APPENDIX E
GROUNDWATER DIVERSION REMEDY EVALUATION FOR THE BACK VALLEY

Prepared for

Chemtronics, Inc.,
Northrop Grumman Systems Corporation,
and CNA Holdings LLC

GROUNDWATER DIVERSION REMEDY EVALUATION FOR THE BACK VALLEY

CHEMTRONICS SITE

SWANNANOA, BUNCOMBE COUNTY, NORTH CAROLINA

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Attachment C:	Back Valley Aquifer Testing Report
Attachment D:	Back Valley Groundwater Model Report

LIST OF ACRONYMS

2D	two dimensional
3D	three dimensional
AOI	Area of Interest
APA	Acid Pit Area
BV	Back Valley
BRA	Baseline Risk Assessment
cm/sec	centimeter per second
COC	chemical of concern
DA	Disposal area
EISB	Enhanced in situ bioremediation
EPA	Environmental Protection Agency
FS	Feasibility Study
FSCT	Feasibility Screening and Candidate Technologies Evaluation
ft bgs	feet below ground surface
ft/d	feet per day
GDR	Groundwater Diversion Remedy
HCSM	Hydrogeologic Conceptual Site Model
K	hydraulic conductivity
MFR	mass flux reduction
PWR	partially weathered rock
RI	Remedial Investigation
VBW	vertical barrier wall

1. INTRODUCTION

Geosyntec Consultants of NC, P.C. (Geosyntec) has prepared this *Groundwater Diversion Remedy Evaluation Report* (GDR Report) on behalf of Chemtronics, Inc., Northrop Grumman Systems Corporation (Northrop Grumman), and CNA Holdings LLC (CNA) (together the Companies) to support the Remedial Investigation/Feasibility Study (RI/FS) currently being completed for the Chemtronics Site ("Site") located in Swannanoa, Buncombe County, North Carolina (**Figure 1**). The GDR concept is an evolution of the vertical barrier wall (VBW) remedial approach included in the *Feasibility Screening and Candidate Technologies Evaluation for the Back Valley* (BV FSCT) (Geosyntec, 2013a).

The *Final Remedial Investigation Report* (RI; Altamont, 2015a) identified specific areas of the Site that warrant further evaluation during the RI/FS based on the results of the RI and Baseline Risk Assessment (BRA). Disposal Area 9 (DA 9) and the Acid Pit Area (APA) were tentatively identified as Areas of Interest (AOIs) for the BV in the BV FSCT, and were therefore retained for further evaluation in the Draft Feasibility Study (FS) (Geosyntec, 2016a). The locations of DA 9 and the APA are illustrated on **Figure 2**. In the BV FSCT, the APA and DA 9 were identified as areas where concentrations of chemicals of concern (COCs) in groundwater exceed the North Carolina groundwater standards by more than 1,000-times (1,000x), and it was determined these areas would substantially benefit from source remediation/mass flux reduction (herein referred to as source MFR). The BV FSCT also evaluated a wide range of potentially applicable remediation technologies for COC-impacted groundwater beneath the APA and DA 9, and ultimately identified the following three source MFR remedial alternatives as suitable for these AOIs: (1) groundwater extraction and ex situ treatment, (2) a VBW and (3) enhanced in situ bioremediation (EISB).

The concept of a GDR approach evolved during evaluation of MFR options for addressing groundwater impacts associated with the APA and DA 9. Initially, a perimeter VBW was evaluated using two-dimensional (2D) and three-dimensional (3D) groundwater flow models; the background of this analysis is provided in Section 1.2.4 below. Unlike a traditional barrier wall approach that would contain impacted groundwater within these areas, the GDR concept is intended to divert groundwater flow around the footprint of the APA and DA 9, thereby reducing the groundwater flow beneath APA and DA-9, and therefore also reduce the mass flux of COCs. As such, the GDR design would include a low permeability barrier coupled with a groundwater

drain upgradient of the APA and DA-9 to reduce groundwater flow beneath these two AOIs.

This GDR Report is a supporting document to the *Back Valley Source Mass Flux Reduction Evaluation Report* (Geosyntec, 2016b) and the Draft FS.

1.1 Report Objectives

The objectives of this report are the following:

- Summarize pre-design field investigations performed to further characterize the subsurface properties in the vicinity of the GDR alignment(s) and advance the evaluation of the GDR conceptual approach;
- Describe the conceptual GDR approach and GDR components;
- Present the results from numerical groundwater flow modeling completed to evaluate the potential effectiveness of two conceptual GDR alignments and four potential design scenarios; and,
- Discuss uncertainties and potential constructability challenges for the GDR.

This GDR Report draws upon a number of investigation phases, datasets, and analyses/evaluations that have been summarized in separate documents. Four relevant documents have been appended herein for reference and include the following:

- *Back Valley Vertical Barrier Wall Pre-Design Geotechnical Report* (**Attachment A**);
- *Summary of Tasks Performed During March through May 2015, as Described in the Work Plan for Additional Geotechnical Borings, Monitoring Well Installation and Aquifer Testing in the Back Valley, February 2015* (**Attachment B**);
- *Back Valley Aquifer Testing Report* (**Attachment C**); and
- *Back Valley Groundwater Model Report* (**Attachment D**).

1.2 Hydrogeologic Setting

Groundwater at the Site exists in a multi-zone aquifer consisting of a Surficial Aquifer System, a Transition Zone Aquifer System and a Bedrock Aquifer System (Altamont, 2015a) (**Figure 3)**. These three aquifer systems are interconnected and have a predominantly downward vertical gradient between the units, but each has different characteristics that influence groundwater flow and transport mechanisms within them. The Surficial Aquifer System (referred to as Zone AB) exists in regolith and extends from the capillary fringe above the water table to the top of the transition zone. The Transition Zone Aquifer System (referred to as Zone CD) represents the gradational shift from the bottom of the regolith, through the PWR, and into the top of the fractured competent bedrock. The permeability of the PWR can be locally variable depending on mineralogy and structure. The Bedrock Aquifer System (referred to as Zone EF) extends below the Transition Zone Aquifer System and exists with a system of fractures in the underlying bedrock. Groundwater flow is predominately toward the southeast or generally down-valley in all three aquifer systems

1.3 Summary of Pre-Design Investigations and Data Evaluation

Extensive geologic and hydrogeologic data collection was performed in 2014 and 2015 to advance the remedy selection process for the BV, with particular emphasis on the GDR alternative(s), due to the complex hydrogeology in the BV and potential construction challenges posed by the design. The collected data vastly improved the understanding of the geology and hydrogeology of the BV hydrostratigraphy in the GDR investigation area. The findings from each investigation phase are summarized in the following subsections.

1.3.1 Geotechnical Field Investigation

As outlined in the agency-approved *Work Plan for a Back Valley Pre-Design Geotechnical Investigation* (Geosyntec, 2013b), a field investigation was performed in fall 2013 to collect samples and data to evaluate the feasibility of constructing a VBW and support its design in the event the VBW alternative was selected. The field investigation consisted of 18 geotechnical soil borings installed along the potential alignment of the VBW around the perimeter of the APA and DA 9.

The findings from the geotechnical field investigation resulted in a vastly better understanding of subsurface conditions along the potential VBW alignment and resulted in the following data, including:

- Subsurface mapping of the variable nature of the top of competent bedrock, thickness of differential weathering, and occasional presence of shallow rock lenses residing within the saprolite (e.g., Zone B) and PWR (e.g., Zone C);

- Identification of zones and locations where there was evidence of groundwater flow through bedrock fractures; and

- Subsurface mapping of the areas of good and poor rock rippability along the potential VBW alignment based on the density and distribution of bedrock fractures observed in the soil borings.

The findings from this investigation were documented in the *Back Valley Geotechnical Field Investigation Summary* (Altamont, 2014), which is included as an appendix to the *Back Valley Vertical Barrier Wall Pre-Design Geotechnical Report* included herein as **Attachment A**.

1.3.2 Material Compatibility Testing

As part of the BV geotechnical investigation, a laboratory testing program was undertaken to evaluate the feasibility, appropriate backfill mix and bentonite slurry mix design requirements for the VBW, and constructability of a perimeter VBW around the APA and DA 9. The findings from the testing phase were documented in the *Back Valley Vertical Barrier Wall Pre-Design Geotechnical Report* (**Attachment A)**.

The laboratory testing program results indicated that:

- Soils from the VBW excavation achieved the desired hydraulic conductivity criterion of $1x10^{-6}$ centimeters per second (cm/sec) or less and minimum index properties for backfill when mixed with cement-bentonite or bentonite only. Thus, it is anticipated that soil from sources other than the excavation trend for the VBW would not be required.

- Hydrant water is acceptable to prepare the bentonite slurry based on the fact that trial bentonite slurry batches mixed with this water source met target index property values.

- Site groundwater chemistry did not negatively impact (i.e., did not increase) the hydraulic conductivity of the soil-cement-bentonite backfill samples when compared to the backfill samples prepared with hydrant water.

- Site groundwater chemistry increased the hydraulic conductivity of the soil-bentonite backfill samples when compared to the backfill samples prepared with hydrant water. However, a slight improvement in the hydraulic conductivity (i.e., decrease) of the soil-bentonite backfill samples prepared using Site groundwater was observed with the addition of dry bentonite to the mix.

- Site groundwater chemistry slightly increased the hydraulic conductivity of cement-bentonite backfill samples when compared to the backfill samples prepared with hydrant water.

- Bentonite slurry should contain a minimum of 7 percent (%) bentonite.

The laboratory testing results suggested that either ex situ mixing (i.e., open trench technology using soil-bentonite mix) or in situ mixing (i.e., deep soil mixing using soil-cement-bentonite mix) are viable options to achieve the hydraulic conductivity and strength performance criteria. A maximum hydraulic conductivity target of $1x10^{-7}$ cm/sec was considered reasonable for the soil-cement-bentonite and soil-bentonite backfill mixes for constructing a VBW at the Site.

1.3.3 Hydrogeological Testing

Preliminary numerical groundwater flow modeling of the BV hydrogeologic system suggested that approximately 65% of the total groundwater flow within the BV model domain occurred through the saprolite, PWR, and highly fractured bedrock zone, of which 45% of the groundwater flow occurred in the latter two zones. In an effort to improve the understanding of the BV flow regime (e.g., saprolite, PWR, and upper fractured bedrock zones), four additional borings were drilled/advanced along the northern and western portions of the APA (shown on **Figure 4**) to address key data gaps for updating the groundwater numerical model and to support the remedy selection process. As presented in the *Work Plan for Additional Geotechnical Borings, Monitoring Well Installation, and Aquifer Testing in the Back Valley* (Altamont, 2015b), the proposed work was designed to:

- Provide additional information on the depth to competent bedrock and fracture distribution in the upper bedrock along the north and west sides of the APA;

- Provide additional potentiometric level information within Zone CD in the vicinity of the APA; and

- Provide hydraulic head and chemical data to assess horizontal and vertical groundwater flow in the BV, particularly near the APA and DA 9, and the tributaries to Gregg Branch located to the west and east of the APA.

The primary findings from this subsequent investigation were the following:

- The two wells installed north of the APA confirmed the shallow depth to top of bedrock (11 to 19 ft below ground surface [ft bgs]) observed previously in the geotechnical borings and that the uppermost water-bearing zone on the north side of the APA was encountered in Zone CD of the bedrock (i.e., the AB zone was unsaturated). However, the two wells installed on the west side of the APA confirmed the variable depth (37.5 to 72 ft bgs) to competent bedrock previously observed and resultant wide range of saturated thicknesses of the AB and CD zones. Additional details regarding this testing phase are summarized in **Attachment B.**

- Low specific capacities of less than 0.1 gallon per minute per foot of drawdown were observed in the two wells located west of the APA which were originally considered for constant rate pumping testing. The constant rate pumping test was not performed due to the low observed specific capacities, low well yields, and predicted drawdowns of less than 0.05 ft at the nearest observation well. A summary of the specific capacity testing performed is provided in **Attachment C**.

- Slug testing was performed in lieu of a constant rate pumping test due to the low yields observed in the two pumping wells. The slug tests provided a robust data set of hydraulic conductivity (K) estimates for Zone AB, Zone CD, and Zone EF. The K results from slug testing were combined with the historical K data to generate new minimum, maximum, average, and median values by zone for consideration in refining the numerical groundwater flow model. A low K zone was identified in Zone CD in the vicinity of the APA. A detailed description and delineation of the low K zone and the distribution of K data collected is included in **Attachment C**.

1.3.4 Numerical Groundwater Flow Modeling

Both two-dimensional (2D) and three-dimensional (3D) numerical groundwater flow models of the BV were prepared by Geosyntec to evaluate VBW remedial options at the APA and DA 9. The 2D Limit Equilibrium Slope Stability Analysis model (SLIDE 6.0, Rocscience, Inc.) was used as a screening tool to evaluate a VBW and bedrock grout curtain in the area of the APA and DA 9. The 2D modeling results illustrated the potential benefit of an upgradient barrier approach to divert groundwater around the APA and DA 9 to reduce the flux of groundwater and dissolved phase contaminants.

A 3D finite-difference, numerical model using MODFLOW-2005 code (Harbaugh, 2005) was used to expand the screening evaluation. The overall objective of the 3D groundwater flow model was to evaluate the effectiveness of the VBW and GDR approaches being considered for the APA and DA 9. The model domain included the entire BV watershed for the purposes of calculating groundwater recharge into the system, but model construction details were focused in the area around the APA and DA 9 to incorporate topographic relief, hydrostratigraphic layers of non-uniform thickness, and groundwater to surface water interactions. The Site hydrostratigraphy (**Figure 3**) was subdivided into seven model layers (**Table 1**) of varying thicknesses depending upon location.

The calibrated model was used initially as a tool to evaluate the viability of a perimeter VBW for reducing the mass flux from the APA and DA 9. Results of the perimeter VBW evaluation showed that the perimeter VBW only reduced flow within the saprolite and PWR portions of the APA. Simulation results also showed that the perimeter VBW caused groundwater mounding of up to 5 ft inside the APA, while not substantially reducing groundwater flow beneath the APA, the mounding increased the potential for contact of groundwater with contained APA materials. In summary, these results indicated that the perimeter VBW was not the most effective remedy for the APA; details of the simulation results can be found in the *Back Valley Groundwater Model Report* (GW Model Report) in **Attachment D**.

The additional geologic and hydrogeologic data collected in the BV (see Sections 1.3.1 and 1.3.3) were used to refine and recalibrate the numerical groundwater model to improve its representativeness to actual Site conditions. These refinements included updates to the top of rock surface and the thicknesses of bedrock model layers, rock outcrop elevations within several creek branches, auger refusal data from the 1987 RI, and hydraulic conductivity zonation of model layers based on the spatial variability of

hydraulic conductivity values obtained from slug testing performed in select wells within the BV. The model was recalibrated under steady-state conditions using a contemporaneous round of groundwater level measurements collected by Altamont on April 24, 2015. The recovery data collected during the extraction system shutdown and groundwater vertical gradients were also used to calibrate the model to more closely simulate actual Site conditions.

The calibrated model was used to simulate the GDR concept being evaluated at as an alternative remedy to the perimeter VBW. The purpose of an upgradient GDR is to divert groundwater around the APA and DA 9 to reduce the volume of flow beneath them and the chemical mass flux from these areas. A combination of two conceptual GDR layouts and four design components (VBW, VBW with a groundwater drain [+ drain], VBW + drain + shallow grout curtain, and VBW + drain + deep grout curtain) were simulated using the calibrated model. Results from these simulations are discussed in Section 3 of this report and presented in detail in **Attachment D**.

2. GDR CONCEPT FOR MASS FLUX REDUCTION

2.1 Background

As a means of reducing contaminant mass flux in groundwater from the APA and DA 9, passive remedies incorporating low permeability barrier walls were considered as viable approaches for evaluation due to the size of these AOIs, topographic relief, and the presence of pre-existing low permeability engineered caps. The perimeter VBW conceptual design was first evaluated for potential application in the BV as a fully enclosed feature encompassing the APA and DA 9 with a soil-bentonite wall set at or keyed into the underlying top of competent bedrock. As discussed in Section 1, 3D numerical modeling simulation results of a perimeter VBW around the APA showed that flow was only reduced within the saprolite and PWR (model layers 1 and 2) indicating that this design was not the most effective at reducing flow beneath the footprint of the APA. The simulation results also showed groundwater mounding within the APA caused by the perimeter VBW, and flow underneath the VBW at the downgradient end.

Based on the results of the VBW analyses, the GDR concept evolved as an alternate barrier design to take advantage of the steep hydraulic gradient beneath the APA and DA 9. The general concept of a GDR was introduced by USEPA (1984) and involves placement of a diversionary wall upgradient of a known source area with the purpose of diverting uncontaminated groundwater around the source area, as illustrated conceptually on **Figure 5**. In doing so, the contaminant mass flux discharging in groundwater from the source area (in this case, the APA and DA 9) is reduced due to decreased volume of groundwater coming in contact with the source and discharging downgradient.

2.2 GDR Components

The GDR conceptual design included three components: a soil-bentonite wall (e.g., VBW), a grout curtain installed through the overlying soils and into the underlying competent rock, and a groundwater drain, as shown on **Figure 6**. The soil-bentonite wall would serve as a barrier to groundwater flow through the unconsolidated overburden (predominantly saprolite) and would vary in thickness depending upon the saprolite thickness and density. The soil-bentonite wall might also extend into portions of the underlying PWR depending upon the degree of weathering and the density of the material. A grout curtain would be constructed beneath the soil-bentonite wall into the

PWR and portions of the fractured bedrock by means of drilling and pressure grouting individual boreholes. The depth of the grout curtain and spacing between grout borings would be dictated by the fracture density versus depth observed in the fractured bedrock and based on detailed testing along the preferred alignment. To create a continuous hydraulic barrier, the soil-bentonite wall would need to have good continuity with the grout curtain. To address the potential for groundwater mounding behind/upgradient of the wall, a subgrade groundwater drain would be installed upgradient of the wall at the top of bedrock to capture and direct the clean groundwater around the source to downgradient areas.

2.3 GDR Alignments

Two conceptual alignments for the GDR were evaluated. The alignment in Option 1 extends from the northeast corner of the APA, across the northern APA boundary, and around the northwest corner and approximately 160 ft down the eastern slope of the valley of the unnamed tributary west of the APA and DA 9 (**Figure 7**). The western bend of this alignment is designed to direct clean groundwater into the unnamed tributary to Gregg Branch. An upgradient groundwater drain would parallel the wall on its northern and northwestern limits.

The alignment in Option 2 is similar to Option 1 to the northeast and north; however, the GDR would extend approximately 470 ft longer (compared to Option 1) along the western limits of the APA to the southwest corner of DA 9 to divert more groundwater away from DA 9 (**Figure 8**).

2.4 Design Scenarios Retained for Evaluation

Four GDR design scenarios were considered for evaluation using the numerical groundwater flow model. In addition, a groundwater modeling run was performed to simulate the current/base case conditions. The conceptual design scenarios increase in complexity in terms of the components considered in the design. The four GDR scenarios evaluated for each alignment (Option 1 and Option 2) are the following:

- Scenario 1 – an upgradient VBW;
- Scenario 2 – an upgradient VBW with an upgradient groundwater drain;
- Scenario 3 – an upgradient VBW, upgradient groundwater drain, and a grout curtain 30 ft into competent bedrock; and

- Scenario 4 – an upgradient VBW, upgradient groundwater drain, and a grout curtain 115 ft into competent bedrock.

3. NUMERICAL MODELING OF GDR SCENARIOS

The calibrated groundwater numerical model was used to simulate various scenarios to evaluate the effect a GDR would have on groundwater flow and contaminant mass discharge reduction at the Site. The four design scenarios were evaluated for each of the two GDR alignments being considered (e.g., Option 1 and Option 2). For each scenario, the numerical groundwater flow model was modified to incorporate the design elements, such as the VBW, drain, and grout curtain. Predictive simulations were run using the numerical groundwater flow model to evaluate the change in groundwater flux downgradient of the APA and DA 9 for each scenario. Flow occurring within the footprint of the APA and DA 9 was summed within each model layer (**Table 2**). Flow from each GDR scenario was compared to the calibrated model without the GDR (referred to herein as the "Base Case") to assess the percentage of flow change (if any) in each layer (a negative percent difference in flow in **Table 2** indicates a reduction of flow).

Particle tracking within the APA and DA 9 was completed to simulate flow paths, assess travel times for each scenario, and serve as a means of comparison among the scenarios.

3.1 Model Configuration of GDR Components

As outlined in Section 2.4, the GDR components vary for each of the four GDR design scenarios evaluated using the numerical groundwater model. In all four scenarios, the VBW was extended from the surface to the top of rock (bottom of model layer 2). A K value of 1.0×10^{-7} cm/s (2.8×10^{-4} feet per day [ft/d]) and wall thickness of 3 ft was applied to the model cells which represented the VBW; this value is based on professional experience and is consistent with the laboratory testing results from Site samples (**Attachment A**). A grout curtain was not simulated in Scenarios 1 and 2 but was incorporated in Scenarios 3 and 4. In Scenario 3, the grout curtain was extended to the bottom of layer 5 (30 ft into Zone E); in Scenario 4, the grout curtain was extended to layer 6 (15 ft into Zone E). The corresponding grout curtain model cells were given the same K value and 3 ft thickness as the VBW.

In Scenarios 2 through 4, a groundwater drain was incorporated within the saprolite along the northern perimeter of the VBW. For each drain cell, the drain bottom elevations were designed to be 3 ft above the top of rock; the width and thickness of the drain was also assigned a value of 3 ft. The hydraulic conductivity of the drain was

assumed to approximate gravel, therefore, a value of 1,000 ft/d was assigned to each drain cell in the model (Heath, 1983).

For further details regarding model design and calibration, see **Attachment D**.

3.2 Modeling Results for GDR Option 1 - Northern Alignment

3.2.1 Scenario 1 - Upgradient VBW

For the APA, simulation of Scenario 1 showed that the GDR reduced flow within the saprolite, PWR and lower bedrock (model layers 1, 2, 6, and 7, respectively), with a maximum flow reduction of 4% occurring in Zone AB (layer 1) and Zone E (layer 5) (**Table 2**). A slight increase in flow (2% to 3%) was simulated in Zone C_{RI} to Zone E (layers 3 through 5), resulting from groundwater being diverted under the VBW and back into the APA footprint. Simulation results indicated that the VBW had no impact on groundwater flow beneath DA 9. As a result, the change in total flow through all the model layers was negligible.

Simulated groundwater particle flow paths (**Figure 9**) showed that this scenario had little influence on groundwater flow paths compared to the Base Case. The exception to this was in the northern corner of the APA, where one of the particles was diverted around the VBW. Simulated travel times for the particles are similar to the Base Case, with particles typically taking five to 15 years to travel beneath the APA.

3.2.2 Scenario 2 – Upgradient Vertical Barrier Wall with Upgradient Drain

Addition of the upgradient groundwater drain in Scenario 2 resulted in only a 3% decrease in total flow beneath the APA as compared to the Base Case (**Table 2**). Groundwater flow reduction occurred solely in Zone AB (layer 1) and Zone C_{PWR} (layer 2), with a maximum flow reduction of 11% in Zone AB. Groundwater flow below Zone C_{PWR} varied slightly from the Base Case, but generally remained unchanged. The addition of an upgradient drain provided a negligible benefit on performance of the GDR in the DA 9 Area, with total flow only being reduced by 1%. Groundwater flow in most model layers beneath DA 9 was reduced by 1% to 2%, except for Zone C_{RI} (layer 3) (no change). Groundwater flow paths and travel times did not vary appreciably and were comparable to Scenario 1 (**Figure 9**).

3.2.3 Scenario 3 – Upgradient VBW, Upgradient Drain, 30-ft Grout Curtain into Competent Bedrock

Similar to Scenarios 1 and 2, the reduction of groundwater flow beneath the APA was found to occur only in Zone AB (layer 1) and Zone C_{PWR} (layer 2) in the model simulations for Scenario 3 (**Table 2**). The addition of the grout curtain below the VBW resulted in a slight decrease in flow when compared to Scenario 2, with a maximum flow reduction of 12% in Zone AB (layer 1). Slight increases in groundwater flow were predicted from Zone C_{RI} (layer 3) to Zone E (layer 5), but in general, groundwater flow remained relatively unchanged when compared to Scenario 2. Compared to the Base Case, this scenario results in a 4% reduction in total groundwater flow beneath the APA. Groundwater flow beneath DA 9 also remained relatively unchanged by the addition of the grout curtain, exhibiting only a 1% decrease in total groundwater flow when compared to the Base Case.

The addition of the grout curtain along the entire alignment did, however, show positive effects by diverting two of the groundwater flow paths for the simulated particles north of the GDR (**Figure 9**). For these two particle flow paths, the grout curtain blocked groundwater flow beneath the APA and diverted the particles to the drain. The remaining simulated particle flow path was diverted under the GDR, with the flow path ascending back into Zone AB (layer 1) beneath the APA. Results indicated a travel time of 15 years for the particle to pass beneath the APA. Similar to Scenario 1 and Scenario 2, the GDR in Scenario 3 did not impact groundwater flow paths or travel times for particles originating in DA 9.

3.2.4 Scenario 4 – Upgradient VBW, Upgradient Drain, 115-ft Grout Curtain into Competent Bedrock

The conditions represented by Scenario 4 resulted in the greatest reduction of simulated groundwater flow for both the APA and DA 9 Areas – 34% reduction of groundwater flow in the APA Area and 5% reduction of groundwater flow in the DA 9 Area (**Table 2**). Beneath the APA, groundwater flow was significantly reduced in all seven layers of the model, with a maximum groundwater flow reduction of 48% occurring in Zone D (layer 4). Beneath DA 9, the maximum groundwater flow reduction of 14% occurred in Zone D.

Scenario 4 also resulted in the greatest change in simulated particle flow paths beneath the APA (**Figure 9**). All groundwater particles upgradient of the APA were blocked by the VBW and grout curtain and subsequently flowed to the groundwater drain. The

single particle modeled to originate beneath the APA continued to show a travel time beneath the APA of five years (similar to the previous three scenarios). Particles originating beneath DA 9 were not impacted by the GDR.

3.3 GDR Option 2 – Northern and Western Alignment

3.3.1 Scenario 1 - Upgradient VBW

For the APA, simulation of Scenario 1 conditions showed that the GDR reduced groundwater flow only within Zone AB and C_{PWR} (model layers 1 and 2, respectively), with a maximum groundwater flow reduction of 17% occurring in Zone AB (**Table 2**). An increase in groundwater flow, ranging from 2% to 12%, was predicted in Zone C_{RI} to Zone E (layers 3 through 6), resulting from groundwater being diverted under and around the VBW and back into the APA footprint. Total flow reduction was negligible compared to the Base Case. Groundwater flow beneath DA 9 was also reduced only in Zone AB and C_{PWR} (model layers 1 and 2), with a maximum flow reduction of 20% in Zone AB. Similar to the APA, Zone C_{RI} to Zone E (layers 3 to 5) within the footprint of DA 9 exhibited an increase in flow, ranging from 6% to 10%; however, the total flow was reduced by 6% compared to the Base Case.

Simulated groundwater particle flow paths (**Figure 10**) showed little impact to flow paths when compared to the Base Case. The exception occurred in the northern corner of the APA footprint, where one of the particles was diverted east around the VBW. Simulated travel times for the particles are similar to the Base Case, with particles typically taking five to 15 years to travel beneath the APA.

3.3.2 Scenario 2 – Upgradient VBW with Upgradient Drain

The addition of the upgradient drain in Scenario 2 resulted in a 2% decrease in total flow beneath the APA as compared to the Base Case (**Table 2**). Groundwater flow reduction occurred solely in Zone AB (layer 1) and Zone C_{PWR} (layer 2), with a maximum flow reduction of 23% in Zone AB. Similarly, groundwater flow within the DA 9 footprint was reduced in Zone AB (layer 1) and Zone C_{PWR} (layer 2), with a maximum groundwater flow reduction of 22% occurring in Zone AB. Total groundwater flow within the DA 9 footprint was reduced by 7% when compared to the Base Case. For both the APA and DA 9, flow within the lower model layers varied slightly, but generally remained unchanged. Flow paths and travel times did not differ appreciably compared to Scenario 1 (**Figure 10**).

3.3.3 Scenario 3 – Upgradient VBW, Upgradient Drain, 30-ft Grout Curtain into Competent Bedrock

Similar to the prior two scenarios, under this scenario, the bulk of the reduction of groundwater flow beneath the APA and DA 9 was simulated to occur primarily in Zone AB (layer 1) and Zone C_{PWR} (layer 2), (**Table 2**). The addition of the grout curtain resulted in a maximum groundwater flow reduction in Zone AB (layer 1) of 34% beneath the APA and 40% beneath DA 9. For the APA, flow increased from Zone C_{RI} to Zone E (layers 3 to 6), with the exception of Zone F (layer 7). Increases in groundwater flow beneath DA 9 were observed from Zone C_{RI} to Zone E (layers 3 to 5). Overall, total predicted groundwater flow decreased 2% beneath in the APA and 13% beneath the DA 9.

The addition of the grout curtain along the entire alignment impacted groundwater flow paths for all three simulated particles starting north of the GDR (**Figure 10**). The westernmost particle was diverted under the grout curtain into layer 5 (Zone E) before it ascended back into the APA footprint; the central particle exhibited a long flow path in Zone E (layer 6) compared to the other two particles; and the easternmost particle was blocked by the grout curtain and removed by the groundwater drain. Travel time for the westernmost particle was also observed to increase to 45 years beneath the APA. Groundwater flow paths and travel times for particles originating beneath DA 9 were not significantly influenced.

3.3.4 Scenario 4 – Upgradient VBW, Upgradient Drain, 115-ft Grout Curtain into Competent Bedrock

Of the eight scenarios simulated during the groundwater flow modeling activities, Option 2 - Scenario 4 demonstrated the greatest amount of simulated total reduction of groundwater flow below both the APA and DA 9 – specifically 52% reduction below the APA and 48% reduction below DA 9 (**Table 2**). Within the APA footprint, groundwater flow was reduced in all 7 layers of the model, with a maximum groundwater flow reduction of 62% occurring in Zone D (layer 4). Groundwater flow was also reduced in all 7 layers beneath DA 9, with a maximum groundwater flow reduction of 65% occurring in Zone AB (layer 1).

Scenario 4 also resulted in the greatest change in simulated groundwater particle flow paths beneath the APA and DA 9 (**Figure 10**). All particles upgradient of the APA were blocked by the VBW and grout curtain, and subsequently removed from the model by the groundwater drain. Particles originating beneath DA 9 were diverted to the

southeast. For the groundwater particle originating inside the APA footprint, travel time beneath the APA (which had been five years for the previous three scenarios) was increased to 10 years.

3.4 GDR Performance Summary

Beneath the APA, there were minimal differences in the reduction of groundwater flow predicted for Scenarios 1, 2, and 3 under GDR Option 1 and Option 2. For Scenarios 1, 2, and 3 beneath DA 9, GDR Option 2 exhibited better groundwater flow reductions than GDR Option 1, though the total groundwater flow reductions only varied between 6 and 13%. The largest predicted reductions in total groundwater flow were observed for GDR Option 2 - Scenario 4 (115 ft grout curtain), which provided significantly more groundwater flow reduction (and hence mass flux reduction) than Option 1, particularly beneath DA 9. This finding suggests that there is a significant deeper component of groundwater flow beneath the western limits of the APA and DA 9 that is diverted by the longer western GDR alignment in Option 2 and deeper grouting. The deeper grout curtain simulated in Scenario 4 was effective at diverting groundwater flow observed in Scenarios 1, 2, and 3 for both GDR Options that migrated under and around the GDR and re-entered within the footprints of the APA and DA 9. An example of this can be seen on **Figure 9** which shows simulated groundwater particle tracks for the APA footprint and illustrates how particles of groundwater flow beneath the GDR in Scenario 3, but are stopped by the GDR in Scenario 4.

Based on these simulations, the most effective GDR design for the APA and DA 9 is one that addresses the western component of groundwater flow (e.g., Option 2) and extends downward through the fractured bedrock to a sufficient depth (e.g., Scenario 4 – 115 ft) to eliminate the potential for groundwater to flow under the GDR and re-enter the area beneath the APA and DA 9.

4. GDR DESIGN, CONSTRUCTION, AND EFFECTIVENESS CONSIDERATIONS

While the conceptual GDR approach appears to be a possible groundwater remedy for the APA and DA 9, its viability and effectiveness will rely on its constructability, which is inherently dependent upon the bedrock characteristics and groundwater flow dynamics. A number of critical considerations must be addressed in the event this remedial approach is selected. These considerations include, but are not limited to, the following:

- **Bedrock Surface**. Drilling and subsurface sampling along the perimeter of the APA and DA 9 has shown that the top of bedrock surface (demarcated as the base of Zone C_{pwr}) is shallow along the northern limits of the APA, but can change abruptly over short distances and reach significant depths, particularly along the western side of the APA. This condition can provide excavation challenges in reaching and exposing the bedrock surface for direct contact with the soil-bentonite wall component of the GDR. These abrupt changes can be observed in geologic cross sections in the Back Valley that are included in the *Hydrogeologic Conceptual Site Model (HCSM)* (Altamont, 2016). As an example, an approximate 25 ft elevation difference in the base of Zone C_{pwr} was observed over a distance of 40 to 50 ft laterally between borings VBW-10/MW254-L25CD and VBW-16/MW255-L25CD in cross-section A-A' along the western boundary of the APA (see Figure 16 of the BV HCSM). To further evaluate the bedrock surface topography, additional drilling along the proposed alignment of the GDR would be necessary to refine the design for full-scale GDR implementation.

- **Competent Bedrock Fracture Density/Groundwater Yields**. Three principal bedrock fracture orientations have been identified at the Site and are discussed in the BV HCSM. While the general trends in fracture orientations are well understood, the density of fractures and groundwater yields in the competent bedrock is expected to vary over short distances and will have a significant impact on the performance. This uncertainty could be addressed during a pre-design phase investigation in the proposed alignment, or during construction if the construction program included flexibility to adjust the grout injection frequency and volumes based on field conditions.

- **PWR and Bedrock Rippability**. Rippability is a qualitative property of rock and describes the relative ease at which the bedrock materials can be removed by an excavator. The constructability of the soil bentonite wall component of the GDR to its design depth is directly related to the rippable characteristics of the material. Shallow rock lenses have been observed in the PWR that could adversely affect constructing the wall on top of the competent bedrock surface. Deeper sections of rippable rock may also pose concerns because the excavator power diminishes with depth; as a result, the continuity between the soil-bentonite wall and grout curtain could be compromised since the wall may not be in direct contact with the bedrock surface. In such cases, the vertical interval between the base of the VBW and the competent bedrock/bedrock grout curtain may not be adequately grouted due to its porosity and permeability. The variability in rippability would require further evaluation to refine the GDR design.

- **Demonstrating effectiveness**. Groundwater elevations would be expected to reach a new equilibrium relatively quickly (e.g., within a year of construction). Therefore, groundwater elevation monitoring would be an important element to evaluate the GDR performance. However, groundwater travel times from the GDR at the upgradient side of the APA to an expected groundwater quality monitoring network downgradient of the APA are estimated to be between five and ten years under Scenario 4. Therefore, it will take several years of groundwater quality data collection to evaluate the effectiveness of the GDR. By comparison, for other remedies under consideration, such as EISB, active remediation would occur downgradient of the APA and DA 9, and therefore closer to the groundwater monitoring network, thus enabling an evaluation of remedy effectiveness more quickly than with the GDR.

5. CONCLUSIONS

Groundwater modeling simulations have demonstrated that a GDR can be expected to effectively reduce the groundwater flux discharging from beneath the APA and DA 9. The predicted reduction in groundwater flux is greatest for a GDR aligned along the northern and western boundaries of the APA and inclusive of a deep grout curtain (simulated herein at a depth of 115 ft). A number of uncertainties exist related to the performance and constructability of the GDR, however, which would need to be addressed during GDR design for full-scale implementation.

The effectiveness of the GDR to reduce mass discharge from beneath the APA and DA 9 has been evaluated and compared to the two other potential groundwater remedies, namely groundwater extraction and treatment and EISB, considered for the Back Valley in the *Back Valley Source Mass Flux Reduction Evaluation Report*.

6. REFERENCES

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TABLES

Table 1 - Model Layers
Chemtronics Site
Swannanoa, North Carolina

Model Layer	Geologic Unit	Geologic Zone	Model Layer Thickness (feet)
1	Regolith/Saprolite	AB	2 - 82
2	Partially Weathered Rock	Cpwr	1 - 44
3	Highly Fractured Bedrock	Cri & D	1 - 38
4	Competent Bedrock	D	15
5	Competent Bedrock	E	15
6	Competent Bedrock	E	85
7	Competent Bedrock	F	200

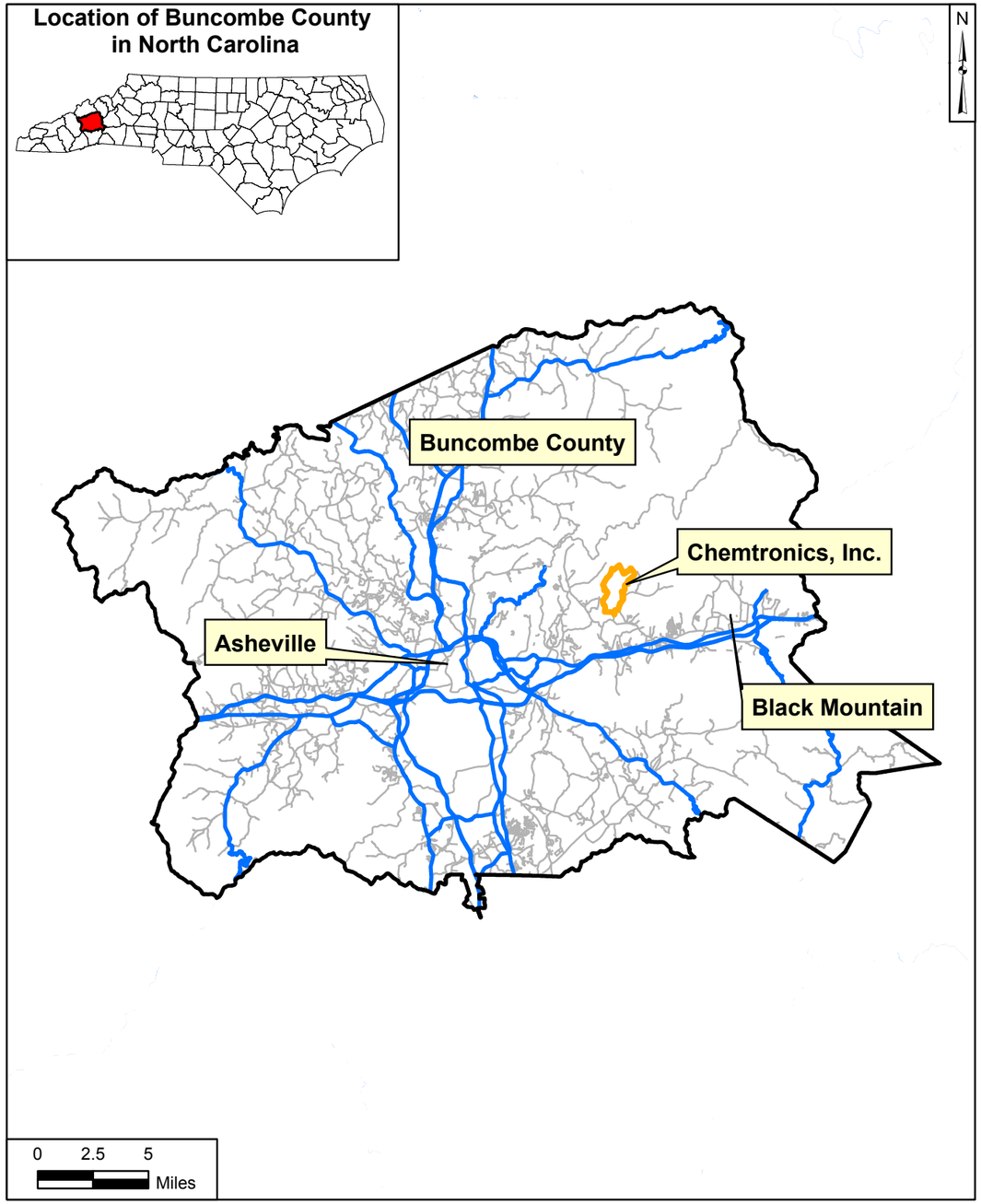
Table 2: Simulated Groundwater Flow within the Footprint of the APA and DA 9
Chemtronics Site
Swannanoa, North Carolina

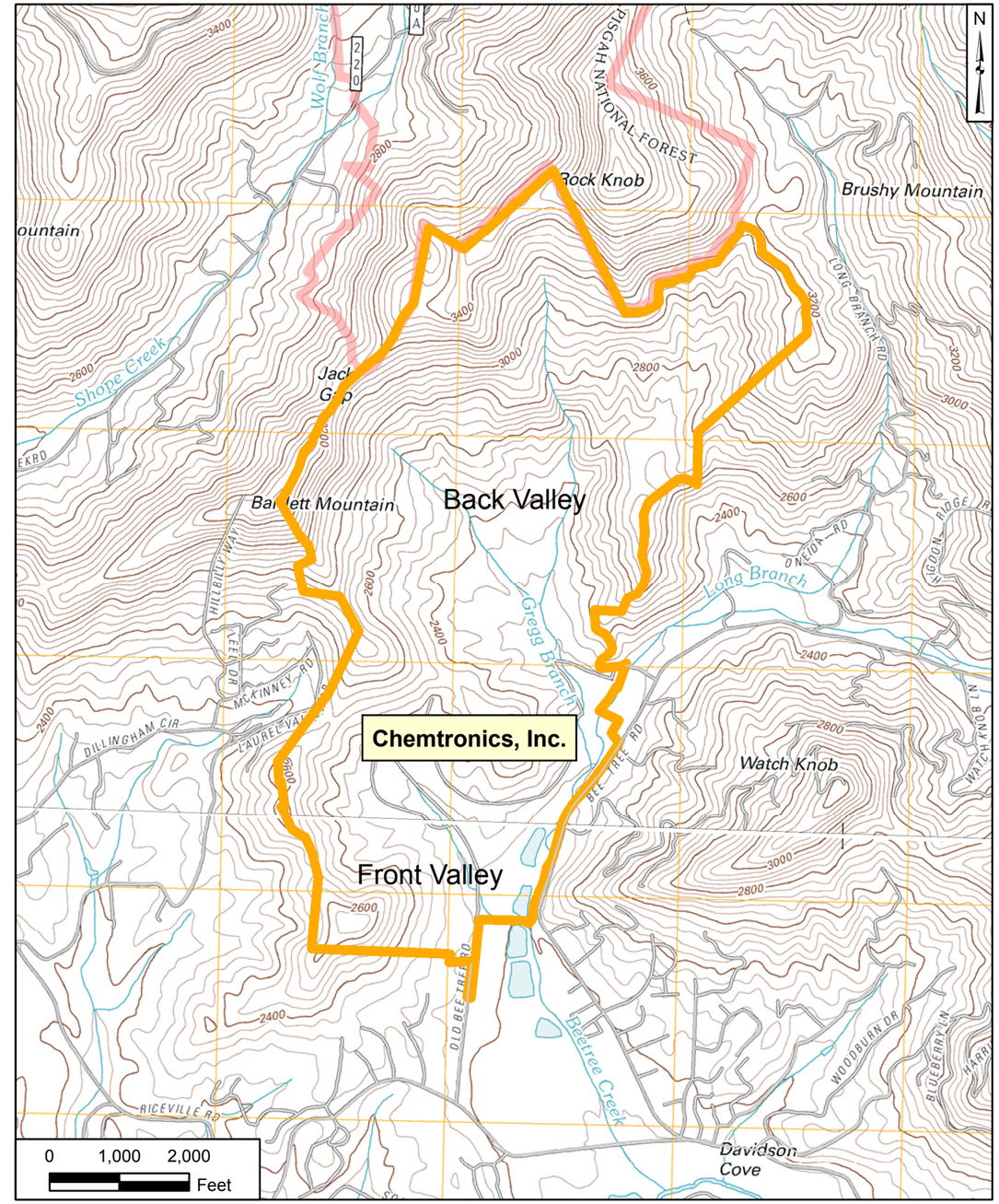
			Simulated Scenario								
			Base Case	1) VBW		2) VBW+ GW drain		3) VBW+GW drain+grout curtain (30 ft)		4) VBW+GW drain+grout curtain (115 ft)	
GDR Option	**Hydrogeologic Unit**	**Model Layer**	**Total Flow (gpm)**	**Total Flow (gpm)**	**Difference from Base Case (%)**	**Total Flow (gpm)**	**Difference from Base Case (%)**	**Total Flow (gpm)**	**Difference from Base Case (%)**	**Total Flow (gpm)**	**Difference from Base Case (%)**
APA Groundwater Flow											
1	Zone AB	1	5.40	5.18	-4%	4.81	-11%	4.76	-12%	4.23	-22%
	Zone C_{pwr}	2	5.49	5.39	-2%	5.20	-5%	5.13	-7%	3.96	-28%
	Zone Cri	3	3.04	3.12	2%	3.12	3%	3.10	2%	1.71	-44%
	Zone D	4	2.85	2.93	3%	2.98	4%	2.99	5%	1.48	-48%
	Zone E	5	3.15	3.22	2%	3.27	4%	3.27	4%	1.73	-45%
	Zone EF	6+7	12.99	12.51	-4%	12.46	-4%	12.53	-4%	8.70	-33%
		Total Flow	*32.93*	*32.35*	*-2%*	*31.84*	*-3%*	*31.77*	*-4%*	*21.80*	*-34%*
2	Zone AB	1	5.40	4.48	-17%	4.17	-23%	3.58	-34%	2.26	-58%
	Zone C_{pwr}	2	5.49	5.18	-6%	5.01	-9%	4.74	-14%	2.56	-53%
	Zone Cri	3	3.04	3.29	8%	3.30	8%	3.41	12%	1.20	-60%
	Zone D	4	2.85	3.20	12%	3.23	13%	3.45	21%	1.08	-62%
	Zone E	5	3.15	3.49	11%	3.53	12%	3.74	19%	1.29	-59%
	Zone E	6	9.48	9.63	2%	9.61	1%	9.71	3%	3.86	-59%
	Zone F	7	3.51	3.51	0%	3.49	0%	3.49	-1%	3.41	-3%
		Total Flow	*32.93*	*32.77*	*-0.5%*	*32.35*	*-2%*	*32.12*	*-2%*	*15.65*	*-52%*
DA 9 Groundwater Flow											
1	Zone AB	1	0.87	0.87	0%	0.85	-2%	0.85	-3%	0.84	-4%
	Zone C_{pwr}	2	1.11	1.10	0%	1.08	-2%	1.08	-2%	1.03	-7%
	Zone Cri	3	0.18	0.18	0%	0.18	0%	0.18	0%	0.17	-5%
	Zone D	4	0.14	0.14	0%	0.13	-2%	0.13	-2%	0.12	-14%
	Zone E	5	0.20	0.20	0%	0.19	-1%	0.19	-1%	0.18	-8%
	Zone EF	6+7	1.95	1.95	0%	1.93	-1%	1.93	-1%	1.89	-3%
		Total Flow	*4.44*	*4.44*	*-0.1%*	*4.38*	*-1%*	*4.37*	*-1%*	*4.22*	*-5%*
2	Zone AB	1	0.87	0.70	-20%	0.68	-22%	0.53	-40%	0.31	-65%
	Zone C_{pwr}	2	1.11	0.97	-12%	0.95	-14%	0.80	-28%	0.50	-55%
	Zone Cri	3	0.18	0.20	7%	0.20	8%	0.19	2%	0.10	-46%
	Zone D	4	0.14	0.15	10%	0.15	9%	0.16	20%	0.08	-45%
	Zone E	5	0.20	0.21	6%	0.21	6%	0.22	12%	0.11	-44%
	Zone EF	6+7	1.95	1.95	0%	1.95	0%	1.95	0%	1.21	-38%
		Total Flow	*4.44*	*4.17*	*-6%*	*4.13*	*-7%*	*3.84*	*-13%*	*2.29*	*-48%*

Notes:

1. Flow within the APA and DA 9 footprints is shown for each of the four scenarios simulated for GDR Option 1 and GDR Option 2 (see Figures 7 and 8).
2. The four scenarios that were simulated (per GDR option) include: i)Vertical Barrier Wall [VBW], ii) VBW with upgradient groundwater drain, iii) VBW with groundwater drain and a grout curtain installed 30 ft into rock [grout curtain extends to the bottom of model layer 5], and iv) VBW with groundwater drain and a grout curtain installed 115 ft into rock [curtain extends to bottom of model layer 6].
3. Difference is relative to the Base Case model (i.e., the calibrated model under post-shutdown conditions); a negative percentage indicates a reduction in flow due to the GDR option that was simulated.
4. gpm = gallons per minute.

FIGURES





Chemtronics Property Boundary
County Boundary
Primary Road
Secondary Road

Notes:
1. County boundaries and roads obtained from NC Department of Transportation.
2. Topographic map for USGS Craggy Pinacle and Oteen 7.5-Minute Quadrangle (dated 2011 and 2010, respectively) obtained from USGS National Map (2012).

Location of Chemtronics Site
Chemtronics Site
Swannanoa, North Carolina

Geosyntec consultants

Kennesaw | February 2016

Figure 1

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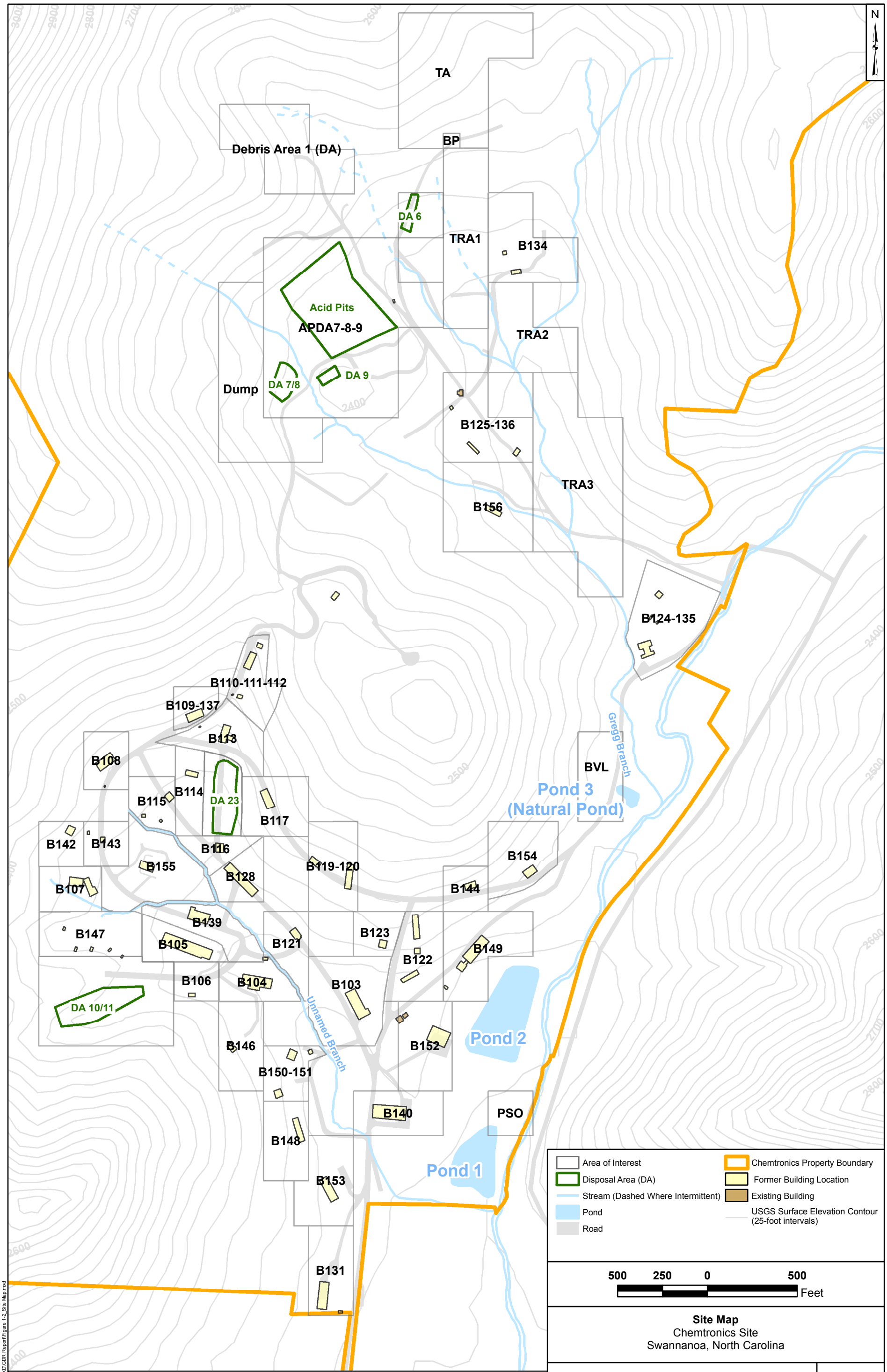

Site Map
Chemtronics Site
Swannanoa, North Carolina

Geosyntec consultants

Figure 2

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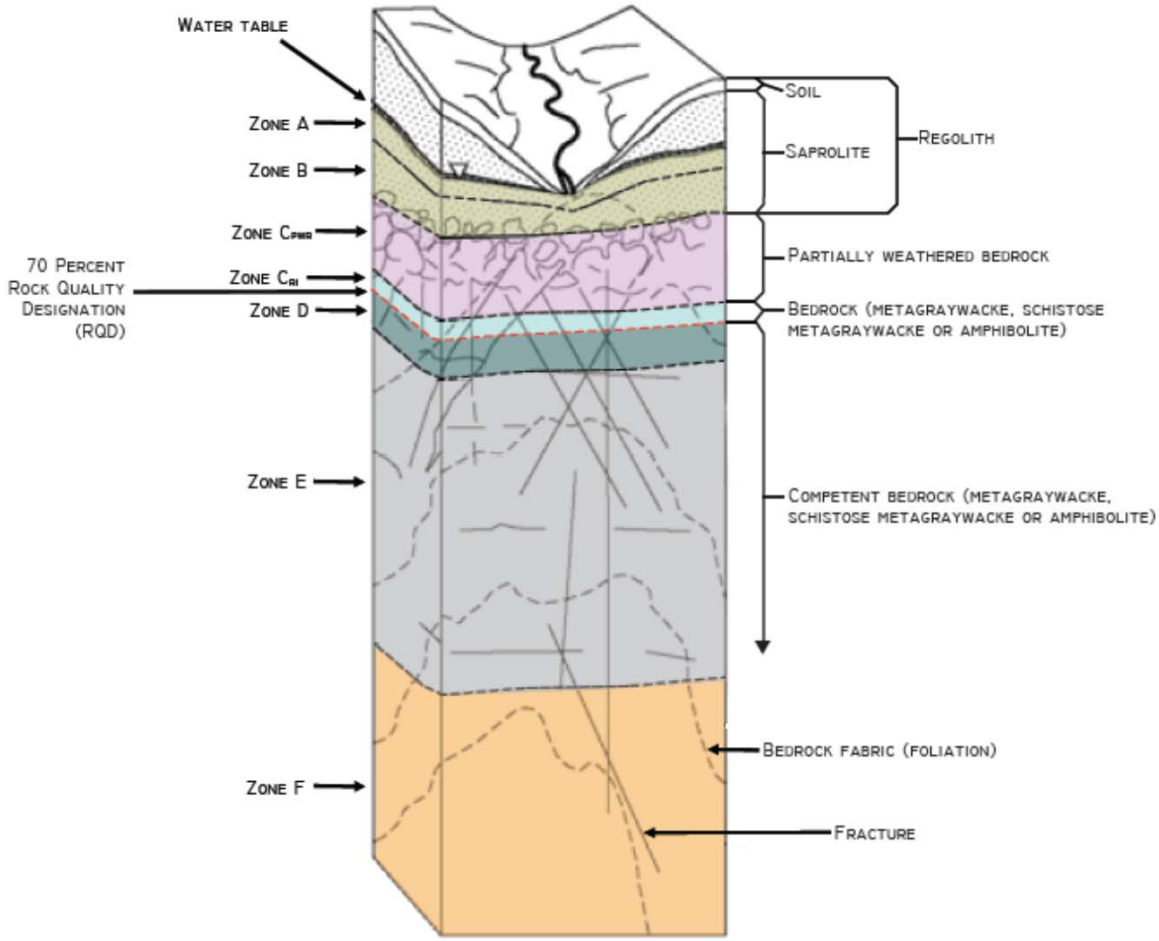

Surficial Aquifer System (Zone AB)

Zone A: Water table

Zone B: Only present if > 40 ft from water table

Transition Zone Aquifer System (Zone CD)

Zone Cpwr: Predominance of partially weathered rock and/or blow counts of 50/6 inches

Zone Cri: Auger refusal to RQD ≥ 70 percent

Zone D: First 10-15 feet where RQD ≥ 70 percent

Bedrock Aquifer System (Zone EF)

Zone E: RQD ≥ 70 percent, 100 ft thick

Zone F: RQD ≥ 70 percent, below Zone E

Source: Modified from Harned and Daniel (1992) and presented in the Hydrogeological Conceptual Site Model (Altamont, 2016).

Hydrostratigraphy at the Site	Geosyntec consultants	Figure
Kennesaw, Georgia	February 2016	3

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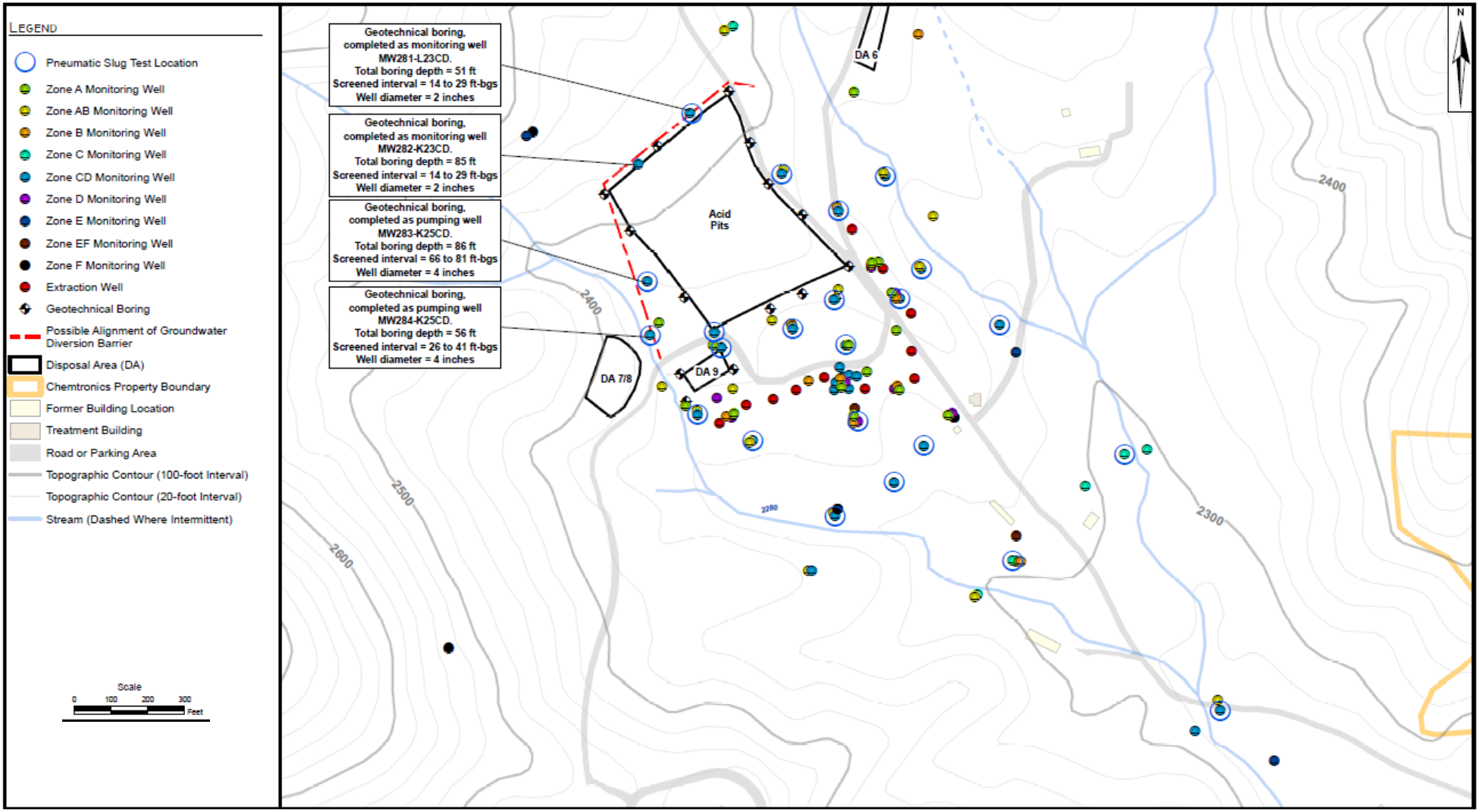


Notes

1. bgs = below ground surface
2. Topographic contours from Lidar data from the NC Flood Plain Mapping Project (2007) and distributed by NCDOT.

References

1. Coordinate System: NAD 1983 State Plane North Carolina FIPS 3200 Feet.
2. Figure source: Altamont, 2015. *Summary of Tasks Performed during March through May 2015*. Figure 1. November 23, 2015.

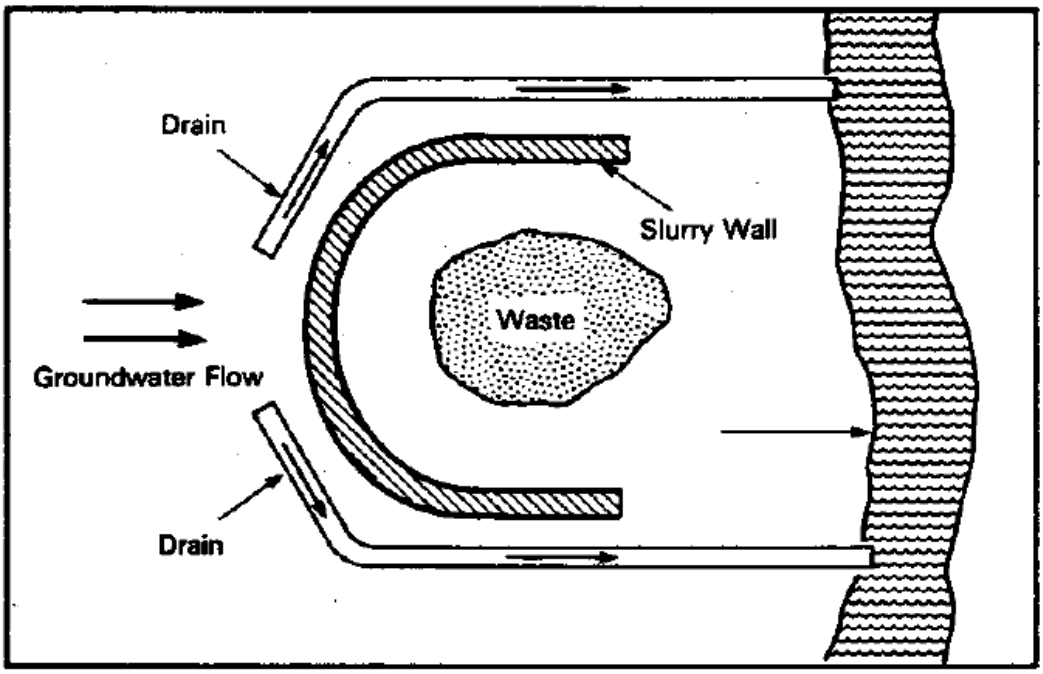
Monitoring Well Locations
Spring 2015

Chemtronics Site, Swannanoa, North Carolina

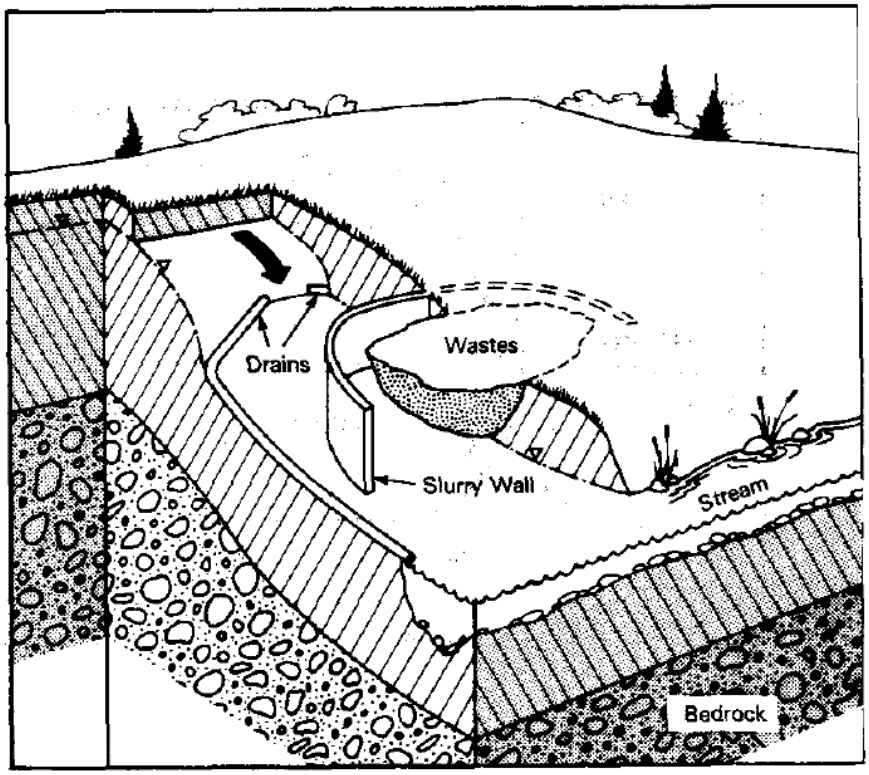
Geosyntec consultants
Kennesaw

Project No. GR4943
February 2016

Figure
4



Plan view of upgradient slurry wall and drain to divert groundwater around waste.



Cut-away prolife of upgradient slurry wall and drain to divert groundwater around waste.

Source: *Slurry Trench Construction for Pollution Migration Control* (EPA, 1984)

Groundwater Diversion Remedy Concept	Geosyntec consultants	Figure
Kennesaw	February 2016	**5**

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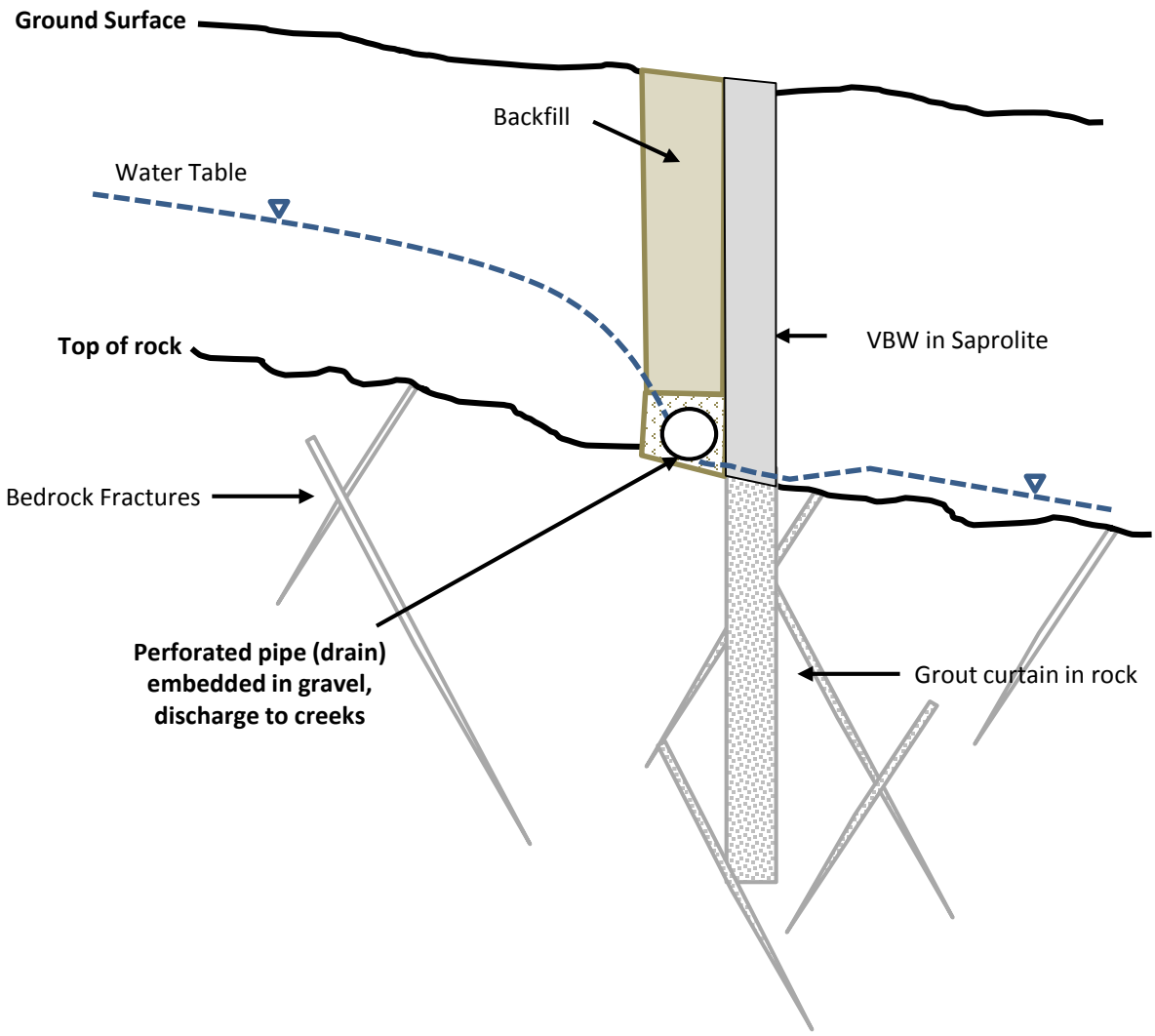

GDR Cross Section	Geosyntec consultants	Figure
Kennesaw	February 2016	6

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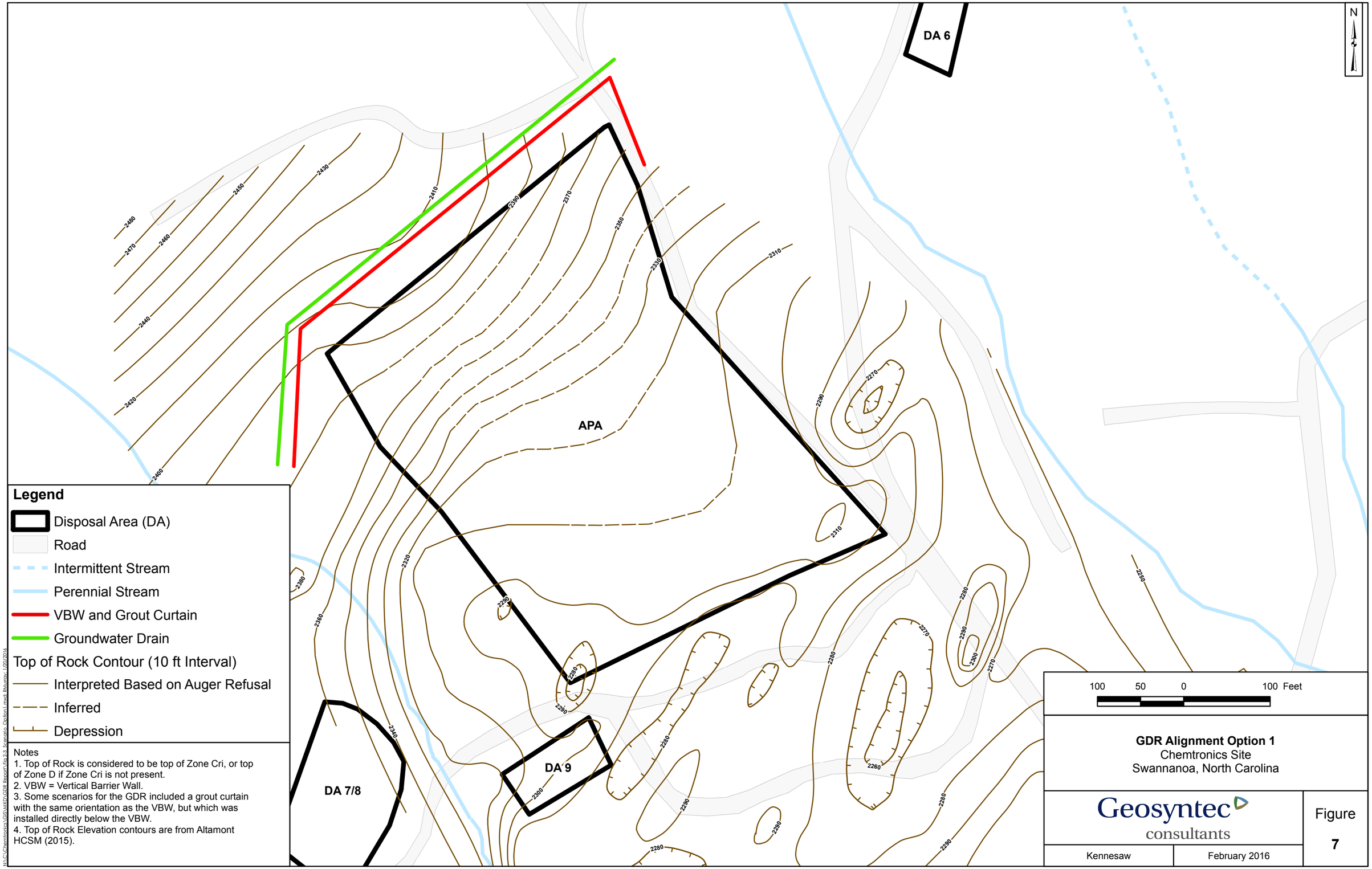
N
DA 6
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DA 7/8
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2290
2280
2270
2260
2250
Legend
Disposal Area (DA)
Road
Intermittent Stream
Perennial Stream
VBW and Grout Curtain
Groundwater Drain
Top of Rock Contour (10 ft Interval)
Interpreted Based on Auger Refusal
Inferred
Depression
Notes
1. Top of Rock is considered to be top of Zone Cri, or top of Zone D if Zone Cri is not present.
2. VBW = Vertical Barrier Wall.
3. Some scenarios for the GDR included a grout curtain with the same orientation as the VBW, but which was installed directly below the VBW.
4. Top of Rock Elevation contours are from Altamont HCSM (2015).
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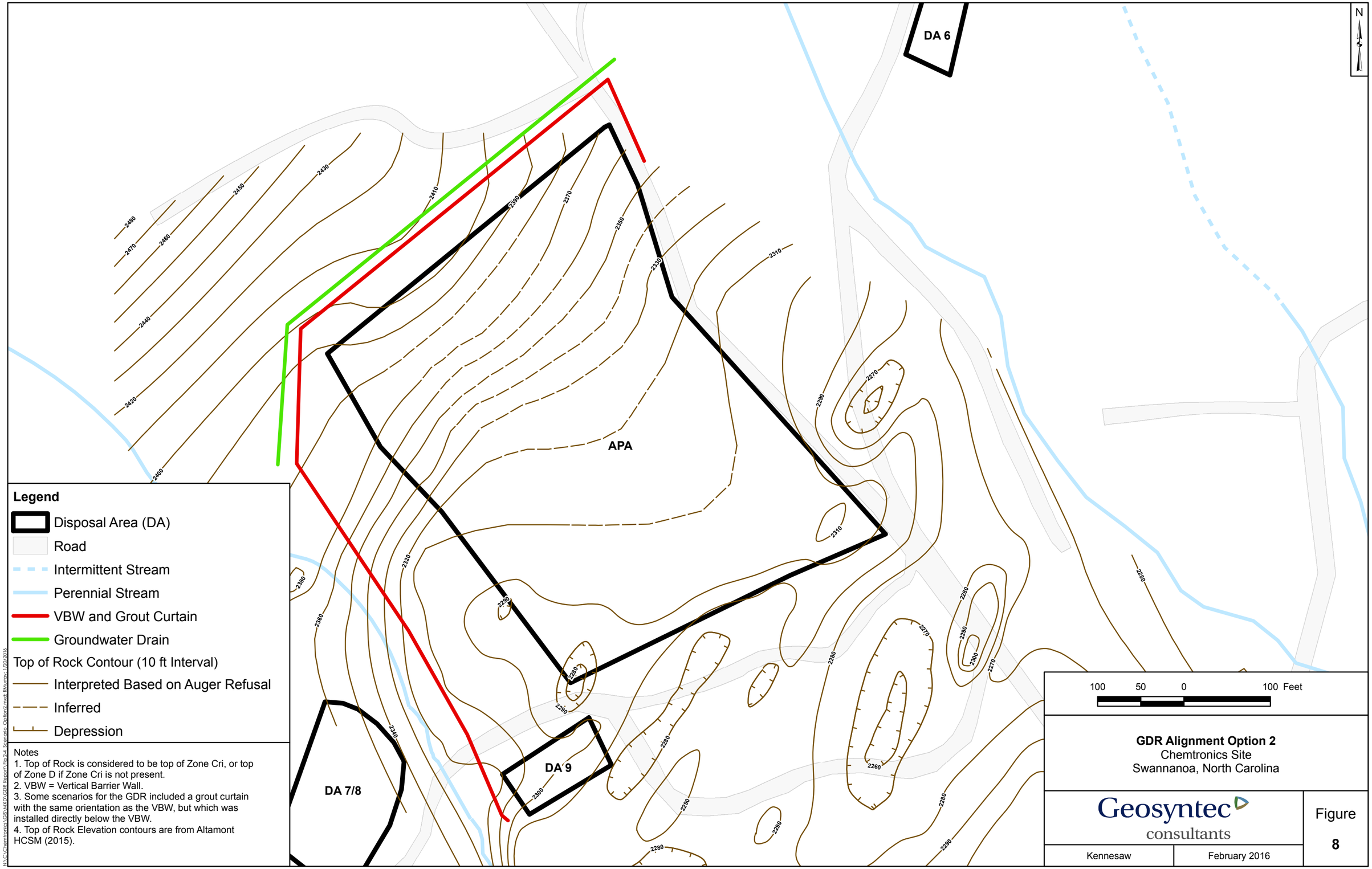
GDR Alignment Option 1
Chemtronics Site
Swannanoa, North Carolina
Geosyntec consultants
Figure
7
Kennesaw
February 2016



Legend

- Disposal Area (DA)
- Road
- Intermittent Stream
- Perennial Stream
- VBW and Grout Curtain
- Groundwater Drain

Top of Rock Contour (10 ft Interval)

- Interpreted Based on Auger Refusal
- Inferred
- Depression

Notes
1. Top of Rock is considered to be top of Zone Cri, or top of Zone D if Zone Cri is not present.
2. VBW = Vertical Barrier Wall.
3. Some scenarios for the GDR included a grout curtain with the same orientation as the VBW, but which was installed directly below the VBW.
4. Top of Rock Elevation contours are from Altamont HCSM (2015).

GDR Alignment Option 2
Chemtronics Site
Swannanoa, North Carolina

Geosyntec consultants

Kennesaw | February 2016

Figure 8

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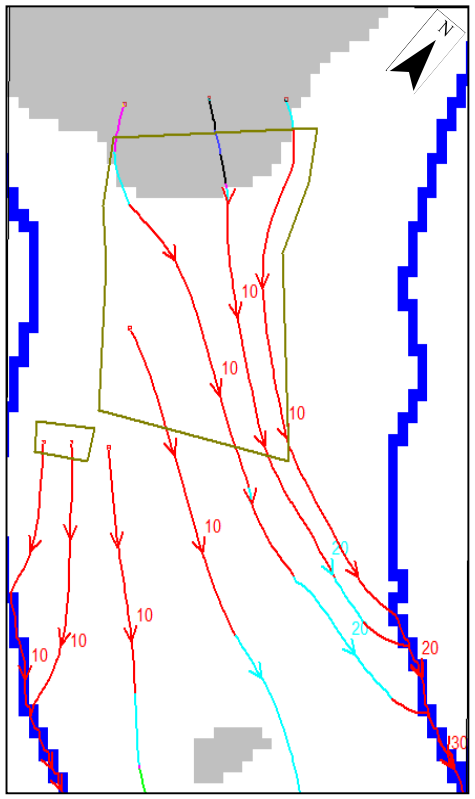
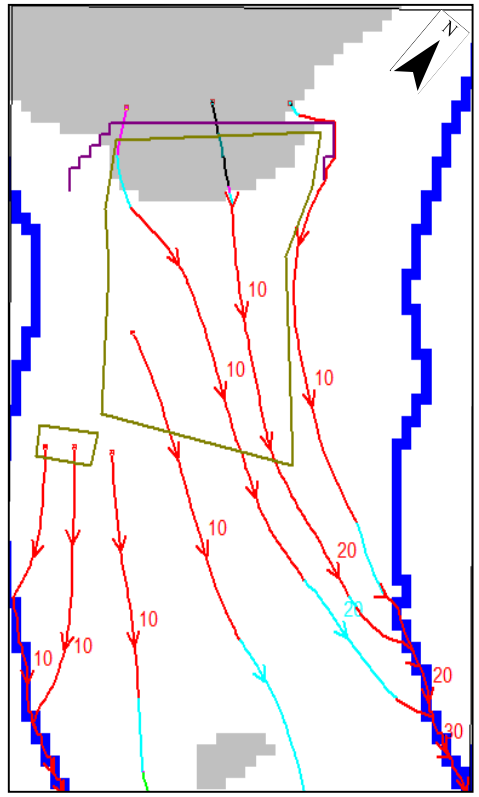
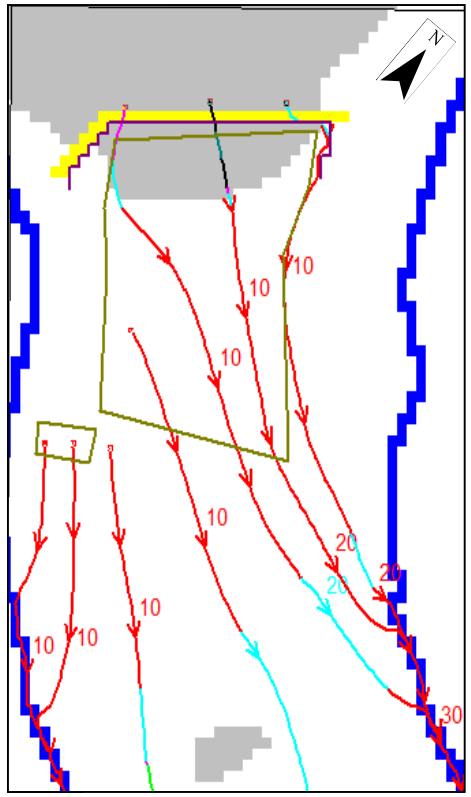
Base Case – No GDR



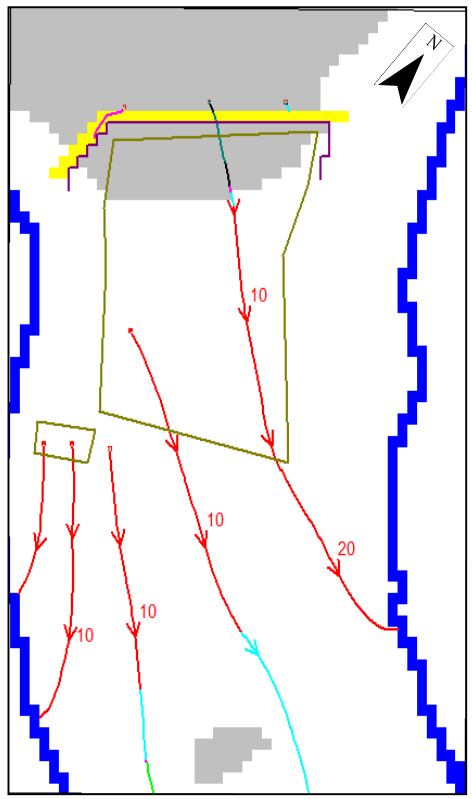
Scenario 1



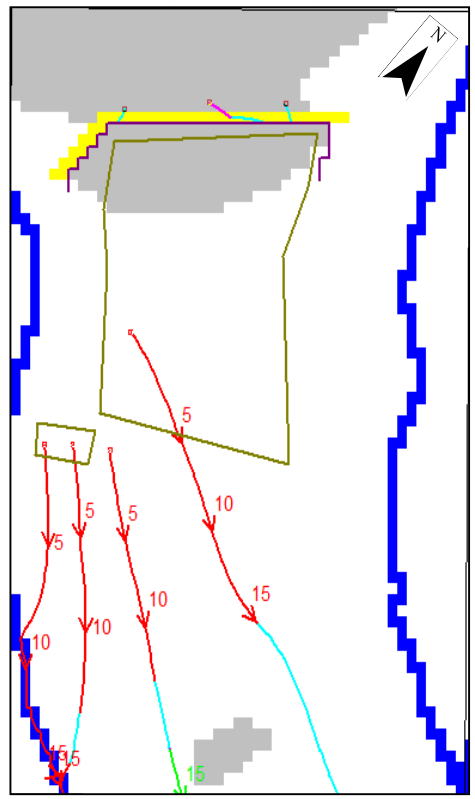
Scenario 2



Scenario 3



Scenario 4



LEGEND

- Disposal Area Footprint
- VBW and Grout Curtain Footprint
- Streams
- Groundwater Drain
- Simulated Dry Cells
- Particle Flow in Layer 1
- Particle Flow in Layer 2
- Particle Flow in Layer 3
- Particle Flow in Layer 4
- Particle Flow in Layer 5
- Particle Flow in Layer 6

Notes:

1. Each scenario pane shows results from model layer 1.
2. Each particle flow arrow represents a 5 year span of time for groundwater flow.
3. Posted travel times for groundwater are in units of years.
4. Within the model, both GDR Drain and Streams were simulated using the MODFLOW Drain Package.
5. The VBW and grout curtain (when present) were both simulated using the MODFLOW Horizontal Flow Barrier Package.
6. Base Case represents simulated flow conditions prior to GDR construction.

GDR Alignment Option 1: Simulated Particle Flow Paths

Chemtronics Site, Swannanoa, North Carolina

Geosyntec consultants Kennesaw	Project No. GR4943 February 2016	**Figure** **9**

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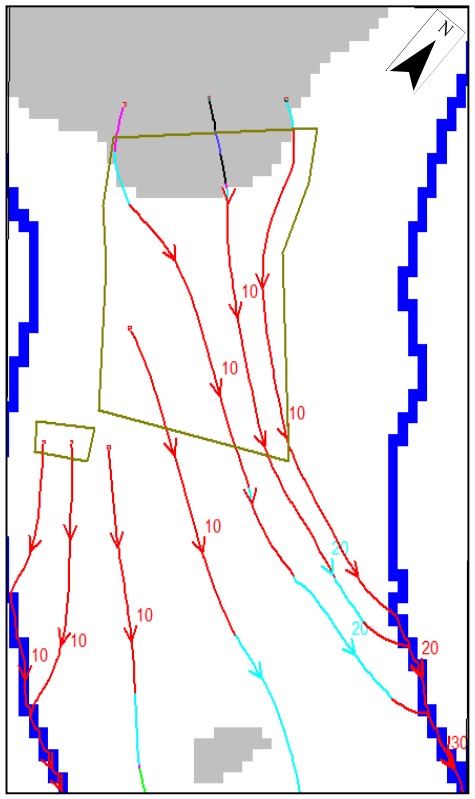
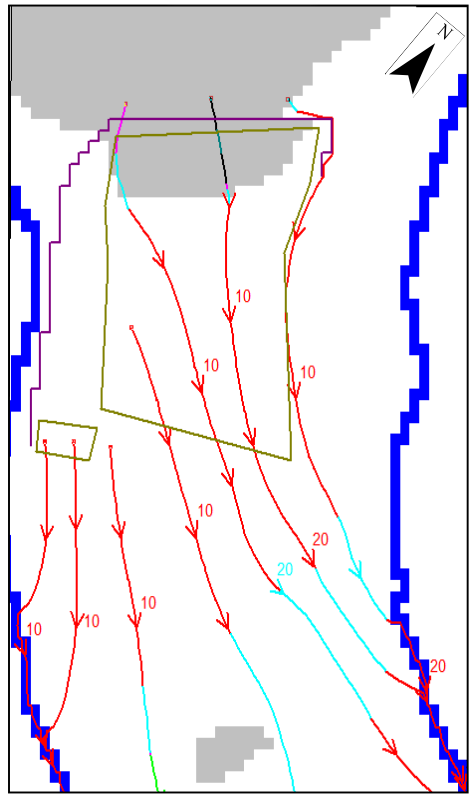
Base Case – No GDR



Scenario 1



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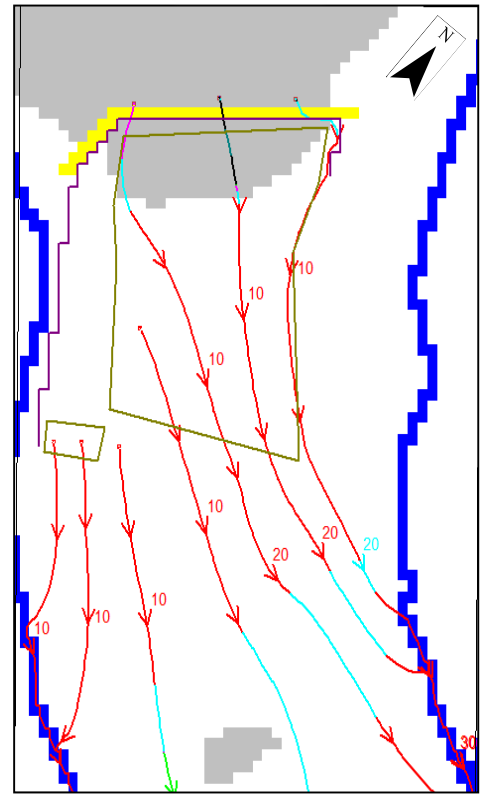

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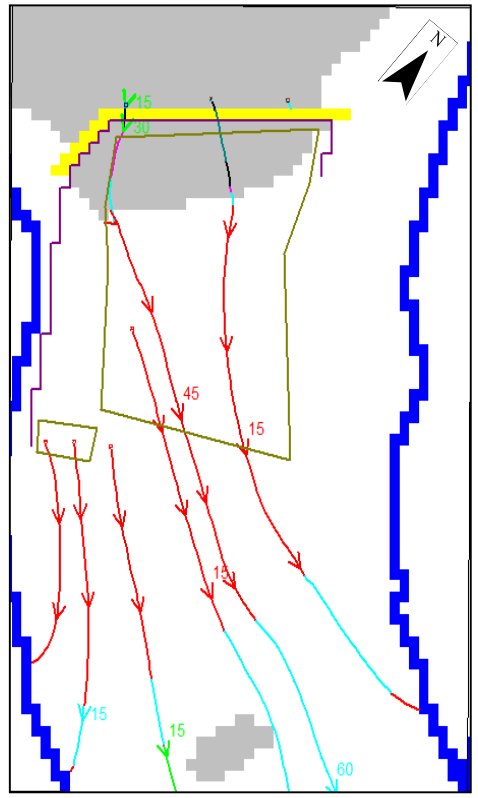

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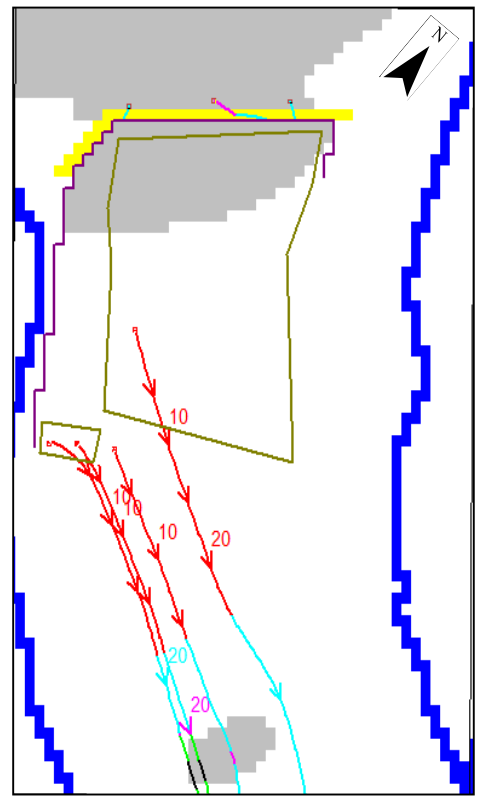

LEGEND

- Disposal Area Footprint
- VBW and Grout Curtain Footprint
- Streams
- Groundwater Drain
- Simulated Dry Cells
- Particle Flow in Layer 1
- Particle Flow in Layer 2
- Particle Flow in Layer 3
- Particle Flow in Layer 4
- Particle Flow in Layer 5
- Particle Flow in Layer 6

Notes:

1. Each scenario pane shows results from model layer 1.
2. Each particle flow arrow represents a 5 year span of time for groundwater flow.
3. Posted travel times for groundwater are in units of years.
4. Within the model, both GDR Drain and Streams were simulated using the MODFLOW Drain Package.
5. The VBW and grout curtain (when present) were both simulated using the MODFLOW Horizontal Flow Barrier Package.
6. Base Case represents simulated flow conditions prior to GDR construction.

GDR Alignment Option 2: Simulated Particle Flow Paths

Chemtronics Site, Swannanoa, North Carolina

Geosyntec consultants Kennesaw	Project No. GR4943 February 2016	Figure 10

Path: N:\C\Chemtronics\GDR Report\figures\Figure 3-2_GDR Option 2_Flow Path Figure.pptx

ATTACHMENT A

BACK VALLEY VERTICAL BARRIER WALL PRE-DESIGN GEOTECHNICAL REPORT

Prepared for

Chemtronics, Inc.,
Northrop Grumman Systems Corporation,
and CNA Holdings LLC

BACK VALLEY
VERTICAL BARRIER WALL
PRE-DESIGN GEOTECHNICAL REPORT

CHEMTRONICS SITE
SWANNANOA, BUNCOMBE COUNTY
NORTH CAROLINA

EPA CERCLIS ID: NCD095459392

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engineers | scientists | innovators

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February 2016

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LIST OF ACRONYMS

ADA	US EPA Ground Water Technical Support Center in Ada, Oklahoma
APA	Acid Pits Area
API	American Petroleum Institute
ASTM	ASTM International
$CaCO_3$	Calcium carbonate
CB	Cement-Bentonite
COCs	Contaminants of Concern
CS	Composite Soil
DA 9	Disposal Area 9
DCA	Dichloroethane
DCM	Dichloromethane
EGT	Excel Geotechnical Testing, Inc.
EPA	United States Environmental Protection Agency
FS	Feasibility Study
FSCT	Feasibility Screening and Candidate Technologies
GW	Groundwater
HSA	Hollow Stem Auger
HW	Hydrant Water
NCDENR	North Carolina Department of Environment and Natural Resources
PWR	Partially Weathered Rock
RAOs	Remedial Action Objectives
RI	Rock Interval
RQD	Rock Quality Designation
SB	Soil-Bentonite
SCB	Soil-Cement-Bentonite
SM	Standard Method
SPT	Standard Penetration Test
TBA	Tert-Butyl Alcohol
TCE	Trichloroethene
TDS	Total Dissolved Solids
VBW	Vertical Barrier Wall

EXECUTIVE SUMMARY

Geosyntec Consultants of NC, P.C. (Geosyntec) has prepared this *Back Valley Vertical Barrier Wall Pre-design Geotechnical Report* (Report) on behalf of Chemtronics, Inc., Northrop Grumman Systems Corporation, and CNA Holdings LLC (together the Companies) to describe a geotechnical investigation performed to support the Feasibility Study (FS) completed for the Chemtronics Site (Site). Per the *Feasibility Screening and Candidate Technologies Evaluation for the Back Valley* (Geosyntec, 2013a) a vertical barrier wall (VBW) was identified as a candidate technology for the Back Valley that could be used to achieve the remedial goal of mass flux reduction from the Acid Pits Area (APA) and Disposal Area 9 (DA 9). During the period between September 2013 and July 2014, a geotechnical field investigation and laboratory testing program were performed to evaluate the feasibility, backfill mix design requirements, and constructability of a VBW around the perimeter of the APA and DA 9. The scope of the work was detailed in the *Work Plan for A Back Valley Pre-Design Geotechnical Investigation, Revision 1* (Work Plan) prepared by Geosyntec on behalf of the Companies (Geosyntec, 2013b) and approved by the United States Environmental Protection Agency (EPA). The North Carolina Department of Environment and Natural Resources (NCDENR) also reviewed the Work Plan and had no comments.

Key findings and conclusions from the field investigation activities that were completed by Altamont Environmental, Inc. (Altamont) we presented in its *Back Valley Geotechnical Field Investigation Summary Repor*t (Field Summary Report) (Altamont, 2014) presented in **Appendix A**, and are set forth below:

- The depth-to-bedrock data from the geotechnical borings were used, in combination with existing depth-to-bedrock data, to develop an updated top of bedrock elevation map for the Back Valley. The results of the investigation showed that depth-to-bedrock is generally shallow in the northern part of the potential perimeter VBW alignment and deeper in the southern part. In 11 out of the 18 borings, competent bedrock was encountered at a depth of 1.1 to 33.4 feet deeper than the top of bedrock, mainly along the southern part of the potential perimeter VBW alignment. The top of bedrock was competent at the other seven boring locations. Bedrock is defined as the depth at which auger refusal has been reached and cored intervals reveal no unconsolidated materials are

present at lower depths. Competent bedrock is defined as rock having a rock quality designation (RQD) of 70 percent or greater over a 10-foot interval.

- The variability in thickness of the transition zone and depths to bedrock and competent bedrock observed in the geotechnical borings suggests that differential weathering is widespread beneath the Back Valley. An extreme example of this condition was observed in boring VBW-10 where a 2-foot thick rock lens was encountered at a relatively shallow depth of 37 feet and was underlain by over 52 feet of very soft un-lithified materials interlayered with partially weathered rock (PWR) and rock with low RQD values. At a nearby boring (VBW-16), located approximately 15 feet south of VBW-10, this rock lens was not encountered and the depth to competent bedrock (61.5 feet below ground surface [ft-bgs]) was about 30 feet deeper in elevation than observed in VBW-10.

- In general, rippability, describing the relative ease with which the PWR and bedrock can be removed by an appropriate excavator with removal tool, is greatest in areas where fracture frequency is the highest, weathering is more advanced, and planar features are advantageously oriented. Based on the field investigation, the PWR layer at the boring locations appears to be, in general, easily rippable. For the bedrock layer, the above characteristics associated with higher rippability were observed at the southern part of the potential alignment of the perimeter VBW. However, the ability to rip the bedrock surface would depend upon the depth of excavation and equipment used.

Key findings and conclusions based on the results of the completed laboratory mix design and compatibility testing program are set forth below:

- Trial bentonite slurry mixes were produced, and based on the results, a minimum of 7 percent (%) dry bentonite for the slurry mix is recommended for the VBW. Furthermore, water from the on-Site hydrant connected to the municipal water supply system (herein referred to as hydrant water) is acceptable to prepare the bentonite slurry based on the fact that trial bentonite slurry batches mixed with this water source met target index property values.

- Soil-cement-bentonite and soil-bentonite backfill samples were produced using a composite soil sample representative of the full depth and alignment of the potential perimeter VBW. The backfill samples were evaluated for hydraulic

conductivity and the results were in the range of $2.7x10^{-7}$ to $3.3x10^{-8}$ centimeters per second (cm/sec). The soil-cement-bentonite backfill samples tested also achieved the target minimum compressive strength requirement. Thus, it is anticipated that soils from sources other than the excavation of the trench for the VBW would not be required to achieve the specified hydraulic conductivity value and the minimum index properties for the backfill material.

- Cement-bentonite backfill samples were produced and evaluated for hydraulic conductivity and the results were in the range of $2.8x10^{-6}$ to $1.3x10^{-6}$ cm/sec. The cement-bentonite backfill samples tested did not pass the target minimum compressive strength requirement.

- From the hydraulic conductivity compatibility testing (i.e., using representative impacted Site groundwater as mix water), soil-cement-bentonite and soil-bentonite mixes were shown to achieve generally acceptable values, with the soil-cement-bentonite mixes being less affected by the groundwater quality than the soil-bentonite mixes. Addition of dry bentonite could be used to improve the hydraulic conductivity performance of the mix. For cement-bentonite samples, hydraulic conductivity values from the compatibility testing increased slightly as compared to values for the design mixes prepared with hydrant water.

The laboratory testing results suggest that either ex situ mixing (i.e., open trench technology, using soil-bentonite mix) or in situ mixing (i.e., deep soil mixing, using soil-cement-bentonite mix) are viable options to achieve the hydraulic conductivity performance criteria. A maximum hydraulic conductivity target of $1x10^{-7}$ cm/sec is reasonable for the soil-cement-bentonite and soil-bentonite backfill mixes.

It is anticipated that the VBW would (at a minimum) be installed to (founded on) the top of the bedrock, to the extent feasible. It is not anticipated that the VBW would be installed to the top of competent bedrock in all locations along the potential perimeter alignment, given the variable thickness of the fractured bedrock. Field investigation results indicate the existence, in some instances, of isolated rock lenses within the saprolite layer on the south side of the potential perimeter VBW alignment. The lateral extent of such rock lenses is unknown, and additional lenses may also exist between the boring locations. This imposes a potential difficulty in excavating the saprolite and PWR and constructing the VBW down to the top of bedrock on the south side of the potential perimeter VBW alignment. Furthermore, fractured bedrock, as defined in this

report, varies in thickness along the potential perimeter VBW alignment. The south side corresponds to areas of advanced weathering, indicated by the largest observed thickness of fractured bedrock (i.e., between top of bedrock and to the top of competent bedrock), which might correspond to increased groundwater flow beneath the base of the VBW. Stage II borings, defined in the Work Plan, comprise additional borings advanced at a 50- to 100-ft center to center spacing, and would be recommended prior to developing a detailed design, if the potential perimeter VBW is selected as the preferred remedial alternative, to gain a better understanding about the frequency of occurrence of rock lenses, and variability in thickness of the fractured bedrock.

The findings presented in this report were evaluated in combination with the results of groundwater flow modeling analysis to further evaluate the anticipated overall performance of the potential VBW.

1. INTRODUCTION

Geosyntec Consultants of NC, P.C. (Geosyntec) prepared this *Back Valley Vertical Barrier Wall Pre-design Geotechnical Report* (Report) on behalf of Chemtronics, Inc., Northrop Grumman Systems Corporation, and CNA Holdings LLC (together the Companies) to describe a geotechnical investigation performed to support the Feasibility Study (FS) completed for the Chemtronics Site (Site). The investigation was carried out in accordance with a Work Plan (Geosyntec, 2013b) that was approved by the United States Environmental Protection Agency (EPA) and reviewed by the North Carolina Department of Environment and Natural Resources (NCDENR). The Site is located in Swannanoa, Buncombe County, North Carolina, and is divided into two geographic areas commonly referred to as the Front Valley and Back Valley (**Figure 1**).

1.1 Objective

Per the *Feasibility Screening and Candidate Technologies Evaluation for the Back Valley*, referred to as the Back Valley FSCT (Geosyntec, 2013a), a vertical barrier wall (VBW) was identified as a candidate technology for the Back Valley as a component of the overall remedy to achieve the Remedial Action Objectives (RAOs). As described in the FSCT, a low permeability VBW around the perimeter of Acid Pits Area (APA) and Disposal Area 9 (DA 9), to the top of bedrock, could be used to achieve the remedial goal of mass flux reduction from the APA and DA 9 areas.

Data collected from the geotechnical investigation were used to evaluate the constructability and anticipated performance of a VBW as a potential remedy and support the overall Site FS. The specific objectives of the VBW pre-design geotechnical investigation activities, as stated in the Work Plan, were to:

(i) increase resolution of topographic information along the potential perimeter VBW alignment;

(ii) characterize the subsurface conditions, including depth to the top of bedrock and competent bedrock as well as the geotechnical properties (i.e., feasibility of excavation) of the unconsolidated materials encountered, along the potential alignment of the perimeter VBW;

(iii) evaluate the constructability of the VBW;

(iv) identify interferences along the potential perimeter VBW alignment (i.e., chain link fence, monitoring wells, utilities, streams);

(v) obtain soil and groundwater samples;

(vi) perform a geotechnical laboratory testing program and VBW backfill mix design program including evaluation of the hydraulic conductivity of the soil-cement-bentonite backfill, the soil-bentonite backfill, and the cement-bentonite backfill design mixes; and

(vii) perform a testing program to evaluate the chemical compatibility of the bentonite slurry, the cement-bentonite slurry, the soil-cement-bentonite backfill, the soil-bentonite backfill, and the cement-bentonite backfill with the existing chemicals of concern (COCs) including evaluation of the hydraulic conductivity of the various backfill mix designs over prolonged exposure to COCs.

1.2 Scope of Work

The scope of the work was detailed in the *Work Plan for A Back Valley Pre-Design Geotechnical Investigation, Revision 1* (Work Plan) prepared by Geosyntec on behalf of the Companies (Geosyntec, 2013b). The Work Plan was submitted to the EPA in August 2013. In a letter dated 5 September 2013, the EPA provided conditional approval of the Work Plan, subject to the Companies responding to comments summarized in the same letter. The North Carolina Department of Environment and Natural Resources (NCDENR) also reviewed the Work Plan and had no comments. The Companies responded to the 5 September 2013 comments on 18 October 2013, and the revised Work Plan was approved by EPA on 8 November 2013. Field work was initiated on 18 September 2013. Additional comments were received from the EPA Ground Water Technical Support Center in Ada, Oklahoma (ADA) on 22 November 2013, after approval of the Work Plan and after substantial completion of the geotechnical investigation. Field procedures were modified where possible to address the ADA comments. The Companies responded to the ADA comments on 10 February 2014 with a recommendation that the response be amended to the revised Work Plan dated 18 October 2013 (Revision 1).

During the period between September 2013 and July 2014, a geotechnical field investigation and laboratory testing program were performed to evaluate the feasibility, design requirements, and constructability of a VBW around the perimeter of the APA and DA 9. Altamont implemented the field investigation during the fall of 2013 and winter of 2014. The laboratory testing program was performed by Excel Geotechnical Testing, Inc. (EGT) as a subcontractor to Geosyntec. Discrete and bulk soil samples were collected by Altamont, in accordance with the field sampling guide prepared by Geosyntec, and Altamont also provided the material to Geosyntec for sample selection and submittal to the geotechnical laboratory. Geosyntec coordinated the geotechnical laboratory testing program including evaluation of geotechnical properties of the native material, testing to support the development of a VBW backfill mix design, and testing to assess the compatibility of the VBW backfill mix design with COCs. Altamont also provided aliquots of the bulk water samples (groundwater and hydrant water) to Lancaster Laboratories, Inc. (Lancaster) for analytical testing. Details on the field and laboratory program are described in subsequent sections of the report.

1.3 Report Organization

The remainder of this document includes the following:

- Section 2 provides an overview of the pertinent Site conditions and background information on VBW design and construction;
- Section 3 presents the geotechnical field investigation, sample collection activities, and soil index property testing;
- Section 4 presents a summary of the testing program and rationale;
- Section 5 presents the backfill soil mix property testing results;
- Section 6 presents the bentonite slurry and cement-bentonite slurry mix property testing results;
- Section 7 presents the soil-bentonite, soil-cement bentonite, and cement-bentonite backfill mix hydraulic conductivity and strength property testing results;

- Section 8 presents the soil-bentonite, soil-cement bentonite, and cement-bentonite backfill mix compatibility testing results;
- Section 9 summarizes the conclusions of the pre-design investigation testing program; and
- Section 10 lists references for documents cited in this report.

2. OVERVIEW OF SITE INFORMATION

A brief overview of site conditions, the regional and Site geology, the Site hydrogeology, and background information on the design and construction of VBW are presented in this section. Detailed background information about geology, hydrogeology, as well as the VBW technology background are presented in a number of documents including Altamont's *Back Valley Geotechnical Field Investigation Summary* report (Field Summary Report) (Altamont, 2014), presented herein as **Appendix A**; the Work Plan, and the *Final Remedial Investigation Report* (Final RI, Altamont, 2015).

2.1 General Overview of Site Conditions

The Site occupies approximately 1,065 acres in Buncombe County, North Carolina and is located at 180 Old Bee Tree Road, approximately 8 miles east of Asheville, in the community of Swannanoa. The topography of the Site is steep, with elevations ranging from 2,200 to 3,400 feet (ft) above mean sea level. The Site lies on the southeast side of Bartlett Mountain and is moderately to heavily vegetated with mixed forest types. The Site is divided into two geographic areas commonly referred to as the Front Valley and the Back Valley. A prominent ridge separates these areas. The scope of work described in this Report is located within the Back Valley. The Back Valley is situated in the Gregg Branch watershed, part of a larger watershed known as Bee Tree Creek, and the regional Swannanoa River watershed.

2.2 Regional and Site Geology

The regional and Site geology is summarized in the Final RI. A brief summary, paraphrased from the Final RI, was provided in the Work Plan, and is included below, for reference. **Figure 2** illustrates the primary components of the hydrogeologic system (Altamont, 2014; LeGrand, 2004).

The Site lies within the Blue Ridge Physiographic Province which extends northeast to southwest from Pennsylvania to Alabama. The Blue Ridge Province is primarily composed of igneous and metamorphic rock that has been complexly folded and faulted in a northeasterly direction.

The geology of the Site is typical of the Blue Ridge Province and consists of soil and saprolite overlying a partially weathered rock (PWR) and fractured bedrock transition zone which grades into competent bedrock with depth.

The soil is primarily a residuum and was formed by disintegration and decomposition of the underlying saprolite. The soil is characterized by a high percentage of clay, silt, and fine sand-sized particles that suggest the measured permeability of this material is very low. Underlying the soil is a layer of saprolite, a highly weathered and thoroughly decomposed rock formed by in-place chemical weathering of igneous and metamorphic rocks. PWR directly overlies the fractured bedrock, which transitions into competent bedrock with depth.

As detailed in the Field Summary Report presented herein as **Appendix A**, bedrock is defined as the depth at which auger refusal has been reached and cored intervals reveal no unconsolidated materials are present at lower depths. Competent bedrock is defined as rock having a rock quality designation (RQD) of 70 percent or greater over a 10-foot interval.

2.3 Site Hydrogeology

The hydrogeologic conditions in the vicinity of the Site are summarized in the Final RI. A brief summary, paraphrased from the Final RI, is provided herein for reference.

The Site hydrogeologic conditions are typical of the Blue Ridge Province with three primary aquifer systems: (i) a surficial system (Zones A and B); (ii) a transition zone and upper bedrock system (Zones C and D); and (iii) a bedrock system (Zones E and F). Zones A and B, the uppermost aquifer zones beneath the Site, exhibit both vertical and horizontal components of groundwater flow. In the Field Summary Report, presented herein as **Appendix A**, and as shown on **Figure 2**, Zone C consists of two subzones. The top of the PWR zone to the depth of auger refusal represents the upper portion of Zone C (Zone C_{pwr}). Due to its relatively high permeability, Zone C_{pwr} is thought to be the zone of highest transmissivity at the Site and contributes to the majority of horizontal migration of groundwater in the surficial aquifer.

The bedrock interval, from auger refusal, down to competent bedrock, is interpreted to represent the lower portion of Zone C (hereinafter as Zone $C_{Rock\ Interval}$ [C_{RI}]) and the 70-percent RQD line is interpreted to represent the top of Zone D in the

hydrostratigraphic conceptual model of the Site (**Figure 2**). Interconnected fractures in Zone C_{RI} make it more transmissive than the underlying Zone D. Zone D represents the upper 10 to 15 ft of the competent bedrock. Zones E and F are comprised of the deepest portion of the bedrock. Previous borings indicate that fracture density and consequently groundwater transport potential generally decrease with depth in the bedrock system.

It is anticipated that the VBW would need to be constructed from the surface down to the top of Zone C_{RI}. However, as Zone C_{RI} is observed to be the most transmissive zone, grout injections may be required to further reduce mass flux at this depth. Soil samples used in the laboratory investigation were collected from Zones A, B, and C_{pwr}.

3. GEOTECHNICAL INVESTIGATION AND SAMPLE COLLECTION

This section provides only an overview of the main elements from the field investigation. Detailed information, field procedures, test results, specific geologic and hydrogeologic findings, and figures illustrating the soil layers and top of bedrock and top of competent bedrock are included in the Field Summary Report presented herein as **Appendix A**.

3.1 Topographic Survey Data Collection

Ground survey work was performed by a licensed surveyor under the direction of Altamont within a work area encompassing the APA and DA 9 including a 100-ft buffer around the perimeter of each disposal area to develop elevation contours at 1-ft intervals. Ground survey work was also performed along the potential perimeter VBW alignment to determine the coordinates and ground elevation of the geotechnical borings described below in this document. Other pertinent features in the work area were also surveyed for horizontal and vertical control including the limits of the APA and DA 9 caps (based on as-built and/or design information on the anchor trenches for the geosynthetics) and the Site access road.

3.2 Geotechnical Sampling and Field Investigation

Eighteen (18) geotechnical soil borings (VBW-1 through VBW-18) spatially distributed along the potential alignment of a perimeter VBW, as shown on **Figure 3**, were advanced using hollow stem auger (HSA) and rock coring techniques. Drilling was performed by AE Drilling Services LLC, a North Carolina-licensed driller, using a CME 550 HSA drill. Fourteen borings were advanced using augers with 3.25-inch inner-diameter/6.63-inch outer-diameter, and subsequently backfilled with bentonite immediately after drilling.

The remaining four borings (VBW-10, VBW-16, VBW-17, and VBW-18) were advanced using 6.25-inch inner-diameter/9.63-inch outer-diameter augers, and were subsequently converted to monitoring wells upon completion of the geotechnical boring. Detailed boring logs are presented in **Appendix A** and a summary of main boring information is presented in **Table 1**.

Continuous Standard Penetration Test (SPT) sampling was done at eight of the initial boring locations at each of the four corners of the APA and DA 9 (i.e., VBW-1, VBW-

3, VBW-7, VBW-10, and VBW-13 through VBW-16). SPT sampling was done at 5-ft intervals for the remaining boring locations. Drilling extended vertically downward until auger refusal.

Lenses of unweathered rock (i.e., resistant rock) were encountered within the saprolite or PWR zones, resulting in HSA refusal before encountering the top of bedrock. These rock lenses were typically relatively thin (i.e., less than 10-ft in thickness), surrounded by either saprolite or PWR. HSA refusal on these layers can be mistakenly interpreted as "top of bedrock." For this reason, the borings were advanced to HSA refusal and then bedrock coring was advanced until a 10-ft continuous run of bedrock with RQD of greater than 70-percent was encountered. The top of bedrock, defined by auger refusal, and top of competent bedrock, defined by RQD greater than 70-percent, are often synonymous. However, there are locations where the top of bedrock is highly fractured and the RQD is less than 70-percent. The thickness of this highly fractured bedrock interval (corresponding to Zone C_{RI}) varied between 0 to 33.4 feet, as indicated in **Table 1** and on figures of **Appendix A**.

A total of 426 disturbed SPT soil samples were collected. The Geotechnical Work Plan called for undisturbed sample collection via Shelby tubes from up to five locations where soft clayey materials were encountered. Based on field observations of the split-spoon returns, clay-rich zones were not present; therefore, no undisturbed samples were collected. Bulk soil samples were obtained at boring locations VBW-2, VBW-4, VBW-5, VBW-6, VBW-8, VBW-9, VBW-11, VBW-12, VBW-14, VBW-17, and VBW-18 by collecting drilling spoils brought to the ground surface by the HSA drilling, and placed in plastic bags, tied, and stored in 5-gallon buckets with sealable lids. General depth of bulk samples obtained was also noted.

Samples of representative Site groundwater from monitoring wells P-5D and P-7D (i.e., 15 gallons of groundwater from each well) were collected using low-flow sampling techniques. Mix water required for the preparation of slurry, backfill mixes, and compatibility testing was obtained by Altamont from an on-Site hydrant connected to the municipal water supply system (i.e., hydrant water). At the completion of the geotechnical field investigation, bulk water samples (groundwater and hydrant water) were transported to EGT laboratory in Roswell, Georgia by Geosyntec personnel, to be used in the subsequent mix design and compatibility testing. Aliquots of the bulk water samples (groundwater and hydrant water) were shipped to Lancaster Laboratories, Inc. (Lancaster) by Altamont for analytical testing.

Additionally, observations for soil or groundwater containing COCs were made and recorded during the completion of each soil boring. Grab soil and groundwater samples were obtained, separate from the geotechnical samples, and shipped to the analytical laboratory to be tested for Volatile Organic Compounds (VOCs).

As mentioned above, detailed information on the field investigation is presented in **Appendix A.**

3.3 Geotechnical Index Property Testing Results

Soil geotechnical laboratory testing was performed by EGT laboratory of Roswell, Georgia on select SPT samples. As stated previously, 426 SPT samples were collected, and submitted to the laboratory for visual observation, but not every sample collected was tested. A representative subset of 104 SPT samples was chosen by Geosyntec for geotechnical laboratory testing based on the following criteria: (i) spatial distribution (i.e., samples selected along both the entire alignment and the full depth of the potential perimeter VBW); (ii) stratigraphic layer (i.e., samples selected to define the soil properties of each type of stratigraphic layer encountered); and (iii) confirmation of field observations.

The following tests were performed:

- Moisture content (ASTM International [ASTM] D2216): The in situ moisture content of the soil dictates the volume of fluid (i.e., slurry) added to the soil-bentonite and soil-cement-bentonite backfill mixes, as discussed in **Section 7**.

- Grain Size Distribution (ASTM D422): Evaluation of the grain size distribution determines the quantity and type of fines existing. In general, a minimum of 20% fines is required to achieve a low hydraulic conductivity with a soil-cement-bentonite VBW. The fines contents varied from 12 to 76%, with only six samples out of the 75 samples tested for fines, having a value less than 20%, as shown on **Figure 4**.

- Atterberg Limits (ASTM D4318): The Atterberg Limits include the liquid limit and plastic limit of a soil. The results indicated that 63 out of the 75 samples tested for Atterberg limits were non-plastic.

- Engineering Classification (ASTM D2487): The engineering classification of the in situ soils was evaluated using the Unified Soil Classification System. **Figure 5** summarizes the classification on various SPT samples at APA and DA 9 areas.

Detailed soil index property testing results are summarized in **Table 2** and EGT's report, presented herein as **Appendix B**.

Based on field observations and review of geotechnical laboratory data, the site stratigraphy comprises the top soil/residuum layer (varies in thickness from 6 to 22.5 ft) classified as a mix of sand, silt, and clay, with a fines content (i.e., silt and clay) ranging from 13 to 76%. This overlays the saprolite material (varies in thickness from 0 to 60 ft) classified mainly as a silty sand material, with fines content between 20 and 50%. Test results on SPT samples retrieved from the PWR layer (varies in thickness from 0 to 41 ft) also resulted in a measured fines content greater than 20%.

4. SUMMARY OF TESTING PROGRAM

The hydraulic conductivity of the VBW is dependent on the materials used to construct it. A Site-specific laboratory investigation using COC-impacted soil and groundwater from the Site is critical to the selection of a VBW backfill that would achieve a low hydraulic conductivity and be stable in the presence of Site-specific groundwater conditions. This section presents the laboratory testing and compatibility assessment activities performed as part of this pre-design investigation.

The defining criteria for functional slurries and backfill mixes were: (i) acceptable values of fresh slurry density, viscosity, filtrate loss, and pH; (ii) backfill mix with a low hydraulic conductivity using the least amount of additional reagents (bentonite or cement); and (iii) backfill mix, prepared with Site groundwater, with a stable low hydraulic conductivity.

4.1 Rationale for Compatibility Testing

The VBW would be exposed to Site soil and groundwater containing COCs and unique geochemistry. The purpose of the compatibility testing was to evaluate whether immediate contact or prolonged contact (i.e., a period of several months during the testing program) with Site-specific groundwater containing COCs would adversely affect the materials (i.e., property loss) used to construct the VBW.

As summarized in the following sections, the completed compatibility testing program included standard laboratory tests to establish material characteristics and properties for (i) bulk and composite soil materials; (ii) mixed bentonite and cement-bentonite slurries prepared with either hydrant water or Site groundwater; and (iii) mixed backfill of cement and bentonite, soil and bentonite, or cement, bentonite, and soil (using slurries prepared with either hydrant water or Site groundwater) exposed to either hydrant water or Site groundwater (as permeant).

4.2 Mix Materials

Materials that were used in preparing the slurry and backfill mixes for this study included: (i) representative Site groundwater; (ii) water from an on-Site hydrant connected to the municipal water supply system (i.e., hydrant water); (iii) premium grade bentonite; (iv) Cement Type I/II; and (v) samples of soils obtained along the

potential alignment of the perimeter VBW. These materials are described in further detail below:

- Groundwater: As mentioned above, samples of representative Site groundwater from monitoring wells P-5D and P-7D were collected. Two aliquots of the groundwater samples were shipped by Altamont to Lancaster, where they were analyzed to evaluate total hardness using Standard Method (SM) 2340C, total dissolved solids (TDS) using SM 2540C, and to verify concentrations of Site COCs, anions (i.e., bromide, chloride, nitrate, nitrite, sulfate), and dissolved metals (i.e., calcium, magnesium, iron, manganese, aluminum, potassium, and sodium).

  COCs targeted for source mass flux reduction in groundwater at DA 9 included trichloroethene (TCE) and 1,2-dichloroethane (1,2-DCA). COCs targeted for source mass flux reduction in groundwater at APA included TCE, 1,2-DCA, chloroform, dichloromethane (DCM), tert butyl alcohol (TBA), benzene, and perchlorate.

  Analytical results from representative Site groundwater collected from monitoring wells P-5D and P-7D identified a total of 12 VOCs, six nitroaromatic compounds, perchlorate, ethane and methane at detectable concentrations. Compounds with the highest reported concentrations were TBA (180,000 micrograms per liter [µg/L] in P-5D groundwater), 1,2-DCA (6,700 µg/L in P-5D groundwater), TCE (2,500 µg/L in P-7D groundwater), and perchlorate (9,900 µg/L in P-7D groundwater).

  The pH values measured by Altamont in the field at time of sampling were 6.27 and 7.08 for P-5D and P-7D groundwater, respectively. Note that EGT's laboratory also tested groundwater samples for pH, using modified ASTM D 4972 Method B, and reported a value of 7.4 for both P-5D and P-7D groundwater.

  Total hardness was 1,200 and 316 milligram per liter (mg/l) as calcium carbonate ($CaCO_3$), for P-5D and P-7D groundwater, respectively. TDS was 1,650 and 562 mg/l, for P-5D and P-7D groundwater, respectively.

A complete list of analytical results with detected compounds from P-5D and P-7D groundwater samples is included in **Table 3**, and in **Appendix C**.

Groundwater samples from P-5D and P-7D were used for mixing certain slurry and backfill mixes, and as a permeant to test hydraulic conductivity of backfill mix samples.

- Hydrant Water: As mentioned above, water was collected from an on-Site hydrant. An aliquot, was shipped by Altamont to Lancaster, where it was tested for pH using SM 4500-H+B, total hardness using SM 2340C, and TDS using SM 2540C.

  Target values for hydrant water, as detailed in the Work Plan, included: (i) pH of between 6 and 8; (ii) hardness of less than 150 parts per million (ppm); and (iii) TDS of less than or equal to 500 ppm.

  Analytical results for the hydrant water sample (presented in **Appendix C**) were: Total hardness 32.3 mg/l as $CaCO_3$, TDS 65 mg/l, and pH value of 10.2.

  However, since the 40 CFR Part 136 requires that the pH analytical analysis be performed immediately (within 15 minutes) upon sample collection, and because this was not possible, the pH result measured in the lab may not be used for reporting purposes. The pH value for hydrant water measured by Altamont in the field at the time of sampling was 9.71. Note that EGT also tested hydrant water for pH, using modified ASTM D 4972 Method B, and reported a value of 6.3. Although there was a discrepancy in pH between the various testing methods, the mix design and compatibility test results should not be negatively impacted as long as the pH of the mix water is greater than 6.

  Hydrant water was used for mixing certain slurry and backfill mixes.

- Bentonite: Premium Grade Wyoming bentonite with a trade name of HYDROGEL was used for mixing bentonite and cement-bentonite slurries; and soil-bentonite, cement-bentonite, and soil-cement-bentonite backfill samples. The bentonite was obtained from Wyo-Ben, Inc.

- Cement: Cement used in the testing program, meeting the requirements of ASTM C150 for Portland Cement Type I or Type II, was obtained from a local hardware store.

- Soils: Bulk soil samples obtained along the potential alignment of the perimeter VBW, at both the APA and DA 9, from both the shallow soil/residuum layer and the underlying saprolite/PWR layers were used in preparing the soil-bentonite and soil-cement-bentonite backfill samples. Testing results on bulk samples and composite soil samples are presented in **Section 5**.

4.3 Acceptable Properties

The bentonite and cement-bentonite slurry samples mixed with groundwater and hydrant water were compared visually and through laboratory test results to each other. In addition, soil-bentonite, cement-bentonite, and soil-cement-bentonite backfill samples prepared with groundwater or hydrant water were compared visually and through laboratory test results to each other. The laboratory test results from the slurry samples and backfill samples were also evaluated against design standards for certain key index properties presented in the next section.

Target values were selected for several key properties of **bentonite slurries**, in accordance with applicable American Petroleum Institute (API) Specification Section 13B-1 (March 2009), including the following:

Unit Weight	$\geq$ 64.5 pounds per cubic foot (pcf) at 65º F
Marsh Funnel Viscosity	$\geq$ 40 seconds at 65º F
pH	7 to 10
Filtrate Loss	$\leq$ 20 milliliters (ml) at 100 pounds per square inch (psi) in 30 minutes

Target values were selected for several key properties of **cement-bentonite slurries**, in accordance with applicable API Specification Section 13B-1 (March 2009), including the following:

Unit Weight	> 64.5 pcf at 65º F
Marsh Funnel Viscosity	> 40 seconds at 65º F

Target values for unconfined compressive strength of **soil-cement-bentonite** backfill mixes, in accordance with ASTM D 2166, were selected as follows:

Compressive Strength	>7 psi (after 7 days curing)
Compressive Strength	>15 psi (after 28 days curing)

Target values for unconfined compressive strength of **cement-bentonite** backfill mixes, in accordance with ASTM D 2166, were selected as follows:

Compressive Strength	>7 psi (after 7 days curing)
Compressive Strength	>20 psi (after 28 days curing)

The typical range of hydraulic conductivity values achieved by use of a constructed VBW is $1x10^{-5}$ cm/sec to $1x10^{-8}$ cm/sec (Evans, 1994). As indicated in the Companies response (on 18 October 2013) to the EPA 5 September 2013 comments, the desired hydraulic conductivity of the VBW backfill mixes is anticipated to be on the order of $1x10^{-6}$ cm/sec. A target hydraulic conductivity value is discussed in the conclusion of this report.

5. BACKFILL SOIL PROPERTY TESTING

Samples from the bulk soil obtained at boring locations VBW-2, VBW-4, VBW-5, VBW-6, VBW-8, VBW-9, VBW-11, VBW-12, VBW-14, VBW-17, and VBW-18 were selected for geotechnical laboratory testing to confirm agreement with the SPT sample test results.

General depth of bulk samples obtained was noted during collection of samples on Site. **Table 4** summarizes the various bulk sample depths, correlation with identified soil layers, and results of geotechnical index property testing (i.e., grain size distribution, Atterberg limits, moisture content, and soil classification).

The bulk composite samples from the upper residuum layer and the underlying saprolite/PWR layers obtained for the barrier wall mix design and compatibility testing indicated agreement with corresponding SPT test results, as shown on **Figure 6**, with residuum bulk samples having fines content values between 37% and 70%, and saprolite/PWR bulk samples having fines content values between 38% and 54%. Organic content (ASTM D2974) on select residuum bulk soil samples varied from 2.8% to 6.5%, and as such was not expected to negatively affect the hydraulic conductivity of the VBW.

Subsequently, a composite soil (CS) sample was prepared from bulk soil samples in the residuum layer (i.e., CS-1), and a second CS sample was prepared from bulk samples in the saprolite/PWR layers (i.e., CS-2). A third composite sample was prepared proportionally to represent the vertical mix of all soil layers along the potential alignment of the perimeter VBW (i.e., CS-3). Geotechnical property testing results of all composite soil samples are summarized in **Table 5**, and a comparison of fines contents results with bulk samples is shown on **Figure 7**.

Hydraulic conductivity testing (ASTM D5084) was also performed on reconstituted CS-2 soil (i.e., representative of saprolite/PWR material), using two levels of compaction effort, with de-aired de-ionized water as permeant. The measured hydraulic conductivity values under a consolidation pressure of 10 pounds per square inch (psi) varied between 3.1×10^{-7} to 4.3×10^{-7} cm/sec. These values do not represent estimates of the in situ soil properties. Rather, they are measurements from re-constituted samples of the saprolite/PWR material and provide evaluation of the material's hydraulic conductivity if the soil is re-compacted.

Based on the measured index properties of the bulk soil samples obtained along the potential alignment of the perimeter VBW, there was no significant difference between critical subsurface stratigraphic conditions at the APA and DA 9. Given that the fines contents results of all three composite samples (i.e., 51.3%, 42.2%, and 41.7% for CS-1, CS-2, and CS-3 respectively) were similar and all greater than 20%, it is anticipated that no supplemental soils from other sources would be required for preparing soil-bentonite and soil-cement-bentonite backfill material to achieve the specified hydraulic conductivity and minimum index properties for the backfill. As such, the remaining parts of the testing program were done using composite sample CS-3, as a representative soil of the full depth of the perimeter VBW along the whole potential alignment.

Complete test results of bulk and composite soil samples are presented in **Appendix B**.

6. BENTONITE AND CEMENT-BENTONITE SLURRY MIX DESIGN AND PROPERTY TESTING

A total of three mixes of bentonite slurry (i.e., B1-Hydrant Water[HW], B2-HW, and B3-HW) and three mixes of cement-bentonite slurry (i.e., CB1-HW, CB2-HW, and CB3-HW) were prepared using hydrant water and a mechanical mixer. The three bentonite slurry mixes contained 4-, 5-, and 6-percent bentonite by weight. The three cement-bentonite slurry mixes contained a cement to water ratio of between 0.16 and 0.21, in combination with 5- and 6-percent bentonite by weight. Samples of the hydrated slurries were tested for density, Marsh funnel viscosity, and filtrate loss as described in API Specifications Section 13B-1, and for pH as per modified ASTM D4972 method B.

While there is no intent to use impacted groundwater to prepare the bentonite slurry or cement-bentonite slurry that would be used in constructing the potential perimeter VBW, samples of bentonite and cement were also hydrated using Site P-5D and P-7D groundwater samples as a severe test of material compatibility (i.e., two samples for each of the hydrant water slurry mixes described previously, half hydrated with groundwater from P-5D and half hydrated with groundwater from P-7D). Six bentonite slurry mixtures (i.e., B1-Groundwater[GW]1, B1-GW2, B2-GW1, B2-GW2, B3-GW1, and B3-GW2) and six cement-bentonite slurry mixtures (i.e., CB1-GW1, CB1-GW2, CB2-GW1, CB2-GW2, CB3-GW1, and CB3-GW2) were prepared and tested for density, Marsh funnel viscosity, filtrate loss, and pH.

After review of initial test results, additional samples (i.e., B4-HW, B4-GW1, B5-HW, B5-GW1, and CB4-HW) were requested with higher bentonite content of 7- and 8-percent. **Table 6** summarizes the various slurry mix designs property and compatibility testing results.

All sample slurry mixes were placed in 1500 cubic centimeter (cc) glass tubes and observed for up to 120 days for changes in free water content, flocculation, and other changes that may indicate that problems could occur with the field application of particular mixtures. During the observation period, various visual changes were noted on a regular basis. In general, for bentonite slurry mixes, higher percentages of bentonite resulted in less sedimentation. Bentonite slurries prepared with P-5D groundwater showed significant sedimentation, in some cases within just an hour of placing the slurry in the observation tubes, as shown in one example presented on

Figure 8. Some minor flocculation was observed in slurries prepared with P-5D groundwater. Thicknesses of water film forming on top of the various bentonite slurries was documented over time by measurement and pictures in **Appendix B**. All cement-bentonite slurries hardened within 7-days and did not exhibit sedimentation or flocculation. Cracks appeared in some of the samples, irrespective of the type of water used, as indicated in observations stated in **Appendix B**.

As summarized in **Table 6**, and based on the target values for key properties of slurries described in **Section 4**, the measured pH was acceptable for all slurries, the unit weights were acceptable for all but one of the cement-bentonite slurries, and only 7- and 8-percent bentonite slurries. Marsh funnel viscosities were acceptable for all but one of the cement-bentonite slurries, and only for bentonite slurries with 6-percent or more bentonite. Filtrate losses were acceptable for all bentonite slurries prepared with hydrant water, and only two of the bentonite slurries prepared with P-7D groundwater, and for none of the slurries prepared with P-5D groundwater.

It is important to note that the measured Marsh funnel viscosities of the bentonite slurry batches hydrated with groundwater were not acceptable. Thus, the groundwater at the Site does appear to impact the ability to produce a viscous bentonite slurry. Furthermore P-5D groundwater caused significant sedimentation in respective bentonite slurry mixes. Groundwater was used in this study for mixing batches of bentonite slurry to simulate “worst” case conditions, even though groundwater from the Site would not be used to prepare bentonite slurry in the field as part of constructing a VBW.

It is anticipated that water from the on-Site hydrant (i.e., hydrant water) would be used for preparing a bentonite slurry or cement-bentonite slurry during construction of the potential VBW at the Site. The laboratory test results presented in **Table 6** indicate that, given the passing mixes, this hydrant water source is expected to result in acceptable hydration and viscosity of the bentonite and cement-bentonite slurry. However, project specifications would need to require that the source water to be tested prior to use.

7. DESIGN MIXES HYDRAULIC CONDUCTIVITY AND STRENGTH TESTING RESULTS

As mentioned in the Work Plan, design mixes considered for the VBW included Soil-Cement-Bentonite (SCB) backfill mixes (i.e., for the case of deep soil in situ mixing), as well as Soil-Bentonite (SB) and Cement-Bentonite (CB) backfill mixes (i.e., for the case of ex situ mixing). The full results of SCB, SB, and CB design mix preparation, testing procedure and results is provided in **Appendix B**. A summary of test results is provided in **Table 7**.

As previously mentioned, composite soil sample CS-3 was used for SCB and SB mixes, since it was representative of the full depth of the potential perimeter VBW along the alignment, and had high fines content (i.e., 41.7%). Soils used in constructing VBWs generally need to have a fines content of at least 20 percent. In addition, it was assumed that permeating the design mixes with groundwater would provide "representative" results, simulating anticipated *in situ* conditions after construction of a VBW.

7.1 Soil-Cement-Bentonite Design Mixes

A total of three SCB backfill design mixes were prepared using the CS-3 representative soil sample mixed with sufficient amount of cement-bentonite slurry prepared by weight (i.e., 7% bentonite by dry weight; cement to water ratio of 0.16, 0.19, and 0.21; and hydrated with hydrant water) to achieve a slump between 4 and 6 inches. The process of slump test calibration used is described in **Appendix B**. Dry bentonite (i.e., 0%, 1% and 2%) was added based on the dry weight of the soil, and thoroughly mixed.

SCB samples were tested for hydraulic conductivity (ASTM D 5084) at 28-days, under a consolidation pressure of 5-psi, using Site P-5D and P-7D groundwater samples as permeant water (i.e., two samples for each of the SCB mixes described previously, half permeated with groundwater from P-5D and half permeated with groundwater from P-7D). The hydraulic conductivity test results of the SCB mixes was in the range of 2.7×10^{-7} to 3.3×10^{-8} cm/sec, with smaller hydraulic conductivity values corresponding to increase dry bentonite and cement content. Hydraulic conductivity was not significantly affected by the type of permeant groundwater. This was a little unexpected because the type of groundwater did have an effect on the slurry property testing (as discussed above in **Section 6**).

Unconfined compressive strength test results at 28-days varied between 56 and 95 psi (i.e., exceeding the requirement of 15psi at 28-days for SCB samples).

7.2 Soil-Bentonite Design Mixes

A total of three SB backfill design mixes were prepared using the CS-3 representative soil sample mixed with sufficient amount of bentonite slurry prepared by weight (i.e., 7% bentonite by dry weight, hydrated with hydrant water) to achieve a slump between 4 and 6 inches. Dry bentonite (i.e., 0%, 1% and 2%) was added based on the dry weight of the soil, and thoroughly mixed.

SB samples were tested for hydraulic conductivity (ASTM D 5084), under a consolidation pressure of 5-psi, using Site P-5D and P-7D groundwater samples as permeant water (i.e., two samples for each of the SB mixes described previously, half permeated with groundwater from P-5D and half permeated with groundwater from P-7D). The hydraulic conductivity test results of the SB mixes was in the range of 8.1×10^{-8} to 3.3×10^{-8} cm/sec. Hydraulic conductivity was not significantly affected by the addition of dry bentonite, or by the type of permeant groundwater. Again, this was a little unexpected because the type of groundwater did have an effect on the slurry property testing (as discussed above in **Section 6**).

7.3 Cement-Bentonite Design Mixes

A total of three CB backfill design mixes were prepared using cement-bentonite slurry prepared by weight (i.e., with 6%, 7%, and 8% bentonite by dry weight; cement to water ratio of 0.16, 0.19, and 0.23; and hydrated with hydrant water). The combinations of bentonite percentage and cement to water ratio are shown in **Table 7**. The cement-bentonite slurry sets up quickly, and therefore cement-bentonite backfill test specimens for unconfined compressive strength and hydraulic conductivity testing were formed immediately after mixing in accordance with laboratory procedures.

CB samples were tested for hydraulic conductivity (ASTM D 5084) at 28-days, under a consolidation pressure of 5-psi, using Site P-5D and P-7D groundwater samples as permeant water (i.e., two samples for each of the CB mixes described previously, half permeated with groundwater from P-5D and half permeated with groundwater from P-7D). The hydraulic conductivity test results of the CB mixes was in the range

of $2.8x10^{-6}$ to $1.3x10^{-6}$ cm/sec. Hydraulic conductivity was not significantly affected by the cement-bentonite slurry composition, or by the type of permeant groundwater.

Unconfined compressive strength test results at 28-days varied between 5.6 and 12.6 psi (i.e., no sample passed the requirement of 20psi at 28-days for CB samples).

8. DESIGN MIXES COMPATIBILITY TESTING RESULTS

While there is no intent to use impacted groundwater to prepare the bentonite slurry or cement-bentonite slurry that would be used in constructing the potential perimeter VBW, samples of bentonite and cement were also hydrated using Site P-5D and P-7D groundwater samples as a severe test of material compatibility to simulate "worst" case conditions.

Table 8 summarizes the compatibility tests performed on the various SCB, SB, and CB backfill mixes to evaluate the compatibility of the backfill mixes with the untreated groundwater. The backfill mixes were evaluated for adverse reactions through visual monitoring and hydraulic conductivity testing (ASTM D5084) following exposure of the mixes to Site groundwater.

As discussed in the Work Plan, the compatibility testing methodology included using: (i) groundwater containing Site COCs to hydrate the bentonite and cement used to produce the SCB, SB, or CB mixes and added to the backfill mixes to achieve the appropriate slump; and (ii) groundwater containing Site COCs as the permeant for the permeability testing. By preparing the test specimen in this manner, the replacement of the pore water is achieved without passing several pore volumes of groundwater containing Site COCs through the sample and steady state conditions are achieved over a shorter testing duration (i.e., several weeks rather than several months). However, the final compatibility test duration remains dependent on the timeframes required to achieve the following steady state criteria: (i) steady state permeability values within +/- 25%; and (ii) agreement between the outflow volume and inflow volume of the permeant within approximately 25%.

8.1 Soil-Cement-Bentonite Compatibility Testing

A total of two SCB backfill design mixes (i.e., SCB-Mix7 and SCB-Mix8) were prepared using the CS-3 representative soil sample mixed with sufficient amount of cement-bentonite slurry prepared by weight (i.e., 7% bentonite by dry weight; cement to water ratio of 0.21; and hydrated with P-5D and P-7D groundwater) to achieve a slump between 4 and 6 inches. Dry bentonite (i.e., 0% and 1%) was added based on the dry weight of the soil, and thoroughly mixed.

SCB samples were tested for hydraulic conductivity (ASTM D 5084) at 28-days, under a consolidation pressure of 5-psi, using Site P-5D and P-7D groundwater samples as permeant water for the SCB-Mix7 and SCB-Mix8, respectively. Testing continued until the hydraulic conductivity of the samples reached steady state as defined previously. The hydraulic conductivity compatibility test results of the SCB mixes was in the range of $1.6x10^{-7}$ to $8.9x10^{-8}$ cm/sec. Hydraulic conductivity was slightly improved by the additions of dry bentonite. However, values from the compatibility testing did not differ from the range of values from the design mix testing phase prepared with hydrant water.

8.2 Soil-Bentonite Compatibility Testing

A total of two SB backfill design mixes (i.e., SB-Mix7 and SB-Mix8) were prepared using the CS-3 representative soil sample mixed with sufficient amount of bentonite slurry prepared by weight (i.e., 7% bentonite by dry weight, hydrated with P-5D and P-7D groundwater) to achieve a slump between 4 and 6 inches. Dry bentonite (i.e., 1% and 2%) was added based on the dry weight of the soil, and thoroughly mixed.

SB samples were tested for hydraulic conductivity (ASTM D 5084), under a consolidation pressure of 5-psi, using Site P-5D and P-7D groundwater samples as permeant water for the SB-Mix7 and SB-Mix8, respectively. Testing continued until the hydraulic conductivity of the samples reached steady state as defined previously. The hydraulic conductivity compatibility test results of the SB mixes was in the range of $1.8x10^{-7}$ to $7.3x10^{-8}$ cm/sec. Hydraulic conductivity was slightly improved by the addition of dry bentonite. Results show a one order of magnitude increase in hydraulic conductivity as compared to design mix prepared with hydrant water.

8.3 Cement-Bentonite Compatibility Testing

A total of four CB backfill design mixes (i.e., CB-Mix9, CB-Mix10, CB-Mix13, and CB-Mix14) were prepared using cement-bentonite slurry prepared by weight (i.e., 6% and 7% bentonite by dry weight; cement to water ratio of 0.19, 0.21, and 0.23; and hydrated with P-5D and P-7D groundwater). The combinations of bentonite percentage and cement to water ratio are shown in **Table 8**. The cement-bentonite slurry sets up quickly, and therefore cement-bentonite backfill test specimens for unconfined compressive strength and hydraulic conductivity testing were formed immediately after mixing in accordance with laboratory procedures.

CB samples were tested for hydraulic conductivity (ASTM D 5084) at 28-days, under a consolidation pressure of 5-psi, using Site P-5D and P-7D groundwater samples as permeant water. Testing continued until the hydraulic conductivity of the samples reached steady state as defined previously. The hydraulic conductivity compatibility test results of the CB mixes was in the range of 9.1×10^{-6} to 3.1×10^{-6} cm/sec. Results show a half-order of magnitude increase in hydraulic conductivity as compared to design mix prepared with hydrant water.

Due to low unconfined compressive strength values in the design mix testing phase, unconfined compressive strength testing for compatibility was also done on CB mixes. Results at 28-days varied between 12.8 and 17 psi (i.e., slightly higher than the CB samples prepared with hydrant water, but still no sample passed the requirement of 20psi at 28-days for CB samples). One additional alternate CB mix was also prepared and tested to confirm the hydraulic conductivity and unconfined compressive strength CB compatibility test results.

9. CONCLUSIONS

The geotechnical and compatibility laboratory testing provided sufficient information to recommend functional bentonite slurry, cement-bentonite slurry, and soil-cement-bentonite, soil-bentonite, or cement-bentonite backfill recipes and provided information on the compatibility of the recommended slurries and backfill mixes with COCs.

9.1 Field Investigation Results

Key findings and conclusions from the field investigation activities (Altamont, 2014), presented in full in **Appendix A**, are set forth below:

- The depth-to-bedrock data from the geotechnical borings were used, in combination with existing depth-to-bedrock data, to develop an updated top of bedrock elevation map for the Back Valley. The results of the investigation showed that depth-to-bedrock is generally shallow in the northern part of the potential perimeter VBW alignment and deeper in the southern part. In 11 out of the 18 borings, competent bedrock was encountered at a depth of 1.1 to 33.4 feet deeper than the top of bedrock, mainly along the southern part of the potential perimeter VBW alignment. The top of bedrock was competent at the other seven boring locations.

- The variability in thickness of the transition zone and depths to bedrock and competent bedrock observed in the geotechnical borings suggests that differential weathering is widespread beneath the Back Valley. An extreme example of this condition was observed in boring VBW-10 where a 2-foot thick rock lens was encountered at a relatively shallow depth of 37 feet and was underlain by over 52 feet of very soft un-lithified materials interlayered with PWR and rock with low RQD values. At a nearby boring (VBW-16), located approximately 15 feet south of VBW-10, this rock lens was not encountered and the depth to competent bedrock (61.5 feet below ground surface [ft-bgs]) was about 30 feet deeper in elevation than observed in VBW-10. This observed variability suggests that additional lenses of rock may exist between the borings that were installed along the potential perimeter VBW alignment

- In general, rippability, describing the relative ease with which the PWR and bedrock can be removed by an appropriate excavator with removal tool, is greatest in areas where fracture frequency is the highest, weathering is more advanced, and planar features are advantageously oriented. Based on the field investigation, the PWR layer at the boring locations appears to be in general easily rippable. For the bedrock layer, the above characteristics associated with higher rippability were observed at the southern part of the potential alignment of the perimeter VBW. The southern part is also a location where the depth-to-bedrock is deep, resulting in potential rock lenses in the saprolite and PWR layers. However, the ability to rip the bedrock surface would depend upon the depth of excavation and equipment used.

9.2 Laboratory Testing Results

The properties of the bentonite slurry and cement-bentonite slurry mixes, and the hydraulic conductivity and strength properties of the various backfill mixtures were evaluated to assess their suitability for use in constructing the barrier wall. The potential incompatibility of the mixes with the Site groundwater and hydrant water was also evaluated. Key findings and conclusions based on the results of the completed mix design and compatibility testing program are set forth below, including:

- Trial bentonite slurry mixes were produced using 4%, 5%, 6%, 7% and 8% bentonite. The bentonite slurry mixes containing 7% and 8% bentonite generally met target property values. Based on these results, a minimum of 7% dry bentonite for the slurry mix is recommended for the Site.

- Hydrant water is acceptable to prepare the bentonite slurry based on the fact that trial bentonite slurry batches mixed with this water source met target index property values.

- Soil-cement-bentonite and soil-bentonite backfill samples were produced using a composite soil sample representative of the full depth and alignment of the potential perimeter VBW. The backfill samples were evaluated for hydraulic conductivity and the results were in the range of 2.7×10^{-7} to 3.3×10^{-8} cm/sec (i.e., lower than the desired hydraulic on the order of 1×10^{-6} cm/sec). The soil-cement-bentonite backfill samples tested also achieved the target minimum compressive strength requirement. Thus, it is anticipated that soils from sources

other than the excavation of the trench for the VBW would not be required to achieve the specified hydraulic conductivity value and the minimum index properties for the backfill material.

- Cement-bentonite backfill samples were produced and evaluated for hydraulic conductivity and the results were in the range of 2.8×10^{-6} to 1.3×10^{-6} cm/sec (i.e., greater than the desired hydraulic conductivity on the order of 1×10^{-6} cm/sec). Also, the cement-bentonite backfill samples tested did not pass the target minimum compressive strength requirement.

- For soil-cement-bentonite samples, hydraulic conductivity values from the compatibility testing (i.e., using representative impacted Site groundwater as mix water) did not differ from the range of values for the design mix testing phase prepared with hydrant water. Thus the Site groundwater did not negatively impact (i.e., increase) the hydraulic conductivity of the soil-cement-bentonite samples.

- For soil-bentonite backfill samples, hydraulic conductivity values from the compatibility testing (i.e., using representative impacted Site groundwater as mix water) increased as compared to values for the design mix testing phase prepared with hydrant water. Thus, the Site groundwater negatively impacted (i.e., increased) the hydraulic conductivity of the soil-bentonite backfill samples, which was slightly improved by the additions of dry bentonite.

- For cement-bentonite samples, hydraulic conductivity values from the compatibility testing (i.e., using representative impacted Site groundwater as mix water) increased slightly as compared to values for the design mix testing phase prepared with hydrant water.

Hydraulic conductivity testing performed on re-constituted CS-2 soil (i.e., representative of saprolite/PWR material), using two levels of compaction effort, under a consolidation pressure of 10 psi, varied between 3.1×10^{-7} to 4.3×10^{-7} cm/sec. These values do not represent estimates of the in situ soil properties. Rather, they are measurements from re-constituted samples of the saprolite/PWR material and provide evaluation of the hydraulic conductivity if the soil is re-compacted.

Given the above result, bentonite slurry should contain a minimum of 7% bentonite. Soil-cement-bentonite and soil-bentonite mixes were shown to achieve generally acceptable values of hydraulic conductivity and strength, with the soil-cement-bentonite mixes being less affected by the groundwater quality than the soil-bentonite mixes. Addition of dry bentonite may be used to improve the hydraulic conductivity performance of the mix.

Finally, a maximum hydraulic conductivity target of $1x10^{-7}$ cm/sec is reasonable for the soil-cement-bentonite and soil-bentonite backfill mixes for constructing a VBW at the Site.

9.3 Discussion of VBW Constructability and Anticipated Performance

The potential VBW would (at a minimum) be installed to (founded on) the top of the bedrock, to the extent feasible. It is not anticipated that the VBW would be installed to the top of competent bedrock in all locations along the potential perimeter alignment, given the variable thickness of the fractured bedrock.

Field investigation results indicate the existence, in some instances, of isolated rock lenses within the saprolite layer. The observed rock lenses were on the south side of the potential perimeter VBW alignment, corresponding also to the largest depths of the potential VBW. The lateral extent of such rock lenses is unknown, and additional lenses may also exist between the boring locations. This imposes a potential difficulty in excavating the saprolite and PWR and constructing the wall down to the top of bedrock.

Furthermore, fractured bedrock, as defined in this report, varies in thickness along the potential perimeter VBW alignment. The south side corresponds to areas of advanced weathering, indicated by the largest observed thickness of fractured bedrock (i.e., between top of bedrock and to the top of competent bedrock), which might correspond to increased flow beneath the base of the VBW.

The geotechnical borings performed as part of this report, defined in the Work Plan as Stage I borings, comprised advancement of boreholes at select locations at approximate 200-ft center to center spacing, and coring 10 ft into competent bedrock. Stage II borings comprise additional borings advanced at a 50- to 100-ft center to center spacing, and would be recommended prior to construction, if the potential perimeter VBW is selected as the preferred remedial alternative, to gain a better understanding about the

frequency of occurrence of rock lenses, and variability in thickness of the fractured bedrock.

The laboratory testing results suggest that either ex situ mixing (i.e., open trench technology, using soil-bentonite mix) or in situ mixing (i.e., deep soil mixing, using soil-cement-bentonite mix) are viable options to achieve the hydraulic conductivity performance criteria.

The findings presented in this report were evaluated in combination with the results of groundwater flow modeling analysis to further evaluate the anticipated overall performance of the potential VBW.

10. REFERENCES

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TABLES

Table 1. Vertical Barrier Wall Borings Location and Information
Chemtronics Site, Swannanoa, North Carolina

Borehole ID	Northing	Easting	Ground Surface Elevation (ft MSL)	Total Depth (ft-bgs)	Depth to Top of Saprolite (ft-bgs)	Depth to Top of PWR[8] (ft-bgs)	Depth to Bedrock[9] (ft-bgs)	Depth to Competent Bedrock[9] (ft-bgs)	Total Zone C Thickness[10]	Zone CRI Thickness[11]	Bedrock Elevation (ft MSL)	Elevation of Competent Bedrock (ft MSL)	Depth to Moist Soil (ft-bgs)	Depth to Water Measured Prior to Coring (ft-bgs)	SPT Sample Collection Interval
VBW-1	703749.746	979144.857	2413.99	44.2	18	24.8	28.5	34.7	9.9	6.2	2385.5	2379.3	15	22.2	Continuous
VBW-2	703902.771	979315.793	2415.77	19.9	-	7	10	10	3	0	2405.8	2405.8	-	-	5-ft
VBW-3	704037.179	979494.251	2406.35	49.3	12	37.5	39	39	1.5	0	2367.4	2367.4	12	34.5	Continuous
VBW-4A[12]	703892.542	979554.931	NS	3.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5-ft
VBW-4B	703892.542	979554.931	2395.01	88.4	12.5	62.5	64.5	78.3	15.8	13.8	2330.5	2316.7	12.5	37	5-ft
VBW-5	703773.191	979621.627	2389.54	89	19	64	78	79.1	15.1	1.1	2311.5	2310.4	19	25.6	5-ft
VBW-6	703670.325	979719.962	2379.7	88.7	18.5	63.5	77.5	77.5	14	0	2302.2	2302.2	18.5	26.4	5-ft
VBW-7	703555.572	979825.251	2373.22	89.6	24	64.5	75	80	15.5	5	2298.2	2293.2	24	56.7	Continuous
VBW-8	703502.731	979705.987	2362.4	80	19	47	80.5	85.1	38.1	4.6	2281.9	2277.3	34	33.3	5-ft
VBW-9	703439.717	979570.570	2361.9	129.1	14	74	85.5	118.9	44.9	33.4	2276.4	2243	14	7.2	5-ft
VBW-10[7,13]	703380.607	979452.269	2366.59	104.8	6	59	89	94	35	5	2277.6	2272.6	10.5	13.6	Continuous
VBW-11	703491.984	979359.640	2376.81	113.5	23	78	92.5	92.5	14.5	0	2284.3	2284.3	8	37	5-ft
VBW-12	703649.160	979240.887	2395.46	39	13	-	27.5	29.1	1.6	1.6	2368	2366.4	10	15.8	5-ft
VBW-13	703266.627	979360.421	2359.69	65	18	33	34	55	22	21	2325.7	2304.7	6	6.9	Continuous
VBW-14	703340.448	979476.456	2349.98	84.7	9	36	69.7	74.7	38.7	5	2280.3	2275.3	9	21.2	Continuous
VBW-15A[12]	703269.218	979508.080	NS	10.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5-ft
VBW-15B[12]	NS	NS	NS	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5-ft
VBW-15C	703269.218	979508.080	2365.36	109	10.5	51	95	95	44	0	2270.4	2270.4	7.5	43.7	Continuous
VBW-16[13]	703206.833	979399.652	2367.31	73.8	22.5	45	61.5	61.5	16.5	0	2305.8	2305.8	12.5	15.5	Continuous
VBW-17[13]	703385.003	979671.118	2356.21	88.3	13	63	76.5	76.5	13.5	0	2279.7	2279.7	8	12.1	5-ft
VBW-18A[12]	703473.308	979799.478	NS	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5-ft
VBW-18B[13]	703473.308	979799.478	2361.11	99	13	41	87	89.4	48.4	2.4	2274.1	2271.7	23	20.4	5-ft

Notes:
1. **Source:** *Back Valley Geotechnical Field Investigation Summary* report (Altamont 2014), presented herein as Appendix A.
2. ft MSL - feet above mean sea level.
3. ft-bgs - feet below ground surface.
4. SPT - Standard penetration test.
5. NA - Not applicable.
6. NS - Not surveyed.
7. VBW-10 encountered a lens of rock approximately 2-feet thick at 37 ft-bgs. From 37 ft-bgs to total depth, the hole was advanced using coring techniques.
8. PWR - Partially weathered rock designation determined by blow counts of 50 over 6 inches. In some instances, PWR was defined by field observations made by Altamont Staff.
9. Bedrock/Competent Bedrock - Bedrock is defined as the depth at which auger refusal is reached and cored intervals reveal no unconsolidated materials at lower depths. Competent bedrock is defined as the depth at which an RQD of 70% or greater is encountered over a cored interval of 10 feet.
10. Zone C defined as the interval between PWR (i.e. blow counts of 50 over 6 inches prior to auger refusal) and the occurrence of competent bedrock, defined above.
11. Zone CRI - Zone C Rock Interval defined as the interval between bedrock and competent bedrock, defined above.
12. Borings VBW-4A, VBW-15A, VBW-15B, and VBW-18A encountered shallow subsurface obstructions and were abandoned and relocated. No boring log was made for VBW-15B.
13. VBW-10, VBW-16, VBW-17, and VBW-18B were converted to monitoring wells MW254-L25CD, MW255-L25CD, MW256-M25CD, and MW257-M25CD, respectively.

Table 2. Geotechnical Standard Penetration Test (SPT) Samples Index Property Testing Results
Chemtronics Site, Swannanoa, North Carolina

Sample ID	From Depth (ft-bgs)	To Depth (ft-bgs)	Moisture Content (%)	Grain Size Analysis			Atterberg Limits			Engineering Classification
				Gravel Content (%)	Sand Content (%)	Fines Content (%)	LL	PL	PI	
VBW-1-3-4.5	3	4.5	21.8	5	28.8	66.2	57	29	28	CH Sandy Fat Clay
VBW-1-7.5-9	7.5	9	25.9							
VBW-1-15-16.5	15	16.5	55.2	0.1	28.5	71.4	93	66	27	MH Elastic Silt With Sand
VBW-1-18-19.5	18	19.5	48.4							
VBW-1-22.5-24	22.5	24	32.5	0.1	23.8	76.1	52	36	16	MH Elastic Silt
VBW-1-25.5-27	25.5	27	9.3	35.4	38.4	26.2	NP	NP	NP	SM Silty Sand With Gravel
VBW-2-4-5.5	4	5.5	10.4	0	44.4	55.6	NP	NP	NP	ML Sandy Silt
VBW-2-9-10.5	9	10.5	9.8							
VBW-3-1.5-3	1.5	3	26.8	0.9	26.3	72.8	61	33	28	MH Elastic Silt With Sand
VBW-3-6-7.5	6	7.5	18.6	1.3	56.5	42.2	NP	NP	NP	SM Silty Sand
VBW-3-19.5-21	19.5	21	41	1.4	53.4	45.2	72	58	14	SM Silty Sand
VBW-3-27-28.5	27	28.5	20.8							
VBW-3-36-37.5	36	37.5	56.1	0.6	87	12.4	NP	NP	NP	SM Silty Sand
VBW-4B-2.5-4	2.5	4	4.5	71.5	13.7	14.8	47	29	18	GM Silty Gravel
VBW-4B-12.5-14	12.5	14	18.1	0.4	68.6	31	NP	NP	NP	SM Silty Sand
VBW-4B-47.5-49	47.5	49	21.2	3.6	67.1	29.3	NP	NP	NP	SM Silty Sand
VBW-5-9-10.5	9	10.5	22	7.5	58.8	33.7	NP	NP	NP	SM Silty Sand
VBW-5-19-20.5	19	20.5	39.2							
VBW-5-29-30.5	29	30.5	36.9	3.6	61.6	34.8	NP	NP	NP	SM Silty Sand
VBW-5-39-40.5	39	40.5	38.3	0.1	65.6	34.3	NP	NP	NP	SM Silty Sand
VBW-5-59-60.5	59	60.5	19.6	6.2	57.3	36.5	NP	NP	NP	SM Silty Sand
VBW-5-74-75.5	74	75.5	18.6	0	68.7	31.3	NP	NP	NP	SM Silty Sand
VBW-6-3.5-5	3.5	5	11.7	44.2	26.7	29.1	NP	NP	NP	GM Silty Gravel With Sand
VBW-6-8.5-10	8.5	10	27.6	1.6	59.4	39	NP	NP	NP	SM Silty Sand
VBW-6-33.5-35	33.5	35	31							
VBW-6-43.5-45	43.5	45	11.7	57.1	17.5	25.4	NP	NP	NP	GM Silty Gravel With Sand
VBW-6-53.5-55	53.5	55	14.9	5.5	70.9	23.6	NP	NP	NP	SM Silty Sand
VBW-6-73.5-75	73.5	75	8	2.5	68.7	28.8	NP	NP	NP	SM Silty Sand
VBW-7-27-28.5	27	28.5	26.7	0.2	62.1	37.7	NP	NP	NP	SM Silty Sand
VBW-7-34.5-36	34.5	36	15.9							
VBW-7-54-55.5	54	55.5	16.6	1.3	73.8	24.9	NP	NP	NP	SM Silty Sand
VBW-7-61.5-63	61.5	63	18.1							
VBW-7-67.5-69	67.5	69	18.7	0.5	46.2	53.3	NP	NP	NP	ML Sandy Silt
VBW-7-75-76.5	75	76.5	14.3	11.7	44.7	43.6	NP	NP	NP	SM Silty Sand
VBW-8-4-5.5	4	5.5	21.6	7.2	38.5	54.3	46	23	23	CL Sandy Lean Clay
VBW-8-9-10.5	9	10.5	17.1	32.1	43.9	24	NP	NP	NP	SM Silty Sand With Gravel
VBW-8-29-30.5	29	30.5	30.5	0	69.6	30.4	NP	NP	NP	SM Silty Sand
VBW-8-54-55.5	54	55.5	9.1							
VBW-8-74-75.5	74	75.5	12.4	34.1	42.1	23.8	NP	NP	NP	SM Silty Sand With Gravel
VBW-9-4-5.5	4	5.5	18.9	22.5	22.7	54.8	57	32	25	MH Sandy Elastic Silt With Gravel
VBW-9-34-35.5	34	35.5	27.7	3.3	60.1	36.6	NP	NP	NP	SM Silty Sand
VBW-9-44-45.5	44	45.5	18.8	4.6	63.1	32.3	NP	NP	NP	SM Silty Sand
VBW-9-79-80.5	79	80.5	11.6	0.4	62.1	37.5	NP	NP	NP	SM Silty Sand
VBW-10-4.5-6	4.5	6	35.7							
VBW-10-13.5-15	13.5	15	36	0.1	37.5	62.4	NP	NP	NP	ML Sandy Silt
VBW-10-19.5-21	19.5	21	47.1							
VBW-10-22.5-24	22.5	24	42.3	0	69.4	30.6	NP	NP	NP	SM Silty Sand
VBW-10-27-28.5	27	28.5	38.7	2.5	68.6	28.9	NP	NP	NP	SM Silty Sand
VBW-11-0-1.5	0	1.5	23.9							
VBW-11-8-9.5	8	9.5	42	0.2	31	68.8	NP	NP	NP	ML Sandy Silt
VBW-11-23-24.5	23	24.5	25.6	2.7	68.8	28.5	NP	NP	NP	SM Silty Sand
VBW-11-33-34.5	33	34.5	23.7							
VBW-11-48-49.5	48	49.5	23.1	0	68.8	31.2	NP	NP	NP	SM Silty Sand
VBW-11-73-74.5	73	74.5	17.7	0.6	63.4	36	NP	NP	NP	SM Silty Sand
VBW-11-88-89.5	88	89.5	13.9	5.7	75.5	18.8	NP	NP	NP	SM Silty Sand
VBW-12-4-5.5	4	5.5	23.5							

Table 2. Geotechnical Standard Penetration Test (SPT) Samples Index Property Testing Results
Chemtronics Site, Swannanoa, North Carolina

Sample ID	From Depth (ft-bgs)	To Depth (ft-bgs)	Moisture Content (%)	Grain Size Analysis			Atterberg Limits			Engineering Classification
				Gravel Content (%)	Sand Content (%)	Fines Content (%)	LL	PL	PI	
VBW-12-13-14.5	13	14.5	7	29.1	55.5	15.4	NP	NP	NP	SM Silty Sand With Gravel
VBW-13-0-1.5	0	1.5	32.6							
VBW-13-3-4.5	3	4.5	32.6	4.8	41.2	54	40	26	14	CL Sandy Lean Clay
VBW-13-7.5-9	7.5	9	53.2							
VBW-13-16.5-18	16.5	18	8.6	57.3	29.7	13	NP	NP	NP	GM Silty Gravel With Sand
VBW-13-25.5-27	25.5	27	45.3	0	53.6	46.4	NP	NP	NP	SM Silty Sand
VBW-13-33-34.5	33	34.5	12.9	4.7	73.8	21.5	NP	NP	NP	SM Silty Sand
VBW-14-3-4.5	3	4.5	24.7	8.1	62.1	29.8	46	33	13	SM Silty Sand
VBW-14-12-13.5	12	13.5	56.3	1.5	42	56.5	NP	NP	NP	ML Sandy Silt
VBW-14-25.5-27	25.5	27	27.6							
VBW-14-48-49.5	48	49.5	16.6	0	53	47	NP	NP	NP	SM Silty Sand
VBW-14-49.5-51	49.5	51	16.9	0	63.3	36.7	NP	NP	NP	SM Silty Sand
VBW-14-63-64.5	63	64.5	19.9	0	61.8	38.2	NP	NP	NP	SM Silty Sand
VBW-15A-0-1.5	0	1.5	24.9							
VBW-15C-7.5-9	7.5	9	21.1	3	60.9	36.1	NP	NP	NP	SM Silty Sand
VBW-15C-10.5-12	10.5	12	20.2							
VBW-15C-15-16.5	15	16.5	30.3	3.1	66.5	30.4	NP	NP	NP	SM Silty Sand
VBW-15C-19.5-21	19.5	21	31.2							
VBW-15C-25.5-27	25.5	27	31.7	2.6	50.5	46.9	38	32	6	SM Silty Sand
VBW-15C-28.5-30	28.5	30	15.9							
VBW-15C-37.5-39	37.5	39	19.3	0.3	72.5	27.2	NP	NP	NP	SM Silty Sand
VBW-15C-45-46.5	45	46.5	14.1	0.5	60.8	38.7	NP	NP	NP	SM Silty Sand
VBW-15C-57-58.5	57	58.5	10.2	0.1	64.9	35	NP	NP	NP	SM Silty Sand
VBW-15C-66-67.5	66	67.5	10.9	0	65.7	34.3	NP	NP	NP	SM Silty Sand
VBW-15C-72-73.5	72	73.5	5.4							
VBW-15C-73.5-75	73.5	75	14.1	10.2	58.2	31.6	NP	NP	NP	SM Silty Sand
VBW-15C-87-88.5	87	88.5	12.7							
VBW-15C-94.5-96	94.5	96	6.3	67.9	19.8	12.3	NP	NP	NP	GM Silty Gravel With Sand
VBW-16-1.5-3	1.5	3	34.1	1	34.9	64.1	61	31	30	CH Sandy Fat Clay
VBW-16-6-7.5	6	7.5	26.2							
VBW-16-12-13.5	12	13.5	36.4	0.8	45.4	53.8	NP	NP	NP	ML Sandy Silt
VBW-16-16.5-18	16.5	18	35.9	0	62.7	37.3	NP	NP	NP	SM Silty Sand
VBW-16-30-31.5	30	31.5	18	0	73	27	NP	NP	NP	SM Silty Sand
VBW-16-36-37.5	36	37.5	15.4							
VBW-16-43.5-45	43.5	45	15.6	0.8	70.3	28.9	NP	NP	NP	SM Silty Sand
VBW-16-61.5-63	61.5	63	20.7	0.3	47.4	52.3	NP	NP	NP	ML Sandy Silt
VBW-17-3-4.5	3	4.5	42.2							
VBW-17-13-14.5	13	14.5	20.2	0.3	69.2	30.5	NP	NP	NP	SM Silty Sand
VBW-17-23-24.5	23	24.5	19.2							
VBW-17-38-39.5	38	39.5	21.4	0.7	69.4	29.9	NP	NP	NP	SM Silty Sand
VBW-17-43-44.5	43	44.5	15.8							
VBW-17-63-64.5	63	64.5	13.6	4.4	68.5	27.1	NP	NP	NP	SM Silty Sand
VBW-18B-13-14.5	13	14.5	26.8	0	49.9	50.1	NP	NP	NP	ML Sandy Silt
VBW-18B-23-24.5	23	24.5	20	0	76.2	23.8	NP	NP	NP	SM Silty Sand
VBW-18B-43-44.5	43	44.5	13.6	1.7	61.4	36.9	NP	NP	NP	SM Silty Sand
VBW-18B-58-59.5	58	59.5	15.1							
VBW-18B-68-69.5	68	69.5	17.1	1.2	55.1	43.7	NP	NP	NP	SM Silty Sand
VBW-18B-83-84.5	83	84.5	12.3	0.8	62	37.2	NP	NP	NP	SM Silty Sand

Notes:
1. ft-bgs - feet below ground surface.
2. LL - Liquid Limit.
3. PL - Plastic Limit.
4. PI - Plasticity Index.
5. NP - Non Plastic.

TABLE 3. Summary of P-5D and P7-D Wells Groundwater Analytical Data
Chemtronics Site, Swannanoa, NC

			Sample:	P-5D Groundwater	P-5D Filtered Groundwater	P-7D Groundwater	P-7D Filtered Groundwater
			Date Collected:	1/10/2014	1/10/2014	1/10/2014	1/10/2014
			Lab ref no. :	7333520	7333521	7333522	7333523
Parameter Name	**CAS Number**	**Method**	**Units**	**Results**			
Benzene	71-43-2	SW-846 8260B 25mL purge	µg/l	380		ND	
t-Butyl Alcohol	75-65-0	SW-846 8260B 25mL purge	µg/l	180,000		ND	
Chloroform	67-66-3	SW-846 8260B 25mL purge	µg/l	ND		19	
Cyclohexane	110-82-7	SW-846 8260B 25mL purge	µg/l	93 J		ND	
1,2-Dichloroethane	107-06-2	SW-846 8260B 25mL purge	µg/l	6,700		3,900	
cis-1,2-Dichloroethene	156-59-2	SW-846 8260B 25mL purge	µg/l	ND		140	
Methyl Tertiary Butyl Ether	1634-04-4	SW-846 8260B 25mL purge	µg/l	1,300		ND	
Methylene Chloride	75-09-2	SW-846 8260B 25mL purge	µg/l	ND		5.3 J	
Tetrachloroethene	127-18-4	SW-846 8260B 25mL purge	µg/l	ND		65	
Tetrahydrofuran	109-99-9	SW-846 8260B 25mL purge	µg/l	ND		190	
Trichloroethene	79-01-6	SW-846 8260B 25mL purge	µg/l	320		2,500	
o-Xylene	95-47-6	SW-846 8260B 25mL purge	µg/l	ND		9.2 J	
1,3-Dinitrobenzene	99-65-0	SW-846 8330	µg/l	0.33 J		ND	
1,4-Dinitrobenzene	100-25-4	SW-846 8330	µg/l	0.82		0.78	
Nitroglycerin	55-63-0	SW-846 8330	µg/l	ND		14 J	
RDX	121-82-4	SW-846 8330	µg/l	ND		180	
1,3,5-Trinitrobenzene	99-35-4	SW-846 8330	µg/l	1.1		ND	
2,4,6-Trinitrotoluene	118-96-7	SW-846 8330	µg/l	1.7		0.66	
Perchlorate	14797-73-0	SW-846 6850 1/2007	µg/l	ND		9,900	
Ethene	74-85-1	SW-846 8015B modified	µg/l	21		ND	
Methane	74-82-8	SW-846 8015B modified	µg/l	16		23	
Bromide	24959-67-9	EPA 300.0	mg/l	110		ND	
Chloride	16887-00-6	EPA 300.0	mg/l	38.3		6.7	
Nitrate Nitrogen	14797-55-8	EPA 300.0	mg/l	ND		28.9	
Nitrite Nitrogen	14797-65-0	EPA 300.0	mg/l	ND		ND	
Sulfate	14808-79-8	EPA 300.0	mg/l	782		60.1	
Total Organic Carbon	n.a.	SM 5310 C-2000	mg/l	61.0		5.8	
Total Hardness	471-34-1	SM 2340 C-1997	mg/l as CaCO3	1,200		316	
Total Dissolved Solids	n.a.	SM 2540 C-1997	mg/l	1,650		562	
Aluminum	7429-90-5	SW-846 6010B	mg/l		ND		ND
Calcium	7440-70-2	SW-846 6010B	mg/l		270		96.2
Iron	7439-89-6	SW-846 6010B	mg/l		18.7		ND
Magnesium	7439-95-4	SW-846 6010B	mg/l		101		12.9
Manganese	7439-96-5	SW-846 6010B	mg/l		20.4		0.63
Potassium	7440-09-7	SW-846 6010B	mg/l		5.41		3.52
Sodium	7440-23-5	SW-846 6010B	mg/l		16.7		46.6

Notes:
1. mg/L - milligrams per liter.
2. µg/L - micrograms per liter.
3. ND - Analyte not detected above the method detection limit.
4. J - Laboratory data qualifier used for parameters detected at estimated concentrations above method detection limit but below method reporting limit.

Table 4. Geotechnical Bulk Samples Property Testing Results
Chemtronics Site, Swannanoa, North Carolina

Sample ID	From Depth (ft bgs)	To Depth (ft bgs)	Moisture Content (%)	Grain Size Analysis			Atterberg Limits			Engineering Classification	Organic Content (%)
				Gravel Content (%)	Sand Content (%)	Fines Content (%)	LL	PL	PI		
VBW-2-Residuum/PWR	0	9									
VBW-4B-Residuum	0	12.5	17.8	12.9	36.6	50.5	NP	NP	NP	ML Sandy Silt	2.8
VBW-4B-Saprolite	12.5	69.5	25.7	0.7	61	38.3	NP	NP	NP	SM Silty Sand	
VBW-5-Residuum	0	19									
VBW-5-Saprolite	19	64									
VBW-5-PWR	64	78									
VBW-6-Residuum	0	18.5	16.7	31.1	31.7	37.2	NP	NP	NP	SM Silty sand with gravel	3.9
VBW-6-Saprolite	18.5	55	28.5	1	46.3	52.7	NP	NP	NP	ML Sandy Silt	
VBW-6-PWR	55	77.5	35.6	0.7	60.4	38.9	NP	NP	NP	SM Silty sand	
VBW-8-Residuum	0	19									
VBW-8-Saprolite	19	49									
VBW-8-PWR	49	80									
VBW-9-Residuum	0	14	19.4	8.6	42.8	48.6	45	32	13	SM Silty Sand	4
VBW-9-Saprolite	14	69	33.2	0.5	60.9	38.6	NP	NP	NP	SM Silty Sand	
VBW-9-PWR	69	85.5	38.1	0.8	57.9	41.3	NP	NP	NP	SM Silty Sand	
VBW-11-Residuum	0	23	33.4	1.4	29.2	69.4	NP	NP	NP	ML Sandy Silt	6.5
VBW-11-Saprolite	23	83	48.5	0.2	54.6	45.2	NP	NP	NP	SM Silty Sand	
VBW-12-Residuum	0	13									
VBW-12-Saprolite	13	27.5									
VBW-14-Residuum	1.5	9	22.3	3.6	59	37.4	43	25	18	SC Clayey sand	
VBW-14-Saprolite	9	45	47	0.1	48.9	51	NP	NP	NP	ML Sandy silt	
VBW-14-Deep Saprolite	45	69	38.3	0	61.9	38.1	62	41	21	SM Silty sand	
VBW-17-Residuum	0	13	27.2	1.7	39.5	58.8	74	43	31	MH Sandy elastic silt	
VBW-17-Saprolite	13	58	39.3	0.7	45.4	53.9	NP	NP	NP	ML Sandy silt	
VBW-17-Saprolite/PWR	58	76.5	42.9	0.1	48	51.9	47	27	20	CL Sandy lean clay	
VBW-18B-Residuum	0	13	29.2	1.0	28.8	70.2	78	45	33	MH Elastic silt with sand	5.6
VBW-18B-Saprolite	13	43	25.8	0.1	57.0	42.9	NP	NP	NP	SM Silty sand	
VBW-18B-Saprolite/PWR	43	87	40.1	0.1	58.1	41.8	48	28	20	SM Silty sand	

Notes:
1. ft-bgs - feet below ground surface.
2. LL - Liquid Limit.
3. PL - Plastic Limit.
4. PI - Plasticity Index.
5. NP - Non Plastic.
6. PWR - Partially Weathered Rock.

Table 5. Geotechnical Composite Samples Property Testing Results
Chemtronics Site, Swannanoa, North Carolina

Sample ID	Layer	Average Depth Range (ft bgs)	Moisture Content (%)	Grain Size Analysis			Atterberg Limits			Engineering Classification
				Gravel Content (%)	Sand Content (%)	Fines Content (%)	LL	PL	PI	
CS-1 [1]	Residuum	0 - 15	21.7	6.3	42.4	51.3	NP	NP	NP	ML Sandy Silt
CS-2 [2]	Saprolite and PWR	15 -78	34.1	0.6	57.2	42.2	NP	NP	NP	SM Silty Sand
CS-3 [3]	Residuum, Saprolite and PWR	0 -78	34.5	0.8	57.5	41.7	49	35	14	SM Silty Sand

Notes:
1. CS-1 is a composite sample developed to be representative of the residuum soil layer. For composition details, refer to Appendix B.
2. CS-2 is a composite sample developed to be representative of the saprolite/PWR soil layers. For composition details, refer to Appendix B.
3. CS-3 is a composite sample developed to be proportionally representative of the full depth and alignment of the VBW. For composition details, refer to Appendix B.
4. ft-bgs - feet below ground surface.
5. LL - Liquid Limit.
6. PL - Plastic Limit.
7. PI - Plasticity Index.
8. NP - Non Plastic.
9. PWR - Partially Weathered Rock.
10. VBW - Vertical Barrier Wall.

Table 6. Bentonite Slurry and Cement Bentonite Slurry Property and Compatibility Testing Results
Chemtronics Site, Swannanoa, North Carolina

Sample ID	Mix Water	% Bentonite Added (%)	Cement to Water Ratio (--)	Unit Weight (pcf)	pH (s.u.)	Marsh Funnel Viscosity (sec)	Filtrate Loss (ml)	Observations [Note 5]
Bentonite Slurry								
B1-HW	Hydrant Water	4	--	62.9	**7.3**	31	**19.5**	
B1-GW1	Groundwater (P-5D)	4	--	63.2	**7.3**	27	50.6	
B1-GW2	Groundwater (P-7D)	4	--	62.4	**7.1**	31	20.4	
B2-HW	Hydrant Water	5	--	63.6	**7.1**	36	**17.5**	
B2-GW1	Groundwater (P-5D)	5	--	63.6	**7.2**	28	40.6	
B2-GW2	Groundwater (P-7D)	5	--	64.0	**7.1**	34	**17.2**	
B3-HW	Hydrant Water	6	--	63.7	**7.1**	**46**	**14**	
B3-GW1	Groundwater (P-5D)	6	--	63.7	**7.3**	30	35	
B3-GW2	Groundwater (P-7D)	6	--	64.2	**7.2**	37	**16.2**	
B4-HW	Hydrant Water	7	--	64.1	**7.1**	**74**	**13.2**	
B4-GW1	Groundwater (P-5D)	7	--	63.9	**7.2**	33	28.3	
B5-HW	Hydrant Water	8	--	**64.6**	**7.1**	**148**	**12.2**	
B5-GW1	Groundwater (P-5D)	8	--	64.3	**7.2**	35	26.4	
Cement-Bentonite Slurry								
CB1-HW	Hydrant Water	6	0.16	**69.9**	above 13	[Note 8]		[Note 6]
CB1-GW1	Groundwater (P-5D)	6	0.16	**68.1**	above 13	**42**		[Note 7]
CB1-GW2	Groundwater (P-7D)	6	0.16	**70.3**	above 13	[Note 8]		[Note 7]
CB2-HW	Hydrant Water	6	0.19	**70.7**	above 13	[Note 8]		[Note 7]
CB2-GW1	Groundwater (P-5D)	6	0.19	**65.1**	above 13	**53**		[Note 7]
CB2-GW2	Groundwater (P-7D)	6	0.19	**71**	above 13	[Note 8]		[Note 7]
CB3-HW	Hydrant Water	5	0.21	**71**	above 13	[Note 8]		[Note 6]
CB3-GW1	Groundwater (P-5D)	5	0.21	62.1	above 13	39		[Note 6]
CB3-GW2	Groundwater (P-7D)	5	0.21	**71.1**	above 13	[Note 8]		[Note 6]
CB4-HW	Hydrant Water	7	0.19	**72**	above 13	[Note 8]		[Note 6]

Notes:
1. HW-Hydrant Water, GW-Groundwater (GW1 corresponds to well P5-D, GW2 corresponds to well P7-D).
2. Dry bentonite and dry cement hydrated with the indicated mix water by weight.
3. Bentonite was added to the mix water, and mixed with a high speed blender to uniform consistency. The bentonite slurry was hydrated for a minimum of 24 hours before test
4. For cement-bentonite slurries, cement was added to the hydrated bentonite slurry and mixed with a high speed mixer to a uniform consistency, and then immediately tested.
5. Hydrated slurry was placed in 1500cc glass tubes and visual observations (i.e., flocculation/cloudiness, separation of bentonite and water, etc.) were made for up to 120 days.
6. Test slurry contained a lot of trapped air bubbles after mixing.
7. Test slurry contained some trapped air bubbles after mixing.
8. Test slurry was too thick to pass through the Marsh Funnel.

Table 7. Vertical Barrier Wall Mix Design Testing Results
Chemtronics Site, Swannanoa, North Carolina

Sample ID	Soil Content	Dry Bentonite Added (% of soil content)	Slurry			Permeant	Unconfined Compressive Strength		Hydraulic Conductivity (cm/sec)
			Bentonite (%)	Cement to Water Ratio	Mix Water Type		7days (psi)	28days (psi)	
Soil-Cement-Bentonite Mix Design									
SCB-Mix 1	CS-3	0	7	0.16	Hydrant Water	Groundwater (P-5D)	34.5	56.4	2.7E-07
SCB-Mix 2	CS-3	1	7	0.19	Hydrant Water	Groundwater (P-5D)	52.3	86.0	8.3E-08
SCB-Mix 3	CS-3	2	7	0.21	Hydrant Water	Groundwater (P-5D)	43.3	95.3	4.1E-08
SCB-Mix 4	CS-3	0	7	0.16	Hydrant Water	**Groundwater (P-7D)**			2.7E-07
SCB-Mix 5	CS-3	1	7	0.19	Hydrant Water	**Groundwater (P-7D)**			5.3E-08
SCB-Mix 6	CS-3	2	7	0.21	Hydrant Water	**Groundwater (P-7D)**			3.3E-08
Soil-Bentonite Mix Design									
SB-Mix 1	CS-3	0	7	n/a	Hydrant Water	Groundwater (P-5D)	n/a	n/a	8.1E-08
SB-Mix 2	CS-3	1	7	n/a	Hydrant Water	Groundwater (P-5D)	n/a	n/a	5.9E-08
SB-Mix 3	CS-3	2	7	n/a	Hydrant Water	Groundwater (P-5D)	n/a	n/a	3.3E-08
SB-Mix 4	CS-3	0	7	n/a	Hydrant Water	**Groundwater (P-7D)**	n/a	n/a	6.9E-08
SB-Mix 5	CS-3	1	7	n/a	Hydrant Water	**Groundwater (P-7D)**	n/a	n/a	3.9E-08
SB-Mix 6	CS-3	2	7	n/a	Hydrant Water	**Groundwater (P-7D)**	n/a	n/a	4.7E-08
Cement-Bentonite Mix Design									
CB-Mix 1	n/a	n/a	8	0.19	Hydrant Water	Groundwater (P-5D)	6.2	11.3	2.4E-06
CB-Mix 2	n/a	n/a	7	0.19	Hydrant Water	Groundwater (P-5D)	7.5	11.0	2.4E-06
CB-Mix 3	n/a	n/a	6	0.19	Hydrant Water	Groundwater (P-5D)	8.5	12.6	2.7E-06
CB-Mix 4	n/a	n/a	6	0.16	Hydrant Water	Groundwater (P-5D)	4.4	8.0	2.8E-06
CB-Mix 11	n/a	n/a	6	0.23	Hydrant Water	Groundwater (P-5D)	4.5	5.6	2.3E-06
CB-Mix 5	n/a	n/a	8	0.19	Hydrant Water	**Groundwater (P-7D)**			1.9E-06
CB-Mix 6	n/a	n/a	7	0.19	Hydrant Water	**Groundwater (P-7D)**			1.3E-06
CB-Mix 7	n/a	n/a	6	0.19	Hydrant Water	**Groundwater (P-7D)**			2.4E-06
CB-Mix 8	n/a	n/a	6	0.16	Hydrant Water	**Groundwater (P-7D)**			2.8E-06
CB-Mix 12	n/a	n/a	6	0.23	Hydrant Water	**Groundwater (P-7D)**			1.9E-06

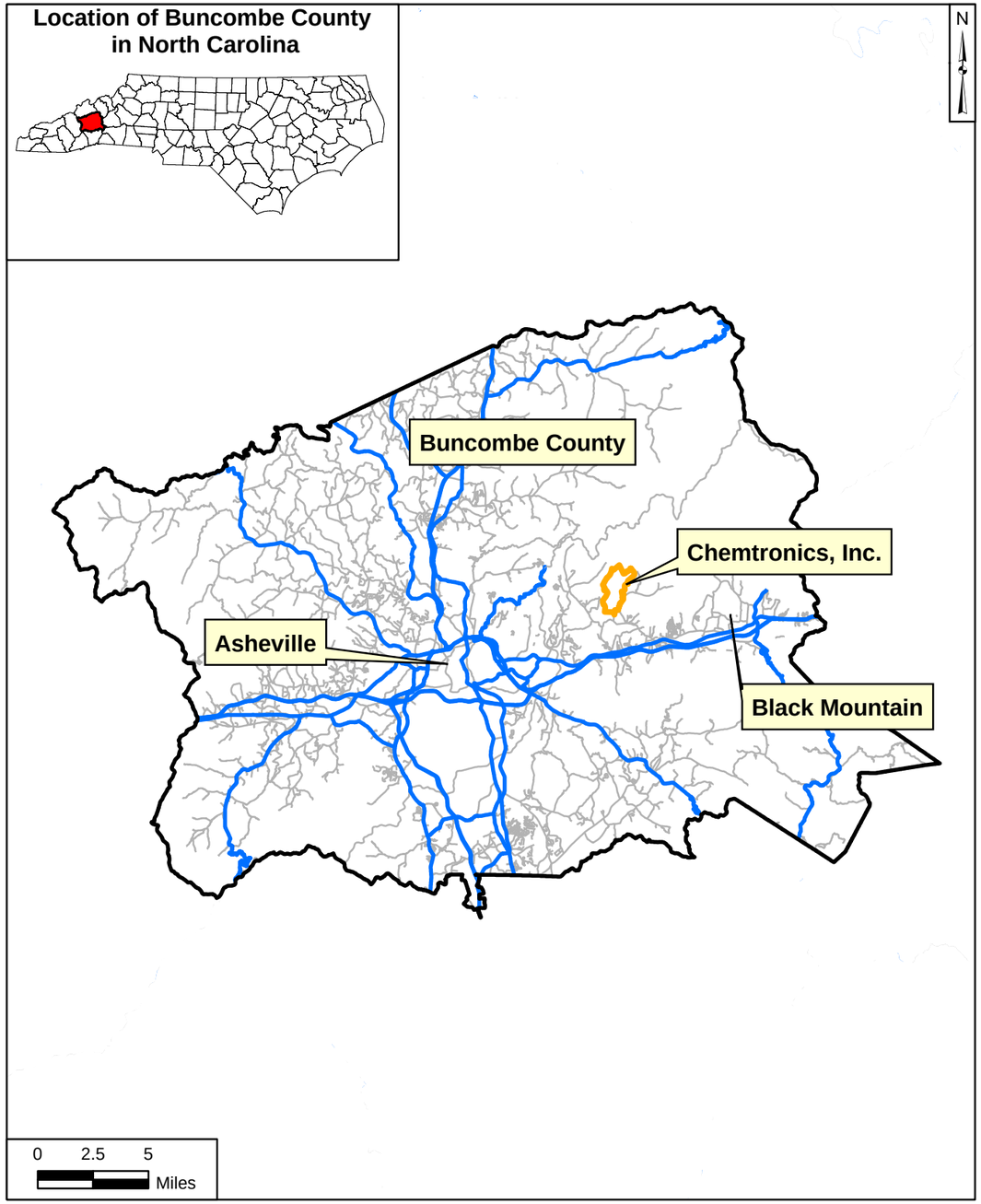
Notes:
1. Hydraulic conductivity testing conducted at consolidation pressure of 5 pounds per square inch (psi).
2. SCB and SB mix designs developed using composite sample CS-3, representative of the full depth and alignment of the VBW.
3. Groundwater used to permeate the backfill samples was obtained at P-5D and P-7D, considered to be representative of impacted groundwater that will be in contact with the vertical barrier wall.
4. SCB and SB slurry was prepared with 7%, based on a review of the test results for various bentonite and cement-bentonite slurries (Table 6-1).

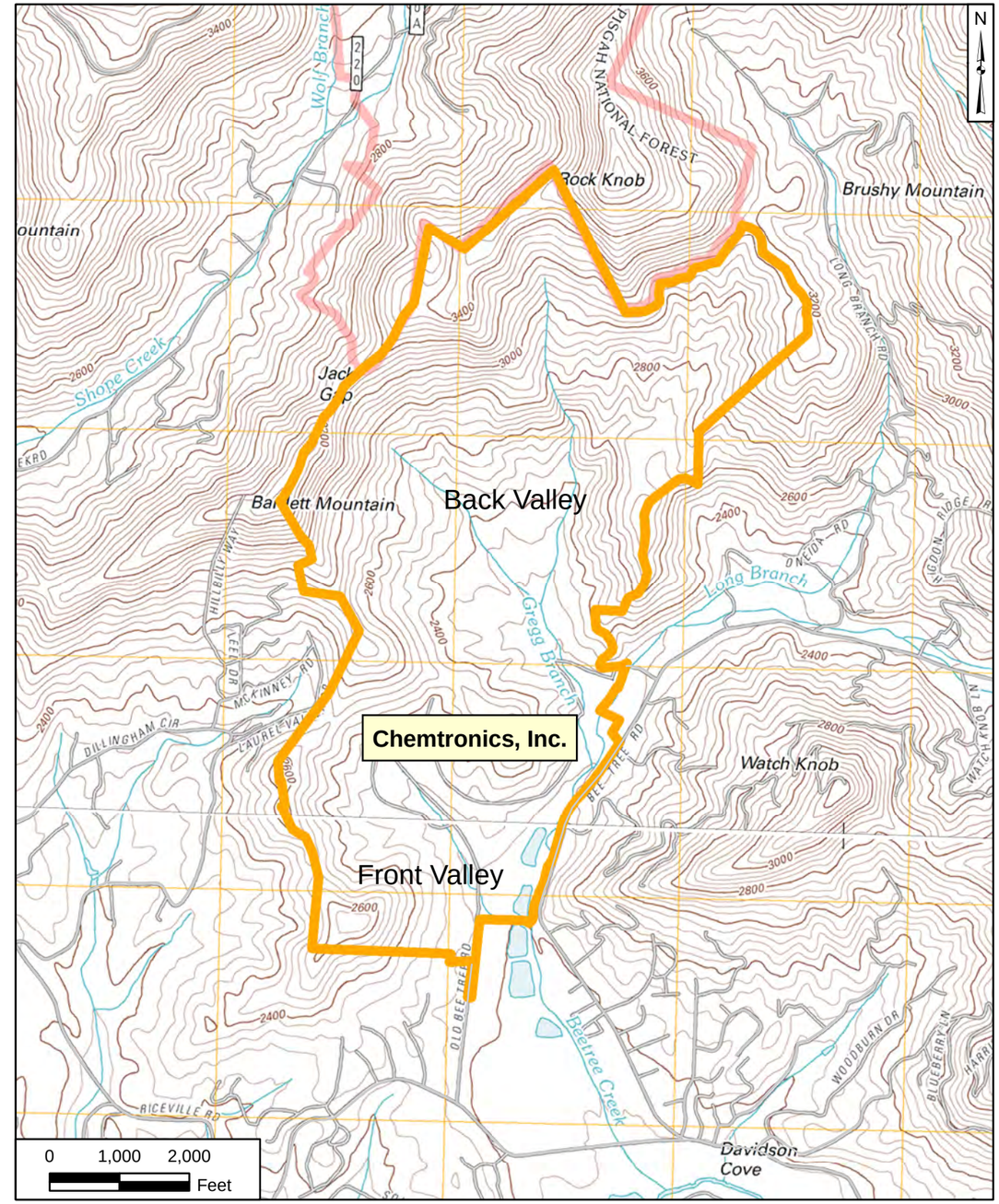
Table 8. Vertical Barrier Wall Mix Design Compatibility Testing Results
Chemtronics Site, Swannanoa, North Carolina

Sample ID	Soil Content	Dry Bentonite Added (% of soil content)	Slurry			Permeant	Unconfined Compressive Strength		Hydraulic Conductivity (cm/sec)
			Bentonite (%)	Cement to Water Ratio	Mix Water Type		7days (psi)	28days (psi)	
Soil-Cement-Bentonite Mix Design Compatibility Testing									
SCB-Mix 7	CS-3	0	7	0.21	Groundwater (P-5D)	Groundwater (P-5D)			1.6E-7
SCB-Mix 8	CS-3	1	7	0.21	**Groundwater (P-7D)**	**Groundwater (P-7D)**			8.9E-8
Soil-Bentonite Mix Design Compatibility Testing									
SB-Mix 7	CS-3	1	7	n/a	Groundwater (P-5D)	Groundwater (P-5D)			1.8E-7
SB-Mix 8	CS-3	2	7	n/a	**Groundwater (P-7D)**	**Groundwater (P-7D)**			7.3E-8
Cement-Bentonite Mix Design Compatibility Testing									
CB-Mix 9	n/a	n/a	7	0.19	Groundwater (P-5D)	Groundwater (P-5D)			9.1E-6
CB-Mix 10	n/a	n/a	7	0.21	**Groundwater (P-7D)**	**Groundwater (P-7D)**			3.1E-6
CB-Mix 13	n/a	n/a	6	0.23	Groundwater (P-5D)	Groundwater (P-5D)	7.6	12.8	7.8E-6
CB-Mix 14	n/a	n/a	6	0.23	**Groundwater (P-7D)**	**Groundwater (P-7D)**	9.5	17	4.1E-6
ACM	n/a	n/a	6	0.23	**Groundwater (P-7D)**	**Groundwater (P-7D)**	4.4	14.9	3.8E-6

Notes:
1. Hydraulic conductivity testing conducted at consolidation pressure of 5 pounds per square inch (psi).
2. SCB and SB mix designs developed using composite sample CS-3, representative of the full depth and alignment of the VBW.
3. Groundwater used to permeate the backfill samples was obtained at P-5D and P-7D, considered to be representative of impacted groundwater that will be in contact with the vertical barrier wall.
4. SCB and SB slurry was prepared with 7% bentonite, based on a review of the test results for various bentonite and cement-bentonite slurries (Table 6-1).
5. Additional alternate CB mix (ACM) was prepared and tested to confirm the hydraulic conductivity and unconfined compressive strength results of CB-Mix 14.

FIGURES





Chemtronics Property Boundary
County Boundary
Primary Road
Secondary Road

Notes:
1. County boundaries and roads obtained from NC Department of Transportation.
2. Topographic map for USGS Craggy Pinacle and Oteen 7.5-Minute Quadrangle (dated 2011 and 2010, respectively) obtained from USGS National Map (2012).

Location of Chemtronics Site
Chemtronics Site
Swannanoa, North Carolina

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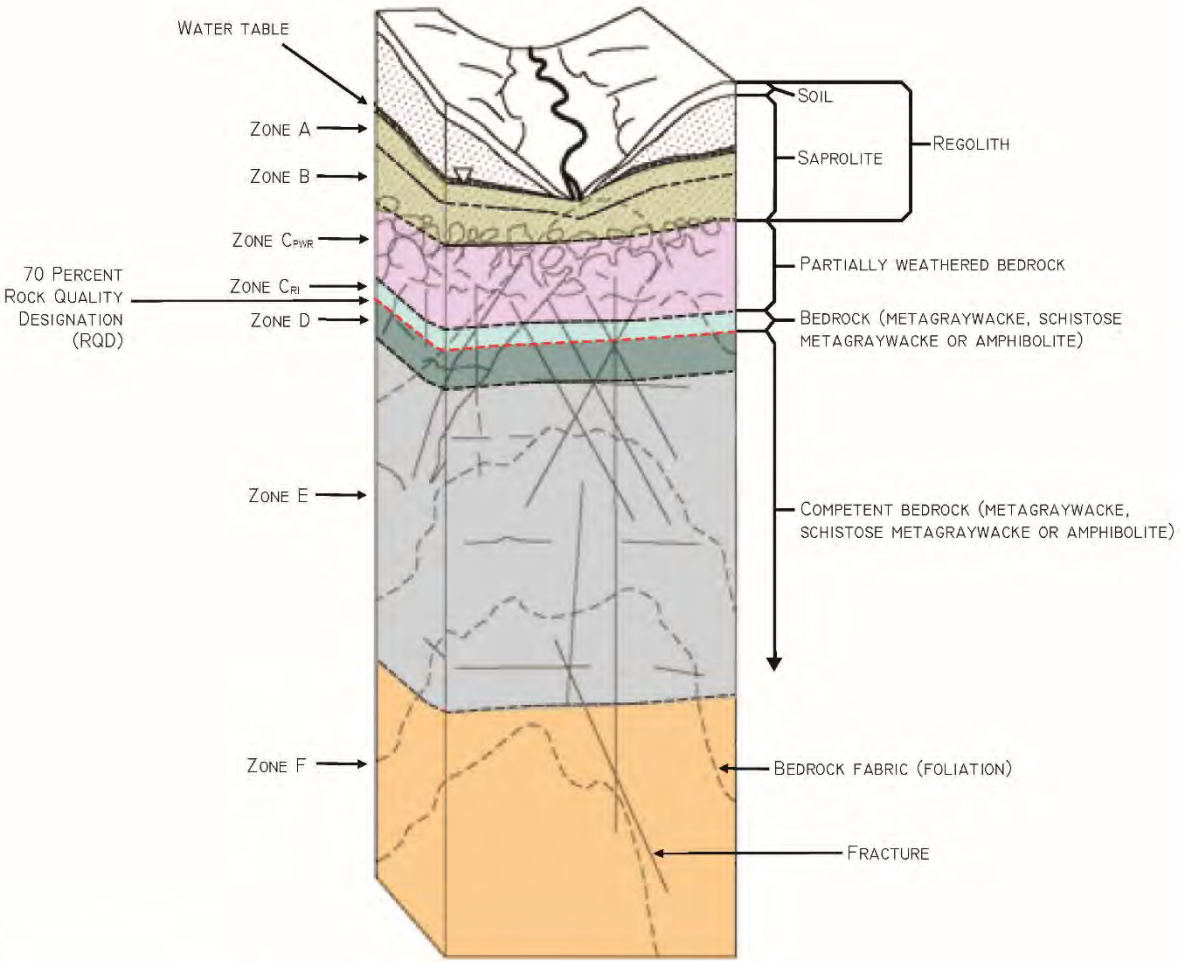
Figure 1

Path: N:\Chemtronics\GIS\MXD\GDR Report\Fig1-1_Area Map.mxd



SURFICIAL AQUIFER SYSTEM (ZONE AB)

ZONE A: WATER TABLE

ZONE B: ONLY PRESENT IF > 40 FT FROM WATER TABLE

TRANSITION ZONE AQUIFER SYSTEM (ZONE CD)

ZONE CPWR: PREDOMINANCE OF PARTIALLY WEATHERED ROCK AND/OR BLOW COUNTS OF 50/6 INCHES

ZONE CRI: AUGER REFUSAL TO RQD ≥ 70 PERCENT

ZONE D: FIRST 10-15 FEET WHERE RQD ≥ 70 PERCENT

BEDROCK AQUIFER SYSTEM (ZONE EF)

ZONE E: RQD ≥ 70 PERCENT, 100 FT THICK

ZONE F: RQD ≥ 70 PERCENT, BELOW ZONE E

Source: Modified from Harned and Daniel (1992) and presented in the Hydrogeological Conceptual Site Model (Altamont, 2015).

Hydrostratigraphy at the Site	Geosyntec consultants	Figure
Kennesaw, Georgia	February 2016	**2**

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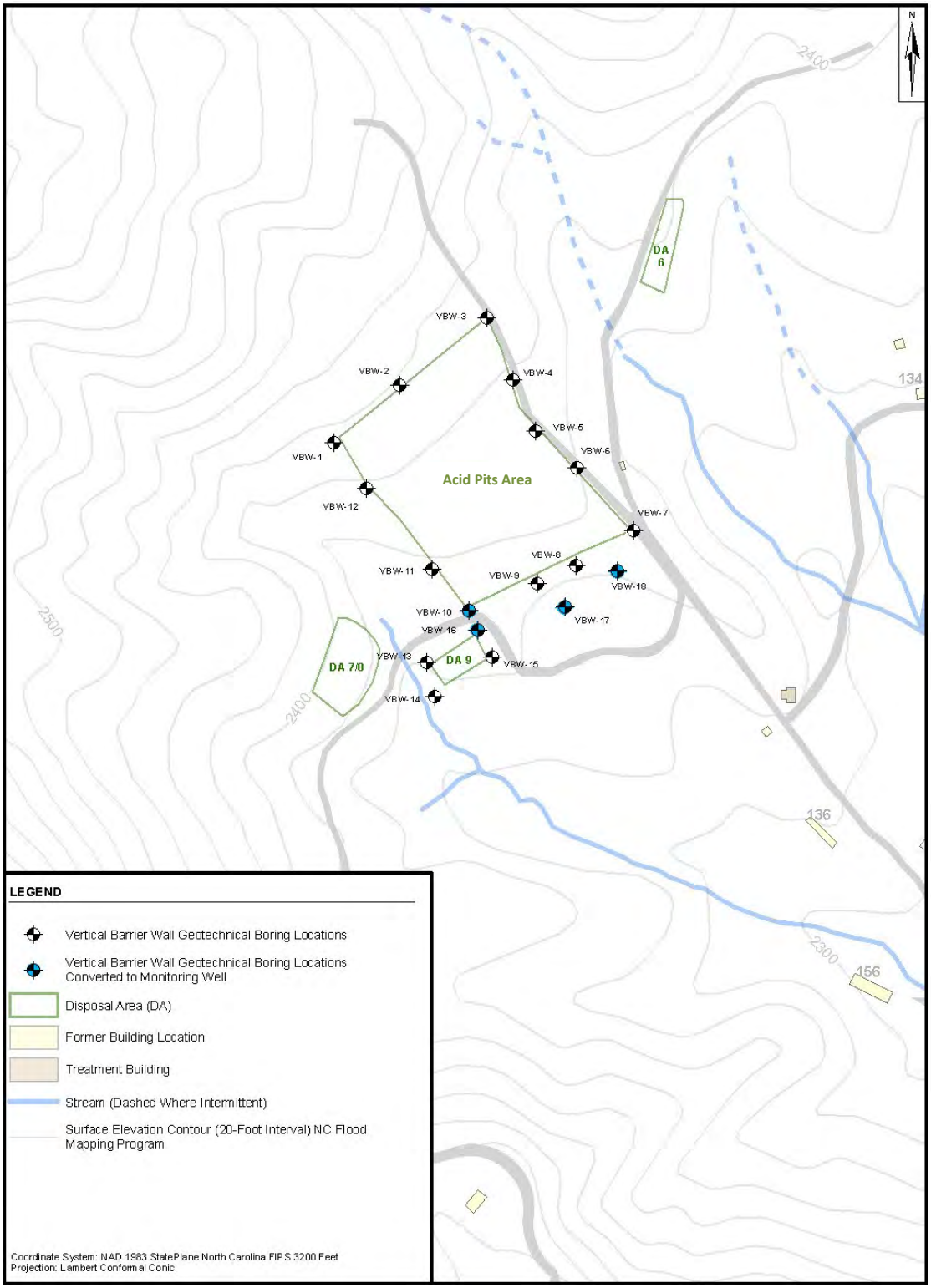

SOURCE: Modified from Altamont Environmental, Inc. 2014. Back Valley Geotechnical Field Investigation Summary.

Vertical Barrier Wall Boring Locations around the APA and DA 9 Areas
Chemtronics Site, Swannanoa, NC

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Figure 3

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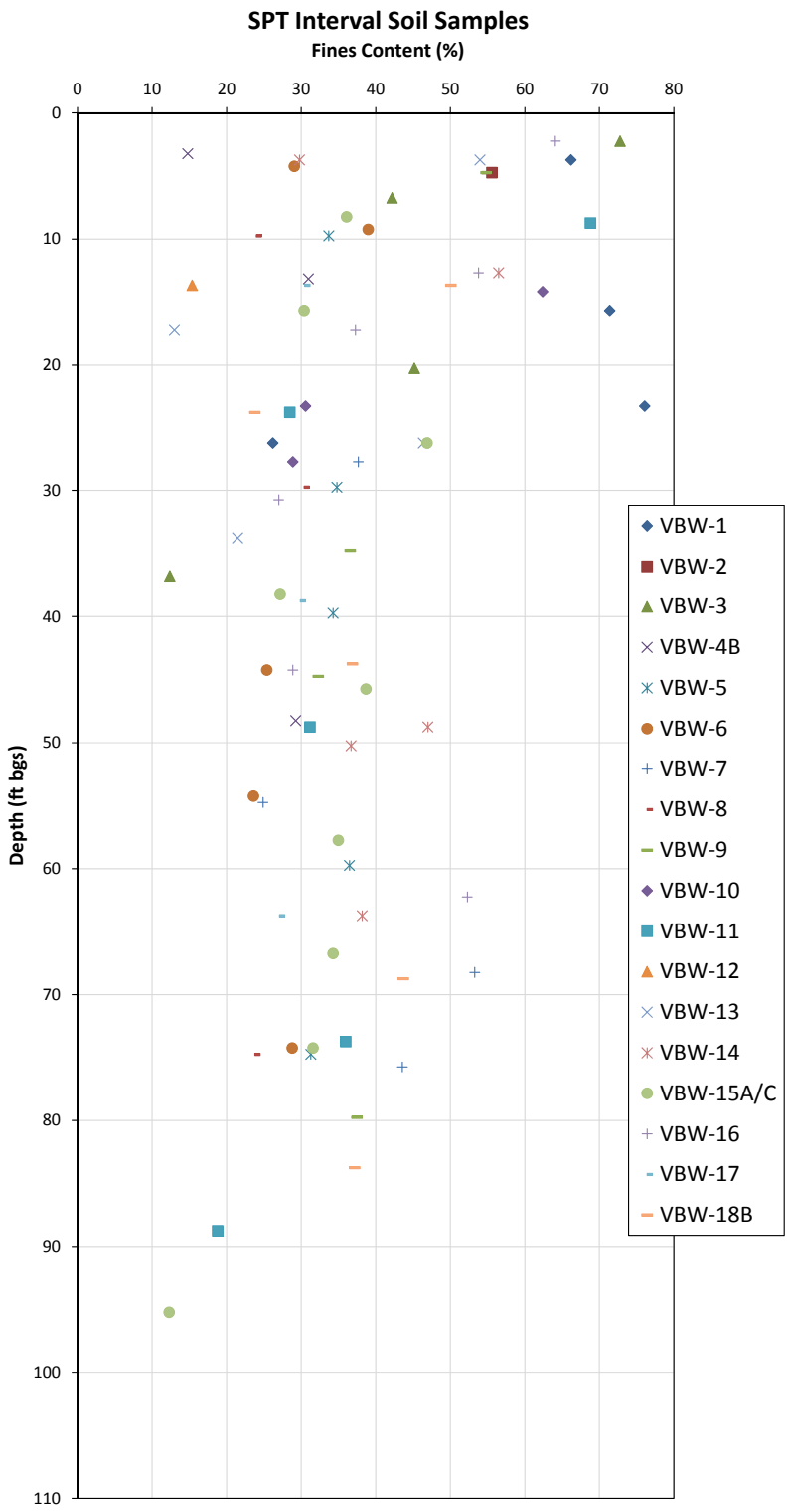

NOTES:

1. Fines Content (%) - Particle sizes smaller than 75 micrometers.
2. ft-bgs - feet below ground surface.

Fines Content Test Results for Standard Penetration Test Samples at Boring Locations around the APA and DA 9 Areas

Chemtronics Site, Swannanoa, NC

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Figure 4

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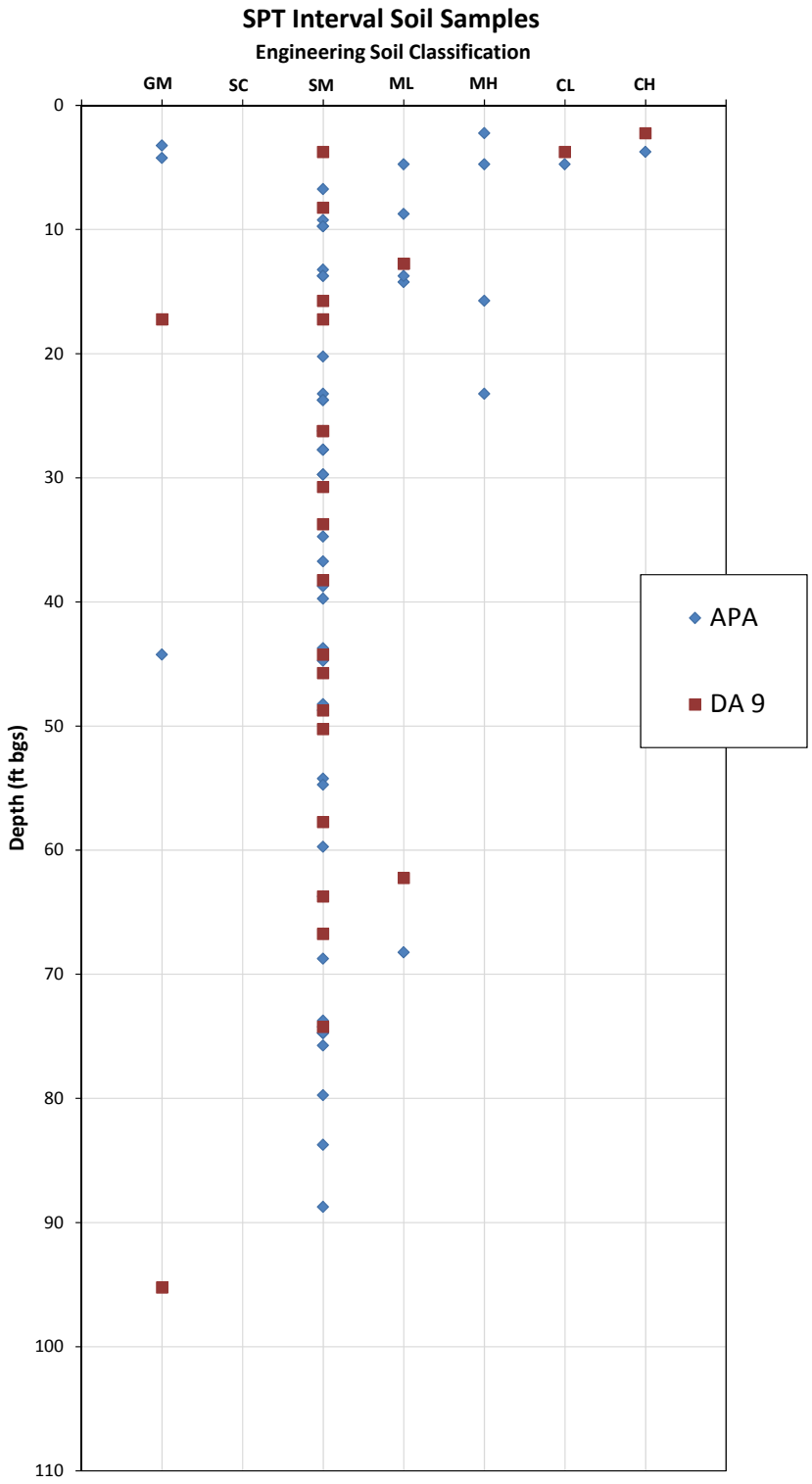

NOTES:

1. ft-bgs - feet below ground surface.
2. GM – silty gravel.
3. SC – clayey sand.
4. SM – silty sand.
5. ML – silt.
6. MH – elastic silt.
7. CL – lean clay.
8. CH – fat clay.

Engineering Soil Classification for Standard Penetration Test Samples at Boring Locations around the APA and DA 9 Areas
Chemtronics Site, Swannanoa, NC

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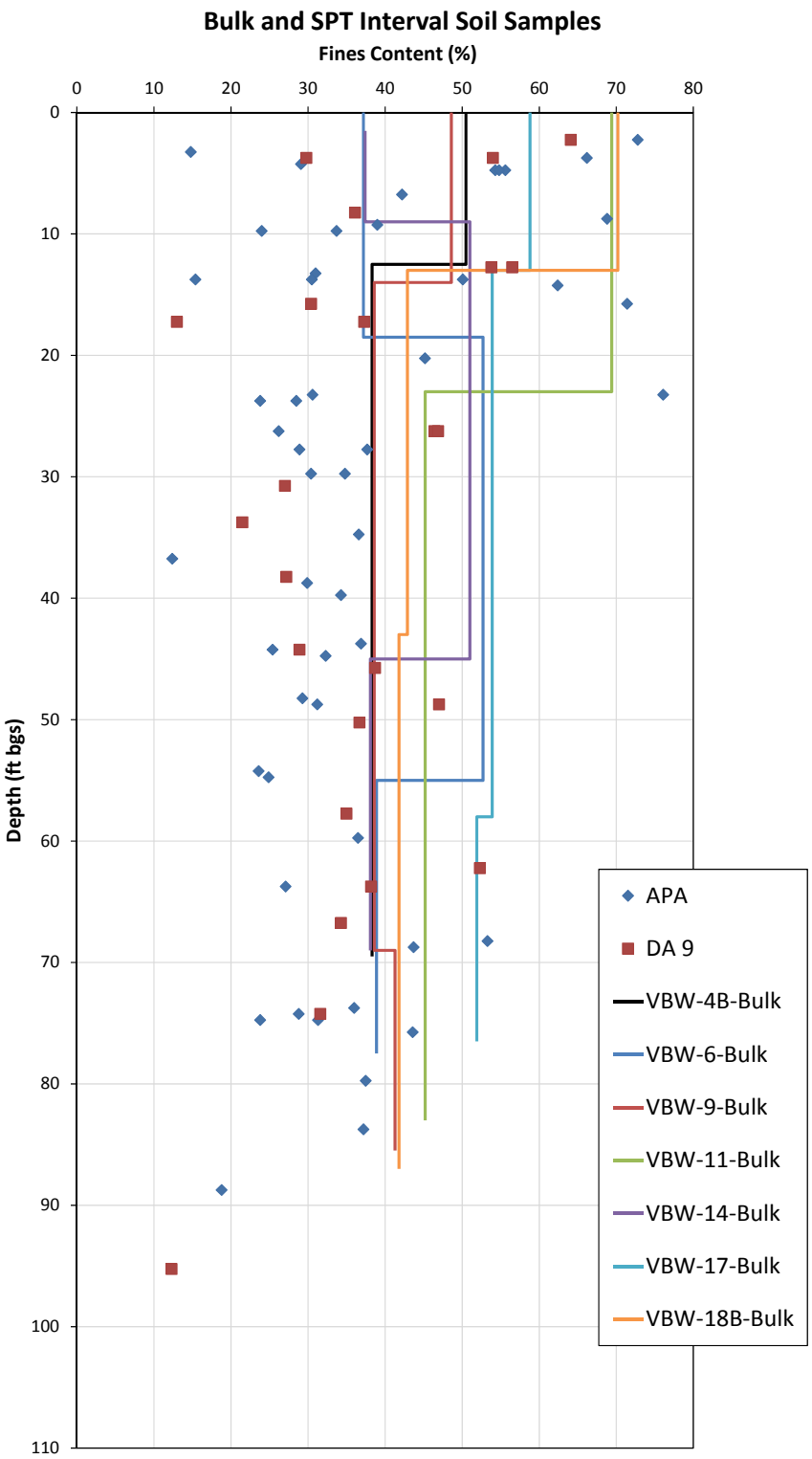
Kennesaw, GA | February 2016

Figure 5

N:\C\Chemtronics\Vertical Barrier Wall\VBW Pre-Design Geotechnical Report_Task 8.5\Figures\2016-02-19 to Companies and EPA\



NOTES:

1. Fines Content (%) - Particle sizes smaller than 75 micrometers.
2. ft-bgs - feet below ground surface.

Fines Content Test Results for Standard Penetration Test and Bulk Soil Samples at Boring Locations around the APA and DA 9 Areas

Chemtronics Site, Swannanoa, NC

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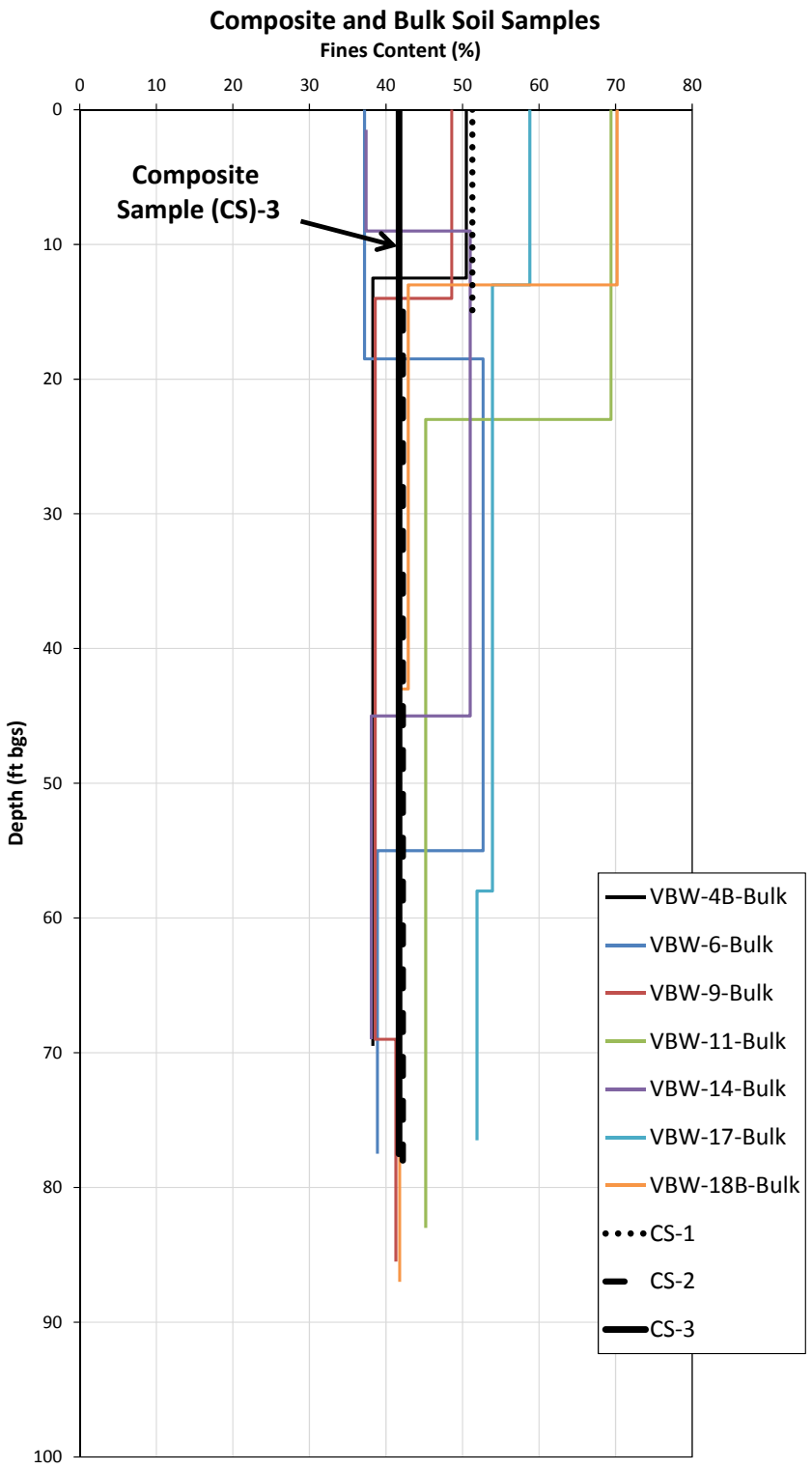
Figure 6

N:\C\Chemtronics\Vertical Barrier Wall\VBW Pre-Design Geotechnical Report_Task 8.5\Figures\2016-02-19 to Companies and EPA\



NOTES:
1. Fines Content (%) - Particle sizes smaller than 75 micrometers.
2. ft-bgs - feet below ground surface.

Fines Content Test Results for Bulk and Composite Soil Samples at Boring Locations around the APA and DA 9 Areas
Chemtronics Site, Swannanoa, NC

Geosyntec consultants

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Figure 7

N:\C\Chemtronics\Vertical Barrier Wall\VBW Pre-Design Geotechnical Report_Task 8.5\Figures\2016-02-19 to Companies and EPA\

(a) 2/20/2014
Day 3

(b) 3/14/2014
Day 25

(c) 4/18/2014
Day 60

(d) 6/16/2014
Day 119

LEGEND:
B2-HW (Left Tube) – Hydrant water, 5% bentonite, 0% cement
B2-GW1 (Middle Tube) – Groundwater (P5-D), 5% bentonite, 0% cement
B2-GW2 (Right Tube) – Groundwater (P7-D), 5% bentonite, 0% cement

SOURCE:
Excel Geotechnical Testing, Inc., 2014. *Chemtronics Geotechnical and Compatibility Study* report.

Sample Pictures Documenting Observations of Slurry Mixes
Chemtronics Site, Swannanoa, NC

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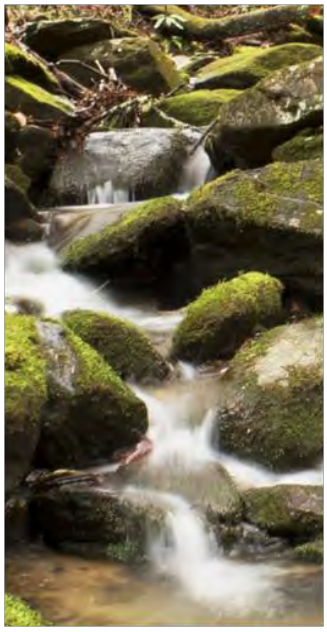
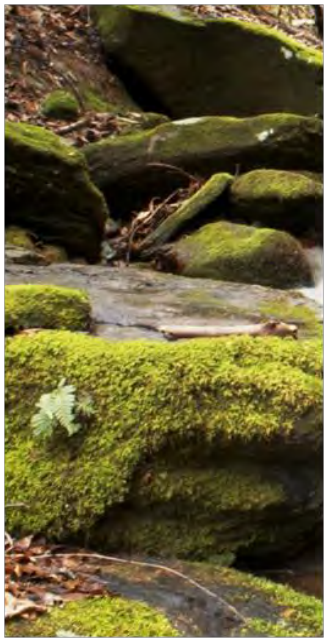
Figure 8

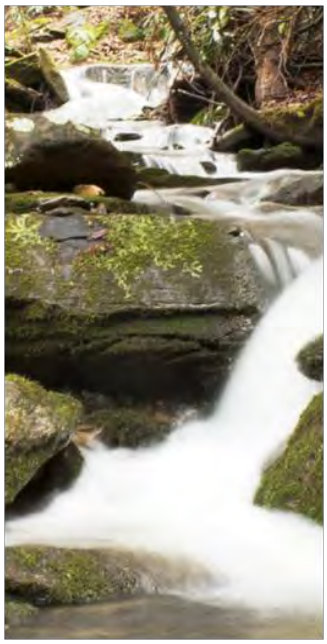
N:\C\Chemtronics\Vertical Barrier Wall\VBW Pre-Design Geotechnical Report_Task 8.5\Figures\2016-02-19 to Companies and EPA\

APPENDIX A

Back Valley Geotechnical Field Investigation Summary Report (Altamont, 2014)







ALTAMONT ENVIRONMENTAL, INC.

ENGINEERING & HYDROGEOLOGY

Back Valley Geotechnical Field Investigation Summary

June 13, 2014

Chemtronics Superfund Site
Swannanoa, Buncombe County
North Carolina
EPA ID: NCD 095 459 392

Chemtronics, Inc., Northrop Grumman Systems Corp.,
and CNA Holdings, LLC
Project Number 2115.182

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Back Valley Geotechnical Field Investigation Summary

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Executive Summary

The *Feasibility Screening and Candidate Technologies Evaluation for the Back Valley* (FSCT) (Geosyntec 2013a) for the Chemtronics Site (Site) identified a Vertical Barrier Wall (VBW) as a component of a potential remedial alternative. The field components of the pre-design geotechnical investigation were performed by Altamont Environmental, Inc. (Altamont) consistent with the *Work Plan for a Back Valley Pre-Design Geotechnical Investigation* (Geosyntec 2013b). The field investigation was performed to collect samples and data required by Geosyntec Consultants of NC, P.C. (Geosyntec) for its evaluation of the feasibility of constructing a VBW and to support its design. The field investigation consisted of 18 geotechnical soil borings installed along the potential alignment of the VBW around the Acid Pit Area (APA) and Disposal Area 9 (DA 9).

Subsurface conditions along the potential VBW alignment were assessed using split-spoon sampling, rock coring, and an evaluation of drill cuttings. The data collected during the installation of the borings are summarized in the following bullets:

- Bedrock and Competent Bedrock—Throughout this report, reference will be made to the top of bedrock and to the top of competent bedrock. Bedrock is defined as the depth at which auger refusal has been reached and cored intervals reveal no unconsolidated materials are present at lower depths. Competent bedrock is defined as rock having a rock quality designation (RQD) of 70 percent or greater over a 10-foot interval.

- Variable Depth to Bedrock—The depth-to-bedrock data from the geotechnical borings were combined with existing depth-to-bedrock data and were used to develop an updated bedrock elevation map for the Back Valley. The depth to bedrock is generally shallow in the northern portion of the potential VBW alignment and deeper in the southern portion of the potential alignment. In 7 out of the 18 borings, the depth to bedrock was the same as the depth to competent bedrock. In the remaining 11 borings, competent bedrock was 1.1 to 33.4 feet deeper than the top of bedrock.

- Differential Weathering—The variability in thickness of the transition zone and depths to bedrock and competent bedrock observed in the geotechnical borings suggests that differential weathering is widespread within the Back Valley. The most extreme example of this condition was observed in VBW-10 where a 2-foot thick rock lens was encountered at a relatively shallow depth of 37 feet and was underlain by over 52 feet of very soft un-lithified materials interlayered with partially weathered rock and rock with low RQD values. At a nearby boring (VBW-16), located approximately 15 feet south of VBW-10, a bedrock lens was not encountered and the depth to competent bedrock (61.5 feet below ground surface [ft-bgs]) was about 30 feet higher in elevation than in VBW-10. It is likely that northwest dipping bedrock with layers of resistant and less resistant material may develop differential weathering profiles that extend into the subsurface and which may have resulted in the rock lens encountered in VBW-10 and the undulating bedrock surfaces. Additional lenses of bedrock could also exist between the borings that were installed along the potential VBW alignment.

- Preferential Groundwater Flow—Geophysical logging was performed in bedrock borings during earlier phases of investigation in the Back Valley. Acoustic televiewer data collected from older

borings south of the potential VBW alignment indicate the occurrence of high-angled fractures that have a range of strikes from north-northwest to northeast and which may provide preferential pathways for groundwater flow. Multiple northerly striking fractures, parallel to the attitude of local foliations (layer parallel) that dip toward the west, were also noted and these fractures may also increase the potential for preferential groundwater flow parallel to these features. The geotechnical borings discussed in this report were not logged with geophysical tools; therefore, the orientation (strike and dip) of observed fractures is not known. However, the data from the historical borings provides insight to the likely orientations of the observed fractures. Furthermore, VBW-9 and VBW-10 have a high degree of fracturing and are both heavily stained, suggesting active flow through these intervals.

- Rippability—Rippability is a qualitative term describing the relative ease with which the rock can be removed by an excavator. In general, along the potential VBW alignment, the areas where rippability will likely be greatest are in areas where the fracture frequency is the highest, weathering is more advanced, and planar features are advantageously oriented. These general conditions were observed in borings VBW-9, VBW-13, and VBW-10. Conversely, characteristics associated with relatively lower rippability were observed in the vicinity of VBW-1, VBW-2, and VBW-3, where weathering and bedrock fracturing are less pervasive.

To summarize, the thickness of partially weathered rock and the characteristics of the bedrock are variable along the potential VBW alignment. The depth to competent bedrock along the northern portion of the potential alignment is relatively shallow, the observed fractures in this area are less stained indicating less water flow, and fewer sub-vertical cross-cutting fractures were observed beneath this area. Conversely, along the southern portion of the potential alignment, the depth to competent bedrock is generally much deeper and there is a highly fractured bedrock zone of variable thickness (up to 30 feet) above competent bedrock. There is also evidence of pervasive groundwater flow (e.g., staining of fractured surfaces and increased differential weathering), and more frequent sub-vertical fracturing that cross-cuts foliation. Given these conditions, bedrock in the southern area of the potential alignment is likely to be more rippable than bedrock in the northern portion.

The geologic observations along the potential alignment raise the following concerns with respect to a VBW: (1) northerly striking bedrock fractures may project northward towards the APA and DA 9 areas and may provide preferential pathways for groundwater flow and (2) differentially weathered bedrock (i.e., less resistant rocks) may dip in directions that undercut the more resistant near surface bedrock/competent bedrock.

1.0 Purpose of Investigation

The *Feasibility Screening and Candidate Technologies Evaluation for the Back Valley (*FSCT) (Geosyntec 2013a) for the Chemtronics Site in Swannanoa, North Carolina (Site) identified a Vertical Barrier Wall (VBW) as a component of a potential remedial alternative for the Back Valley. Geosyntec Consultants of NC, P.C. (Geosyntec) prepared the *Work Plan for a Back Valley Pre-Design Geotechnical Investigation*, which was submitted to the Environmental Protection Agency (EPA) and the North Carolina Department of Environment and Natural Resources (DENR) on August 1, 2013 (Geotechnical Work Plan) (Geosyntec 2013b) on behalf of Chemtronics, Inc., Northrop Grumman Systems Corporation, and CNA Holdings LLC (together the Companies) to describe geotechnical investigations planned to support the Remedial Investigation/Feasibility Study (RI/FS) currently being completed for the Site. Geosyntec's Geotechnical Work Plan outlined the data required for evaluating the feasibility of construction of a VBW, and supporting the design in the event it is feasible. The Geotechnical Work Plan was based on the *Draft Remedial Investigation Report* (Draft RI Report) that was submitted to the EPA on March 1, 2013, by Altamont Environmental, Inc. (Altamont). The Geotechnical Work Plan was approved by the EPA and DENR on September 5, 2013. Altamont was responsible for the implementation of the field component of the Geotechnical Work Plan. The following report describes the installation of geotechnical borings, observations of the materials retrieved from the borings, collection of sampled media, and the inferences made regarding geologic conditions along the potential VBW alignment.

It is anticipated that the VBW may be constructed from the ground surface to the top of competent bedrock and would surround the Acid Pit Area (APA) and Disposal Area 9 (DA 9), significantly reducing the rate of contaminant flux from these areas. In accordance with the Geotechnical Work Plan, a geotechnical field investigation was completed by Altamont and its subcontractor, AE Drilling Services, to collect data needed for assessing the viability of the VBW, and support its design if construction of the VBW is determined to be feasible. The data collected during the geotechnical investigation included: depth to water, soil type and structure, standard penetration tests (SPTs)/blow counts, depth to top of bedrock, type and competence of bedrock, rock quality designations (RQD), and identification of zones that exhibited signs of potential contamination (e.g., elevated flame ionization detector [FID] readings, staining, sampling analysis, etc.). The data will be used by Geosyntec to evaluate whether the VBW is a viable remedial option for the APA and DA 9 and provide for its design if warranted.

Daily updates were provided to Geosyntec during the implementation of the Geotechnical Work Plan as Site activities progressed. The daily updates (in the form of email correspondence) included a description of field activities, draft boring logs, and photographic logs. The daily email updates are available on file in Altamont's project repository. The Boring Logs, Well Completion Records, and Photographic Logs are presented in Appendix A.

General Site information and an overview of the general Site geology and hydrogeology is available in the Draft RI Report. This geotechnical summary report discusses Site-specific geologic information observed during the geotechnical field investigation. A Site location map and geologic map are provided as Figures 1 and 2 for general reference and a diagram depicting the general hydro-stratigraphy is provided as Appendix B.

2.0 Field Procedures

2.1 Summary of Drilling Methods

Eighteen geotechnical soil borings were advanced using hollow stem auger (HSA) and rock coring techniques. Drilling procedures were consistent with the methodology described in the Geotechnical Work Plan (Geosyntec 2013b), EPA Standard Operating Procedure (SOP) SESDGUID-101-R0, and in general accordance with ASTM International (ASTM) standard D2113 (2008). Of the 18 borings, 14 were advanced using augers with 3.25-inch inner diameter and 6.63-inch outer diameter along with NQ-size wire-line coring tools. These borings were backfilled with bentonite immediately after drilling. The remaining four borings (VBW-10, VBW-16, VBW-17, and VBW-18) were advanced using 6.25-inch inner-diameter/9.63-inch outer-diameter augers and PQ-size wire-line coring tools. These four borings were converted to monitoring wells upon completion of the geotechnical boring (see Figure 3 and Table 1).

The soil boring locations were identified in the field by Altamont personnel (based on the locations presented on Figure 3-1, of the Geotechnical Work Plan) and marked with a wooden stake and with orange tape at locations approximately 10 feet outside of the chain link fences surrounding the APA and DA 9. Immediately outside of the fence, along the southern boundary of the APA, a slope exists, which required geotechnical borings VBW-8 and VBW-9 to be offset from the fence approximately 20 feet. At the southwestern corner of DA9, the slope is relatively steep near VBW-14 and required an offset of approximately 30 feet from the fence.

The borehole locations were surveyed by a licensed surveyor under the direction of Altamont to determine their location and elevation above mean sea level (MSL) once the geotechnical investigation was complete. Boring logs and photographic logs are provided in Appendix A.

The general sequence of the geotechnical drilling at each boring was as follows:

1. An exclusion and safe work zone was established around the work area.
2. A photograph was made of the general area surrounding most borings. Significant features nearby the boring location (i.e., chain link fence, topography, monitoring wells, utilities, stream, ditch, berm, roadway, etc.) were noted in the field notebook.
3. An HSA was used to advance the boring through the residuum to the first sampling interval.
4. If a shallow subsurface obstruction was encountered, the boring was abandoned and offset approximately 2 to 5 feet from the original location. Shallow subsurface obstructions consisting of wood or boulders were encountered at borings VBW-4, VBW-15, and VBW-18. Each boring that was offset has been assigned a letter following the boring name in the boring logs. For example, the original VBW-4 location is designated as VBW-4A and the offset location is designated as VBW-4B in Appendix A and in table references. Typically, an offset boring was advanced to the depth of the adjacent abandoned boring, at which point SPTs, sampling, and lithologic descriptions continued. In the text of this report, letter designations have been left off and any references to lithology are inclusive of all borings at a given location.
5. SPTs were performed. The SPT sampling assembly consisted of a 24-inch long, 2-inch-diameter split-spoon sampler affixed to the drilling rods. The split spoon was driven 18 inches into the

subsurface using a calibrated 140-pound hydraulic hammer that was allowed to free-fall from a 30-inch height, in accordance with ASTM D1586. The drill rod was marked in 6-inch increments for counting hammer blows. The numbers of hammer blows to achieve each of the 6-inch depth intervals were recorded by the field geologist on the boring logs. The contents of the split spoons were scanned with an FID, described and sampled by the field geologist.

6. Augers were advanced to the next depth interval. This process was repeated until the boring was advanced to the depth corresponding to auger refusal.
7. After reaching auger refusal and prior to rock coring, a water level was measured relative to ground surface.
8. Site experience has shown that at many locations, unconsolidated materials exist within 10 feet or less of auger refusal. As such, a general bedrock coring procedure has been developed for the Site and includes the following main steps:
   - Each bedrock core hole was advanced until 10 continuous feet of bedrock core with an RQD greater than or equal to 70 percent was recovered (top of Zone D). Only core sections greater than 4 inches were included in the RQD calculation. The RQD calculation determines the percentage of recovered core greater than or equal to 4 inches in length, relative to the length of the core run.
   - During bedrock coring, observations that would suggest a fault or fracture in the bedrock (i.e., drill rods "dropped" or loss of fluid) were recorded on the boring log or in field notes. During the field effort, locations where loss of fluid was noted included VBW-1 and VBW-9. Rod drop was not noted during field investigation.
9. Soil borings were backfilled with bentonite pellets (except where borings were converted to monitoring wells as noted above).

2.2 Summary of Well Construction Specifications

Borings VBW-10, VBW-16, VBW-17, and VBW-18 were converted to Zone CD monitoring wells (and named MW254-L25CD, MW255-L25CD, MW256-M25CD, and MW257-M25CD, respectively) upon completion of geotechnical boring activities. Each of these Zone CD wells was constructed with a 15-foot section of 2-inch-diameter schedule 40 polyvinyl chloride (PVC) screen with a 0.010-inch slot size. The screened interval was typically installed 10 feet into the underlying competent bedrock (upper Zone D) and with 5 feet of screen in the overlying fractured bedrock interval or partially weathered rock (PWR) (lower Zone C). The screen was connected to a 2-inch diameter PVC riser and installed in the borehole to about 3 feet above the ground surface. Sand was tremie-placed in the borehole annulus to 2 to 3 feet above the screen, followed by 2 to 3 feet of tremie-placed bentonite, which was allowed to hydrate for 24 hours, prior to tremie-grouting to the surface using cement grout with up to five percent, by weight, of bentonite. The surface completion was enclosed within a locking steel "stick-up" monument. Well completion records are presented in Appendix A.

After completion, each well was developed using a Waterra Hydrolift-2 inertial pump (Waterra pump) with a surge block affixed to the foot valve. The depth of the foot valve was adjusted multiple times during well development to remove fine particles from the entire well screen. Once water extracted with

the Waterra pump was visually clear, a Grundfos submersible pump was used until approximately 200 gallons of water were purged. Well development forms are provided in Appendix C.

2.3 Summary of Sampling Methods

During the drilling program, the following types of samples were collected: (1) Geotechnical Samples, which included disturbed soil samples for geotechnical analysis that were collected from the split-spoon sampler used during the SPTs, bulk soil samples for geotechnical analysis collected by shovel from auger returns, and bulk groundwater samples for geotechnical analysis collected by pumping groundwater from representative monitoring wells; (2) Soil and Groundwater Samples for volatile organic compound (VOC) Analysis, which included soil samples for VOC analysis that were collected from the spilt-spoon sampler, grab groundwater samples collected from the auger annulus when FID levels were significantly elevated, and groundwater samples from the VBW geotechnical borings that were completed as monitoring wells.

The Geotechnical Work Plan called for undisturbed sample collection via Shelby tubes from up to three locations where clay-rich materials were encountered. Based on the observations of the split-spoon returns, clay-rich zones were not present; therefore, no undisturbed samples were collected.

2.3.1 **Collection of Geotechnical Samples**

2.3.1.1 Collection of Disturbed Soil Samples (SPT Samples) and Bedrock Coring

As summarized in Table 1, the 18 borings were advanced to depths ranging from 19.9 ft-bgs to 129.1 ft-bgs, with the deeper borings generally located south of the APA. As the borings were advanced, SPT samples were collected at depth intervals defined in the Geotechnical Work Plan using procedures in general accordance with the most recent version of ASTM D1586. SPT blow counts were recorded to assess the relative properties of the soils encountered and are summarized in Table 2. Continuous sampling was performed at the eight boring locations that are coincident with the corners of the APA and DA 9 (i.e., VBW-1, VBW-3, VBW-7, VBW-10, and VBW-13 through VBW-16). In the context of this report, continuous sampling is defined as retrieval of a SPT sample, continuously, every 1.5 feet, with augers advanced to the next interval after samples were retrieved. SPT sampling was performed at 5-foot intervals for the remaining boring locations. A total of 426 SPT samples were collected from the 18 soil borings.

In general, the SPTs, SPT sample collection (disturbed soil sample), and bedrock coring procedures included the steps outlined in Section 2.1 and more specific steps below. The field geologist recorded the number of hammer blows for SPT depth intervals on borings logs. The boring logs are summarized in Table 2. Drilling and sampling details are provided on the boring logs in Appendix A. A project field book was maintained during the implementation of the Geotechnical investigation and is maintained in Altamont's project files. Specific SPT depth intervals were sampled as follows:

- An HSA was used to advance each boring through the regolith materials (soil and saprolite) and PWR. The augers were advanced mechanically to the top of the target sampling interval and the SPT sampling assembly was inserted into the HSA and used to collect the target sample.
- The first SPT sample was generally obtained at ground surface. The HSA was advanced to the top of the next SPT sample interval.

- Upon reaching the end of the 18-inch testing interval, the split spoon was retrieved from the boring, unscrewed from the drilling rods, and opened for inspection. A photograph of the sample in the split-spoon sampler was obtained (see Appendix A). The sample depth and location were documented in the photograph. The soil lithology was visually inspected, described, and classified by the field geologist based on field observation in general accordance with the Unified Soil Classification System (ASTM D 2488). Laboratory testing of SPT samples provide further clarification on the soil classification.
- Depth-discrete SPT samples were collected for subsequent geotechnical evaluation at continuous intervals at VBW-1, VBW-3, VBW-7, VBW-10, and VBW-13 through VBW-16, and at 5-foot intervals at the remaining boring locations. The samples were collected from the bottom approximate 1 foot of the split spoon (only) and placed in new zip-lock plastic bags, labeled, and retained on-Site until submittal to the geotechnical laboratory for physical testing. A sample was retained from every SPT sampling interval unless no soil/sample was retained in the split spoon when it was retrieved from the borehole.
- After sample collection, sample containers were immediately sealed to preserve moisture content and labeled with an identification number that uniquely identified the sample. The convention used for SPT sample identification was completed as follows:

  LOCATION-DEPTH1-DEPTH2

  where:

  - LOCATION = Location at which the sample was collected (e.g., VBW-1)
  - DEPTH1 = The starting depth (in ft-bgs) at which the sample was collected
  - DEPTH2 = The ending depth (in ft-bgs) at which the sample was collected
- This testing procedure continued until the augers could no longer advance, at which point the drill rig was equipped with a core barrel to accommodate bedrock coring.

Upon completion of the drilling and prior to commencing the bedrock coring, the field geologist identified the depth to groundwater at the borehole location using an electronic water level meter. Additional observations regarding groundwater were made as applicable during the advancement of the borehole (i.e., wet split spoons, gain or loss of water during coring, etc.).

After water levels were recorded, bedrock coring proceeded in accordance with the procedure described in Section 2.1. Bedrock cores were stored in core boxes marked with Location-Depth1-Depth2, similar to the soil samples. A photograph of each cored interval was made showing the boring name, depth interval, and graphic scale (Appendix A). The “top” and “bottom” of the core were indicated on each core box. The RQD was indicated on the boring log. The bedrock cores are maintained on-Site at an appropriate storage location designated by Altamont.

Field personnel were responsible for sample custody beginning with collection of the samples, preparation of the samples for transport, and delivering the samples to the laboratory. A master list was completed for all samples for documentation of sample identifiers (IDs), depths, and collection dates.

Altamont personnel were responsible for sample custody beginning with collection of the SPT soil samples; preparation of the SPT soil samples for transport; and relinquishing of the samples to a

Geosyntec representative. After collection, the samples were stored in a cool, dry location until the bulk soil samples were relinquished by Altamont to a Geosyntec employee at the completion of the geotechnical investigation. Geosyntec delivered the samples to Excel Geotechnical Laboratory in Roswell, Georgia. A list of collected samples is provided in Appendix C.

2.3.2 Collection of Bulk Soil Samples

Bulk soil sample collection was performed at geotechnical boring locations VBW-2, VBW-4, VBW-5, VBW-6, VBW-8, VBW-9, VBW-11, VBW-12, VBW-17, and VBW-18, along the potential alignment of the VBW surrounding the APA and at VBW-14 near the southwest corner of DA 9. Bulk samples were obtained by collecting excess soil brought to the ground surface by the hollow stem auger and placing it in 5-gallon buckets lined with plastic bags. The bags were tied and the buckets were sealed with lids. The bulk samples were collected to represent the overall stratigraphy, excluding the competent bedrock, along the potential VBW alignment at the APA and from VBW-14 at DA 9.

Bulk samples were obtained from each of the stratigraphic layers previously identified at the Site including soil, saprolite, and PWR. Samples obtained were separated by stratigraphic layer at the field geologist's discretion. In general, the volume of soil obtained from each stratigraphic layer was proportional to the thickness of that layer in the field. Each sample bucket was labeled with the soil boring location, stratigraphic layer represented, and approximate depth from which the sample was retrieved. A total of 28 buckets of soil were obtained.

The general bulk soil sampling procedure included the following main steps:

- At soil boring locations where SPT sampling was performed at 5-foot intervals (i.e., VBW-2, VBW-4, VBW-5, VBW-6, VBW-8, VBW-9, VBW-11, VBW-12, VBW-17, and VBW-18) soil brought to the ground surface by the rotation of the hollow stem auger was shoveled into 5-gallon plastic buckets lined with large plastic bags. Bulk samples were also collected at VBW-14 to provide material from the DA 9 area. The soil was collected at the field geologist's discretion based on field observations in an attempt to collect a sample representative of the full stratigraphic depth. The general depth of the augers at the time of sampling was noted concurrent with each sample collection. Samples obtained were separated by stratigraphic layer (i.e., residuum, saprolite, and PWR).
- The outside of the plastic bucket lids were labeled with the sample location, stratigraphic unit, and depth. The plastic bags inside the buckets were labeled with the same information. The convention used for geotechnical bulk sample identification was completed as follows:

  LOCATION-STRATIGRAPHIC UNIT-DEPTH1-DEPTH2

  where:

  - LOCATION = Location at which the sample was collected (e.g., VBW-1)
  - STRATIGRAPHIC UNIT = Stratigraphic unit making up the bulk material (e.g., residuum, saprolite, or PWR)
  - DEPTH1 = The starting depth (in feet) at which the sample was collected
  - DEPTH2 = The ending depth (in feet) at which the sample was collected

- Once a bucket was full, or drilling in a stratigraphic layer at a particular soil boring location was complete, the top of the plastic bag was tied closed and labeled with a duct tape tag. The bucket lid was then tightly affixed to the bucket. Duct tape was used to secure the lid and aid in sealing the bucket. The plastic bags and buckets were closed as soon as possible following sample collection to preserve the natural moisture content. On occasion, multiple buckets were used for a single stratigraphic layer at a single boring location when the field geologist deemed necessary. In some instances, a clear transition between saprolite and PWR was not visible or material alternated between saprolite and PWR; consequently, certain buckets contained a mixture of saprolite and PWR and were labeled as such.

Altamont personnel were responsible for sample custody beginning with collection of the bulk samples; preparation of the bulk samples for transport; and relinquishing of the samples to a Geosyntec representative. After collection, the samples were stored in a cool, dry location until the bulk soil samples were relinquished by Altamont to a Geosyntec employee at the completion of the geotechnical investigation. Geosyntec delivered the samples to Excel Geotechnical Laboratory in Roswell, Georgia. A list of collected samples is provided in Appendix C.

2.3.3 Collection of Bulk Water Samples

Approximately 15 gallons of representative Site groundwater from monitoring wells P-5D and P-7D (i.e., 15 gallons of groundwater from each well) were collected using low-flow sampling techniques. Samples were collected in accordance with procedures provided in the RI/FS Work Plan (Altamont 2010). Water quality parameters were measured prior to sampling. Groundwater samples were stored in plastic carboy containers. Samples were stored in a cool, dry location until sample shipment could occur. The bulk groundwater samples were driven to Excel Geotechnical Laboratory in Roswell, Georgia at the completion of the geotechnical investigation by Geosyntec personnel.

An aliquot of the 15-gallon samples (i.e., one set of samples collected from the water from P-5D and one set of samples collected from the water from P-7D) was packaged in laboratory-supplied sample bottles, placed on ice in a cooler, and shipped to Lancaster Laboratories, Inc. (Lancaster) by Altamont. Each aliquot of the groundwater samples was analyzed by Lancaster to evaluate pH using EPA Method 150.1, total hardness using EPA Method 130.1, total dissolved solids (TDS) using Standard Method (SM) 2340C, and to verify concentrations of Site chemicals of concern (COCs), anions (i.e., bromide, chloride, nitrate, nitrite, sulfate), and dissolved metals (i.e., calcium, magnesium, iron, manganese, aluminum, potassium, and sodium).

Potable mix water required for the preparation of slurry, backfill mixes, and compatibility testing was obtained by Altamont from an on-Site hydrant connected to the municipal water supply system. Prior to sample collection, the hydrant was allowed to flow for approximately 1 minute to purge stagnant water from the lines. Approximately 15 gallons of water from the municipal water supply system was collected in accordance with procedures provided in the Geotechnical Work Plan. Samples were stored in plastic carboy containers. The sample containers were labeled and stored with a completed chain of custody for eventual transport to the geotechnical laboratory.

An aliquot, obtained from the 15-gallon hydrant water sample, was packaged in laboratory-supplied sample bottles. The bottles were labeled, packaged in a cooler on ice and shipped to Lancaster by

Altamont. Samples were tested by Lancaster for pH by EPA Method 150.1, total hardness by EPA Method 130.1, and TDS using Method SM 2340C.

Bulk water samples (groundwater and hydrant water) were kept in a cool, dry location during storage and transport. At the completion of the geotechnical investigation, the samples were driven to Excel Geotechnical Laboratory in Roswell, Georgia by Geosyntec personnel. Bulk water sample field sheets and chains of custody are provided in Appendix C. The analytical results were reported to Geosyntec and are not presented in this document.

2.3.4 **Collection of Soil and Groundwater Samples for VOC Analysis**

2.3.4.1 Collection of Grab Soil Samples (SPT) for VOC analysis

Observations for soil or groundwater potentially containing COCs were made and recorded during the collection of each geotechnical soil sample. An FID was used to measure levels of VOCs in the vapors from the samples recovered using the SPT as well as the ambient air and breathing zone at the borehole. The measured FID levels were recorded on the borehole log and/or in field notes. The VOC levels were measured with the FID immediately upon opening the split-spoon sampler and prior to making geotechnical observations. VOC concentrations detected by the FID were recorded on field boring logs (Appendix A). Ambient air VOC levels ranged from essentially 0.0 parts per million (ppm) to roughly 3.5 ppm depending on topography, wind, and proximity to the drill rig exhaust. The majority of geotechnical boring locations exhibited VOC vapor concentrations at or slightly above background levels. Boring locations VBW-5, VBW-6, VBW-7, VBW-8, VBW-9, VBW-14, VBW-15, VBW-17, and VBW-18 (see Appendix A) exhibited FID readings above background levels in the SPT samples or breathing zone readings taken near the borehole during drilling activities. These FID readings ranged from 6.52 to 31.34 ppm for the borings listed above, some of which required an upgrade in personal protective equipment (PPE) (see Appendix D for boring locations that required PPE upgrades).

As summarized in Table 1, a sample was collected for laboratory analysis from soil immediately above the first encountered groundwater at the following locations: (1) for APA: VBW-05 and VBW-10, and (2) for DA 9: VBW-13, VBW-14, and VBW-15. These boreholes were pre-selected and defined in the Geotechnical Work Plan. Each depth interval sampled from the selected borings for laboratory analysis was selected based on FID monitoring and visual observations. If FID readings at a boring were not above background, a sample was typically not collected. When a sample was selected for collection, the grab sample was obtained prior to making geotechnical observations of the soil contained in the SPT sampler. Samples for laboratory analysis were collected using EnCore™ samplers, consistent with EPA Method 5035. Soil grab samples were shipped to Lancaster via overnight courier, and were analyzed for VOCs using EPA Method 8260. A summary of the analytical data is included as Table 3. Appendix C provides the laboratory reports.

2.3.4.2 Collection of Grab Groundwater Samples for VOC Analysis

Due to consistently strong odors and above-background FID readings at VBW-06, VBW-08, and VBW-09, groundwater grab samples were collected from these boreholes. The samples were collected from each boring location where FID measurements of SPT samples collected from depths below the water table exceeded background. Groundwater grab samples were collected using a bailer lowered into the annular space of the auger and placed in laboratory-supplied sample bottles, consistent with EPA SOP

SESDPROC-301-R3. The groundwater grab samples were stored and shipped in coolers with blue ice. Groundwater grab samples were obtained separate from the geotechnical samples, shipped to Lancaster via overnight courier, and were analyzed for VOCs using EPA Method 8260. A summary of the analytical data is included as Table 3. Appendix C provides the laboratory reports.

2.3.4.3 Collection of Groundwater Samples from Completed Monitoring Wells

Four of the VBW borings (VBW-10, VBW-16, VBW-17, and VBW-18) were converted to monitoring wells (MW254-L25CD, MW255-L25C, MW256-M25CD, and MW257-M25CD, respectively) and groundwater was sampled, using low-flow sampling techniques, after the wells were completed and developed. The groundwater samples were submitted to Lancaster for VOC and perchlorate analyses by EPA Methods 8260 and 6850, respectively. These results are summarized in Table 3 and Figure 4. Appendix C provides the laboratory reports.

2.4 Work Area Management

Work area management activities have been summarized and included for reference in Appendix D and include descriptions of the following:

- Exclusion Zone—Summarizes the establishment of exclusion zones around drilling sites and how egress and regress were managed. Also describes hazardous vapor monitoring activities and occurrences of upgrading PPE from Level C to Level B.
- Decontamination Procedures—Summarizes the decontamination procedures employed during the geotechnical investigation.
- Investigation Derived Waste (IDW)—Summarizes the handling of both liquid and solid IDW during the drilling activities performed as part of the geotechnical investigation.

3.0 Summary of VOC Analyses and Results

The analysis of the soil grab samples identified 12 VOCs at detectable concentrations. The highest reported VOC concentrations included chloroform (1,900 micrograms per kilogram [µg/kg]), 1,2-dichloroethane (480 µg/kg), and cyclohexane (180 µg/kg), all from boring VBW-5 (Figure 4).

Analytical results from the groundwater grab samples collected from geotechnical soil borings and from the groundwater collected from the newly completed monitoring wells (converted from soil borings) identified a total of 24 VOCs and perchlorate at detectable concentrations. Compounds with the highest reported concentrations were t-butyl alcohol (690,000 micrograms per liter [µg/L] in VBW-18), tetrahydrofuran (230,000 µg/L in VBW-18), acetone (110,000 µg/L in VBW-18), 1,2-dichloroethane (79,000 µg/L in VBW-6), chloroform (24,000 µg/L in VBW-6), and trichloroethene (18,000 µg/L in VBW-9). A complete list of detected compounds is included in Table 3, on Figure 4, and in Appendix C.

4.0 Site-Specific Geologic Conditions

4.1 Soil

Observed soil at the APA and DA 9 is typically brown in color with red-orange zones resulting from the weathering and oxidation of ferromagnesian minerals such as biotite and garnet. Silicate minerals that are resistant to weathering and chemical alterations, such as quartz and muscovite, were represented as very fine to medium sand and silt-sized grains. Relic structures of the parent rock, such as foliation, were absent in soil, although highly weather-resistant quartz veins are sometimes present in soil. In three borings, as noted previously, shallow subsurface obstructions were encountered. These obstructions consisted of wood at VBW-15 and boulders at VBW-4 and VBW-18 (Appendix A).

4.2 Saprolite

Saprolite was observed in all borings from the APA and DA 9 except VBW-2, which contained only soil and PWR. The saprolite thickness in the APA and DA 9 ranges from 0 to 60 feet with an average depth of 37 feet. Grain size in saprolite is a function of the composition of and proximity to the underlying parent rock. In general, saprolite becomes coarser grained and less silty with depth. Grain size is coarser in quartzitic bands and finer in micaceous bands.

4.3 Partially Weathered Rock

The PWR zone is 0 to 41 feet thick in the vicinity of the APA and DA 9 and resembles the parent rock (i.e., schistose metagraywacke[1]) in grain size and color, but is weak and breaks easily due to the effects of weathering on mineral grain boundaries. The average PWR thickness along the potential VBW alignment is approximately 13 feet. The weathered rock is generally coarse-grained, and the primary minerals are quartz, feldspar, and biotite. Iron staining of the grains is sometimes present and foliation is apparent. Clay mineral development is minimal, and the unit is typically moderately permeable. Table 1 and the cross-sections shown in Figures 5, 6, and 7 provide the depths to the top of PWR in the 18 borings drilled during this geotechnical investigation. The top of the PWR zone to the depth of auger refusal represents the upper portion of Zone C (Zone C_{pwr}) (see Appendix B).

4.4 Bedrock/Competent Bedrock

The predominant rock type underlying the APA and DA 9 is biotite-garnet gneiss (schistose metagraywacke shown as Zagsi on Figure 2) as determined by rock coring performed during geotechnical investigation activities. The biotite-garnet gneiss (schistose metagraywacke) is mainly composed of the minerals biotite, quartz, and feldspar with subordinate amounts of garnet, muscovite, pyrite, and chlorite. The rock is light to dark gray and foliation bands are visible on fresh surfaces. In most cases, foliation is distinct and occurs at moderate to high angles relative to the borehole. In some instances, the rock is weakly to non-foliated.

A secondary rock type encountered at the APA and DA 9 is a felsic-rich rock. The main minerals in this rock type include quartz, feldspar, and biotite with minor amounts of garnet and chlorite. The felsic rock is light gray to white in color and weathers to gray, white, or light brown. This rock type is

typically observed interlayered with the biotite-garnet gneiss (schistose metagraywacke). The secondary rock type is interpreted to represent migmatitic leucosomes (light colored partially melted rocks).

In the areas where borings have been advanced in the Back Valley, the geologic map presented on Figure 2 appears consistent with observed cored intervals collected in the field. Foliated to non-foliated biotite-garnet gneiss (schistose metagraywacke) with migmatitic leucosomes is consistent with the rock types described in the Bedrock Geologic Map of the Oteen 7.5 Minute Quadrangle (2008).

Table 1 provides the depths to bedrock and to competent bedrock in the 18 borings drilled during this geotechnical investigation. Cross-sections, shown in Figures 5, 6, and 7, illustrate the top of bedrock and the top of competent bedrock. The top of bedrock varies from 0 to 33 feet above the top of competent bedrock. This interval is interpreted to represent the lower portion of Zone C (hereinafter as Zone C_{RI}) and the 70-percent RQD line is interpreted to represent the top of Zone D in the hydro-stratigraphic conceptual model of the Site (see Appendix B). The following subsections summarize the various bedrock characteristics that are important to this investigation (namely bedrock surface, preferential flow paths, and rippability of the bedrock).

4.4.1 **Bedrock Surface**

Based on the data collected from the 18 geotechnical borings, the top of bedrock exists at depths ranging from 10 to 95 ft-bgs along the potential alignment of the VBW and the top of competent bedrock ranges from 10 to 118.9 ft-bgs. Bedrock elevation data is summarized in Table 1. The depth to bedrock observed in each of the geotechnical borings has been used, along with data from previous Site investigations, to prepare a bedrock topography map (Figure 8) and in the preparation of three cross-sections. The following paragraphs describe the bedrock conditions along each of three cross-sections from A to A', B to B' and C to C' (Figures 5, 6, and 7).

4.4.1.1 Cross-Section A to A' (Figure 5)

The bedrock surface is the shallowest along the northern portion of the potential VBW alignment, as shown on Figure 5. The depths to bedrock observed in borings VBW-1, VBW-2, and VBW-3 were 28.5 feet, 10 feet, and 39 feet, respectively. Bedrock depths appear to continue to be shallow to the north of the potential alignment as indicated by bedrock outcrops occurring approximately 100 feet north of the potential VBW alignment. The thickness of the Zone C_{RI}, defined by auger refusal and the competent bedrock surface, was zero along the northern potential alignment with the exception of VBW-1, which had a Zone C_{RI} of approximately 5 feet.

Moving from VBW-1 to VBW-15 along the western potential alignment of the VBW, as shown on Figure 5, the top of bedrock significantly deepens from 28.5 ft-bgs at VBW-1 to 95 ft-bgs at VBW-15. From VBW-1 to VBW-12, the gradient in the bedrock surface is relatively flat; however, from VBW-12 to VBW-11 the gradient is rather steep, dropping greater than 50 feet in elevation over a distance of approximately 240 feet. From VBW-11 to VBW-15, the depth to bedrock is similar, but decreases toward VBW-15; however, at VBW-16, the bedrock surface rises approximately 30 feet relative to VBW-10 and VBW-15. The thickness of Zone C_{RI} along the western potential alignment decreases from VBW-1 (6.2 feet) to about 2 feet at VBW-12. For VBW-11, VBW-16, and VBW-15, Zone C_{RI} thickness was zero feet. At VBW-10, a rock lens at 37 ft-bgs marked the depth of auger refusal (e.g., the top of bedrock). At that depth, coring began and continued to the completion of the hole; however,

after 2 feet of coring, the quality of the rock rapidly deteriorated. From 39 ft-bgs to about 89 ft-bgs, few intact samples (predominantly PWR) were recovered due to washout from coring activities; therefore, the observed materials flushed from the boring were classified in the boring logs as either saprolite or partially weathered rock. At 89 ft-bgs, bedrock was encountered, and competent bedrock was encountered at 94 ft-bgs.

4.4.1.2 Cross-Section B to B' (Figure 6)

Along the eastern potential alignment, as shown on Figure 6, from VBW-3 to VBW-7, the depth to bedrock increases from 39 ft-bgs at VBW-3 to 75 ft-bgs at VBW-7. The slope of the bedrock surface from VBW-3 to VBW-5 is steeper (13 percent gradient) than it is from VBW-5 to VBW-7 (0.5 percent gradient). To the east of boring VBW-6, historical boring data (Metcalf & Eddy 1987) indicates that the depth to the bedrock surface increases. The Zone C_{RI} thickness along the eastern potential alignment was zero with the exception of VBW-4 and VBW-7, where Zone C_{RI} thickness was 13.8 and 5 feet, respectively.

The depth to the bedrock surface along the potential VBW alignment on the southern side of the APA, as shown on Figure 6, tends to gradually increase from VBW-7 (75 ft-bgs) to VBW-10 (89 ft-bgs). Auger refusal was encountered at a depth of 37 ft-bgs in VBW-10; however, coring determined that the top of competent bedrock is 94 ft-bgs. In VBW-10, the Zone C_{RI} thickness was defined from 89 ft-bgs to 94 ft-bgs. The Zone C_{RI} thickness at VBW-7, VBW-8, and VBW-9 was found to be 5, 4.6, and 33.4 ft, respectively.

From VBW-10 to VBW-14, the cross-section changes direction three times, so direct correlation of bedrock trends along the entire line of the section is not possible. However, the depth to bedrock surface decreases moving from VBW-10 (89 ft-bgs) to VBW-16 (61.5 ft-bgs), and then to VBW-13 (34.5 ft-bgs) and decreases moving from VBW-13 to VBW-14 (69.7 ft-bgs). The Zone C_{RI} thickness along this portion of B to B' was zero at VBW-16; however, at VBW-10, VBW-13, and VBW-14 the Zone C_{RI} thickness was 5, 20.5, and 5 feet, respectively.

4.4.1.3 Cross-Section C to C' (Figure 7)

Along the southern potential VBW alignment, as shown on Figure 7, the ground elevation and bedrock elevation decreases from VBW-7 to VBW-14; however, the depth to auger refusal decreases from VBW-7 (75 ft-bgs) to VBW-14 (67.9 ft-bgs). Zone C_{RI} thickness above competent bedrock along C to C' is greatest at VBW-7 (5 ft) and thins to about 2.5 feet at VBW-18. Moving from VBW-18 to VBW-17, Zone C_{RI} thickness above competent bedrock thins to zero. Zone C_{RI} thickness increases again moving from VBW-15 to VBW-14, where Zone C_{RI} is about 5 feet thick.

4.4.2 **Bedrock Fractures**

Rock quality designations for core collected from geotechnical borings from the APA portion of the potential VBW alignment ranged from 0 to 100 percent, with an average of 55 percent. The average for the bottom 10 feet of core from all the APA geotechnical borings was 81 percent. For geotechnical borings along the DA 9 portion of the potential VBW alignment, core RQD ranged from 0 to 100 percent, with an average of 68 percent. The average for the bottom 10 feet of core from all DA 9 borings was 92 percent. Fractures noted in the cored intervals along the potential VBW alignment were

mostly low-angle fractures. Moderately dipping and steep, sub-vertical fractures were also present. Generally, high-angled fractures were parallel to steeply dipping foliations; however local occurrences of cross-cutting, high-angled fractures were observed as well. A summary of RQD information and fracture descriptions for all soil boring locations is included as Table 4 and is presented on the boring logs in Appendix A.

The borings installed along the northern half of the potential VBW alignment generally had very little sub-vertical fracturing. The core returned from these locations showed generally sub-horizontal fracturing, typical of exfoliation or stress relief fractures. The high-angled fracturing is more prevalent along the southern boundary of the potential VBW alignment. These observations are further supported by historical downhole acoustic televiewer data for MW169-J23F, MW170-J23E, MW-4B, P-7B, P-5B, and BW-9 (Figure 9), provided by Marshall Miller and Associates and from Appendix D of the Data Summary Report, described in the RI. Data from MW169-J23 shows very tightly oriented sub-horizontal fractures that are oriented nearly perpendicular to the orientation of northwest dipping foliations. This well is located north of the APA, where cored intervals of geotechnical borings displayed predominantly sub-horizontal fracturing. MW-4B, P-7B, P-5B, and BW-9 are located along the southern potential alignment of the VBW (Figure 9). Acoustic televiewer data from these wells shows generally southwest to westward dipping foliations. Dip angles are shallow to moderate for most foliations. Fractures in these wells are characterized as generally layer-parallel fractures (parallel to foliation) and sub-vertical to vertical fractures. The VBW borings along the southern potential alignment of the VBW are similarly fractured.

These fracture relationships likely account for the high degree of bedrock variability on the southern potential alignment of the VBW. Vertical to sub-vertical fractures that cut the sub-horizontal stress relief fractures likely result in deeper weathering profiles due to the effects of chemical weathering acting on exposures of greater surface area. The depth to bedrock and the bedrock topography south of the potential VBW alignment as well as the down-valley bedrock surface characteristics support this hypothesis.

4.4.3 **Preferential Groundwater Flow Paths**

The southern area of the potential VBW alignment has a greater depth to bedrock and more variability in bedrock topography. The bedrock cores observed along the southern potential alignment had a greater frequency of sub-vertical fracturing trending toward the APA and had significant staining on fractured surfaces, suggesting preferential pathways for groundwater to flow (see photographs of borings VBW-9 and VBW-18 in Appendix A and Figures 6 and 7). The southern potential alignment is somewhat parallel to the strike of local foliations/gneissic banding and is generally perpendicular to sub-vertical fractures trending to the north to northwest.

The east and west potential VBW alignments may trend across areas with deep differential weathering profiles that parallel local foliation or gneissic banding. Such weathering profiles could project into the hillside to varying depths, below the overlying competent bedrock, and may serve as preferential flow paths. The borings along the eastern and western potential alignments had fewer sub-vertical fractures and were dominated by stress-relief fractures. Little staining was observed in these areas. This suggests that the sub-horizontal fracturing likely transmits water along sub-horizontal flow planes toward areas of discharge and retards the downward migration of water. On the western potential alignment, in the vicinity of VBW-10 to VBW-12, an example of the variability in bedrock surface due to differential

weathering is observed. Moving south from VBW-12 to VBW-10, the depth to bedrock increases significantly in an area where significant lithology changes were observed along the section from VW-12 to VBW-15. At VBW-12, the shallow depth to bedrock is due to an apparently more weather-resistant bedrock. Moving along the potential alignment, in the order of VBW-11, VBW-10, VBW-16 and then to VBW-15, the depth to competent bedrock varies, suggesting zones of alternating resistant and less-resistant bedrock, typical of the schistose metagraywacke mapped in this area. Less resistant weathering profiles along this section of the VBW potential alignment could project to the northwest under more resistant competent bedrock layers.

4.4.4 **Rippability**

Rippability is a qualitative property of rock and describes the relative ease at which the bedrock materials can be removed by an excavator. During the geotechnical investigation, Altamont recorded SPT blow counts for each soil sample interval and recorded RQD for the cored intervals. For the cored intervals, Altamont also noted relative fracture and foliation orientation (i.e., horizontal or vertical), frequency of fractures, staining, and degree of weathering. These attributes were compiled and are summarized in Table 4. As described in the previous section (4.1.6 and 4.1.7), the northern portion of the potential VBW alignment will likely be less rippable due to less pervasive weathering profiles, the predominance of shallow dipping fractures that are not closely spaced, and lack of vertical fractures (see core images displayed on Figure 5 for VBW-1, VBW-2, and VBW-3). Moving toward the southern portion of the potential VBW alignment, where depths to competent bedrock are deeper, the rippability will likely be greater due to the interconnectivity of vertical and horizontal fractures, generally moderate to steeply dipping foliations, and greater differential weathering (see core images displayed on Figure 5 and 6 for VBW-9, VBW-10, and VBW-13).

4.5 Groundwater

As discussed in Section 2.1, depth-to-water measurements were made once auger refusal was reached and prior to the initiation of coring into bedrock. These depth-to-water measurements may not represent the true potentiometric surface due to borehole smearing of primary porosity. General moisture content was noted in the drilling returns and split-spoon samples and documented on the boring logs and field notes. The first occurrence of moist soils is interpreted to correlate with the top of the capillary fringe. The actual potentiometric surface is likely some place between the measured groundwater level and the first occurrence of moist soils. At some locations (VBW-8, VBW-9, and VBW-18), the depth-to-water measurement placed the potentiometric surface above the depth to moist soils. These borings were sampled at 5-foot intervals, which could account for the discrepancy in borings VBW-8 and VBW-18, leaving VBW-9 as the only anomalous location. In these situations, the recorded water level is assumed to be the more accurate reading, although in other areas of the Site, localized semi-confined aquifer conditions have been observed in saprolite.

Depth to water in borings along the potential VBW alignment ranged from 6.9 to 56.7 ft-bgs, with an average of 25.2 ft-bgs. The shallowest groundwater levels were recorded in VBW-13 (6.9 ft-bgs), adjacent to a creek west of DA 9, and in VBW-9 (7.2 ft-bgs), which is located near the outfall of the APA cap underdrain system. The depth to groundwater at VBW-14, also adjacent to the creek west of DA 9, was measured as 21.2 ft-bgs. The depth to groundwater at VBW-14 is unexpectedly deep,

considering its proximity to the creek and VBW-13. VBW-7 and VBW-15 also exhibited deeper-than-expected water depths of 56.7 and 43.7 ft-bgs, respectively.

The depth-to-water measurements and depth-to-soil moisture are denoted on the cross-sections shown in Figures 5, 6, and 7, and in Table 1.

5.0 Summary and Conclusions

Subsurface conditions along the potential VBW alignment, as defined in the Geotechnical Work Plan, have been assessed through the installation of 18 geotechnical borings. The following are general observations and conclusions based on the data collected during the installation of these borings.

- Bedrock Surface Variation—The measured depths to bedrock were used to develop and update a bedrock elevation map for the Back Valley. Depth to bedrock is generally shallow in the northern portion of potential VBW alignment and deeper in the southern portion of the potential alignment. Competent bedrock is coincident with the top of Zone D. Along the potential VBW alignment, the top of competent bedrock is 0 to 33.4 feet deeper than the top of bedrock (Zone C_{RI}).

- Differential Weathering—The variability in thickness of partially weathered rock and in the top of the bedrock/competent bedrock observed in the VBW borings suggests that differential weathering is widespread in the vicinity of the APA and DA9. The most pronounced example of this condition was observed in VBW-10 where a 2-foot-thick rock lens was encountered at 37 feet below ground surface followed by very soft un-lithified materials interlayered with partially weathered rock and rock with low RQD values. Competent bedrock at VBW-10 was not encountered until 89 ft-bgs. Approximately 15 feet south of VBW-10, at VBW-16, the boring did not intersect a rock lens, but the depth to bedrock was coincident with competent bedrock (61.5 ft-bgs) and was about 30 feet higher in elevation than at VBW-10. It is likely that northwest dipping bedrock, having layers of resistant and less resistant rock, may develop differential weathering profiles that extend into the subsurface, which may have resulted in the rock lens encountered in VBW-10 and the undulating bedrock surfaces. Additional lenses of bedrock could also exist in between the borings that were installed along the potential VBW alignment; however, no others were encountered during this investigation.

- Preferential Flow Potential—In the southern portion of the potential VBW alignment, historic acoustic televiewer data from borings near the potential VBW alignment indicate the occurrence of high-angled fractures that strike from north to northeast and may provide preferential flow pathways along the southern potential alignment. Likewise, layer parallel fractures dipping toward the west or northwest may increase the potential for preferential flow in directions parallel to strike or in the downdip direction. VBW-9 and VBW-10 have a high degree of fracturing and are both heavily stained, suggesting active flow through these intervals.

- Rippability—Rippability is a qualitative quality of rock describing the relative ease that the rock can be removed by an excavator. In general, along the potential VBW alignment, the areas where rippability will likely be greatest are in areas where fracture frequency is highest, weathering is more advanced, and planar features are oriented advantageously. These are the general subsurface condition in the vicinity of VBW-9, VBW-10, and VBW-13.

6.0 References

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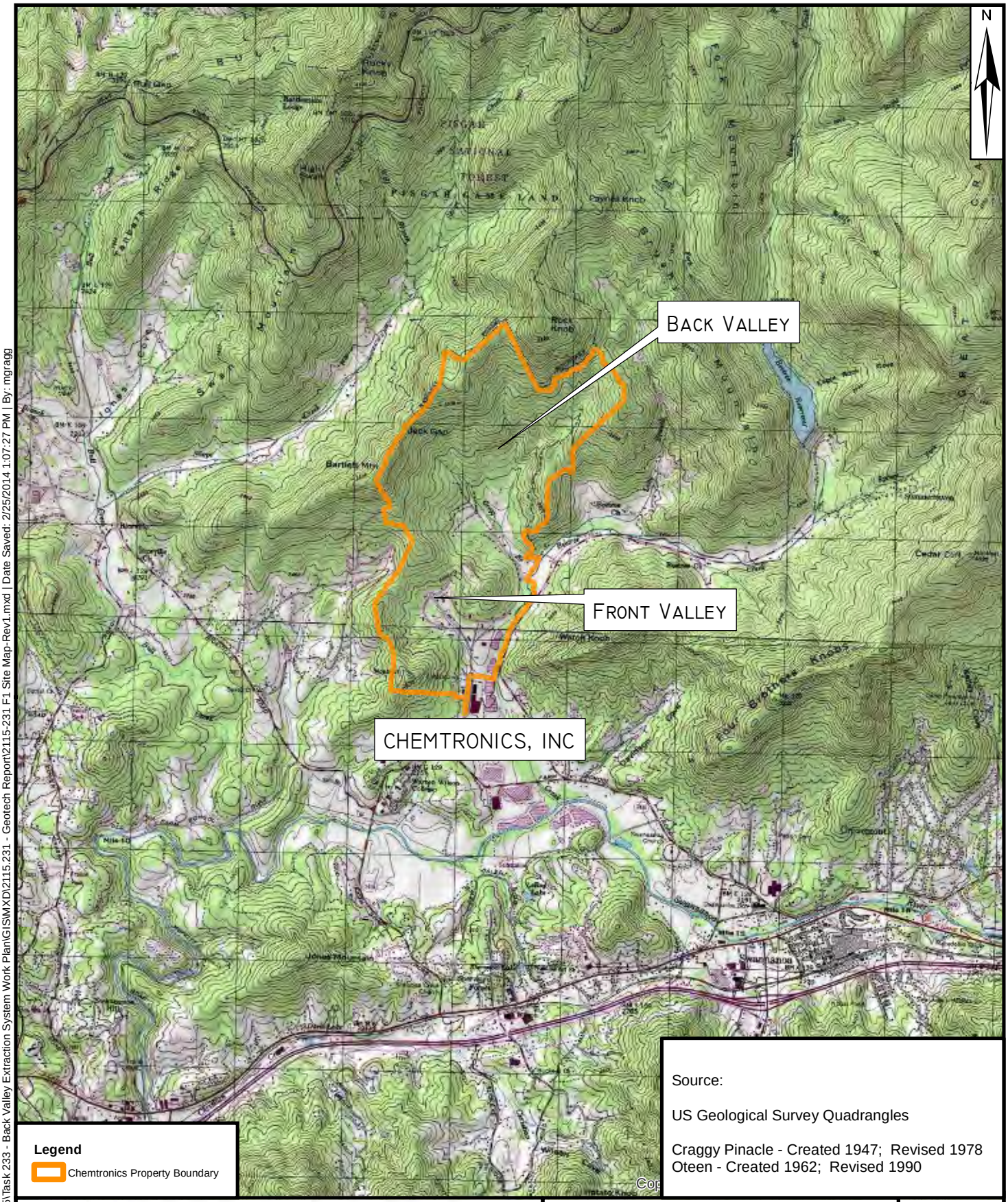
Figures



Source:

US Geological Survey Quadrangles

Craggy Pinacle - Created 1947; Revised 1978
Oteen - Created 1962; Revised 1990

Legend

Chemtronics Property Boundary

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SITE MAP

CHEMTRONICS, INC.
SWANNANOA, NORTH CAROLINA

FIGURE

1

DRAWN BY: MICHAEL GRAGG
PROJECT MANAGER: STU RYMAN
CLIENT: CHEMTRONICS, INC.
DATE: 02/25/2014

SCALE
0 1,000 2,000 4,000
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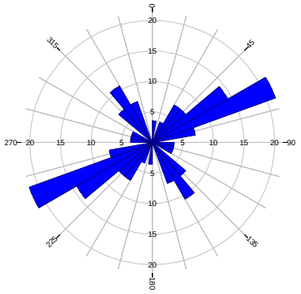
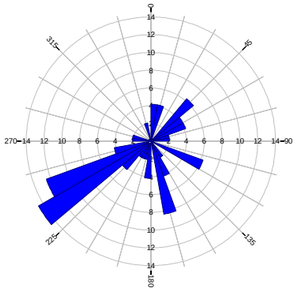
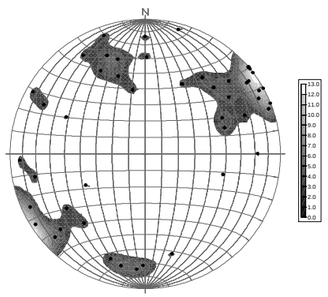


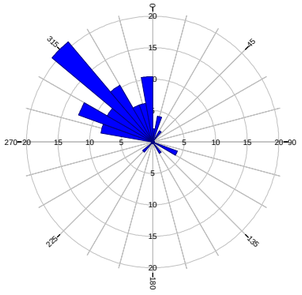
Lineament Orientations (Bidirectional) From Site Vicinity (N=28)



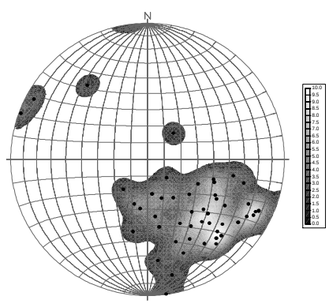
Dip Azimuth of Joint Measurements from the Northern Oteen Geologic Map (Data obtained from the NCGS) (N=48)



Equal Area Stereonet of Joint Measurements from the Northern Oteen Geologic Map (Data obtained from the NCGS) (N=48)



Dip Azimuth of Foliations from the Northern Oteen Geologic Map. (N=48)



Equal Area Stereonet of Foliations from the Northern Oteen Geologic Map. (N=48)

Legend

- Chemtronics Property Boundary
- Disposal Area (DA)
- Road or Parking Area

Surface Water

- Intermittent Stream
- Stream
- Ponds

Geologic Units (Note 2)

- Zag - Metagraywacke
- Zagsi - Schistose Metagraywacke
- Zass - Silimanite/Kyanite Schist
- Zua - Altered Ultramafic
- Extent of Bedrock Geologic Map of the Oteen 7.5 Minute Quadrangle

Structure Data (Note 1)

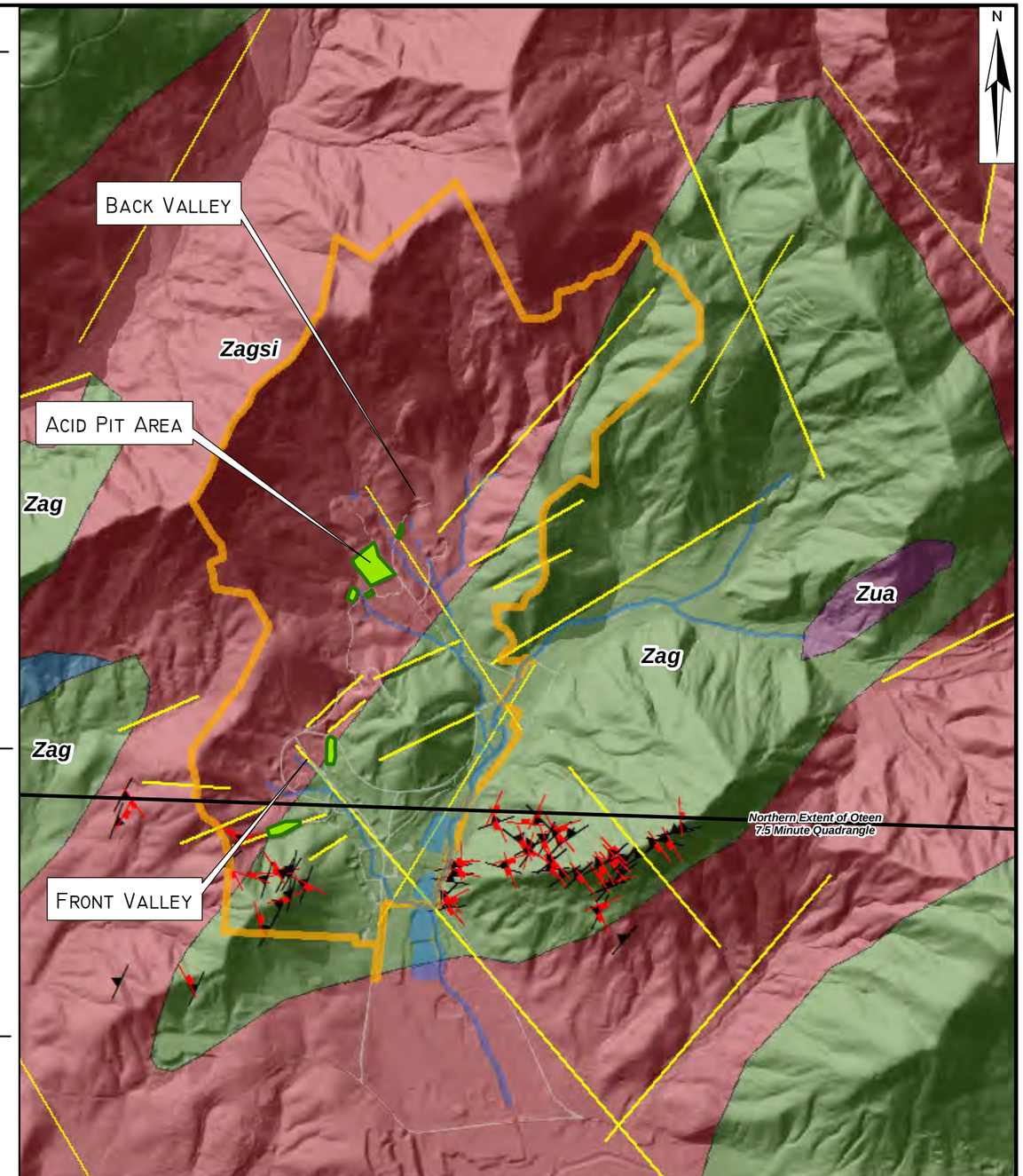
- Foliation
- Joint
- Lineaments

Notes

1. Structure data obtained from NC Geological Survey through request by Altamont (personal communication September 2013). Lineament data compiled by Altamont (2013) from visual inspection of Lidar data obtained from the NC Flood Plain Mapping program and distributed by the NCDOT (2007).
2. Geologic units from the Bedrock Geologic Map of Buncombe County, North Carolina.

References

1. Bedrock Geologic Map of the Oteen 7.5 Minute Quadrangle, North Carolina (2008).
2. Bedrock Geologic Map of Buncombe County, North Carolina, (Preliminary Open-File Report, 2007).
3. Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet.



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Drawn By: Chuck Pippin
Project Manager: Stu Ryman
Client: Chemtronics, Inc.
Date:02/25/2014

Scale
0 1,000 2,000 3,000 Feet

GEOLOGIC MAP FOR CHEMTRONICS SITE

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE
2

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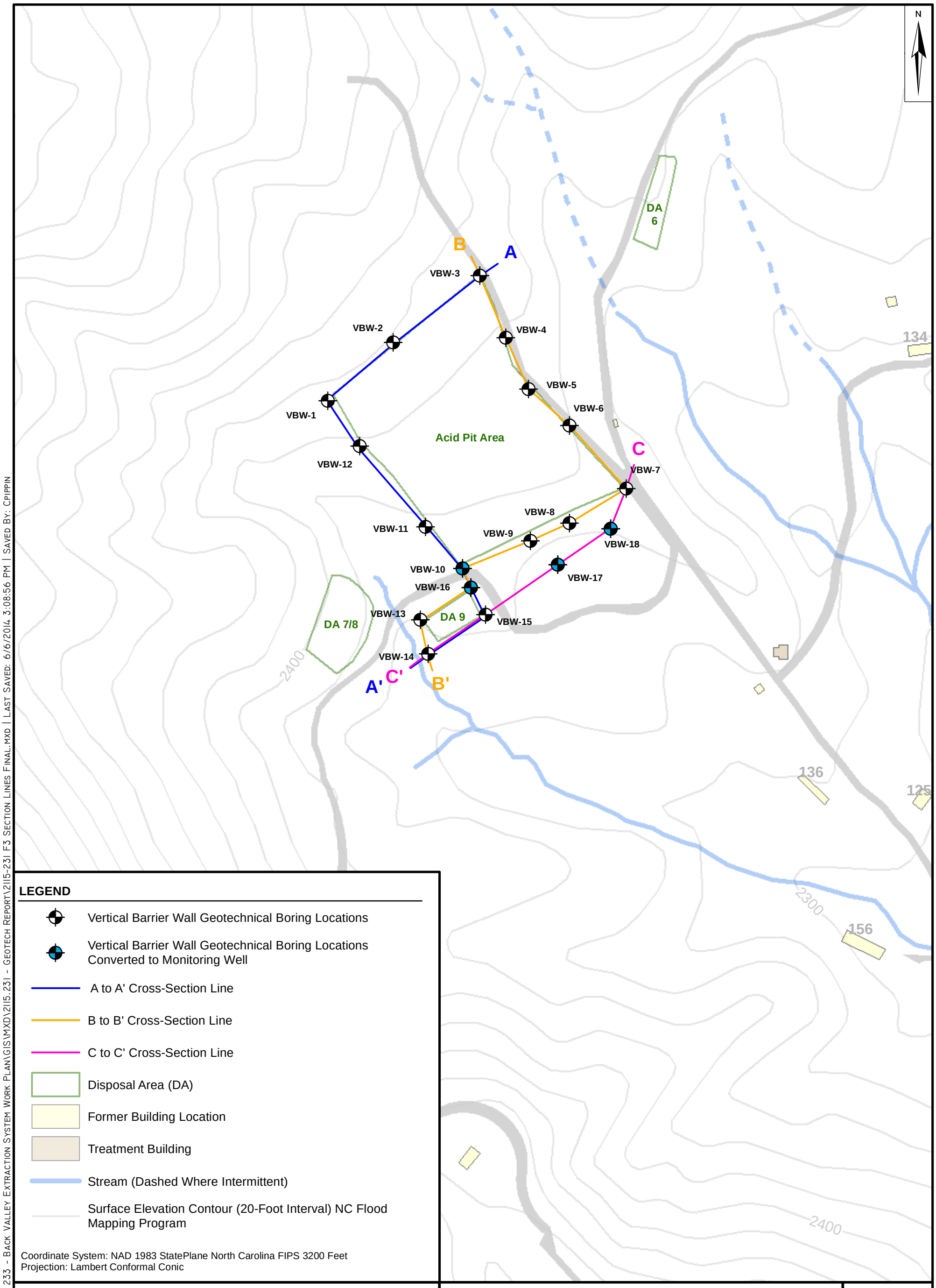

LEGEND

- Vertical Barrier Wall Geotechnical Boring Locations
- Vertical Barrier Wall Geotechnical Boring Locations Converted to Monitoring Well
- A to A' Cross-Section Line
- B to B' Cross-Section Line
- C to C' Cross-Section Line
- Disposal Area (DA)
- Former Building Location
- Treatment Building
- Stream (Dashed Where Intermittent)
- Surface Elevation Contour (20-Foot Interval) NC Flood Mapping Program

Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet
Projection: Lambert Conformal Conic

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DRAWN BY: CHUCK PIPPIN
PROJECT MANAGER: STU RYMAN
CLIENT: CHEMTRONICS, INC.
DATE: 02/20/2014

SCALE
0 75 150 300
FEET

VERTICAL BARRIER WALL GEOTECHNICAL BORING LOCATIONS WITH CROSS-SECTION LINES

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE
3

FILE: SEE FILE PATH.

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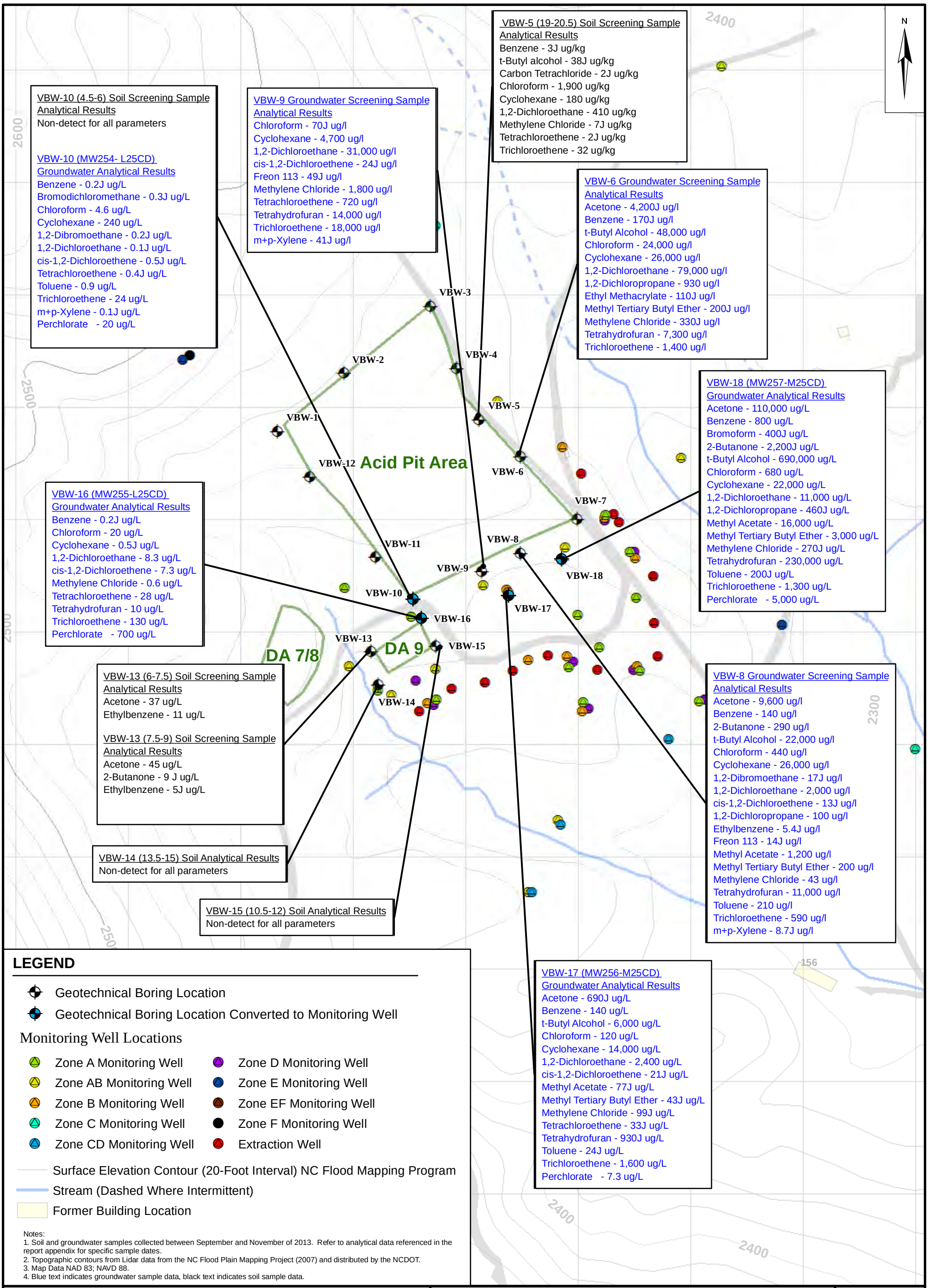

VBW-10 (4.5-6) Soil Screening Sample Analytical Results
Non-detect for all parameters

VBW-10 (MW254- L25CD) Groundwater Analytical Results
Benzene - 0.2J ug/L
Bromodichloromethane - 0.3J ug/L
Chloroform - 4.6 ug/L
Cyclohexane - 240 ug/L
1,2-Dibromoethane - 0.2J ug/L
1,2-Dichloroethane - 0.1J ug/L
cis-1,2-Dichloroethene - 0.5J ug/L
Tetrachloroethene - 0.4J ug/L
Toluene - 0.9 ug/L
Trichloroethene - 24 ug/L
m+p-Xylene - 0.1J ug/L
Perchlorate - 20 ug/L

VBW-9 Groundwater Screening Sample Analytical Results
Chloroform - 70J ug/l
Cyclohexane - 4,700 ug/l
1,2-Dichloroethane - 31,000 ug/l
cis-1,2-Dichloroethene - 24J ug/l
Freon 113 - 49J ug/l
Methylene Chloride - 1,800 ug/l
Tetrachloroethene - 720 ug/l
Tetrahydrofuran - 14,000 ug/l
Trichloroethene - 18,000 ug/l
m+p-Xylene - 41J ug/l

VBW-5 (19-20.5) Soil Screening Sample Analytical Results
Benzene - 3J ug/kg
t-Butyl alcohol - 38J ug/kg
Carbon Tetrachloride - 2J ug/kg
Chloroform - 1,900 ug/kg
Cyclohexane - 180 ug/kg
1,2-Dichloroethane - 410 ug/kg
Methylene Chloride - 7J ug/kg
Tetrachloroethene - 2J ug/kg
Trichloroethene - 32 ug/kg

VBW-6 Groundwater Screening Sample Analytical Results
Acetone - 4,200J ug/l
Benzene - 170J ug/l
t-Butyl Alcohol - 48,000 ug/l
Chloroform - 24,000 ug/l
Cyclohexane - 26,000 ug/l
1,2-Dichloroethane - 79,000 ug/l
1,2-Dichloropropane - 930 ug/l
Ethyl Methacrylate - 110J ug/l
Methyl Tertiary Butyl Ether - 200J ug/l
Methylene Chloride - 330J ug/l
Tetrahydrofuran - 7,300 ug/l
Trichloroethene - 1,400 ug/l

VBW-18 (MW257-M25CD) Groundwater Analytical Results
Acetone - 110,000 ug/L
Benzene - 800 ug/L
Bromoform - 400J ug/L
2-Butanone - 2,200J ug/L
t-Butyl Alcohol - 690,000 ug/L
Chloroform - 680 ug/L
Cyclohexane - 22,000 ug/L
1,2-Dichloroethane - 11,000 ug/L
1,2-Dichloropropane - 460J ug/L
Methyl Acetate - 16,000 ug/L
Methyl Tertiary Butyl Ether - 3,000 ug/L
Methylene Chloride - 270J ug/L
Tetrahydrofuran - 230,000 ug/L
Toluene - 200J ug/L
Trichloroethene - 1,300 ug/L
Perchlorate - 5,000 ug/L

VBW-16 (MW255-L25CD) Groundwater Analytical Results
Benzene - 0.2J ug/L
Chloroform - 20 ug/L
Cyclohexane - 0.5J ug/L
1,2-Dichloroethane - 8.3 ug/L
cis-1,2-Dichloroethene - 7.3 ug/L
Methylene Chloride - 0.6 ug/L
Tetrachloroethene - 28 ug/L
Tetrahydrofuran - 10 ug/L
Trichloroethene - 130 ug/L
Perchlorate - 700 ug/L

VBW-13 (6-7.5) Soil Screening Sample Analytical Results
Acetone - 37 ug/L
Ethylbenzene - 11 ug/L

VBW-13 (7.5-9) Soil Screening Sample Analytical Results
Acetone - 45 ug/L
2-Butanone - 9 J ug/L
Ethylbenzene - 5J ug/L

VBW-14 (13.5-15) Soil Analytical Results
Non-detect for all parameters

VBW-15 (10.5-12) Soil Analytical Results
Non-detect for all parameters

VBW-8 Groundwater Screening Sample Analytical Results
Acetone - 9,600 ug/l
Benzene - 140 ug/l
2-Butanone - 290 ug/l
t-Butyl Alcohol - 22,000 ug/l
Chloroform - 440 ug/l
Cyclohexane - 26,000 ug/l
1,2-Dibromoethane - 17J ug/l
1,2-Dichloroethane - 2,000 ug/l
cis-1,2-Dichloroethene - 13J ug/l
1,2-Dichloropropane - 100 ug/l
Ethylbenzene - 5.4J ug/l
Freon 113 - 14J ug/l
Methyl Acetate - 1,200 ug/l
Methyl Tertiary Butyl Ether - 200 ug/l
Methylene Chloride - 43 ug/l
Tetrahydrofuran - 11,000 ug/l
Toluene - 210 ug/l
Trichloroethene - 590 ug/l
m+p-Xylene - 8.7J ug/l

VBW-17 (MW256-M25CD) Groundwater Analytical Results
Acetone - 690J ug/L
Benzene - 140 ug/L
t-Butyl Alcohol - 6,000 ug/L
Chloroform - 120 ug/L
Cyclohexane - 14,000 ug/L
1,2-Dichloroethane - 2,400 ug/L
cis-1,2-Dichloroethene - 21J ug/L
Methyl Acetate - 77J ug/L
Methyl Tertiary Butyl Ether - 43J ug/L
Methylene Chloride - 99J ug/L
Tetrachloroethene - 33J ug/L
Tetrahydrofuran - 930J ug/L
Toluene - 24J ug/L
Trichloroethene - 1,600 ug/L
Perchlorate - 7.3 ug/L

LEGEND

- Geotechnical Boring Location
- Geotechnical Boring Location Converted to Monitoring Well

Monitoring Well Locations

- Zone A Monitoring Well
- Zone AB Monitoring Well
- Zone B Monitoring Well
- Zone C Monitoring Well
- Zone CD Monitoring Well
- Zone D Monitoring Well
- Zone E Monitoring Well
- Zone EF Monitoring Well
- Zone F Monitoring Well
- Extraction Well
- Surface Elevation Contour (20-Foot Interval) NC Flood Mapping Program
- Stream (Dashed Where Intermittent)
- Former Building Location

Notes:
1. Soil and groundwater samples collected between September and November of 2013. Refer to analytical data referenced in the report appendix for specific sample dates.
2. Topographic contours from Lidar data from the NC Flood Plain Mapping Project (2007) and distributed by the NCDOT.
3. Map Data NAD 83; NAVD 88.
4. Blue text indicates groundwater sample data, black text indicates soil sample data.

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Project Manager: Stu Ryman
Client: Chemtronics, Inc.
Date: 06/6/2014

SCALE
0 75 150 300
FEET

SUMMARY OF SOIL AND GROUNDWATER ANALYTICAL DATA

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE
4

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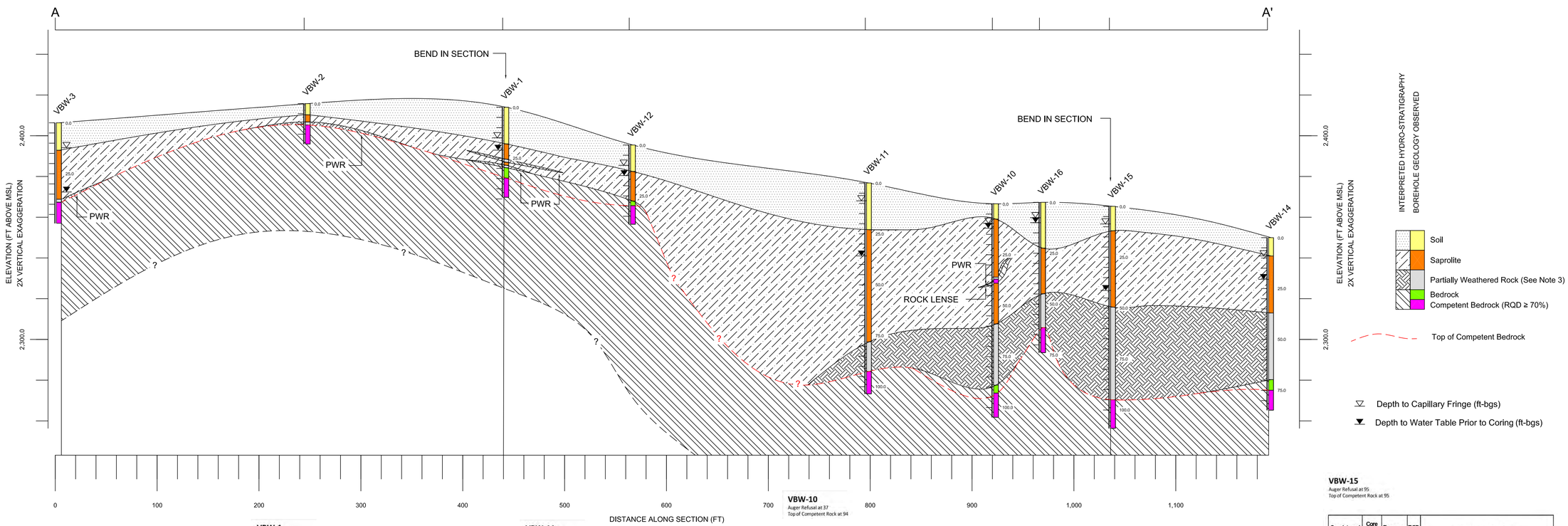
CROSS-SECTION A TO A'



VBW-3

Auger Refusal at 39
Top of Competent Rock at 39

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
39-44	5	92	86	8 low angle fractures in non-foliated rock. Staining visible in top 6 inches of core with no staining below.
44-49.3	5.3	100	94	8 fractures in non-foliated rock - 2 high angle and 6 low angle. No visible staining.

VBW-2

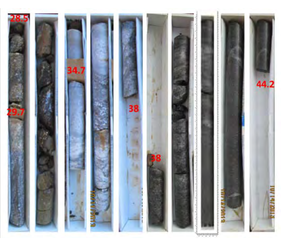
Auger Refusal at 10
Top of Competent Rock at 10

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
10-14.7	4.7	89	77	9 low angle fractures. No visible staining.
14.7-19.8	5.1	96	88	6 low angle fractures. No visible staining.

VBW-1

Auger Refusal at 28.5
Top of Competent Rock at 34.7

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
28.5-29.7	1.2	67	38	3 fractures - 1 high angle parallel to foliation and 2 low angle. Staining present throughout core.
29.7-34.7	5	100	42	8 fractures - 2 high angle parallel to foliation, 1 high angle cross cutting foliation, and 5 low angle. Minor staining in top 2.2 feet with no staining below.
34.7-38	3.3	100	79	3 low angle fractures. No visible staining.
38-44.2	6.2	100	100	8 fractures - 2 high angle parallel to foliation and 6 low angle. No visible staining.



VBW-12

Auger Refusal at 27.5
Top of Competent Rock at 29.1

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
27.5-29.1	1.6	69	44	2 fractures - 1 high angle cross cutting foliation and 1 low angle. No visible staining.
29.1-38.9	9.8	99	91	16 fractures - 3 high angle parallel to foliation, 3 high angle cross cutting foliation, and 10 low angle. Pyrite present on one fracture face at 35 ft-bgs. No visible staining.

VBW-11

Auger Refusal at 92.5
Top of Competent Rock at 92.5

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
92.5-93.5	1	80	70	No fractures and no staining present.
93.5-103.5	10	98	96	7 fractures - 3 high angle parallel to foliation and 4 low angle. No visible staining.

VBW-10

Auger Refusal at 37
Top of Competent Rock at 94

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
37-39	2	94	56	2 fractures parallel to foliation. Iron-oxide staining present above and below lower fracture.
39-44	5	0	0	No recovery.
44-49	5	0	0	No recovery.
49-54	5	3	0	Very little recovery.
54-59	5	27	0	Broken rock. Iron-oxide staining present throughout.
59-64	5	47	35	9 fractures - 3 high angle parallel to foliation and 6 low angle. Iron-oxide staining prevalent throughout.
64-69.5	5.5	59	39	6 fractures - 1 high angle parallel to foliation and 5 low angle. Iron-oxide staining prevalent throughout, manganese-oxide coating self fracture faces, dissolution of minerals along planes parallel to foliation.
69.5-74	4.5	40	17	10 fractures - 2 high angle parallel to foliation, 1 high angle cross cutting foliation, and 7 low angle (with manganese-oxide staining). The 2 high angle fractures appear to form a conjugate pair. Iron-oxide staining on 1 high angle fracture.
74-79	5	12	0	Cannot indicate number or frequency of fractures from return. Iron and manganese coatings present.
79-84	5	5	0	Cannot indicate number or frequency of fractures from return. Iron and manganese coatings present.
84-89	5	0	0	No recovery.
89-94	5	96	68	5 fractures - 4 high angle parallel to foliation and 1 high angle cross cutting foliation. Iron-oxide staining present at mineral boundaries.
94-99	5	90	85	7 fractures - 5 high angle parallel to foliation and 2 low angle. Fractures coated with pyrite from 96-99 ft-bgs. Iron-oxide staining present from 94-96 ft-bgs with no staining below.
99-104.8	5.8	77	73	7 fractures in non-foliated rock - 3 high angle and 4 low angle. Little to no iron-oxide staining present.

VBW-16

Auger Refusal at 61.5
Top of Competent Rock at 61.5

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
61.5-63.8	1.8	91	83	5 fractures - 4 high angle parallel to foliation, 1 low angle. Iron-oxide staining present on fracture faces.
63.8-68.8	5	100	100	No fractures. No visible staining.
68.8-73.8	5	98	98	2 high angle fractures parallel to foliation. No visible staining.

VBW-15

Auger Refusal at 95
Top of Competent Rock at 95

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
95-99	5	100	99	No fractures. No visible staining.
99-109	10	99	99	11 fractures in weakly to non-foliated rock - 6 high angle parallel to foliation when visible, 5 low angle. Staining present in middle section of core.

VBW-14

Auger Refusal at 69.7
Top of Competent Rock at 74.7

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
69.7-74.7	5	94	48	10 fractures - 5 high angle cross cutting foliation and 5 low angle. Iron-oxide staining on fractures from 70.5-72.3 ft-bgs.
74.7-79.7	5	100	100	1 high angle fracture in non-foliated rock. No visible staining.
79.7-84.7	5	98	86	5 fractures in non-foliated rock - 1 high angle and 4 low angle. No visible staining.

Notes:
1. At some locations moist soil, interpreted as the capillary fringe, was noted at depths greater than the recorded water level. In these situations the recorded water level is assumed to be the more accurate reading.

2. Hydro-stratigraphy is interpreted based on field observation made during advancement at the VBW geotechnical boring. The actual hydro-stratigraphy will vary based on the altitude of geologic materials and the effects of differential weathering.

3. Partially weathered rock determined through field observation and/or blow counts ≥ 50/6 inches.

DRAWN BY: WYATT EDSEL
PROJ MGR: CHUCK PIPPIN
CLIENT: CHEMTRONICS, INC.
DATE: 01/20/14

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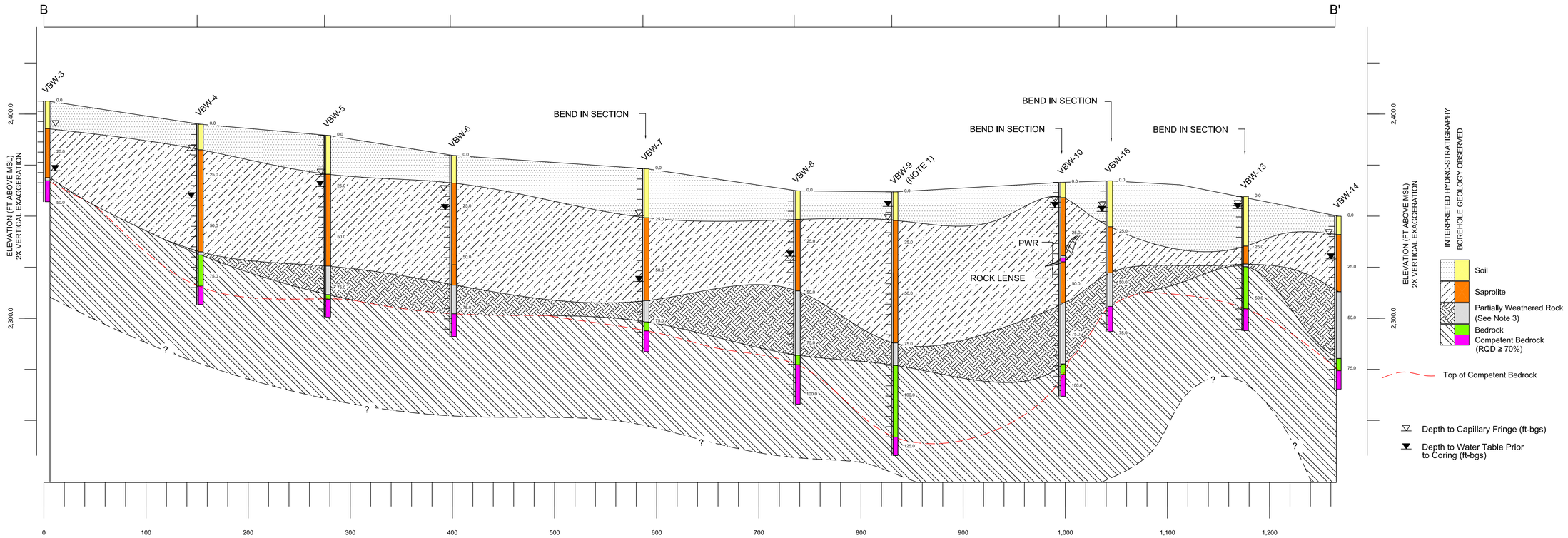
REV.	DATE	DESCRIPTION	BY	CHK	APV

CROSS-SECTION A TO A'
CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

SHEET NO. 5

FILEPATH: P:\CHEMTRONICS - 231\5\TASK 231-GEOTECHNICAL DRILLING AND BV TS SUPPORT\GEOTECH REPORT\FIGURES\CAD

CROSS-SECTION B TO B'



VBW-3

Auger Refusal at 39
Top of Competent Rock at 39

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
39-44	5	92	86	8 low angle fractures in non-foliated rock. Staining visible in top 6 inches of core with no staining below.
44-49.3	5.3	100	94	9 fractures in non-foliated rock - 2 high angle and 6 low angle. No visible staining.

VBW-4

Auger Refusal at 64.5
Top of Competent Rock at 78.3

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
64.5-68.3	3.8	15	0	2 fractures - 1 high angle cross cutting foliation and 1 low angle. Iron-oxide staining present in bottom half of core.
68.3-73.3	5	40	20	8 low angle fractures. Iron-oxide staining present in broken rock at top of core.
73.3-78.3	5	92	52	13 fractures - 3 high angle parallel to foliation and 10 low angle. Iron-oxide staining present but mainly confined to felsic zones of core.
78.3-83.3	5	98	86	4 low angle fractures. No visible staining.
83.3-88.3	5	100	82	7 fractures - 1 high angle parallel to foliation and 6 low angle. No visible staining.

VBW-5

Auger Refusal at 78
Top of Competent Rock at 79.1

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
78-79.1	1.1	91	64	2 fractures - 1 high angle parallel to foliation and 1 low angle. Iron-oxide staining visible on lower fracture and at base of core.
79.1-89	9.9	86	79	8 fractures - 1 high angle parallel to foliation, 1 high angle cross cutting foliation, and 6 low angle. Staining present in heavily weathered fracture at 86.1 ft-bgs, minor pyrite noted on several of the lower fractures.

VBW-6

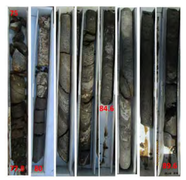
Auger Refusal at 77.5
Top of Competent Rock at 77.5

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
77.5-78.5	2	100	70	3 low angle fractures. Staining visible in top 1 inch of core.
78.5-88.7	10.2	100	80	9 fractures - 6 high angle parallel to foliation and 13 low angle. No visible staining.

VBW-7

Auger Refusal at 75
Top of Competent Rock at 80

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
75-77.8	2.8	32	0	3 fractures - 2 high angle parallel to foliation and 1 low angle. Iron-oxide staining throughout.
77.8-80	2.2	77	36	7 low angle fractures. Minor iron-oxide staining predominantly in felsic zones.
80-84.6	4.6	100	70	12 fractures - 6 high angle parallel to foliation, 2 high angle cross cutting foliation, and 4 low angle. Very minor iron-oxide staining present on fracture faces.
84.6-89.6	5	98	84	7 fractures - 6 moderate to high angle parallel to foliation and 1 low angle. Iron-oxide staining present on fracture faces in upper portion of core.



VBW-8

Auger Refusal at 80.5
Top of Competent Rock at 85.1

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
80.5-85.1	4.6	100	63	15 fractures - 1 sub-vertical parallel to mafic felsic contact, 4 high angle cross cutting foliation and 10 low angle. Chlorite present in high angle fracture zone. Manganese-oxide staining present on many fractures with occasional pyrite.
85.1-89.5	4.4	91	75	12 fractures - 7 high angle parallel to foliation, 1 vertical cross cutting foliation, and 4 low angle. Manganese-oxide staining less frequent, pyrite coating present on most fracture faces.
89.5-94.5	5	86	64	12 fractures - 3 high angle parallel to foliation, 1 high angle cross cutting foliation, and 8 low angle. No manganese-oxide staining, pyrite visible on 2 fracture faces.
94.5-104.5	10	96	76	24 fractures - 13 high angle typically parallel to foliation and 11 low angle. No manganese-oxide staining, minor pyrite on some fracture faces.

VBW-9

Auger Refusal at 85.5
Top of Competent Rock at 118.9

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
85.5-89.3	3.8	61	11	13 low angle fractures in non-foliated rock. Iron-oxide staining present throughout.
89.3-93.9	4.6	100	74	11 fractures - 4 high angle parallel to foliation and 7 low angle. Iron-oxide staining present in middle and bottom sections of core.
93.9-98.9	5.0	42	22	6 fractures - 2 high angle parallel to foliation and 4 low angle. Iron-oxide staining present in top 3 inches and at base of core.
98.9-103.9	5.0	66	32	11 fractures - 7 high angle parallel to foliation and 4 low angle. Iron-oxide staining present throughout with locally intense weathering.
103.9-108.9	5.0	78	48	13 fractures - 8 high angle parallel to foliation and 5 low angle. Iron-oxide staining present to approximately 107 ft-bgs.
108.9-118.9	10.0	85	57	23 fractures - 8 high angle parallel to foliation, 2 high angle cross cutting foliation, and 13 low angle. Pyrite and possibly epidote or chlorite present on fracture faces near base of core. No visible staining.
118.9-129.1	10.2	97	84	14 fractures - 13 high angle parallel to foliation and 1 low angle. Pyrite and possibly epidote or chlorite present on most fracture faces. No visible staining.

VBW-13

Auger Refusal at 34.5
Top of Competent Rock at 55

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
34-35	1	80	0	5 fractures generally oriented with foliation - 4 high angle and 1 low angle. Iron-oxide staining present throughout.
35-40	5	78	54	9 fractures - 1 high angle parallel to foliation, 1 high angle cross cutting foliation, and 3 low angle. Core is heavily stained with iron-oxide in 36.1 ft-bgs with no staining below.
40-45	5	38	20	3 low angle fractures. Lower half of core contains intensely weathered rock/sandy material, followed by iron-oxide stained felsic rock.
45-50	5	8	0	1 low angle fracture in non-foliated felsic rock. Intense weathering and iron-oxide staining present.
50-60	10	71	68	7 fractures - 4 high angle parallel to foliation, 3 low angle. Iron-oxide staining present in middle and lower sections of the core.
60-65	5	88	66	7 low angle fractures. Iron-oxide staining brackets fracture in middle section of core.

VBW-10

Auger Refusal at 37
Top of Competent Rock at 94

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
37-39	2	94	58	2 fractures parallel to foliation. iron-oxide staining present above and below lower fracture.
39-44	5	0	C	No recovery.
44-49	5	0	C	No recovery.
49-54	5	3	C	Very little recovery.
54-59	5	27	C	Broken rock. Iron-oxide staining present throughout.
59-64	5	47	35	9 fractures - 3 high angle parallel to foliation and 6 low angle. Iron-oxide staining prevalent throughout.
64-69.5	5.5	59	39	6 fractures - 1 high angle parallel to foliation and 5 low angle. Iron-oxide staining prevalent throughout, manganese-oxide coating all fracture faces, dissolution of minerals along planes parallel to foliation.
69.5-74	4.5	40	17	10 fractures - 2 high angle parallel to foliation, 1 high angle cross cutting foliation, and 7 low angle (with manganese-oxide staining). The 2 high angle fractures appear to form a conjugate pair. Iron-oxide staining on 1 high angle fracture.
74-79	5	12	C	Cannot indicate number or frequency of fractures from return. Iron and manganese coatings present.
79-84	5	5	C	Cannot indicate number or frequency of fractures from return. Iron and manganese coatings present.
84-89	5	0	C	No recovery.
89-94	5	96	68	5 fractures - 4 high angle parallel to foliation and 1 high angle cross cutting foliation. Iron-oxide staining present at mineral boundaries.
94-99	5	90	85	7 fractures - 5 high angle parallel to foliation and 2 low angle. Fractures coated with pyrite from 98-99 ft-bgs. Iron-oxide staining present from 94-98 ft-bgs with no staining below.
99-104.8	5.8	77	73	7 fractures in non-foliated rock - 3 high angle and 4 low angle. Little to no iron-oxide staining present.

VBW-16

Auger Refusal at 61.5
Top of Competent Rock at 61.5

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
61.5-63.6	1.8	91	83	5 fractures - 4 high angle parallel to foliation, 1 low angle. Iron-oxide staining present on fracture faces.
63.6-68.6	5	100	100	No fractures. No visible staining.
68.6-73.6	5	98	98	2 high angle fractures parallel to foliation. No visible staining.

VBW-14

Auger Refusal at 69.7
Top of Competent Rock at 74.7

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
69.7-74.7	5	94	48	10 fractures - 5 high angle cross cutting foliation and 5 low angle. Iron-oxide staining on fractures from 70.5-72.3 ft-bgs.
74.7-79.7	5	100	100	1 high angle fracture in non-foliated rock. No visible staining.
79.7-84.7	5	98	86	5 fractures in non-foliated rock - 1 high angle and 4 low angle. No visible staining.

Notes:
1. At some locations moist soil, interpreted as the capillary fringe, was noted at depths greater than the recorded water level. In these situations the recorded water level is assumed to be the more accurate reading.

2. Hydro-stratigraphy is interpreted based on field observation made during advancement at the VBW geotechnical boring. The actual hydro-stratigraphy will vary based on the altitude of geologic materials and the effects of differential weathering.

3. Partially weathered rock determined through field observation and/or blow counts ≥ 50/6 inches.

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PROJ MGR: CHUCK PIPPIN
CLIENT: CHEMTRONICS, INC.
DATE: 01/20/14

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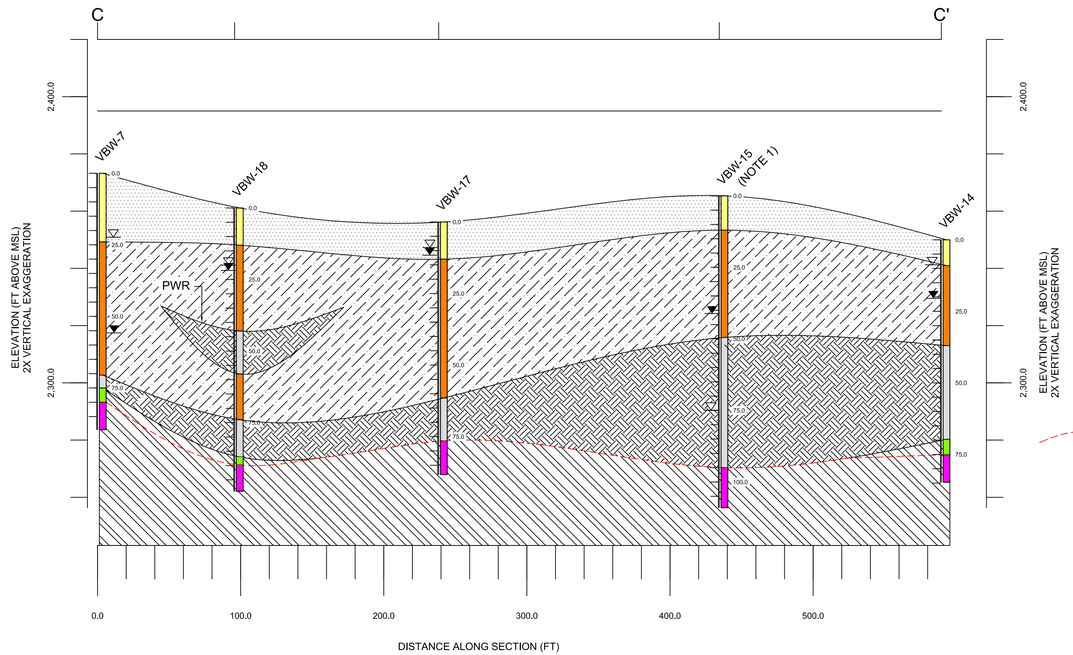
REV.	DATE	DESCRIPTION	BY	CHK	APV

CROSS-SECTION B TO B'
CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

SHEET NO. 6

FILE PATH: P:\

CROSS-SECTION C TO C'



INTERPRETED HYDRO-STRATIGRAPHY
BOREHOLE GEOLOGY OBSERVED

- Soil
- Saprolite
- Partially Weathered Rock (See Note 3)
- Bedrock
- Competent Bedrock (RQD ≥ 70%)
- Top of Competent Bedrock
- Depth to Capillary Fringe (ft-bgs)
- Depth to Water Table Prior to Coring (ft-bgs)

Notes:
1. At some locations moist soil, interpreted as the capillary fringe, was noted at depths greater than the recorded water level. In these situations the recorded water level is assumed to be the more accurate reading.

2. Hydro-stratigraphy is interpreted based on field observation made during advancement at the VBW geotechnical boring. The actual hydro-stratigraphy will vary based on the altitude of geologic materials and the effects of differential weathering.

3. Partially weathered rock determined through field observation and/or by blow counts ≥ 50/6 inches.

VBW-7
Auger Refusal at 75
Top of Competent Rock at 80

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
75-77.8	2.8	32	0	3 fractures - 2 high angle parallel to foliation and 1 low angle. Iron-oxide staining throughout.
77.8-80	2.2	77	36	7 low angle fractures. Minor iron-oxide staining predominantly in felsic zones.
80-84.6	4.6	100	70	12 fractures - 6 high angle parallel to foliation, 2 high angle cross cutting foliation, and 4 low angle . Very minor iron-oxide staining present on fracture faces.
84.6-89.6	5	98	84	7 fractures - 6 moderate to high angle parallel to foliation and 1 low angle. Iron-oxide staining present on fracture faces in upper portion of core.

VBW-18
Auger Refusal at 87
Top of Competent Rock at 89.4

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
87-89.4	2.4	100	63	9 fractures - 1 high angle parallel to foliation, 2 high angle cross cutting foliation, and 6 low angle. Minor to moderate iron-oxide staining present from 87-88.2 ft-bgs.
89.4-94.4	5	98	80	8 fractures - 2 high angle to sub-vertical parallel to foliation, 2 high angle to sub-vertical cross cutting foliation, and 4 low angle. Pyrite visible on 4 fractures, chlorite visible on 2 fractures. No visible staining.
94.4-99	4.6	100	100	2 low angle fractures. No visible staining.

VBW-17
Auger Refusal at 76.5
Top of Competent Rock at 76.5

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
76.5-79.2	2.7	100	89	7 fractures - 1 high angle parallel to foliation, 1 high angle cross cutting foliation, and 5 low angle. Iron-oxide staining present on broken rock near top of core run. Pyrite visible on lowest fracture face.
79.2-84.1	4.9	100	86	8 fractures - 4 high angle parallel to foliation, 1 high angle cross cutting foliation, and 3 low angle. Very minor iron-oxide staining present throughout. Pyrite visible on lower fracture faces.
84.1-88.3	4.2	95	29	10 fractures - 1 high angle parallel to foliation, 3 high angle cross cutting foliation, and 6 low angle. Pyrite visible on most fracture faces. Sections of core are heavily fractured/broken.

VBW-15
Auger Refusal at 95
Top of Competent Rock at 95

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
95-99	5	100	99	No fractures. No visible staining.
99-109	10	99	99	11 fractures in weakly to non-foliated rock - 6 high angle parallel to foliation when visible, 5 low angle. Staining present in middle section of core.

VBW-14
Auger Refusal at 69.7
Top of Competent Rock at 74.7

Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures
69.7-74.7	5	94	48	10 fractures - 5 high angle cross cutting foliation and 5 low angle. Iron-oxide staining on fractures from 70.5-72.3 ft-bgs.
74.7-79.7	5	100	100	1 high angle fracture in non-foliated rock. No visible staining.
79.7-84.7	5	98	86	5 fractures in non-foliated rock - 1 high angle and 4 low angle. No visible staining.

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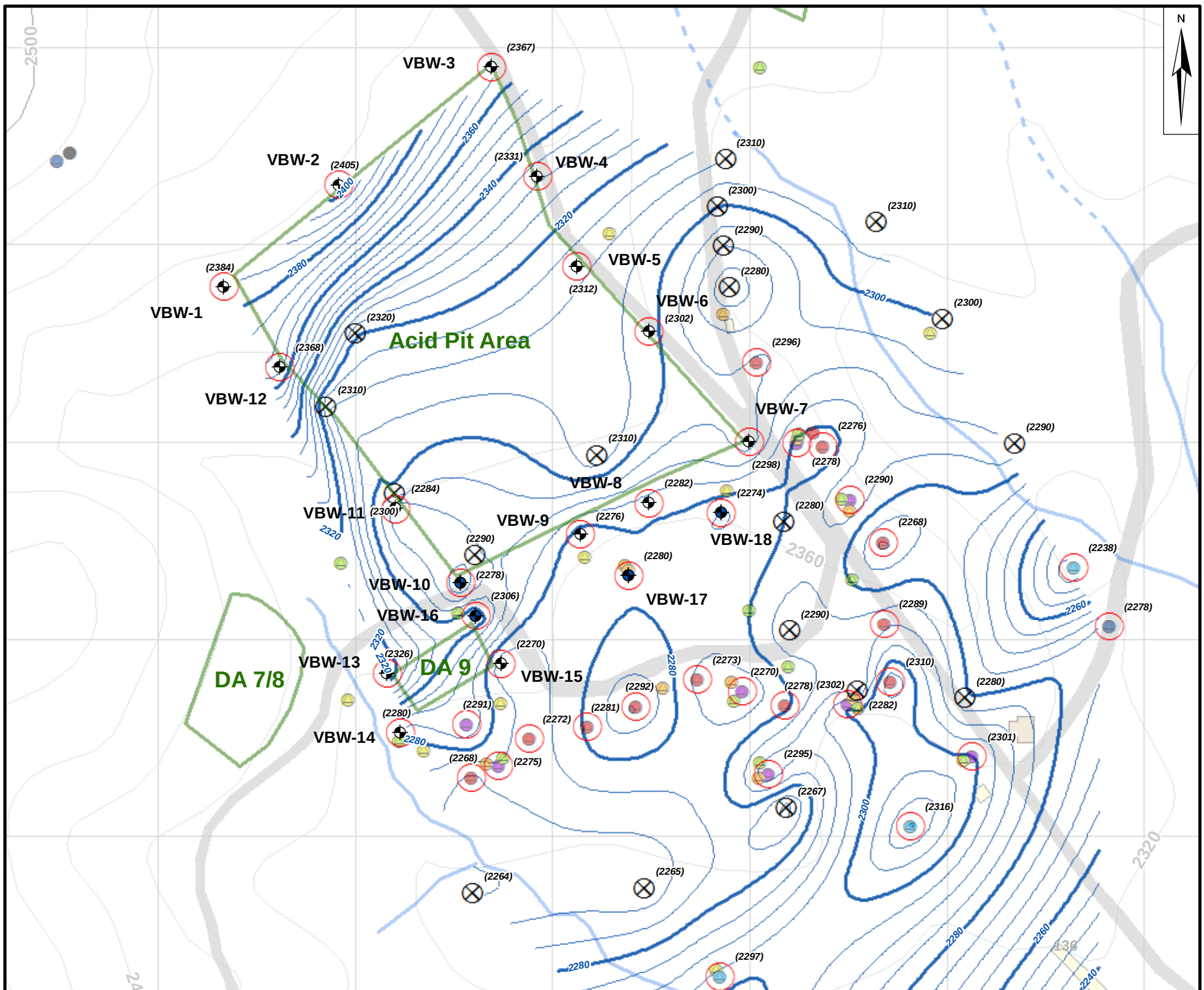
REV.	DATE	DESCRIPTION	BY	CHK	APV

CROSS-SECTION C TO C'
CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

SHEET NO. 7

FILE PATH: P:\



LEGEND

Bedrock Elevation Contours

- 20-ft Bedrock Contour Interval
- 5-ft Bedrock Contour Interval

Bedrock Elevation Data Points used for bedrock contours

- Based on Boring Data
- Digitized Point Based on Metcalf and Eddy Bedrock Contour Map (April 1987 RI)
- Surface Elevation Contour (20-Foot Interval) NC Flood Mapping Program
- Geotechnical Boring Location
- Geotechnical Boring Location Converted to Monitoring Well

Monitoring Well Locations

- Zone A Monitoring Well
- Zone AB Monitoring Well
- Zone B Monitoring Well
- Zone C Monitoring Well
- Zone CD Monitoring Well
- Zone D Monitoring Well
- Zone E Monitoring Well
- Zone EF Monitoring Well
- Zone F Monitoring Well
- Extraction Well

- Stream (Dashed Where Intermittent)
- Road or Parking Area
- 250-ft by 250-ft Reference Grid
- Former Building Location
- Treatment Building
- Disposal Area (DA)

(2,154) Elevation in feet mean sea level of Bedrock at Monitoring Well and of Digitized Point from Metcalf and Eddy Bedrock Contour Map (April 1987 RI)

Note:
1. Topographic contours from Lidar data from the NC Flood Plain Mapping Project (2007) and distributed by the NCDOT.
2. Map Data NAD 83; NAVD 88.

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DATE: 02/25/2014

SCALE
0 50 100 200 FEET

BACK VALLEY BEDROCK TOPOGRAPHY

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE
8

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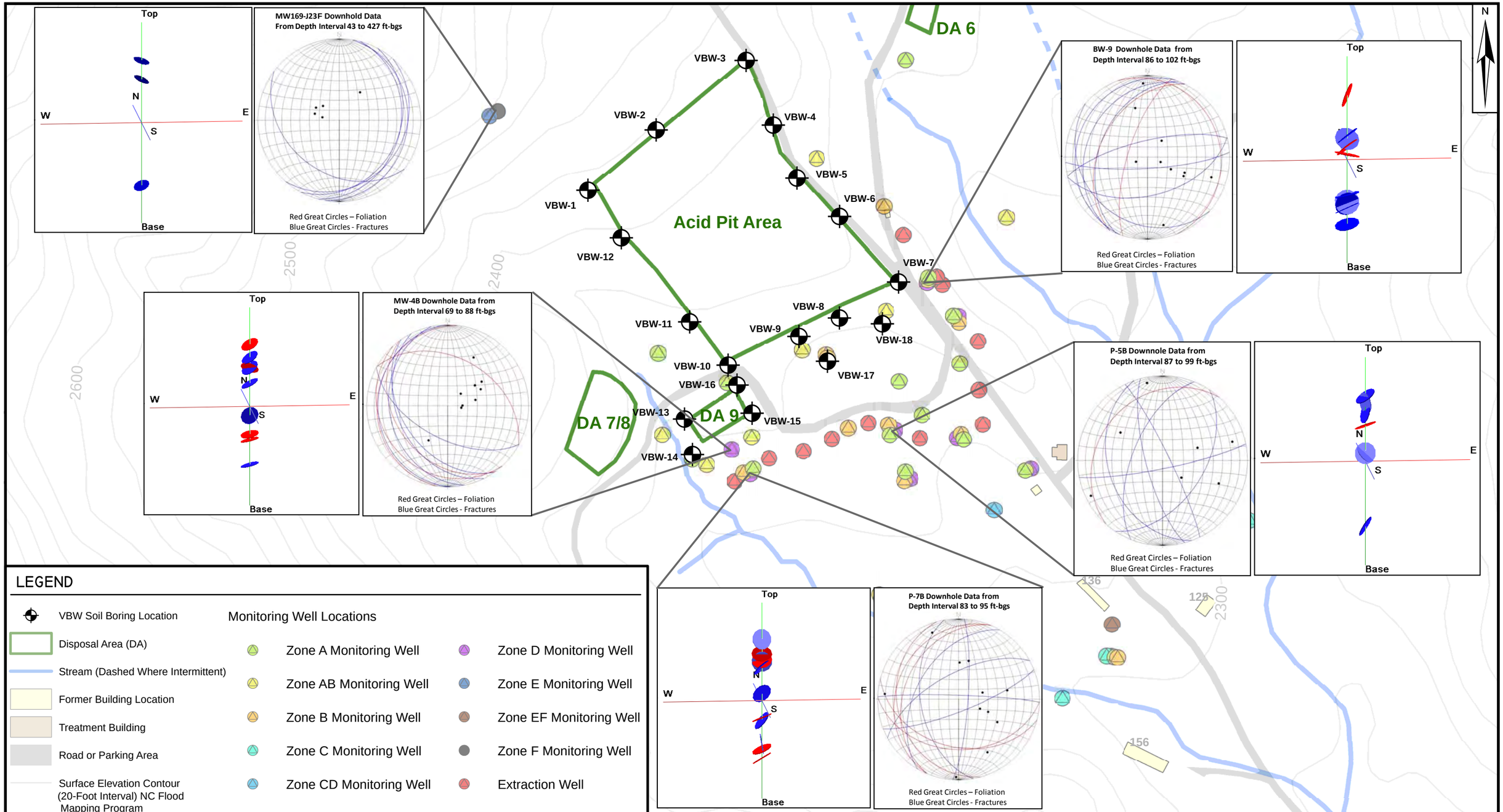

LEGEND

- VBW Soil Boring Location
- Disposal Area (DA)
- Stream (Dashed Where Intermittent)
- Former Building Location
- Treatment Building
- Road or Parking Area
- Surface Elevation Contour (20-Foot Interval) NC Flood Mapping Program

Monitoring Well Locations

- Zone A Monitoring Well
- Zone AB Monitoring Well
- Zone B Monitoring Well
- Zone C Monitoring Well
- Zone CD Monitoring Well
- Zone D Monitoring Well
- Zone E Monitoring Well
- Zone EF Monitoring Well
- Zone F Monitoring Well
- Extraction Well

NOTES:

1. Acoustic televiewer data presented in stereonets from Marshal Miller and Assiciates and from the Data Summary Report - Appendix D 2003 Appalachian Geophysical Survey.

2. On the stereonets and oriented fracture disc diagrams, foliation planes are represented in red and fractures planes are represented as blue or light blue.

REFERENCES:

1. Topgraphic Contours from Buncombe County Lidar Data (2007).

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Drawn By: Chuck Pippin
Project Manager: Stu Ryman
Client: Chemtronics, Inc.
Date: 02/21/2014

SCALE
0 100 200 300
Feet

HISTORIC ACOUSTIC TELEVIEWER DATA

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE
9

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Tables

Table 1
VBW Geotechnical Boring Details
Chemtronics Site, Swannanoa, North Carolina

Borehole ID	Total Depth (ft-bgs)	Ground Surface Elevation (ft MSL)	Depth to Top of Saprolite (ft-bgs)	Depth to Top of PWR[13] (ft-bgs)	Depth to Bedrock (ft-bgs)	Depth to Competent Bedrock (ft-bgs)[7]	Total Zone C Thickness[11]	Zone C_{RI} Thickness[12]	Bedrock Elevation (ft MSL)	Elevation of Competent Bedrock (ft MSL)	Depth to Moist Soil (ft-bgs)	Depth to Water Measured Prior to Coring (ft-bgs)	Groundwater Sample Collected	Soil Sample Collected	Completed as Monitoring Well[15]	SPT Sample Collection Interval
VBW-1	44.2	2413.99	18	24.8	28.5	34.7	9.9	6.2	2385.5	2379.3	15.0	22.2	-	-	-	Continuous
VBW-2	19.9	2415.77	-	7	10	10	3	0	2405.8	2405.8	-	-	-	-	-	5-ft
VBW-3	49.3	2406.35	12	37.5	39	39	1.5	0	2367.4	2367.4	12.0	34.5	-	-	-	Continuous
VBW-4A[14]	3.5	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-	-	5-ft
VBW-4B	88.4	2395.01	12.5	62.5	64.5	78.3	15.8	13.8	2330.5	2316.7	12.5	37.0	-	-	-	5-ft
VBW-5	89	2389.54	19	64	78	79.1	15.1	1.1	2311.5	2310.4	19.0	25.6	-	Yes[10]	-	5-ft
VBW-6	88.7	2379.70	18.5	63.5	77.5	77.5	14	0	2302.2	2302.2	18.5	26.4	Yes[8]	-	-	5-ft
VBW-7	89.6	2373.22	24	64.5	75	80	15.5	5	2298.2	2293.2	24.0	56.7	-	-	-	Continuous
VBW-8	80	2362.40	19	47	80.5	85.1	38.1	4.6	2281.9	2277.3	34.0	33.3	Yes[8]	-	-	5-ft
VBW-9	129.1	2361.90	14	74	85.5	118.9	44.9	33.4	2276.4	2243.0	14.0	7.2	Yes[8]	-	-	5-ft
VBW-10[6]	104.8	2366.59	6	59	89	94	35	5	2277.6	2272.6	10.5	13.6	Yes[9]	Yes[10]	Yes	Continuous
VBW-11	113.5	2376.81	23	78	92.5	92.5	14.5	0	2284.3	2284.3	8.0	37.0	-	-	-	5-ft
VBW-12	39	2395.46	13	-	27.5	29.1	1.6	1.6	2368.0	2366.4	10.0	15.8	-	-	-	5-ft
VBW-13	65	2359.69	18	33	34	55	22	21	2325.7	2304.7	6.0	6.9	-	Yes[10]	-	Continuous
VBW-14	84.7	2349.98	9	36	69.7	74.7	38.7	5	2280.3	2275.3	9.0	21.2	-	Yes[10]	-	Continuous
VBW-15A[14]	10.5	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-	-	5-ft
VBW-15B[14]	2	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-	-	5-ft
VBW-15C	109	2365.36	10.5	51	95	95	44	0	2270.4	2270.4	7.5	43.7	-	Yes[10]	-	Continuous
VBW-16	73.8	2367.31	22.5	45	61.5	61.5	16.5	0	2305.8	2305.8	12.5	15.5	Yes[9]	-	Yes	Continuous
VBW-17	88.3	2356.21	13	63	76.5	76.5	13.5	0	2279.7	2279.7	8.0	12.1	Yes[9]	-	Yes	5-ft
VBW-18A[14]	5	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	-	-	5-ft
VBW-18B	99	2361.11	13	41	87	89.4	48.40	2.4	2274.1	2271.7	23.0	20.4	Yes[9]	-	Yes	5-ft

Notes

1. ft-bgs - feet below ground surface.
2. MSL - mean sea level.
3. SPT - Standard penetration test.
4. NA - Not applicable.
5. NS - Not surveyed.
6. VBW-10 encountered a lense of rock approximately 2-feet thick at 37 ft-bgs. From 37 ft-bgs to total depth, the hole was advanced using coring techniques.
7. Bedrock/Competent Bedrock - Bedrock is defined as the depth at which auger refusal is reached and cored intervals reveal no unconsolidated materials at lower depths. Competent bedrock is defined as the depth at which an RQD of 70% or greater is encountered over a cored interval of 10 feet.
8. Groundwater grab sample collected from within auger flights at depths corresponding to elevated flame ionization detector (FID) reading in split-spoon sample and analyzed for volatile organic compounds (VOC).
9. Groundwater sample collected from completed monitoring well and analyzed for VOC and perchlorate.
10. Soil grab sample collected for VOC analysis from boring with elevated FID readings.
11. Zone C defined as the interval between PWR (i.e. blow counts of 50 over 6 inches prior to auger refusal) and the occurrence of competent bedrock, defined above.
12. Zone C_{RI} - Zone C Rock Interval defined as the interval between bedrock and competent bedrock, defined above.
13. PWR - Partially weathered rock designation determined by blow counts of 50 over 6 inches. In some instances, PWR was defined by field observations made by Altamont Staff.
14. Borings VBW-4A, VBW-15A, VBW-15B, and VBW-18A encountered shallow subsurface obstructions and were abandoned and relocated. No boring log was made for VBW-15B.
15. VBW-10, VBW-16, VBW-17, and VBW-18 were converted to monitoring wells MW254-L25CD, MW255-L25CD, MW256-M25CD, and MW257-M25CD, respectively.

Table 2
Summary of Blow Count Data
Chemtronics Site, Swannanoa, North Carolina

Boring ID	Depth (ft)	Length (in)	Recovery	Blows (0-6 inches)	Blows (6-12 inches)	Blows (12-18 inches)	N-Value
VBW-1	0	18	12	3	5	6	11
	1.5	18	15	6	6	5	11
	3	18	13	5	5	5	10
	4.5	18	13	6	7	7	14
	6	18	16	6	7	7	14
	7.5	18	16	7	7	8	15
	9	18	18	7	8	9	17
	10.5	18	18	6	7	6	13
	12	18	15	3	4	7	11
	13.5	18	17	3	5	8	13
	15	18	16	6	6	6	12
	16.5	18	9	6	5	4	9
	18	18	15	2	2	3	5
	19.5	18	12	2	3	5	8
	21	18	8	4	5	6	11
	22.5	18	15	3	5	8	13
	24	18	14	25	34	50	84
	25.5	18	9	22	14	7	21
	27	18	11	2	4	7	11
VBW-2	0	18	7	4	4	5	9
	4	18	17	42	42	23	65
	9	12	11	14	19	50	69
VBW-3	0	18	17	12	10	6	16
	1.5	18	16	6	6	8	14
	3	18	18	8	8	8	16
	4.5	18	16	10	8	8	16
	6	18	13	12	13	16	29
	7.5	18	3	4	5	6	11
	9	18	11	11	12	11	23
	10.5	18	18	10	13	12	25
	12	18	14	5	5	5	10
	13.5	18	14	8	4	6	10
	15	18	18	5	6	6	12
	16.5	18	16	8	7	6	13
	18	18	3	5	5	4	9
	19.5	18	10	4	5	5	10
	21	18	17	4	5	7	12
	22.5	18	9	3	3	4	7
	24	18	10	3	3	5	8
	25.5	18	17	4	6	6	12
	27	18	17	3	3	5	8

Table 2
Summary of Blow Count Data
Chemtronics Site, Swannanoa, North Carolina

Boring ID	Depth (ft)	Length (in)	Recovery	Blows (0-6 inches)	Blows (6-12 inches)	Blows (12-18 inches)	N-Value
VBW-3	28.5	18	14	5	5	4	9
	30	18	17	5	9	8	17
	31.5	18	15	7	8	8	16
	33	18	16	3	2	4	6
	34.5	18	18	4	7	10	17
	36	18	14	4	9	11	20
	37.5	18	12	5	50	50	100
VBW-4A	0	18	15	5	8	10	18
	2.5	18	11	12	23	50	73
VBW-4B	2.5	18	15	14	41	27	68
	7.5	18	10	6	5	9	14
	12.5	18	10	4	4	5	9
	17.5	18	0	4	4	6	10
	22.5	18	13	6	7	9	16
	27.5	18	12	3	8	8	16
	32.5	18	0	6	10	11	21
	37.5	18	14	5	6	9	15
	42.5	18	5	7	8	12	20
	47.5	18	15	5	7	9	16
	52.5	18	15	8	10	14	24
	57.5	18	14	4	6	12	18
	62.5	18	0	50	50	50	100
VBW-5	0	18	15	6	9	7	16
	4.5	18	12	18	4	10	14
	9	18	18	6	7	5	12
	14	18	0	10	6	5	11
	19	18	15	2	2	2	4
	24	18	0	0	2	1	3
	29	18	13	4	3	5	8
	34	18	18	2	2	5	7
	39	18	13	4	32	50	82
	44	18	15	7	13	21	34
	49	18	18	4	5	10	15
	54	18	16	4	7	9	16
	59	18	14	5	11	15	26
	64	18	14	6	8	11	19
	69	18	16	6	7	10	17
	74	18	14	10	12	18	30
VBW-6	3.5	18	15	20	46	31	77
	8.5	18	14	6	5	5	10
	13.5	18	0	7	8	8	16

Table 2
Summary of Blow Count Data
Chemtronics Site, Swannanoa, North Carolina

Boring ID	Depth (ft)	Length (in)	Recovery	Blows (0-6 inches)	Blows (6-12 inches)	Blows (12-18 inches)	N-Value
VBW-6	18.5	18	14	4	3	4	7
	23.5	18	14	3	3	3	6
	28.5	18	18	3	3	5	8
	33.5	18	17	4	2	5	7
	38.5	18	7	4	4	5	9
	43.5	18	6	17	22	39	61
	48.5	18	11	9	9	10	19
	53.5	18	8	8	11	28	39
	58.5	18	1	22	22	26	48
	63.5	18	14	12	21	50	71
	68.5	18	9	16	50	50	100
	73.5	18	5	38	50	50	100
VBW-7	0	18	17	5	5	5	10
	1.5	18	13	2	5	8	13
	3	18	13	9	10	11	21
	4.5	18	16	12	11	13	24
	6	18	16	10	11	10	21
	7.5	18	14	10	10	11	21
	9	18	0	4	10	11	21
	10.5	18	12	12	11	13	24
	12	18	14	12	13	12	25
	13.5	18	13	6	6	8	14
	15	18	16	7	9	10	19
	16.5	18	15	12	15	15	30
	18	18	14	5	8	9	17
	19.5	18	16	9	9	10	19
	21	18	17	9	10	10	20
	22.5	18	16	3	6	7	13
	24	18	17	4	5	7	12
	25.5	18	18	7	7	10	17
	27	18	17	9	8	9	17
	28.5	18	18	7	11	13	24
	30	18	16	15	20	25	45
	31.5	18	15	21	21	14	35
	33	18	18	5	6	11	17
	34.5	18	18	6	11	23	34
	36	18	18	14	13	12	25
	37.5	18	17	5	9	11	20
	39	18	18	3	4	6	10
	40.5	18	14	4	6	9	15
	42	18	9	6	9	12	21

Table 2
Summary of Blow Count Data
Chemtronics Site, Swannanoa, North Carolina

Boring ID	Depth (ft)	Length (in)	Recovery	Blows (0-6 inches)	Blows (6-12 inches)	Blows (12-18 inches)	N-Value
VBW-7	43.5	18	10	11	50	50	100
	45	18	17	8	15	8	23
	46.5	18	11	8	12	20	32
	48	18	14	8	7	16	23
	49.5	18	14	10	15	17	32
	51	18	10	18	21	31	52
	52.5	18	10	11	12	20	32
	54	18	13	9	9	15	24
	55.5	18	5	22	37	45	82
	57	18	13	13	18	32	50
	58.5	18	9	23	50	50	100
	60	18	14	44	34	29	63
	61.5	18	14	17	17	15	32
	63	18	14	11	13	14	27
	64.5	18	10	17	45	50	95
	66	18	12	32	44	50	94
	67.5	18	11	15	18	20	38
	69	18	11	8	34	50	84
	70.5	18	3	50	50	50	100
	72	18	4	50	50	50	100
	73.5	18	3	50	50	50	100
VBW-8	4	18	14	4	6	11	17
	9	18	11	5	3	3	6
	14	18	0	5	6	7	13
	19	18	15	4	3	3	6
	24	18	0	3	4	4	8
	29	18	11	3	3	3	6
	34	18	10	5	8	13	21
	39	18	13	10	14	23	37
	44	18	12	7	11	19	30
	49	18	14	36	39	50	89
	54	18	9	41	50	50	100
	59	18	13	7	12	32	44
	64	18	12	7	12	50	62
	69	18	6	50	50	50	100
	74	18	4	50	50	50	100
	79	18	3	50	50	50	100
VBW-9	4	18	18	6	5	7	12
	9	18	13	4	3	5	8
	14	18	17	4	4	7	11
	19	18	0	4	5	5	10

Table 2
Summary of Blow Count Data
Chemtronics Site, Swannanoa, North Carolina

Boring ID	Depth (ft)	Length (in)	Recovery	Blows (0-6 inches)	Blows (6-12 inches)	Blows (12-18 inches)	N-Value
VBW-9	24	18	15	3	5	7	12
	29	18	11	4	7	11	18
	34	18	11	3	3	7	10
	39	18	10	5	8	13	21
	44	18	13	6	10	17	27
	49	18	12	10	13	18	31
	54	18	13	8	8	11	19
	59	18	14	10	10	12	22
	64	18	9	7	10	20	30
	69	18	11	12	22	37	59
	74	18	2	50	50	50	100
	79	18	12	20	31	30	61
	84	18	2	50	50	50	100
VBW-10	0	18	12	4	4	6	10
	1.5	18		10	24	13	37
	3	18	12	1	2	4	6
	4.5	18	12	2	2	3	5
	6	18	6	9	9	4	13
	7.5	18		2	2	2	4
	9	18		1	2	2	4
	10.5	18		2	3	4	7
	12	18	14	2	2	2	4
	13.5	18	8	2	2	2	4
	15	18	8	1	2	2	4
	16.5	18	18	1	2	2	4
	18	18	18	2	1	3	4
	19.5	18		1	2	2	4
	21	18	12	2	3	3	6
	22.5	18		2	2	3	5
	24	18		3	3	4	7
	25.5	18		2	3	4	7
	27	18	14	2	4	5	9
	28.5	18	12	3	4	5	9
	30	18	12	2	5	7	12
	31.5	18		3	6	8	14
	33	18	8	4	10	16	26
	34.5	18		4	10	50	60
	36	12	3	50	50	50	100
VBW-11	0	18	17	0	2	9	11
	3	18	3	9	8	4	12
	8	18	18	5	4	6	10

Table 2
Summary of Blow Count Data
Chemtronics Site, Swannanoa, North Carolina

Boring ID	Depth (ft)	Length (in)	Recovery	Blows (0-6 inches)	Blows (6-12 inches)	Blows (12-18 inches)	N-Value
VBW-11	13	18		3	3	3	6
	18	18	9	3	2	3	5
	23	18	14	4	4	5	9
	28	18	17	3	2	3	5
	33	18	14	4	4	5	9
	38	18	0	5	5	6	11
	43	18	8	5	7	9	16
	48	18	9	5	9	10	19
	53	18	8	5	7	10	17
	58	18	9	13	23	16	39
	63	18	11	9	13	16	29
	68	18	12	9	15	15	30
	73	18	10	9	16	26	42
	78	18	8	36	50	50	100
	83	18	4	50	50	50	100
	88	18	4	50	50	50	100
VBW-12	4	18	18	5	7	11	18
	8	18	16	6	8	6	14
	13	18	7	12	15	16	31
	18	18	16	4	6	8	14
	23	18	0	13	16	21	37
VBW-13	0	18	13	2	2	2	4
	1.5	18	14	5	4	5	9
	3	18	18	5	5	5	10
	4.5	18	13	4	5	4	9
	6	18	14	1	1	1	2
	7.5	18	12	1	1	2	3
	9	18	2	2	2	1	3
	10.5	18	4	5	5	2	7
	12	18	0	4	4	3	7
	13.5	18	4	3	4	3	7
	15	18	5	2	2	10	12
	16.5	18	6	15	15	8	23
	18	18	8	4	4	4	8
	19.5	18	12	3	2	2	4
	21	18	6	2	3	4	7
	22.5	18	9	3	4	4	8
	24	18	6	4	2	3	5
	25.5	18	11	3	3	4	7
	27	18		5	5	6	11
	28.5	18	10	7	7	7	14

Table 2
Summary of Blow Count Data
Chemtronics Site, Swannanoa, North Carolina

Boring ID	Depth (ft)	Length (in)	Recovery	Blows (0-6 inches)	Blows (6-12 inches)	Blows (12-18 inches)	N-Value
VBW-13	30	18	6	9	14	8	22
	31.5	18	10	8	10	14	24
	33	12	10	16	20	50	70
VBW-14	0	18	12	4	3	2	5
	1.5	18	12	3	6	6	12
	3	18	12	6	2	3	5
	4.5	18	12	2	4	3	7
	6	18	12	5	6	4	10
	7.5	18	12	6	6	5	11
	9	18	10	5	4	3	7
	10.5	18	18	4	3	4	7
	12	18	11	2	1	1	2
	13.5	18	8	4	3	5	8
	15	18	11	4	6	5	11
	16.5	18	7	4	7	7	14
	18	18	8	4	3	5	8
	19.5	18	12	3	5	6	11
	21	18	6	4	7	9	16
	22.5	18	6	5	7	10	17
	24	18	6	3	2	2	4
	25.5	18	9	5	5	7	12
	27	18		8	13	13	26
	28.5	18	6	8	10	10	20
	30	18	12	5	9	12	21
	31.5	18	11	15	19	22	41
	33	18	11	6	7	14	21
	34.5	18	7	18	25	29	54
	36	18	12	18	21	24	45
	37.5	18	8	27	50	50	100
	39	18	5	5	17	22	39
	40.5	18	5	29	44	44	88
	42	18	1	15	50	50	100
	43.5	18	6	29	34	42	76
	45	18	14	6	9	11	20
	46.5	18	9	12	20	18	38
	48	18	4	25	28	27	55
	49.5	18	9	29	50	50	100
	51	18	11	29	34	35	69
	52.5	18	15	25	28	29	57
	54	18	12	25	50	50	100
	55.5	18	13	13	17	17	34

Table 2
Summary of Blow Count Data
Chemtronics Site, Swannanoa, North Carolina

Boring ID	Depth (ft)	Length (in)	Recovery	Blows (0-6 inches)	Blows (6-12 inches)	Blows (12-18 inches)	N-Value
VBW-14	57	18	5	13	24	50	74
	58.5	18	0	50	50	50	100
	60	18	12	13	14	17	31
	61.5	18	5	25	30	50	80
	63	18	13	15	16	14	30
	64.5	18	13	15	14	18	32
	66	18	9	21	50	50	100
	67.5	18	5	50	50	50	100
VBW-15A	0	18	15	4	3	3	6
	1.5	18	11	2	12	17	29
	3	18	2	8	12	9	21
	4.5	18	15	11	2	9	11
	6	18	0	3	4	4	8
	7.5	18	0	4	5	4	9
	9	18		9	5	5	10
VBW-15C	4.5	18	15	4	4	4	8
	6	18	15	4	5	5	10
	7.5	18	12	3	5	5	10
	9	18	16	3	6	6	12
	10.5	18	16	4	6	6	12
	12	18	15	3	4	3	7
	13.5	18	18	3	3	3	6
	15	18	18	2	2	3	5
	16.5	18	14	4	5	6	11
	18	18	11	2	2	3	5
	19.5	18	18	2	2	3	5
	21	18	15	3	3	1	4
	22.5	18	15	0	2	3	5
	24	18	7	2	3	2	5
	25.5	18	18	2	2	3	5
	27	18	18	6	10	10	20
	28.5	18	10	2	2	4	6
	30	18	7	3	4	6	10
	31.5	18	5	5	9	11	20
	33	18	13	4	6	8	14
	34.5	18	10	5	5	9	14
	36	18	9	12	14	19	33
	37.5	18	12	5	8	11	19
	39	18	11	6	8	9	17
	40.5	18	9	6	9	20	29
	42	18	18	8	13	22	35

Table 2
Summary of Blow Count Data
Chemtronics Site, Swannanoa, North Carolina

Boring ID	Depth (ft)	Length (in)	Recovery	Blows (0-6 inches)	Blows (6-12 inches)	Blows (12-18 inches)	N-Value
VBW-15C	43.5	18	14	13	17	22	39
	45	18	11	20	22	25	47
	46.5	18	10	12	16	13	29
	48	18	10	7	13	16	29
	49.5	18	12	7	12	21	33
	51	18	10	18	47	50	97
	52.5	18	6	50	50	50	100
	54	18	5	50	50	50	100
	55.5	18	5	50	50	50	100
	57	18	9	18	32	33	65
	58.5	18	9	24	50	50	100
	60	18	10	19	50	50	100
	61.5	18	8	37	50	50	100
	63	18	4	50	50	50	100
	64.5	18	3	50	50	50	100
	66	18	4	50	50	50	100
	67.5	18	6	44	50	50	100
	69	18	6.5	34	50	50	100
	70.5	18	2.5	50	50	50	100
	72	18	3	50	50	50	100
	73.5	18	3	50	50	50	100
	75	18	1	50	50	50	100
	76.5	18	1	50	50	50	100
	78	18	1.5	50	50	50	100
	79.5	18	7.5	33	50	50	100
	81	18	9	47	50	50	100
	82.5	18	12	20	23	50	73
	84	18	4	50	50	50	100
	85.5	18	5.5	50	50	50	100
	87	18	2	50	50	50	100
	88.5	18	2	50	50	50	100
	90	18	2	50	50	50	100
	91.5	18	2	50	50	50	100
	93	18	5	50	50	50	100
	94.5	6	3	50	50	50	100
VBW-16	0	18	13	2	3	4	7
	1.5	18		3	3	5	8
	3	18	18	5	4	6	10
	4.5	18	18	6	6	5	11
	6	18	12	6	6	10	16
	7.5	18	12	13	6	7	13

Table 2
Summary of Blow Count Data
Chemtronics Site, Swannanoa, North Carolina

Boring ID	Depth (ft)	Length (in)	Recovery	Blows (0-6 inches)	Blows (6-12 inches)	Blows (12-18 inches)	N-Value
VBW-16	9	18	16	5	5	5	10
	10.5	18	6	2	3	3	6
	12	18	12	1	2	2	4
	13.5	18	12	3	3	2	5
	15	18	6	1	2	2	4
	16.5	18	18	2	2	2	4
	18	18	18	1	1	3	4
	19.5	18	14	2	2	3	5
	21	18	18	3	2	3	5
	22.5	18	17	2	3	5	8
	24	18	12	2	4	5	9
	25.5	18	12	4	5	7	12
	27	18	10	4	6	7	13
	28.5	18	7	4	5	7	12
	30	18	12	4	6	10	16
	31.5	18	13	5	10	14	24
	33	18	11	6	14	19	33
	34.5	18	12	8	17	23	40
	36	18	11	10	12	11	23
	37.5	18	7	5	6	7	13
	39	18	11	5	10	12	22
	40.5	18	11	7	12	15	27
	42	18	8	12	12	13	25
	43.5	18	10	7	10	28	38
	45	18	9	5	22	50	72
	46.5	18	6	36	50	50	100
	48	18	3	24	50	50	100
	49.5	18	5	50	50	50	100
	51	18	9	6	50	50	100
	52.5	18	2	50	50	50	100
	54	18	5	50	50	50	100
	55.5	18	13	31	50	50	100
	57	18	5	50	50	50	100
	58.5	18	1	50	50	50	100
	60	18	2	50	50	50	100
VBW-17	3	18	18	3	3	4	7
	8	18	15	3	4	6	10
	13	18	14	4	5	7	12
	18	18	15	2	3	6	9
	23	18	14	4	4	6	10
	28	18	13	2	4	4	8

Table 2
Summary of Blow Count Data
Chemtronics Site, Swannanoa, North Carolina

Boring ID	Depth (ft)	Length (in)	Recovery	Blows (0-6 inches)	Blows (6-12 inches)	Blows (12-18 inches)	N-Value
VBW-17	33	18	15	4	8	11	19
	38	18	13	5	9	13	22
	43	18	12	8	13	17	30
	48	18	15	9	19	21	40
	53	18	16	5	10	30	40
	58	18	14	13	33	41	74
	63	18	9	38	50	50	100
	68	18	11	32	50	50	100
	73	18	3	50	50	50	100
VBW-18A	3	18	18	6	10	23	33
VBW-18B	3	18	14	11	10	15	25
	8	18	16	4	5	8	13
	13	18	11	7	5	6	11
	18	18	16	4	5	6	11
	23	18	14	4	6	8	14
	28	18	14	11	11	13	24
	33	18	13	41	30	27	57
	38	18	11	9	11	17	28
	43	18	11	9	23	19	42
	48	18	7	50	50	50	100
	53	18	9	10	16	19	35
	58	18	12	29	36	21	57
	63	18	15	6	10	13	23
	68	18	6	7	16	33	49
	73	18	10	18	37	50	87
	78	18	4	50	50	50	100
	83	18	8	27	50	50	100

Note:

1. N-Value is the sum of the final 12-inches of standard penetration test advancement.
2. Geotechnical boring VBW-15B was advanced to a depth of 2 feet below ground surface, at which point a shallow subsurface obstruction was encountered. No geotechnical data were recorded.

Table 3
Summary of Analytical Data
Chemtronics Site, Swannanoa, North Carolina

		Sample ID (see notes 9 and 10)	VBW-6	VBW-8	VBW-9	MW254-L25CD	MW255-L25CD	MW256-M25CD	MW257-M25CD	Sample ID	VBW-5 19-20.5 ft-bgs	VBW-10 4.5-6 ft-bgs	VBW-13 6-7.5 ft-bgs	VBW-13 7.5-9 ft-bgs	VBW-14 13.5-15 ft-bgs	VBW-15C 10.5-12 ft-bgs
		Matrix	Water	Water	Water	Water	Water	Water	Water	Matrix	Soil	Soil	Soil	Soil	Soil	Soil
		Date Collected	10/24/2013	10/30/2013	11/5/2013	10/4/2013	10/4/2013	12/11/2013	12/11/2013	Date Collected	10/22/2013	9/18/2013	10/2/2013	10/2/2013	9/27/2013	10/3/2013
CAS Number	Parameter Name	NC 2L Standard µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	NC IHSB PSRG µg/kg	µg/kg	µg/kg		µg/kg	µg/kg	µg/kg
67-64-1	Acetone	6,000	**4,200 J**	**9,600**	ND	ND	ND	690 J	**110,000**	100,000,000	ND	ND	37	45	ND	ND
71-43-2	Benzene	1	170 J	140	ND	0.2 J	0.2 J	**140**	**800**	5400	3 J	ND	ND	ND	ND	ND
75-25-2	Bromoform	4	ND	ND	ND	ND	ND	ND	**400 J**	220,000	ND	ND	ND	ND	ND	ND
75-27-4	Bromodichloromethane	0.6	ND	ND	ND	0.3 J	ND	ND	ND	1400	ND	ND	ND	ND	ND	ND
78-93-3	2-Butanone	4,000	ND	**290**	ND	ND	ND	ND	2,200 J	NE	ND	ND	ND	9 J	ND	ND
1634-04-4	t-Butyl Alcohol	10	**48,000**	**22,000**	ND	ND	ND	**6,000**	**690,000**	NE	38 J	ND	ND	ND	ND	ND
56-23-5	Carbon Tetrachloride	0.3	ND	ND	ND	ND	ND	ND	ND	3000	2 J	ND	ND	ND	ND	ND
66-67-3	Chloroform	70	**24,000**	**440**	70 J	4.6	20	**120**	**680**	1500	**1,900**	ND	ND	ND	ND	ND
110-82-7	Cyclohexane	NE	26,000	26,000	4,700	240	0.5 J	14,000	22,000	120,000	180	ND	ND	ND	ND	ND
107-06-2	1,2-Dibromoethane	0.02	ND	**17 J**	ND	**0.2 J**	ND	ND	ND	17000	ND	ND	ND	ND	ND	ND
107-06-2	1,2-Dichloroethane	0.4	**79,000**	**2,000**	**31,000**	0.1 J	**8.3**	**2,400**	**11,000**	2,200	410	ND	ND	ND	ND	ND
156-59-2	cis-1,2-Dichloroethene	70	ND	13 J	24 J	0.5 J	7.3	21 J	ND	400000	ND	ND	ND	ND	ND	ND
78-87-5	1,2-Dichloropropane	0.6	**930**	**100**	ND	ND	ND	ND	**460 J**	4,700	ND	ND	ND	ND	ND	ND
100-41-4	Ethylbenzene	600	ND	5.4 J	ND	ND	ND	ND	ND	27000	ND	ND	11	5 J	ND	ND
97-63-2	Ethyl Methacrylate	NE	110 J	ND	ND	ND	ND	ND	ND	1100000	ND	ND	ND	ND	ND	ND
76-13-1	Freon 113	200,000	ND	14 J	49 J	ND	ND	ND	ND	NE	ND	ND	ND	ND	ND	ND
79-20-9	Methyl Acetate	NE	ND	1,200	ND	ND	ND	77 J	16,000	29,000,000	ND	ND	ND	ND	ND	ND
1634-04-4	Methyl Tertiary Butyl Ether	20	**200 J**	**200**	ND	ND	ND	**43 J**	**3,000**	220,000	ND	ND	ND	ND	ND	ND
75-09-2	Methylene Chloride	5	**330 J**	**43**	**1,800**	ND	0.6	**99 J**	**270 J**	620,000	7 J	ND	ND	ND	ND	ND
127-18-4	Tetrachloroethene	0.7	ND	ND	**720**	0.4 J	**28**	**33 J**	ND	82000	2 J	ND	ND	ND	ND	ND
109-99-9	Tetrahydrofuran	NE	7,300	11,000	14,000	ND	10	930 J	230,000	19,000,000	ND	ND	ND	ND	ND	ND
108-88-3	Toluene	600	ND	210	ND	0.9	ND	24 J	200 J	820,000	ND	ND	ND	ND	ND	ND
79-01-6	Trichloroethene	3	**1,400**	**590**	**18,000**	**24**	**130**	**1600**	**1,300**	4,000	32	ND	ND	ND	ND	ND
1330-20-7	m+p-Xylene	500	ND	8.7 J	41 J	0.1 J	ND	ND	ND	390000	ND	ND	ND	ND	ND	ND
14797-73-0	Perchlorate	2	ND	ND	ND	**20**	**700**	**7.3**	**5,000**	140,000	ND	ND	ND	ND	ND	ND

NOTE:

1. VBW-10, VBW-16, VBW-17, and VBW-18 were converted to monitoring wells MW254-L25CD, MW255-L25CD, MW256-M25CD, and MW257-M25CD, respectively.
2. ND - Analyte not detected above the method detection limit.
3. NE - 2L Standard not established.
4. NC 2L Standard - 2L Standard is from "North Carolina Administrative Code, Title 15A: Department of Environment and Natural Resources, Subchapter 2L - Groundwater Classifications and Standards," DENR (Amended April 1, 2013).
5. NC IHSB PSRG - North Carolina Inactive Hazardous Sites Branch Preliminary Soil Remediation Goals (Amended July, 2013).
6. J - Laboratory data qualifier used for parameters detected at estimated concentrations above method detection limit but below method reporting limit.
7. Bold cells indicate exceedance of 2L standard.
8. µg/kg - micrgrams per kilogram. µg/L - micrograms per liter.
9. Groundwater samples from VBW-6, VBW-8, and VBW-9 collected from auger flights using a new bailer upon detection of significantly high FID readings from split-spoon samples.
10. Groundwater samples from MW254-L25CD, MW255-L25CD, MW256-M25CD, and MW257-M25CD collected from completed monitoring wells using low-flow sampling methods.
11. Ft-bgs - Feet below ground surface.

Table 4
Summary of Core Run Data for VBW Geotechnical Borings
Chemtronics Site, Swannanoa, North Carolina

Borehole ID	Core Run	Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures	Other Attributes of Cored Intervals						
							Number of Fractures per Core Length	Number of Low-Angle Fractures (0 - 30°)	Number of High-Angle Fractures (30°- 60°)	Number of Sub-Vertical Fractures (60°- 90°)	Foliation Relative to Boring	Degree of Weathering	Fracture Spacing Close (6" or less) Varied Not Close (>6")
VBW-1	Run 1	28.5-29.7	1.2	67	38	3 fractures - 1 high-angle parallel to foliation and 2 low-angle. Staining present throughout core.	2.5	2	1	0	Moderately Dipping	Moderate	Close
VBW-1	Run 2	29.7-34.7	5	100	42	8 fractures - 2 high-angle parallel to foliation, 1 high-angle cross-cutting foliation, and 5 low-angle. Minor staining in top 2.2 feet with no staining below.	1.6	5	1	2	Steeply Dipping	Moderate	Close
VBW-1	Run 3	34.7-38	3.3	100	79	3 low-angle fractures. No visible staining.	0.9	3	0	0	Moderately Dipping	None	Not Close
VBW-1	Run 4	38-44.2	6.2	100	100	8 fractures - 2 high-angle parallel to foliation and 6 low-angle. No visible staining.	1.3	6	1	1	Shallow Dipping	None	Not Close
VBW-2	Run 1	10-14.7	4.7	89	77	9 low-angle fractures. No visible staining.	1.9	8	1	0	Steeply Dipping	None	Not Close
VBW-2	Run 2	14.7-19.8	5.1	96	88	6 low-angle fractures. No visible staining.	1.2	6	0	0	Steeply Dipping	None	Not Close
VBW-3	Run 1	39-44	5	92	86	8 low-angle fractures in non-foliated rock. Staining visible in top 6 inches of core with no staining below.	1.6	8	0	0	Non-Foliated	None	Not Close
VBW-3	Run 2	44-49.3	5.3	100	94	8 fractures in non-foliated rock - 2 high angle and 6 low angle. No visible staining.	1.5	6	1	1	Non-Foliated	None	Not Close
VBW-4B	Run 1	64.5-68.3	3.8	16	0	2 fractures - 1 high-angle cross cutting-foliation and 1 low-angle. Iron-oxide staining present in bottom half of core.	0.5	1	0	1	Steeply Dipping	None	Close
VBW-4B	Run 2	68.3-73.3	5	40	20	8 low-angle fractures. Iron-oxide staining present in broken rock at top of core.	1.6	7	1	0	Moderately Dipping	None	Close
VBW-4B	Run 3	73.3-78.3	5	92	52	13 fractures - 3 high-angle parallel to foliation and 10 low-angle. Iron-oxide staining present but mainly confined to felsic zones of core.	2.6	10	3	0	Moderately Dipping	Slight	Varied
VBW-4B	Run 4	78.3-83.3	5	98	86	4 low-angle fractures. No visible staining.	0.8	4	0	0	Shallow Dipping.5	None	Not Close
VBW-4B	Run 5	83.3-88.3	5	100	82	7 fractures - 1 high-angle parallel to foliation and 6 low-angle. No visible staining.	1.4	5	2	0	Moderately Dipping	None	Not Close
VBW-5	Run 1	78-79.1	1.1	91	64	2 fractures - 1 high-angle parallel to foliation and 1 low-angle. Iron-oxide staining visible on lower fracture and at base of core.	1.8	1	0	1	Moderately Dipping	None	Varied
VBW-5	Run 2	79.1-89	9.9	86	79	8 fractures - 1 high-angle parallel to foliation, 1 high-angle cross-cutting foliation, and 6 low-angle. Staining present in heavily weathered fracture at 86.1 ft-bgs, minor pyrite noted on several of the lower fractures.	0.8	6	2	0	Shallow Dipping	Slight	Not Close
VBW-6	Run 1	77.5-78.5	2	100	70	3 low-angle fractures. Staining visible in top 1 inch of core.	1.5	3	0	0	Steeply Dipping	None	Close
VBW-6	Run 2	78.5-88.7	10.2	100	80	19 fractures - 6 high-angle parallel to foliation and 13 low-angle. No visible staining.	1.9	13	2	4	Steeply Dipping	None	Not Close
VBW-7	Run 1A	75-77.8	2.8	32	0	3 fractures - 2 high-angle parallel to foliation and 1 low-angle. Iron-oxide staining throughout.	1.1	1	2	0	Moderately Dipping	High	Close
VBW-7	Run 1B	77.8-80	2.2	77	36	7 low-angle fractures. Minor iron-oxide staining predominantly in felsic zones.	3.2	7	0	0	Steeply Dipping	Slight	Close
VBW-7	Run 2	80-84.6	4.6	100	70	12 fractures - 6 high-angle parallel to foliation, 2 high-angle cross-cutting foliation, and 4 low-angle . Very minor iron-oxide staining present on fracture faces.	2.6	4	0	8	Steeply Dipping	Slight	Not Close
VBW-7	Run 3	84.6-89.6	5	98	84	7 fractures - 6 moderate- to high-angle parallel to foliation and 1 low-angle. Iron-oxide staining present on fracture faces in upper portion of core.	1.4	1	3	3	Steeply Dipping	Slight	Not Close
VBW-8	Run 1	80.5-85.1	4.6	100	63	15 fractures - 1 sub-vertical parallel to mafic-felsic contact, 4 high-angle cross-cutting foliation and 10 low-angle. Chlorite present in high-angle fracture zone. Manganese-oxide staining present on many fractures with occasional pyrite.	3.3	10	2	3	Shallow Dipping	Slight	Varied

Table 4
Summary of Core Run Data for VBW Geotechnical Borings
Chemtronics Site, Swannanoa, North Carolina

Borehole ID	Core Run	Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures	Other Attributes of Cored Intervals						
							Number of Fractures per Core Length	Number of Low-Angle Fractures (0 - 30°)	Number of High-Angle Fractures (30°- 60°)	Number of Sub-Vertical Fractures (60°- 90°)	Foliation Relative to Boring	Degree of Weathering	Fracture Spacing Close (6" or less) Varied Not Close (>6")
VBW-8	Run 2	85.1-89.5	4.4	91	75	12 fractures - 7 high-angle parallel to foliation, 1 vertical cross-cutting foliation, and 4 low-angle. Manganese-oxide staining less frequent, pyrite coating present on most fracture faces.	2.7	4	7	1	Moderately Dipping	None	Varied
VBW-8	Run 3	89.5-94.5	5	86	64	12 fractures - 3 high-angle parallel to foliation, 1 high-angle cross-cutting foliation, and 8 low-angle. No manganese-oxide staining, pyrite visible on 2 fracture faces.	2.4	8	4	0	Moderately Dipping	None	Varied
VBW-8	Run 4	94.5-104.5	10	96	76	24 fractures - 13 high-angle typically parallel to foliation and 11 low-angle. No manganese-oxide staining, minor pyrite on some fracture faces.	2.4	11	10	3	Moderately Dipping	Slight	Varied
VBW-9	Run 1	85.5-89.3	3.8	61	11	13 low-angle fractures in non-foliated rock. Iron-oxide staining present throughout.	3.4	13	0	0	Non-Foliated	High	Close
VBW-9	Run 2	89.3-93.9	4.6	100	74	11 fractures - 4 high-angle parallel to foliation and 7 low-angle. Iron-oxide staining present in middle and bottom sections of core.	2.4	7	2	2	Steeply Dipping	Moderate	Varied
VBW-9	Run 3	93.9-98.9	5	42	22	6 fractures - 2 high-angle parallel to foliation and 4 low-angle. Iron-oxide staining present in top 3 inches and at base of core.	1.2	4	1	1	Steeply Dipping	Slight	Varied
VBW-9	Run 4	98.9-103.9	5	66	32	11 fractures - 7 high-angle parallel to foliation and 4 low-angle. Iron-oxide staining present throughout with locally intense weathering.	2.2	4	3	4	Steeply Dipping	High	Close
VBW-9	Run 5	103.9-108.9	5	78	48	13 fractures - 8 high-angle parallel to foliation and 5 low-angle. Iron-oxide staining present to approximately 107 ft-bgs.	2.6	5	4	4	Steeply Dipping	Moderate	Varied
VBW-9	Run 6	108.9-118.9	10	85	57	23 fractures - 8 high-angle parallel to foliation, 2 high-angle cross-cutting foliation, and 13 low-angle. Pyrite and possibly epidote or chlorite present on fracture faces near base of core. No visible staining.	2.3	13	2	8	Steeply Dipping	Slight	Varied
VBW-9	Run 7	118.9-129.1	10.2	97	84	14 fractures - 13 high-angle parallel to foliation and 1 low-angle. Pyrite and possibly epidote or chlorite present on most fracture faces. No visible staining.	1.4	2	0	12	Steeply Dipping	None	Not Close
VBW-10	Run 1	37-39	2	94	58	2 fractures parallel to foliation. Iron-oxide staining present above and below lower fracture.	1.0	0	2	0	Moderately Dipping	Moderate	Close
VBW-10	Run 2	39-44	5	0	0	No recovery.	-	-	-	-	-	-	-
VBW-10	Run 3	44-49	5	0	0	No recovery.	-	-	-	-	-	-	-
VBW-10	Run 4	49-54	5	3	0	Very little recovery.	-	-	-	-	-	-	-
VBW-10	Run 5	54-59	5	27	0	Broken rock. Iron-oxide staining present throughout.	-	-	-	-	-	-	-
VBW-10	Run 6	59-64	5	47	35	9 fractures - 3 high-angle parallel to foliation and 6 low-angle. Iron-oxide staining prevalent throughout.	1.8	6	0	3	Steeply Dipping	High	Close
VBW-10	Run 7	64-69.5	5.5	59	39	6 fractures - 1 high-angle parallel to foliation and 5 low-angle. Iron-oxide staining prevalent throughout, manganese-oxide coating all fracture faces, dissolution of minerals along planes parallel to foliation.	1.1	5	0	1	Steeply Dipping	High	Close
VBW-10	Run 8	69.5-74	4.5	40	17	10 fractures - 2 high-angle parallel to foliation, 1 high-angle cross-cutting foliation, and 7 low-angle (with manganese-oxide staining). The 2 high-angle fractures appear to form a conjugate pair. Iron-oxide staining on 1 high angle fracture.	2.2	7	0	3	Steeply Dipping	High	Close

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Borehole ID	Core Run	Core Interval (ft-bgs)	Core Length (ft)	Recovery (%)	RQD (%)	Description of Fractures	Other Attributes of Cored Intervals						
							Number of Fractures per Core Length	Number of Low-Angle Fractures (0 - 30°)	Number of High-Angle Fractures (30°- 60°)	Number of Sub-Vertical Fractures (60°- 90°)	Foliation Relative to Boring	Degree of Weathering	Fracture Spacing Close (6" or less) Varied Not Close (>6")
VBW-10	Run 9	74-79	5	12	0	Cannot indicate number or frequency of fractures from return. Iron and manganese coatings present.	-	-	-	-	-	-	-
VBW-10	Run 10	79-84	5	5	0	Cannot indicate number or frequency of fractures from return. Iron and manganese coatings present.	-	-	-	-	-	-	-
VBW-10	Run 11	84-89	5	0	0	No recovery.	-	-	-	-	-	-	-
VBW-10	Run 12	89-94	5	96	68	5 fractures - 4 high-angle parallel to foliation and 1 high-angle cross-cutting foliation. Iron-oxide staining present at mineral boundaries.	1.0	0	1	4	Steeply Dipping	High	Varied
VBW-10	Run 13	94-99	5	90	85	7 fractures - 5 high-angle parallel to foliation and 2 low-angle. Fractures coated with pyrite from 98-99 ft-bgs. Iron-oxide staining present from 94-98 ft-bgs with no staining below.	1.4	2	3	2	Steeply Dipping	High	Not Close
VBW-10	Run 14	99-104.8	5.8	77	73	7 fractures in non-foliated rock - 3 high-angle and 4 low-angle. Little to no iron-oxide staining present.	1.2	4	2	1	Non-Foliated	Moderate	Not Close
VBW-11	Run 1	92.5-93.5	1	80	70	1 low angle fracture and no staining present.	1.0	1	0	0	Shallow Dipping	None	Not Close
VBW-11	Run 2	93.5-103.5	10	98	96	7 fractures - 3 high-angle parallel to foliation and 4 low-angle. No visible staining.	0.7	4	1	2	Shallow Dipping	None	Not Close
VBW-12	Run 1	27.5-29.1	1.6	69	44	2 fractures - 1 high-angle cross-cutting foliation and 1 low-angle. No visible staining.	1.3	1	1	0	Steeply Dipping	None	Varied
VBW-12	Run 2	29.1-38.9	9.8	99	91	16 fractures - 3 high-angle parallel to foliation, 3 high-angle cross-cutting foliation, and 10 low-angle. Pyrite present on one fracture face at 35 ft-bgs. No visible staining.	1.6	10	4	2	Moderately Dipping	None	Varied
VBW-13	Run 1	34-35	1	90	0	5 fractures generally oriented with foliation - 4 high-angle and 1 low-angle. Iron-oxide staining present throughout.	5.0	1	0	4	Steeply Dipping	High	Close
VBW-13	Run 2	35-40	5	78	54	5 fractures - 1 high-angle parallel to foliation, 1 high-angle cross-cutting foliation, and 3 low-angle. Core is heavily stained with iron-oxide to 36.1 ft-bgs with no staining below.	1.0	4	0	1	Steeply Dipping	Moderate	Varied
VBW-13	Run 3	40-45	5	38	20	5 low-angle fractures. Lower half of core contains intensely weathered rock/sandy material, followed by iron-oxide stained felsic rock.	1.0	5	0	0	Steeply Dipping	High	Varied
VBW-13	Run 4	45-50	5	8	0	1 low-angle fracture in non-foliated felsic rock. Intense weathering and iron-oxide staining present.	0.2	1	0	0	Steeply Dipping	High	Close
VBW-13	Run 5	50-60	10	71	68	7 fractures - 4 high-angle parallel to foliation, 3 low-angle. Iron-oxide staining present in middle and lower sections of the core.	0.7	3	0	4	Steeply Dipping	Slight	Not Close
VBW-13	Run 6	60-65	5	98	95	7 low-angle fractures. Iron-oxide staining brackets fracture in middle section of core.	1.4	7	0	0	Steeply Dipping	Slight	Not Close
VBW-14	Run 1	69.7-74.7	5	94	48	10 fractures - 5 high-angle cross-cutting foliation and 5 low-angle. Iron-oxide staining on fractures from 70.5-72.3 ft-bgs.	2.0	5	2	3	Shallow Dipping	Moderate	Close
VBW-14	Run 2	74.7-79.7	5	100	100	1 high-angle fracture in non-foliated rock. No visible staining.	0.2	0	0	1	Non-Foliated	None	Not Close
VBW-14	Run 3	79.7-84.7	5	98	86	5 fractures in non-foliated rock - 1 high-angle and 4 low-angle. No visible staining.	1.0	3	1	1	Non-Foliated	None	Not Close
VBW-15C	Run 1	95-99	5	100	99	No fractures. No visible staining.	0.0	0	0	0	Moderately Dipping	None	Not Close
VBW-15C	Run 2	99-109	10	99	99	11 fractures in weakly to non-foliated rock - 6 high-angle parallel to foliation when visible, 5 low-angle. Staining present in middle section of core.	1.1	5	3	3	Non-Foliated	Slight	Not Close
VBW-16	Run 1	61.5-63.8	1.8	91	83	5 fractures - 4 high-angle parallel to foliation, 1 low-angle. Iron-oxide staining present on fracture faces.	2.8	1	0	4	Steeply Dipping	Moderate	Close
VBW-16	Run 2	63.8-68.8	5	100	100	No fractures. No visible staining.	0.0	0	0	0	Steeply Dipping	None	Not Close

Table 4
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Chemtronics Site, Swannanoa, North Carolina

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							Number of Fractures per Core Length	Number of Low-Angle Fractures (0 - 30°)	Number of High-Angle Fractures (30°- 60°)	Number of Sub-Vertical Fractures (60°- 90°)	Foliation Relative to Boring	Degree of Weathering	Fracture Spacing Close (6" or less) Varied Not Close (>6")
VBW-16	Run 3	68.8-73.8	5	98	98	2 high-angle fractures parallel to foliation. No visible staining.	0.4	0	0	2	Steeply Dipping	None	Not Close
VBW-17	Run 1	76.5-79.2	2.7	100	89	7 fractures - 1 high-angle parallel to foliation, 1 high-angle cross-cutting foliation, and 5 low-angle. Iron-oxide staining present on broken rock near top of core run. Pyrite visible on lowest fracture face.	2.6	5	1	1	Steeply Dipping	Moderate	Close
VBW-17	Run 2	79.2-84.1	4.9	100	86	8 fractures - 4 high-angle parallel to foliation, 1 high-angle cross-cutting foliation, and 3 low-angle. Very minor iron-oxide staining present throughout. Pyrite visible on lower fracture faces.	1.6	3	0	5	Steeply Dipping	Slight	Varied
VBW-17	Run 3	84.1-88.3	4.2	95	29	10 fractures - 1 high-angle parallel to foliation, 3 high-angle cross-cutting foliation, and 6 low-angle. Pyrite visible on most fracture faces. Sections of core are heavily fractured/broken.	2.4	6	0	4	Steeply Dipping	Slight	Close
VBW-18B	Run 1	87-89.4	2.4	100	63	9 fractures - 1 high-angle parallel to foliation, 2 high-angle cross-cutting foliation, and 6 low-angle. Minor to moderate iron-oxide staining present from 87-88.2 ft-bgs.	3.8	6	1	2	Steeply Dipping	Moderate	Close
VBW-18B	Run 2	89.4-94.4	5	98	80	8 fractures - 2 high-angle to sub-vertical parallel to foliation, 2 high-angle to sub-vertical cross-cutting foliation, and 4 low-angle. Pyrite visible on 4 fractures, chlorite visible on 2 fractures. No visible staining.	1.6	4	2	2	Steeply Dipping	Slight	Varied
VBW-18B	Run 3	94.4-99	4.6	100	100	2 low-angle fractures. No visible staining.	0.4	2	0	0	Moderately Dipping	None	Not Close

Notes:

1. ft - Feet.
2. ft-bgs - Feet below ground surface.
3. % - Percent.

Appendices

Appendix A

Boring Logs, Well Completion Records, and Photographic Logs

Boring Logs

Boring Log Abbreviations, Acronyms, and Definitions
Chemtronics Site, Swannanoa, North Carolina

BEDROCK	Top of bedrock interpreted as auger refusal.
CME	Central Mining Equipment
COMPETENT BEDROCK	Top of competent bedrock interpreted as the occurrence of ten continuous feet of rock with RQD greater than or equal to 70 percent.
ELEV.	Elevation.
FID	Flame ionization detector.
FT	Feet/foot.
FT-BGS	Feet below ground surface.
HSA	Hollow stem auger.
N-VALUE	Equal to the sum of the blow counts for the last 12 inches of a standard penetration test.
PID	Photo ionization detector.
PPM	Parts per million.
PWR	Partially weathered rock.
RC RUN	Rock core run.
RQD	Rock quality designation - equal to the sum of all core within a rock core run greater than or equal to four inches in length.
SS	Split spoon.
VBW	Vertical barrier wall.

BORING NUMBER VBW-1

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703749.74623, 979144.85746
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 10/11/13 **COMPLETED** 10/14/13
GROUND ELEVATION 2413.99 ft **HOLE SIZE** 6.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING 22.2 ft / Elev 2391.8 ft
LOGGED BY Michael Gragg **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION (Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.)	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
0	SS	67	3-5-6 (11)	1.76		ML			SILT - red to brown, damp, soft to firm, sandy silt, MLS, minor clay and mica, organic materal (roots) and rock fragments present.	
	SS	83	6-6-5 (11)	2.07					3.0 / 2411.0	
	SS	72	5-5-5 (10)	2.06		ML			SILT - red to brown, damp to moist, firm, clayey silt, ML, slightly micaceous, fine sand and minor rock fragments present, increasing sand content with depth.	
5	SS	72	6-7-7 (14)	2.07						
	SS	89	6-7-7 (14)	2.35						
	SS	89	7-7-8 (15)	2.24						
10	SS	100	7-8-9 (17)	2.28						
	SS	100	6-7-6 (13)	2.3						
	SS	83	3-4-7 (11)	2.72						
15	SS	94	3-5-8 (13)	2.75						
	SS	89	6-6-6 (12)	2.85						
	SS	50	6-5-4 (9)	2.93					18.0 / 2396.0	
	SS	83	2-2-3 (5)	3.05	Saprolite.	SM			18.5 / 2395.5 SAND - light brown, wet, loose, silty sand, SM, fine sand, highly micaceous.	
20	SS	67	2-3-5 (8)	3.09	Saprolite.	SW			19.7 / 2394.3 SAND - brown to red-brown, moist to wet, loose, well-graded sand, SW, fine to coarse sand, minor silt, highly micaceous, foliations visible.	
	SS	44	4-5-6 (11)	3.16	Saprolite.	SM	▽		SAND - light brown to red-brown, moist to wet, loose, silty sand, SM, fine sand, highly micaceous, foliation visible, sand content increasing with depth.	
	SS	83	3-5-8 (13)	3.18	Saprolite.	SM			22.5 / 2391.5 SAND - dark brown, damp to moist, loose, sandy silt to silty sand, SM, fine to medium sand, highly micaceous, horizontal foliation visible.	
25	SS	78	25-34-50 (84)	3.44	Saprolite and PWR.				24.8 / 2389.2 PWR - friable, grey to dark brown, moist, soft, fine to medium grain, mica and quartz gravel/crushed rock, garnets present, iron-oxide staining present between layers.	
	SS	50	22-14-7 (21)	3.33	PWR.				27.0 / 2387.0	
	SS	61	2-4-7 (11)	3.48	Saprolite.	SM			28.5 / 2385.5 SAND - brown/white to black, moist, loose, silty sand, SM, fine to medium sand, very minor clays, highly micaceous, high angle foliation.	
30	RC Run 1	67 (38)			Hollow stem auger refusal encountered at 28.5 ft-bgs. Top of competent rock at 34.7 ft-bgs.				29.7 / 2384.3 Note: a SS sample was collected from 28.5-28.8 ft-bgs with blow counts of 50/3 and contained PWR.	
	RC Run 2	100 (42)							BEDROCK - 50% biotite and other mafic minerals, 50% quartz/feldspar, felsic minerals constitute porphyroblasts within mafic matrix, medium to coarse grained, high angle foliation, iron-oxide staining throughout.	
35				3.02					34.7 / 2379.3	

(Continued Next Page)

GEN BH/TP/NO WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703749.74623, 979144.85746
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ 20 40 60 80
35	RC Run 3	100 (79)		2.95					3 fractures - 1 high anlge parallel to foliation, 2 low angle cross foliation. BEDROCK - 29.7-31.9 ft-bgs similar to previous core run, with garnets increasing with depth, followed by decrease in grain size (fine to medium grained) and transition to weaker foliation, no staining below 31.9 ft-bgs. 8 fractures - 2 high angle parallel to foliation, 1 high angle and 5 low angle cross foliation.	
40	RC Run 4	100 (100)		3.1					COMPETENT BEDROCK - similar to previous core run to 36.4 ft-bgs, then transition to garnet-rich, banded biotite-rich rock and felsic rock, gneiss, no visible staining. 3 low angle fractures. 1 mechanical break. *(continued)*	

38.0 — 2376.0

44.2 — 2369.8

COMPETENT BEDROCK - similar to previous core run, decreasing felsic content and grain size with depth.

8 fractures - 2 high angle parallel to foliation, 6 low angle cross foliation.
2 mechanical breaks.

Boring terminated at 44.2 feet.

BORING NUMBER VBW-2

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703902.77075, 979315.79255
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 10/14/13 **COMPLETED** 10/14/13
GROUND ELEVATION 2415.77 ft **HOLE SIZE** 6.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING ---
LOGGED BY Michael Gragg **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
0	SS	39	4-4-5 (9)	1.76	PWR. Hollow stem auger refusal at 10 ft-bgs. Top of rock at 10 ft-bgs.	CL-ML			CLAY - top 4 inches dark brown, damp, loose, silty sand, SM, fine sand, organic material present (grass, roots), rock fragments of biotite schist, then red, damp, soft to firm, silty clay, CL-ML, rock fragments and organic material present.	
3.0									2412.8	
5	SS	94	42-42-23 (65)	3.34		SM			SAND - brown, damp, dense, silty sand, SM, fine sand, iron-oxide staining present in thin layers, rock fragments at top, 1-inch layer of red, clayey silt at 5.4 feet below ground surface (ft-bgs).	
7.0									2408.8	
				3.42					PWR - dark brown to black, damp, medium dense to very dense, biotite-rich weathered rock, very friable, 3-inch zone of red, silty clay-clayey silt at 9.5 ft-bgs, rock fragments present.	
10									10.0	2405.8
	RC Run 1	89 (77)		2.42					A final SS sample was collected from 9-10 ft-bgs with blow counts of 14, 19, and 50/0 inches. Materials returned described above.	
									COMPETENT BEDROCK - off-white to dark grey, fine to medium grain, biotite-rich rock with bands of felsic rock, garnets present, moderate to high angle foliation, garnetiferous gneiss.	
15									14.7	2401.1
									9 low angle fractures.	
	RC Run 2	96 (88)		2.35					COMPETENT BEDROCK - similar to previous core run. 6 low angle fractures. 2 mechanical breaks.	
									19.8	2396.0
									Boring terminated at 19.8 feet.	

BORING NUMBER VBW-3

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 704037.17926, 979494.25141
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 10/15/13 **COMPLETED** 10/15/13
GROUND ELEVATION 2406.35 ft **HOLE SIZE** 6.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING 34.5 ft / Elev 2371.9 ft
LOGGED BY Michael Gragg **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION (Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.)	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
0	SS	94	12-10-6 (16)	1.70		GP-GM			1.0 GRAVEL - road material, light brown, damp, loose to medium dense, poorly-graded gravel with silt, GP-GM, some fine sand. 2405.4	
	SS	89	6-6-8 (14)	1.93		CL-ML			CLAY - red-brown to light brown, damp to moist, firm, clayey silt to silty clay, CL-ML, some fine sand, micas, and small rock fragments present.	
	SS	100	8-8-8 (16)	2.01						
5	SS	89	10-8-8 (16)	2.04					6.0 2400.4	
	SS	72	12-13-16 (29)	2.06		SM			SAND - light brown to red-brown, damp, medium dense to loose, silty sand, SM, fine to medium sand, micaceous, weak foliations visible, quartz rock fragments at base.	
	SS	17	4-5-6 (11)	2.35						
10	SS	61	11-12-11 (23)	2.13					10.5 2395.9	
	SS	100	10-13-12 (25)	2.31		SM			SAND - light brown to red-brown, damp, medium dense, silty sand, SM, fine sand, micaceous, coarse sand and rock fragments present from 11.4-11.6 feet below ground surface (ft-bgs). 12.0 2394.4	
	SS	78	5-5-5 (10)	2.34	Saprolite.	SM			12.8 2393.6	
						ML			13.5 2392.9 SAND - light brown to black, damp to moist, loose, silty sand, SM, fine sand, highly micaceous, weak foliation.	
15	SS	78	8-4-6 (10)	2.67	Saprolite.	SW-SM			SILT - light brown to red-brown, damp to moist, firm, sandy silt, MLS, fine sand, highly micaceous, weak foliation.	
	SS	100	5-6-6 (12)	2.32	Saprolite.				SAND - dark brown to brown, damp to moist, loose, well-graded silty sand, SW-SM, fine to coarse sand, highly micaceous, minor clay, biotite-rich rock fragments present from 15-18 ft-bgs.	
	SS	89	8-7-6 (13)	3.42	Saprolite.					
20	SS	17	5-5-4 (9)	2.32	Saprolite.				19.5 2386.9	
	SS	56	4-5-5 (10)	2.54	Saprolite.	SM			SAND - light brown to white, damp to moist, loose, silty sand, SM, fine to medium sand, highly micaceous, foliation visible.	
	SS	94	4-5-7 (12)	2.54	Saprolite.					
	SS	50	3-3-4 (7)	7.62	Saprolite.				24.0 2382.4	
25	SS	56	3-3-5 (8)	4.64	Saprolite.	SM			SAND - light to dark brown, damp to moist, loose, silty sand, SM, fine sand, highly micaceous, weak foliation. 25.8 2380.6	
	SS	94	4-6-6 (12)	4.32	Saprolite.	SW-SM			27.0 SAND - light brown to white, damp, loose, well-graded silty sand, SW-SM, fine to coarse sand, highly micaceous, foliation visible. 2379.4	
	SS	94	3-3-5 (8)	3.08	Saprolite.	SM			SAND - light to dark brown, damp to moist, loose, silty sand, SM, highly micaceous, foliation clearly visible. 29.3 2377.1	
30	SS	78	5-5-4 (9)	2.60	Saprolite.	SM			SAND - light brown to white, damp to moist, loose, silty sand, SM, micaceous, weak foliation. 30.7 2375.7	
	SS	94	5-9-8 (17)	10.03	Saprolite.	SW-SM			SAND - light ot dark brown, damp to moist, loose, well-graded silty sand, SW-SM, fine to coarse sand, highly micaceous, low angle foliation.	
	SS	83	7-8-8 (16)	2.82	Saprolite.					
	SS	89	3-2-4 (6)	2.13	Saprolite.		▽		34.5 2371.9	
35										

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GEN BH/TP/NO WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

BORING NUMBER VBW-3

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 704037.17926, 979494.25141
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
35	SS	100	4-7-10 (17)	2.29	Saprolite.	SW-SM			SAND - brown to white, moist to wet, loose to very dense, well-graded silty sand, SW-SM, fine to coarse sand, micaceous, low angle foliation. *(continued)*	
	SS	78	4-9-11 (20)	2.39	Saprolite.					
	SS	67	5-50-50 (100)	2.62	PWR.				39.0 / 2367.4	
40	RC Run 1	92 (86)		3.12	Hollow stem auger refusal at 39 ft-bgs. Top of competent rock at 39 ft-bgs.				COMPETENT BEDROCK - predominantly felsic rock, medium grained, intact with thin, non-foliated zones of biotite, no staining below top two factures. 2 mechanical breaks and 8 low angle fractures.	
									44.0 / 2362.4	
45	RC Run 2	100 (94)		3.61					COMPETENT BEDROCK - similar to previous core run, thin garnet rich zone from 47.2-47.9 ft-bgs, no staining present, 2 high angle fractures show a greenish mineral coating, one with slickensides. 8 fractures - 2 high angle, 6 low angle.	
									49.3 / 2357.1	

Boring terminated at 49.3 feet.

BORING NUMBER VBW-4A

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING ,
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 11/16/13 **COMPLETED** 11/16/13
GROUND ELEVATION **HOLE SIZE** 6.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING ---
LOGGED BY Michael Gragg **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY %	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
0										
	SS	83	5-8-10 (18)	1.28	Hollow stem auger refusal at 3.5 feet below ground surface (ft-bgs).	GP			0.5 GRAVEL - road gravel.	
						ML			SILT - red-brown to light brown, damp, firm, clayey silt, ML, no structure.	
	SS	61	12-23-50 (73)	1.49		GW			2.8 GRAVEL - broken rock, quartz and biotite-garnet schist. 3.5	
									Boring abandoned. VBW-4B offset 5 feet to the south. Boring terminated at 3.5 feet.	

BORING NUMBER VBW-4B

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703892.54244, 979554.93088
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 10/16/13 **COMPLETED** 10/17/13
GROUND ELEVATION 2395.01 ft **HOLE SIZE** 6.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING 37.0 ft / Elev 2358.0 ft
LOGGED BY Michael Gragg **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
0					Offset 5 feet south of original location.				SAND - red-brown, damp, medium dense to dense, well-graded silty sand, SW-SM, some fine sand and quartz and biotite-garnet schist rock fragments.	
	SS	83	14-41-27 (68)	0.92		SW-SM				
5									6.0 — 2389.0	
						SM			SAND - light brown, damp, loose, sitly sand, SM, fine sand, micaceous. 7.8 — 2387.3	
	SS	56	6-5-9 (14)	1.6					SAND - light to dark brown, damp to wet, loose to medium dense, silty sand, SM, highly micaceous, foliation increasingly visible with depth.	
10									Friable rock fragments from 27.5-29 feet below ground surface (ft-bgs).	
									Oxidized garnets present from 37.5-39 ft-bgs.	
	SS	56	4-4-5 (9)	1.85	Saprolite					
15										
	SS	0	4-4-6 (10)		No sample.					
20						SM				
	SS	72	6-7-9 (16)	2.11	Saprolite					
25										
	SS	67	3-8-8 (16)	2.14	Saprolite					
30										
	SS	0	6-10-11 (21)		No sample.					
35										

GEN BH/TP/NO WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

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CLIENT Chemtronics, Inc. **PROJECT NAME (NUMBER)** Geotech Investigation for VBW (2115.231)

NORTHING, EASTING 703892.54244, 979554.93088 **PROJECT LOCATION** 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.
35									SAND - light to dark brown, damp to wet, loose to medium dense, silty sand, SM, highly micaceous, foliation increasingly visible with depth.
					Wet cuttings.				
	SS	78	5-6-9 (15)	2.26	Saprolite				Friable rock fragments from 27.5-29 feet below ground surface (ft-bgs).
40						SM			Oxidized garnets present from 37.5-39 ft-bgs. *(continued)*
	SS	28	7-8-12 (20)	2.3	Saprolite				
45									
								46.0	2349.0
									SAND - white to dark brown, damp to moist, loose to very dense, well-graded silty sand, SW-SM, fine to coarse sand, quartz rock fragments in felsic zones, highly micaceous in mafic zones, foliation visible.
	SS	83	5-7-9 (16)	2.39	Saprolite				Felsic content generally increasing with depth.
50									
					Iron-oxide staining present.				
	SS	83	8-10-14 (24)	2.54	Saprolite				
55						SW-SM			
	SS	78	4-6-12 (18)	2.56	Saprolite				
60									
	SS	0	50-50-50 (100)		No sample. Hollow stem auger refusal at 64.5 ft-bgs. Top of competent rock at 78.3 ft-bgs.				
								64.5	2330.5
65	RC Run 1	16 (0)		0.95					BEDROCK - alternating bands of fine grained felsic and biotite-rich rock, garnets fairly abundant in core and oxidized on fracture surfaces, iron-oxide staining present, high angle foliation.
								68.3	2 fractures - 1 high angle and 1 low angle cross foliation. 2326.7
70	RC Run 2	40 (20)		1.97					BEDROCK -similar to previous core run, increase in grain size and biotite content with depth. 8 low angle fractures.
								73.3	2321.7
75									

SPT N VALUE ●
RQD (%) ○
20 40 60 80

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BORING NUMBER VBW-4B

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703892.54244, 979554.93088
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ 20 40 60 80
75	RC Run 3	92 (52)		2.34					BEDROCK - similar to previous core runs, two felsic zones, 5 and 9 inches thick, with iron-oxide staining, heavily fractured, some dissolution features present. 13 fractures - 3 high angle parellel to foliation, 10 low angle cross foliation. 1 mechanical break. *(continued)*	
									78.3 — 2316.7	
80	RC Run 4	98 (86)		2.32					COMPETENT BEDROCK - similar to previous core runs, minor chlorite present, no staining visible. 4 low angle fractures. 1 mechanical break.	
									83.3 — 2311.7	
85	RC Run 5	100 (82)		2.24					COMPETENT BEDROCK - similar to previous core run. 7 fractures - 1 high angle parellel to foliation, 6 low angle cross foliation. 1 mechanical break.	
									88.3 — 2306.7	
									Boring terminated at 88.3 feet.	

BORING NUMBER VBW-5

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703773.19094, 979621.62677
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 10/22/13 **COMPLETED** 10/22/13
GROUND ELEVATION 2389.54 ft **HOLE SIZE** 6.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING 25.6 ft / Elev 2363.9 ft
LOGGED BY Michael Gragg **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION (Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.)	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
0	SS	83	6-9-7 (16)	1.66		GP			0.5 GRAVEL - road materials, poorly-graded gravel. 2389.0	
						ML			SILT - brown, damp, firm to stiff, silty clay to clayey silt, ML, roots and rock fragments present, no structure. 3.0 2386.5	
5	SS	67	18-4-10 (14)	2.22		SM			SAND - brown, damp, medium dense, silty sand, SM, fine sand, slightly micaceous, slight layering visible, rock fragments in upper zone. 7.0 2382.5	
10	SS	100	6-7-5 (12)	3.79		SP			SAND - black, damp, loose, poorly-graded sand, SP, fine sand with minor silt, micaceous, some layering present.	
15	SS	0	10-6-5 (11)		No sample.				17.0 2372.5	
20	SS	83	2-2-2 (4)	23.04	Saprolite.	SM			SAND - white to light brown, moist, loose, silty sand, SM, fine sand, micaceous, layering present.	
25	SS	0	0-2-1 (3)	3.01	Saprolite.		▽		26.0 2363.5	
30	SS	72	4-3-5 (8)	2.93	Saprolite.	SM			SAND - brown to red-brown, moist to wet, loose, silty sand, SM, fine to medium sand, highly micaceous, high angle foliation, oxidized garnets present, 3-inch thick felsic zone at 29 feet below ground surface (ft-bgs).	
35	SS	100	2-2-5	2.91	Saprolite.	SM			32.0 2357.5 SAND - white to light brown, moist, loose, silty sand, SM, fine sand, micaceous, non-foliated.	

GEN BH/TP/NO WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

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BORING NUMBER VBW-5

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703773.19094, 979621.62677
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○
35			(7)						35.3 — 2354.2 SAND - dark brown to red-brown, moist, loose, silty sand, SM, fine to medium sand, highly micaceous, high angle foliation.	
						SM			37.0 — 2352.5 SAND - white to dark brown, damp to moist, loose to medium dense, silty sand, SM, fine to medium sand, highly micaceous, horizontal to high angle foliation, felsic zones non-foliated.	
40	SS	72	4-32-50 (82)	2.81	Saprolite. Wet cuttings.					
45	SS	83	7-13-21 (34)	2.86	Saprolite and PWR. Driller noted odor. FID 2.52 ppm in breathing zone.	SM				
50	SS	100	4-5-10 (15)	3.83	Saprolite, slight odor.					
55	SS	89	4-7-9 (16)	3.78	Saprolite.					
									57.0 — 2332.5 SAND - light brown to orange-brown, damp, loose to medium dense, silty sand, SM, fine sand, highly micaceous, high angle foliation, quartz gravel present at 60.5 ft-bgs.	
60	SS	78	5-11-15 (26)	4.27	Saprolite. Wet cuttings.	SM				
									62.0 — 2327.5 SILT - light to dark brown, damp to moist, firm to stiff, sandy silt, MLS, non-foliated, oxidized garnets present, felsic zone near 65.5 ft-bgs containing quartz gravel.	
65	SS	78	6-8-11 (19)	3.60	Saprolite and PWR.	ML				
									67.0 — 2322.5 SAND - white to brown, damp to moist, loose, well-graded sand, SW, fine to coarse sand with some quartz gravel present, high angle foliation.	
						SW			69.6 — 2319.9 SAND - light to dark brown to red-brown, damp to moist, loose to medium dense, silty sand, SM, fine to medium sand, micaceous, low angle foliation.	
70	SS	89	6-7-10 (17)	7.43	Saprolite and PWR, odor.					
				8.83	Saprolite and PWR, slight odor.	SM				
75	SS	78	10-12-18							

GEN BH/TP/NO WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

(Continued Next Page)

BORING NUMBER VBW-5

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703773.19094, 979621.62677
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ 20 40 60 80
75			(30)		Hollow stem auger refusal at 78 ft-bgs. Top of competent rock at 79.1 ft-bgs.	SM			SAND - light to dark brown to red-brown, damp to moist, loose to medium dense, silty sand, SM, fine to medium sand, micaceous, low angle foliation. *(continued)*	
	RC Run 1	91 (64)		2.45					78.0 2311.5 BEDROCK - biotite-garnet schist, very minor felsic mineral content, high angle foliation slightly visible, oxide staining on lower fracture and at base of core. 2 fractures - 1 high angle parellel to foliation, 1 low angle cross foliation.	
80									79.1 2310.4	
85	RC Run 2	86 (79)		1.83					COMPETENT BEDROCK - alternating bands of biotite-garnet schist and felsic rock, zones typically 2-inches thick, dipping at medium to high angle, heavy staining present to 86.1 ft-bgs, particularly in heavily weathered fracture, minor pyrite noted on several of the deeper fractures. 8 fractures - 1 high angle parellel to foliation, 1 high angle and 6 low angle cross foliation.	
									89.0 2300.5 Boring terminated at 89.0 feet.	

BORING NUMBER VBW-6

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703670.32541, 979719.96234
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 10/24/13 **COMPLETED** 10/25/13
GROUND ELEVATION 2379.7 ft **HOLE SIZE** 6.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING 26.4 ft / Elev 2353.3 ft
LOGGED BY Michael Gragg **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
0						GP			0.5 GRAVEL - road materials, poorly-graded gravel. 2379.2	
									SAND - brown to red-brown, damp, medium dense to dense, silty sand, SM, gravel and rock fragments present.	
5	SS	83	20-46-31 (77)	2.66		SM				
									7.0 2372.7	
									SAND - light brown to red-brown, damp, loose, silty sand, SM, fine to medium sand, some layering visible.	
10	SS	78	6-5-5 (10)	2.81						
						SM				
15	SS	0	7-8-8 (16)		No sample.					
									17.0 2362.7	
									SAND - light to dark brown, damp to moist, loose, silty sand, SM, fine to medium sand, highly micaceous, high angle foliation increasingly visible with depth, oxidized garnets present from 28.5-38.7 feet below ground surface (ft-bgs).	
20	SS	78	4-3-4 (7)	2.77	Saprolite, odor present.					
25	SS	78	3-3-3 (6)	2.79	Saprolite.					
						SM	▽			
30	SS	100	3-3-5 (8)	2.87	Saprolite, 2.91 ppm in breathing zone.					
35	SS	94	4-2-5 (7)	2.90	Saprolite.					

GEN BH/TP/NO WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

(Continued Next Page)

CLIENT Chemtronics, Inc. **PROJECT NAME (NUMBER)** Geotech Investigation for VBW (2115.231)

NORTHING, EASTING 703670.32541, 979719.96234 **PROJECT LOCATION** 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
35						SM			SAND - light to dark brown, damp to moist, loose, silty sand, SM, fine to medium sand, highly micaceous, high angle foliation increasingly visible with depth, oxidized garnets present from 28.5-38.7 feet below ground surface (ft-bgs). *(continued)*	
								38.7	2341.0	
40	SS	39	4-4-5 (9)	2.87	Saprolite.	SW-SM			SAND - white to light brown, moist to wet, loose to dense, well-graded silty sand, SW-SM, fine to coarse sand, high angle foliation, fragments of biotite-garnet schist at 45 ft-bgs.	
45	SS	33	17-22-39 (61)	12.13	Saprolite, strong odor. Exterior of SS initially read 167 ppm.					
								47.0	2332.7	
50	SS	61	9-9-10 (19)	3.75	Saprolite, strong odor.	SW			SAND - light to dark brown to grey, damp to moist, loose, well-graded sand, SW, fine to coarse sand with minor silt, highly micaceous, roughly horizontal foliation, weathered rock fabric present.	
								52.0	2327.7	
55	SS	44	8-11-28 (39)	3.42	Saprolite, strong odor.	SW-SM			SAND - light to dark brown, damp to moist, loose to very dense, well-graded silty sand, SW-SM, fine to coarse sand, highly micaceous, oxidized garnets and weathered rock fabric present, low to high angle foliation. Transition to PWR at approximately 64 ft-bgs.	
60	SS	6	22-22-26 (48)	3.48	Saprolite, 3.52 ppm in breathing zone.					
65	SS	78	12-21-50 (71)	3.38	PWR, odor present.					
70	SS	50	16-50-50 (100)	3.71	FID 5.62 ppm in breathing zone. PWR.					
75	SS	28	38-50-50 (100)	4.24	PWR.					

(Continued Next Page)

BORING NUMBER VBW-6

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703670.32541, 979719.96234
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ 20 40 60 80
75										
					Hollow stem auger refusal at 77.5 ft-bgs. Top of competent rock at 77.5 ft-bgs.	SW-SM			77.5 2302.2	
	RC Run 1	100 (70)		2.82					78.5 2301.2 COMPETENT BEDROCK - banded biotite-garnet schist and felsic rock, medium grain, high angle foliation, staining present only in top 1 inch of core, no staining on fractures. 3 low angle fractures.	
80									COMPETENT BEDROCK - garnetiferous gneiss, similar to previous core run, no staining observed. 19 fractures - 6 high angle parellel to foliation, 13 low angle cross foliation.	
	RC Run 2	100 (80)		2.99						
85										
									88.7 2291.0	

Boring terminated at 88.7 feet.

BORING NUMBER VBW-7

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703555.57151, 979825.25115
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 10/8/13 **COMPLETED** 10/10/13
GROUND ELEVATION 2373.22 ft **HOLE SIZE** 6.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING 56.7 ft / Elev 2316.5 ft
LOGGED BY Michael Gragg **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

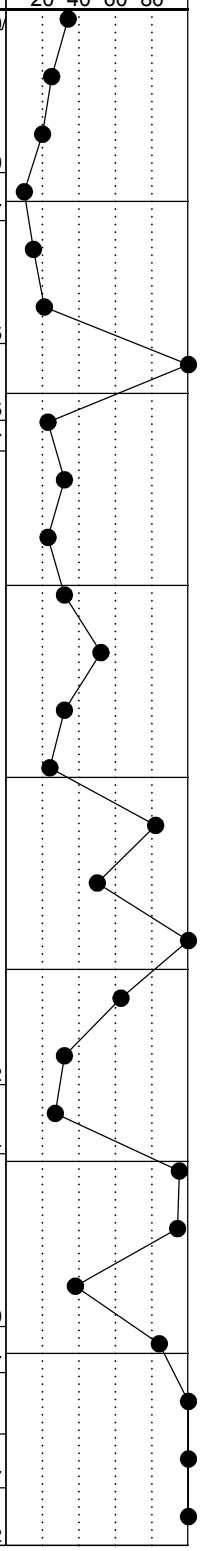
DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
0	SS	94	5-5-5 (10)	2.19		ML			SILT - brown to dark brown to red-brown, damp, soft, sandy silt, MLS, organic material and rock fragments present. 1.5 / 2371.7	
	SS	72	2-5-8 (13)	2.31		ML			SILT - red, damp, soft, clayey silt, ML, no structure, possibly fill material. 3.0 / 2370.2	
	SS	72	9-10-11 (21)	2.34		ML			SILT - red, damp, firm, sandy silt, MLS, no structure. 4.5 / 2368.7	
5	SS	89	12-11-13 (24)	2.51		SM			SAND - red to brown, damp, loose to medium dense, silty sand, SM, micaceous, layering increasingly visible with depth.	
	SS	89	10-11-10 (21)	2.57						
	SS	78	10-10-11 (21)	2.61						
10	SS	0	4-10-11 (21)		No sample.					
	SS	67	12-11-13 (24)	2.78						
	SS	78	12-13-12 (25)	2.69					13.5 / 2359.7	
15	SS	72	6-6-8 (14)	2.97		SM			SAND - light brown to red-brown, damp to moist, loose to medium dense, silty sand, SM, fine sand with minor medium sand, micaceous to highly micaceous, high angle foliation becoming clear at 24 feet below ground surface (ft-bgs).	
	SS	89	7-9-10 (19)	2.73						
	SS	83	12-15-15 (30)	2.81						
	SS	78	5-8-9 (17)	2.82						
20	SS	89	9-9-10 (19)	2.97						
	SS	94	9-10-10 (20)	3.16						
	SS	89	3-6-7 (13)	3.13						
25	SS	94	4-5-7 (12)	3.12	Saprolite.					
	SS	100	7-7-10 (17)	3.02	Saprolite.					
	SS	94	9-8-9 (17)	3.09	Saprolite.				28.5 / 2344.7	
30	SS	100	7-11-13 (24)	3.12	Saprolite.	SM			SAND - light brown to red-brown, damp to moist, loose to medium dense, silty sand, SM, highly micaceous, foliation visible.	
	SS	89	15-20-25 (45)	3.23	Saprolite.					
	SS	83	21-21-14 (35)	3.32	Saprolite.					
	SS	100	5-6-11 (17)	3.27	Saprolite.				34.5 / 2338.7	
35						SM				

(Continued Next Page)

CLIENT Chemtronics, Inc. **PROJECT NAME (NUMBER)** Geotech Investigation for VBW (2115.231)

NORTHING, EASTING 703555.57151, 979825.25115 **PROJECT LOCATION** 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION (Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.)	SPT N VALUE ● RQD (%) ○
35	SS	100	6-11-23 (34)	3.20	Saprolite.	SM			35.2 SAND - light brown to white, moist, loose to medium dense, silty sand, SM, fine to medium sand. *(continued)* 2338.0	
	SS	100	14-13-12 (25)	3.22	Saprolite.				SAND - brown to dark brown, damp to moist, loose to medium dense, silty sand, SM, fine to medium sand, highly micaceous.	
	SS	94	5-9-11 (20)	3.24	Saprolite.				39.3 2334.0	
40	SS	100	3-4-6 (10)	3.31	Saprolite.	SW-SM			40.5 SAND - white to light brown, moist to wet, loose, well-graded silty sand, SW-SM, fine to coarse sand, quartz gravel and micas present. 2332.7	
	SS	78	4-6-9 (15)	3.47	Saprolite.	SM			SAND - light to dark brown, moist, loose to medium dense, silty sand, SM, fine sand, highly micaceous, roughly horizontal foliation.	
	SS	50	6-9-12 (21)	3.40	Saprolite.				43.7 2329.5	
45	SS	56	11-50-50 (100)	1.07	Saprolite.	SM			SAND - light brown to red-brown, moist, loose to very dense, silty sand, SM, fine sand, highly micaceous.	
	SS	94	8-15-8 (23)	1.20	Saprolite.	SP			45.7 2327.5	
	SS	61	8-12-20 (32)	1.45	Saprolite.	SM			46.5 SAND - white to light and dark brown, moist, loose to medium dense, poorly-graded sand, SP, fine to medium sand, minor silt, micaceous. 2326.7	
	SS	78	8-7-16 (23)	1.40	Saprolite.				SAND - light brown to red-brown, damp to moist, loose to very dense, silty sand, SM, fine sand, highly micaceous, low to moderate angle foliation.	
50	SS	78	10-15-17 (32)	1.53	Saprolite.					
	SS	56	18-21-31 (52)	1.58	Saprolite.					
	SS	56	11-12-20 (32)	1.60	Saprolite.					
55	SS	72	9-9-15 (24)	1.57	Saprolite, sweet-plastic smell.					
	SS	28	22-37-45 (82)	1.77	Saprolite, driller noted sweet smell.					
	SS	72	13-18-32 (50)	7.40	Saprolite, odor present.					
60	SS	50	23-50-50 (100)	2.57	Saprolite, odor present.					
	SS	78	44-34-29 (63)	8.32	Saprolite, odor present.					
	SS	78	17-17-15 (32)	5.65	Saprolite, odor present.				63.0 2310.2	
	SS	78	11-13-14 (27)	7.37	Saprolite, odor present.	SM			SAND - light to dark brown, damp, medium dense, silty sand, SM, fine sand, highly micaceous, horizontal foliation.	
65	SS	56	17-45-50 (95)	9.42	PWR. PWR.				64.8 2308.4	
	SS	67	32-44-50 (94)	4.84	PWR, odor present.	SW			SAND - white to orange to dark brown, damp, medium to very dense, well-graded sand, SW, fine to medium sand with minor silt and coarse sand, micaceous, thin bands of iron-oxide staining in upper zone.	
	SS	61	15-18-20 (38)	3.80	Saprolite, odor present.				69.3 2303.9	
70	SS	61	8-34-50 (84)	13.72	PWR, odor present.	SM			70.5 SAND - light to dark brown, damp, medium to very dense, silty sand, SM, fine sand, highly micaceous, low angle foliation, quartz gravel at base. 2302.7	
	SS	17	50-50-50 (100)	2.54	PWR, odor present.				72.1 PWR - black, friable, weathered biotite schist followed by well-graded quartz gravel, GWS, fine to medium sand present. 2301.1	
	SS	22	50-50-50 (100)	7.78	PWR, odor present.	SM			73.5 SAND - brown to dark brown, damp to moist, very dense, silty sand, SM, fine sand, highly micaceous, horizontal foliation. 2299.7	
75	SS	17	50-50-50 (100)	7.52	PWR, odor present.	SP			75.0 2298.2	



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BORING NUMBER VBW-7

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703555.57151, 979825.25115
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.		SPT N VALUE ● RQD (%) ○ 20 40 60 80
75	RC Run 1A	32 (0)		3.06	Hollow stem auger refusal at 75 ft-bgs. Top of competent rock at 80 ft-bgs.				SAND - brown to dark brown, damp to moist, very dense, poorly-graded sand, SP, fine sand with minor silt and medium sand, highly micaceous, horizontal foliation. Note: a SS sample was advanced from 75-75.25 ft-bgs, 3 inches past auger refusal, with blow counts of 50/3. Materials were similar to those described above.	77.8 / 2295.4	
80	RC Run 1B	77 (36)		2.07					BEDROCK - 2 inches of broken, weakly banded, biotite-rich rock and felsic rock followed by 2 inches intact, weakly banded biotite-rich and felsic rock followed by 1 inch quartz vein, then light brown felsic rock with high angle foliation, then highly weathered friable fragments of biotite-rich rock. Iron-oxide staining present throughout. 3 fractures - 2 high angle parellel to foliation, 1 low angle cross foliation.	80.0 / 2293.2	
85	RC Run 2	100 (70)		2.18	Odor present.				BEDROCK - 9 inches of non-foliated, medium grained, quartz-feldspar-rich felsic rock, followed by fine grained, weakly foliated, biotite-schist, all non-friable and intact. 7 low angle fractures.	84.6 / 2288.6	
	RC Run 3	98 (84)		2.43	Slight odor present.				COMPETENT BEDROCK - 1.7 feet of thinly banded biotite schist, minor garnets, non-friable, followed by 1-inch thick quartz vein followed by contorted and folded, fine to medium grained, felsic-rich and biotite-rich zones with boudinage present in the felsic zones, very minor iron-oxide staining visible on fractures. 12 fractures - 6 high angle parellel to foliation, 2 high angle and 4 low angle cross foliation.	89.6 / 2283.6	
									COMPETENT BEDROCK - similar to lower zone of previous core run, oxide staining present on fractures in upper zone of core. 7 fractures - 4 moderate to high angle parellel to foliation, 2 moderate to high angle and 1 low angle cross foliation.		

Boring terminated at 89.6 feet.

BORING NUMBER VBW-8

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703502.73133, 979705.98692
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 10/28/13 **COMPLETED** 10/30/13
GROUND ELEVATION 2362.4 ft **HOLE SIZE** 6.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING 33.3 ft / Elev 2329.1 ft
LOGGED BY Michael Gragg **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
0									CLAY - brown to red-brown, damp to moist, soft to firm, clayey silt to silty clay, CL-ML, micas and organic material (roots) present, fine sand and quartz gravel present in lower zone.	
5	SS	78	4-6-11 (17)	1.57		CL-ML				
									7.0 — 2355.4	
									SAND - light brown to black, damp, loose, silty sand, SM, highly micaceous, some layering visible, quartz rock fragments at 9 feet below ground surface (ft-bgs).	
10	SS	61	5-3-3 (6)	1.49		SM				
15	SS	0	5-6-7 (13)		No sample.				15.0 — 2347.4	
									SAND - light grey to dark brown, damp, loose, silty sand, SM, fine to medium sand, highly micaceous, low angle foliation.	
20	SS	83	4-3-3 (6)	17.21	Saprolite, strong odor.					
25	SS	0	3-4-4 (8)		No sample.	SM				
30	SS	61	3-3-3 (6)	11.17	Wet cuttings. FID 4.47 ppm in breathing zone, strong odor. Saprolite.					
					Wet cuttings. FID 117 ppm in breathing zone, strong odor. Saprolite.				32.0 — 2330.4	
						SW-SM	▽		SAND - brown to red-brown, damp to moist, loose to medium dense, well-graded silty sand, SW-SM, fine to coarse sand, highly micaceous, high angle foliation.	
35	SS	56	5-8-13	10.22						

GEN BH/TP/NO WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

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CLIENT Chemtronics, Inc. **PROJECT NAME (NUMBER)** Geotech Investigation for VBW (2115.231)

NORTHING, EASTING 703502.73133, 979705.98692 **PROJECT LOCATION** 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
35			(21)						SAND - brown to red-brown, damp to moist, loose to medium dense, well-graded silty sand, SW-SM, fine to coarse sand, highly micaceous, high angle foliation. *(continued)*	
40	SS	72	10-14-23 (37)	4.08	Saprolite.	SW-SM				
									42.0 — 2320.4	
									SAND - light grey to dark brown, damp, loose to medium dense, well-grade silty sand, SW-SM, fine to coarse sand, highly micaceous, high angle foliation, PWR fragments present.	
45	SS	67	7-11-19 (30)	22.95	Saprolite, strong odor.	SW-SM				
									47.0 — 2315.4	
									PWR - grey to dark brown, extremely friable rock, high angle foliation, predominantly micaceous with thin felsic zone at 50.5 ft-bgs, oxidized garnets present below 54 ft-bgs.	
50	SS	78	36-39-50 (89)	21.96	PWR, strong odor.					
					Wet cuttings.					
55	SS	50	41-50-50 (100)	11.33	PWR, strong odor.					
									57.0 — 2305.4	
									PWR - light grey to dark brown, damp, loose to medium dense, silty sand and PWR, fine to coarse sand, highly micaceous, high angle foliation, oxidized garnets from 64-65.5 ft-bgs.	
60	SS	72	7-12-32 (44)	16.97	Saprolite, strong odor.					
65	SS	67	7-12-50 (62)	16.16	PWR, strong odor.					
70	SS	33	50-50-50 (100)	17.81	PWR, strong odor.					
75	SS	22	50-50-50	9.38	PWR.					

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BORING NUMBER VBW-8

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703502.73133, 979705.98692
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ 20 40 60 80
75			(100)						PWR - light grey to dark brown, damp, loose to medium dense, silty sand and PWR, fine to coarse sand, highly micaceous, high angle foliation, oxidized garnets from 64-65.5 ft-bgs. *(continued)*	
80	SS	17	50-50-50 (100)	7.45	PWR.				80.5 2281.9	
85	RC Run 1	100 (63)		2.76	Hollow stem auger refusal at 80.5 ft-bgs. Top of competent rock at 85.1 ft-bgs.				BEDROCK - biotite-garnet schist with thin felsic zones, medium to high angle foliation, manganese-oxide staining on many fractures with occasional pyrite, chlorite present in felsic high angle fracture zone. 15 fractures - 1 sub-vertical parallel to felsic-mafic contact, 4 high angle and 10 low angle cross foliation. 85.1 2277.3	
90	RC Run 2	91 (75)		2.81					COMPETENT BEDROCK - similar to previous core run, pyrite coating most fractures, manganese-oxide staining less frequently coating fractures, minor chlorite in felsic zone at top of core run. 12 fractures - 1 vertical, 7 high angle (parallel to foliation), 4 low angle. 89.5 2272.9	
95	RC Run 3	86 (64)		2.47					COMPETENT BEDROCK - similar to previous core run, no manganese-oxide staining present, pyrite visible on 2 fractures, no chlorite present. 12 fractures - 4 high angle (3 parallel to foliation), 8 low angle. 94.5 2267.9	
100	RC Run 4	96 (76)		3.05					COMPETENT BEDROCK - similar to previous core run, minor chlorite, no manganese-oxide staining present, very minor pyrite on some fractures. 24 fractures - 13 high angle (typically parallel to foliation), 11 low angle. 104.5 2257.9	
									Boring terminated at 104.5 feet.	

BORING NUMBER VBW-9

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703439.71704, 979570.56985
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 11/4/13 **COMPLETED** 11/6/13
GROUND ELEVATION 2361.9 ft **HOLE SIZE** 6.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING 7.2 ft / Elev 2354.7 ft
LOGGED BY Michael Gragg **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
0					Background FID 1.5-3 ppm.	ML			SILT - brown, damp, firm, clayey silt, ML, quartz gravel (0.5-inch diameter) present below 5 feet below ground surface (ft-bgs).	
5	SS	100	6-5-7 (12)	4.70	Strong odor.					
					FID 11.59 ppm at borehole.		▽		7.0 — 2354.9 SAND - light brown, damp to moist, loose, silty sand, SM, micaceous, completely oxidized garnets present, quartz gravel present in 7 to 9 ft-bgs interval, increased mica content and visibility of low angle foliation with depth.	
10	SS	72	4-3-5 (8)	6.58	Strong odor.					
15	SS	94	4-4-7 (11)	9.49	Saprolite, strong odor.	SM				
20	SS	0	4-5-5 (10)		Only slough in split spoon. No sample taken.				22.0 — 2339.9 SAND - grey to dark brown, damp to moist, loose to medium dense, well-graded silty sand, SW-SM, fine to coarse sand, highly micaceous, minor oxidized garnets, high angle foliation.	
25	SS	83	3-5-7 (12)	10.67	Saprolite, strong odor.	SW-SM				
30	SS	61	4-7-11 (18)	10.64	Saprolite, strong odor.					
35	SS	61	3-3-7	2.99	Saprolite.					

GEN BH/TP/NO WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

(Continued Next Page)

CLIENT Chemtronics, Inc. **PROJECT NAME (NUMBER)** Geotech Investigation for VBW (2115.231)

NORTHING, EASTING 703439.71704, 979570.56985 **PROJECT LOCATION** 180 Old Bee Tree, Swannanoa, NC

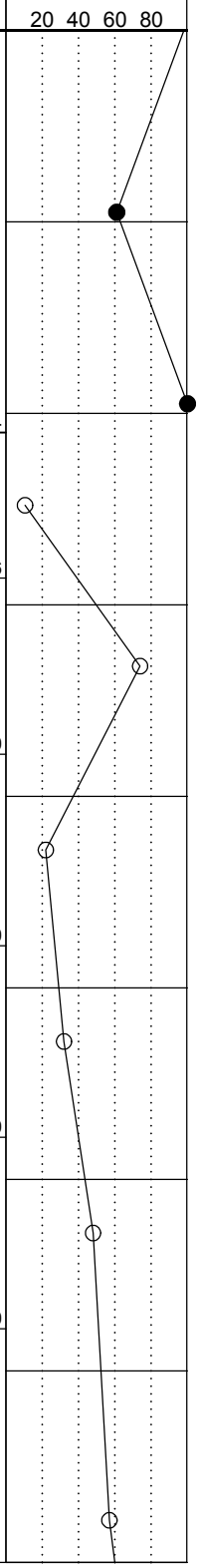
DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○
35			(10)		Quartz gravel present.	SW-SM			SAND - grey to dark brown, damp to moist, loose to medium dense, well-graded silty sand, SW-SM, fine to coarse sand, highly micaceous, minor oxidized garnets, high angle foliation. *(continued)*	20 40 60 80
40	SS	56	5-8-13 (21)	3.52	Saprolite.					
					Wet cuttings.					
						SM		42.0	SAND - brown, damp to moist, loose to medium dense, silty sand, SM, fine sand, highly micaceous, oxidized garnets present, high angle foliation. 2319.9	
45	SS	72	6-10-17 (27)	3.22	Saprolite.	SW		44.4	SAND - light grey to light brown, damp to moist, loose to medium dense, well-graded sand, SW, fine to coarse quartz sand, coarse grained muscovite present, non-foliated. 2317.5	
50	SS	67	10-13-18 (31)	5.77	Saprolite.	SW-SM		47.0	SAND - grey to dark brown, damp to moist, loose to medium dense, well-graded silty sand, SW-SM, fine to coarse sand, highly micaceous, garnets present (less oxidation), high angle foliation. 2314.9	
55	SS	72	8-8-11 (19)	11.93	Saprolite.					
60	SS	78	10-10-12 (22)	13.94	Saprolite.					
65	SS	50	7-10-20 (30)	9.04	Saprolite, slight odor.	SW-SM		62.0	SAND - light grey to dark brown, damp to moist, loose to dense, well-graded silty sand, SW-SM, fine to coarse sand, highly micaceous, high angle foliation, oxidized garnets present in the 64 to 65.5 ft-bgs interval. 2299.9	
70	SS	61	12-22-37 (59)	3.29	Saprolite.					
75	SS	11	50-50-50			SW-SM		72.0	SAND - biotite-garnet schist, readily breaks down into grey to brown, damp, medium dense to very dense, well-graded silty sand, SW-SM, fine to coarse sand, oxidized garnets present, high angle foliation. 2289.9	

(Continued Next Page)

CLIENT Chemtronics, Inc. **PROJECT NAME (NUMBER)** Geotech Investigation for VBW (2115.231)

NORTHING, EASTING 703439.71704, 979570.56985 **PROJECT LOCATION** 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.
75			(100)	2.96	PWR.				SAND - biotite-garnet schist, readily breaks down into grey to brown, damp, medium dense to very dense, well-graded silty sand, SW-SM, fine to coarse sand, oxidized garnets present, high angle foliation. *(continued)*
80	SS	67	20-31-30 (61)	3.44	PWR.	SW-SM			
85	SS	11	50-50-50 (100)	2.14	PWR.				85.5 — 2276.4
	RC Run 1	61 (11)		1.70	Hollow stem auger refusal at 85.5 ft-bgs. Top of competent rock at 118.9 ft-bgs.				BEDROCK - off-white to dark grey, quartz, feldspar dominant with non-foliated strings of biotite, fine to medium grained, iron-oxide staining present throughout. Thin zone of biotite-garnet schist present at 86.7 ft-bgs. 89.3 — 2272.6 13 low angle fractures.
90	RC Run 2	100 (74)		1.88					BEDROCK - alternating bands of biotite-garnet schist and quartz-feldspar rich felsic rock, fine to medium grained, iron-oxide staining present in central and bottom portions of core run. 11 fractures - 4 high angle parellel to foliation, 7 low angle cross foliation. 93.9 — 2268.0 1 mechanical break.
95	RC Run 3	42 (22)		1.54					BEDROCK - Similar to previous core run, predominantly biotite-garnet schist, staining present in top portion and on fracture surface at base. 6 fractures - 2 high angle parellel to foliation, 4 low angle cross foliation. 98.9 — 2263.0
100	RC Run 4	66 (32)		2.74					BEDROCK - Similar to previous 2 core runs with an increase in garnet content, iron-oxide staining present throughout, some portions show intense weathering. 11 fractures - 7 high angle parellel to foliation, 4 low angle cross foliation. 103.9 — 2258.0
105	RC Run 5	78 (48)		2.44					BEDROCK - Similar to previous core runs with iron-oxide staining to approximately 107 ft-bgs. 13 fractures - 8 high angle parellel to foliation, 5 low angle cross foliation. 108.9 — 2253.0
110	RC Run 6	85 (57)							BEDROCK - alternating bands of biotite-garnet schist and quarts-feldspar rich felsic rock, medium grained, pyrite and possibly epidote present on fractures near base. 23 fractures - 8 high angle parallel to foliation, 2 high angle and 13 low angle cross foliation. 3 mechanical breaks.
115									



GEN BH/TP/NO WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

(Continued Next Page)

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703439.71704, 979570.56985
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ 20 40 60 80
115				3.34					118.9 2243.0	
120	RC Run 7	97 (84)		3.26					COMPETENT BEDROCK - Similar to previous core run, pyrite and/or possibly epidote present on most fractures, a zone of partially melted biotite-garnet schist is present at approximately 125 ft-bgs. 4 fractures - 13 high angle parellel to foliation, 1 low angle cross foliation. 3 mechanical breaks.	
125									129.1 2232.8	
									Boring terminated at 129.1 feet.	

WELL NUMBER VBW-10

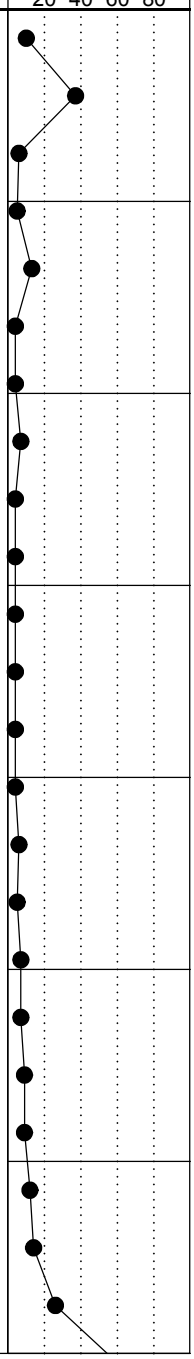
ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703380.60667, 979452.26884
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 9/18/13 **COMPLETED** 9/20/13
GROUND ELEVATION 2366.59 ft **HOLE SIZE** 9.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING 13.6 ft / Elev 2353.0 ft
LOGGED BY Gragg & Pippin **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES Boring converted to monitoring well MW254-L25CD.
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	MATERIAL DESCRIPTION (Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.)
0	SS	67	4-4-6 (10)		PID 0.0 ppm.	ML		SILT - reddish brown, firm to stiff, clayey silt, ML, organic material (grass) present in top 2 inches.
	SS		10-24-13 (37)		PID 0.0 ppm.			3.0 / 2363.6
	SS	67	1-2-4 (6)	2.32		ML		SILT - reddish brown, firm to stiff, damp to moist, sandy silt, MLS, minor clay, mica content increasing with depth, layering visible at 7.5 feet below ground surface (ft-bgs).
5	SS	67	2-2-3 (5)	2.91				
	SS	33	9-9-4 (13)	2.20	Saprolite.			
	SS		2-2-2 (4)	2.37	Saprolite.			
10	SS		1-2-2 (4)	2.15	Saprolite.			
	SS		2-3-4 (7)	2.45	Saprolite.			
	SS	78	2-2-2 (4)	2.27	Saprolite.		▽	
15	SS	44	2-2-2 (4)	2.17	Saprolite.			
	SS	44	1-2-2 (4)	2.24	Saprolite.			
	SS	100	1-2-2 (4)	2.30	Saprolite.			18.0 / 2348.6
	SS	100	2-1-3 (4)			SW		SAND - moist, well-graded sand, SW, fine to medium sand, quartz and feldspar gravel present (2-8mm diameter in size), heterogranular, non-foliated, relic rock fabric present.
20	SS		1-2-2 (4)		Saprolite.			20.5 / 2346.1
						SM		21.0 / 2345.6
	SS	67	2-3-3 (6)		Few FID readings taken below water table.	SM		SAND - moist, loose, silty sand, SM, fine to medium sand, non-cohesive, increase in biotite content, decrease in feldspar content.
	SS		2-2-3 (5)					
25	SS		3-3-4 (7)		Saprolite.			SAND - yellow-grey to white to yellowish brown, moist, loose, silty sand, SM, non-cohesive, layering visible.
	SS		2-3-4 (7)					
	SS	78	2-4-5 (9)					28.0 / 2338.6
30	SS	67	3-4-5 (9)			SM		SAND - reddish brown to white, damp to moist, loose to very dense, silty sand, SM, fine to medium sand, non-cohesive, micaceous, weathered garnets and minor quartz gravel present.
	SS	67	2-5-7 (12)					
	SS		3-6-8 (14)					A final SS sample was collected from 38.75-39 ft-bgs with blow counts of 50/3 inches. Materials returned were similar to those described above.
	SS	44	4-10-16 (26)					
35								

WELL DIAGRAM

SPT N VALUE ●
RQD (%) ○
20 40 60 80



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GEN BH/TP/WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703380.60667, 979452.26884
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○
35	SS		4-10-50 (60)			SM					
	RC Run 1	94 (58)			Hollow stem auger refusal at 37 ft-bgs. Top of competent rock at 94 ft-bgs.				37.0 / 2329.6 BEDROCK - 2 inches of brownish grey, weathered quartz, feldspar, biotite, felsic rock, brownish grey followed by 4 inches of gray quartz, feldspar, biotite, felsic rock, followed by 2.25 inches of similar rock with biotite-garnet zone and fracture along foliation, followed by 10 inches of similar rock with iron staining and decrease in garnet, then 4.25 inches of biotite-garnet rock and felsic rock.	Cement Grout	
40	RC Run 2	0 (0)				SP			39.0 / 2327.6 44.0 / 2322.6 2 fractures parallel to foliation and in mica-rich zones. Iron-oxide staining above and below lower fracture.		
45	RC Run 3	0 (0)		2.22	Saprolite.	SP			SAND - no recovery, returns from core barrel not collected. 49.0 / 2317.6 10 minutes to advance with no down pressure, no loss of circulation.		
50	RC Run 4	3 (0)		2.15	Saprolite.	SP			SAND - returns from core barrel composed of medium to fine grained quartz (75%), feldspar (20%), biotite (3%), and garnet (2%), predominant grain size 9mm to 2 mm. 54.0 / 2312.6 Returns collected in ziploc bag. 10 minutes to advance with no down pressure.		
55	RC Run 5	27 (0)		2.12	Saprolite.	SP			SAND - returns from core barrel were similar to those from the previous core run, 2-inch zone of coarse grained felsic rock. 59.0 / 2307.6 10 minutes to advance with no down pressure, no loss of circulation.		
60	RC Run 6	47 (35)		2.28	PWR.				SAND - very crumbly felsic material, medium (2mm) to coarse (4-5mm) grained, non- to weakly foliated, quartz (65%), feldspar (30%), biotite (3%), garnet (2%), intact rock at end of run showew contact between felsic material and biotite-garnet-quartz schist, well foliated, dip of schist is approximately 60 degrees from orientation of borehole. 64.0 / 2302.6 Little to no down pressure, no loss of circulation.		
65	RC Run 7	59 (39)		2.60	PWR.				PWR - very weathered biotite-garnet schist with 0.5 inch bands of quartz-feldspar, well foliated in schist portion, banding suggests possible migmatite, iron-oxide staining prevalent throughout. 69.5 / 2297.1		
70	RC Run 8	40 (17)		0.86	PWR.				PWR - similar to previous core run, manganese-oxide coating on all fractures, dissolution of minerals present along planes parallel to foliation. 74.0 / 2292.6		
75											

(Continued Next Page)

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc. **PROJECT NAME (NUMBER)** Geotech Investigation for VBW (2115.231)

NORTHING, EASTING 703380.60667, 979452.26884 **PROJECT LOCATION** 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○
75	RC Run 9	12 (0)							6 fractures - 5 sub-horizontal, 1 high angle. 2 mechanical breaks.		20 40 60 80
									PWR - similar to previous core run, highly weathered biotite-garnet schist, prominant iron-oxide staining on 1 fracture, manganese-oxide staining present on low angle fractures.		
80	RC Run 10	5 (0)							10 fractures - 3 high angle (2 of which form apparent conjugate pair), 7 low angle.	Bentonite Seal	
									PWR - similar to previous core run, returns appear to have bounded fractures due to manganese- and iron-oxide coatings on surfaces, cannot indicate number or frequency of fractures. *(continued)*		
85	RC Run 11	0 (0)							PWR - similar to previous core run, 3 inches of returns.		
									PWR - no recovery, drill cuttings consisted of quartz (70%), feldspar (25%), micas (3%), garnet (1%), and opaque minerals (1%), drill cuttings collected ziplock bag.		
90	RC Run 12	96 (68)		1.39					BEDROCK - 89-89.5 ft-bgs contains felsic band in high angle contact with biotite garnet schist, 89.5-91 ft-bgs contains alternating bands of felsic rock and schist with non-distinct banding, 91-92.2 ft-bgs rock is mostly felsic with little foliation but increased foliation with depth, biotite growing at angle perpendicular to foliation, 92.2-93.3 ft-bgs biotite-garnet schist present as distinct bands 1/2-2-inches thick followed by biotite-schist to 94 ft-bgs.	Sand #1 2" Standard PVC Sch. 40 0.010" slot	
95	RC Run 13	90 (85)							5 fractures - 4 parallel to foliation, 1 cross foliation at 92 ft-bgs. 3 mechanical breaks.		
100	RC Run 14	77 (73)							COMPETENT BEDROCK - 94-95.5 ft-bgs banded felsic rock and schist followed by 8-inch zone of biotite-garnet schist, 95.5-99 ft-bgs alternating bands of felsic rock and schist from 1/2-cm to 10-cm thick, 94-95 and 96-98 ft-bgs show orange iron-oxide staining, 95-96 ft-bgs very little oxide staining, 98-99 ft-bgs is fresh unweathered rock with no oxide staining. fractures-several micro fractures perpendicular to foliation from 94-95 ft-bgs, possible secondary foliation defined by alkali minerals but does not cut through schist bands. 7 fractures - 6 parallel to foliation, 1 cross foliation. 2 mechanical breaks.	Sand #2	
									COMPETENT BEDROCK - 99 to 100.25 similar to previous core run, then coarse grained feldspar (70%),		

79.0 — 2287.6
84.0 — 2282.6
89.0 — 2277.6
94.0 — 2272.6
99.0 — 2267.6
104.8 — 2261.8

(Continued Next Page)

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc. **PROJECT NAME (NUMBER)** Geotech Investigation for VBW (2115.231)

NORTHING, EASTING 703380.60667, 979452.26884 **PROJECT LOCATION** 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○ 20 40 60 80
									quartz (20%), biotite (7%), white mica (2%), opaques (1%), possibly meta-syenite. 9 fractures. 2 mechanical breaks. Boring terminated at 104.8 feet.		

BORING NUMBER VBW-11

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703491.98397, 979359.63993
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 10/18/13 **COMPLETED** 10/18/13
GROUND ELEVATION 2376.81 ft **HOLE SIZE** 6.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
▽ **AT TIME OF DRILLING** 37.0 ft / Elev 2339.8 ft
LOGGED BY Michael Gragg **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
0	SS	94	0-2-9 (11)	1.36	Offset 1.5 feet to the north from original location.	ML			SILT - brown to light brown, damp to moist, soft-stiff, clayey silt, ML, roots present in upper zone, mica content increasing with depth.	
5	SS	17	9-8-4 (12)	1.42						
10	SS	100	5-4-6 (10)	1.80						
									11.0 — 2365.8	
						ML			SILT - light brown to brown, damp to moist, soft, sandy silt, MLS, micaceous, some layering visible.	
15	SS		3-3-3 (6)	1.84						
									16.0 — 2360.8	
						SM			SAND - light to dark brown, damp to moist, loose, silty sand, SM, fine sand, micaceous, former rock fabric, layering present.	
20	SS	50	3-2-3 (5)	1.92						
25	SS	78	4-4-5 (9)	2.13	Saprolite.					
									26.0 — 2350.8	
						SM			SAND - white, brown to dark brown, damp to moist, loose, silty sand, SM, fine sane, increasing mica content with depth.	
30	SS	94	3-2-3 (5)	2.07	Saprolite.					
35	SS	78	4-4-5 (9)	2.78	Saprolite.					

GEN BH/TP/NO WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

(Continued Next Page)

CLIENT Chemtronics, Inc. **PROJECT NAME (NUMBER)** Geotech Investigation for VBW (2115.231)

NORTHING, EASTING 703491.98397, 979359.63993 **PROJECT LOCATION** 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
35									SAND - white, brown to dark brown, damp to moist, loose, silty sand, SM, fine sane, increasing mica content with depth. *(continued)*	
						SM				
	SS	0	5-5-6 (11)		No sample. Wet cuttings.				39.0 — 2337.8	
40									SAND - light ot dark brown, damp to moist, loose, silty sand, SM, fine to medium sand, highly micaceous, oxidized garnets present, low angle foliation visible.	
	SS	44	5-7-9 (16)	2.44	Saprolite.					
45										
						SM				
	SS	50	5-9-10 (19)	2.27	Saprolite.					
50										
	SS	44	5-7-10 (17)	2.28	Saprolite.					
55									56.0 — 2320.8	
									SAND - light to dark brown, damp, medium dense, well-graded sand, SW, fine to coarse sand with minor silt grading to fine to medium sand with depth, highly micaceous, oxidized garnets present, PWR present in upper zone.	
	SS	50	13-23-16 (39)	3.09	Saprolite.					
60										
					Wet cuttings.					
	SS	61	9-13-16 (29)	2.44	Saprolite.	SW				
65										
	SS	67	9-15-15 (30)	2.35	Saprolite.					
70									71.0 — 2305.8	
					Wet cuttings.				SAND - light to dark brown, damp, medium dense, silty sand, SM, fine to medium sand, highly micaceous, high angle foliation.	
						SM				
	SS	56	9-16-26 (42)	2.25	Saprolite.					
75										

(Continued Next Page)

BORING NUMBER VBW-11

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703491.98397, 979359.63993
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

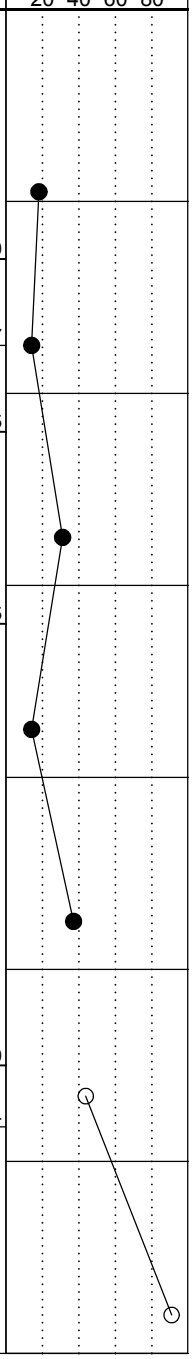
DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
75					Wet cuttings.	SM			76.0 — 2300.8 SAND - light to dark brown, damp to moist, dense to very dense, poorly-graded sand, SP, fine to medium sand with minor silt, highly micaceous, low to high angle foliation, PWR content increasing with depth.	
80	SS	44	36-50-50 (100)	2.29	Saprolite and PWR.					●
85	SS	22	50-50-50 (100)	0.46	PWR.	SP				●
90	SS	22	50-50-50 (100)	1.16	PWR. Hollow stem auger refusal at 92.5 feet below ground surface (ft-bgs). Top of competent rock at 92.5 ft-bgs.					●
				2.50					92.5 — 2284.3	
95	RC Run 1	80 (70)							93.5 — 2283.3 COMPETENT BEDROCK - 1.5-inch diameter quartz rock at top with iron-oxide staining present followed by un-fractured, fine to medium grained, biotite-garnet schist with no visible staining.	○
100	RC Run 2	98 (96)		2.63					COMPETENT BEDROCK - biotite-garnet schist, garnet porphyroblasts as large as 1/2-inch diameter, increase in felsic content in bottom 1.9 feet with banded biotite-garnet schist and felsic rock, high angle foliation, no staining present, 2.5-inch thick zone of chlorite and quartz was noted at 97.7 ft-bgs. 7 fractures - 3 high angle parallel to foliation, 4 low angle cross foliation. 2 mechanical breaks.	○
									103.5 — 2273.3 Boring terminated at 103.5 feet.	

BORING NUMBER VBW-12

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703649.15971, 979240.88656
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 10/21/13 **COMPLETED** 10/22/13
GROUND ELEVATION 2395.46 ft **HOLE SIZE** 6.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING 15.8 ft / Elev 2379.7 ft
LOGGED BY Michael Gragg **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
0					Offset approximately 18 feet west from fence.	ML			SILT - brown to red-brown, damp, firm to stiff, sandy silt, MLS, roots present in upper zone.	
5	SS	100	5-7-11 (18)	2.82						
						ML			6.5 — 2389.0 SILT - brown, damp, firm, clayey silt, ML, some fine sand and rock fragments present, slightly micaceous.	
	SS	89	6-8-6 (14)	2.58					8.8 — 2386.7	
10						SP			SAND - grey, damp, loose, poorly-graded sand, SP, fine to medium sand, micaceous, quartz gravel present.	
									11.0 — 2384.5 SAND - brown to black, damp, moist, poorly-graded sand, SP, fine to medium sand, highly micaceous, relic rock fabric present, 1-inch thick quartz rock at top.	
	SS	39	12-15-16 (31)	2.57	Saprolite.	SP				
15							▽		16.0 — 2379.5 SAND - brown to black, moist to wet, loose to medium dense, silty sand, SM, fine to medium sand, highly micaceous, relic rock fabric present.	
	SS	89	4-6-8 (14)	2.70	Saprolite.					
20						SM				
	SS	0	13-16-21 (37)	2.73	No sample.					
25				2.43					27.5 — 2368.0	
	RC Run 1	69 (44)			Hollow stem auger refusal at 27.5 feet below ground surface (ft-bgs). Top of competent rock at 29.1 ft-bgs.				29.1 — 2366.4 BEDROCK - predominately biotite-garnet schist with thin bands of felsic rock, medium grained, pyrite present on lower fracture face, staining present in top 1 inch of core. 2 fractures - 1 low angle parallel to foliation, 1 high angle cross foliation.	
30										
35	RC Run 2	99 (91)		2.43						



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GEN BH/TP/NO WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703649.15971, 979240.88656
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ 20 40 60 80
35									COMPETENT BEDROCK - similar to previous core run, pyrite present on one fracture face, thickness of felsic zones increases in bottom 2.2 feet of core. 16 fractures - 3 high angle parallel to foliation, 3 high angle and 10 low angle cross foliation. 2 mechanical breaks. *(continued)*	
									38.9 — 2356.6 Boring terminated at 38.9 feet.	

BORING NUMBER VBW-13

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703266.62727, 979360.42126
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 10/2/13 **COMPLETED** 10/2/13
GROUND ELEVATION 2359.69 ft **HOLE SIZE** 6.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING 6.9 ft / Elev 2352.8 ft
LOGGED BY Michael Gragg **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
0	SS	72	2-2-2 (4)			ML			SILT - red-brown to dark brown, damp, soft to firm, sandy silt, MLS, fine sand with minor clay, organics present in upper zone.	
	SS	78	5-4-5 (9)							
	SS	100	5-5-5 (10)							
5	SS	72	4-5-4 (9)						6.0 / 2353.7	
	SS	78	1-1-1 (2)		Wet cuttings.	ML	▽		SILT - dark grey, moist to wet, soft to stiff, clayey silt, ML, fine sand, increasing mica content with depth, rock fragments present at base.	
	SS	67	1-1-2 (3)							
10	SS	11	2-2-1 (3)							
	SS	22	5-5-2 (7)							
	SS	0	4-4-3 (7)		No sample.					
15	SS	22	3-4-3 (7)	2.73						
	SS	28	2-2-10 (12)	2.96					16.5 / 2343.2	
	SS	33	15-15-8 (23)	2.48		SM			SAND - dark grey, moist, medium dense, silty sand, SM, fine sand, micaceous, quartz rock fragments present. 18.0 / 2341.7	
20	SS	44	4-4-4 (8)	4.52	Saprolite.	SM			SAND - light grey to white, moist to wet, loose, silty sand, SM, foliations visible, increasing felsic content with depth.	
	SS	67	3-2-2 (4)	2.47	Saprolite.				Weathered green porphyroblasts (1 mm diameter) present from 18-19.5 feet below ground surface (ft-bgs).	
	SS	33	2-3-4 (7)	2.50	Saprolite.				Weathered garnets present from 19.5-22.5 ft-bgs.	
	SS	50	3-4-4 (8)	2.41	Saprolite.				24.0 / 2335.7	
25	SS	33	4-2-3 (5)	2.57	Saprolite.	SM			SAND - grey to dark grey, moist, loose, silty sand, SM, fine sand, highly micaceous, minor foliations visible. 25.5 / 2334.2	
	SS	61	3-3-4 (7)	2.59	Saprolite.	SM			SAND - dark grey to white, damp to moist, loose to very dense, silty sand, SM, fine to medium sand, green porphyroblasts present (1-2 mm diameter), foliations visible, increase in garnet content from 33-34.5 ft-bgs, slight staining visible at base.	
	SS		5-5-6 (11)	2.53	Saprolite.					
30	SS	56	7-7-7 (14)	2.49	Saprolite.				Note: a SS sample was driven from approximately 34.5-34.7 ft-bgs with blow counts of 10 and 50/3. Returns consisted of similar materials to previous SS with intact rock in SS shoe.	
	SS	33	9-14-8 (22)	2.46	Saprolite.					
	SS	56	8-10-14 (24)	2.61	Saprolite.					
				2.54	PWR.				34.0 / 2325.7	
35	RC	90		2.07					BEDROCK - heavily weathered biotite-garnet schist with 35.0 / 2324.7	

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GEN BH/TP/NO WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

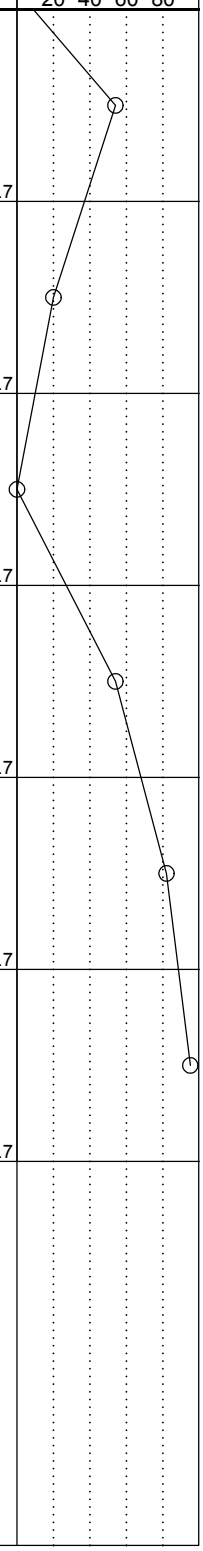
BORING NUMBER VBW-13

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703266.62727, 979360.42126
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	
35	Run 1	(0)			Hollow stem auger refusal at 34.5 ft-bgs. Top of competent rock at 55 ft-bgs.				felsic migmatite banding, heavily fractured showing oxide staining throughout, fractures generally parallel to foliation. 5 fractures - 4 high angle, 1 low angle.	
40	RC Run 2	78 (54)		2.32					BEDROCK - medium grained biotite-garnet schist with felsic migmatite banding, heavy iron-oxide staining to 36.1 ft-bgs with no staining below. 5 fractures - 1 high angle parallel to foliation, 1 high angle and 3 low angle cross foliation.	40.0 / 2319.7
45	RC Run 3	38 (20)		2.36					BEDROCK - 1.2 feet of biotite-garnet schist followed by 0.3 feet of sand (intensely weathered rock), then 0.4 feet of felsic migmatite with iron-oxide staining. 5 low angle cross foliation fractures.	45.0 / 2314.7
50	RC Run 4	8 (0)		2.6	First core run began at 34 ft-bgs, likely due to rock fall-in.				BEDROCK - felsic migmatite with strings of biotite-garnet schist, heavy iron-oxide staining and intense weathering present. 1 low angle fracture followed by a zone of broken/crushed rock.	50.0 / 2309.7
55	RC Run 5	60 (54)			Core Run 5 split into two runs to show RQD in bottom 10-ft of core >70%				BEDROCK - biotite-garnet schist with bands of felsic migmatite, medium grained, iron-oxide staining middle and base of core. 5 fractures - 4 high angle parallel to foliation, 1 low angle cross foliation.	55.0 / 2304.7
60	RC Run 5	82 (82)		2.25					COMPETENT BEDROCK - biotite-garnet schist with bands of felsic migmatite, medium grained, iron-oxide staining middle and base of core. 2 low angle fractures. 3 mechanical breaks.	60.0 / 2299.7
65	RC Run 6	98 (95)		2.32					COMPETENT BEDROCK - similar to previous core run, iron-oxide staining around fracture in middle section of core run. 7 low angle fractures - 3 parallel to foliation, 4 cross foliation.	65.0 / 2294.7
									Boring terminated at 65.0 feet.	

SPT N VALUE ●
RQD (%) ○

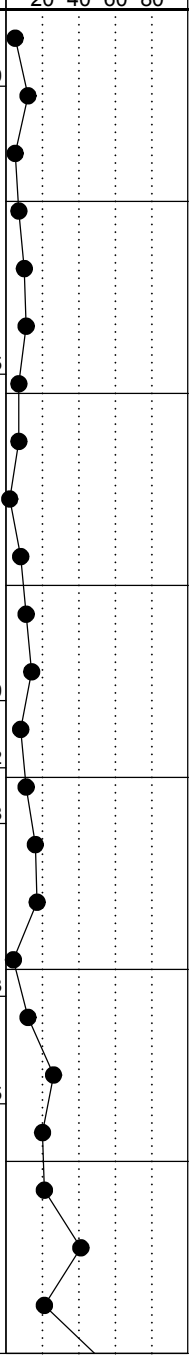


BORING NUMBER VBW-14

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703340.44759, 979476.45604
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 9/27/13 **COMPLETED** 10/1/13
GROUND ELEVATION 2349.98 ft **HOLE SIZE** 6.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING 21.2 ft / Elev 2328.8 ft
LOGGED BY Gragg & Pippin **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	MATERIAL DESCRIPTION (Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.)	SPT N VALUE ● / RQD (%) ○
0	SS	67	4-3-2 (5)	0.51		ML		SILT - brown, damp, soft, clayey silt, ML, minor fine sand with quartz gravel in lower 6 inches. 2.0 / 2348.0	
	SS	67	3-6-6 (12)	0.89		SM		SAND - dark brown, damp to moist, loose, silty sand, SM, fine sand with minor clay, micaceous, some organic material from 4.5-6 ft-bgs, quartz gravel present in lower zone.	
	SS	67	6-2-3 (5)	1.13					
5	SS	67	2-4-3 (7)	1.15					
	SS	67	5-6-4 (10)	1.42					
	SS	67	6-6-5 (11)	1.36				9.5 / 2340.5	
10	SS	56	5-4-3 (7)	1.58	Saprolite.	SM		SAND - grey, moist to wet, loose, silty sand, SM, fine sand, micaceous, some gravel present in upper zone, foliations increasingly visible with depth.	
	SS	100	4-3-4 (7)	2.32	Saprolite.				
	SS	61	2-1-1 (2)	1.87	Saprolite.				
15	SS	44	4-3-5 (8)	6.52	Saprolite.				
	SS	61	4-6-5 (11)	5.60	Saprolite.				
	SS	39	4-7-7 (14)	4.42	Saprolite.			18.0 / 2332.0	
	SS	44	4-3-5 (8)	2.31	Saprolite.	SM		SAND - white/grey to dark grey, moist, loose, silty sand, SM, fine sand, foliated. 19.8 / 2330.2	
20	SS	67	3-5-6 (11)	2.01	Saprolite.	ML	▽	SILT - grey, moist, loose, sandy silt, MLS, fine sand. 21.2 / 2328.8	
	SS	33	4-7-9 (16)	2.07	Saprolite.	SM		SAND - white to grey, moist, loose, silty sand, SM, some oxide staining present.	
	SS	33	5-7-10 (17)	1.83	Saprolite.				
25	SS	33	3-2-2 (4)	2.42	Saprolite.			25.7 / 2324.3	
	SS	50	5-5-7 (12)	2.08	Saprolite.	SM		SAND - grey, moist, loose, silty sand, SM, fine sand, oxidized garnets present.	
	SS		8-13-13 (26)	1.92	Saprolite.			28.5 / 2321.5	
30	SS	33	8-10-10 (20)	2.02	Saprolite.	SP		SAND - white to grey to light brown, damp, loose to very dense, poorly-graded sand, SP, fine to medium sand, some minor silt, quartz gravel present at 36-37.5, 51-52.5, and 58.5-60 ft-bgs.	
	SS	67	5-9-12 (21)	2.23	Saprolite.				
	SS	61	15-19-22 (41)	2.16	Saprolite.				
	SS	61	6-7-14 (21)	2.21	Saprolite.				
35									



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GEN BH/TP/NO WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

CLIENT Chemtronics, Inc. **PROJECT NAME (NUMBER)** Geotech Investigation for VBW (2115.231)

NORTHING, EASTING 703340.44759, 979476.45604 **PROJECT LOCATION** 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
35										
	SS	39	18-25-29 (54)	2.50	Saprolite.	SP			SAND - white to grey to light brown, damp, loose to very dense, poorly-graded sand, SP, fine to medium sand, some minor silt, quartz gravel present at 36-37.5, 51-52.5, and 58.5-60 ft-bgs. *(continued)*	
	SS	67	18-21-24 (45)	2.56	PWR.					
	SS	44	27-50-50 (100)	2.67	PWR.					
40	SS	28	5-17-22 (39)	1.42	PWR.					
	SS	28	29-44-44 (88)	0.00	PWR. FID may be reading incorrectly.					
	SS	6	15-50-50 (100)	0.00	PWR.					
45	SS	33	29-34-42 (76)	0.00	Saprolite.					
	SS	78	6-9-11 (20)	0.04	Saprolite.					
	SS	50	12-20-18 (38)	0.22	Saprolite.					
	SS	22	25-28-27 (55)	0.36	Saprolite.					
50	SS	50	29-50-50 (100)	0.58	PWR.					
	SS	61	29-34-35 (69)	0.61	Saprolite.					
	SS	83	25-28-29 (57)	0.64	Saprolite.					
55	SS	67	25-50-50 (100)	0.67	PWR.					
	SS	72	13-17-17 (34)	0.92	Saprolite.					
	SS	28	13-24-50 (74)	0.92	PWR.					
60	SS	0	50-50-50 (100)	0.91	PWR.					
	SS	67	13-14-17 (31)	0.98	PWR.					
	SS	28	25-30-50 (80)	1.78	PWR.					
	SS	72	15-16-14 (30)	1.93	PWR.					
65	SS	72	15-14-18 (32)	2.25	PWR.					
	SS	50	21-50-50 (100)	2.01	PWR.					
	SS	28	50-50-50 (100)	2.12	PWR. Hollow stem auger refusal at 69 feet below ground surface (ft-bgs). Top of competent rock at 74.7 ft-bgs.				69.7 2280.3	
70									BEDROCK - biotite-garnet schist, medium grained, iron-oxide staining on fractures from 70.5-72.3 ft-bgs, gneissic banding of biotite rich and felsic zones. 10 fractures - 5 low angle parallel to foliation, 5 high angle cross foliation. 2 mechanical breaks.	
	RC Run 1	94 (48)		1.97						
75									74.7 2275.3	

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BORING NUMBER VBW-14

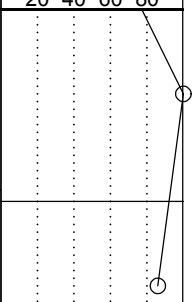
ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703340.44759, 979476.45604
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ 20 40 60 80
75	RC Run 2	100 (100)		2.01					COMPETENT BEDROCK - medium grained, non-foliated, felsic rock (mignatite) with inclusions of biotite-garnet schist, biotite-garnet schist contect increasing with depth. 1 high angle fracture. *(continued)*	
80	RC Run 3	98 (86)		2.24					COMPETENT BEDROCK - top 0.8 feet medium grained biotite-garnet schist with felsic banding followed by medium grained, non-foliated, felsic rock. 5 fractures - 1 high angle, 4 low angle.	
									Boring terminated at 84.7 feet.	

79.7 2270.3

84.7 2265.3



BORING NUMBER VBW-15A

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING ,
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 10/3/13 **COMPLETED** 10/3/13
GROUND ELEVATION **HOLE SIZE** 6.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING ---
LOGGED BY Gragg & Pippin **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY %	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
0										
	SS	83	4-3-3 (6)	0.92		CL-ML			0.8 CLAY - red, damp, soft, silty clay, CL-ML, organics (roots, grass) present.	
	SS	61	2-12-17 (29)	1.5		SM			SAND - golden brown, damp, loose, silty sand, SM, micaceous. 3.0	
	SS	11	8-12-9 (21)	1.42	No sample, just tree root.	SM			SAND - golden brown, damp to moist, loose to medium dense, silty sand, SM, fine to medium sand.	
5	SS	83	11-2-9 (11)						6.0	
	SS	0	3-4-4 (8)		No sample.				No sample, only woody material.	
	SS	0	4-5-4 (9)		No sample.				Hole abandoned. Offset 1 foot to the west and encountered similar results (VBW-15B). Offset 1 foot to the east (VBW-15C).	
10	SS		9-5-5 (10)		No sample.				10.5	

Boring terminated at 10.5 feet.

BORING NUMBER VBW-15C

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703269.21763, 979508.08002
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 10/3/13 **COMPLETED** 10/8/13
GROUND ELEVATION 2365.36 ft **HOLE SIZE** 6.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING 43.7 ft / Elev 2321.7 ft
LOGGED BY Chuck Pippin **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION (Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.)	SPT N VALUE ● / RQD (%) ○ (20 40 60 80)
0						CL-ML			0.8 CLAY - red, damp, soft, silty clay, CL-ML, organics (roots, grass) present. (Information from VBW-15A). 2364.6	
					Offset 1 foot east of original location due to woody debris obstructing auger.	SM			SAND - golden brown, damp, loose, silty sand, SM, micaceous. (Information from VBW-15A). 4.5 2360.9	
5	SS	83	4-4-4 (8)	1.98		SM			SAND - yellow to orange-brown, damp to moist, loose, silty sand, SM, fine to medium sand, minor organics (root) present, increasing mica content with depth. 8.2 2357.2	
	SS	83	4-5-5 (10)	2.16						
	SS	67	3-5-5 (10)	2.19		SW			9.2 SAND - brown, moist, loose, well-graded sand, SW, fine to coarse sand, micaceous, organics (root) present near base. 2356.2	
10	SS	89	3-6-6 (12)	2.32		SM			11.0 SAND - light reddish brown, moist, loose, silty sand, SM, slightly micaceous, relict rock fabric present. 2354.4	
	SS	89	4-6-6 (12)	2.72	Saprolite.	SP			SAND - light brown to brown to yellow brown, moist, loose, poorly-graded sand, SP, fine to medium sand, micaceous to highly micaceous, saprolitic, localized quartz gravels present.	
	SS	83	3-4-3 (7)	2.62						
15	SS	100	3-3-3 (6)	3.10	Saprolite.					
	SS	100	2-2-3 (5)	2.92						
	SS	78	4-5-6 (11)	3.27	Saprolite.					
	SS	61	2-2-3 (5)	3.01						
20	SS	100	2-2-3 (5)	3.14	Saprolite.					
	SS	83	3-3-1 (4)	3.19						
	SS	83	0-2-3 (5)	3.29	Saprolite.				23.1 2342.3	
25	SS	39	2-3-2 (5)	3.22		SW			SAND - dark reddish brown, moist, loose, well-graded sand, SW, fine to medium sand, coarsening with depth, micaceous, saprolitic. 25.5 2339.9	
	SS	100	2-2-3 (5)	3.02	Saprolite.	SW-SM			SAND - light brown to grey, moist to wet, loose, well-graded silty sand, SW-SM, fine to coarse sand, relic rock fabric and localized quartz gravel present, high angle foliation. 28.5 2336.9	
	SS	100	6-10-10 (20)	2.91						
30	SS	56	2-2-4 (6)	3.25	Saprolite.	SW			SAND - reddish brown, moist, loose to medium dense, well-graded sand, SW, fine to medium sand with localized coarse sand, micaceous.	
	SS	39	3-4-6 (10)	3.31						
	SS	28	5-9-11 (20)	3.47	Saprolite.					
	SS	72	4-6-8 (14)	3.38						
35									34.8 2330.6	

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GEN BH/TP/NO WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

BORING NUMBER VBW-15C

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703269.21763, 979508.08002
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
35	SS	56	5-5-9 (14)	3.18		SP			SAND - light brown, damp to moist, loose to medium dense, poorly-graded sand, SP, fine sand, slightly micaceous, well defined foliation. *(continued)*	
	SS	50	12-14-19 (33)	3.41	Saprolite.					
	SS	67	5-8-11 (19)	3.36	Saprolite.					
40	SS	61	6-8-9 (17)	3.19						
	SS	50	6-9-20 (29)	3.29	Saprolite.					
	SS	100	8-13-22 (35)	3.37						
							▽		43.5 / 2321.9	
45	SS	78	13-17-22 (39)	3.24	Saprolite.	SP			SAND - reddish brown, damp, medium dense to very dense, poorly-graded sand, SP, fine to medium sand, localized zones of schist and felsic PWR.	
	SS	61	20-22-25 (47)	3.40						
	SS	56	12-16-13 (29)	3.37	Saprolite.					
	SS	56	7-13-16 (29)	3.51	Saprolite.					
50	SS	67	7-12-21 (33)	3.30						
	SS	56	18-47-50 (97)	3.19	PWR and Saprolite.					
	SS	33	50-50-50 (100)	3.24	PWR and Saprolite.				52.9 / 2312.5	
						SP			54.0 / 2311.4 SAND - grey, damp, very dense, poorly-graded sand, SP, fine to medium sand, felsic PWR with no visible foliation.	
55	SS	28	50-50-50 (100)	2.13					PWR - brown, damp, dense to very dense, biotite-garnet schist, very weathered, breaks down to fine to medium sand.	
	SS	28	50-50-50 (100)	2.32	PWR.					
	SS	50	18-32-33 (65)	2.45					Linear biotite-rich mafic feature noted at 69.5 feet below ground surface (ft-bgs).	
60	SS	50	24-50-50 (100)	2.63	PWR.					
	SS	56	19-50-50 (100)	2.61						
	SS	44	37-50-50 (100)	2.63	PWR.					
	SS	22	50-50-50 (100)	2.58						
65	SS	17	50-50-50 (100)	2.66	PWR.					
	SS	22	50-50-50 (100)	2.65						
	SS	33	44-50-50 (100)	2.69	PWR.					
70	SS	36	34-50-50 (100)	2.80						
	SS	14	50-50-50 (100)	2.72	PWR.				72.0 / 2293.4	
	SS	17	50-50-50 (100)	0.98					PWR - grey, damp, very dense, biotite-garnet schist, PWR-rock, does not crumble, quartz-feldspar (70%), biotite (25%), garnet (3%), other (2%).	
									73.5 / 2291.9	
75	SS	17	50-50-50 (100)	2.02	PWR.	SP			75.0 / 2290.4 SAND - orange stained, damp to moist, very dense,	

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BORING NUMBER VBW-15C

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703269.21763, 979508.08002
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION (Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.)	SPT N VALUE ● / RQD (%) ○ (20 40 60 80)
75										
	SS	6	50-50-50 (100)	2.51					poorly-graded sand, SP, fine to medium sand, saprolite (biotite schist).	
	SS	6	50-50-50 (100)	2.76	PWR.				PWR - grey, damp, very dense, biotite-garnet schist.	
	SS	8	50-50-50 (100)	3.01					79.5 — 2285.9	
80	SS	42	33-50-50 (100)	13.51	PWR.				PWR - damp, medium dense to very dense, alternating bands of biotite-garnet schist and feslic schist with muscovite, increasing felsic content with depth. 81.0 — 2284.4	
	SS	50	47-50-50 (100)	3.60					PWR - tan to white to grayish brown, damp to moist, medium dense to very dense, alternating bands of biotite schist and felsic rock (PWR and saprolite), garnets present in deeper biotite schist.	
	SS	67	20-23-50 (73)	2.43	PWR.					
85	SS	22	50-50-50 (100)	0.89						
	SS	31	50-50-50 (100)	1.48	PWR.				87.0 — 2278.4	
	SS	11	50-50-50 (100)	1.61					SAND - white-gray, moist, very dense, poorly-graded sand, SP, medium to coarse sand, felsic saprolite, not well foliated.	
90	SS	11	50-50-50 (100)	1.62	PWR.	SP				
	SS	11	50-50-50 (100)	1.84					91.5 — 2273.9	
	SS	11	50-50-50 (100)	2.02	PWR.				PWR - grey to blue-grey, moist, very dense, biotite-garnet schist, breaks down into medium to coarse sand, well foliated. 93.0 — 2272.4	
	SS	28	50-50-50 (100)	2.18					PWR - reddish to orange-brown, damp, very dense, biotite-garnet schist, quartz schist, breaks down into medium to coarse sand, well foliated.	
95	SS	50	50-50-50/0"	2.33					95.0 — 2270.4	>>
	RC Run 1	100 (99)		2.12	PWR. Hollow stem auger refusal at 95 ft-bgs. Top of competent rock at 95 ft-bgs.				COMPETENT BEDROCK - thinly banded biotite-garnet schist and felsic schist, moderately dipping foliations, garnet-rich 2 mechanical breaks. 99.0 — 2266.4	
100	RC Run 2	99 (99)		2.40					COMPETENT BEDROCK - top 1.2 feet highly metamorphosed/partially melted biotite-garnet schist, with thin flesic banding, followed by alternating bands of biotite-garnet schist and felsic rock, weakly foliated, bottom 1.2 feet contain quartz/feldspar-rich zone with large muscovite grains (1/2-inch diameter) and minor garnet, staining present in middle of core run. 11 fractures - 6 high angle, 5 low angle.	
105									109.0 — 2256.4	
									Boring terminated at 109.0 feet.	

WELL NUMBER VBW-16

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703206.83257, 979399.65241
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 9/24/13 **COMPLETED** 9/26/13
GROUND ELEVATION 2367.31 ft **HOLE SIZE** 9.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING 15.5 ft / Elev 2351.8 ft
LOGGED BY Gragg & Pippin **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES Boring converted to monitoring well MW255-L25CD.
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION (Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.)	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
0	SS	72	2-3-4 (7)	0.81		ML			SILT - grass and topsoil to 1 inch, then red to yellow, soft, damp, silt, ML, very minor clay, micaceous at depth.		
	SS		3-3-5 (8)	3.5					2.7 — 2364.6		
	SS	100	5-4-6 (10)	3.3		ML			SILT - grey to dark grey, damp, soft to firm, silt, ML, minor clay. 4.5 — 2362.8		
5	SS	100	6-6-5 (11)	2.29		ML			SILT - reddish/orange-brown to light brown, damp, stiff, sandy silt, MLS, fine sand, micaceous.		
	SS	67	6-6-10 (16)	2.9					7.4 — 2359.9		
	SS	67	13-6-7 (13)	1.81		SP			7.6 — 2359.7 SAND - dark grey, damp, loose, poorly-graded sand, SP, fine to medium sand.		
10	SS	89	5-5-5 (10)	2.18		SP			SAND - white to light brown, damp, loose, poorly-graded sand, SP, fine to medium sand, composed of weathered biotite, quartz, and feldspar. 10.5 — 2356.8		
	SS	33	2-3-3 (6)	2.46		ML			12.3 — 2355.0		
	SS	67	1-2-2 (4)	2.45		SP			SILT - light brown, damp, soft, sandy silt, MLS, fine sand and minor clay, micaceous. 13.5 — 2353.8		
15	SS	67	3-3-2 (5)	2.4		ML	▽		SAND - reddish brown to light brown, damp to moist, loose, poorly-graded sand, SP, fine to medium sand with minor silt and gravel, biotite present. 16.5 — 2350.8		
	SS	33	1-2-2 (4)	2.42							
	SS	100	2-2-2 (4)	2.43					SILT - reddish/orange brown to light to dark brown, damp, soft, sandy silt, MLS, fine sand, clay and felsic rock fragments present in upper zone, micaceous (mica content increasing with depth).		
	SS	100	1-1-3 (4)	2.44							
20	SS	78	2-2-3 (5)	2.44					SAND - brown to orange-brown, moist, loose, silty sand, SM, fine to medium sand, micaceous, increasingly saprolitic with depth.		
	SS	100	3-2-3 (5)	2.51						◄Cement Grout	
	SS	94	2-3-5 (8)	2.43	Saprolite.				Oxidized garnets present in 31.5-33 and 39-39.3 ft-bgs zones.		
25	SS	67	2-4-5 (9)	1.58	Saprolite.						
	SS	67	4-5-7 (12)	2.07	Saprolite.	SM					
	SS	56	4-6-7 (13)	2.32	Saprolite.						
30	SS	39	4-5-7 (12)	2.39	Saprolite.						
	SS	67	4-6-10 (16)	2.52	Saprolite.						
	SS	72	5-10-14 (24)	2.44	Saprolite.						
	SS	61	6-14-19 (33)	2.36	Saprolite.						
35											

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GEN BH/TP/WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc. **PROJECT NAME (NUMBER)** Geotech Investigation for VBW (2115.231)

NORTHING, EASTING 703206.83257, 979399.65241 **PROJECT LOCATION** 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION (Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.)	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
35	SS	67	8-17-23 (40)	2.26	Saprolite.	SM			SAND - brown to orange-brown, moist, loose, silty sand, SM, fine to medium sand, micaceous, increasingly saprolitic with depth. Oxidized garnets present in 31.5-33 and 39-39.3 ft-bgs zones. *(continued)*		
	SS	61	10-12-11 (23)	2.48	Saprolite.						
	SS	39	5-6-7 (13)	2.46	Saprolite.						
40	SS	61	5-10-12 (22)	2.53	Saprolite.				40.5 / 2326.8		
	SS	61	7-12-15 (27)	2.51	Saprolite.	SW			SAND - dark grey, damp, medium dense, well-graded sand, SW, fine to medium sand with local coarse sand, felsic schist (saprolite) with quartz (65-75%), feldspar (5-20%), mica (3-20%), and opaque minerals (2-10%), mica content increasing with depth.		
	SS	44	12-12-13 (25)	2.6	Saprolite.						
45	SS	56	7-10-28 (38)	2.43	PWR.				45.0 / 2322.3		
	SS	50	5-22-50 (72)	2.57	PWR.	SW			SAND - orange brown, damp, loose to very dense, well-graded sand, SW, biotite-quartz-feldspar schist saprolite, oxidized garnets present.	Bentonite Seal	
	SS	33	36-50-50 (100)	2.69	PWR.						
	SS	17	24-50-50 (100)	2.71	PWR.						
50	SS	28	50-50-50 (100)	2.57	PWR.						
	SS	50	6-50-50 (100)	2.52	PWR.				52.5 / 2314.8		
	SS	11	50-50-50 (100)	2.58	PWR.	SP			SAND - white, damp, very dense, poorly-graded sand, SP, fine to medium sand, quartz-biotite-feldspar felsic banding present.		
55	SS	28	50-50-50 (100)	2.64	PWR.				55.5 / 2311.8		
	SS	72	31-50-50 (100)	2.42	PWR.	SP			SAND - orange-brown to white, damp, medium dense to very dense, poorly-graded sand, SP, fine to medium sand, biotite-garnet schist and felsic banding visible (saprolite and PWR).	Sand #1 47-65 ft-bgs. 2" Standard PVC Sch. 40 0.010" slot	
	SS	28	50-50-50 (100)	2.22	PWR.						
60	SS	6	50-50-50 (100)	2.54	PWR.						
	SS	11	50-50-50 (100)	2.61	PWR.				Note: a SS sample was advanced from 61.5-61.9 ft-bgs, 5 inches past auger refusal, with blow counts of 13 and 50/4. Materials in the sample were similar to those described above. 61.5 / 2305.8		
	RC Run 1	91 (83)		0.45	Hollow stem auger refusal at 61.5 feet below ground surface (ft-bgs). Top of competent rock at 61.5 ft-bgs				COMPETENT BEDROCK - fine grained biotite garnet schist to 61.5 ft-bgs, then 6 inches of medium grained, non-foliated, felsic rock (possibly migmatite), then grey, medium grained, biotite-garnet schist, iron-oxide staining present on fracture faces. 63.8 / 2303.5		
65	RC Run 2	100 (100)		1.83					5 fractures - 4 high angle parallel to foliation, 1 low angle cross foliation. 68.8 / 2298.5		
70	RC Run 3	98 (98)		2.21					COMPETENT BEDROCK - biotite-garnet schist interlayered with felsic zones (0.5-2.5 inches thick) - gnessic banding.	Sand #2 65-73.8 ft-bgs.	
									COMPETENT BEDROCK - biotite-garnet schist with felsic banding (gneiss), no staining present, not rippable. 73.8 / 2293.5		

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ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703206.83257, 979399.65241
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○ 20 40 60 80
									2 high angle fractures parallel to foliation.		
									Boring terminated at 73.8 feet.		

WELL NUMBER VBW-17

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703385.00341, 979671.11797
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 11/6/13 **COMPLETED** 11/8/13
GROUND ELEVATION 2356.21 ft **HOLE SIZE** 9.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING 12.1 ft / Elev 2344.1 ft
LOGGED BY Michael Gragg **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES Boring converted to monitoring well MW256-M25CD.
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	MATERIAL DESCRIPTION (Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.)
0					Background FID approximately 2 ppm.	ML	SILT - dark brown, damp, soft, sandy silt, MLS, roots present, no visible structure. (3.5 / 2352.7)
	SS	100	3-3-4 (7)	2.13		ML	SILT - brown, damp, soft, clayey silt, ML, quartz rock fragments present, no visible structure. (6.0 / 2350.2)
5						SM	SAND - brown, damp to moist, loose, silty sand, SM, fine to medium sand, highly micaceous, intensely weather garnets present, high angle foliation increasingly visible with depth.
	SS	83	3-4-6 (10)	2.31			
10							
	SS	78	4-5-7 (12)	2.41	Saprolite.		
15							
	SS	83	2-3-6 (9)	2.51	Saprolite.		
20						SM	SAND - brown to black, damp to moist, loose, silty sand, SM, fine to medium sand, highly micaceous, high angle foliation. (21.0 / 2335.2)
	SS	78	4-4-6 (10)	2.32	Saprolite.		
25							
	SS	72	2-4-4 (8)	2.36	Saprolite.		
30						SM	SAND - grey to dark brown, damp to moist, loose to medium dense, silty sand, SM, fine sand, highly micaceous, minor oxidized garnets, high angle foliation. (31.0 / 2325.2)
	SS	83	4-8-11 (19)	2.43	Saprolite.		
35							

Groundwater Level

GRAPHIC LOG

WELL DIAGRAM: Cement Grout

SPT N VALUE ● RQD (%) ○ 20 40 60 80

(Continued Next Page)

CLIENT Chemtronics, Inc. **PROJECT NAME (NUMBER)** Geotech Investigation for VBW (2115.231)

NORTHING, EASTING 703385.00341, 979671.11797 **PROJECT LOCATION** 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION (Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.)	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
35						SM			36.0 — 2320.2		
	SS	72	5-9-13 (22)	2.84	Saprolite.	SW			SAND - white to greenish-grey, damp, loose to medium dense, well-graded sand, SW, fine to coarse sand with minor silt, irregular bands of biotite-rich zones, non-foliated.		
40									41.0 — 2315.2		
	SS	67	8-13-17 (30)	3.09	Saprolite.	SM			SAND - grey to greenish-grey, damp to moist, loose to medium dense, silty sand, SM, fine to medium sand, highly micaceous, oxidized garnets present, high angle foliation.		
45									46.0 — 2310.2		
	SS	83	9-19-21 (40)	5.91	Wet cuttings. Slow drilling. Saprolite.	SW-SM			SAND - dark brown to light grey, moist, loose to medium dense, well-graded silty sand, SW-SM, fine to coarse sand, oxidized garnets present, highly micaceous, high angle foliation.		
50					Slow drilling.				51.0 — 2305.2		
						SM			SAND - grey to light brown, damp, loose to medium dense, silty sand, SM, fine sand, micaceous, non-foliated.		
	SS	89	5-10-30 (40)	5.51	Saprolite.				53.8 — 2302.4		
55						SM			SAND - light to dark brown, damp, loose to medium dense, silty sand, SM, fine to medium sand, highly micaceous, oxidized garnets present, high angle foliation.		
									56.0 — 2300.2		
	SS	78	13-33-41 (74)	5.02	Saprolite.	SP			SAND - greenish-grey, damp, medium dense to dense, poorly-graded sand, SP, fine sand with minor silt, micaceous, high angle foliation.		
60									61.0 — 2295.2		
	SS	50	38-50-50 (100)	3.75	PWR, slight odor.	SW-SM			SAND - grey to brown, damp to moist, dense to very dense, well-graded silty sand, SW-SM, fine to coarse sand, highly micaceous, high angle foliation with occurence of PWR fragments increasing with depth.		
65										Bentonite Seal	
	SS	61	32-50-50 (100)	7.52	PWR, slight odor.						
70											
	SS	17	50-50-50 (100)	2.19	PWR.						
75											

(Continued Next Page)

WELL NUMBER VBW-17

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703385.00341, 979671.11797
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○
75						SW-SM			76.5 — 2279.7		20 40 60 80
	RC Run 1	100 (89)		1.49	Hollow stem auger refusal at 76.5 ft-bgs. Top of competent rock at 76.5 ft-bgs. FID 1.49 ppm.				COMPETENT BEDROCK - alternating bands of biotite-garnet schist and quartz-feldspar rich felsic rock, iron-oxide staining visible on broken rock near top of core run, pyrite noted on lowest fracture. 7 fractures - 1 high angle parellel to foliation, 1 high anlge and 5 low angle cross foliation.		
80	RC Run 2	100 (86)		2.49					79.2 — 2277.0 COMPETENT BEDROCK - similar to previous core run, very minor iron-oxide staining throughout, pyrite visible on lower fracture faces. 8 fractures - 4 high angle parellel to foliation, 1 high angle and 3 low angle cross foliation.	◄Sand #1 ◄2" Standard PVC Sch. 40 0.010" slot	
85	RC Run 3	95 (29)		2.52	Note: RQD of 76% from 76.5-86.5 ft-bgs.				84.1 — 2272.1 COMPETENT BEDROCK - Similar to previous core runs, pyrite visible on most fractures, sections of core run are heavily fractured/broken. 10 fracturs - 1 high angle parellel to foliation, 3 high angle and 6 low angle cross foliation.		
									88.3 — 2267.9 Boring terminated at 88.3 feet.		

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

BORING NUMBER VBW-18A

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING ,
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 11/12/13 **COMPLETED** 11/12/13
GROUND ELEVATION **HOLE SIZE** 9.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING ---
LOGGED BY Michael Gragg **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY %	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	SPT N VALUE ● RQD (%) ○ 20 40 60 80
0									SILT - brown to orange-brown, silt, ML, minor clay, quartz rock fragments and roots present.	
						ML			Hollow stem auger refusal at 5 feet below ground surface (ft-bgs). Offset approximately 5 feet west of original location (VBW-18B).	
	SS	100	6-10-23 (33)	1.60						●
5									5.0	
									Boring terminated at 5.0 feet.	

WELL NUMBER VBW-18B

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703473.30755, 979799.4782
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC
DATE STARTED 11/12/13 **COMPLETED** 11/14/13
GROUND ELEVATION 2361.11 ft **HOLE SIZE** 9.63 inch
DRILLING CONTRACTOR AE Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 550 HSA
AT TIME OF DRILLING 20.4 ft / Elev 2340.7 ft
LOGGED BY Michael Gragg **CHECKED BY** Amy Huffman
AT END OF DRILLING ---
NOTES Boring converted to monitoring well MW257-M25CD.
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
0					Note: offset 5 feet west of original location. Background FID 2-3 ppm.	ML			SILT - dark brown to orange brown, damp, stiff, clayey silt, ML, quartz rock fragments and roots present, no visible structure.		
	SS	78	11-10-15 (25)								
5				2.54					6.0 — 2355.1		
						SM			SAND - light brown, damp, loose, silty sand, SM, micaceous, no visible structure, possible garnets (completely oxidized) present.		
	SS	89	4-5-8 (13)	2.50							
10									11.0 — 2350.1		
						SM			SAND - dark brown, damp, loose, silty sand, SM, highly micaceous, high angle foliation increasingly visible with depth.		
	SS	61	7-5-6 (11)	2.24	Saprolite.						
15											
	SS	89	4-5-6 (11)	2.25	Saprolite. Thin quartz vein.						
20							▽		21.0 — 2340.1		
						SP			SAND - light to dark brown, moist, loose to dense, poorly-graded sand, SP, fine to medium sand with minor silt, highly micaceous, high angle foliation, with garnets present in lower eight feet.		
	SS	78	4-6-8 (14)	2.27	Saprolite.						
25											
	SS	78	11-11-13 (24)	2.49	Saprolite.						
30											
	SS	72	41-30-27 (57)	3.47	Saprolite.						
35											

(Continued Next Page)

GEN BH/TP/WELL 021714 BACK VALLEY GEOTECH.GPJ GINT US.GDT 2/28/14

CLIENT Chemtronics, Inc. **PROJECT NAME (NUMBER)** Geotech Investigation for VBW (2115.231)

NORTHING, EASTING 703473.30755, 979799.4782 **PROJECT LOCATION** 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○
35									SAND - light to dark brown, moist, loose to dense, poorly-graded sand, SP, fine to medium sand with minor silt, highly micaceous, high angle foliation, with garnets present in lower eight feet. *(continued)*		
40	SS	61	9-11-17 (28)	9.54	Saprolite. Thin quartz banding.	SP				◄Cement Grout	
									41.0 — 2320.1		
45	SS	61	9-23-19 (42)	5.03	PWR, odor.	SM			PWR - very friable, readily breaks down into grey brown to white, damp to moist, medium dense, silty sand, SM, fine to coarse sand, highly micaceous, with high angle foliation.		
									46.0 — 2315.1		
50	SS	39	50-50-50 (100)	31.34	PWR, strong odor.	SP			SAND - light brown, moist, very dense, poorly-graded sand, SP, fine to medium sand with minor silt, micaceous with high angle foliation.		
									51.0 — 2310.1		
55	SS	50	10-16-19 (35)	21.02	PWR.	SM			PWR - biotite-rich rock with quartz rich zone near 53 feet below ground surface (ft-bgs), readily breaks down into light grey to dark brown, damp to moist, medium dense, silty sand, SM, with high angle foliation.		
									56.0 — 2305.1		
60	SS	67	29-36-21 (57)	27.82	Saprolite, strong odor.	SP			SAND - light brown to grey, moist, medium dense, poorly-graded sand, SP, fine sand, micaceous, some high angle foliation visible.		
									61.0 — 2300.1		
65	SS	83	6-10-13 (23)	16.67	Saprolite, strong odor.	SM			SAND - light brown to orange brown, damp, loose to medium dense, silty sand, SM, fine sand, highly micaceous, low to high angle foliation with oxidized garnets (0.25-inch diameter) present. Quartz rock (1-inch diamter) at base.		
									68.3 — 2292.9		
70	SS	33	7-16-33 (49)	19.68	Saprolite.	SP			SAND - light brown to orange brown, damp, loose to very dense, poorly-graded sand, SP, fine to medium sand, thin bands of mica and irregular foliation present. Oxidized garnets present in the 73-74.5 ft-bgs interval.		
75	SS	56	18-37-50 (87)	12.18	PWR.						

(Continued Next Page)

WELL NUMBER VBW-18B

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics, Inc.
PROJECT NAME (NUMBER) Geotech Investigation for VBW (2115.231)
NORTHING, EASTING 703473.30755, 979799.4782
PROJECT LOCATION 180 Old Bee Tree, Swannanoa, NC

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	FID (ppm)	REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○
75									SAND - light brown to orange brown, damp, loose to very dense, poorly-graded sand, SP, fine to medium sand, thin bands of mica and irregular foliation present. Oxidized garnets present in the 73-74.5 ft-bgs interval. *(continued)*	Bentonite Seal	20 40 60 80
	SS	22	50-50-50 (100)	2.25	PWR.	SP					
80									81.0 — 2280.1 SAND - brown to dark brown, damp, medium dense to very dense, poorly-graded sand, SP, fine to medium sand with minor silt, highly micaceous with high angle foliation.		
	SS	44	27-50-50 (100)	2.39	PWR, slight odor.	SP					
85									87.0 — 2274.1		
	RC Run 1	100 (63)		1.72	Hollow stem auger refusal at 87 feet below ground surface (ft-bgs), top of competent rock at 89.4 ft-bgs.				BEDROCK - white to dark grey, predominantly quartz and feldspar, approximately 25 percent biotite/mafic minerals, biotite-garnet schist, high angle foliation, minor to moderate iron-oxide staining present from 87 to 88.2 ft-bgs. 9 fractures - 1 high angle parallel to foliation, 2 high angle and 6 low angle cross foliation.	Sand #1 2" Standard PVC Sch. 40 0.010" slot	
90	RC Run 2	98 (80)		1.96					89.4 — 2271.7		
95	RC Run 3	100 (100)		2.32	NOTE: boring drilled to 99 ft-bgs, backfilled to 98 ft-bgs with #1 sand.				94.4 — 2266.7 89.4 - 92.8 COMPETENT BEDROCK - grey to black, quartz-feldspar rich rock with wavy bands of biotite/mafic minerals, fine to medium grained, high angle to sub-vertical foliation, biotite-garnet schist. 92.8 - 94.4 COMPETENT BEDROCK - grey to white, quartz-feldspar rich rock with varying amounts of biotite and minor garnet, weakly foliated at high angle, fine grained, metagraywacke. 8 fractures - 2 sub-vertical to high angle parallel to foliation, 2 sub-vertical to high angle and 4 low angle cross foliation. 1 mechanical break.		
									99.0 — 2262.1 COMPETENT BEDROCK - grey to black, biotite, quartz, feldspar, garnet, high angle to vertical foliation, metagraywacke. 2 low angle cross foliation fractures. Boring terminated at 99.0 feet.		

Well Completion Records

MONITORING WELL CONSTRUCTION DATA

9/20/2013	CLIENT: Chemtronics Inc	PROJECT NO: 2115.231

WELL/BORING NO: MW254-L25CD (VBW-10)

PLANE COORDINATES:

NORTH 703378.999

EAST 979455.177

PROJECT NAME: Chemtronics Inc.

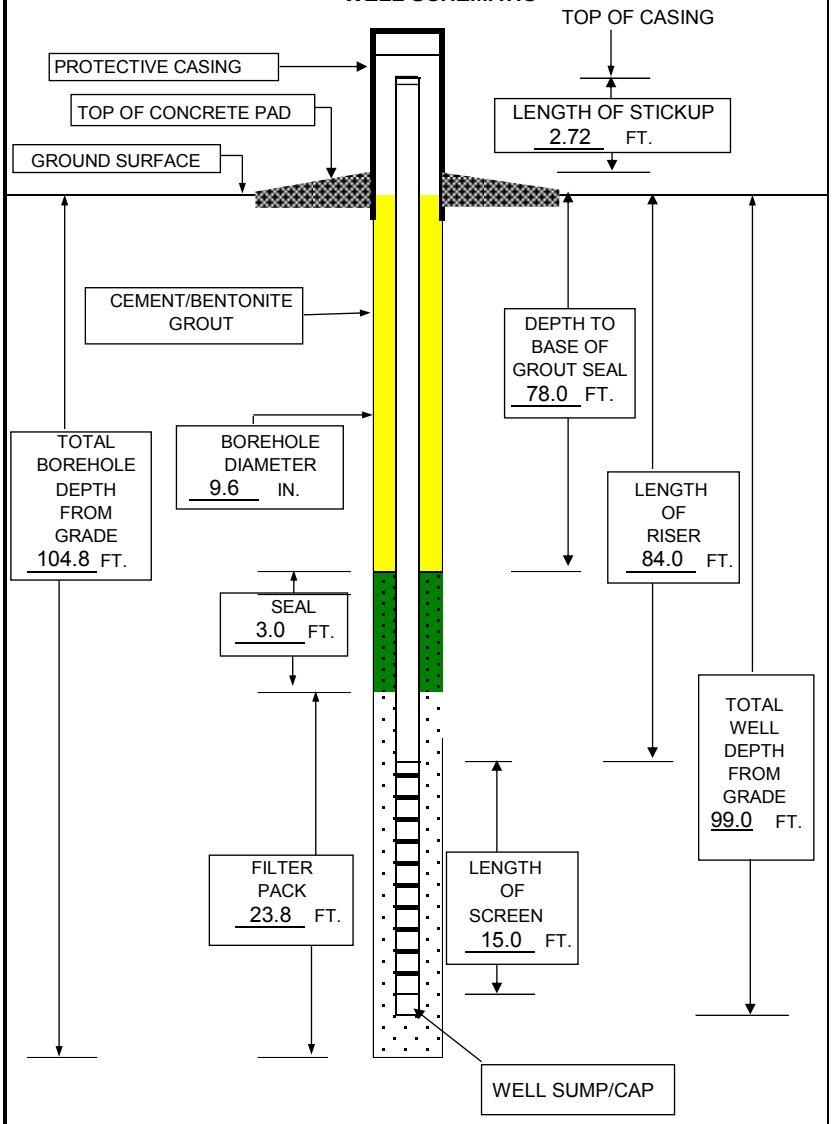
ADDRESS: Swannanoa, NC

TOP OF SLAB ELEVATION: 2366.72

WELL CONTRACTOR: AE Drilling Services

TOP OF CASING ELEVATION: 2369.44

WELL SCHEMATIC



ALL ELEVATIONS ARE IN FEET NGVD

CONSTRUCTION DATA

CASING INFORMATION

MATERIAL: [X] PVC [ ] STAINLESS [ ] CARBON [ ] OTHER _____

DIAMETER: [X] 2" [ ] 4" [ ] 6" [ ] OTHER _____ IN.

JOINTS: [X] THREADED [ ] WELDED [ ] SCREWED [ ] COUPLED [ ] OTHER _____

SCHEDULE: 40

SCREEN INFORMATION

MATERIAL: [X] PVC [ ] STAINLESS [ ] TEFLON [ ] OTHER _____

DIAMETER: [X] 2" [ ] 4" [ ] 6" [ ] OTHER _____ IN

SLOT: [X] 0.010 [ ] 0.020 [ ] OTHER _____ IN

CENTRALIZER: [ ] YES [X] NO

SHOW LOCATION OF CENTRALIZER(S) ON SCHEMATIC

FILTER PACK MATERIAL

20/40 SAND GP #2 (99-104.5 ft-bgs)

OTHER [X] GP #1 (81-99 ft-bgs)

SECONDARY FILTER PACK MATERIAL

SUGAR SAND [ ]

OTHER [ ] _____

BENTONITE WELL SEAL

[ ] 1/2-INCH PELLETS

[ ] 1/4-INCH PELLETS

[X] CHIPS

[ ] OTHER _____

SURFACE PROTECTION

CONCRETE PAD: [X] 3'X3' [ ] 4'X4' [ ] OTHER _____ FT

WELL SUMP/CAP

[X] YES

[ ] NO

LENGTH 0.40 FT.

ALTAMONT ENVIRONMENTAL, INC.
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MONITORING WELL CONSTRUCTION DATA

9/26/2013	CLIENT: Chemtronics Inc	PROJECT NO: 2115.231

WELL/BORING NO: MW255-L25CD (VBW-16)

PLANE COORDINATES:

NORTH 703337.725

EAST 979473.585

PROJECT NAME: Chemtronics Inc.

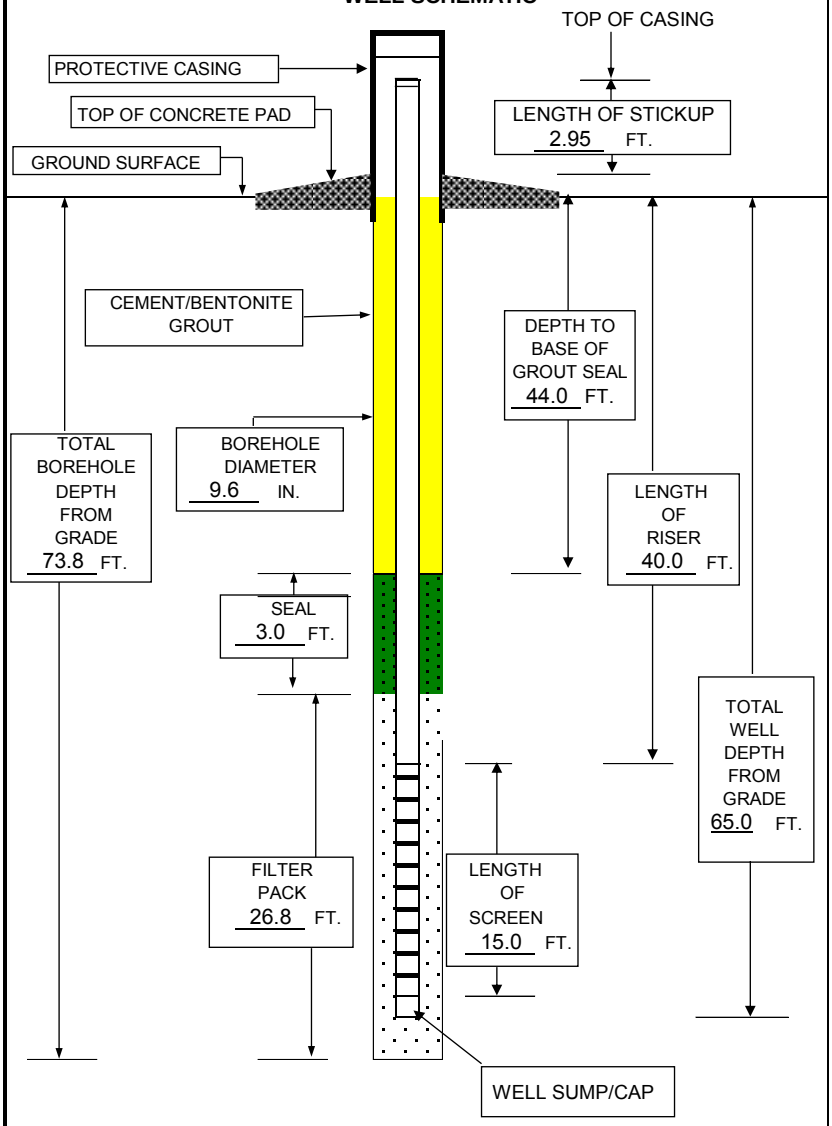
ADDRESS: Swannanoa, NC

TOP OF SLAB ELEVATION: 2367.46

WELL CONTRACTOR: AE Drilling Services

TOP OF CASING ELEVATION: 2370.41

WELL SCHEMATIC



ALL ELEVATIONS ARE IN FEET NGVD

CONSTRUCTION DATA

CASING INFORMATION

MATERIAL: [X] PVC [ ] STAINLESS [ ] CARBON [ ] OTHER

DIAMETER: [X] 2" [ ] 4" [ ] 6" [ ] OTHER IN.

JOINTS: [X] THREADED [ ] WELDED [ ] SCREWED [ ] COUPLED [ ] OTHER

SCHEDULE: 40

SCREEN INFORMATION

MATERIAL: [X] PVC [ ] STAINLESS [ ] TEFLON [ ] OTHER

DIAMETER: [X] 2" [ ] 4" [ ] 6" [ ] OTHER IN

SLOT: [X] 0.010 [ ] 0.020 [ ] OTHER IN

CENTRALIZER: [ ] YES [X] NO

SHOW LOCATION OF CENTRALIZER(S) ON SCHEMATIC

FILTER PACK MATERIAL

20/40 SAND GP #2 (65-73.8 ft-bgs)

OTHER [X] GP #1 (47-65 ft-bgs)

SECONDARY FILTER PACK MATERIAL

SUGAR SAND [ ]

OTHER [ ]

BENTONITE WELL SEAL

[ ] 1/2-INCH PELLETS

[ ] 1/4-INCH PELLETS

[X] CHIPS

[ ] OTHER

SURFACE PROTECTION

CONCRETE PAD: [X] 3'X3' [ ] 4'X4' [ ] OTHER FT

WELL SUMP/CAP

[X] YES

[ ] NO

LENGTH 0.40 FT.

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WWW.ALTAMONTENVIRONMENTAL.COM

MONITORING WELL CONSTRUCTION DATA

11/8/2013	CLIENT: Chemtronics Inc	PROJECT NO: 2115.231

WELL/BORING NO: MW256-M25CD (VBW-17)

PLANE COORDINATES:

NORTH 703388.742

EAST 979667.975

PROJECT NAME: Chemtronics Inc.

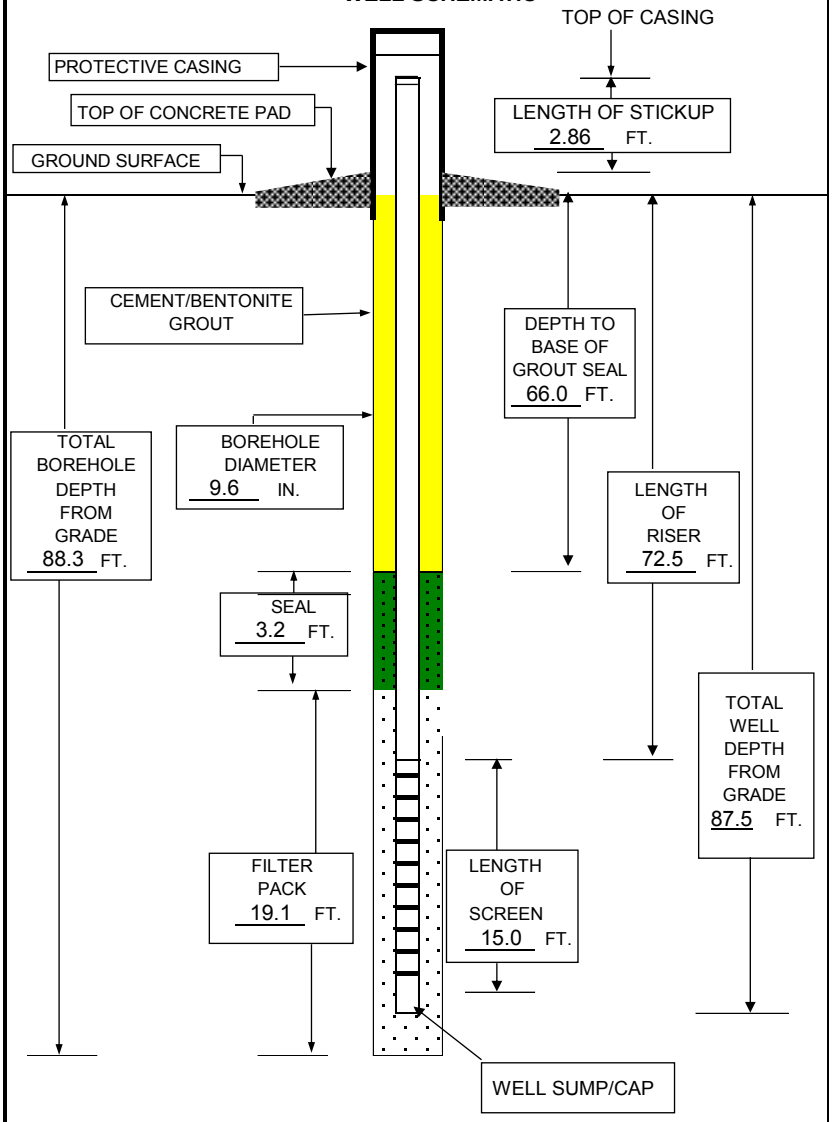
ADDRESS: Swannanoa, NC

TOP OF SLAB ELEVATION: 2356.23

WELL CONTRACTOR: AE Drilling Services

TOP OF CASING ELEVATION: 2359.09

WELL SCHEMATIC



ALL ELEVATIONS ARE IN FEET NGVD

CONSTRUCTION DATA

CASING INFORMATION

MATERIAL: [X] PVC [ ] STAINLESS [ ] CARBON [ ] OTHER _____

DIAMETER: [X] 2" [ ] 4" [ ] 6" [ ] OTHER _____ IN.

JOINTS: [X] THREADED [ ] WELDED [ ] SCREWED [ ] COUPLED [ ] OTHER _____

SCHEDULE: 40

SCREEN INFORMATION

MATERIAL: [X] PVC [ ] STAINLESS [ ] TEFLON [ ] OTHER _____

DIAMETER: [X] 2" [ ] 4" [ ] 6" [ ] OTHER _____ IN

SLOT: [X] 0.010 [ ] 0.020 [ ] OTHER _____ IN

CENTRALIZER: [ ] YES [X] NO

SHOW LOCATION OF CENTRALIZER(S) ON SCHEMATIC

FILTER PACK MATERIAL

20/40 SAND

OTHER [X] GP #1

SECONDARY FILTER PACK MATERIAL

SUGAR SAND [ ]

OTHER [ ] _____

BENTONITE WELL SEAL

[ ] 1/2-INCH PELLETS

[ ] 1/4-INCH PELLETS

[X] CHIPS

[ ] OTHER _____

SURFACE PROTECTION

CONCRETE PAD: [X] 3'X3' [ ] 4'X4' [ ] OTHER _____ FT

WELL SUMP/CAP

[X] YES

[ ] NO

LENGTH 0.40 FT.

ALTAMONT ENVIRONMENTAL, INC.
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MONITORING WELL CONSTRUCTION DATA

11/14/2013	CLIENT: Chemtronics Inc	PROJECT NO: 2115.231

WELL/BORING NO: MW257-M25CD (VBW-18)

PLANE COORDINATES:

NORTH 703467.491

EAST 979780.481

PROJECT NAME: Chemtronics Inc.

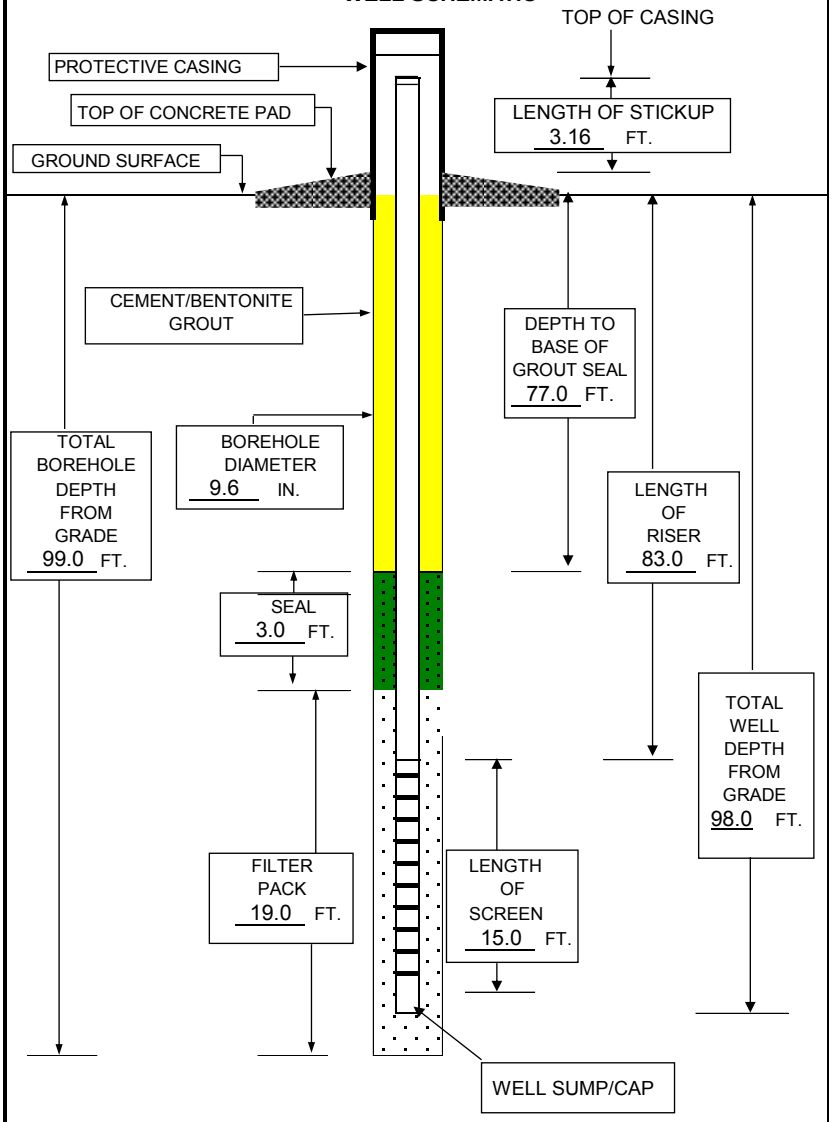
ADDRESS: Swannanoa, NC

TOP OF SLAB ELEVATION: 2360.69

WELL CONTRACTOR: AE Drilling Services

TOP OF CASING ELEVATION: 2363.85

WELL SCHEMATIC



ALL ELEVATIONS ARE IN FEET NGVD

CONSTRUCTION DATA

CASING INFORMATION

MATERIAL: [X] PVC [ ] STAINLESS [ ] CARBON [ ] OTHER _____

DIAMETER: [X] 2" [ ] 4" [ ] 6" [ ] OTHER _____ IN.

JOINTS: [X] THREADED [ ] WELDED [ ] SCREWED [ ] COUPLED [ ] OTHER _____

SCHEDULE: 40

SCREEN INFORMATION

MATERIAL: [X] PVC [ ] STAINLESS [ ] TEFLON [ ] OTHER _____

DIAMETER: [X] 2" [ ] 4" [ ] 6" [ ] OTHER _____ IN

SLOT: [X] 0.010 [ ] 0.020 [ ] OTHER _____ IN

CENTRALIZER: [ ] YES [X] NO

SHOW LOCATION OF CENTRALIZER(S) ON SCHEMATIC

FILTER PACK MATERIAL

20/40 SAND

OTHER [X] GP #1

SECONDARY FILTER PACK MATERIAL

SUGAR SAND [ ]

OTHER [ ] _____

BENTONITE WELL SEAL

[ ] 1/2-INCH PELLETS

[ ] 1/4-INCH PELLETS

[X] CHIPS

[ ] OTHER _____

SURFACE PROTECTION

CONCRETE PAD: [X] 3'X3' [ ] 4'X4' [ ] OTHER _____ FT

WELL SUMP/CAP

[X] YES

[ ] NO

LENGTH 0.40 FT.

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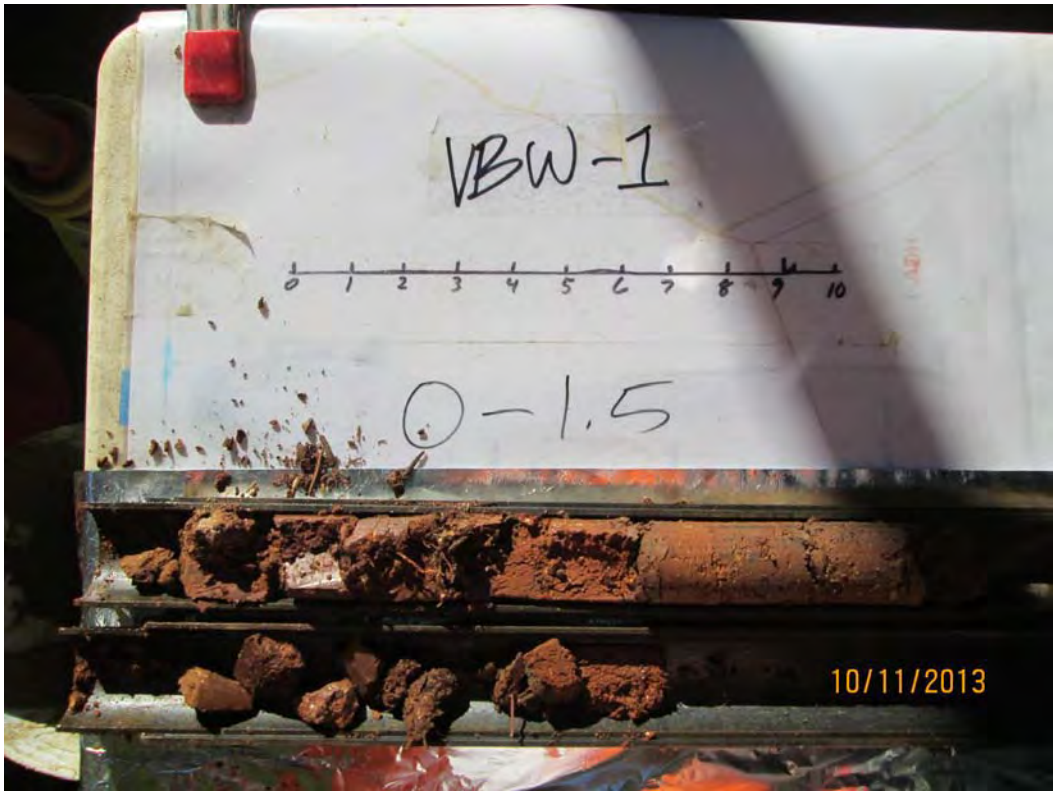
Photographic Logs

VBW-1

10/11/2013 – 10/14/2013

10/11/2013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10/11/2013

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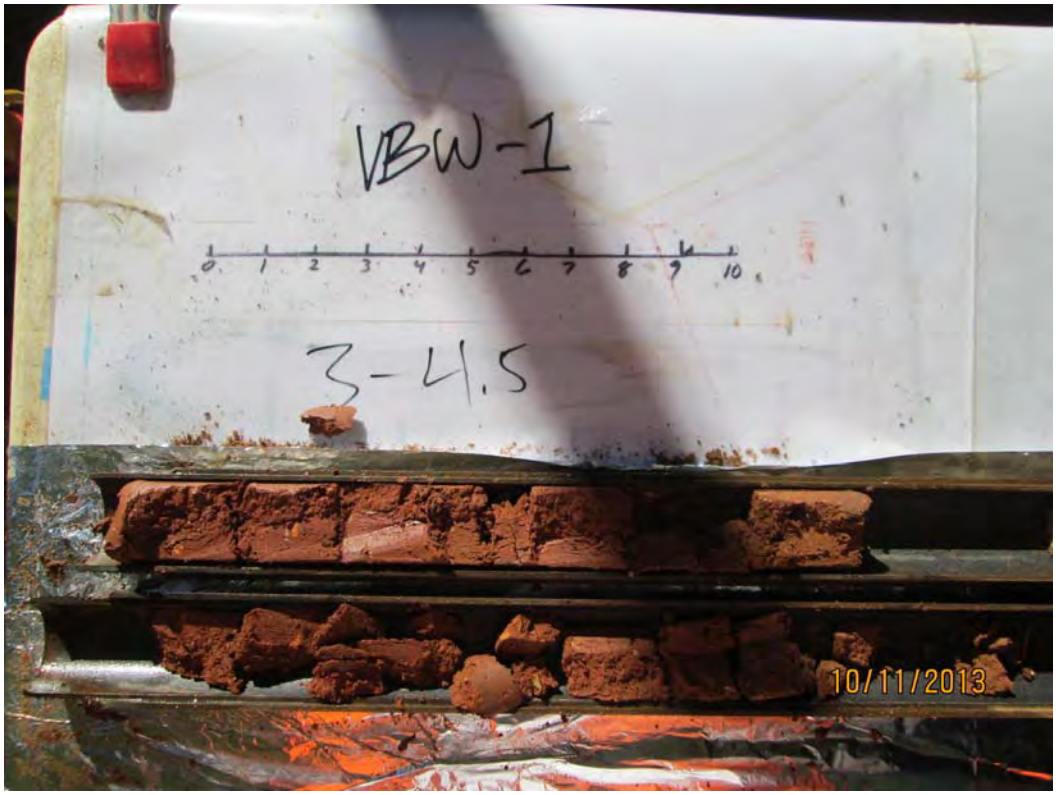
10/11/2013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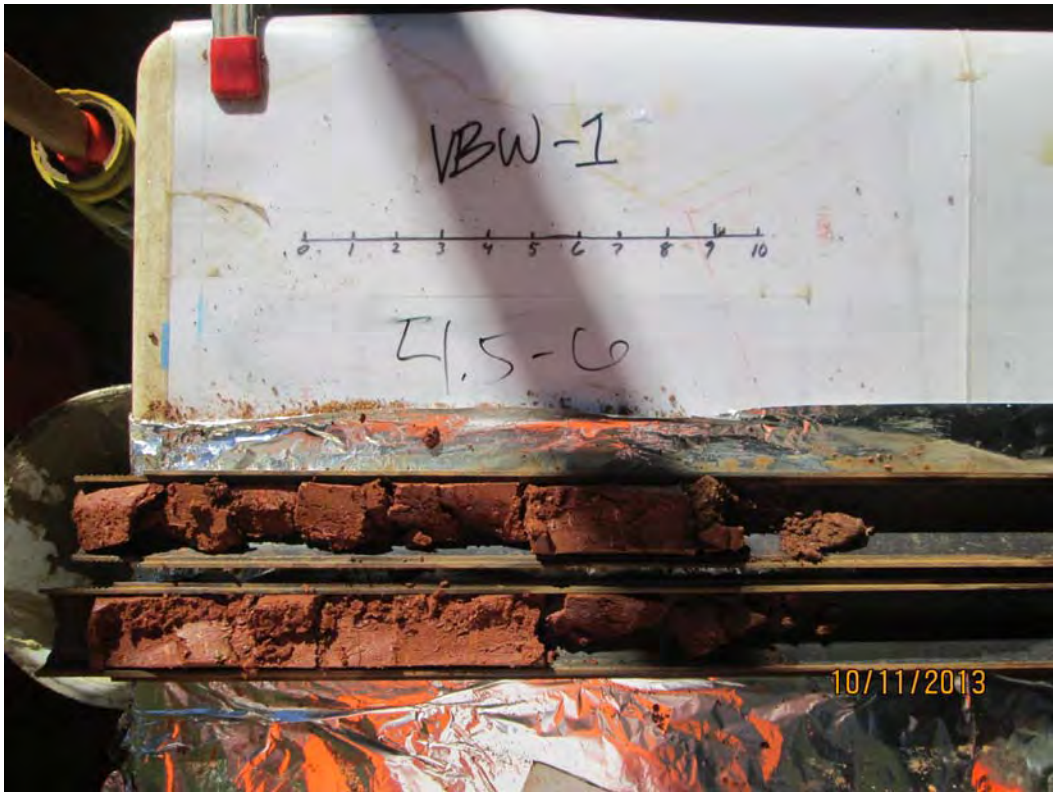
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VBW-1
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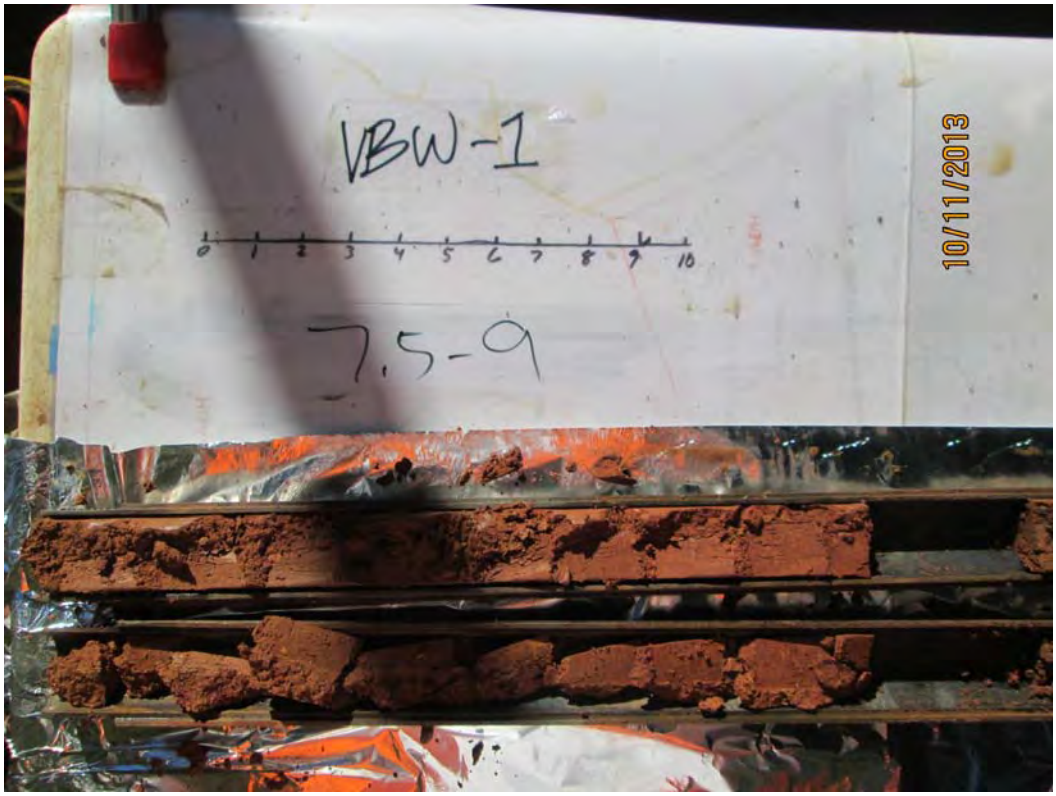
10/11/2013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10/11/2013

VBW-1
0 1 2 3 4 5 6 7 8 9 10
28.5-30
10/11/2013

VBW-1
0 1 2 3 4 5 6 7 8 9 10
28.5 → 29.7
10/11/2013

VBW-1
28.5
CR1
29.7
CR2
34.7
10/11/2013

VBW-1
28.5
CR1
29.7
CR2
34.7
38
10/11/2013

VBW-1
38
44.2
10/14/2013

VBW-2

10/14/2013

Mislabeled. Interval should be 4-5.5.

VBW -2
0 1 2 3 4 5 6 7 8 9 10
9-10.5
10/14/2013

VBW -2
0 1 2 3 4 5 6 7 8 9 10
10' bgs - 2nd
10/14/2013

VBW-2
0 1 2 3 4 5 6 7 8 9 10
10 → 14.7
14.7 → 19.8
14.7
10/14/2013

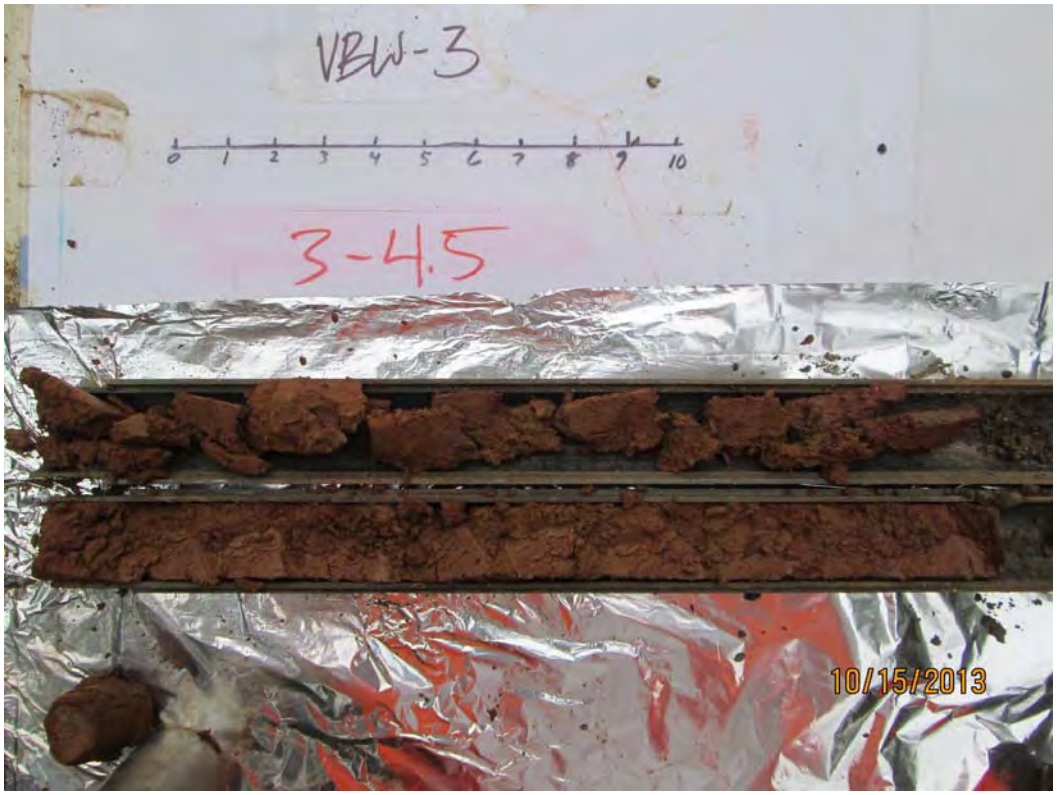
VBW-3

10/15/2013

10/15/2013

VBW-3
0 1 2 3 4 5 6 7 8 9 10
0-1.5
10/15/2013

VBW-3
0 1 2 3 4 5 6 7 8 9 10
1.5-3
10/15/2013


VBW-3
0 1 2 3 4 5 6 7 8 9 10
3-4.5
10/15/2013

VBW-3
0 1 2 3 4 5 6 7 8 9 10
4.5-6
10/15/2013

VBW-3
0 1 2 3 4 5 6 7 8 9 10
6-7.5
10/15/2013

VBW-3
0 1 2 3 4 5 6 7 8 9 10
7.5-9
10/15/2013

VBW-3
0 1 2 3 4 5 6 7 8 9 10
9-10.5
10/15/2013

VBW-3
10.5-12
10/15/2013

VBW-3
12-13.5
10/15/2013

VBW-3
0 1 2 3 4 5 6 7 8 9 10
13.5-15
10/15/2013

VBW-3
0 1 2 3 4 5 6 7 8 9 10
15-16.5
10/15/2013

VBW-3
0 1 2 3 4 5 6 7 8 9 10
16.5-18
10/15/2013

VBW-3
0 1 2 3 4 5 6 7 8 9 10
18-19.5
10/15/2013

VBW-3
19.5-21
10/15/2013

VBW-3
21-22.5
10/15/2013

VBW-3
0 1 2 3 4 5 6 7 8 9 10
22.5-24
10/15/2013

VBW-3
0 1 2 3 4 5 6 7 8 9 10
24-25.5
10/15/2013

VBW-3
25.5-27
10/15/2013

VBW-3
27-28.5
10/15/2013

VBW-3
0 1 2 3 4 5 6 7 8 9 10
28.5-30
10/15/2013

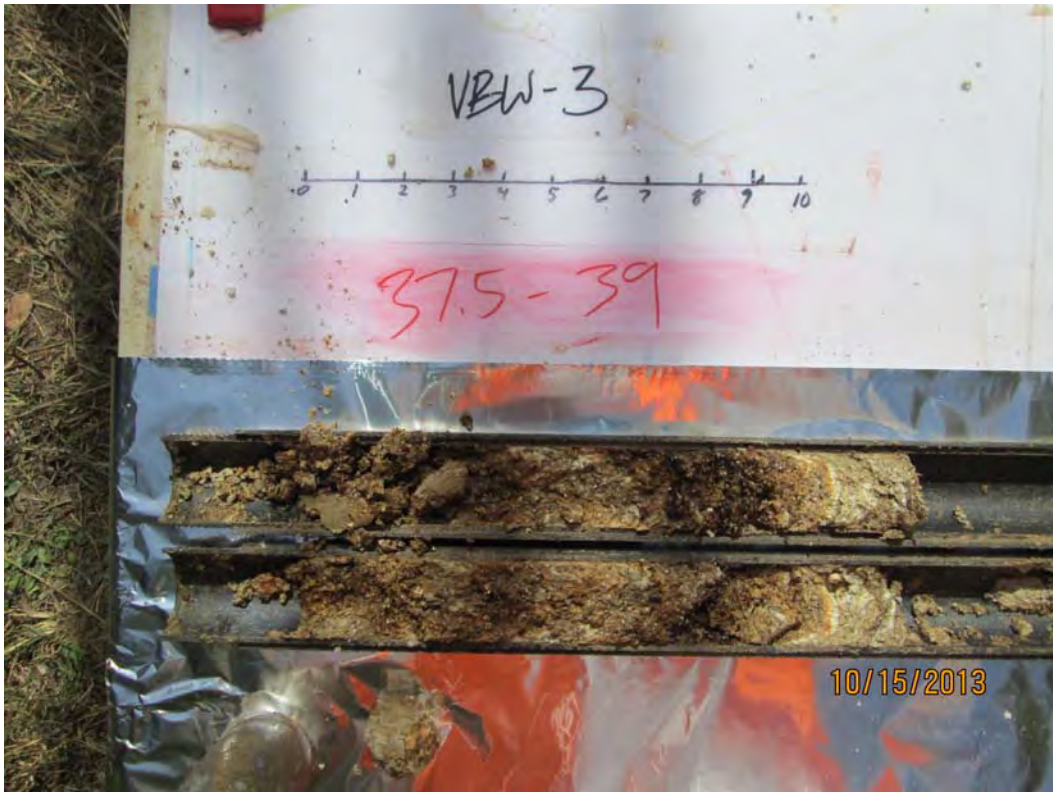
VBW-3
0 1 2 3 4 5 6 7 8 9 10
30-31.5
10/15/2013

VBW-3
0 1 2 3 4 5 6 7 8 9 10
31.5-33
10/15/2013

VBW-3
0 1 2 3 4 5 6 7 8 9 10
33-34.5
10/15/2013

VBW-3
34.5-36
10/15/2013

VBW-3
36-37.5
10/15/2013


VBW-3
0 1 2 3 4 5 6 7 8 9 10
37.5 - 39
10/15/2013

VBW-3
0 1 2 3 4 5 6 7 8 9 10
39
44
10/15/2013

VBW-3
44
49.3
10/15/2013

VBW-4A and VBW-4B

10/16/2013

10/16/2013

VBW-4
0 1 2 3 4 5 6 7 8 9 10
0-1.5
10/16/2013

VBW-4
0 1 2 3 4 5 6 7 8 9 10
2.5-4
10/16/2013

VBW-4B
0 1 2 3 4 5 6 7 8 9 10
2.5-4
10/16/2013

VBW-4B
0 1 2 3 4 5 6 7 8 9 10
7.5-9
10/16/2013

VBW-4B
0 1 2 3 4 5 6 7 8 9 10
12.5-14
10/16/2013

Sample VBW-04B 17.5-19 not photographed

No Sample

Sample VBW-04B 27.5-29 not photographed

Sample VBW-04B 32.5-34 not photographed

No Sample

VBW-4B
0 1 2 3 4 5 6 7 8 9 10
37.5-39
10/16/2013

VBW-4B
0 1 2 3 4 5 6 7 8 9 10
42.5-44
10/16/2013

VBW-4B
0 1 2 3 4 5 6 7 8 9 10
47.5-49
10/16/2013

VBW-4B
0 1 2 3 4 5 6 7 8 9 10
52.5-54
10/16/2013

VBW-4B
0 1 2 3 4 5 6 7 8 9 10
57.5 59
10/16/2013

VBW-4B
0 1 2 3 4 5 6 7 8 9 10
62.5-64
10/16/2013

VBW-4B
64.5
68.5
73.3
78.3
10/17/2013

VBW-4B
78.3
83.3
NQ BTM
10/17/2013

10/17/2013
VBW-4B
0 1 2 3 4 5 6 7 8 9 10
83.3
88.9
IQ BTM

VBW-5

10/22/2013 – 10/23/2013

310K EP
10/23/2013

VBW-5
0 1 2 3 4 5 6 7 8 9 10
0-1.5
10/22/2013

VBW-5
4-5.5
10/22/2013

VBW-5
9-10.5
10/22/2013

VBW-5
14-15.5
10/22/2013

VBW-5
19-20.5
10/22/2013

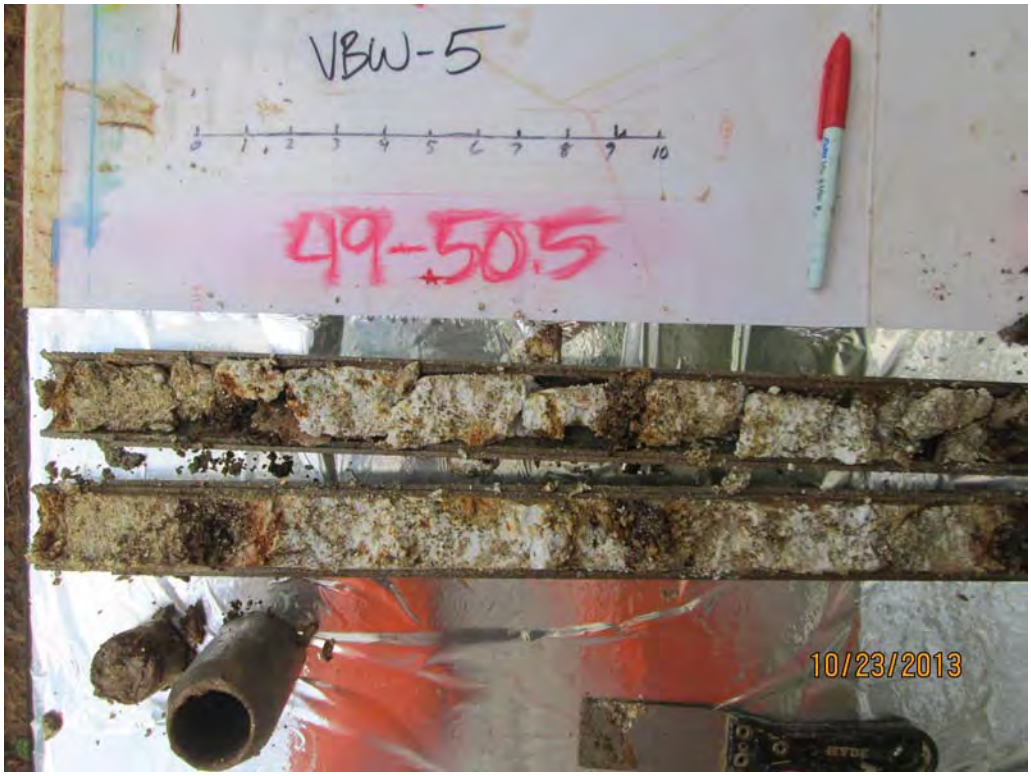
VBW-5
24-25.5
10/22/2013

VBW-5
29-30.5
10/22/2013

VBW-5
34-39.5
10/22/2013

VBW-5
39-40.5
10/23/2013

VBW-5
0 1 2 3 4 5 6 7 8 9 10
44-45.5
10/23/2013


VBW-5
0 1 2 3 4 5 6 7 8 9 10
49-50.5
10/23/2013

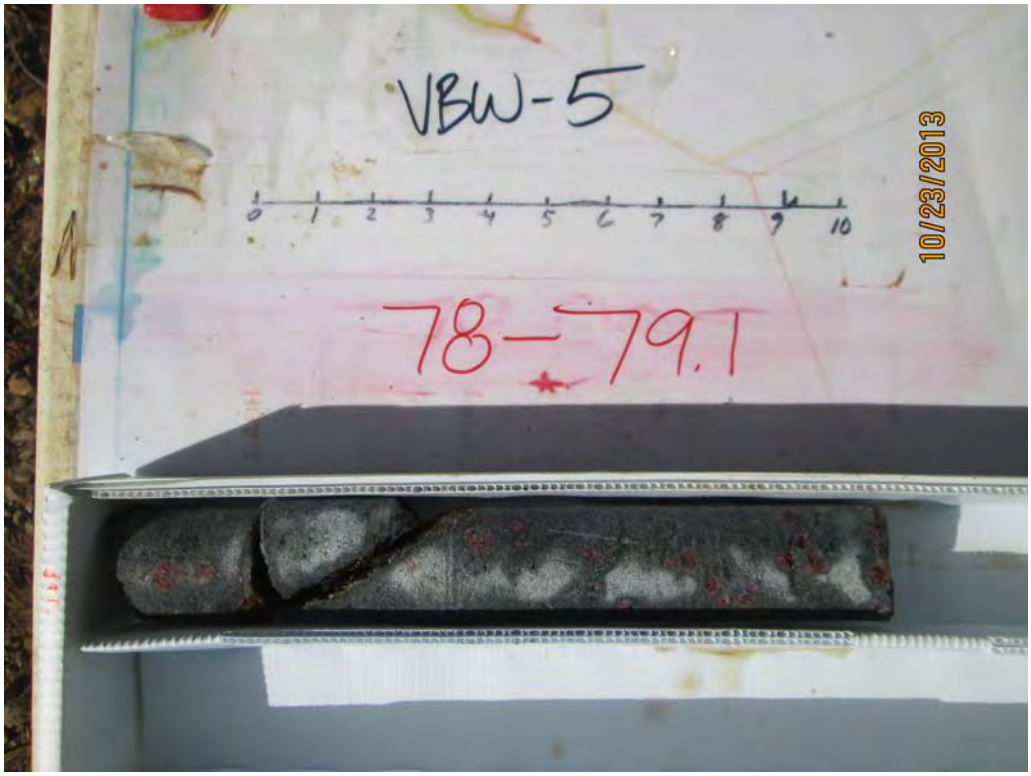
VBW-5
0 1 2 3 4 5 6 7 8 9 10
54-55.5
10/23/2013

VBW-5
0 1 2 3 4 5 6 7 8 9 10
59-60.5
10/23/2013

VBW-5
64-65.5
10/23/2013

VBW-5
69-70.5
10/23/2013

VBW-5
0 1 2 3 4 5 6 7 8 9 10
74-75.5
10/23/2013


VBW-5
0 1 2 3 4 5 6 7 8 9 10
78-79.1
10/23/2013

VBW-5
79.1-89
10/23/2013

VBW-5
0 1 2 3 4 5 6 7 8 9 10
79.1-89
10/23/2013

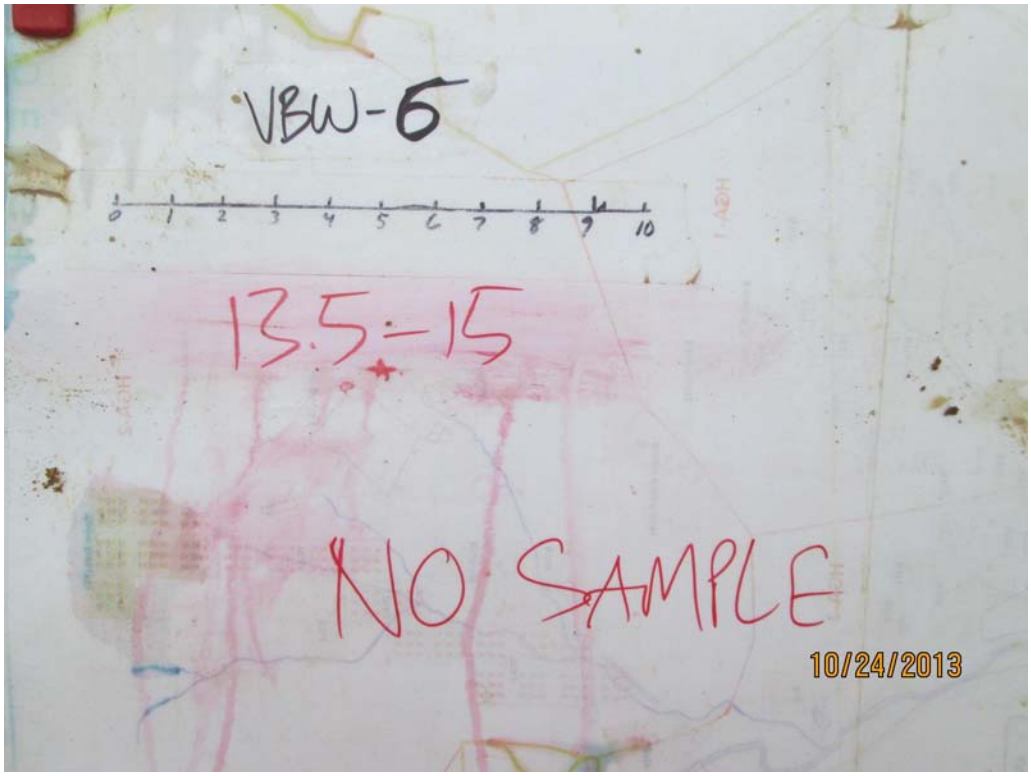
VBW-6

10/24/2013 – 10/25/2013

10/24/2013

VBW-6
0 1 2 3 4 5 6 7 8 9 10
35-5
10/24/2013

VBW-6
0 1 2 3 4 5 6 7 8 9 10
8.5-10
10/24/2013


VBW-6
0 1 2 3 4 5 6 7 8 9 10
13.5-15
NO SAMPLE
10/24/2013

VBW-6
0 1 2 3 4 5 6 7 8 9 10
18.5-20
10/24/2013

VBW-6
0 1 2 3 4 5 6 7 8 9 10
23.5-25
10/24/2013

VBW-6
285-30
10/24/2013

VBW-6
335-35
10/24/2013

VBW-6
0 1 2 3 4 5 6 7 8 9 10
38.5-40
10/24/2013

VBW-6
0 1 2 3 4 5 6 7 8 9 10
43.5-45
10/24/2013

VBW-6
0 1 2 3 4 5 6 7 8 9 10
48.5-50
10/24/2013

VBW-6
0 1 2 3 4 5 6 7 8 9 10
53.5-55
10/24/2013

VBW-6
0 1 2 3 4 5 6 7 8 9 10
58.5-60
10/24/2013

VBW-6
0 1 2 3 4 5 6 7 8 9 10
63.5-65
10/24/2013

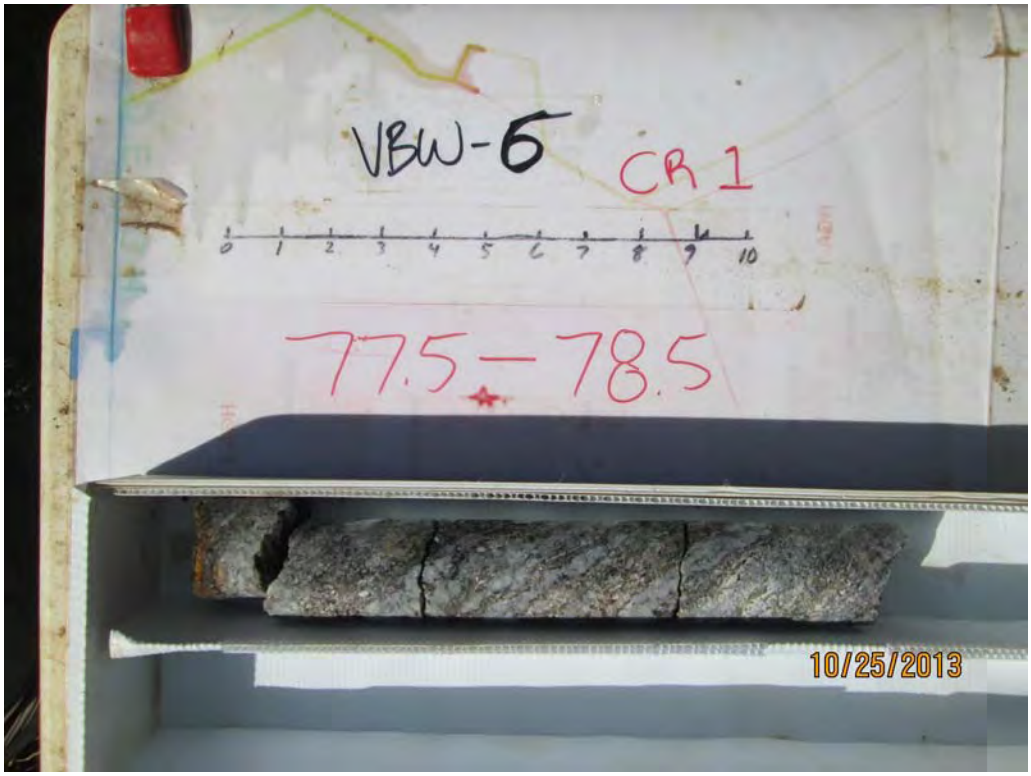
VBW-6
0 1 2 3 4 5 6 7 8 9 10
68.5-70
10/24/2013

VBW-6
0 1 2 3 4 5 6 7 8 9 10
73.5-75
10/24/2013

10/25/2013

10/25/2013

CAUTION
10/25/2013


VBW-5
CR 1
0 1 2 3 4 5 6 7 8 9 10
77.5 – 78.5
10/25/2013

VBW-5 CR 2
78.5-88.7
10/25/2013

VBW-7

10/08/2013 – 10/10/2013

10/08/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
0- 1.5
10/08/2013

1.5-3
10/08/2013

VBW-
3-4.5
10/08/2013

0 1 2 3 4 5 6 7 8 9 10
4.5-6
10/08/2013

VBW-7
0 1 2 3 4 5 6 7 8 9 10
6-7.5
10/08/2013

Sample VBW-07 9-10.5 not photographed

No Sample

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
10.5-12
10/08/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
12-13.5
10/08/2013

VBW- 7
13.5-15
10/08/2013

VBW- 7
15-16.5
10/08/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
16.5-18
10/08/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
18-19.5
10/08/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
19.5-21
10/08/2013

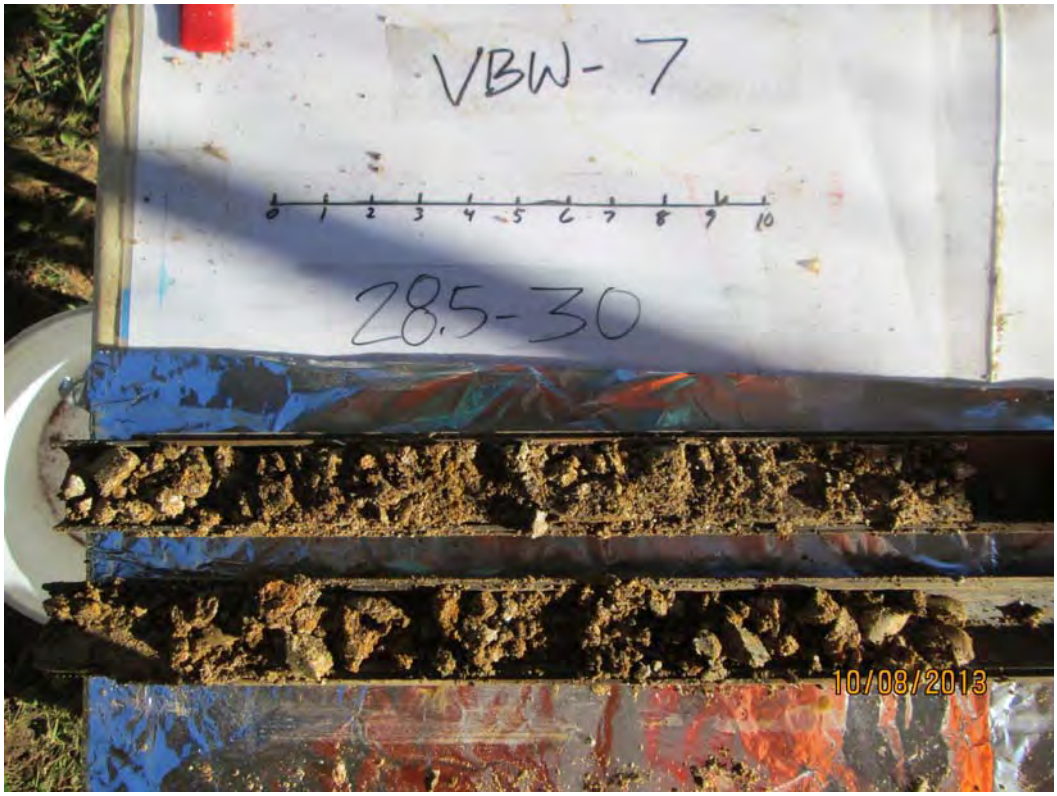
VBW- 7
0 1 2 3 4 5 6 7 8 9 10
21-22.5
10/08/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
22.5-24
10/08/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
24-25.5
10/08/2013

VBW- 7
25.5-27
10/08/2013

VBW- 7
27-28.5
10/08/2013


VBW- 7
0 1 2 3 4 5 6 7 8 9 10
28.5-30
10/08/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
30-31.5
10/08/2013

VBW- 7
31.5-33
10/08/2013

VBW- 7
32-34.5
10/08/2013

VBW- 7
34.5-36
10/08/2013

VBW- 7
36-37.5
10/08/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
37,5-39
10/08/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
39-40,5
10/08/2013

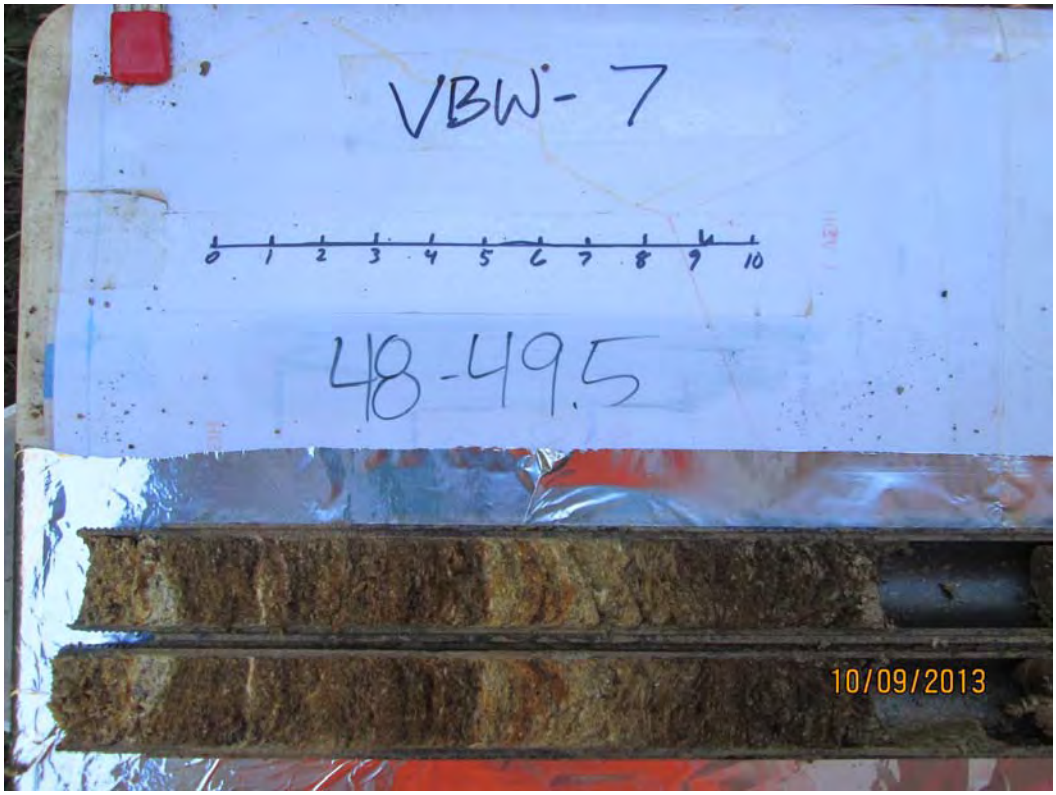
VBW- 7
0 1 2 3 4 5 6 7 8 9 10
40.5-42
10/08/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
42-43.5
10/08/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
43.5-45
10/09/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
45-46.5
10/09/2013

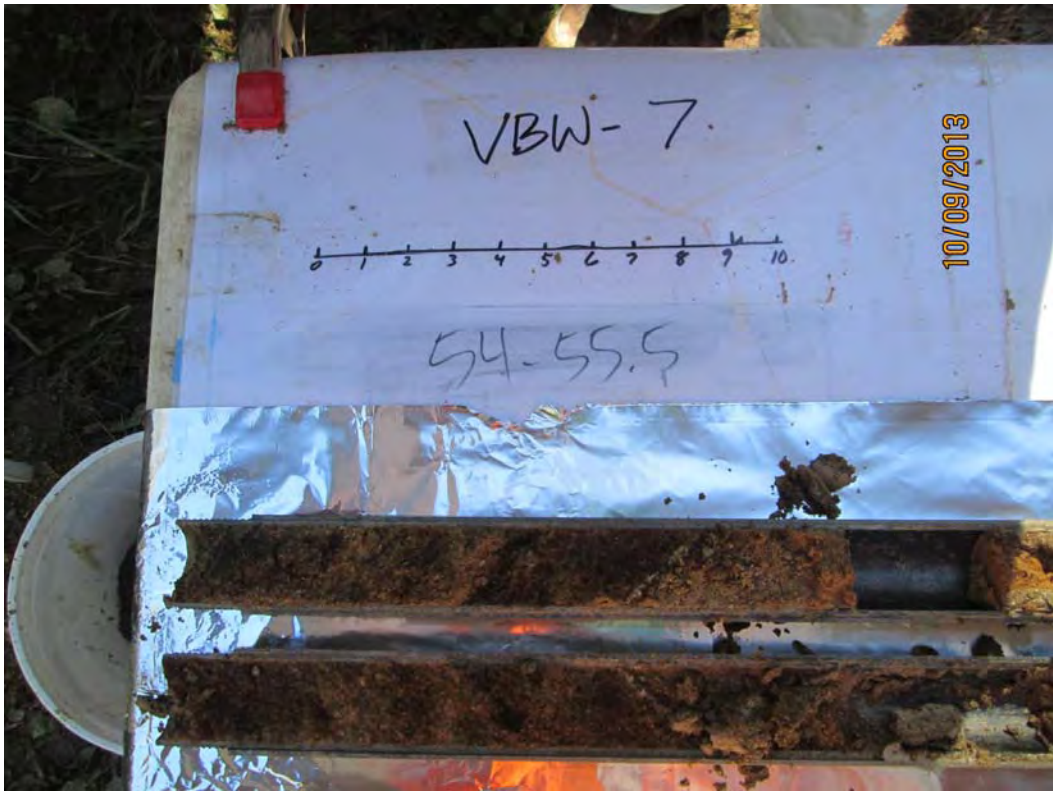
VBW- 7
0 1 2 3 4 5 6 7 8 9 10
46.5-48
10/09/2013


VBW- 7
0 1 2 3 4 5 6 7 8 9 10
48-49.5
10/09/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
49.5-51
10/09/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
51-52.5
10/09/2013

VBW- 7
52.5-54
10/09/2013


VBW- 7
54-55.5
10/09/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
555-57
10/09/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
57-585
10/09/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
58.5 -60
10/09/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
60-61.5
10/09/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
61.5-63
10/09/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
63-64.5
10/09/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
64.5-66
10/09/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
66-67.5
10/09/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
67.5-69
10/09/2013

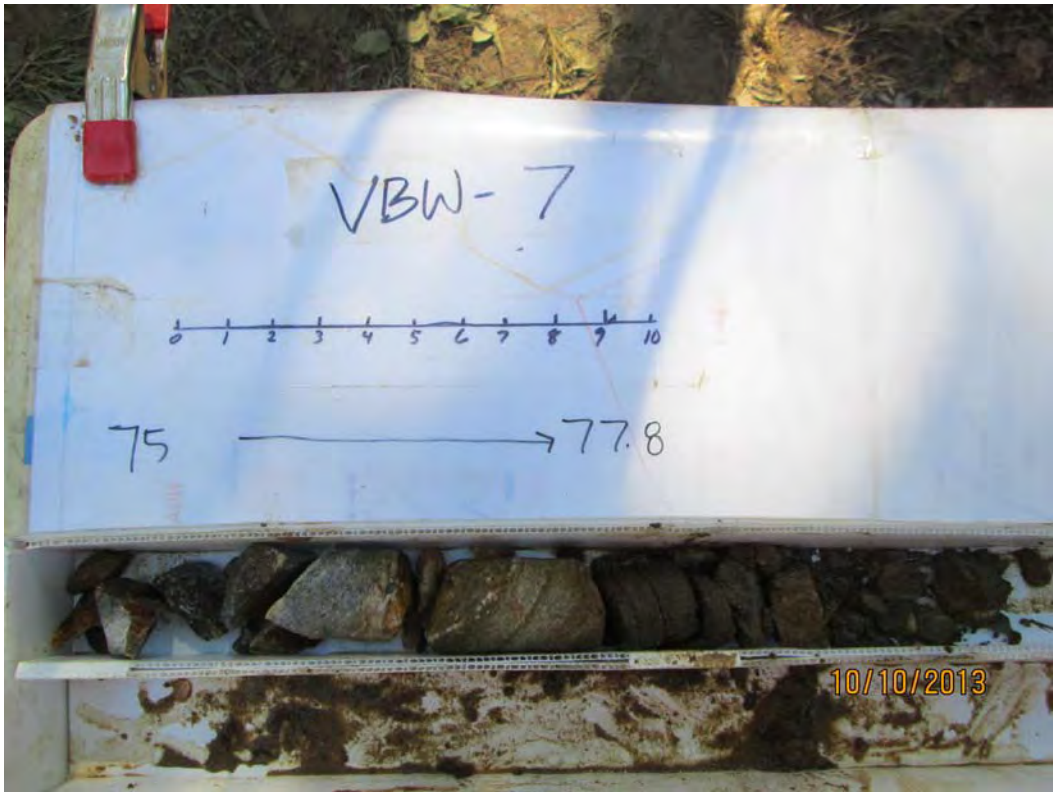
VBW- 7
0 1 2 3 4 5 6 7 8 9 10
69-70.5
10/09/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
70.5-72
10/09/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
72-73.5
10/09/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
73.5-75
10/09/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
75-76.5
10/09/2013


VBW- 7
0 1 2 3 4 5 6 7 8 9 10
75
77.8
10/10/2013

VBW- 7
0 1 2 3 4 5 6 7 8 9 10
77.8
80
10/10/2013

VBW- 7
80
84.6
10/10/2013

VBW- 7
84.6
89.6
10/10/2013

VBW-8

10/28/2013 – 10/30/2013

10/28/2013

VBW-8
0 1 2 3 4 5 6 7 8 9 10
4-5.5
10/28/2013

Sample VBW-08 14-15.5 not photographed

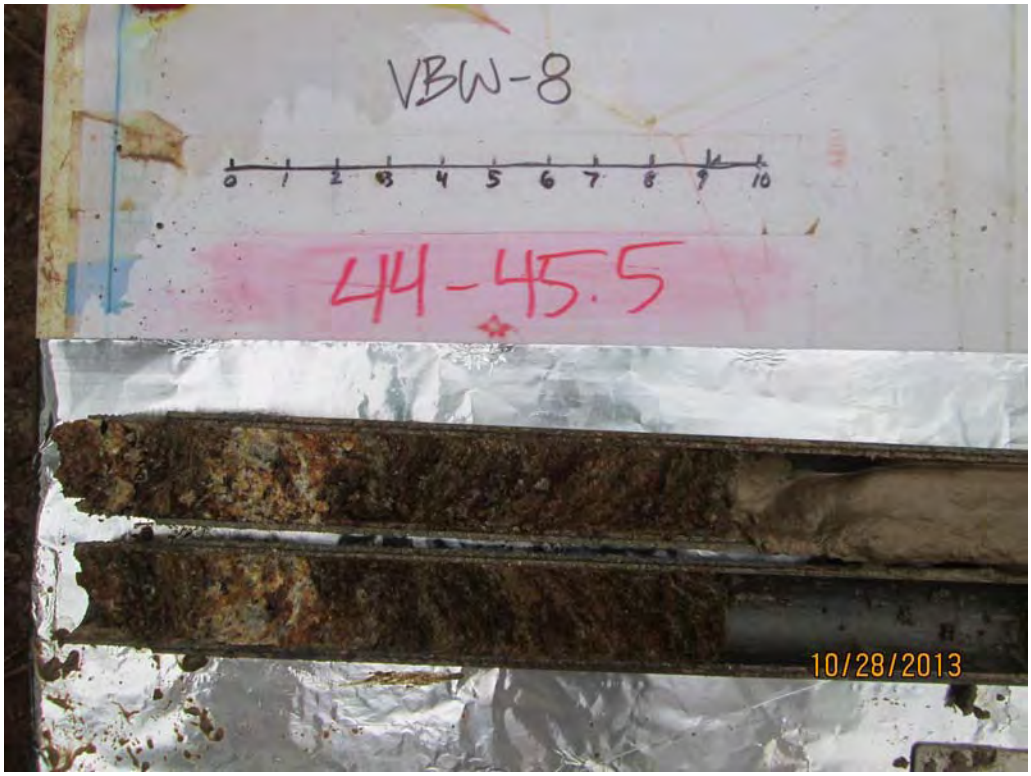
No Sample

Sample VBW-08 19-20.5 not photographed

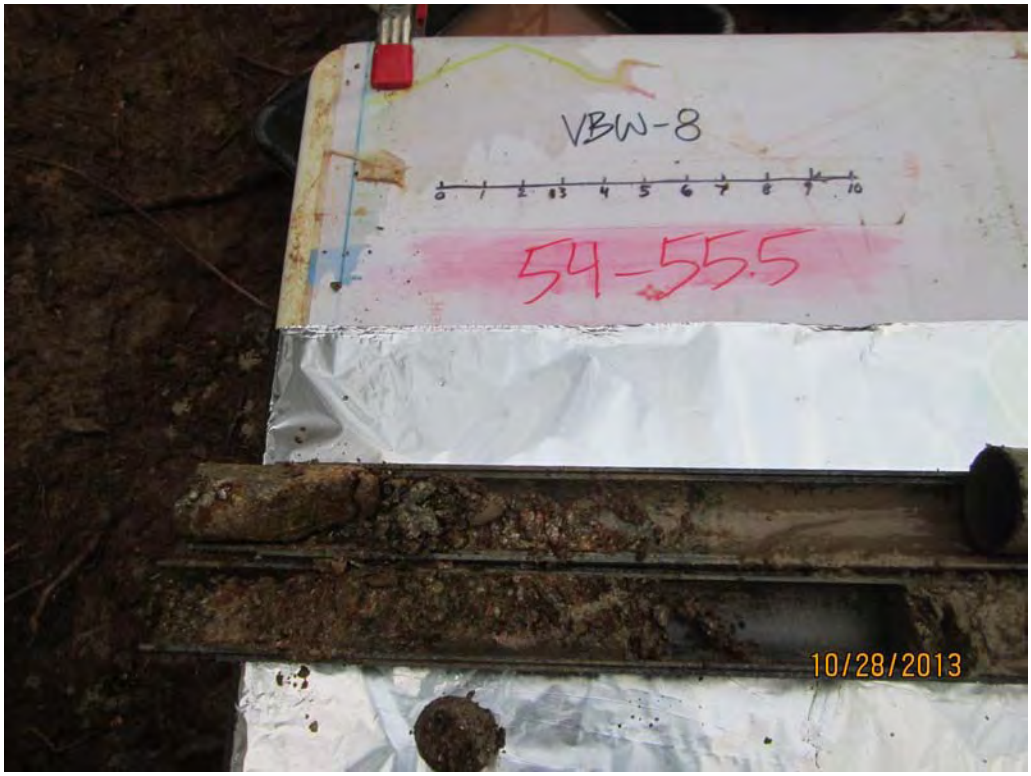
VBW-8
0 1 2 3 4 5 6 7 8 9 10
29-30.5
10/28/2013

VBW-8
0 1 2 3 4 5 6 7 8 9 10
34-35.5
10/28/2013

VBW-8
0 1 2 3 4 5 6 7 8 9 10
39-40.5
10/28/2013


VBW-8
0 1 2 3 4 5 6 7 8 9 10
44-45.5
10/28/2013

VBW-8
0 1 2 3 4 5 6 7 8 9 10
49-50.5
10/28/2013


VBW-8
0 1 2 3 4 5 6 7 8 9 10
54-55.5
10/28/2013

VBW-8
0 1 2 3 4 5 6 7 8 9 10
59-60.5
10/29/2013

VBW-8
0 1 2 3 4 5 6 7 8 9 10
64-65.5
10/29/2013

VBW-8
0 1 2 3 4 5 6 7 8 9 10
69-70.5
10/29/2013

VBW-8
0 1 2 3 4 5 6 7 8 9 10
74-75.5
10/29/2013

VBW-8
0 1 2 3 4 5 6 7 8 9 10
79-80.5
10/29/2013

VBW-8
0 1 2 3 4 5 6 7 8 9 10
80.5-85.1
10/30/2013

VBW-8
0 1 2 3 4 5 6 7 8 9 10
85.1-89.5
NO BTM
10/30/2013

VBW-8
89.5
94.5
94.5
10/30/2013

VBW-8
94.5-104.5
NQ BTM
10/30/2013

VBW-9

11/04/2013 – 11/06/2013

11/04/2013

VBW-9
0 1 2 3 4 5 6 7 8 9 10
4-5.5
11/04/2013

VBW-9
0 1 2 3 4 5 6 7 8 9 10
9-10.5
11/04/2013

VBW-9
0 1 2 3 4 5 6 7 8 9 10
14-15.5
11/04/2013

VBW-9
0 1 2 3 4 5 6 7 8 9 10
19-20.5
11/04/2013

VBW-9
0 1 2 3 4 5 6 7 8 9 10
24-25.5
11/04/2013

VBW-9
0 1 2 3 4 5 6 7 8 9 10
29-30.5
11/04/2013

VBW-9
0 1 2 3 4 5 6 7 8 9 10
34-35.5
11/04/2013

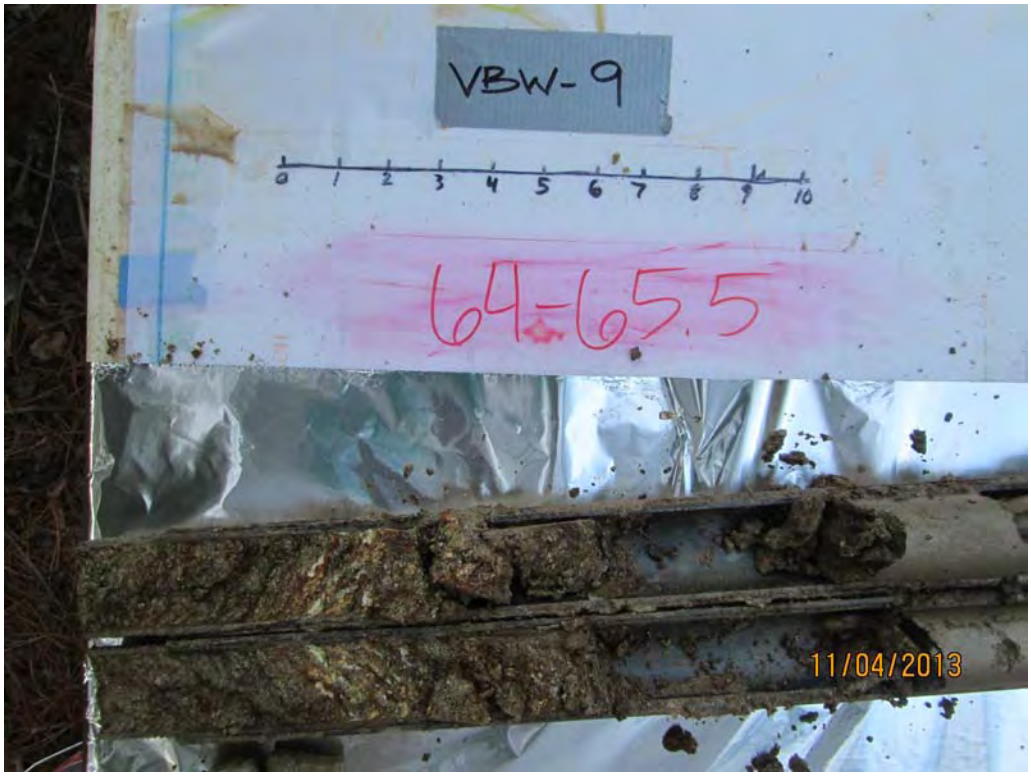
VBW-9
0 1 2 3 4 5 6 7 8 9 10
39-40.5
11/04/2013

VBW-9
0 1 2 3 4 5 6 7 8 9 10
44-45.5
11/04/2013

VBW-9
0 1 2 3 4 5 6 7 8 9 10
49-50.5
11/04/2013

VBW-9
0 1 2 3 4 5 6 7 8 9 10
54-55.5
11/04/2013

VBW-9
0 1 2 3 4 5 6 7 8 9 10
59-60.5
11/04/2013


VBW-9
0 1 2 3 4 5 6 7 8 9 10
64-65.5
11/04/2013

VBW-9
0 1 2 3 4 5 6 7 8 9 10
69-70.5
11/04/2013

VBW-9
0 1 2 3 4 5 6 7 8 9 10
74-75.5
11/05/2013

VBW-9
79-80.5
11/05/2013

VBW-9
84-85.5
11/05/2013

VBW-9
85.5 – 89.3
89.3 – 93.9
11/05/2013

VBW-9
93.9 – 98.9
11/05/2013

VBW-9
98.9
103.9
108.9
11/05/2013

VBW-9
108.9
118.9
11/06/2013

VBW-9
118.9—129.1
11/06/2013

11/06/2013

VBW-10

09/18/2013 – 09/20/2013

USC GAMECOCKS

BORING NAME
VBW-10
3"
3"
6"
INTERVAL
0 - 1.5'

BORING NAME
VBW-10
INTERVAL
1.5 - 3.0
3"
3"
6"

BORING NAME
VBW-10
INTERVAL
3 - 4.5
3"
3"
6"

Sample VBW-10 6-7.5 not photographed

BORING NAME
VBW-10
INTERVAL
7.5 – 9.0
3"
3"
6"

BORING NAME
VBW-10
INTERVAL
9.0 · 10.5
3"
3"
6"
Ziploc

BORING NAME
VBW-10
INTERVAL
10.5 - 11.0
3"
3"
6"

10.5 to 12.0

BORING NAME
VBW-10
INTERVAL
12.0 13.5
3"
6"

BORING NAME
VBW-10
INTERVAL
13.5-15.0
3"
3"
6"

BORING NAME
VBW-10
INTERVAL.
15.0-16.5
3"
3"
6"

VBW-10
16.6-18.0

BORING NAME
VBW-10
INTERVAL
18-19.5
3"
3"
6"

BORING NAME
VBW-10
19.5-21

BORING NAME
VBW-10
INTERVAL
21.0-22.5

BORING NAME
VBW-10
INTERVAL
22.5 to 24.0
3"
3"
6"

BORING NAME
VBW-10
INTERVAL
24- 25.5
3"
3"
6"
VBW- 10
24-25.5

BORING NAME
VBW-10
INTERVAL
25.5 - 27

BORING NAME
VBW-10
INTERVAL
27 to 28.5

BORING NAME
VBW-10
INTERVAL
28.5 - 30

BORING NAME
VBW-10
INTERVAL
30 - 31.5

BORING NAME
VBW-10
INTERVAL
31.5-33
3"
3"
6"

BORING NAME
VBW-10
INTERVAL
33-34.5
3"
3"
6"

VBW-10
34.5-36

BORING NAME
VBW-10
INTERVAL
36 - 37.5

← TOP
1"
4"
2.25"
10"
3 1/4"

39-44

TOP VBW 10
74 | 74
79 | 79
84 | 84
89 | 89

VBW-10
89-99
1-20-13
89-94-RQD 68%
94-99-RQD-85%

VBW-10
99-104
RQD=89%
99
109

VBW-11

10/18/2013

10/18/2013

VBW-11
0 1 2 3 4 5 6 7 8 9 10
0-1.5
10/18/2013

VBW-11
0 1 2 3 4 5 6 7 8 9 10
3-4.5
10/18/2013

VBW-11
0 1 2 3 4 5 6 7 8 9 10
8-9.5
10/18/2013

VBW-11
0 1 2 3 4 5 6 7 8 9 10
13—14.5
10/18/2013

VBW-11
0 1 2 3 4 5 6 7 8 9 10
18-19.5
10/18/2013

VBW-11
23-24.5
10/18/2013

VBW-11
28-29.5
10/18/2013

Sample VBW-11 38-39.5 not photographed

No Sample

Sample VBW-11 48-49.5 not photographed

VBW-11
0 1 2 3 4 5 6 7 8 9 10
53-54.5
10/18/2013

VBW-11
0 1 2 3 4 5 6 7 8 9 10
58-59.5
10/18/2013

VBW-11
0 1 2 3 4 5 6 7 8 9 10
63-64.5
10/18/2013

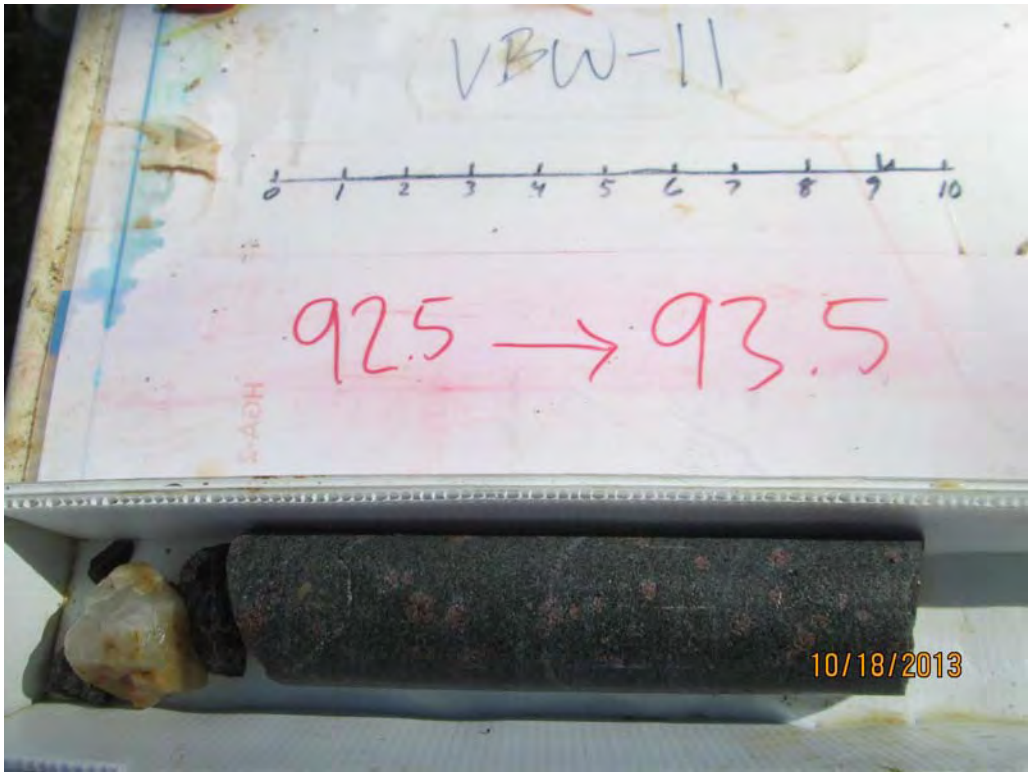
VBW-11
0 1 2 3 4 5 6 7 8 9 10
68-69.5
10/18/2013

VBW-11
0 1 2 3 4 5 6 7 8 9 10
73-74.5
10/18/2013

VBW-11
0 1 2 3 4 5 6 7 8 9 10
78-79.5
10/18/2013

VBW-11
0 1 2 3 4 5 6 7 8 9 10
83-84.5
10/18/2013

VBW-11
0 1 2 3 4 5 6 7 8 9 10
88-89.5
10/18/2013


VBW-11
0 1 2 3 4 5 6 7 8 9 10
92.5 → 93.5
10/18/2013

VBW-11
93.5 – 103.5
10/18/2013

VBW-12

10/21/2013 – 10/22/2013

10/21/2013

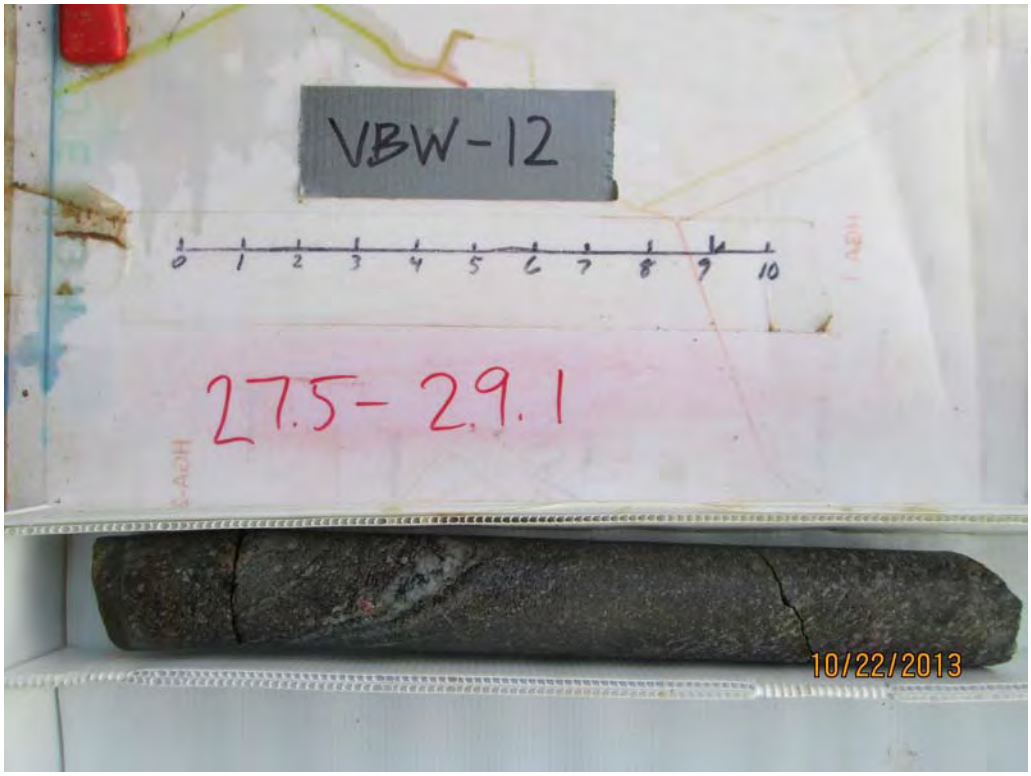
VBW-12
4-5.5
10/21/2013

VBW-12
8-9.5
10/21/2013

VBW-12
13-14.5
10/21/2013

VBW-12
18-19.5
10/21/2013

VBW-12
23-24.5
10/21/2013


VBW-12
0 1 2 3 4 5 6 7 8 9 10
27.5-29.1
10/22/2013

VBW-12
10/22/2013

VBW-13

10/02/2013

VBW-13
INTERVAL
0-1.5
0
3
6
10/02/2013

VBW-13
INTERVAL
1.5-3
0
3
6
10/02/2013

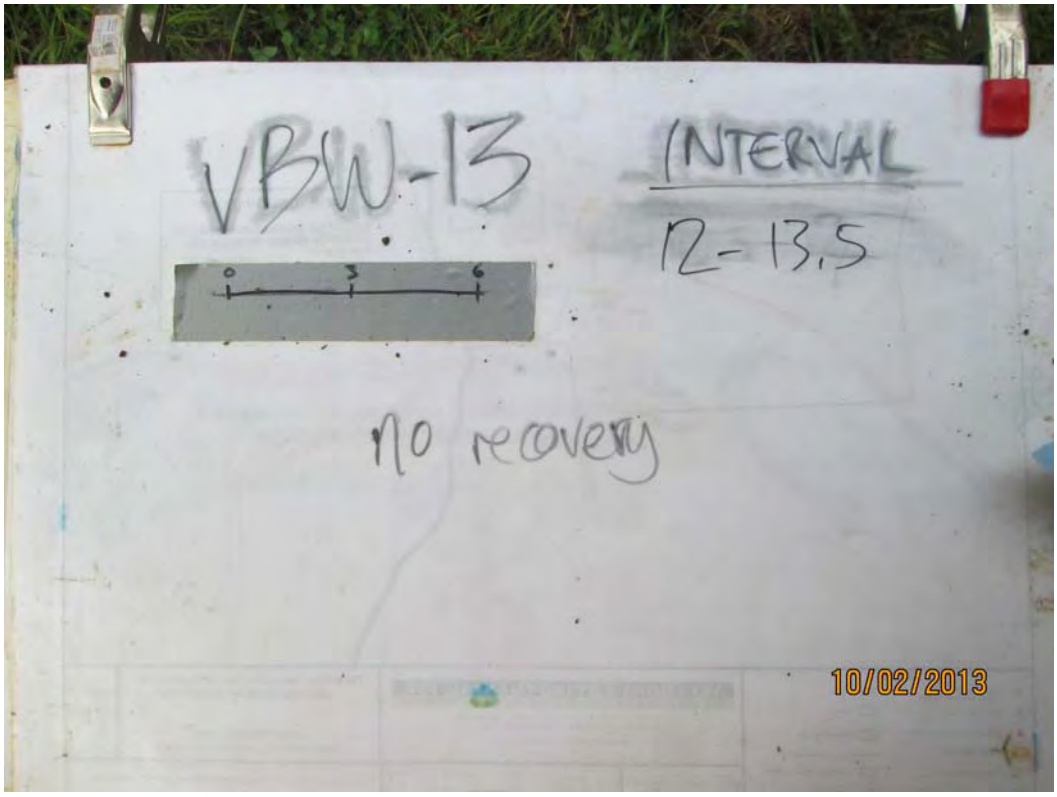
VBW-13
INTERVAL
3-4.5
10/02/2013

VBW-13
INTERVAL
4.5-6
10/02/2013

VBW-13
INTERVAL
6-7.5
0
3
6
10/02/2013

VBW-13
INTERVAL
7.5-9
0
3
6
10/02/2013

Sample VBW-13 10.5-12 not photographed


VBW-13
INTERVAL
12-13.5
no recovery
10/02/2013

VBW-13
INTERVAL
13.5-15
10/02/2013

VBW-13
INTERVAL
15-16.5
10/02/2013

VBW-13
INTERVAL
16.5-18
10/02/2013

VBW-13
INTERVAL
18-19.5
10/02/2013

VBW-13
INTERVA
19.5-2
10/02/2013

VBW-13
INTERVAL
21-22.5
0
3
6
10/02/2013

VBW-13
INTERVAL
22.5-24
0
3
6
10/02/2013

VBW-13
INTERVAL
24-25.5
0
3
6
10/02/2013

VBW-13
INTERVAL
25.5-27
0
3
6
10/02/2013

VBW-13
INTERVAL
27-28.5
10/02/2013

VBW-13
INTERVAL
28.5-30
10/02/2013

VBW-13
INTERVAL
30-31.5
10/02/2013

VBW-13
INTERVAL
31.5-33
10/02/2013

VBW-13
INTERVAL
33-34.5
10/02/2013

VBW-13
INTERVAL
34.5-36
10/02/2013

VBW-13
INTERVAL
34-35
TOP
BOTTOM
10/02/2013

VBW-13
INTERVAL
35-40
TOP
BOTTOM
10/02/2013

VBW-13
INTERVAL
40-45
TOP
Bottom
10/02/2013

PAPER MATE
CR4
45-50
10/02/2013

VBW-13
INTERVAL
50-60
0 3 6
TOP
Bottom
10/02/2013

VBW-13
INTERVAL
60-65
0 3 6
TOP
Bottom
10/02/2013

VBW-14

09/27/2013 – 10/01/2013

VBW-14
INTERVAL
0 – 1.5

VBW-14
INTERVAL
1.5 – 3

VBW-14
INTERVAL
3-4.5

VBW-14
INTERVAL
4.5-6

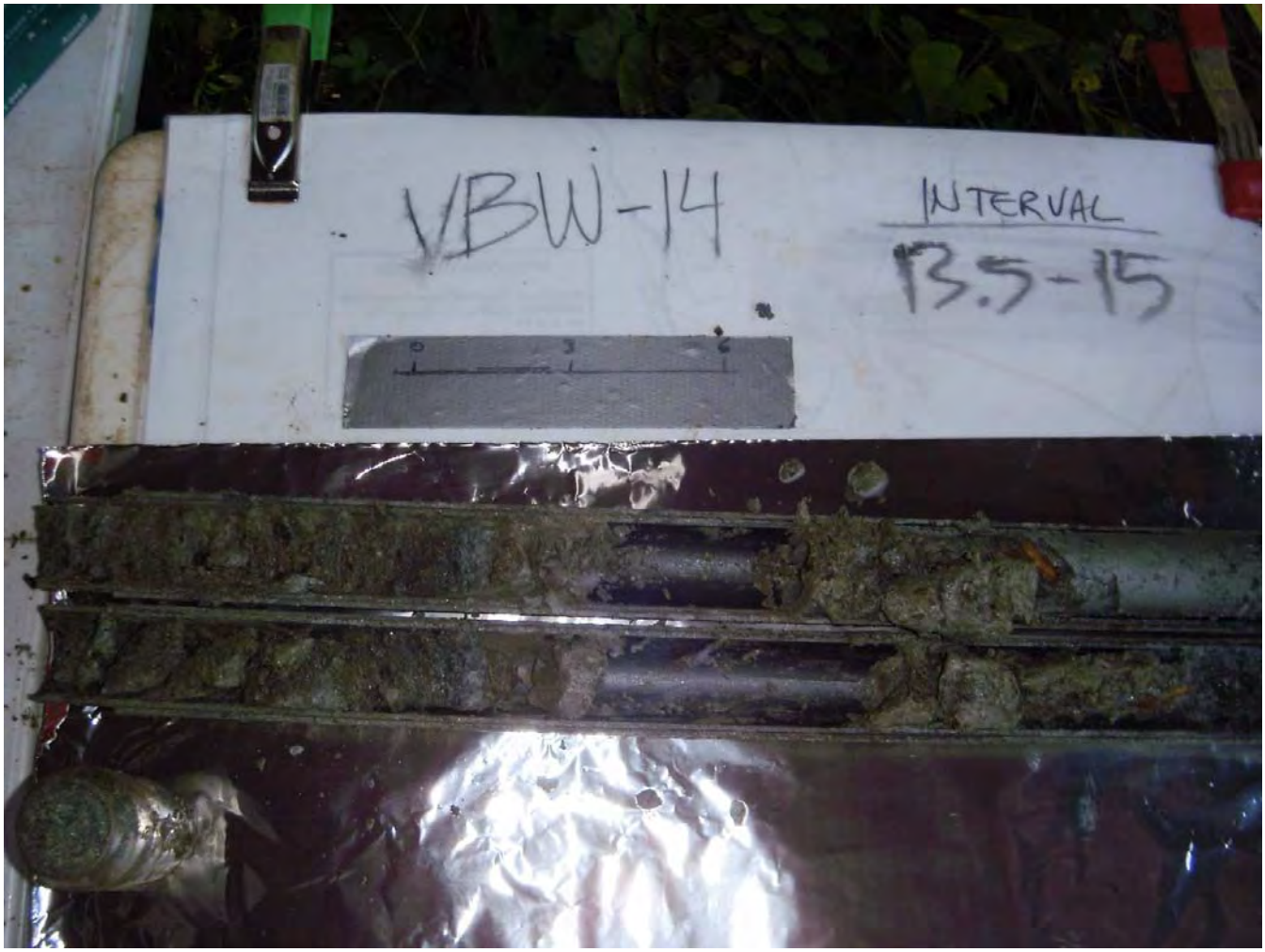
VBW-14
INTERVAL
6-7.5

VBW-14
INTERVAL
7.5-9.0

VBW-14
INTERVAL
9-10.5

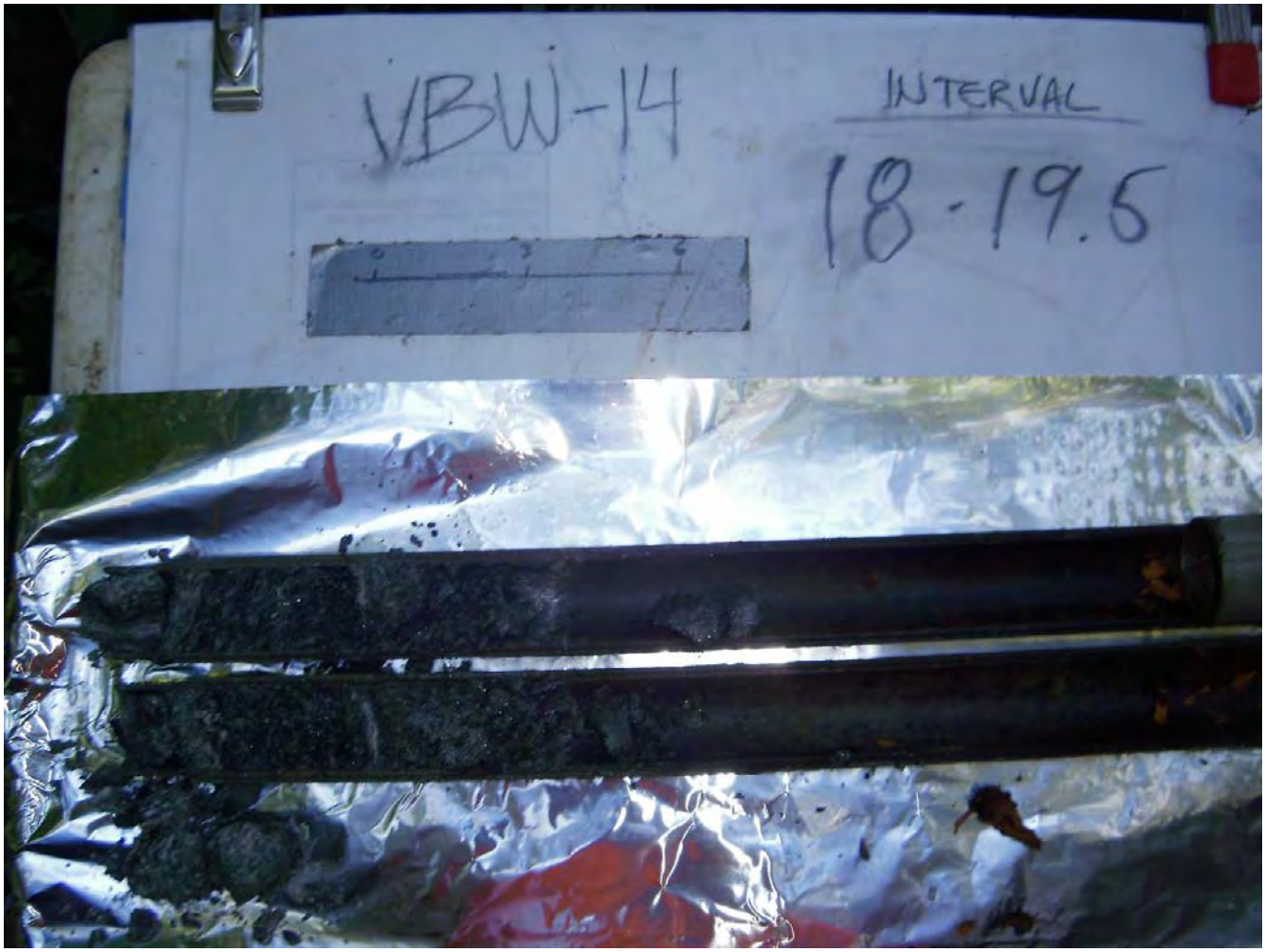
VBW-14
INTERVAL
10.5-12

VBW-14
INTERVAL
12-13.5


VBW-14
INTERVAL
13.5-15

VBW-14
INTERVAL
15-16.5

VBW-14
INTERVAL
16.5-18


VBW-14
INTERVAL
18-19.5

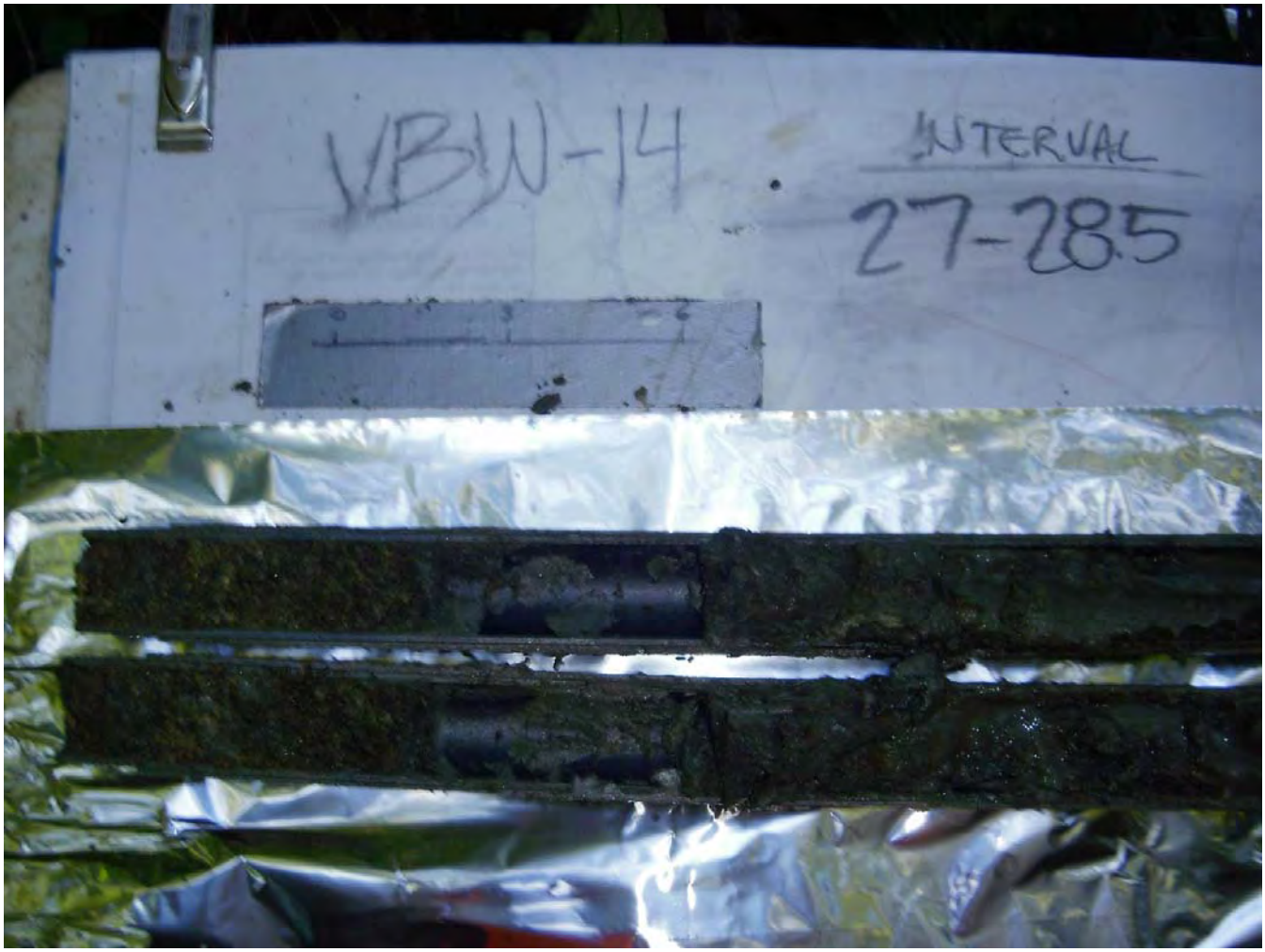
VBW-14
INTERVAL
19.5 to 21.0

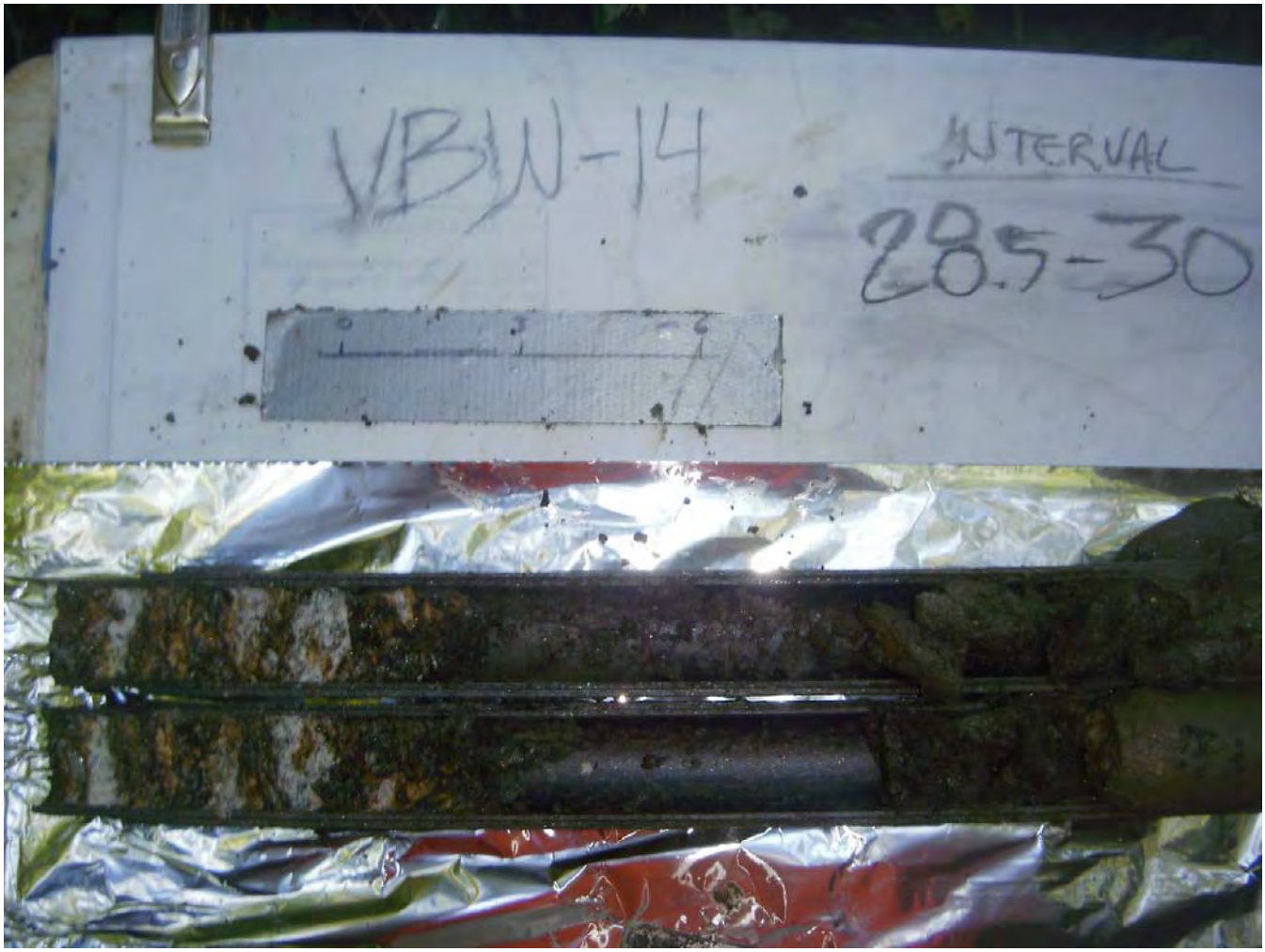
VBW-14
INTERVAL
21-22.5

VBW-14
INTERVAL
22.5-24

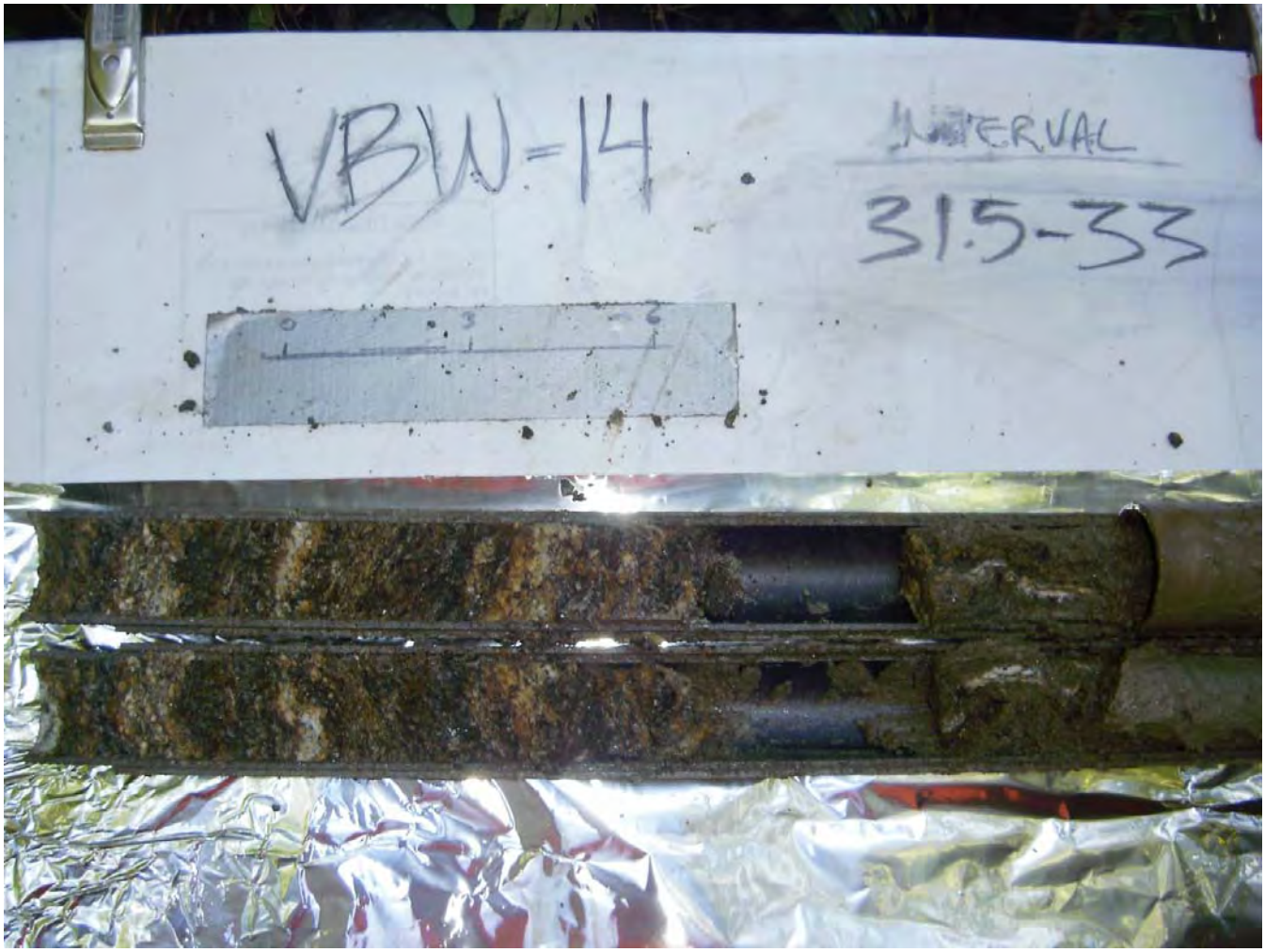
VBW-14
INTERVAL
24-25.5

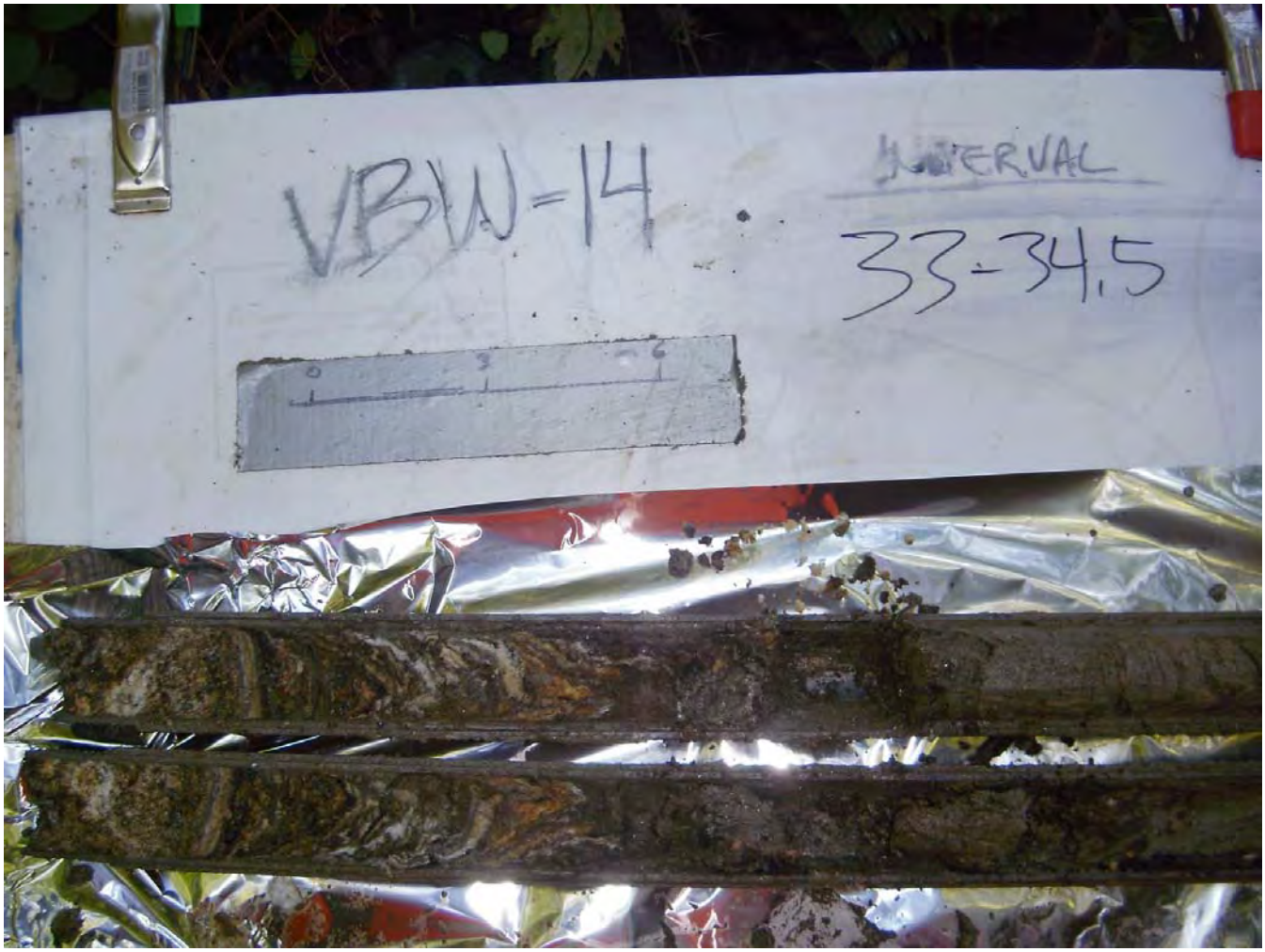
VBW-14
INTERVAL
25.5-27

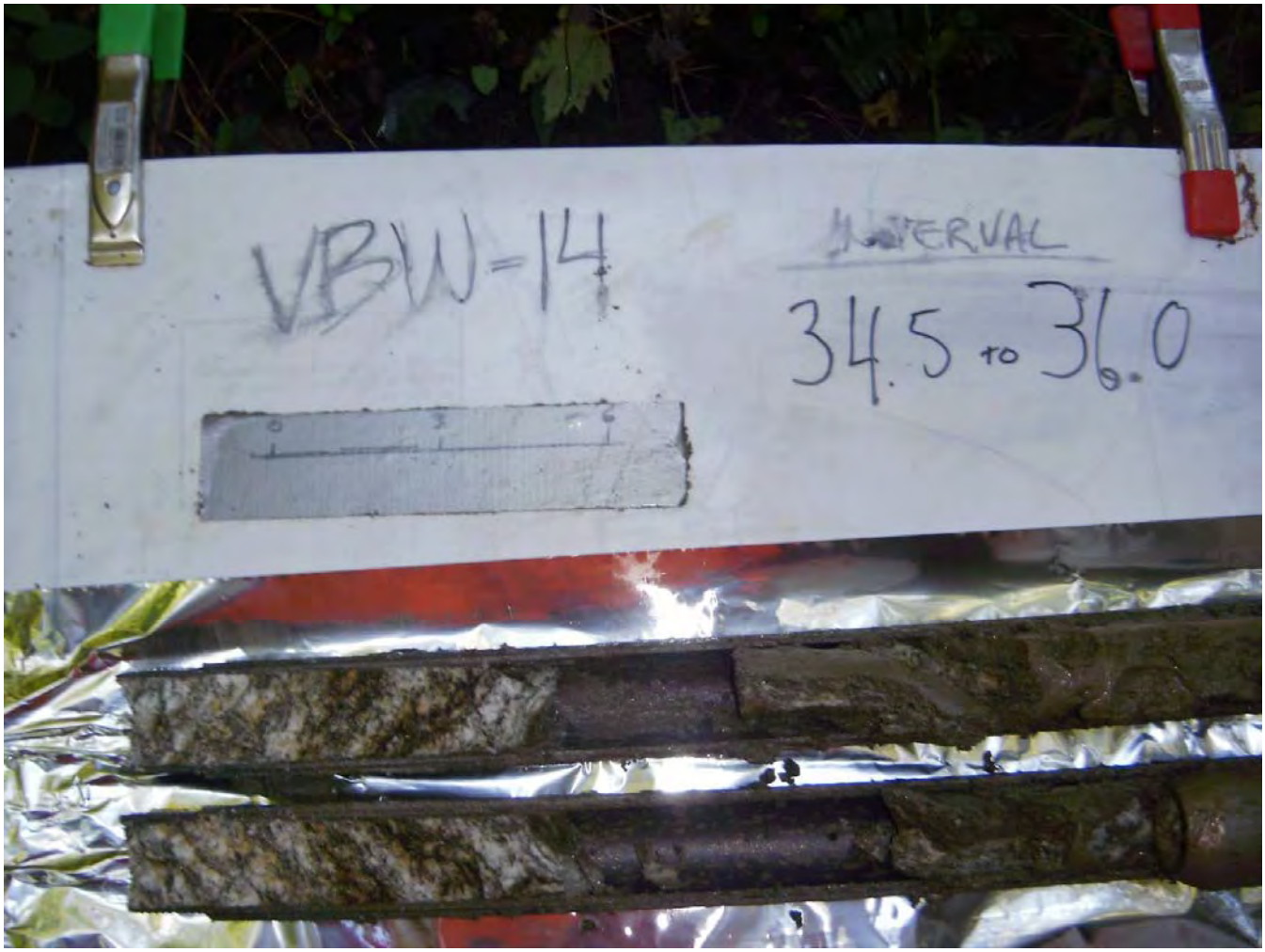

VBW-14
INTERVAL
27-28.5


VBW-14
INTERVAL
28.5-30

VBW=14
INTERVAL
30-31.5


VBW=14
INTERVAL
31.5-33


VBW-14
INTERVAL
33-34.5

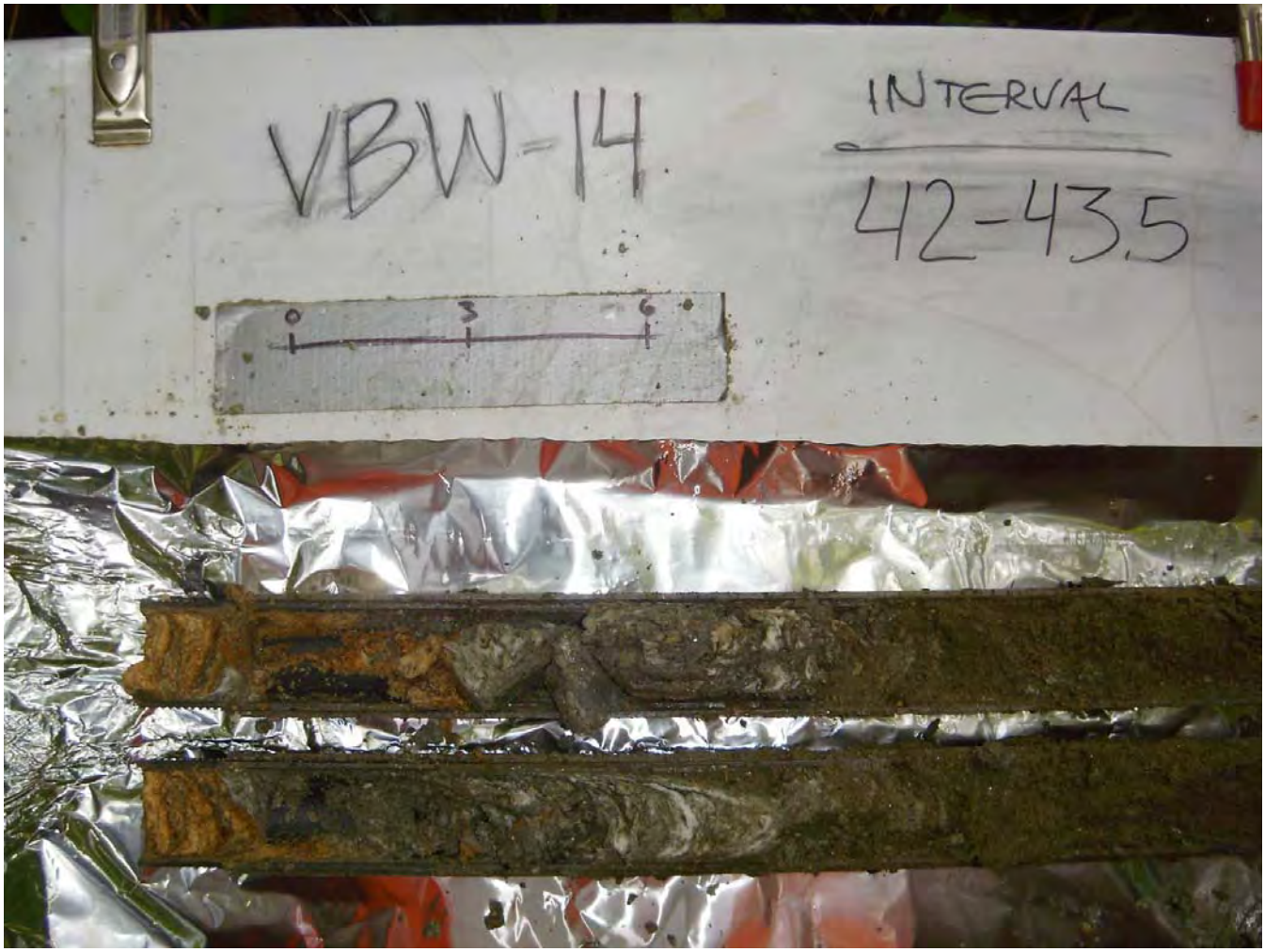

VBW-14
INTERVAL
34.5 to 36.0

VBW-14
INTERVAL
36-37.5

VBW-14
INTERVAL
37.5-39

VBW-14
INTERVAL
39-40.5

VBW-14
INTERVAL
40.5-42


VBW-14
INTERVAL
42-43.5
0
3
6

VBW-14
INTERVAL
43.5-45
0
3
6

VBW-14
INTERVAL
45-46.5
0
3
6

VBW-14
INTERVAL
46.5-48
0
3
6

VBW-14
INTERVAL
48-49.5

VBW-14
INTERVAL
49.5-51

VBW-14
INTERVAL
51-52.5
0
3
6
HYDE

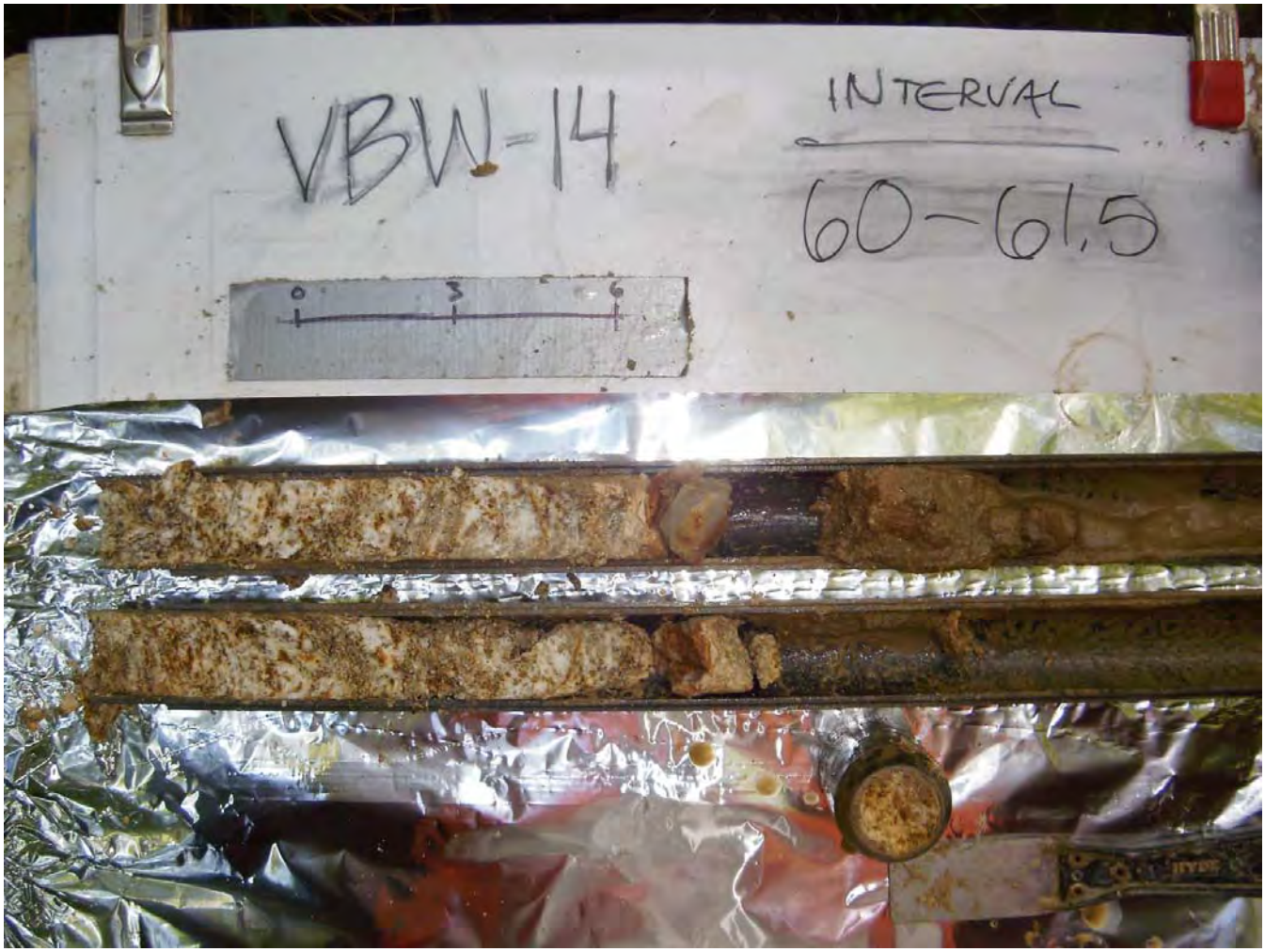
VBW-14
INTERVAL
52.5-54
0
3
6

VBW-14
INTERVAL
54-55.5
0
3
6

VBW-14
INTERVAL
55.5-57
0
3
6
HYDE

VBW-14
INTERVAL
57-58.5
0
3
6

VBW-14
INTERVAL
58.5-60
0
3
6


VBW-14
INTERVAL
60-61.5

VBW-14
INTERVAL
61.5-63
09/30/2013

VBW-14
INTERVAL
63-64.5
0
3
6
09/30/2013

VBW-14
INTERVAL
64.5-66
0
3
6
09/30/2013

Sample is incorrectly labeled in photograph. Interval should read “67.5-69”.

VBW-14
INTERVAL
69.7-74.7
0
3
6
69.7'
TOP
74.7'
BOTTOM
10/01/2013

VBW-14
INTERVAL
74.7-79.7
0
3
6
74.7
TOP
79.7
BOTTOM
10/01/2013

#1
TOP
VBW-14
INTERVAL
74.7-79.7
BOTTOM
79.7
10/01/2013

VBW-14
INTERVAL
79.7-84.7
TOP
10/01/2013

VBW-15A, 15B, and 15C

10/03/2013 – 10/08/2013

Note: VBW-15B encountered the same wood obstruction as VBW-15A and was not photographed.

VBW-15
0-1.5

VBW-15
1.5-3.0

VBW-15
3 to 4.5

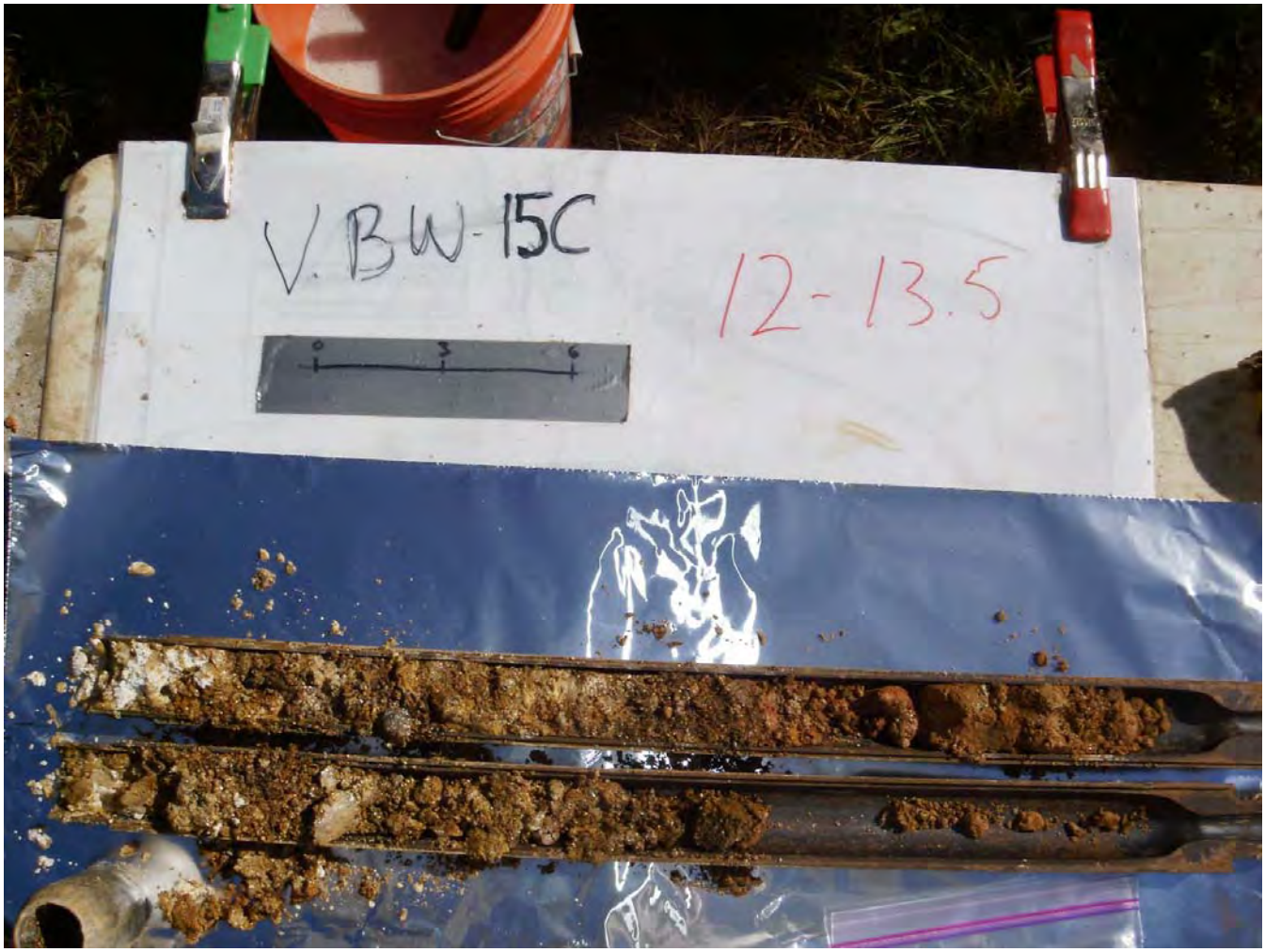
VBW-15
4.5 to 6.0

Augering through wood zone, producing smoke.

VBW-15C
6-7.5

VBW-15C
7.5-9.0

9-10.5


V. BW-15C
12-13.5

V. BW-15C
13.5-15

V·BW-15C
15 - 16.5

V·BW-15C
16.5 - 18.0

V. BW-15C
18 - 19.5

V. BW-15C
19.5 - 21

V. BW-15C
21-22.5

V. BW-15C
22.5-24

24-25.5

V.BW-15C
27-28.5

V.BW-15C
28.5-30.0

V.BW-15C
30-31.5

V.BW-15C
31.5-33

V.BW-15C
33-34.5

V.BW-15C
34.5-36

37.5-39

V BW-15C
39-40.5

V BW-15C
40.5-42

V. BW-15C
42-43.5

V. BW-15C
43.5-45

V.BW-15C
45-46.5

V.BW-15C
46.5-48

V.BW-15C
48-49.5

V.BW-15C
49.5-51

V.B.W-15C
51-52.5

V.B.W-15C
52.5-54

Sample VBW-15C 54-55.5 not photographed

VBW15C
57-58.5

VBW15C
58.5-60

VBW15C
60-61.5

VBW15C
61.5-63

VBW15C
0
3
6
63-64.5

VBW15C
0
3
6
64.5-66

VBW15C
66-67.5

VBW15C
67.5-69

VBW15C
69-70.5
0
3
6

VBW15C
70.5-72
0
3
6

VBW15C
72-73.5

VBW15C
73.5-75

VBW15C
75-76.5

VBW15C
76.5-78

VBW15C
78-79.5

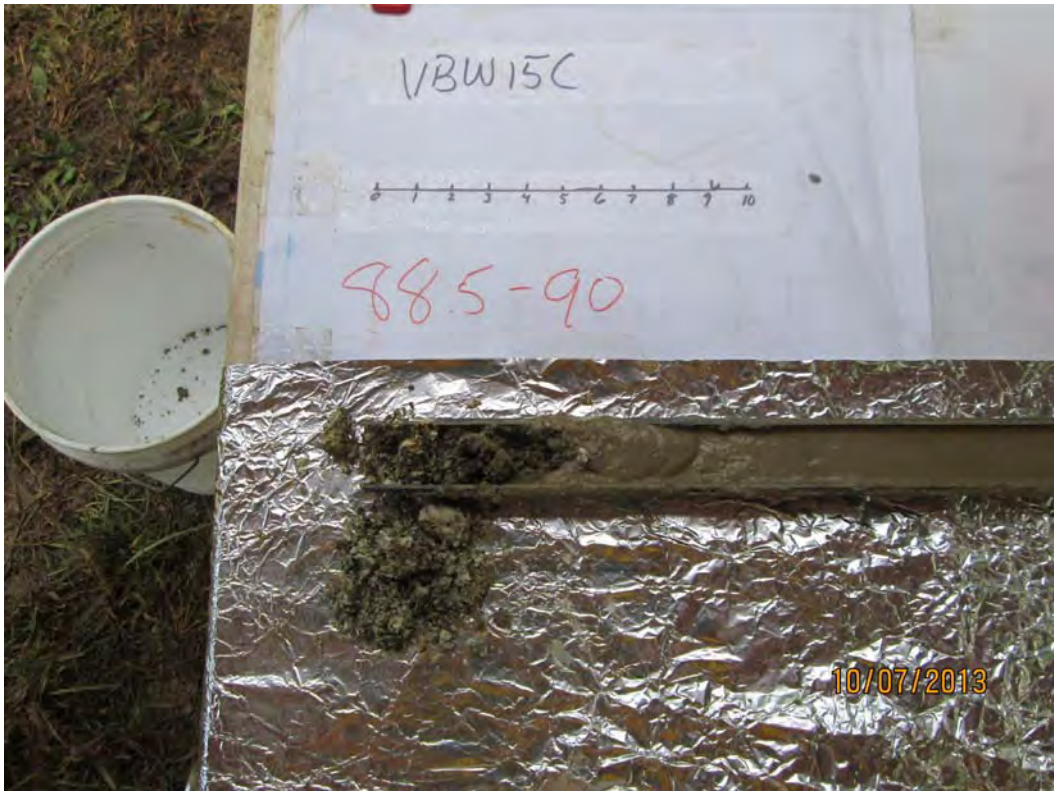
VBW15C
79.5-81

VBW15C
81-82.5

VBW15C
82.5-84

Sample VBW-15C 85.5-87 not photographed

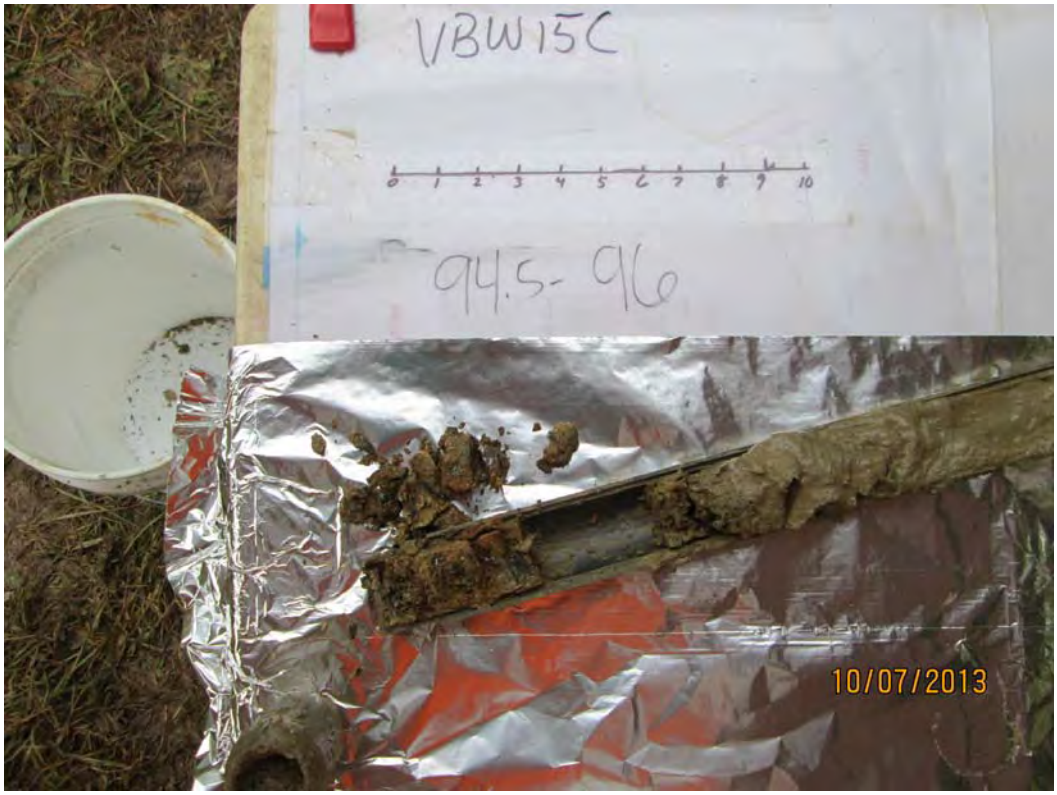
VBW15C
INTERVAL
87-88.5
10/07/2013


VBW15C
88.5-90
10/07/2013

VBW15C
90-91.5
10/07/2013

VBW15C
91.5-93
10/07/2013

VBW15C
93-94.5
10/07/2013


VBW15C
94.5-96
10/07/2013

VBW15C
95-99
10/07/2013

VBW15C
99-109
10/08/2013

VBW-16

09/24/2013 – 09/26/2013

Sample VBW-16 1.5-3 not photographed

BORING
VBW-16
INTERVAL
3-4.5

BORING
VBW-16
INTERVAL
4.5-6

BORING
VBW-16
INTERVAL
6 - 7.5
0
3"
6"

BORING
VBW-16
INTERVAL
7.5 - 9
0
3"
6"

BORING
VBW-16.
INTERVAL
9-10.5
0
3"
6"

BORING
VBW-16
INTERVAL
10.5-12
0
3"
6"

BORING
VBW-16
INTERVAL
12 - 13.5
0
3"
6"

BORING
VBW-16
INTERVAL
13.5 -15
0
3"
6"

BORING
VBW-16
INTERVAL
15-16.5

BORING
VBW-16
INTERVAL
16.5-18

BORING
VBW-16
INTERVAL
18-19.5

BORING
VBW-16
INTERVAL
19.5-21
Multi-purpose
Aluminum Foil

BORING
VBW-16
INTERVAL
21-22.5

BORING
VBW-16
INTERVAL
22.5-24

BORING
VBW-16
INTERVAL
24 - 25.5
3"
Aluminum Foil
200 SQ FT

BORING
VBW-16
INTERVAL
25.5-27
3"
6"

BORING
VBW-16
INTERVAL
27-28.5
0"
3"
6"
Multi-purpose
Aluminum Foil
200 SQ FT

BORING
VBW-16
INTERVAL
28.5-30
0"
3"
6"

BORING
VBW-16
INTERVAL
30 - 31.5
0"
3"
6"

BORING
VBW-16
INTERVAL
31.5 to 33.0
0"
3"
6"

BORING
VBW-16
INTERVAL
33 to 34.5

BORING
VBW-16
INTERVAL
34.5 to 36.0

BORING
VBW-16
INTERVAL
36 - 37.5

BORING
VBW-16
INTERVAL
37.5 - 39.0
Aluminum Foil

BORING
VBW-16
INTERVAL
39-40.5
0"
3"
6"

BORING
VBW-16
INTERVAL
40.5-42
0"
3"
6"

BORING
VBW-16
INTERVAL
42- 43.5

BORING
VBW-16
INTERVAL
43.5 - 45
Aluminum Foil
200 SQ FT

BORING
VBW-16
INTERVAL
45 - 46.5

BORING
VBW-16
INTERVAL
46.5-48

BORING
INTERVAL
4B-49.5

BORING
INTERVAL
49.5-51
Aluminum Foil
200 SQ FT

VBW-16
INTERVAL
51-52.5

VBW-16
INTERVAL
52.5-54

VBW-16
INTERVAL
54-55.5

VBW-16
INTERVAL
55.5-57

VBW-16
INTERVAL
57-58.5

VBW-16
INTERVAL
58.5-60
HYDE

VBW-16
INTERVAL
60-61.5

VBW-16
INTERVAL
61.5-63

Aluminum Foil

Aluminum Foil

11/06/2013

VBW-17
0 1 2 3 4 5 6 7 8 9 10
3-4.5
11/06/2013
HYDE

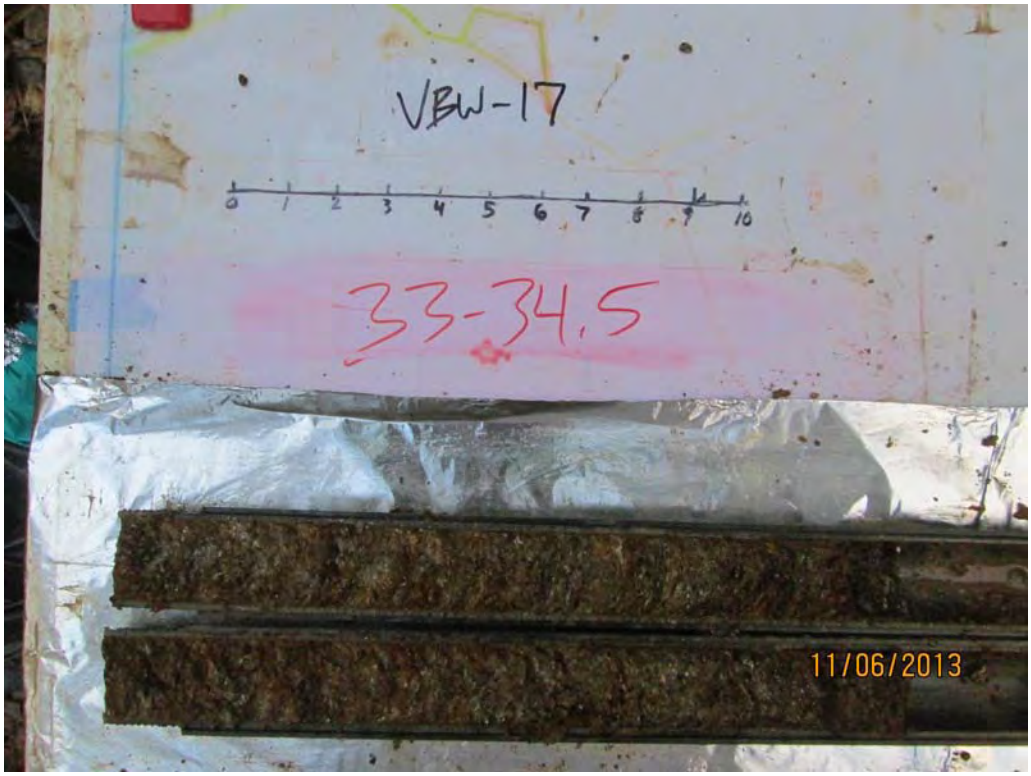
VBW-17
0 1 2 3 4 5 6 7 8 9 10
8-9.5
11/06/2013

VBW-17
0 1 2 3 4 5 6 7 8 9 10
13-14.5
11/06/2013

VBW-17
0 1 2 3 4 5 6 7 8 9 10
18-19.5
11/06/2013

VBW-17
0 1 2 3 4 5 6 7 8 9 10
23-24.5
11/06/2013

VBW-17
0 1 2 3 4 5 6 7 8 9 10
28-29.5
11/06/2013


VBW-17
0 1 2 3 4 5 6 7 8 9 10
33-34.5
11/06/2013

VBW-17
0 1 2 3 4 5 6 7 8 9 10
38-39.5
11/06/2013

VBW-17
0 1 2 3 4 5 6 7 8 9 10
43-44.5
11/06/2013

VBW-17
0 1 2 3 4 5 6 7 8 9 10
48-49.5
11/07/2013

VBW-17
0 1 2 3 4 5 6 7 8 9 10
53-54.5
11/07/2013

VBW-17
0 1 2 3 4 5 6 7 8 9 10
58-59.5
11/07/2013

VBW-17
0 1 2 3 4 5 6 7 8 9 10
63-64.5
11/07/2013

VBW-17
0 1 2 3 4 5 6 7 8 9 10
68-69.5
11/07/2013

VBW-17
0 1 2 3 4 5 6 7 8 9 10
73-74.5
11/07/2013

VBW-17
76.5-79.2
11/07/2013

VBW-17
79.2-84.1

VBW-17
0 1 2 3 4 5 6 7 8 9 10
84.1 – 88.3

VBW-17

11/06/2013 – 11/08/2013

VBW-18A and VBW-18B

11/12/2013 – 11/14/2013

11/12/2013

VBW-18
3-4.5
11/12/2013

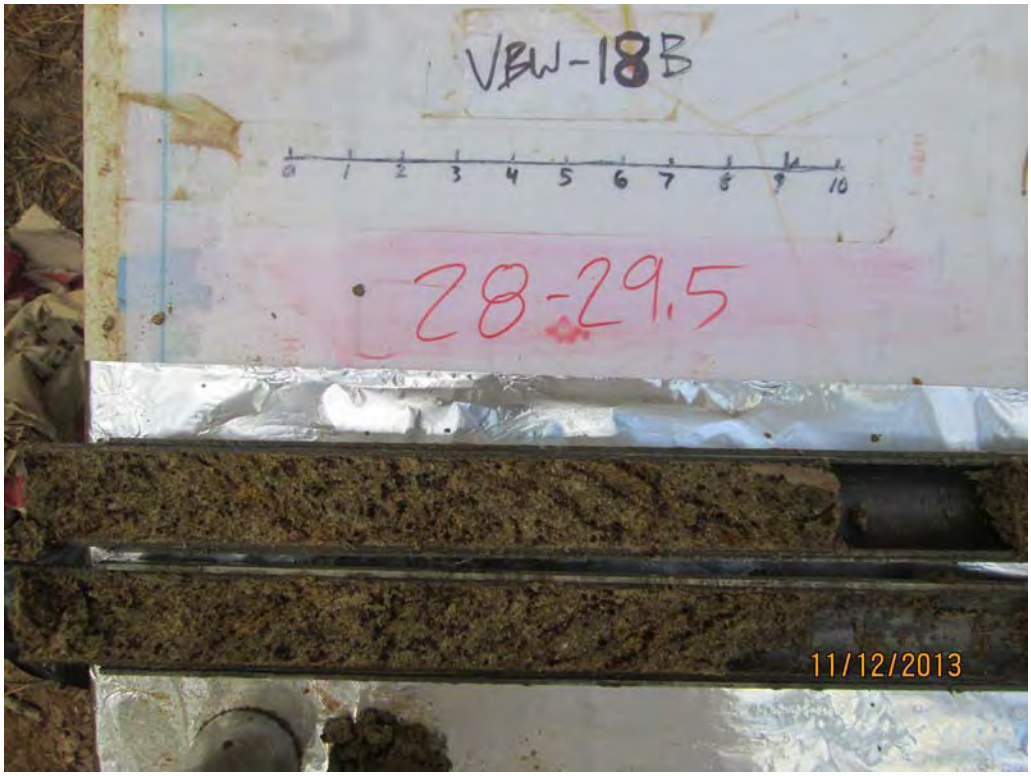
VBW-18B
0 1 2 3 4 5 6 7 8 9 10
3-4.5
11/12/2013

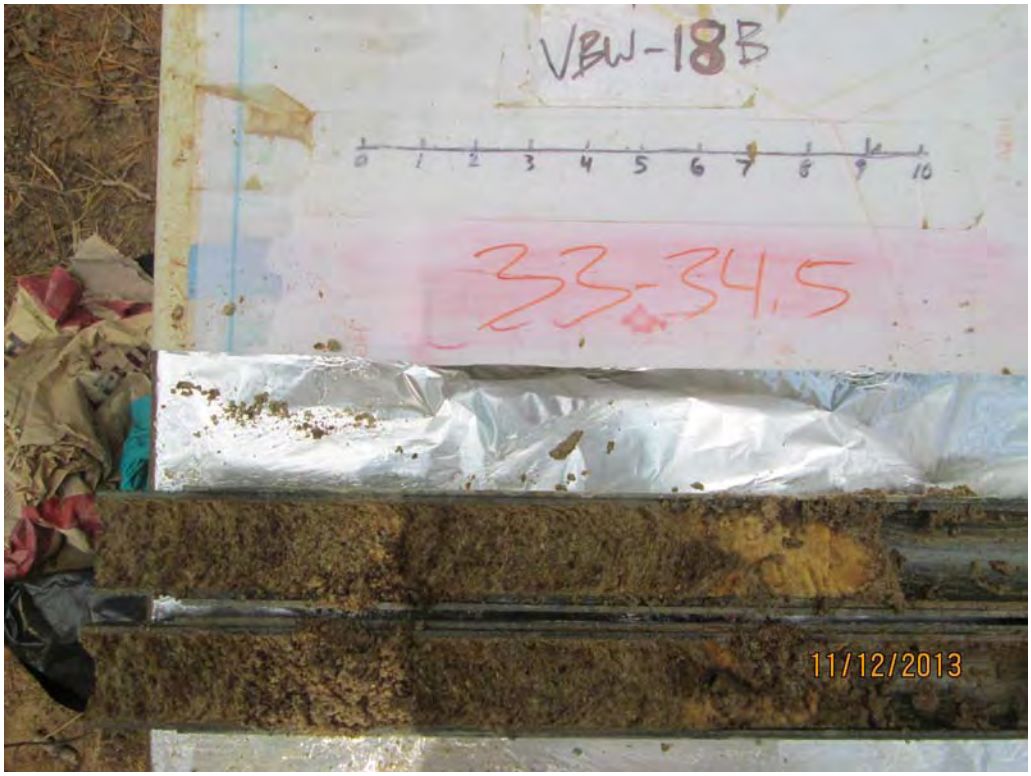
VBW-18B
0 1 2 3 4 5 6 7 8 9 10
8-9.5
11/12/2013

VBW-18B
13-14.5
11/12/2013

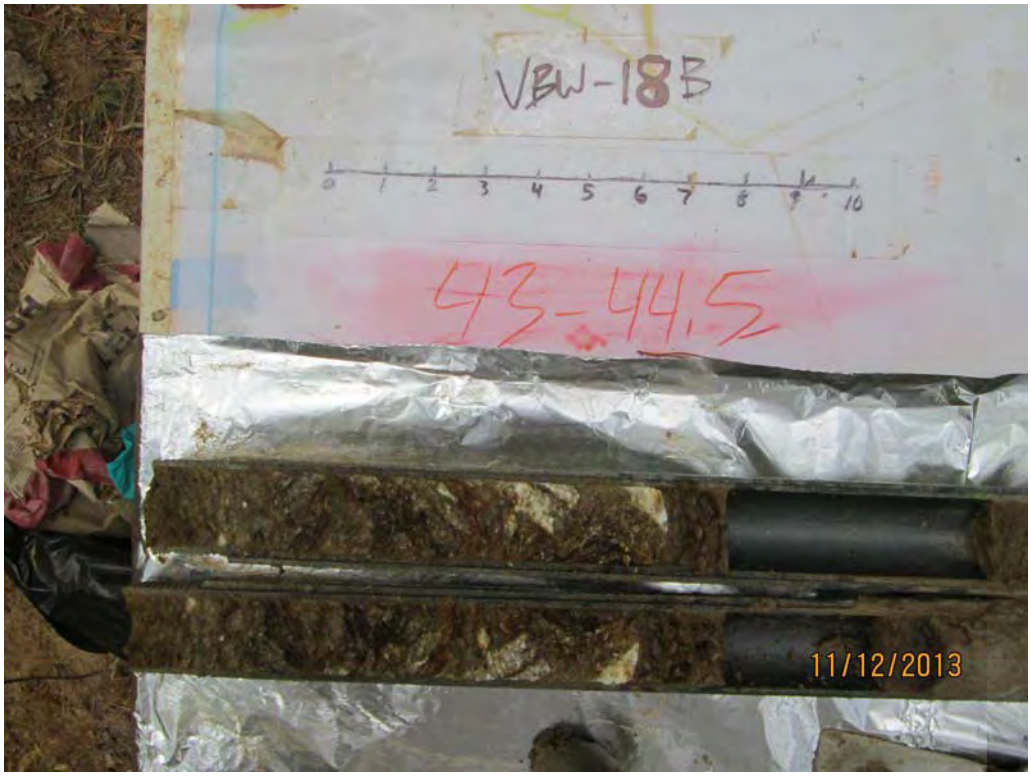
VBW-18B
18-19.5
11/12/2013

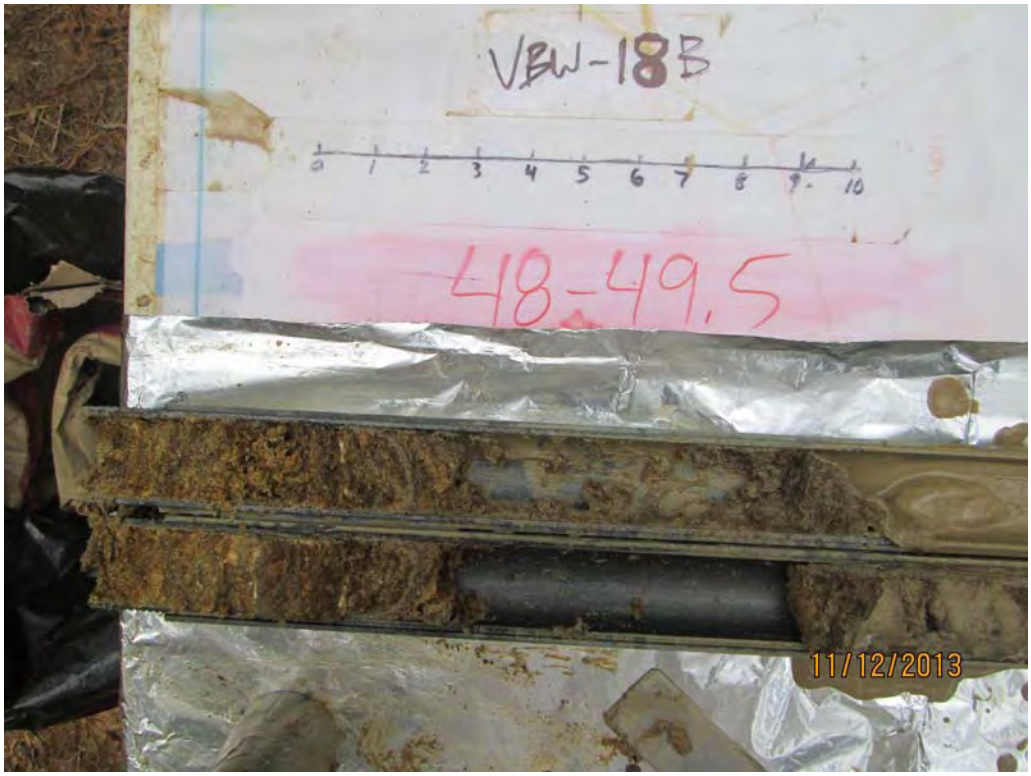
VBW-18B
23-24.5
11/12/2013


VBW-18B
28-29.5
11/12/2013


VBW-18B
0 1 2 3 4 5 6 7 8 9 10
33-34.5
11/12/2013

VBW-18B
0 1 2 3 4 5 6 7 8 9 10
38-39.5
11/12/2013


VBW-18B
43-44.5
11/12/2013

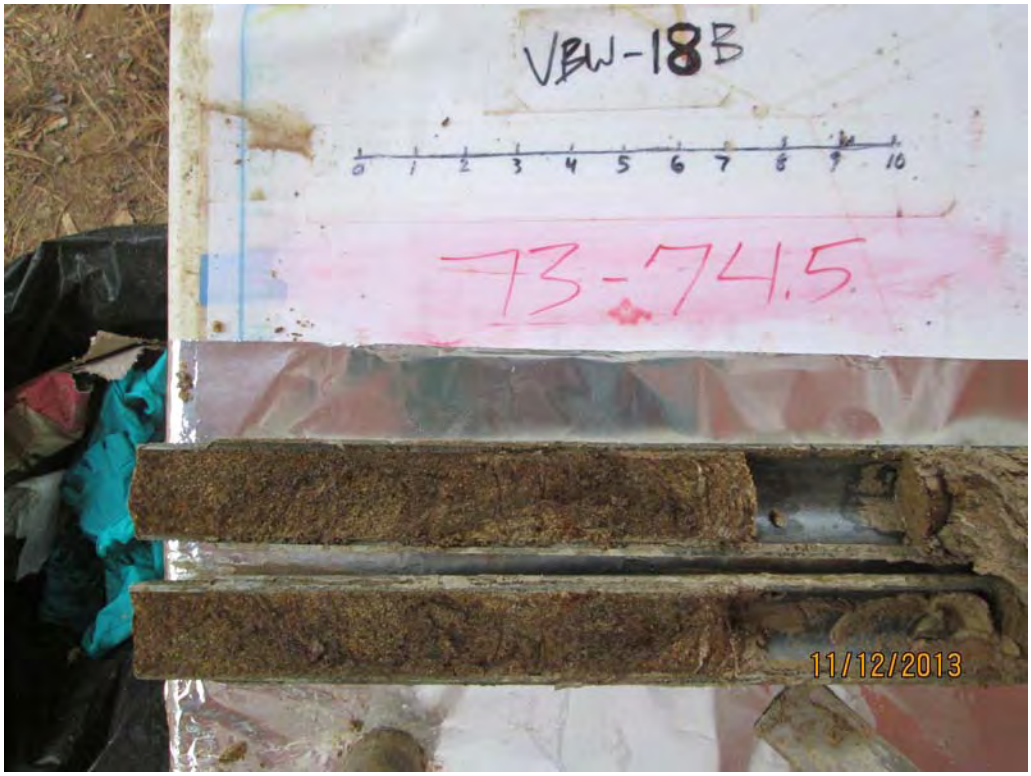

VBW-18B
48-49.5
11/12/2013

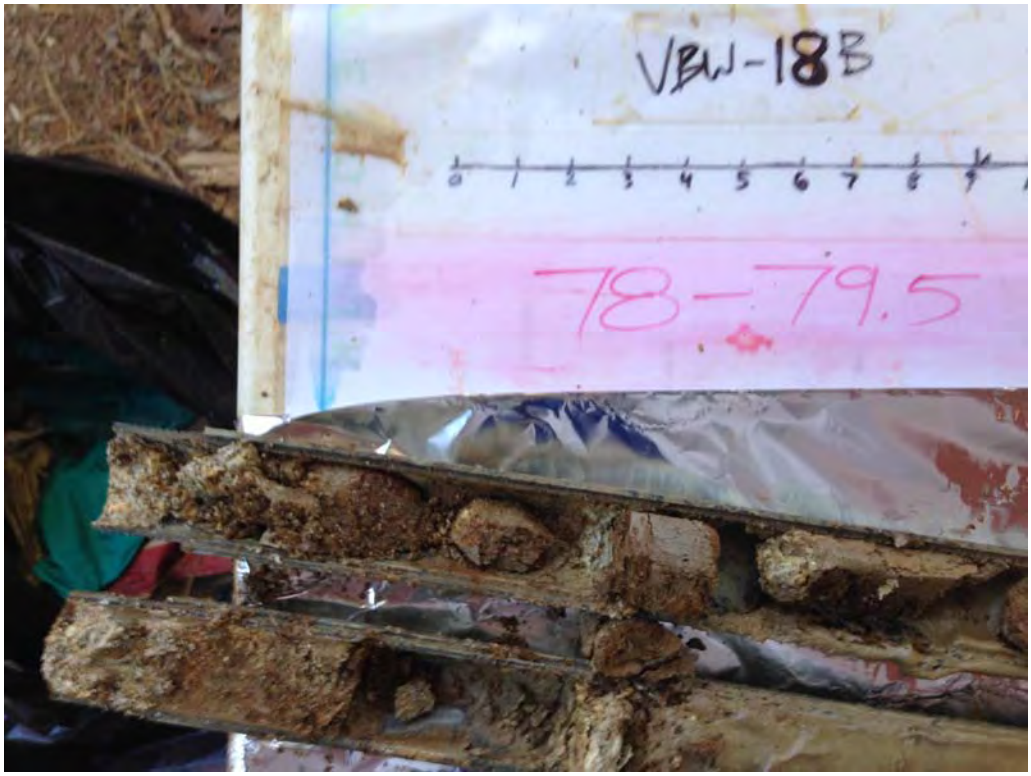
VBW-18B
0 1 2 3 4 5 6 7 8 9 10
53-54.5
11/12/2013

VBW-18B
0 1 2 3 4 5 6 7 8 9 10
58-59.5
11/12/2013

VBW-18B
63-64.5
11/12/2013

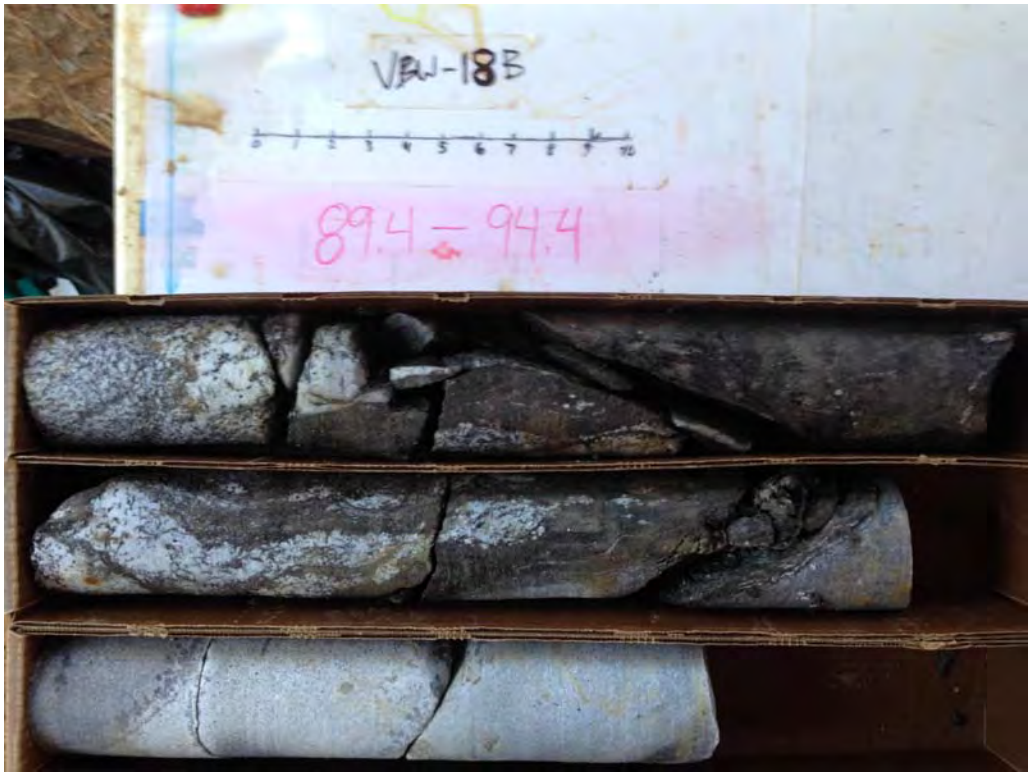
VBW-18B
68-69.5
11/12/2013


VBW-18B
73-74.5
11/12/2013


VBW-18B
78-79.5

VBW-18B
0 1 2 3 4 5 6 7 8 9 10
83-84.5

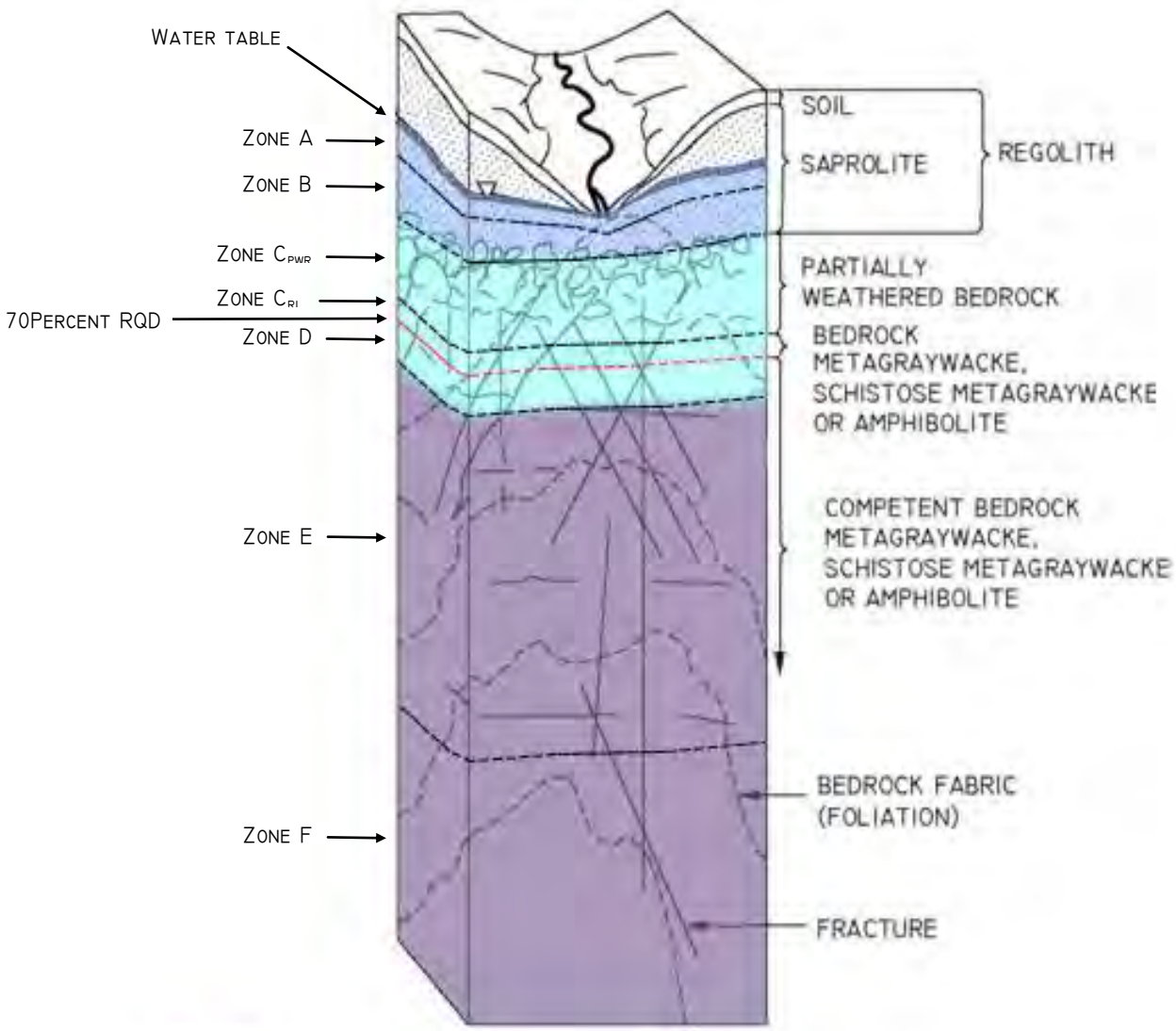
VBW-18B
0 1 2 3 4 5 6 7 8 9 10
87-89.4


VBW-18B
89.4 – 94.4

BW18B
94.4–.99

Appendix B

Site Hydro-Stratigraphy



Surficial aquifer system (Zone AB)
Zone A: Water table, Zone B: Only present if > 40 ft from water table

Transition zone aquifer system (Zone CD)
Zone C_{PWR}: Predominance of partially weathered rock and/or blow counts of 50/6 inches
Zone C_{RI}: Auger refusal to RQD ≥ 70 percent
zone D: first 10-15 feet where RQD ≥ 70 percent

Bedrock aquifer system (Zone EF)
Zone E: RQD ≥ 70 percent, 100 ft thick
zone F: RQD ≥ 70 percent, below Zone E

Note: Drawing after Harned and Daniel, 1992.

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Engineering & Hydrogeology
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www.altamontenvironmental.com

Hydro-Stratigraphy
Definition of Zones A through F
at the Chemtronics Site

Chemtronics, Inc.
Swannanoa, North Carolina

Appendix C

Sampling Logs, Field Sheets, and Analytical Data

Soil Sampling Logs

VBW Geotechnical Sampling Summary
Chemtronics Site, Swannanoa, North Carolina

Boring Location	Sample ID	Depth (top, ft-bgs)	Depth (bottom, ft-bgs)	Sample Method	Sample Submitted for VOC Analysis	Date Collected
VBW-1	VBW-1-0-1.5	0	1.5	SS	-	10/11/2013
	VBW-1-1.5-3	1.5	3	SS	-	10/11/2013
	VBW-1-3-4.5	3	4.5	SS	-	10/11/2013
	VBW-1-4.5-6	4.5	6	SS	-	10/11/2013
	VBW-1-6-7.5	6	7.5	SS	-	10/11/2013
	VBW-1-7.5-9	7.5	9	SS	-	10/11/2013
	VBW-1-9-10.5	9	10.5	SS	-	10/11/2013
	VBW-1-10.5-12	10.5	12	SS	-	10/11/2013
	VBW-1-12-13.5	12	13.5	SS	-	10/11/2013
	VBW-1-13.5-15	13.5	15	SS	-	10/11/2013
	VBW-1-15-16.5	15	16.5	SS	-	10/11/2013
	VBW-1-16.5-18	16.5	18	SS	-	10/11/2013
	VBW-1-18-19.5	18	19.5	SS	-	10/11/2013
	VBW-1-19.5-21	19.5	21	SS	-	10/11/2013
	VBW-1-21-22.5	21	22.5	SS	-	10/11/2013
	VBW-1-22.5-24	22.5	24	SS	-	10/11/2013
	VBW-1-24-25.5	24	25.5	SS	-	10/11/2013
	VBW-1-25.5-27	25.5	27	SS	-	10/11/2013
	VBW-1-27-28.5	27	28.5	SS	-	10/11/2013
VBW-2	VBW-2-0-1.5	0	1.5	SS	-	10/14/2013
	VBW-2-4-5.5	4	5.5	SS	-	10/14/2013
	VBW-2-9-10.5	9	10.5	SS	-	10/14/2013
VBW-2	VBW-2-Residuum/PWR	0	9	Bulk Sample	-	10/14/2013
VBW-3	VBW-3-0-1.5	0	1.5	SS	-	10/15/2013
	VBW-3-1.5-3	1.5	3	SS	-	10/15/2013
	VBW-3-3-4.5	3	4.5	SS	-	10/15/2013
	VBW-3-4.5-6	4.5	6	SS	-	10/15/2013
	VBW-3-6-7.5	6	7.5	SS	-	10/15/2013
	VBW-3-7.5-9	7.5	9	SS	-	10/15/2013
	VBW-3-9-10.5	9	10.5	SS	-	10/15/2013
	VBW-3-10.5-12	10.5	12	SS	-	10/15/2013
	VBW-3-12-13.5	12	13.5	SS	-	10/15/2013
	VBW-3-13.5-15	13.5	15	SS	-	10/15/2013
	VBW-3-15-16.5	15	16.5	SS	-	10/15/2013
	VBW-3-16.5-18	16.5	18	SS	-	10/15/2013
	VBW-3-18-19.5	18	19.5	SS	-	10/15/2013
	VBW-3-19.5-21	19.5	21	SS	-	10/15/2013
	VBW-3-21-22.5	21	22.5	SS	-	10/15/2013
	VBW-3-22.5-24	22.5	24	SS	-	10/15/2013
	VBW-3-24-25.5	24	25.5	SS	-	10/15/2013
	VBW-3-25.5-27	25.5	27	SS	-	10/15/2013
	VBW-3-27-28.5	27	28.5	SS	-	10/15/2013
	VBW-3-28.5-30	28.5	30	SS	-	10/15/2013
	VBW-3-30-31.5	30	31.5	SS	-	10/15/2013
	VBW-3-31.5-33	31.5	33	SS	-	10/15/2013
	VBW-3-33-34.5	33	34.5	SS	-	10/15/2013

VBW Geotechnical Sampling Summary
Chemtronics Site, Swannanoa, North Carolina

Boring Location	Sample ID	Depth (top, ft-bgs)	Depth (bottom, ft-bgs)	Sample Method	Sample Submitted for VOC Analysis	Date Collected
VBW-3	VBW-3-34.5-36	34.5	36	SS	-	10/15/2013
	VBW-3-36-37.5	36	37.5	SS	-	10/15/2013
	VBW-3-37.5-39	37.5	39	SS	-	10/15/2013
VBW-4A	VBW-4-0-1.5	0	1.5	SS	-	10/16/2013
	VBW-4-1.5-3	2.5	4	SS	-	10/16/2013
VBW-4B	VBW-4B-2.5-4	2.5	4	SS	-	10/16/2013
	VBW-4B-7.5-9	7.5	9	SS	-	10/16/2013
	VBW-4B-12.5-14	12.5	14	SS	-	10/16/2013
	VBW-4B-22.5-24	22.5	24	SS	-	10/16/2013
	VBW-4B-27.5-29	27.5	29	SS	-	10/16/2013
	VBW-4B-37.5-39	37.5	39	SS	-	10/16/2013
	VBW-4B-42.5-44	42.5	44	SS	-	10/16/2013
	VBW-4B-47.5-49	47.5	49	SS	-	10/16/2013
	VBW-4B-52.5-54	52.5	54	SS	-	10/16/2013
	VBW-4B-57.5-59	57.5	59	SS	-	10/16/2013
VBW-4B	VBW-4B-Residuum	0	12.5	Bulk Sample	-	10/16/2013
	VBW-4B-Saprolite	12.5	69.5	Bulk Sample	-	10/16/2013
VBW-5	VBW-5-0-1.5	0	1.5	SS	-	10/22/2013
	VBW-5-4-5.5	4	5.5	SS	-	10/22/2013
	VBW-5-9-10.5	9	10.5	SS	-	10/22/2013
	VBW-5-19-20.5	19	20.5	SS	Yes	10/22/2013
	VBW-5-29-30.5	29	30.5	SS	-	10/22/2013
	VBW-5-34-35.5	34	35.5	SS	-	10/22/2013
	VBW-5-39-40.5	39	40.5	SS	-	10/23/2013
	VBW-5-44-45.5	44	45.5	SS	-	10/23/2013
	VBW-5-49-50.5	49	50.5	SS	-	10/23/2013
	VBW-5-54-55.5	54	55.5	SS	-	10/23/2013
	VBW-5-59-60.5	59	60.5	SS	-	10/23/2013
	VBW-5-64-65.5	64	65.5	SS	-	10/23/2013
	VBW-5-69-70.5	69	70.5	SS	-	10/23/2013
	VBW-5-74-75.5	74	75.5	SS	-	10/23/2013
VBW-5	VBW-5-Residuum	0	19	Bulk Sample	-	10/22/2013
	VBW-5-Saprolite	19	64	Bulk Sample	-	10/22-10/23/13
	VBW-5-PWR	64	78	Bulk Sample	-	10/23/2013
VBW-6	VBW-6-3.5-5	3.5	5	SS	-	10/24/2013
	VBW-6-8.5-10	8.5	10	SS	-	10/24/2013
	VBW-6-18.5-20	18.5	20	SS	-	10/24/2013
	VBW-6-23.5-25	23.5	25	SS	-	10/24/2013
	VBW-6-28.5-30	28.5	30	SS	-	10/24/2013
	VBW-6-33.5-35	33.5	35	SS	-	10/24/2013
	VBW-6-38.5-40	38.5	40	SS	-	10/24/2013
	VBW-6-43.5-45	43.5	45	SS	-	10/24/2013
	VBW-6-48.5-50	48.5	50	SS	-	10/24/2013
	VBW-6-53.5-55	53.5	55	SS	-	10/24/2013
	VBW-6-58.5-60	58.5	60	SS	-	10/24/2013
	VBW-6-63.5-65	63.5	65	SS	-	10/24/2013
	VBW-6-68.5-70	68.5	70	SS	-	10/24/2013

VBW Geotechnical Sampling Summary
Chemtronics Site, Swannanoa, North Carolina

Boring Location	Sample ID	Depth (top, ft-bgs)	Depth (bottom, ft-bgs)	Sample Method	Sample Submitted for VOC Analysis	Date Collected
VBW-6	VBW-6-73.5-75	73.5	75	SS	-	10/24/2013
VBW-6	VBW-6-Residuum	0	18.5	Bulk Sample	-	10/24/2013
	VBW-6-Saprolite	18.5	55	Bulk Sample	-	10/24/2013
	VBW-6-PWR	55	77.5	Bulk Sample	-	10/24/2013
VBW-7	VBW-7-0-1.5	0	1.5	SS	-	10/8/2013
	VBW-7-1.5-3	1.5	3	SS	-	10/8/2013
	VBW-7-3-4.5	3	4.5	SS	-	10/8/2013
	VBW-7-4.5-6	4.5	6	SS	-	10/8/2013
	VBW-7-6-7.5	6	7.5	SS	-	10/8/2013
	VBW-7-7.5-9	7.5	9	SS	-	10/8/2013
	VBW-7--10.5-12	10.5	12	SS	-	10/8/2013
	VBW-7-12-13.5	12	13.5	SS	-	10/8/2013
	VBW-7-13.5-15	13.5	15	SS	-	10/8/2013
	VBW-7-15-16.5	15	16.5	SS	-	10/8/2013
	VBW-7-16.5-18	16.5	18	SS	-	10/8/2013
	VBW-7-18-19.5	18	19.5	SS	-	10/8/2013
	VBW-7-19.5-21	19.5	21	SS	-	10/8/2013
	VBW-7-21-22.5	21	22.5	SS	-	10/8/2013
	VBW-7-22.5-24	22.5	24	SS	-	10/8/2013
	VBW-7-24-25.5	24	25.5	SS	-	10/8/2013
	VBW-7-25.5-27	25.5	27	SS	-	10/8/2013
	VBW-7-27-28.5	27	28.5	SS	-	10/8/2013
	VBW-7-28.5-30	28.5	30	SS	-	10/8/2013
	VBW-7-30-31.5	30	31.5	SS	-	10/8/2013
	VBW-7-31.5-33	31.5	33	SS	-	10/8/2013
	VBW-7-33-34.5	33	34.5	SS	-	10/8/2013
	VBW-7-34.5-36	34.5	36	SS	-	10/8/2013
	VBW-7-36-37.5	36	37.5	SS	-	10/8/2013
	VBW-7-37.5-39	37.5	39	SS	-	10/8/2013
	VBW-7-39-40.5	39	40.5	SS	-	10/8/2013
	VBW-7-40.5-42	40.5	42	SS	-	10/8/2013
	VBW-7-42-43.5	42	43.5	SS	-	10/8/2013
	VBW-7-43.5-45	43.5	45	SS	-	10/9/2013
	VBW-7-45-46.5	45	46.5	SS	-	10/9/2013
	VBW-7-469.5-48	46.5	48	SS	-	10/9/2013
	VBW-7-48-49.5	48	49.5	SS	-	10/9/2013
	VBW-7-49.5-51	49.5	51	SS	-	10/9/2013
	VBW-7-**51-52.5**	51	52.5	SS	-	10/9/2013
	VBW-7-52.5-54	52.5	54	SS	-	10/9/2013
	VBW-7-54-55.5	54	55.5	SS	-	10/9/2013
	VBW-7-55.5-57	55.5	57	SS	-	10/9/2013
	VBW-7-57-58.5	57	58.5	SS	-	10/9/2013
	VBW-7-58.5-60	58.5	60	SS	-	10/9/2013
	VBW-7-60-61.5	60	61.5	SS	-	10/9/2013
	VBW-7-61.5-63	61.5	63	SS	-	10/9/2013
	VBW-7-63-64.5	63	64.5	SS	-	10/9/2013
	VBW-7-64.5-66	64.5	66	SS	-	10/9/2013

VBW Geotechnical Sampling Summary
Chemtronics Site, Swannanoa, North Carolina

Boring Location	Sample ID	Depth (top, ft-bgs)	Depth (bottom, ft-bgs)	Sample Method	Sample Submitted for VOC Analysis	Date Collected
VBW-7	VBW-7-66-67.5	66	67.5	SS	-	10/9/2013
	VBW-7-67.5-69	67.5	69	SS	-	10/9/2013
	VBW-7-69-70.5	69	70.5	SS	-	10/9/2013
	VBW-7-70.5-72	70.5	72	SS	-	10/9/2013
	VBW-7-72-73.5	72	73.5	SS	-	10/9/2013
	VBW-7-73.5-75	73.5	75	SS	-	10/9/2013
	VBW-7-75-76.5	75	76.5	SS	-	10/9/2013
VBW-8	VBW-8-4-5.5	4	5.5	SS	-	10/28/2013
	VBW-8-9-10.5	9	10.5	SS	-	10/28/2013
	VBW-8-19-20.5	19	20.5	SS	-	10/28/2013
	VBW-8-29-30.5	29	30.5	SS	-	10/28/2013
	VBW-8-34-35.5	34	35.5	SS	-	10/28/2013
	VBW-8-39-40.5	39	40.5	SS	-	10/28/2013
	VBW-8-44-45.5	44	45.5	SS	-	10/28/2013
	VBW-8-49-50.5	49	50.5	SS	-	10/28/2013
	VBW-8-54-55.5	54	55.5	SS	-	10/28/2013
	VBW-8-59-60.5	59	60.5	SS	-	10/29/2013
	VBW-8-64-65.5	64	65.5	SS	-	10/29/2013
	VBW-8-69-70.5	69	70.5	SS	-	10/29/2013
	VBW-8-74-75.5	74	75.5	SS	-	10/29/2013
	VBW-8-79-80.5	79	80.5	SS	-	10/29/2013
VBW-8	VBW-8-Residuum	0	19	Bulk Sample	-	10/29/2013
	VBW-8-Saprolite	19	49	Bulk Sample	-	10/29/2013
	VBW-8-PWR	49	80	Bulk Sample	-	10/29/2013
VBW-9	VBW-9-4-5.5	4	5.5	SS	-	11/4/2013
	VBW-9-9-10.5	9	10.5	SS	-	11/4/2013
	VBW-9-14-15.5	14	15.5	SS	-	11/4/2013
	VBW-9-24-25.5	24	25.5	SS	-	11/4/2013
	VBW-9-29-30.5	29	30.5	SS	-	11/4/2013
	VBW-9-34-35.5	34	35.5	SS	-	11/4/2013
	VBW-9-39-40.5	39	40.5	SS	-	11/4/2013
	VBW-9-44-45.5	44	45.5	SS	-	11/4/2013
	VBW-9-49-50.5	49	50.5	SS	-	11/4/2013
	VBW-9-54-55.5	54	55.5	SS	-	11/4/2013
	VBW-9-59-60.5	59	60.5	SS	-	11/4/2013
	VBW-9-64-65.5	64	65.5	SS	-	11/4/2013
	VBW-9-69-70.5	69	70.5	SS	-	11/4/2013
	VBW-9-74-75.5	74	75.5	SS	-	11/5/2013
	VBW-9-79-80.5	79	80.5	SS	-	11/5/2013
	VBW-9-84-85.5	84	85.5	SS	-	11/5/2013
VBW-9	VBW-9-Residuum	0	14	Bulk Sample	-	11/4/2013
	VBW-9-Saprolite	14	69	Bulk Sample	-	11/4/2013
	VBW-9-PWR	69	85.5	Bulk Sample	-	11/5/2013
VBW-10	VBW-10-0-1.5	0	1.5	SS	-	9/18/2013
	VBW-10-1.5-3	1.5	3	SS	-	9/18/2013
	VBW-10-3-4.5	3	4.5	SS	-	9/18/2013
	VBW-10-4.5-6	4.5	6	SS	Yes	9/18/2013

VBW Geotechnical Sampling Summary
Chemtronics Site, Swannanoa, North Carolina

Boring Location	Sample ID	Depth (top, ft-bgs)	Depth (bottom, ft-bgs)	Sample Method	Sample Submitted for VOC Analysis	Date Collected
VBW-10	VBW-10-6-7.5	6	7.5	SS	-	9/18/2013
	VBW-10-7.5-9	7.5	9	SS	-	9/18/2013
	VBW-10-9-10.5	9	10.5	SS	-	9/18/2013
	VBW-10-10.5-12	10.5	12	SS	-	9/18/2013
	VBW-10-12-13.5	12	13.5	SS	-	9/18/2013
	VBW-10-13.5-15	13.5	15	SS	-	9/18/2013
	VBW-10-15-16.5	15	16.5	SS	-	9/18/2013
	VBW-10-16.5-18	16.5	18	SS	-	9/18/2013
	VBW-10-18-19.5	18	19.5	SS	-	9/18/2013
	VBW-10-19.5-21	19.5	21	SS	-	9/18/2013
	VBW-10-21-22.5	21	22.5	SS	-	9/18/2013
	VBW-10-22.5-24	22.5	24	SS	-	9/18/2013
	VBW-10-24-25.5	24	25.5	SS	-	9/18/2013
	VBW-10-25.5-27	25.5	27	SS	-	9/18/2013
	VBW-10-27-28.5	27	28.5	SS	-	9/18/2013
	VBW-10-28.5-30	28.5	30	SS	-	9/18/2013
	VBW-10-30-31.5	30	31.5	SS	-	9/18/2013
	VBW-10-31.5-33	31.5	33	SS	-	9/18/2013
	VBW-10-33-34.5	33	34.5	SS	-	9/18/2013
	VBW-10-34.5-36	34.5	36	SS	-	9/18/2013
	VBW-10-36-37.5	36	37.5	SS	-	9/18/2013
VBW-11	VBW-11-0-1.5	0	1.5	SS	-	10/18/2013
	VBW-11-3-4.5	3	4.5	SS	-	10/18/2013
	VBW-11-8-9.5	8	9.5	SS	-	10/18/2013
	VBW-11-13-14.5	13	14.5	SS	-	10/18/2013
	VBW-11-18-19.5	18	19.5	SS	-	10/18/2013
	VBW-11-23-24.5	23	24.5	SS	-	10/18/2013
	VBW-11-28-29.5	28	29.5	SS	-	10/18/2013
	VBW-11-33-34.5	33	34.5	SS	-	10/18/2013
	VBW-11-43-44.5	43	44.5	SS	-	10/18/2013
	VBW-11-48-49.5	48	49.5	SS	-	10/18/2013
	VBW-11-53-54.5	53	54.5	SS	-	10/18/2013
	VBW-11-58-59.5	58	59.5	SS	-	10/18/2013
	VBW-11-63-64.5	63	64.5	SS	-	10/18/2013
	VBW-11-68-69.5	68	69.5	SS	-	10/18/2013
	VBW-11-73-74.5	73	74.5	SS	-	10/18/2013
	VBW-11-78-79.5	78	79.5	SS	-	10/18/2013
	VBW-11-83-84.5	83	84.5	SS	-	10/18/2013
	VBW-11-88-89.5	88	89.5	SS	-	10/18/2013
VBW-11	VBW-11-Residuum	0	23	Bulk Sample	-	10/18/2013
	VBW-11-Saprolite	23	83	Bulk Sample	-	10/18/2013
VBW-12	VBW-12-4-5.5	4	5.5	SS	-	10/21/2013
	VBW-12-8-9.5	8	9.5	SS	-	10/21/2013
	VBW-12-13-14.5	13	14.5	SS	-	10/21/2013
	VBW-12-18-19.5	18	19.5	SS	-	10/21/2013
VBW-12	VBW-12-Residuum	0	13	Bulk Sample	-	10/21/2013
	VBW-12-Saprolite	13	27.5	Bulk Sample	-	10/21/2013

VBW Geotechnical Sampling Summary
Chemtronics Site, Swannanoa, North Carolina

Boring Location	Sample ID	Depth (top, ft-bgs)	Depth (bottom, ft-bgs)	Sample Method	Sample Submitted for VOC Analysis	Date Collected
VBW-13	VBW-13-0-1.5	0	1.5	SS	-	10/2/2013
	VBW-13-1.5-3	1.5	3	SS	-	10/2/2013
	VBW-13-3-4.5	3	4.5	SS	-	10/2/2013
	VBW-13-4.5-6	4.5	6	SS	-	10/2/2013
	VBW-13-6-7.5	6	7.5	SS	Yes	10/2/2013
	VBW-13-7.5-9	7.5	9	SS	Yes	10/2/2013
	VBW-13-9-10.5	9	10.5	SS	-	10/2/2013
	VBW-13-10.5-12	10.5	12	SS	-	10/2/2013
	VBW-13-13.5-15	13.5	15	SS	-	10/2/2013
	VBW-13-15-16.5	15	16.5	SS	-	10/2/2013
	VBW-13-16.5-18	16.5	18	SS	-	10/2/2013
	VBW-13-18-19.5	18	19.5	SS	-	10/2/2013
	VBW-13-19.5-21	19.5	21	SS	-	10/2/2013
	VBW-13-21-22.5	21	22.5	SS	-	10/2/2013
	VBW-13-22.5-24	22.5	24	SS	-	10/2/2013
	VBW-13-24-25.5	24	25.5	SS	-	10/2/2013
	VBW-13-25.5-27	25.5	27	SS	-	10/2/2013
	VBW-13-27-28.5	27	28.5	SS	-	10/2/2013
	VBW-13-28.5-30	28.5	30	SS	-	10/2/2013
	VBW-13-30-31.5	30	31.5	SS	-	10/2/2013
	VBW-13-31.5-33	31.5	33	SS	-	10/2/2013
	VBW-13-33-34.5	33	34.5	SS	-	10/2/2013
VBW-14	VBW-14-0-1.5	0	1.5	SS	-	9/27/2013
	VBW-14-1.5-3	1.5	3	SS	-	9/27/2013
	VBW-14-3-4.5	3	4.5	SS	-	9/27/2013
	VBW-14-4.5-6	4.5	6	SS	-	9/27/2013
	VBW-14-6-7.5	6	7.5	SS	-	9/27/2013
	VBW-14-7.5-9	7.5	9	SS	-	9/27/2013
	VBW-14-9-10.5	9	10.5	SS	-	9/27/2013
	VBW-14-10.5-12	10.5	12	SS	-	9/27/2013
	VBW-14-12-13.5	12	13.5	SS	-	9/27/2013
	VBW-14-13.5-15	13.5	15	SS	Yes	9/27/2013
	VBW-14-15-16.5	15	16.5	SS	-	9/27/2013
	VBW-14-16.5-18	16.5	18	SS	-	9/27/2013
	VBW-14-18-19.5	18	19.5	SS	-	9/27/2013
	VBW-14-19.5-21	19.5	21	SS	-	9/27/2013
	VBW-14-21-22.5	21	22.5	SS	-	9/27/2013
	VBW-14-22.5-24	22.5	24	SS	-	9/27/2013
	VBW-14-24-25.5	24	25.5	SS	-	9/27/2013
	VBW-14-25.5-27	25.5	27	SS	-	9/27/2013
	VBW-14-27-28.5	27	28.5	SS	-	9/27/2013
	VBW-14-28.5-30	28.5	30	SS	-	9/27/2013
	VBW-14-30-31.5	30	31.5	SS	-	9/27/2013
	VBW-14-31.5-33	31.5	33	SS	-	9/27/2013
	VBW-14-33-34.5	33	34.5	SS	-	9/27/2013
	VBW-14-34.5-36	34.5	36	SS	-	9/27/2013
	VBW-14-36-37.5	36	37.5	SS	-	9/27/2013

VBW Geotechnical Sampling Summary
Chemtronics Site, Swannanoa, North Carolina

Boring Location	Sample ID	Depth (top, ft-bgs)	Depth (bottom, ft-bgs)	Sample Method	Sample Submitted for VOC Analysis	Date Collected
VBW-14	VBW-14-37.5-39	37.5	39	SS	-	9/27/2013
	VBW-14-39-40.5	39	40.5	SS	-	9/27/2013
	VBW-14-40.5-42	40.5	42	SS	-	9/27/2013
	VBW-14-42-43.5	42	43.5	SS	-	9/27/2013
	VBW-14-43.5-45	43.5	45	SS	-	9/27/2013
	VBW-14-45-46.5	45	46.5	SS	-	9/27/2013
	VBW-14-46.5-48	46.5	48	SS	-	9/27/2013
	VBW-14-48-49.5	48	49.5	SS	-	9/27/2013
	VBW-14-49.5-51	49.5	51	SS	-	9/27/2013
	VBW-14-51-52.5	51	52.5	SS	-	9/27/2013
	VBW-14-52.5-54	52.5	54	SS	-	9/27/2013
	VBW-14-54-55.5	54	55.5	SS	-	9/27/2013
	VBW-14-55.5-57	55.5	57	SS	-	9/27/2013
	VBW-14-57-58.5	57	58.5	SS	-	9/27/2013
	VBW-14-58.5-60	58.5	60	SS	-	9/27/2013
	VBW-14-60-61.5	60	61.5	SS	-	9/27/2013
	VBW-14-61.5-63	61.5	63	SS	-	9/30/2013
	VBW-14-63-64.5	63	64.5	SS	-	9/30/2013
	VBW-14-64.5-66	64.5	66	SS	-	9/30/2013
	VBW-14-66-67.5	66	67.5	SS	-	9/30/2013
	VBW-14-67.5-69	67.5	69	SS	-	9/30/2013
VBW-14	VBW-14-Residuum	1.5	9	Bulk Sample	-	9/30/2013
	VBW-14-Saprolite	9	45	Bulk Sample	-	9/30/2013
	VBW-14-Deep Saprolite	45	69	Bulk Sample	-	9/30/2013
VBW-15A	VBW-15A-0-1.5	0	1.5	SS	-	10/3/2013
	VBW-15A-1.5-3	1.5	3	SS	-	10/3/2013
	VBW-15A-3-4.5	3	4.5	SS	-	10/3/2013
	VBW-15A-4.5-6	4.5	6	SS	-	10/3/2013
VBW-15C	VBW-15C-4.5-6	4.5	6	SS	-	10/3/2013
	VBW-15C-6-7.5	6	7.5	SS	-	10/3/2013
	VBW-15C-7.5-9	7.5	9	SS	-	10/3/2013
	VBW-15C-9-10.5	9	10.5	SS	-	10/3/2013
	VBW-15C-10.5-12	10.5	12	SS	Yes	10/3/2013
	VBW-15C-12-13.5	12	13.5	SS	-	10/3/2013
	VBW-15C-13.5-15	13.5	15	SS	-	10/3/2013
	VBW-15C-15-16.5	15	16.5	SS	-	10/3/2013
	VBW-15C-16.5-18	16.5	18	SS	-	10/3/2013
	VBW-15C-18-19.5	18	19.5	SS	-	10/3/2013
	VBW-15C-19.5-21	19.5	21	SS	-	10/3/2013
	VBW-15C-21-22.5	21	22.5	SS	-	10/3/2013
	VBW-15C-22.5-24	22.5	24	SS	-	10/3/2013
	VBW-15C-24-25.5	24	25.5	SS	-	10/3/2013
	VBW-15C-25.5-27	25.5	27	SS	-	10/3/2013
	VBW-15C-27-28.5	27	28.5	SS	-	10/3/2013
	VBW-15C-28.5-30	28.5	30	SS	-	10/3/2013
	VBW-15C-30-31.5	30	31.5	SS	-	10/3/2013
	VBW-15C-31.5-33	31.5	33	SS	-	10/3/2013

VBW Geotechnical Sampling Summary
Chemtronics Site, Swannanoa, North Carolina

Boring Location	Sample ID	Depth (top, ft-bgs)	Depth (bottom, ft-bgs)	Sample Method	Sample Submitted for VOC Analysis	Date Collected
VBW-15C	VBW-15C-33-34.5	33	34.5	SS	-	10/3/2013
	VBW-15C-34.5-36	34.5	36	SS	-	10/3/2013
	VBW-15C-36-37.5	36	37.5	SS	-	10/3/2013
	VBW-15C-37.5-39	37.5	39	SS	-	10/3/2013
	VBW-15C-39-40.5	39	40.5	SS	-	10/3/2013
	VBW-15C-40.5-42	40.5	42	SS	-	10/3/2013
	VBW-15C-42-43.5	42	43.5	SS	-	10/3/2013
	VBW-15C-43.5-45	43.5	45	SS	-	10/3/2013
	VBW-15C-45-46.5	45	46.5	SS	-	10/3/2013
	VBW-15C-46.5-48	46.5	48	SS	-	10/3/2013
	VBW-15C-48-49.5	48	49.5	SS	-	10/3/2013
	VBW-15C-49.5-51	49.5	51	SS	-	10/3/2013
	VBW-15C-51-52.5	51	52.5	SS	-	10/3/2013
	VBW-15C-52.5-54	52.5	54	SS	-	10/3/2013
	VBW-15C-54-55.5	54	55.5	SS	-	10/4/2013
	VBW-15C-55.5-57	55.5	57	SS	-	10/4/2013
	VBW-15C-57-58.5	57	58.5	SS	-	10/4/2013
	VBW-15C-58.5-60	58.5	60	SS	-	10/4/2013
	VBW-15C-60-61.5	60	61.5	SS	-	10/4/2013
	VBW-15C-61.5-63	61.5	63	SS	-	10/4/2013
	VBW-15C-63-64.5	63	64.5	SS	-	10/4/2013
	VBW-15C-64.5-66	64.5	66	SS	-	10/4/2013
	VBW-15C-66-67.5	66	67.5	SS	-	10/4/2013
	VBW-15C-67.5-69	67.5	69	SS	-	10/4/2013
	VBW-15C-69-70.5	69	70.5	SS	-	10/4/2013
	VBW-15C-70.5-72	70.5	72	SS	-	10/4/2013
	VBW-15C-72-73.5	72	73.5	SS	-	10/4/2013
	VBW-15C-73.5-75	73.5	75	SS	-	10/4/2013
	VBW-15C-75-76.5	75	76.5	SS	-	10/4/2013
	VBW-15C-76.5-78	76.5	78	SS	-	10/4/2013
	VBW-15C-78-79.5	78	79.5	SS	-	10/4/2013
	VBW-15C-79.5-81	79.5	81	SS	-	10/4/2013
	VBW-15C-81-82.5	81	82.5	SS	-	10/4/2013
	VBW-15C-82.5-84	82.5	84	SS	-	10/4/2013
	VBW-15C-84-85.5	84	85.5	SS	-	10/7/2013
	VBW-15C-85.5-87	85.5	87	SS	-	10/7/2013
	VBW-15C-87-88.5	87	88.5	SS	-	10/7/2013
	VBW-15C-88.5-90	88.5	90	SS	-	10/7/2013
	VBW-15C-90-91.5	90	91.5	SS	-	10/7/2013
	VBW-15C-91.5-93	91.5	93	SS	-	10/7/2013
	VBW-15C-93-94.5	93	94.5	SS	-	10/7/2013
	VBW-15C-94.5-96	94.5	96	SS	-	10/7/2013
VBW-16	VBW-16-0-1.5	0	1.5	SS	-	9/24/2013
	VBW-16-1.5-3	1.5	3	SS	-	9/24/2013
	VBW-16-3-4.5	3	4.5	SS	-	9/24/2013
	VBW-16-4.5-6	4.5	6	SS	-	9/24/2013
	VBW-16-6-7.5	6	7.5	SS	-	9/24/2013

VBW Geotechnical Sampling Summary
Chemtronics Site, Swannanoa, North Carolina

Boring Location	Sample ID	Depth (top, ft-bgs)	Depth (bottom, ft-bgs)	Sample Method	Sample Submitted for VOC Analysis	Date Collected
VBW-16	VBW-16-7.5-9	7.5	9	SS	-	9/24/2013
	VBW-16-9-10.5	9	10.5	SS	-	9/24/2013
	VBW-16-10.5-12	10.5	12	SS	-	9/24/2013
	VBW-16-12-13.5	12	13.5	SS	-	9/24/2013
	VBW-16-13.5-15	13.5	15	SS	-	9/24/2013
	VBW-16-15-16.5	15	16.5	SS	-	9/24/2013
	VBW-16-16.5-18	16.5	18	SS	-	9/24/2013
	VBW-16-18-19.5	18	19.5	SS	-	9/24/2013
	VBW-16-19.5-21	19.5	21	SS	-	9/24/2013
	VBW-16-21-22.5	21	22.5	SS	-	9/24/2013
	VBW-16-22.5-24	22.5	24	SS	-	9/24/2013
	VBW-16-24-25.5	24	25.5	SS	-	9/24/2013
	VBW-16-25.5-27	25.5	27	SS	-	9/24/2013
	VBW-16-27-28.5	27	28.5	SS	-	9/24/2013
	VBW-16-28.5-30	28.5	30	SS	-	9/24/2013
	VBW-16-30-31.5	30	31.5	SS	-	9/24/2013
	VBW-16-31.5-33	31.5	33	SS	-	9/24/2013
	VBW-16-33-34.5	33	34.5	SS	-	9/24/2013
	VBW-16-34.5-36	34.5	36	SS	-	9/24/2013
	VBW-16-36-37.5	36	37.5	SS	-	9/24/2013
	VBW-16-37.5-39	37.5	39	SS	-	9/24/2013
	VBW-16-39-40.5	39	40.5	SS	-	9/24/2013
	VBW-16-40.5-42	40.5	42	SS	-	9/24/2013
	VBW-16-42-43.5	42	43.5	SS	-	9/24/2013
	VBW-16-43.5-45	43.5	45	SS	-	9/24/2013
	VBW-16-45-46.5	45	46.5	SS	-	9/25/2013
	VBW-16-46.5-48	46.5	48	SS	-	9/25/2013
	VBW-16-48-49.5	48	49.5	SS	-	9/25/2013
	VBW-16-49.5-51	49.5	51	SS	-	9/25/2013
	VBW-16-51-52.5	51	52.5	SS	-	9/25/2013
	VBW-16-52.5-54	52.5	54	SS	-	9/25/2013
	VBW-16-54-55.5	54	55.5	SS	-	9/25/2013
	VBW-16-55.5-57	55.5	57	SS	-	9/25/2013
	VBW-16-57-58.5	57	58.5	SS	-	9/25/2013
	VBW-16-58.5-60	58.5	60	SS	-	9/25/2013
	VBW-16-60-61.5	60	61.5	SS	-	9/25/2013
	VBW-16-61.5-63	61.5	63	SS	-	9/25/2013
VBW-17	VBW-17-3-4.5	3	4.5	SS	-	11/6/2013
	VBW-17-8-9.5	8	9.5	SS	-	11/6/2013
	VBW-17-13-14.5	13	14.5	SS	-	11/6/2013
	VBW-17-18-19.5	18	19.5	SS	-	11/6/2013
	VBW-17-23-24.5	23	24.5	SS	-	11/6/2013
	VBW-17-28-29.5	28	29.5	SS	-	11/6/2013
	VBW-17-33-34.5	33	34.5	SS	-	11/6/2013
	VBW-17-38-39.5	38	39.5	SS	-	11/6/2013
	VBW-17-43-44.5	43	44.5	SS	-	11/6/2013
	VBW-17-48-49.5	48	49.5	SS	-	11/7/2013

VBW Geotechnical Sampling Summary
Chemtronics Site, Swannanoa, North Carolina

Boring Location	Sample ID	Depth (top, ft-bgs)	Depth (bottom, ft-bgs)	Sample Method	Sample Submitted for VOC Analysis	Date Collected
VBW-17	VBW-17-53-54.5	53	54.5	SS	-	11/7/2013
	VBW-17-58-59.5	58	59.5	SS	-	11/7/2013
	VBW-17-63-64.5	63	64.5	SS	-	11/7/2013
	VBW-17-68-69.5	68	69.5	SS	-	11/7/2013
	VBW-17-73-74.5	73	74.5	SS	-	11/7/2013
	VBW-17-Residuum	0	13	Bulk Sample	-	11/6/2013
	VBW-17-Saprolite	13	58	Bulk Sample	-	11/6-11/7/13
	VBW-17-Saprolite/PWR	58	76.5	Bulk Sample	-	11/7/2013
VBW-18A	VBW-18-3-4.5	3	4.5	SS	-	11/12/2013
VBW-18B	VBW-18B-3-4.5	3	4.5	SS	-	11/12/2013
	VBW-18B-8-9.5	8	9.5	SS	-	11/12/2013
	VBW-18B-13-14.5	13	14.5	SS	-	11/12/2013
	VBW-18B-18-19.5	18	19.5	SS	-	11/12/2013
	VBW-18B-23-24.5	23	24.5	SS	-	11/12/2013
	VBW-18B-28-29.5	28	29.5	SS	-	11/12/2013
	VBW-18B-33-34.5	33	34.5	SS	-	11/12/2013
	VBW-18B-38-39.5	38	39.5	SS	-	11/12/2013
	VBW-18B-43-44.5	43	44.5	SS	-	11/12/2013
	VBW-18B-48-49.5	48	49.5	SS	-	11/12/2013
	VBW-18B-53-54.5	53	54.5	SS	-	11/12/2013
	VBW-18B-58-59.5	58	59.5	SS	-	11/12/2013
	VBW-18B-63-64.5	63	64.5	SS	-	11/12/2013
	VBW-18B-68-69.5	68	69.5	SS	-	11/12/2013
	VBW-18B-73-74.5	73	74.5	SS	-	11/12/2013
	VBW-18B-78-79.5	78	79.5	SS	-	11/13/2013
	VBW-18B-83-84.5	83	84.5	SS	-	11/13/2013
VBW-18B	VBW-18B-Residuum	0	13	Bulk Sample	-	11/12/2013
	VBW-18B-Saprolite	13	43	Bulk Sample	-	11/12/2013
	VBW-18B-Saprolite/PWR	43	87	Bulk Sample	-	11/12-11/13/2013

Note:

1. VBW-15B encountered a wood obstruction and was not sampled.

Soil Analytical Results

ANALYTICAL RESULTS

Prepared by:	Prepared for:
Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601	Altamont Environmental 231 Haywood Street Asheville NC 28801

October 28, 2013

Project: Chemtronics Site

Submittal Date: 10/23/2013
Group Number: 1428419
PO Number: 2115.231
State of Sample Origin: NC

Client Sample Description	Lancaster Labs (LL) #
VBW-5-19-20.5 Grab Soil	7247658

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Altamont Environmental	Attn: Amy Huffman
ELECTRONIC COPY TO	Altamont Environmental	Attn: Marta VanDussen

Respectfully Submitted,

Nancy Jean Bornholm

Nancy Jean Bornholm
Principal Specialist

(717) 556-7250

Sample Description: VBW-5-19-20.5 Grab Soil
Chemtronics Soil Sampling

LL Sample # SW 7247658
LL Group # 1428419
Account # 12184

Project Name: Chemtronics Site

Collected: 10/22/2013 17:10 by MG

Submitted: 10/23/2013 09:10
Reported: 10/28/2013 14:02

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW-5

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10237	Acetone	67-64-1	11	U	11	32	1.18
10237	Acetonitrile	75-05-8	40	U	40	160	1.18
10237	Acrolein	107-02-8	32	U	32	160	1.18
10237	Acrylonitrile	107-13-1	6	U	6	32	1.18
10237	Allyl Chloride	107-05-1	2	U	2	8	1.18
10237	t-Amyl methyl ether	994-05-8	2	U	2	8	1.18
10237	Benzene	71-43-2	3	J	0.8	8	1.18
10237	Benzyl Chloride	100-44-7	2	U	2	6	1.18
10237	Bromobenzene	108-86-1	2	U	2	8	1.18
10237	Bromochloromethane	74-97-5	2	U	2	8	1.18
10237	Bromodichloromethane	75-27-4	2	U	2	8	1.18
10237	Bromoform	75-25-2	2	U	2	8	1.18
10237	Bromomethane	74-83-9	3	U	3	8	1.18
10237	n-Butanol	71-36-3	170	U	170	400	1.18
10237	2-Butanone	78-93-3	6	U	6	16	1.18
10237	t-Butyl alcohol	75-65-0	38	J	32	160	1.18
10237	n-Butylbenzene	104-51-8	2	U	2	8	1.18
10237	sec-Butylbenzene	135-98-8	2	U	2	8	1.18
10237	tert-Butylbenzene	98-06-6	2	U	2	8	1.18
10237	Carbon Disulfide	75-15-0	2	U	2	8	1.18
10237	Carbon Tetrachloride	56-23-5	2	J	2	8	1.18
10237	2-Chloro-1,3-butadiene	126-99-8	2	U	2	8	1.18
10237	Chlorobenzene	108-90-7	2	U	2	8	1.18
10237	Chloroethane	75-00-3	3	U	3	8	1.18
10237	Chloroform	67-66-3	1,900		74	370	54.95
10237	Chloromethane	74-87-3	3	U	3	8	1.18
10237	2-Chlorotoluene	95-49-8	2	U	2	8	1.18
10237	4-Chlorotoluene	106-43-4	2	U	2	8	1.18
10237	Cyclohexane	110-82-7	180		2	8	1.18
10237	Cyclohexanone	108-94-1	40	U	40	400	1.18
10237	1,2-Dibromo-3-chloropropane	96-12-8	3	U	3	8	1.18
10237	Dibromochloromethane	124-48-1	2	U	2	8	1.18
10237	1,2-Dibromoethane	106-93-4	2	U	2	8	1.18
10237	Dibromomethane	74-95-3	2	U	2	8	1.18
10237	trans-1,4-Dichloro-2-butene	110-57-6	16	U	16	79	1.18
10237	1,2-Dichlorobenzene	95-50-1	2	U	2	8	1.18
10237	1,3-Dichlorobenzene	541-73-1	2	U	2	8	1.18
10237	1,4-Dichlorobenzene	106-46-7	2	U	2	8	1.18
10237	Dichlorodifluoromethane	75-71-8	3	U	3	8	1.18
10237	1,1-Dichloroethane	75-34-3	2	U	2	8	1.18
10237	1,2-Dichloroethane	107-06-2	410		2	8	1.18
10237	1,1-Dichloroethene	75-35-4	2	U	2	8	1.18
10237	cis-1,2-Dichloroethene	156-59-2	2	U	2	8	1.18
10237	trans-1,2-Dichloroethene	156-60-5	2	U	2	8	1.18
10237	1,2-Dichloropropane	78-87-5	2	U	2	8	1.18
10237	1,3-Dichloropropane	142-28-9	2	U	2	8	1.18
10237	2,2-Dichloropropane	594-20-7	2	U	2	8	1.18
10237	1,1-Dichloropropene	563-58-6	2	U	2	8	1.18
10237	cis-1,3-Dichloropropene	10061-01-5	2	U	2	8	1.18
10237	trans-1,3-Dichloropropene	10061-02-6	2	U	2	8	1.18
10237	Ethyl Methacrylate	97-63-2	2	U	2	8	1.18

*=This limit was used in the evaluation of the final result

Sample Description: VBW-5-19-20.5 Grab Soil
Chemtronics Soil Sampling

LL Sample # SW 7247658
LL Group # 1428419
Account # 12184

Project Name: Chemtronics Site

Collected: 10/22/2013 17:10 by MG

Submitted: 10/23/2013 09:10
Reported: 10/28/2013 14:02

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW-5

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10237	Ethyl t-butyl ether	637-92-3	2	U	2	8	1.18
10237	Ethylbenzene	100-41-4	2	U	2	8	1.18
10237	Freon 113	76-13-1	3	U	3	16	1.18
10237	n-Heptane	142-82-5	5	U	5	8	1.18
10237	Hexachlorobutadiene	87-68-3	3	U	3	8	1.18
10237	n-Hexane	110-54-3	2	U	2	8	1.18
10237	2-Hexanone	591-78-6	5	U	5	16	1.18
10237	Isobutyl Alcohol	78-83-1	160	U	160	400	1.18
10237	Isopropylbenzene	98-82-8	2	U	2	8	1.18
10237	p-Isopropyltoluene	99-87-6	2	U	2	8	1.18
10237	Methacrylonitrile	126-98-7	8	U	8	79	1.18
10237	Methyl Acetate	79-20-9	3	U	3	8	1.18
10237	Methyl Methacrylate	80-62-6	2	U	2	8	1.18
10237	Methyl Tertiary Butyl Ether	1634-04-4	0.8	U	0.8	8	1.18
10237	4-Methyl-2-pentanone	108-10-1	5	U	5	16	1.18
10237	Methylcyclohexane	108-87-2	2	U	2	8	1.18
10237	Methylene Chloride	75-09-2	7	J	3	8	1.18
10237	Naphthalene	91-20-3	2	U	2	8	1.18
10237	Pentachloroethane	76-01-7	2	U	2	8	1.18
10237	Propionitrile	107-12-0	48	U	48	160	1.18
10237	n-Propylbenzene	103-65-1	2	U	2	8	1.18
10237	Styrene	100-42-5	2	U	2	8	1.18
10237	1,1,1,2-Tetrachloroethane	630-20-6	2	U	2	8	1.18
10237	1,1,2,2-Tetrachloroethane	79-34-5	2	U	2	8	1.18
10237	Tetrachloroethene	127-18-4	2	J	2	8	1.18
10237	Tetrahydrofuran	109-99-9	6	U	6	8	1.18
10237	Toluene	108-88-3	2	U	2	8	1.18
10237	1,2,3-Trichlorobenzene	87-61-6	2	U	2	8	1.18
10237	1,2,4-Trichlorobenzene	120-82-1	2	U	2	8	1.18
10237	1,1,1-Trichloroethane	71-55-6	2	U	2	8	1.18
10237	1,1,2-Trichloroethane	79-00-5	2	U	2	8	1.18
10237	Trichloroethene	79-01-6	32		2	8	1.18
10237	1,2,4-Trimethylbenzene	95-63-6	2	U	2	8	1.18
10237	1,3,5-Trimethylbenzene	108-67-8	2	U	2	8	1.18
10237	Vinyl Acetate	108-05-4	3	U	3	16	1.18
10237	Vinyl Chloride	75-01-4	2	U	2	8	1.18
10237	m+p-Xylene	1330-20-7	2	U	2	8	1.18
10237	o-Xylene	95-47-6	2	U	2	8	1.18
Wet Chemistry	**SM 2540 G-1997**		**%**		**%**	**%**	
00111	Moisture	n.a.	25.6		0.50	0.50	1

Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.

*=This limit was used in the evaluation of the final result

Sample Description: VBW-5-19-20.5 Grab Soil
Chemtronics Soil Sampling

LL Sample # SW 7247658
LL Group # 1428419
Account # 12184

Project Name: Chemtronics Site

Collected: 10/22/2013 17:10 by MG

Submitted: 10/23/2013 09:10
Reported: 10/28/2013 14:02

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW-5

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time		Analyst	Dilution Factor
10237	GC/MS Volatiles	SW-846 8260B	1	B132981AA	10/25/2013	09:27	Stephanie A Selis	1.18
10237	GC/MS Volatiles	SW-846 8260B	1	Q132981AA	10/25/2013	14:47	Lauren C Temple	54.95
07320	GC/MS - LL DIH2O Encore Prep	SW-846 5035A	1	201329632871	10/23/2013	15:40	Mitchell R Washel	n.a.
07320	GC/MS - LL DIH2O Encore Prep	SW-846 5035A	2	201329632871	10/23/2013	15:40	Mitchell R Washel	n.a.
07578	GC/MS-HL Encore Prep-NC	SW-846 5035A	1	201329632871	10/23/2013	15:25	Mitchell R Washel	n.a.
00111	Moisture	SM 2540 G-1997	1	13296820001B	10/23/2013	18:29	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1428419
Reported: 10/28/13 at 02:02 PM

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: B132981AA	Sample number(s): 7247658									
Acetone	7	U	7.	20	ug/kg	94	93	23-171	1	30
Acetonitrile	25	U	25.	100	ug/kg	70	72	61-147	2	30
Acrolein	20	U	20.	100	ug/kg	89	83	50-137	6	30
Acrylonitrile	4	U	4.	20	ug/kg	83	85	58-123	2	30
Allyl Chloride	1	U	1.	5	ug/kg	89	85	56-139	5	30
t-Amyl methyl ether	1	U	1.	5	ug/kg	95	95	63-130	1	30
Benzene	0.5	U	0.5	5	ug/kg	98	94	80-120	5	30
Benzyl Chloride	1	U	1.	4	ug/kg	93	94	52-131	2	30
Bromobenzene	1	U	1.	5	ug/kg	105	103	80-120	2	30
Bromochloromethane	1	U	1.	5	ug/kg	102	100	75-129	2	30
Bromodichloromethane	1	U	1.	5	ug/kg	96	93	75-120	4	30
Bromoform	1	U	1.	5	ug/kg	104	103	70-120	1	30
Bromomethane	2	U	2.	5	ug/kg	100	96	32-162	4	30
n-Butanol	110 U		110.	250	ug/kg	89	88	55-120	2	30
2-Butanone	4	U	4.	10	ug/kg	88	93	38-146	5	30
t-Butyl alcohol	20	U	20.	100	ug/kg	103	98	60-149	5	30
n-Butylbenzene	1	U	1.	5	ug/kg	105	99	72-120	6	30
sec-Butylbenzene	1	U	1.	5	ug/kg	107	103	75-120	4	30
tert-Butylbenzene	1	U	1.	5	ug/kg	102	98	75-120	3	30
Carbon Disulfide	1	U	1.	5	ug/kg	95	91	63-128	4	30
Carbon Tetrachloride	1	U	1.	5	ug/kg	105	102	69-122	3	30
2-Chloro-1,3-butadiene	1	U	1.	5	ug/kg	100	96	72-126	4	30
Chlorobenzene	1	U	1.	5	ug/kg	108	99	80-120	8	30
Chloroethane	2	U	2.	5	ug/kg	95	92	17-171	3	30
Chloromethane	2	U	2.	5	ug/kg	93	89	56-120	5	30
2-Chlorotoluene	1	U	1.	5	ug/kg	100	96	78-120	4	30
4-Chlorotoluene	1	U	1.	5	ug/kg	99	95	79-120	5	30
Cyclohexane	1	U	1.	5	ug/kg	88	85	63-124	3	30
Cyclohexanone	25	U	25.	250	ug/kg	85	75	51-138	13	30
1,2-Dibromo-3-chloropropane	2	U	2.	5	ug/kg	92	96	55-128	4	30
Dibromochloromethane	1	U	1.	5	ug/kg	100	96	77-120	4	30
1,2-Dibromoethane	1	U	1.	5	ug/kg	101	99	80-120	3	30
Dibromomethane	1	U	1.	5	ug/kg	98	96	80-120	2	30
trans-1,4-Dichloro-2-butene	10	U	10.	50	ug/kg	94	101	67-139	8	30
1,2-Dichlorobenzene	1	U	1.	5	ug/kg	105	101	80-120	3	30
1,3-Dichlorobenzene	1	U	1.	5	ug/kg	105	102	80-120	3	30
1,4-Dichlorobenzene	1	U	1.	5	ug/kg	104	99	80-120	4	30
Dichlorodifluoromethane	2	U	2.	5	ug/kg	91	87	32-120	4	30
1,1-Dichloroethane	1	U	1.	5	ug/kg	102	98	80-120	4	30
1,2-Dichloroethane	1	U	1.	5	ug/kg	105	101	72-126	4	30
1,1-Dichloroethene	1	U	1.	5	ug/kg	104	99	73-129	5	30
cis-1,2-Dichloroethene	1	U	1.	5	ug/kg	100	96	80-120	4	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1428419
Reported: 10/28/13 at 02:02 PM

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
trans-1,2-Dichloroethene	1	U	1.	5	ug/kg	102	97	79-120	5	30
1,2-Dichloropropane	1	U	1.	5	ug/kg	100	98	77-120	2	30
1,3-Dichloropropane	1	U	1.	5	ug/kg	100	95	80-120	5	30
2,2-Dichloropropane	1	U	1.	5	ug/kg	100	94	72-123	5	30
1,1-Dichloropropene	1	U	1.	5	ug/kg	99	95	77-120	4	30
cis-1,3-Dichloropropene	1	U	1.	5	ug/kg	99	97	74-120	1	30
trans-1,3-Dichloropropene	1	U	1.	5	ug/kg	93	91	77-120	3	30
Ethyl Methacrylate	1	U	1.	5	ug/kg	92	94	65-120	2	30
Ethyl t-butyl ether	1	U	1.	5	ug/kg	95	95	64-124	0	30
Ethylbenzene	1	U	1.	5	ug/kg	105	97	80-120	8	30
Freon 113	2	U	2.	10	ug/kg	93	88	64-137	5	30
n-Heptane	3	U	3.	5	ug/kg	76	74	49-129	3	30
Hexachlorobutadiene	2	U	2.	5	ug/kg	105	95	46-130	10	30
n-Hexane	1	U	1.	5	ug/kg	85	82	56-127	4	30
2-Hexanone	3	U	3.	10	ug/kg	95	97	40-129	2	30
Isobutyl Alcohol	100 U		100.	250	ug/kg	91	91	64-121	0	30
Isopropylbenzene	1	U	1.	5	ug/kg	107	101	76-120	5	30
p-Isopropyltoluene	1	U	1.	5	ug/kg	107	103	75-120	4	30
Methacrylonitrile	5	U	5.	50	ug/kg	93	96	65-122	2	30
Methyl Acetate	2	U	2.	5	ug/kg	99	105	62-158	6	30
Methyl Methacrylate	1	U	1.	5	ug/kg	89	92	60-120	4	30
Methyl Tertiary Butyl Ether	0.5	U	0.5	5	ug/kg	96	96	69-126	0	30
4-Methyl-2-pentanone	3	U	3.	10	ug/kg	90	94	52-125	5	30
Methylcyclohexane	1	U	1.	5	ug/kg	83	81	58-134	3	30
Methylene Chloride	2	U	2.	5	ug/kg	100	96	80-124	4	30
Naphthalene	1	U	1.	5	ug/kg	95	91	59-123	5	30
Pentachloroethane	1	U	1.	5	ug/kg	97	94	71-120	4	30
Propionitrile	30	U	30.	100	ug/kg	94	91	74-129	4	30
n-Propylbenzene	1	U	1.	5	ug/kg	107	105	77-120	2	30
Styrene	1	U	1.	5	ug/kg	102	96	76-120	6	30
1,1,1,2-Tetrachloroethane	1	U	1.	5	ug/kg	104	97	80-120	6	30
1,1,2,2-Tetrachloroethane	1	U	1.	5	ug/kg	93	96	71-123	3	30
Tetrachloroethene	1	U	1.	5	ug/kg	112	107	78-126	5	30
Tetrahydrofuran	4	U	4.	5	ug/kg	94	92	64-140	2	30
Toluene	1	U	1.	5	ug/kg	105	97	80-120	7	30
1,2,3-Trichlorobenzene	1	U	1.	5	ug/kg	102	93	64-120	10	30
1,2,4-Trichlorobenzene	1	U	1.	5	ug/kg	99	91	68-120	8	30
1,1,1-Trichloroethane	1	U	1.	5	ug/kg	104	101	71-125	3	30
1,1,2-Trichloroethane	1	U	1.	5	ug/kg	104	98	80-120	5	30
Trichloroethene	1	U	1.	5	ug/kg	103	98	80-120	5	30
1,2,4-Trimethylbenzene	1	U	1.	5	ug/kg	106	101	79-120	4	30
1,3,5-Trimethylbenzene	1	U	1.	5	ug/kg	104	100	78-120	4	30
Vinyl Acetate	2	U	2.	10	ug/kg	73	75	40-127	3	30
Vinyl Chloride	1	U	1.	5	ug/kg	94	93	53-120	1	30
m+p-Xylene	1	U	1.	5	ug/kg	105	97	80-120	8	30
o-Xylene	1	U	1.	5	ug/kg	103	96	80-120	7	30
Batch number: Q132981AA	Sample number(s): 7247658									
Chloroform	50	U	50.	250	ug/kg	109	98	80-120	11	30
Batch number: 13296820001B	Sample number(s): 7247658									
Moisture						100		99-101		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1428419
Reported: 10/28/13 at 02:02 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc		DUP Conc		DUP RPD	Dup RPD Max
Batch number: B132981AA	Sample number(s): 7247658		BKG: 7247658								
Acetone						8	U	9	U	0 (1)	30
Acetonitrile						29	U	31	U	0 (1)	30
Acrolein						24	U	25	U	0 (1)	30
Acrylonitrile						5	U	5	U	0 (1)	30
Allyl Chloride						1	U	1	U	0 (1)	30
t-Amyl methyl ether						1	U	1	U	0 (1)	30
Benzene						2	J	4	J	43* (1)	30
Benzyl Chloride						1	U	1	U	0 (1)	30
Bromobenzene						1	U	1	U	0 (1)	30
Bromochloromethane						1	U	1	U	0 (1)	30
Bromodichloromethane						1	U	1	U	0 (1)	30
Bromoform						1	U	1	U	0 (1)	30
Bromomethane						2	U	2	U	0 (1)	30
n-Butanol						130	U	140	U	0 (1)	30
2-Butanone						5	U	5	U	0 (1)	30
t-Butyl alcohol						29	J	25	U	200* (1)	30
n-Butylbenzene						1	U	1	U	0 (1)	30
sec-Butylbenzene						1	U	1	U	0 (1)	30
tert-Butylbenzene						1	U	1	U	0 (1)	30
Carbon Disulfide						1	U	1	U	0 (1)	30
Carbon Tetrachloride						1	J	3	J	81* (1)	30
2-Chloro-1,3-butadiene						1	U	1	U	0 (1)	30
Chlorobenzene						1	U	1	U	0 (1)	30
Chloroethane						2	U	2	U	0 (1)	30
Chloromethane						2	U	2	U	0 (1)	30
2-Chlorotoluene						1	U	1	U	0 (1)	30
4-Chlorotoluene						1	U	1	U	0 (1)	30
Cyclohexane						130		580		126*	30
Cyclohexanone						29	U	31	U	0 (1)	30
1,2-Dibromo-3-chloropropane						2	U	2	U	0 (1)	30
Dibromochloromethane						1	U	1	U	0 (1)	30
1,2-Dibromoethane						1	U	1	U	0 (1)	30
Dibromomethane						1	U	1	U	0 (1)	30
trans-1,4-Dichloro-2-butene						12	U	12	U	0 (1)	30
1,2-Dichlorobenzene						1	U	1	U	0 (1)	30
1,3-Dichlorobenzene						1	U	1	U	0 (1)	30
1,4-Dichlorobenzene						1	U	1	U	0 (1)	30
Dichlorodifluoromethane						2	U	2	U	0 (1)	30
1,1-Dichloroethane						1	U	1	U	0 (1)	30
1,2-Dichloroethane						310		370		19	30
1,1-Dichloroethene						1	U	1	U	0 (1)	30
cis-1,2-Dichloroethene						1	U	1	U	0 (1)	30
trans-1,2-Dichloroethene						1	U	1	U	0 (1)	30
1,2-Dichloropropane						1	U	1	U	0 (1)	30
1,3-Dichloropropane						1	U	1	U	0 (1)	30
2,2-Dichloropropane						1	U	1	U	0 (1)	30
1,1-Dichloropropene						1	U	1	U	0 (1)	30
cis-1,3-Dichloropropene						1	U	1	U	0 (1)	30
trans-1,3-Dichloropropene						1	U	1	U	0 (1)	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1428419
Reported: 10/28/13 at 02:02 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc		DUP Conc		DUP RPD	Dup RPD Max
Ethyl Methacrylate						1	U	1	U	0 (1)	30
Ethyl t-butyl ether						1	U	1	U	0 (1)	30
Ethylbenzene						1	U	1	U	0 (1)	30
Freon 113						2	U	4	J	200* (1)	30
n-Heptane						4	U	4	U	0 (1)	30
Hexachlorobutadiene						2	U	2	U	0 (1)	30
n-Hexane						1	U	1	U	0 (1)	30
2-Hexanone						4	U	4	U	0 (1)	30
Isobutyl Alcohol						120	U	120	U	0 (1)	30
Isopropylbenzene						1	U	1	U	0 (1)	30
p-Isopropyltoluene						1	U	1	U	0 (1)	30
Methacrylonitrile						6	U	6	U	0 (1)	30
Methyl Acetate						2	U	2	U	0 (1)	30
Methyl Methacrylate						1	U	1	U	0 (1)	30
Methyl Tertiary Butyl Ether						0.6	U	0.6	U	0 (1)	30
4-Methyl-2-pentanone						4	U	4	U	0 (1)	30
Methylcyclohexane						1	U	1	U	0 (1)	30
Methylene Chloride						5	J	7		29 (1)	30
Naphthalene						1	U	1	U	0 (1)	30
Pentachloroethane						1	U	1	U	0 (1)	30
Propionitrile						35	U	37	U	0 (1)	30
n-Propylbenzene						1	U	1	U	0 (1)	30
Styrene						1	U	1	U	0 (1)	30
1,1,1,2-Tetrachloroethane						1	U	1	U	0 (1)	30
1,1,2,2-Tetrachloroethane						1	U	1	U	0 (1)	30
Tetrachloroethene						2	J	3	J	65* (1)	30
Tetrahydrofuran						5	U	5	U	0 (1)	30
Toluene						1	U	1	U	0 (1)	30
1,2,3-Trichlorobenzene						1	U	1	U	0 (1)	30
1,2,4-Trichlorobenzene						1	U	1	U	0 (1)	30
1,1,1-Trichloroethane						1	U	1	U	0 (1)	30
1,1,2-Trichloroethane						1	U	1	U	0 (1)	30
Trichloroethene						24		43		56* (1)	30
1,2,4-Trimethylbenzene						1	U	1	U	0 (1)	30
1,3,5-Trimethylbenzene						1	U	1	U	0 (1)	30
Vinyl Acetate						2	U	2	U	0 (1)	30
Vinyl Chloride						1	U	1	U	0 (1)	30
m+p-Xylene						1	U	1	U	0 (1)	30
o-Xylene						1	U	1	U	0 (1)	30
Batch number: Q132981AA	Sample number(s): 7247658		BKG: P248185								
Chloroform						38	U	38	U	0 (1)	30
Batch number: 13296820001B	Sample number(s): 7247658		BKG: P245543								
Moisture						17.4		17.5		1	5

Surrogate Quality Control

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1428419
Reported: 10/28/13 at 02:02 PM

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed
unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: GC/MS Volatiles
Batch number: B132981AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
7247658	105	129	99	97
Blank	102	99	101	93
DUP	105	99	99	93
LCS	101	100	104	105
LCSD	101	101	99	97
Limits:	50-141	54-135	52-141	50-131

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Services Analysis Request/Chain of Custody

eurofins | Lancaster Laboratories

COC#: 7000

Acct. # 12184 Group # 1428419 Sample # 7247658

Client: Altamont Environmental

Project Name/#: Chemtrans 2115.231

Project Manager: Amy ~~Bondurant~~ Huffman P.O. #: 2115.231

Sampler: M. Gray

Phone #: ~~828~~ 828-281-3350 Quote #: 207662

State where sample(s) were collected: NC

SF#: 128607

SCR#: 145381

Sample Identification	Collection Date	Collection Time	Grab	Composite	Sediment	Soil	Ground	Potable	Surface	NPDES	Water	Other:	Total # of Containers	GC/MS VOAs (8260)	Nitroaromatics/Amines (8330)	Perchlorate (6850)	Moisture (2540 G)	Remarks
NBW-5-19-20-5	10/22/13	1710	X			X							4	X			X	do not send for validation

Preservation Codes: H = HCl, T = Thiosulfate, N = HNO_3, B = NaOH, S = H_2SO_4, P = H_3PO_4, O = Other

Turnaround Time Requested (TAT) (please check): Standard ☐ RUSH ☒

(RUSH TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 48 hr TAT

E-mail address to send RUSH results: AHuffman@AltamontEnvironmental.com

Data Package Options (please check if required)

Type I (Validation/non-CLP) ☐ MA MCP ☐ TX TRRP - 13 ☐

Type III (Reduced non-CLP) ☐ CT RCP ☐

Type IV (CLP SOW) ☐ ASP Type A ☐

Type VI (Raw Data Only) ☐ ASP Type B ☐

EDD Format: TerraBase

If site-specific QC (MS/MSD/Dup) required, indicate QC samples and submit triplicate volume.

Relinquished by:	Date	Time	Received by:	Date	Time
M. Gray	10/22/13	1835			
			Brianna Bru	10-23-13	910

Airbill No.:

Relinquished by Commercial Carrier:

UPS ☒ FedEx ____ Other ____

Temperature upon receipt 0.3 °C

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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Data Qualifiers:

C – result confirmed by reanalysis.

J - estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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ANALYTICAL RESULTS

Prepared by:	Prepared for:
Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601	Altamont Environmental 231 Haywood Street Asheville NC 28801

September 23, 2013

Project: Chemtronics Site

Submittal Date: 09/19/2013
Group Number: 1419960
PO Number: 2115.231
State of Sample Origin: NC

Client Sample Description	Lancaster Labs (LL) #
VBW-10-4.5-6 Grab Soil	7203235

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Altamont Environmental	Attn: Amy Huffman
ELECTRONIC COPY TO	Altamont Environmental	Attn: Marta VanDussen

Respectfully Submitted,

Nancy Jean Bornholm

Nancy Jean Bornholm
Principal Specialist

(717) 556-7250

Sample Description: VBW-10-4.5-6 Grab Soil
Chemtronics Site

LL Sample # SW 7203235
LL Group # 1419960
Account # 12184

Project Name: Chemtronics Site

Collected: 09/18/2013 13:15 by MG

Submitted: 09/19/2013 09:35
Reported: 09/23/2013 16:15

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW10

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10237	Acetone	67-64-1	10	U	10	27	1.05
10237	Acetonitrile	75-05-8	34	U	34	140	1.05
10237	Acrolein	107-02-8	27	U	27	140	1.05
10237	Acrylonitrile	107-13-1	5	U	5	27	1.05
10237	Allyl Chloride	107-05-1	1	U	1	7	1.05
10237	t-Amyl methyl ether	994-05-8	1	U	1	7	1.05
10237	Benzene	71-43-2	0.7	U	0.7	7	1.05
10237	Benzyl Chloride	100-44-7	1	U	1	5	1.05
10237	Bromobenzene	108-86-1	1	U	1	7	1.05
10237	Bromochloromethane	74-97-5	1	U	1	7	1.05
10237	Bromodichloromethane	75-27-4	1	U	1	7	1.05
10237	Bromoform	75-25-2	1	U	1	7	1.05
10237	Bromomethane	74-83-9	3	U	3	7	1.05
10237	n-Butanol	71-36-3	150	U	150	340	1.05
10237	2-Butanone	78-93-3	5	U	5	14	1.05
10237	t-Butyl alcohol	75-65-0	27	U	27	140	1.05
10237	n-Butylbenzene	104-51-8	1	U	1	7	1.05
10237	sec-Butylbenzene	135-98-8	1	U	1	7	1.05
10237	tert-Butylbenzene	98-06-6	1	U	1	7	1.05
10237	Carbon Disulfide	75-15-0	1	U	1	7	1.05
10237	Carbon Tetrachloride	56-23-5	1	U	1	7	1.05
10237	2-Chloro-1,3-butadiene	126-99-8	1	U	1	7	1.05
10237	Chlorobenzene	108-90-7	1	U	1	7	1.05
10237	Chloroethane	75-00-3	3	U	3	7	1.05
10237	Chloroform	67-66-3	1	U	1	7	1.05
10237	Chloromethane	74-87-3	3	U	3	7	1.05
10237	2-Chlorotoluene	95-49-8	1	U	1	7	1.05
10237	4-Chlorotoluene	106-43-4	1	U	1	7	1.05
10237	Cyclohexane	110-82-7	1	U	1	7	1.05
10237	Cyclohexanone	108-94-1	34	U	34	340	1.05
10237	1,2-Dibromo-3-chloropropane	96-12-8	3	U	3	7	1.05
10237	Dibromochloromethane	124-48-1	1	U	1	7	1.05
10237	1,2-Dibromoethane	106-93-4	1	U	1	7	1.05
10237	Dibromomethane	74-95-3	1	U	1	7	1.05
10237	trans-1,4-Dichloro-2-butene	110-57-6	14	U	14	69	1.05
10237	1,2-Dichlorobenzene	95-50-1	1	U	1	7	1.05
10237	1,3-Dichlorobenzene	541-73-1	1	U	1	7	1.05
10237	1,4-Dichlorobenzene	106-46-7	1	U	1	7	1.05
10237	Dichlorodifluoromethane	75-71-8	3	U	3	7	1.05
10237	1,1-Dichloroethane	75-34-3	1	U	1	7	1.05
10237	1,2-Dichloroethane	107-06-2	1	U	1	7	1.05
10237	1,1-Dichloroethene	75-35-4	1	U	1	7	1.05
10237	cis-1,2-Dichloroethene	156-59-2	1	U	1	7	1.05
10237	trans-1,2-Dichloroethene	156-60-5	1	U	1	7	1.05
10237	1,2-Dichloropropane	78-87-5	1	U	1	7	1.05
10237	1,3-Dichloropropane	142-28-9	1	U	1	7	1.05
10237	2,2-Dichloropropane	594-20-7	1	U	1	7	1.05
10237	1,1-Dichloropropene	563-58-6	1	U	1	7	1.05
10237	cis-1,3-Dichloropropene	10061-01-5	1	U	1	7	1.05
10237	trans-1,3-Dichloropropene	10061-02-6	1	U	1	7	1.05
10237	Ethyl Methacrylate	97-63-2	1	U	1	7	1.05

*=This limit was used in the evaluation of the final result

Sample Description: VBW-10-4.5-6 Grab Soil
Chemtronics Site

LL Sample # SW 7203235
LL Group # 1419960
Account # 12184

Project Name: Chemtronics Site

Collected: 09/18/2013 13:15 by MG

Submitted: 09/19/2013 09:35
Reported: 09/23/2013 16:15

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW10

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10237	Ethyl t-butyl ether	637-92-3	1	U	1	7	1.05
10237	Ethylbenzene	100-41-4	1	U	1	7	1.05
10237	Freon 113	76-13-1	3	U	3	14	1.05
10237	n-Heptane	142-82-5	4	U	4	7	1.05
10237	Hexachlorobutadiene	87-68-3	3	U	3	7	1.05
10237	n-Hexane	110-54-3	1	U	1	7	1.05
10237	2-Hexanone	591-78-6	4	U	4	14	1.05
10237	Isobutyl Alcohol	78-83-1	140	U	140	340	1.05
10237	Isopropylbenzene	98-82-8	1	U	1	7	1.05
10237	p-Isopropyltoluene	99-87-6	1	U	1	7	1.05
10237	Methacrylonitrile	126-98-7	7	U	7	69	1.05
10237	Methyl Acetate	79-20-9	3	U	3	7	1.05
10237	Methyl Methacrylate	80-62-6	1	U	1	7	1.05
10237	Methyl Tertiary Butyl Ether	1634-04-4	0.7	U	0.7	7	1.05
10237	4-Methyl-2-pentanone	108-10-1	4	U	4	14	1.05
10237	Methylcyclohexane	108-87-2	1	U	1	7	1.05
10237	Methylene Chloride	75-09-2	3	U	3	7	1.05
10237	Naphthalene	91-20-3	1	U	1	7	1.05
10237	Pentachloroethane	76-01-7	1	U	1	7	1.05
10237	Propionitrile	107-12-0	41	U	41	140	1.05
10237	n-Propylbenzene	103-65-1	1	U	1	7	1.05
10237	Styrene	100-42-5	1	U	1	7	1.05
10237	1,1,1,2-Tetrachloroethane	630-20-6	1	U	1	7	1.05
10237	1,1,2,2-Tetrachloroethane	79-34-5	1	U	1	7	1.05
10237	Tetrachloroethene	127-18-4	1	U	1	7	1.05
10237	Tetrahydrofuran	109-99-9	5	U	5	7	1.05
10237	Toluene	108-88-3	1	U	1	7	1.05
10237	1,2,3-Trichlorobenzene	87-61-6	1	U	1	7	1.05
10237	1,2,4-Trichlorobenzene	120-82-1	1	U	1	7	1.05
10237	1,1,1-Trichloroethane	71-55-6	1	U	1	7	1.05
10237	1,1,2-Trichloroethane	79-00-5	1	U	1	7	1.05
10237	Trichloroethene	79-01-6	1	U	1	7	1.05
10237	1,2,4-Trimethylbenzene	95-63-6	1	U	1	7	1.05
10237	1,3,5-Trimethylbenzene	108-67-8	1	U	1	7	1.05
10237	Vinyl Acetate	108-05-4	3	U	3	14	1.05
10237	Vinyl Chloride	75-01-4	1	U	1	7	1.05
10237	m+p-Xylene	1330-20-7	1	U	1	7	1.05
10237	o-Xylene	95-47-6	1	U	1	7	1.05
Wet Chemistry	**SM 2540 G-1997**		**%**		**%**	**%**	
00111	Moisture	n.a.	23.8		0.50	0.50	1

Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.

*=This limit was used in the evaluation of the final result

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Lancaster Laboratories Environmental
2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Analysis Report

Sample Description: VBW-10-4.5-6 Grab Soil
Chemtronics Site

LL Sample # SW 7203235
LL Group # 1419960
Account # 12184

Project Name: Chemtronics Site

Collected: 09/18/2013 13:15 by MG

Submitted: 09/19/2013 09:35
Reported: 09/23/2013 16:15

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW10

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10237	GC/MS Volatiles	SW-846 8260B	1	B132631AA	09/20/2013 19:26	Chelsea B Stong	1.05
07320	GC/MS - LL DIH2O Encore Prep	SW-846 5035A	1	201326232468	09/19/2013 15:59	Mitchell R Washel	n.a.
07320	GC/MS - LL DIH2O Encore Prep	SW-846 5035A	2	201326232468	09/19/2013 15:59	Mitchell R Washel	n.a.
07578	GC/MS-HL Encore Prep-NC	SW-846 5035A	1	201326232468	09/19/2013 15:18	Mitchell R Washel	n.a.
00111	Moisture	SM 2540 G-1997	1	13262820001B	09/19/2013 20:01	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1419960
Reported: 09/23/13 at 04:15 PM

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: B132631AA	Sample number(s): 7203235									
Acetone	7	U	7.	20	ug/kg	125	101	23-171	21	30
Acetonitrile	25	U	25.	100	ug/kg	90	89	61-147	1	30
Acrolein	20	U	20.	100	ug/kg	80	80	50-137	0	30
Acrylonitrile	4	U	4.	20	ug/kg	98	95	58-123	3	30
Allyl Chloride	1	U	1.	5	ug/kg	97	94	56-139	3	30
t-Amyl methyl ether	1	U	1.	5	ug/kg	92	93	63-130	1	30
Benzene	0.5	U	0.5	5	ug/kg	96	95	80-120	1	30
Benzyl Chloride	1	U	1.	4	ug/kg	94	89	52-131	5	30
Bromobenzene	1	U	1.	5	ug/kg	90	95	80-120	5	30
Bromochloromethane	1	U	1.	5	ug/kg	104	102	75-129	1	30
Bromodichloromethane	1	U	1.	5	ug/kg	93	92	75-120	1	30
Bromoform	1	U	1.	5	ug/kg	102	99	70-120	3	30
Bromomethane	2	U	2.	5	ug/kg	100	99	32-162	1	30
n-Butanol	110 U		110.	250	ug/kg	77	79	55-120	2	30
2-Butanone	4	U	4.	10	ug/kg	95	91	38-146	4	30
t-Butyl alcohol	20	U	20.	100	ug/kg	86	90	60-149	5	30
n-Butylbenzene	1	U	1.	5	ug/kg	93	96	72-120	3	30
sec-Butylbenzene	1	U	1.	5	ug/kg	95	99	75-120	3	30
tert-Butylbenzene	1	U	1.	5	ug/kg	92	94	75-120	2	30
Carbon Disulfide	1	U	1.	5	ug/kg	100	96	63-128	3	30
Carbon Tetrachloride	1	U	1.	5	ug/kg	101	97	69-122	3	30
2-Chloro-1,3-butadiene	1	U	1.	5	ug/kg	95	92	72-126	3	30
Chlorobenzene	1	U	1.	5	ug/kg	96	93	80-120	3	30
Chloroethane	2	U	2.	5	ug/kg	100	97	17-171	3	30
Chloroform	1	U	1.	5	ug/kg	98	98	80-120	0	30
Chloromethane	2	U	2.	5	ug/kg	103	101	56-120	2	30
2-Chlorotoluene	1	U	1.	5	ug/kg	89	93	78-120	4	30
4-Chlorotoluene	1	U	1.	5	ug/kg	90	96	79-120	6	30
Cyclohexane	1	U	1.	5	ug/kg	95	91	63-124	4	30
Cyclohexanone	25	U	25.	250	ug/kg	84	83	51-138	1	30
1,2-Dibromo-3-chloropropane	2	U	2.	5	ug/kg	90	89	55-128	2	30
Dibromochloromethane	1	U	1.	5	ug/kg	97	95	77-120	2	30
1,2-Dibromoethane	1	U	1.	5	ug/kg	96	94	80-120	2	30
Dibromomethane	1	U	1.	5	ug/kg	96	96	80-120	0	30
trans-1,4-Dichloro-2-butene	10	U	10.	50	ug/kg	97	98	67-139	0	30
1,2-Dichlorobenzene	1	U	1.	5	ug/kg	91	95	80-120	4	30
1,3-Dichlorobenzene	1	U	1.	5	ug/kg	92	94	80-120	2	30
1,4-Dichlorobenzene	1	U	1.	5	ug/kg	93	95	80-120	2	30
Dichlorodifluoromethane	2	U	2.	5	ug/kg	109	104	32-120	5	30
1,1-Dichloroethane	1	U	1.	5	ug/kg	96	95	80-120	1	30
1,2-Dichloroethane	1	U	1.	5	ug/kg	98	97	72-126	0	30
1,1-Dichloroethene	1	U	1.	5	ug/kg	103	99	73-129	4	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1419960
Reported: 09/23/13 at 04:15 PM

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
cis-1,2-Dichloroethene	1	U	1.	5	ug/kg	98	97	80-120	1	30
trans-1,2-Dichloroethene	1	U	1.	5	ug/kg	105	104	79-120	1	30
1,2-Dichloropropane	1	U	1.	5	ug/kg	97	98	77-120	1	30
1,3-Dichloropropane	1	U	1.	5	ug/kg	93	92	80-120	1	30
2,2-Dichloropropane	1	U	1.	5	ug/kg	94	91	72-123	3	30
1,1-Dichloropropene	1	U	1.	5	ug/kg	100	96	77-120	4	30
cis-1,3-Dichloropropene	1	U	1.	5	ug/kg	94	95	74-120	1	30
trans-1,3-Dichloropropene	1	U	1.	5	ug/kg	89	89	77-120	1	30
Ethyl Methacrylate	1	U	1.	5	ug/kg	87	84	65-120	3	30
Ethyl t-butyl ether	1	U	1.	5	ug/kg	93	93	64-124	0	30
Ethylbenzene	1	U	1.	5	ug/kg	95	91	80-120	4	30
Freon 113	2	U	2.	10	ug/kg	101	98	64-137	3	30
n-Heptane	3	U	3.	5	ug/kg	101	95	49-129	6	30
Hexachlorobutadiene	2	U	2.	5	ug/kg	97	99	46-130	2	30
n-Hexane	1	U	1.	5	ug/kg	101	97	56-127	5	30
2-Hexanone	3	U	3.	10	ug/kg	76	72	40-129	5	30
Isobutyl Alcohol	100 U		100.	250	ug/kg	77	83	64-121	7	30
Isopropylbenzene	1	U	1.	5	ug/kg	95	92	76-120	4	30
p-Isopropyltoluene	1	U	1.	5	ug/kg	95	96	75-120	2	30
Methacrylonitrile	5	U	5.	50	ug/kg	104	100	65-122	5	30
Methyl Acetate	2	U	2.	5	ug/kg	145	140	62-158	3	30
Methyl Methacrylate	1	U	1.	5	ug/kg	92	90	60-120	2	30
Methyl Tertiary Butyl Ether	0.5	U	0.5	5	ug/kg	103	103	69-126	0	30
4-Methyl-2-pentanone	3	U	3.	10	ug/kg	79	73	52-125	8	30
Methylcyclohexane	1	U	1.	5	ug/kg	104	100	58-134	4	30
Methylene Chloride	2	U	2.	5	ug/kg	105	106	80-124	0	30
Naphthalene	1	U	1.	5	ug/kg	94	97	59-123	4	30
Pentachloroethane	1	U	1.	5	ug/kg	97	102	71-120	5	30
Propionitrile	30	U	30.	100	ug/kg	84	84	74-129	1	30
n-Propylbenzene	1	U	1.	5	ug/kg	92	96	77-120	5	30
Styrene	1	U	1.	5	ug/kg	93	93	76-120	1	30
1,1,1,2-Tetrachloroethane	1	U	1.	5	ug/kg	95	93	80-120	3	30
1,1,2,2-Tetrachloroethane	1	U	1.	5	ug/kg	91	92	71-123	1	30
Tetrachloroethene	1	U	1.	5	ug/kg	97	94	78-126	3	30
Tetrahydrofuran	4	U	4.	5	ug/kg	74	75	64-140	0	30
Toluene	1	U	1.	5	ug/kg	93	92	80-120	1	30
1,2,3-Trichlorobenzene	1	U	1.	5	ug/kg	93	99	64-120	7	30
1,2,4-Trichlorobenzene	1	U	1.	5	ug/kg	94	98	68-120	4	30
1,1,1-Trichloroethane	1	U	1.	5	ug/kg	87	84	71-125	3	30
1,1,2-Trichloroethane	1	U	1.	5	ug/kg	94	92	80-120	2	30
Trichloroethene	1	U	1.	5	ug/kg	98	96	80-120	1	30
1,2,4-Trimethylbenzene	1	U	1.	5	ug/kg	93	97	79-120	4	30
1,3,5-Trimethylbenzene	1	U	1.	5	ug/kg	92	97	78-120	5	30
Vinyl Acetate	2	U	2.	10	ug/kg	71	68	40-127	4	30
Vinyl Chloride	1	U	1.	5	ug/kg	106	106	53-120	1	30
m+p-Xylene	1	U	1.	5	ug/kg	97	93	80-120	4	30
o-Xylene	1	U	1.	5	ug/kg	93	92	80-120	1	30

Batch number: 13262820001B Sample number(s): 7203235
Moisture 100 99-101

Sample Matrix Quality Control

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1419960
Reported: 09/23/13 at 04:15 PM
Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc		DUP Conc		DUP RPD	Dup RPD Max
Batch number: B132631AA	Sample number(s): 7203235		BKG: 7203235								
Acetone						7	U	9	U	0 (1)	30
Acetonitrile						26	U	31	U	0 (1)	30
Acrolein						21	U	25	U	0 (1)	30
Acrylonitrile						4	U	5	U	0 (1)	30
Allyl Chloride						1	U	1	U	0 (1)	30
t-Amyl methyl ether						1	U	1	U	0 (1)	30
Benzene						0.5	U	0.6	U	0 (1)	30
Benzyl Chloride						1	U	1	U	0 (1)	30
Bromobenzene						1	U	1	U	0 (1)	30
Bromochloromethane						1	U	1	U	0 (1)	30
Bromodichloromethane						1	U	1	U	0 (1)	30
Bromoform						1	U	1	U	0 (1)	30
Bromomethane						2	U	2	U	0 (1)	30
n-Butanol						120	U	140	U	0 (1)	30
2-Butanone						4	U	5	U	0 (1)	30
t-Butyl alcohol						21	U	25	U	0 (1)	30
n-Butylbenzene						1	U	1	U	0 (1)	30
sec-Butylbenzene						1	U	1	U	0 (1)	30
tert-Butylbenzene						1	U	1	U	0 (1)	30
Carbon Disulfide						1	U	1	U	0 (1)	30
Carbon Tetrachloride						1	U	1	U	0 (1)	30
2-Chloro-1,3-butadiene						1	U	1	U	0 (1)	30
Chlorobenzene						1	U	1	U	0 (1)	30
Chloroethane						2	U	2	U	0 (1)	30
Chloroform						1	U	1	U	0 (1)	30
Chloromethane						2	U	2	U	0 (1)	30
2-Chlorotoluene						1	U	1	U	0 (1)	30
4-Chlorotoluene						1	U	1	U	0 (1)	30
Cyclohexane						1	U	1	U	0 (1)	30
Cyclohexanone						26	U	31	U	0 (1)	30
1,2-Dibromo-3-chloropropane						2	U	2	U	0 (1)	30
Dibromochloromethane						1	U	1	U	0 (1)	30
1,2-Dibromoethane						1	U	1	U	0 (1)	30
Dibromomethane						1	U	1	U	0 (1)	30
trans-1,4-Dichloro-2-butene						10	U	12	U	0 (1)	30
1,2-Dichlorobenzene						1	U	1	U	0 (1)	30
1,3-Dichlorobenzene						1	U	1	U	0 (1)	30
1,4-Dichlorobenzene						1	U	1	U	0 (1)	30
Dichlorodifluoromethane						2	U	2	U	0 (1)	30
1,1-Dichloroethane						1	U	1	U	0 (1)	30
1,2-Dichloroethane						1	U	1	U	0 (1)	30
1,1-Dichloroethene						1	U	1	U	0 (1)	30
cis-1,2-Dichloroethene						1	U	1	U	0 (1)	30
trans-1,2-Dichloroethene						1	U	1	U	0 (1)	30
1,2-Dichloropropane						1	U	1	U	0 (1)	30
1,3-Dichloropropane						1	U	1	U	0 (1)	30
2,2-Dichloropropane						1	U	1	U	0 (1)	30
1,1-Dichloropropene						1	U	1	U	0 (1)	30
cis-1,3-Dichloropropene						1	U	1	U	0 (1)	30
trans-1,3-Dichloropropene						1	U	1	U	0 (1)	30
Ethyl Methacrylate						1	U	1	U	0 (1)	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1419960
Reported: 09/23/13 at 04:15 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc		DUP Conc		DUP RPD	Dup RPD Max
Ethyl t-butyl ether						1	U	1	U	0 (1)	30
Ethylbenzene						1	U	1	U	0 (1)	30
Freon 113						2	U	2	U	0 (1)	30
n-Heptane						3	U	4	U	0 (1)	30
Hexachlorobutadiene						2	U	2	U	0 (1)	30
n-Hexane						1	U	1	U	0 (1)	30
2-Hexanone						3	U	4	U	0 (1)	30
Isobutyl Alcohol						100	U	120	U	0 (1)	30
Isopropylbenzene						1	U	1	U	0 (1)	30
p-Isopropyltoluene						1	U	1	U	0 (1)	30
Methacrylonitrile						5	U	6	U	0 (1)	30
Methyl Acetate						2	U	2	U	0 (1)	30
Methyl Methacrylate						1	U	1	U	0 (1)	30
Methyl Tertiary Butyl Ether						0.5	U	0.6	U	0 (1)	30
4-Methyl-2-pentanone						3	U	4	U	0 (1)	30
Methylcyclohexane						1	U	1	U	0 (1)	30
Methylene Chloride						2	U	2	U	0 (1)	30
Naphthalene						1	U	1	U	0 (1)	30
Pentachloroethane						1	U	1	U	0 (1)	30
Propionitrile						31	U	37	U	0 (1)	30
n-Propylbenzene						1	U	1	U	0 (1)	30
Styrene						1	U	1	U	0 (1)	30
1,1,1,2-Tetrachloroethane						1	U	1	U	0 (1)	30
1,1,2,2-Tetrachloroethane						1	U	1	U	0 (1)	30
Tetrachloroethene						1	U	1	U	0 (1)	30
Tetrahydrofuran						4	U	5	U	0 (1)	30
Toluene						1	U	1	U	0 (1)	30
1,2,3-Trichlorobenzene						1	U	1	U	0 (1)	30
1,2,4-Trichlorobenzene						1	U	1	U	0 (1)	30
1,1,1-Trichloroethane						1	U	1	U	0 (1)	30
1,1,2-Trichloroethane						1	U	1	U	0 (1)	30
Trichloroethene						1	U	1	U	0 (1)	30
1,2,4-Trimethylbenzene						1	U	1	U	0 (1)	30
1,3,5-Trimethylbenzene						1	U	1	U	0 (1)	30
Vinyl Acetate						2	U	2	U	0 (1)	30
Vinyl Chloride						1	U	1	U	0 (1)	30
m+p-Xylene						1	U	1	U	0 (1)	30
o-Xylene						1	U	1	U	0 (1)	30

Batch number: 13262820001B Sample number(s): 7203235 BKG: P195490

Moisture	47.1	46.4	1	5

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: GC/MS Volatiles
Batch number: B132631AA

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1419960
Reported: 09/23/13 at 04:15 PM

Surrogate Quality Control

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
7203235	100	103	95	95
Blank	102	105	96	95
DUP	102	104	98	96
LCS	100	105	98	99
LCSD	99	99	98	98
Limits:	50-141	54-135	52-141	50-131

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Services Analysis Request/Chain of Custody

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COC#: 6999

Acct. # 12184 Group # 1419960 Sample # 7203235

Client:	Altamont Environmental
Project Name/#:	Chemtronics
Project Manager:	Amy ~~Bondurant~~ Huffman
P.O. #:	2115.231
Sampler:	Mike Gragg
Phone #:	828-281-3350
Quote #:	207662
State where sample(s) were collected:	NC

SF#: 128607

SCR#: 145380

Sample Identification	Collection Date	Collection Time	Grab	Composite	Soil	Sediment	Water: Potable	Water: Ground	Water: NPDES	Water: Surface	Other:	Total # of Containers	GC/MS VOAs (8260)	Nitroaromatics/Amines (8330)	Perchlorate (6850)	Moisture (2540 G)	Remarks
VBW-10-4.5-6	9/18/13	1315	X		X							4	X			X	do not send for validation

Preservation Codes: H = HCl, T = Thiosulfate, N = HNO_3, B = NaOH, S = H_2SO_4, P = H_3PO_4, O = Other

Turnaround Time Requested (TAT) (please check): Standard ☐ RUSH ☒
(RUSH TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 48 hr TAT

E-mail address to send RUSH results: AHuffman@AltamontEnvironmental.com

Data Package Options (please check if required)

Type I (Validation/non-CLP)	☐	MA MCP	☐	TX TRRP - 13	☐
Type III (Reduced non-CLP)	☐	CT RCP	☐		
Type IV (CLP SOW)	☐	ASP Type A	☐		
Type VI (Raw Data Only)	☐	ASP Type B	☐		

EDD Format: TerraBase

If site-specific QC (MS/MSD/Dup) required, indicate QC samples and submit triplicate volume.

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	9/16/13	1130			
M. Gragg	9/18/13	1732			
			[signature]	9-19-13	0935

Airbill No.:
Relinquished by Commercial Carrier:
UPS ✓ FedEx ____ Other ____

Temperature upon receipt 0.4 °C

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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Data Qualifiers:

C – result confirmed by reanalysis.

J - estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

ANALYTICAL RESULTS

Prepared by:	Prepared for:
Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601	Altamont Environmental 231 Haywood Street Asheville NC 28801

October 09, 2013

Project: Chemtronics Site

Submittal Date: 10/03/2013
Group Number: 1423475
PO Number: 2115.231
State of Sample Origin: NC

Client Sample Description	Lancaster Labs (LL) #
VBW-13-6-7.5 Grab Soil	7222605
VBW-13-7.5-9 Grab Soil	7222606

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Altamont Environmental	Attn: Amy Huffman
ELECTRONIC COPY TO	Altamont Environmental	Attn: Marta VanDussen

Respectfully Submitted,

Nancy Jean Bornholm

Nancy Jean Bornholm
Principal Specialist

(717) 556-7250

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Lancaster Laboratories Environmental
2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Analysis Report

Sample Description: VBW-13-6-7.5 Grab Soil
Chemtronics Soil Sampling

LL Sample # SW 7222605
LL Group # 1423475
Account # 12184

Project Name: Chemtronics Site

Collected: 10/02/2013 09:25 by MG

Submitted: 10/03/2013 09:15
Reported: 10/09/2013 11:31

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CV136

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10237	Acetone	67-64-1	37		12	35	1.15
10237	Acetonitrile	75-05-8	43	U	43	170	1.15
10237	Acrolein	107-02-8	35	U	35	170	1.15
10237	Acrylonitrile	107-13-1	7	U	7	35	1.15
10237	Allyl Chloride	107-05-1	2	U	2	9	1.15
10237	t-Amyl methyl ether	994-05-8	2	U	2	9	1.15
10237	Benzene	71-43-2	0.9	U	0.9	9	1.15
10237	Benzyl Chloride	100-44-7	2	U	2	7	1.15
10237	Bromobenzene	108-86-1	2	U	2	9	1.15
10237	Bromochloromethane	74-97-5	2	U	2	9	1.15
10237	Bromodichloromethane	75-27-4	2	U	2	9	1.15
10237	Bromoform	75-25-2	2	U	2	9	1.15
10237	Bromomethane	74-83-9	3	U	3	9	1.15
10237	n-Butanol	71-36-3	190	U	190	430	1.15
10237	2-Butanone	78-93-3	7	U	7	17	1.15
10237	t-Butyl alcohol	75-65-0	35	U	35	170	1.15
10237	n-Butylbenzene	104-51-8	2	U	2	9	1.15
10237	sec-Butylbenzene	135-98-8	2	U	2	9	1.15
10237	tert-Butylbenzene	98-06-6	2	U	2	9	1.15
10237	Carbon Disulfide	75-15-0	2	U	2	9	1.15
10237	Carbon Tetrachloride	56-23-5	2	U	2	9	1.15
10237	2-Chloro-1,3-butadiene	126-99-8	2	U	2	9	1.15
10237	Chlorobenzene	108-90-7	2	U	2	9	1.15
10237	Chloroethane	75-00-3	3	U	3	9	1.15
10237	Chloroform	67-66-3	2	U	2	9	1.15
10237	Chloromethane	74-87-3	3	U	3	9	1.15
10237	2-Chlorotoluene	95-49-8	2	U	2	9	1.15
10237	4-Chlorotoluene	106-43-4	2	U	2	9	1.15
10237	Cyclohexane	110-82-7	2	U	2	9	1.15
10237	Cyclohexanone	108-94-1	43	U	43	430	1.15
10237	1,2-Dibromo-3-chloropropane	96-12-8	3	U	3	9	1.15
10237	Dibromochloromethane	124-48-1	2	U	2	9	1.15
10237	1,2-Dibromoethane	106-93-4	2	U	2	9	1.15
10237	Dibromomethane	74-95-3	2	U	2	9	1.15
10237	trans-1,4-Dichloro-2-butene	110-57-6	17	U	17	87	1.15
10237	1,2-Dichlorobenzene	95-50-1	2	U	2	9	1.15
10237	1,3-Dichlorobenzene	541-73-1	2	U	2	9	1.15
10237	1,4-Dichlorobenzene	106-46-7	2	U	2	9	1.15
10237	Dichlorodifluoromethane	75-71-8	3	U	3	9	1.15
10237	1,1-Dichloroethane	75-34-3	2	U	2	9	1.15
10237	1,2-Dichloroethane	107-06-2	2	U	2	9	1.15
10237	1,1-Dichloroethene	75-35-4	2	U	2	9	1.15
10237	cis-1,2-Dichloroethene	156-59-2	2	U	2	9	1.15
10237	trans-1,2-Dichloroethene	156-60-5	2	U	2	9	1.15
10237	1,2-Dichloropropane	78-87-5	2	U	2	9	1.15
10237	1,3-Dichloropropane	142-28-9	2	U	2	9	1.15
10237	2,2-Dichloropropane	594-20-7	2	U	2	9	1.15
10237	1,1-Dichloropropene	563-58-6	2	U	2	9	1.15
10237	cis-1,3-Dichloropropene	10061-01-5	2	U	2	9	1.15
10237	trans-1,3-Dichloropropene	10061-02-6	2	U	2	9	1.15
10237	Ethyl Methacrylate	97-63-2	2	U	2	9	1.15

*=This limit was used in the evaluation of the final result

Sample Description: VBW-13-6-7.5 Grab Soil
Chemtronics Soil Sampling

LL Sample # SW 7222605
LL Group # 1423475
Account # 12184

Project Name: Chemtronics Site

Collected: 10/02/2013 09:25 by MG

Submitted: 10/03/2013 09:15
Reported: 10/09/2013 11:31

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CV136

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10237	Ethyl t-butyl ether	637-92-3	2	U	2	9	1.15
10237	Ethylbenzene	100-41-4	11		2	9	1.15
10237	Freon 113	76-13-1	3	U	3	17	1.15
10237	n-Heptane	142-82-5	5	U	5	9	1.15
10237	Hexachlorobutadiene	87-68-3	3	U	3	9	1.15
10237	n-Hexane	110-54-3	2	U	2	9	1.15
10237	2-Hexanone	591-78-6	5	U	5	17	1.15
10237	Isobutyl Alcohol	78-83-1	170	U	170	430	1.15
10237	Isopropylbenzene	98-82-8	2	U	2	9	1.15
10237	p-Isopropyltoluene	99-87-6	2	U	2	9	1.15
10237	Methacrylonitrile	126-98-7	9	U	9	87	1.15
10237	Methyl Acetate	79-20-9	3	U	3	9	1.15
10237	Methyl Methacrylate	80-62-6	2	U	2	9	1.15
10237	Methyl Tertiary Butyl Ether	1634-04-4	0.9	U	0.9	9	1.15
10237	4-Methyl-2-pentanone	108-10-1	5	U	5	17	1.15
10237	Methylcyclohexane	108-87-2	2	U	2	9	1.15
10237	Methylene Chloride	75-09-2	3	U	3	9	1.15
10237	Naphthalene	91-20-3	2	U	2	9	1.15
10237	Pentachloroethane	76-01-7	2	U	2	9	1.15
10237	Propionitrile	107-12-0	52	U	52	170	1.15
10237	n-Propylbenzene	103-65-1	2	U	2	9	1.15
10237	Styrene	100-42-5	2	U	2	9	1.15
10237	1,1,1,2-Tetrachloroethane	630-20-6	2	U	2	9	1.15
10237	1,1,2,2-Tetrachloroethane	79-34-5	2	U	2	9	1.15
10237	Tetrachloroethene	127-18-4	2	U	2	9	1.15
10237	Tetrahydrofuran	109-99-9	7	U	7	9	1.15
10237	Toluene	108-88-3	2	U	2	9	1.15
10237	1,2,3-Trichlorobenzene	87-61-6	2	U	2	9	1.15
10237	1,2,4-Trichlorobenzene	120-82-1	2	U	2	9	1.15
10237	1,1,1-Trichloroethane	71-55-6	2	U	2	9	1.15
10237	1,1,2-Trichloroethane	79-00-5	2	U	2	9	1.15
10237	Trichloroethene	79-01-6	2	U	2	9	1.15
10237	1,2,4-Trimethylbenzene	95-63-6	2	U	2	9	1.15
10237	1,3,5-Trimethylbenzene	108-67-8	2	U	2	9	1.15
10237	Vinyl Acetate	108-05-4	3	U	3	17	1.15
10237	Vinyl Chloride	75-01-4	2	U	2	9	1.15
10237	m+p-Xylene	1330-20-7	2	U	2	9	1.15
10237	o-Xylene	95-47-6	2	U	2	9	1.15
Wet Chemistry	**SM 2540 G-1997**		**%**		**%**	**%**	
00111	Moisture	n.a.	33.7		0.50	0.50	1

Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.

*=This limit was used in the evaluation of the final result

Sample Description: VBW-13-6-7.5 Grab Soil
Chemtronics Soil Sampling

LL Sample # SW 7222605
LL Group # 1423475
Account # 12184

Project Name: Chemtronics Site

Collected: 10/02/2013 09:25 by MG

Submitted: 10/03/2013 09:15
Reported: 10/09/2013 11:31

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CV136

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10237	GC/MS Volatiles	SW-846 8260B	1	B132801AA	10/07/2013 15:34	Lauren C Temple	1.15
07320	GC/MS - LL DIH2O Encore Prep	SW-846 5035A	1	201327632623	10/03/2013 14:18	Mitchell R Washel	n.a.
07320	GC/MS - LL DIH2O Encore Prep	SW-846 5035A	2	201327632623	10/03/2013 14:18	Mitchell R Washel	n.a.
07578	GC/MS-HL Encore Prep-NC	SW-846 5035A	1	201327632623	10/03/2013 14:12	Mitchell R Washel	n.a.
00111	Moisture	SM 2540 G-1997	1	13276820003B	10/03/2013 20:47	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Sample Description: VBW-13-7.5-9 Grab Soil
Chemtronics Soil Sampling

LL Sample # SW 7222606
LL Group # 1423475
Account # 12184

Project Name: Chemtronics Site

Collected: 10/02/2013 09:30 by MG

Submitted: 10/03/2013 09:15
Reported: 10/09/2013 11:31

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CV137

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10237	Acetone	67-64-1	45		10	29	1.05
10237	Acetonitrile	75-05-8	37	U	37	150	1.05
10237	Acrolein	107-02-8	29	U	29	150	1.05
10237	Acrylonitrile	107-13-1	6	U	6	29	1.05
10237	Allyl Chloride	107-05-1	1	U	1	7	1.05
10237	t-Amyl methyl ether	994-05-8	1	U	1	7	1.05
10237	Benzene	71-43-2	0.7	U	0.7	7	1.05
10237	Benzyl Chloride	100-44-7	1	U	1	6	1.05
10237	Bromobenzene	108-86-1	1	U	1	7	1.05
10237	Bromochloromethane	74-97-5	1	U	1	7	1.05
10237	Bromodichloromethane	75-27-4	1	U	1	7	1.05
10237	Bromoform	75-25-2	1	U	1	7	1.05
10237	Bromomethane	74-83-9	3	U	3	7	1.05
10237	n-Butanol	71-36-3	160	U	160	370	1.05
10237	2-Butanone	78-93-3	9	J	6	15	1.05
10237	t-Butyl alcohol	75-65-0	29	U	29	150	1.05
10237	n-Butylbenzene	104-51-8	1	U	1	7	1.05
10237	sec-Butylbenzene	135-98-8	1	U	1	7	1.05
10237	tert-Butylbenzene	98-06-6	1	U	1	7	1.05
10237	Carbon Disulfide	75-15-0	1	U	1	7	1.05
10237	Carbon Tetrachloride	56-23-5	1	U	1	7	1.05
10237	2-Chloro-1,3-butadiene	126-99-8	1	U	1	7	1.05
10237	Chlorobenzene	108-90-7	1	U	1	7	1.05
10237	Chloroethane	75-00-3	3	U	3	7	1.05
10237	Chloroform	67-66-3	1	U	1	7	1.05
10237	Chloromethane	74-87-3	3	U	3	7	1.05
10237	2-Chlorotoluene	95-49-8	1	U	1	7	1.05
10237	4-Chlorotoluene	106-43-4	1	U	1	7	1.05
10237	Cyclohexane	110-82-7	1	U	1	7	1.05
10237	Cyclohexanone	108-94-1	37	U	37	370	1.05
10237	1,2-Dibromo-3-chloropropane	96-12-8	3	U	3	7	1.05
10237	Dibromochloromethane	124-48-1	1	U	1	7	1.05
10237	1,2-Dibromoethane	106-93-4	1	U	1	7	1.05
10237	Dibromomethane	74-95-3	1	U	1	7	1.05
10237	trans-1,4-Dichloro-2-butene	110-57-6	15	U	15	73	1.05
10237	1,2-Dichlorobenzene	95-50-1	1	U	1	7	1.05
10237	1,3-Dichlorobenzene	541-73-1	1	U	1	7	1.05
10237	1,4-Dichlorobenzene	106-46-7	1	U	1	7	1.05
10237	Dichlorodifluoromethane	75-71-8	3	U	3	7	1.05
10237	1,1-Dichloroethane	75-34-3	1	U	1	7	1.05
10237	1,2-Dichloroethane	107-06-2	1	U	1	7	1.05
10237	1,1-Dichloroethene	75-35-4	1	U	1	7	1.05
10237	cis-1,2-Dichloroethene	156-59-2	1	U	1	7	1.05
10237	trans-1,2-Dichloroethene	156-60-5	1	U	1	7	1.05
10237	1,2-Dichloropropane	78-87-5	1	U	1	7	1.05
10237	1,3-Dichloropropane	142-28-9	1	U	1	7	1.05
10237	2,2-Dichloropropane	594-20-7	1	U	1	7	1.05
10237	1,1-Dichloropropene	563-58-6	1	U	1	7	1.05
10237	cis-1,3-Dichloropropene	10061-01-5	1	U	1	7	1.05
10237	trans-1,3-Dichloropropene	10061-02-6	1	U	1	7	1.05
10237	Ethyl Methacrylate	97-63-2	1	U	1	7	1.05

*=This limit was used in the evaluation of the final result

Sample Description: VBW-13-7.5-9 Grab Soil
Chemtronics Soil Sampling

LL Sample # SW 7222606
LL Group # 1423475
Account # 12184

Project Name: Chemtronics Site

Collected: 10/02/2013 09:30 by MG

Submitted: 10/03/2013 09:15
Reported: 10/09/2013 11:31

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CV137

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10237	Ethyl t-butyl ether	637-92-3	1	U	1	7	1.05
10237	Ethylbenzene	100-41-4	5	J	1	7	1.05
10237	Freon 113	76-13-1	3	U	3	15	1.05
10237	n-Heptane	142-82-5	4	U	4	7	1.05
10237	Hexachlorobutadiene	87-68-3	3	U	3	7	1.05
10237	n-Hexane	110-54-3	1	U	1	7	1.05
10237	2-Hexanone	591-78-6	4	U	4	15	1.05
10237	Isobutyl Alcohol	78-83-1	150	U	150	370	1.05
10237	Isopropylbenzene	98-82-8	1	U	1	7	1.05
10237	p-Isopropyltoluene	99-87-6	1	U	1	7	1.05
10237	Methacrylonitrile	126-98-7	7	U	7	73	1.05
10237	Methyl Acetate	79-20-9	3	U	3	7	1.05
10237	Methyl Methacrylate	80-62-6	1	U	1	7	1.05
10237	Methyl Tertiary Butyl Ether	1634-04-4	0.7	U	0.7	7	1.05
10237	4-Methyl-2-pentanone	108-10-1	4	U	4	15	1.05
10237	Methylcyclohexane	108-87-2	1	U	1	7	1.05
10237	Methylene Chloride	75-09-2	3	U	3	7	1.05
10237	Naphthalene	91-20-3	1	U	1	7	1.05
10237	Pentachloroethane	76-01-7	1	U	1	7	1.05
10237	Propionitrile	107-12-0	44	U	44	150	1.05
10237	n-Propylbenzene	103-65-1	1	U	1	7	1.05
10237	Styrene	100-42-5	1	U	1	7	1.05
10237	1,1,1,2-Tetrachloroethane	630-20-6	1	U	1	7	1.05
10237	1,1,2,2-Tetrachloroethane	79-34-5	1	U	1	7	1.05
10237	Tetrachloroethene	127-18-4	1	U	1	7	1.05
10237	Tetrahydrofuran	109-99-9	6	U	6	7	1.05
10237	Toluene	108-88-3	1	U	1	7	1.05
10237	1,2,3-Trichlorobenzene	87-61-6	1	U	1	7	1.05
10237	1,2,4-Trichlorobenzene	120-82-1	1	U	1	7	1.05
10237	1,1,1-Trichloroethane	71-55-6	1	U	1	7	1.05
10237	1,1,2-Trichloroethane	79-00-5	1	U	1	7	1.05
10237	Trichloroethene	79-01-6	1	U	1	7	1.05
10237	1,2,4-Trimethylbenzene	95-63-6	1	U	1	7	1.05
10237	1,3,5-Trimethylbenzene	108-67-8	1	U	1	7	1.05
10237	Vinyl Acetate	108-05-4	3	U	3	15	1.05
10237	Vinyl Chloride	75-01-4	1	U	1	7	1.05
10237	m+p-Xylene	1330-20-7	1	U	1	7	1.05
10237	o-Xylene	95-47-6	1	U	1	7	1.05

Project defined calibration criteria are not met. The calibration is compliant with the method defined criteria.

Wet Chemistry	**SM 2540 G-1997**		%		%	%	
00111	Moisture	n.a.	27.8		0.50	0.50	1

Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.

*=This limit was used in the evaluation of the final result

Sample Description: VBW-13-7.5-9 Grab Soil
Chemtronics Soil Sampling

LL Sample # SW 7222606
LL Group # 1423475
Account # 12184

Project Name: Chemtronics Site

Collected: 10/02/2013 09:30 by MG

Submitted: 10/03/2013 09:15
Reported: 10/09/2013 11:31

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CV137

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10237	GC/MS Volatiles	SW-846 8260B	1	B132771AA	10/05/2013 00:45	Sara E Johnson	1.05
07320	GC/MS - LL DIH2O Encore Prep	SW-846 5035A	1	201327632623	10/03/2013 14:18	Mitchell R Washel	n.a.
07320	GC/MS - LL DIH2O Encore Prep	SW-846 5035A	2	201327632623	10/03/2013 14:18	Mitchell R Washel	n.a.
07578	GC/MS-HL Encore Prep-NC	SW-846 5035A	1	201327632623	10/03/2013 14:14	Mitchell R Washel	n.a.
00111	Moisture	SM 2540 G-1997	1	13276820003B	10/03/2013 20:47	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1423475
Reported: 10/09/13 at 11:31 AM

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: B132771AA	Sample number(s): 7222606									
Acetone	7	U	7.	20	ug/kg	135		23-171		
Acetonitrile	25	U	25.	100	ug/kg	89		61-147		
Acrolein	20	U	20.	100	ug/kg	80		50-137		
Acrylonitrile	4	U	4.	20	ug/kg	94		58-123		
Allyl Chloride	1	U	1.	5	ug/kg	107		56-139		
t-Amyl methyl ether	1	U	1.	5	ug/kg	92		63-130		
Benzene	0.5	U	0.5	5	ug/kg	100		80-120		
Benzyl Chloride	1	U	1.	4	ug/kg	86		52-131		
Bromobenzene	1	U	1.	5	ug/kg	88		80-120		
Bromochloromethane	1	U	1.	5	ug/kg	113		75-129		
Bromodichloromethane	1	U	1.	5	ug/kg	104		75-120		
Bromoform	1	U	1.	5	ug/kg	109		70-120		
Bromomethane	2	U	2.	5	ug/kg	117		32-162		
n-Butanol	110 U		110.	250	ug/kg	72		55-120		
2-Butanone	4	U	4.	10	ug/kg	98		38-146		
t-Butyl alcohol	20	U	20.	100	ug/kg	92		60-149		
n-Butylbenzene	1	U	1.	5	ug/kg	99		72-120		
sec-Butylbenzene	1	U	1.	5	ug/kg	97		75-120		
tert-Butylbenzene	1	U	1.	5	ug/kg	91		75-120		
Carbon Disulfide	1	U	1.	5	ug/kg	106		63-128		
Carbon Tetrachloride	1	U	1.	5	ug/kg	119		69-122		
2-Chloro-1,3-butadiene	1	U	1.	5	ug/kg	105		72-126		
Chlorobenzene	1	U	1.	5	ug/kg	98		80-120		
Chloroethane	2	U	2.	5	ug/kg	111		17-171		
Chloroform	1	U	1.	5	ug/kg	111		80-120		
Chloromethane	2	U	2.	5	ug/kg	106		56-120		
2-Chlorotoluene	1	U	1.	5	ug/kg	91		78-120		
4-Chlorotoluene	1	U	1.	5	ug/kg	91		79-120		
Cyclohexane	1	U	1.	5	ug/kg	93		63-124		
Cyclohexanone	25	U	25.	250	ug/kg	57		51-138		
1,2-Dibromo-3-chloropropane	2	U	2.	5	ug/kg	87		55-128		
Dibromochloromethane	1	U	1.	5	ug/kg	105		77-120		
1,2-Dibromoethane	1	U	1.	5	ug/kg	98		80-120		
Dibromomethane	1	U	1.	5	ug/kg	102		80-120		
trans-1,4-Dichloro-2-butene	10	U	10.	50	ug/kg	98		67-139		
1,2-Dichlorobenzene	1	U	1.	5	ug/kg	97		80-120		
1,3-Dichlorobenzene	1	U	1.	5	ug/kg	96		80-120		
1,4-Dichlorobenzene	1	U	1.	5	ug/kg	95		80-120		
Dichlorodifluoromethane	2	U	2.	5	ug/kg	117		32-120		
1,1-Dichloroethane	1	U	1.	5	ug/kg	105		80-120		
1,2-Dichloroethane	1	U	1.	5	ug/kg	117		72-126		
1,1-Dichloroethene	1	U	1.	5	ug/kg	113		73-129		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1423475
Reported: 10/09/13 at 11:31 AM

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
cis-1,2-Dichloroethene	1	U	1.	5	ug/kg	101		80-120		
trans-1,2-Dichloroethene	1	U	1.	5	ug/kg	112		79-120		
1,2-Dichloropropane	1	U	1.	5	ug/kg	99		77-120		
1,3-Dichloropropane	1	U	1.	5	ug/kg	97		80-120		
2,2-Dichloropropane	1	U	1.	5	ug/kg	106		72-123		
1,1-Dichloropropene	1	U	1.	5	ug/kg	101		77-120		
cis-1,3-Dichloropropene	1	U	1.	5	ug/kg	99		74-120		
trans-1,3-Dichloropropene	1	U	1.	5	ug/kg	91		77-120		
Ethyl Methacrylate	1	U	1.	5	ug/kg	81		65-120		
Ethyl t-butyl ether	1	U	1.	5	ug/kg	93		64-124		
Ethylbenzene	1	U	1.	5	ug/kg	96		80-120		
Freon 113	2	U	2.	10	ug/kg	111		64-137		
n-Heptane	3	U	3.	5	ug/kg	99		49-129		
Hexachlorobutadiene	2	U	2.	5	ug/kg	106		46-130		
n-Hexane	1	U	1.	5	ug/kg	98		56-127		
2-Hexanone	3	U	3.	10	ug/kg	75		40-129		
Isobutyl Alcohol	100		100.	250	ug/kg	80		64-121		
	U									
Isopropylbenzene	1	U	1.	5	ug/kg	99		76-120		
p-Isopropyltoluene	1	U	1.	5	ug/kg	99		75-120		
Methacrylonitrile	5	U	5.	50	ug/kg	97		65-122		
Methyl Acetate	2	U	2.	5	ug/kg	142		62-158		
Methyl Methacrylate	1	U	1.	5	ug/kg	87		60-120		
Methyl Tertiary Butyl Ether	0.5	U	0.5	5	ug/kg	108		69-126		
4-Methyl-2-pentanone	3	U	3.	10	ug/kg	74		52-125		
Methylcyclohexane	1	U	1.	5	ug/kg	106		58-134		
Methylene Chloride	2	U	2.	5	ug/kg	111		80-124		
Naphthalene	1	U	1.	5	ug/kg	91		59-123		
Pentachloroethane	1	U	1.	5	ug/kg	109		71-120		
Propionitrile	30	U	30.	100	ug/kg	80		74-129		
n-Propylbenzene	1	U	1.	5	ug/kg	98		77-120		
Styrene	1	U	1.	5	ug/kg	97		76-120		
1,1,1,2-Tetrachloroethane	1	U	1.	5	ug/kg	102		80-120		
1,1,2,2-Tetrachloroethane	1	U	1.	5	ug/kg	85		71-123		
Tetrachloroethene	1	U	1.	5	ug/kg	105		78-126		
Tetrahydrofuran	4	U	4.	5	ug/kg	71		64-140		
Toluene	1	U	1.	5	ug/kg	99		80-120		
1,2,3-Trichlorobenzene	1	U	1.	5	ug/kg	99		64-120		
1,2,4-Trichlorobenzene	1	U	1.	5	ug/kg	96		68-120		
1,1,1-Trichloroethane	1	U	1.	5	ug/kg	102		71-125		
1,1,2-Trichloroethane	1	U	1.	5	ug/kg	97		80-120		
Trichloroethene	1	U	1.	5	ug/kg	102		80-120		
1,2,4-Trimethylbenzene	1	U	1.	5	ug/kg	96		79-120		
1,3,5-Trimethylbenzene	1	U	1.	5	ug/kg	96		78-120		
Vinyl Acetate	2	U	2.	10	ug/kg	41		40-127		
Vinyl Chloride	1	U	1.	5	ug/kg	111		53-120		
m+p-Xylene	1	U	1.	5	ug/kg	97		80-120		
o-Xylene	1	U	1.	5	ug/kg	96		80-120		
Batch number: B132801AA	Sample number(s): 7222605									
Acetone	7	U	7.	20	ug/kg	135	109	23-171	21	30
Acetonitrile	25	U	25.	100	ug/kg	88	97	61-147	10	30
Acrolein	20	U	20.	100	ug/kg	74	83	50-137	11	30
Acrylonitrile	4	U	4.	20	ug/kg	104	90	58-123	14	30
Allyl Chloride	1	U	1.	5	ug/kg	107	102	56-139	5	30
t-Amyl methyl ether	1	U	1.	5	ug/kg	98	90	63-130	8	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental
Reported: 10/09/13 at 11:31 AM

Group Number: 1423475

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Benzene	0.5	U	0.5	5	ug/kg	100	96	80-120	4	30
Benzyl Chloride	1	U	1.	4	ug/kg	98	86	52-131	13	30
Bromobenzene	1	U	1.	5	ug/kg	93	89	80-120	4	30
Bromochloromethane	1	U	1.	5	ug/kg	111	103	75-129	8	30
Bromodichloromethane	1	U	1.	5	ug/kg	105	99	75-120	6	30
Bromoform	1	U	1.	5	ug/kg	113	99	70-120	13	30
Bromomethane	2	U	2.	5	ug/kg	121	118	32-162	2	30
n-Butanol	110 U		110.	250	ug/kg	75	73	55-120	2	30
2-Butanone	4	U	4.	10	ug/kg	110	90	38-146	19	30
t-Butyl alcohol	20	U	20.	100	ug/kg	88	89	60-149	1	30
n-Butylbenzene	1	U	1.	5	ug/kg	101	98	72-120	3	30
sec-Butylbenzene	1	U	1.	5	ug/kg	100	97	75-120	4	30
tert-Butylbenzene	1	U	1.	5	ug/kg	96	91	75-120	5	30
Carbon Disulfide	1	U	1.	5	ug/kg	104	101	63-128	2	30
Carbon Tetrachloride	1	U	1.	5	ug/kg	121	115	69-122	5	30
2-Chloro-1,3-butadiene	1	U	1.	5	ug/kg	106	101	72-126	5	30
Chlorobenzene	1	U	1.	5	ug/kg	98	91	80-120	7	30
Chloroethane	2	U	2.	5	ug/kg	118	114	17-171	4	30
Chloroform	1	U	1.	5	ug/kg	111	105	80-120	5	30
Chloromethane	2	U	2.	5	ug/kg	117	116	56-120	2	30
2-Chlorotoluene	1	U	1.	5	ug/kg	93	90	78-120	3	30
4-Chlorotoluene	1	U	1.	5	ug/kg	95	90	79-120	5	30
Cyclohexane	1	U	1.	5	ug/kg	96	94	63-124	3	30
Cyclohexanone	25	U	25.	250	ug/kg	67	72	51-138	7	30
1,2-Dibromo-3-chloropropane	2	U	2.	5	ug/kg	103	83	55-128	21	30
Dibromochloromethane	1	U	1.	5	ug/kg	106	100	77-120	6	30
1,2-Dibromoethane	1	U	1.	5	ug/kg	101	89	80-120	12	30
Dibromomethane	1	U	1.	5	ug/kg	106	97	80-120	9	30
trans-1,4-Dichloro-2-butene	10	U	10.	50	ug/kg	112	95	67-139	17	30
1,2-Dichlorobenzene	1	U	1.	5	ug/kg	98	94	80-120	4	30
1,3-Dichlorobenzene	1	U	1.	5	ug/kg	98	95	80-120	2	30
1,4-Dichlorobenzene	1	U	1.	5	ug/kg	97	94	80-120	3	30
Dichlorodifluoromethane	2	U	2.	5	ug/kg	139*	134*	32-120	4	30
1,1-Dichloroethane	1	U	1.	5	ug/kg	105	100	80-120	5	30
1,2-Dichloroethane	1	U	1.	5	ug/kg	117	108	72-126	8	30
1,1-Dichloroethene	1	U	1.	5	ug/kg	112	111	73-129	1	30
cis-1,2-Dichloroethene	1	U	1.	5	ug/kg	102	97	80-120	5	30
trans-1,2-Dichloroethene	1	U	1.	5	ug/kg	110	105	79-120	5	30
1,2-Dichloropropane	1	U	1.	5	ug/kg	100	96	77-120	4	30
1,3-Dichloropropane	1	U	1.	5	ug/kg	98	88	80-120	10	30
2,2-Dichloropropane	1	U	1.	5	ug/kg	108	105	72-123	3	30
1,1-Dichloropropene	1	U	1.	5	ug/kg	103	99	77-120	4	30
cis-1,3-Dichloropropene	1	U	1.	5	ug/kg	103	97	74-120	6	30
trans-1,3-Dichloropropene	1	U	1.	5	ug/kg	94	86	77-120	9	30
Ethyl Methacrylate	1	U	1.	5	ug/kg	90	77	65-120	15	30
Ethyl t-butyl ether	1	U	1.	5	ug/kg	98	91	64-124	8	30
Ethylbenzene	1	U	1.	5	ug/kg	96	91	80-120	5	30
Freon 113	2	U	2.	10	ug/kg	115	110	64-137	5	30
n-Heptane	3	U	3.	5	ug/kg	99	96	49-129	3	30
Hexachlorobutadiene	2	U	2.	5	ug/kg	105	100	46-130	5	30
n-Hexane	1	U	1.	5	ug/kg	98	94	56-127	4	30
2-Hexanone	3	U	3.	10	ug/kg	86	69	40-129	22	30
Isobutyl Alcohol	100 U		100.	250	ug/kg	82	83	64-121	1	30
Isopropylbenzene	1	U	1.	5	ug/kg	98	93	76-120	6	30

*- Outside of specification
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(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1423475
Reported: 10/09/13 at 11:31 AM

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
p-Isopropyltoluene	1	U	1.	5	ug/kg	101	98	75-120	3	30
Methacrylonitrile	5	U	5.	50	ug/kg	108	92	65-122	16	30
Methyl Acetate	2	U	2.	5	ug/kg	134	112	62-158	18	30
Methyl Methacrylate	1	U	1.	5	ug/kg	97	85	60-120	13	30
Methyl Tertiary Butyl Ether	0.5	U	0.5	5	ug/kg	115	104	69-126	11	30
4-Methyl-2-pentanone	3	U	3.	10	ug/kg	85	69	52-125	22	30
Methylcyclohexane	1	U	1.	5	ug/kg	107	102	58-134	5	30
Methylene Chloride	2	U	2.	5	ug/kg	112	106	80-124	5	30
Naphthalene	1	U	1.	5	ug/kg	98	87	59-123	12	30
Pentachloroethane	1	U	1.	5	ug/kg	107	104	71-120	3	30
Propionitrile	30	U	30.	100	ug/kg	75	82	74-129	9	30
n-Propylbenzene	1	U	1.	5	ug/kg	103	97	77-120	6	30
Styrene	1	U	1.	5	ug/kg	98	91	76-120	8	30
1,1,1,2-Tetrachloroethane	1	U	1.	5	ug/kg	103	94	80-120	8	30
1,1,2,2-Tetrachloroethane	1	U	1.	5	ug/kg	94	83	71-123	13	30
Tetrachloroethene	1	U	1.	5	ug/kg	105	100	78-126	5	30
Tetrahydrofuran	4	U	4.	5	ug/kg	67	72	64-140	7	30
Toluene	1	U	1.	5	ug/kg	98	93	80-120	5	30
1,2,3-Trichlorobenzene	1	U	1.	5	ug/kg	102	93	64-120	9	30
1,2,4-Trichlorobenzene	1	U	1.	5	ug/kg	97	92	68-120	6	30
1,1,1-Trichloroethane	1	U	1.	5	ug/kg	116	110	71-125	5	30
1,1,2-Trichloroethane	1	U	1.	5	ug/kg	100	89	80-120	12	30
Trichloroethene	1	U	1.	5	ug/kg	105	101	80-120	4	30
1,2,4-Trimethylbenzene	1	U	1.	5	ug/kg	97	96	79-120	2	30
1,3,5-Trimethylbenzene	1	U	1.	5	ug/kg	98	96	78-120	3	30
Vinyl Acetate	2	U	2.	10	ug/kg	86	80	40-127	8	30
Vinyl Chloride	1	U	1.	5	ug/kg	117	116	53-120	0	30
m+p-Xylene	1	U	1.	5	ug/kg	98	93	80-120	6	30
o-Xylene	1	U	1.	5	ug/kg	97	92	80-120	5	30

Batch number: 13276820003B Sample number(s): 7222605-7222606

Moisture	100	99-101

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: B132771AA	Sample number(s): 7222606 UNSPK: P222821								
Acetone	160	153	31-195	2	30				
Acetonitrile	68	68	41-166	6	30				
Acrolein	77	68	10-165	9	30				
Acrylonitrile	88	90	48-139	6	30				
Allyl Chloride	105	109	55-154	7	30				
t-Amyl methyl ether	90	90	50-132	3	30				
Benzene	96	98	55-143	4	30				
Benzyl Chloride	63	70	30-130	12	30				
Bromobenzene	80	83	43-139	7	30				
Bromochloromethane	108	109	60-137	4	30				
Bromodichloromethane	99	101	53-136	4	30				
Bromoform	84	87	38-124	6	30				

*- Outside of specification
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(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1423475
Reported: 10/09/13 at 11:31 AM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Bromomethane	117	133	42-168	16	30				
n-Butanol	81	84	35-154	6	30				
2-Butanone	103	104	37-163	4	30				
t-Butyl alcohol	128	106	47-153	16	30				
n-Butylbenzene	60	54	30-146	8	30				
sec-Butylbenzene	71	67	33-157	2	30				
tert-Butylbenzene	75	72	41-152	1	30				
Carbon Disulfide	103	105	48-146	5	30				
Carbon Tetrachloride	116	117	45-153	3	30				
2-Chloro-1,3-butadiene	102	103	51-152	4	30				
Chlorobenzene	81	81	49-135	3	30				
Chloroethane	115	126	39-152	12	30				
Chloroform	111	112	61-142	4	30				
Chloromethane	108	125	36-143	18	30				
2-Chlorotoluene	75	78	42-146	6	30				
4-Chlorotoluene	74	73	39-145	3	30				
Cyclohexane	88	90	57-151	6	30				
Cyclohexanone	57	64	27-162	13	30				
1,2-Dibromo-3-chloropropane	71	80	30-139	14	30				
Dibromochloromethane	96	97	51-128	4	30				
1,2-Dibromoethane	88	89	54-129	4	30				
Dibromomethane	99	99	57-130	3	30				
trans-1,4-Dichloro-2-butene	102	106	31-144	7	30				
1,2-Dichlorobenzene	60	64	36-133	9	30				
1,3-Dichlorobenzene	66	68	34-134	6	30				
1,4-Dichlorobenzene	66	67	35-136	4	30				
Dichlorodifluoromethane	126	136	26-151	11	30				
1,1-Dichloroethane	104	107	63-142	6	30				
1,2-Dichloroethane	117	116	54-143	2	30				
1,1-Dichloroethene	114	116	61-149	5	30				
cis-1,2-Dichloroethene	102	101	53-146	2	30				
trans-1,2-Dichloroethene	109	111	51-153	5	30				
1,2-Dichloropropane	93	96	54-144	6	30				
1,3-Dichloropropane	90	92	51-140	6	30				
2,2-Dichloropropane	105	110	53-147	8	30				
1,1-Dichloropropene	96	99	54-145	5	30				
cis-1,3-Dichloropropene	91	93	45-137	5	30				
trans-1,3-Dichloropropene	84	87	41-129	7	30				
Ethyl Methacrylate	52	53	35-134	6	30				
Ethyl t-butyl ether	91	93	58-124	5	30				
Ethylbenzene	80	75	44-141	4	30				
Freon 113	116	119	56-156	5	30				
n-Heptane	78	80	21-180	5	30				
Hexachlorobutadiene	44	39	10-155	8	30				
n-Hexane	86	90	33-169	8	30				
2-Hexanone	75	75	32-160	2	30				
Isobutyl Alcohol	110	97	44-158	10	30				
Isopropylbenzene	72	68	38-144	2	30				
p-Isopropyltoluene	69	64	29-152	4	30				
Methacrylonitrile	88	90	54-142	6	30				
Methyl Acetate	123	129	48-161	8	30				
Methyl Methacrylate	104	105	42-134	4	30				

*- Outside of specification
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(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1423475
Reported: 10/09/13 at 11:31 AM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Methyl Tertiary Butyl Ether	108	108	55-129	3	30				
4-Methyl-2-pentanone	71	71	46-139	3	30				
Methylcyclohexane	91	93	39-168	5	30				
Methylene Chloride	112	116	60-149	6	30				
Naphthalene	33	36	10-138	11	30				
Pentachloroethane	84	87	35-145	6	30				
Propionitrile	106	95	44-169	8	30				
n-Propylbenzene	77	75	39-157	0	30				
Styrene	73	70	35-134	1	30				
1,1,1,2-Tetrachloroethane	88	89	39-150	4	30				
1,1,2,2-Tetrachloroethane	81	87	40-152	11	30				
Tetrachloroethene	95	95	42-149	2	30				
Tetrahydrofuran	101	84	53-163	16	30				
Toluene	90	91	50-146	4	30				
1,2,3-Trichlorobenzene	29	30	10-140	8	30				
1,2,4-Trichlorobenzene	32	34	10-136	9	30				
1,1,1-Trichloroethane	100	102	52-146	5	30				
1,1,2-Trichloroethane	92	90	47-161	1	30				
Trichloroethene	95	95	53-144	3	30				
1,2,4-Trimethylbenzene	75	75	37-149	2	30				
1,3,5-Trimethylbenzene	78	77	38-150	2	30				
Vinyl Acetate	5*	2*	21-139	81*	30				
Vinyl Chloride	111	126	50-154	15	30				
m+p-Xylene	77	74	44-137	1	30				
o-Xylene	75	72	42-137	1	30				

Batch number: B132801AA Sample number(s): 7222605 UNSPK: P222932

Acetone	114	104	31-195	17	30
Acrolein	0*	0*	10-165	0	30
Acrylonitrile	85	75	48-139	25	30
Allyl Chloride	114	107	55-154	19	30
t-Amyl methyl ether	94	86	50-132	22	30
Benzene	106	100	55-143	18	30
Benzyl Chloride	82	62	30-130	39*	30
Bromobenzene	122	93	43-139	39*	30
Bromochloromethane	103	94	60-137	21	30
Bromodichloromethane	103	93	53-136	23	30
Bromoform	100	82	38-124	33*	30
Bromomethane	134	125	42-168	19	30
n-Butanol	116	99	35-154	28	30
2-Butanone	81	72	37-163	24	30
t-Butyl alcohol	154*	121	47-153	37*	30
n-Butylbenzene	110	89	30-146	33*	30
sec-Butylbenzene	163*	121	33-157	42*	30
tert-Butylbenzene	162*	122	41-152	41*	30
Carbon Disulfide	99	95	48-146	16	30
Carbon Tetrachloride	136	125	45-153	21	30
2-Chloro-1,3-butadiene	111	102	51-152	21	30
Chlorobenzene	90	86	49-135	17	30
Chloroethane	131	123	39-152	19	30
Chloroform	119	110	61-142	21	30
Chloromethane	133	127	36-143	17	30

*- Outside of specification
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(1) The result for one or both determinations was less than five times the LOQ.
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Quality Control Summary

Client Name: Altamont Environmental Group Number: 1423475
Reported: 10/09/13 at 11:31 AM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
2-Chlorotoluene	140	111	42-146	36*	30				
4-Chlorotoluene	109	94	39-145	27	30				
Cyclohexane	111	102	57-151	21	30				
Cyclohexanone	104	88	27-162	29	30				
1,2-Dibromo-3-chloropropane	119	86	30-139	45*	30				
Dibromochloromethane	120	97	51-128	33*	30				
1,2-Dibromoethane	92	78	54-129	29	30				
Dibromomethane	86	78	57-130	21	30				
trans-1,4-Dichloro-2-butene	126	83	31-144	53*	30				
1,2-Dichlorobenzene	91	81	36-133	24	30				
1,3-Dichlorobenzene	89	80	34-134	23	30				
1,4-Dichlorobenzene	79	73	35-136	20	30				
Dichlorodifluoromethane	158*	146	26-151	21	30				
1,1-Dichloroethane	119	109	63-142	22	30				
1,2-Dichloroethane	107	98	54-143	21	30				
1,1-Dichloroethene	130	119	61-149	22	30				
cis-1,2-Dichloroethene	101	94	53-146	19	30				
trans-1,2-Dichloroethene	106	101	51-153	18	30				
1,2-Dichloropropane	103	95	54-144	21	30				
1,3-Dichloropropane	104	90	51-140	27	30				
2,2-Dichloropropane	123	116	53-147	18	30				
1,1-Dichloropropene	104	96	54-145	21	30				
cis-1,3-Dichloropropene	78	77	45-137	14	30				
trans-1,3-Dichloropropene	79	71	41-129	23	30				
Ethyl Methacrylate	65	47	35-134	44*	30				
Ethyl t-butyl ether	100	93	58-124	20	30				
Ethylbenzene	99	94	44-141	18	30				
Freon 113	137	125	56-156	22	30				
n-Heptane	88	78	21-180	26	30				
Hexachlorobutadiene	125	94	10-155	41*	30				
n-Hexane	103	88	33-169	28	30				
2-Hexanone	66	60	32-160	23	30				
Isobutyl Alcohol	133	108	44-158	34*	30				
Isopropylbenzene	100	99	38-144	13	30				
p-Isopropyltoluene	146	114	29-152	37*	30				
Methacrylonitrile	85	76	54-142	24	30				
Methyl Acetate	51	28*	48-161	69*	30				
Methyl Methacrylate	45	31*	42-134	50*	30				
Methyl Tertiary Butyl Ether	110	99	55-129	23	30				
4-Methyl-2-pentanone	62	57	46-139	21	30				
Methylcyclohexane	116	109	39-168	19	30				
Methylene Chloride	116	109	60-149	19	30				
Naphthalene	24	37	10-138	33*	30				
Pentachloroethane	0*	0*	35-145	0	30				
Propionitrile	149	108	44-169	44*	30				
n-Propylbenzene	155	117	39-157	41*	30				
Styrene	63	75	35-134	6	30				
1,1,1,2-Tetrachloroethane	125	109	39-150	27	30				
1,1,2,2-Tetrachloroethane	13*	0*	40-152	200*	30				
Tetrachloroethene	236*	203*	42-149	27	30				
Tetrahydrofuran	129	93	53-163	45*	30				
Toluene	122	107	50-146	25	30				

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1423475
Reported: 10/09/13 at 11:31 AM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
1,2,3-Trichlorobenzene	34	42	10-140	8	30				
1,2,4-Trichlorobenzene	35	40	10-136	1	30				
1,1,1-Trichloroethane	129	120	52-146	20	30				
1,1,2-Trichloroethane	111	90	47-161	34*	30				
Trichloroethene	175*	165*	53-144	18	30				
1,2,4-Trimethylbenzene	122	112	37-149	22	30				
1,3,5-Trimethylbenzene	153*	122	38-150	35*	30				
Vinyl Chloride	134	126	50-154	19	30				
m+p-Xylene	91	93	44-137	10	30				
o-Xylene	87	92	42-137	7	30				
Batch number: 13276820003B	Sample number(s): 7222605-7222606					BKG: P221745			
Moisture						15.7	16.0	2	5

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed
unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: GC/MS Volatiles
Batch number: B132771AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
7222606	111	101	96	88
Blank	110	105	99	96
LCS	106	102	101	103
MS	108	102	105	92
MSD	110	104	104	91
Limits:	50-141	54-135	52-141	50-131

Analysis Name: GC/MS Volatiles
Batch number: B132801AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
7222605	106	100	99	85
Blank	107	105	96	92
LCS	107	101	98	104
LCSD	105	102	97	95
MS	85	96	123	72
MSD	83	94	114	84
Limits:	50-141	54-135	52-141	50-131

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Services Analysis Request/Chain of Custody

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COC#: 6999

Acct. # 12184 Group # 1423475 Sample # 7222605-06

Client: **Altamont Environmental**

Project Name/#: Chemtronics 2115.231

Project Manager: Amy ~~Bondurant~~ Huffman P.O. #: 2115.231

Sampler: M. Gragg

Phone #: 828-281-3350 Quote #: 207662

State where sample(s) were collected: NC

SF#: 128607

SCR#: 145380

Sample Identification	Collection Date	Collection Time	Grab	Composite	Soil	Sediment	Potable Water	Ground Water	Surface Water	NPDES	Other:	Total # of Containers	GC/MS VOAs (8260)	Nitroaromatics/Amines (8330)	Perchlorate (6850)	Moisture (2540 G)	Remarks
VBW-13-6-7.5	10/2/13	925	X		X							4	X			X	do not send
VBW-13-7.5-9	10/2/13	930	X		X							4	X			X	for validation

Preservation Codes: H = HCl, T = Thiosulfate, N = HNO_3, B = NaOH, S = H_2SO_4, P = H_3PO_4, O = Other

Turnaround Time Requested (TAT) (please check): Standard ☐ RUSH ☒

(RUSH TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 48 hr TAT

E-mail address to send RUSH results: AHuffman@AltamontEnvironmental.com

Data Package Options (please check if required)

Type I (Validation/non-CLP) ☐ MA MCP ☐ TX TRRP - 13 ☐

Type III (Reduced non-CLP) ☐ CT RCP ☐

Type IV (CLP SOW) ☐ ASP Type A ☐

Type VI (Raw Data Only) ☐ ASP Type B ☐

EDD Format: TerraBase

If site-specific QC (MS/MSD/Dup) required, indicate QC samples and submit triplicate volume.

Relinquished by:	Date	Time	Received by:	Date	Time
M. Gragg	10/2/13	1625			

Airbill No.:

Relinquished by Commercial Carrier:

UPS X FedEx ____ Other ____

Temperature upon receipt 0.3 °C

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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Data Qualifiers:

C – result confirmed by reanalysis.

J - estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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ANALYTICAL RESULTS

Prepared by:	Prepared for:
Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601	Altamont Environmental 231 Haywood Street Asheville NC 28801

October 03, 2013

Project: Chemtronics Site

Submittal Date: 09/28/2013
Group Number: 1422302
PO Number: 2115.231
State of Sample Origin: NC

Client Sample Description	Lancaster Labs (LL) #
VBW-14-13.5-15 Grab Soil	7216795

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Altamont Environmental	Attn: Amy Huffman
ELECTRONIC COPY TO	Altamont Environmental	Attn: Marta VanDussen

Respectfully Submitted,

Nancy Jean Bornholm

Nancy Jean Bornholm
Principal Specialist

(717) 556-7250

Sample Description: VBW-14-13.5-15 Grab Soil
Chemtronics Soil Sampling

LL Sample # SW 7216795
LL Group # 1422302
Account # 12184

Project Name: Chemtronics Site

Collected: 09/27/2013 09:30 by MG

Submitted: 09/28/2013 08:50
Reported: 10/03/2013 18:48

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CVB14

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10237	Acetone	67-64-1	10	U	10	30	1.02
10237	Acetonitrile	75-05-8	37	U	37	150	1.02
10237	Acrolein	107-02-8	30	U	30	150	1.02
10237	Acrylonitrile	107-13-1	6	U	6	30	1.02
10237	Allyl Chloride	107-05-1	1	U	1	7	1.02
10237	t-Amyl methyl ether	994-05-8	1	U	1	7	1.02
10237	Benzene	71-43-2	0.7	U	0.7	7	1.02
10237	Benzyl Chloride	100-44-7	1	U	1	6	1.02
10237	Bromobenzene	108-86-1	1	U	1	7	1.02
10237	Bromochloromethane	74-97-5	1	U	1	7	1.02
10237	Bromodichloromethane	75-27-4	1	U	1	7	1.02
10237	Bromoform	75-25-2	1	U	1	7	1.02
10237	Bromomethane	74-83-9	3	U	3	7	1.02
10237	n-Butanol	71-36-3	160	U	160	370	1.02
10237	2-Butanone	78-93-3	6	U	6	15	1.02
10237	t-Butyl alcohol	75-65-0	30	U	30	150	1.02
10237	n-Butylbenzene	104-51-8	1	U	1	7	1.02
10237	sec-Butylbenzene	135-98-8	1	U	1	7	1.02
10237	tert-Butylbenzene	98-06-6	1	U	1	7	1.02
10237	Carbon Disulfide	75-15-0	1	U	1	7	1.02
10237	Carbon Tetrachloride	56-23-5	1	U	1	7	1.02
10237	2-Chloro-1,3-butadiene	126-99-8	1	U	1	7	1.02
10237	Chlorobenzene	108-90-7	1	U	1	7	1.02
10237	Chloroethane	75-00-3	3	U	3	7	1.02
10237	Chloroform	67-66-3	1	U	1	7	1.02
10237	Chloromethane	74-87-3	3	U	3	7	1.02
10237	2-Chlorotoluene	95-49-8	1	U	1	7	1.02
10237	4-Chlorotoluene	106-43-4	1	U	1	7	1.02
10237	Cyclohexane	110-82-7	1	U	1	7	1.02
10237	Cyclohexanone	108-94-1	37	U	37	370	1.02
10237	1,2-Dibromo-3-chloropropane	96-12-8	3	U	3	7	1.02
10237	Dibromochloromethane	124-48-1	1	U	1	7	1.02
10237	1,2-Dibromoethane	106-93-4	1	U	1	7	1.02
10237	Dibromomethane	74-95-3	1	U	1	7	1.02
10237	trans-1,4-Dichloro-2-butene	110-57-6	15	U	15	75	1.02
10237	1,2-Dichlorobenzene	95-50-1	1	U	1	7	1.02
10237	1,3-Dichlorobenzene	541-73-1	1	U	1	7	1.02
10237	1,4-Dichlorobenzene	106-46-7	1	U	1	7	1.02
10237	Dichlorodifluoromethane	75-71-8	3	U	3	7	1.02
10237	1,1-Dichloroethane	75-34-3	1	U	1	7	1.02
10237	1,2-Dichloroethane	107-06-2	1	U	1	7	1.02
10237	1,1-Dichloroethene	75-35-4	1	U	1	7	1.02
10237	cis-1,2-Dichloroethene	156-59-2	1	U	1	7	1.02
10237	trans-1,2-Dichloroethene	156-60-5	1	U	1	7	1.02
10237	1,2-Dichloropropane	78-87-5	1	U	1	7	1.02
10237	1,3-Dichloropropane	142-28-9	1	U	1	7	1.02
10237	2,2-Dichloropropane	594-20-7	1	U	1	7	1.02
10237	1,1-Dichloropropene	563-58-6	1	U	1	7	1.02
10237	cis-1,3-Dichloropropene	10061-01-5	1	U	1	7	1.02
10237	trans-1,3-Dichloropropene	10061-02-6	1	U	1	7	1.02
10237	Ethyl Methacrylate	97-63-2	1	U	1	7	1.02

*=This limit was used in the evaluation of the final result

Sample Description: VBW-14-13.5-15 Grab Soil
Chemtronics Soil Sampling

LL Sample # SW 7216795
LL Group # 1422302
Account # 12184

Project Name: Chemtronics Site

Collected: 09/27/2013 09:30 by MG

Submitted: 09/28/2013 08:50
Reported: 10/03/2013 18:48

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CVB14

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10237	Ethyl t-butyl ether	637-92-3	1	U	1	7	1.02
10237	Ethylbenzene	100-41-4	1	U	1	7	1.02
10237	Freon 113	76-13-1	3	U	3	15	1.02
10237	n-Heptane	142-82-5	4	U	4	7	1.02
10237	Hexachlorobutadiene	87-68-3	3	U	3	7	1.02
10237	n-Hexane	110-54-3	1	U	1	7	1.02
10237	2-Hexanone	591-78-6	4	U	4	15	1.02
10237	Isobutyl Alcohol	78-83-1	150	U	150	370	1.02
10237	Isopropylbenzene	98-82-8	1	U	1	7	1.02
10237	p-Isopropyltoluene	99-87-6	1	U	1	7	1.02
10237	Methacrylonitrile	126-98-7	7	U	7	75	1.02
10237	Methyl Acetate	79-20-9	3	U	3	7	1.02
10237	Methyl Methacrylate	80-62-6	1	U	1	7	1.02
10237	Methyl Tertiary Butyl Ether	1634-04-4	0.7	U	0.7	7	1.02
10237	4-Methyl-2-pentanone	108-10-1	4	U	4	15	1.02
10237	Methylcyclohexane	108-87-2	1	U	1	7	1.02
10237	Methylene Chloride	75-09-2	3	U	3	7	1.02
10237	Naphthalene	91-20-3	1	U	1	7	1.02
10237	Pentachloroethane	76-01-7	1	U	1	7	1.02
10237	Propionitrile	107-12-0	45	U	45	150	1.02
10237	n-Propylbenzene	103-65-1	1	U	1	7	1.02
10237	Styrene	100-42-5	1	U	1	7	1.02
10237	1,1,1,2-Tetrachloroethane	630-20-6	1	U	1	7	1.02
10237	1,1,2,2-Tetrachloroethane	79-34-5	1	U	1	7	1.02
10237	Tetrachloroethene	127-18-4	1	U	1	7	1.02
10237	Tetrahydrofuran	109-99-9	6	U	6	7	1.02
10237	Toluene	108-88-3	1	U	1	7	1.02
10237	1,2,3-Trichlorobenzene	87-61-6	1	U	1	7	1.02
10237	1,2,4-Trichlorobenzene	120-82-1	1	U	1	7	1.02
10237	1,1,1-Trichloroethane	71-55-6	1	U	1	7	1.02
10237	1,1,2-Trichloroethane	79-00-5	1	U	1	7	1.02
10237	Trichloroethene	79-01-6	1	U	1	7	1.02
10237	1,2,4-Trimethylbenzene	95-63-6	1	U	1	7	1.02
10237	1,3,5-Trimethylbenzene	108-67-8	1	U	1	7	1.02
10237	Vinyl Acetate	108-05-4	3	U	3	15	1.02
10237	Vinyl Chloride	75-01-4	1	U	1	7	1.02
10237	m+p-Xylene	1330-20-7	1	U	1	7	1.02
10237	o-Xylene	95-47-6	1	U	1	7	1.02
Wet Chemistry	**SM 2540 G-1997**		**%**		**%**	**%**	
00111	Moisture	n.a.	32.0		0.50	0.50	1

Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.

*=This limit was used in the evaluation of the final result

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Lancaster Laboratories Environmental
2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Analysis Report

Sample Description: VBW-14-13.5-15 Grab Soil
Chemtronics Soil Sampling

LL Sample # SW 7216795
LL Group # 1422302
Account # 12184

Project Name: Chemtronics Site

Collected: 09/27/2013 09:30 by MG

Submitted: 09/28/2013 08:50
Reported: 10/03/2013 18:48

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CVB14

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10237	GC/MS Volatiles	SW-846 8260B	1	B132751AA	10/02/2013 12:10	Lauren C Temple	1.02
07320	GC/MS - LL DIH2O Encore Prep	SW-846 5035A	1	201327132559	09/28/2013 13:11	Lisa J Cooke	n.a.
07320	GC/MS - LL DIH2O Encore Prep	SW-846 5035A	2	201327132559	09/28/2013 13:11	Lisa J Cooke	n.a.
07578	GC/MS-HL Encore Prep-NC	SW-846 5035A	1	201327132559	09/28/2013 13:03	Lisa J Cooke	n.a.
00111	Moisture	SM 2540 G-1997	1	13273820003B	09/30/2013 20:45	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1422302
Reported: 10/03/13 at 06:48 PM

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: B132751AA	Sample number(s): 7216795									
Acetone	7	U	7.	20	ug/kg	112	106	23-171	6	30
Acetonitrile	25	U	25.	100	ug/kg	95	96	61-147	1	30
Acrolein	20	U	20.	100	ug/kg	83	82	50-137	2	30
Acrylonitrile	4	U	4.	20	ug/kg	94	91	58-123	4	30
Allyl Chloride	1	U	1.	5	ug/kg	100	99	56-139	1	30
t-Amyl methyl ether	1	U	1.	5	ug/kg	88	87	63-130	1	30
Benzene	0.5	U	0.5	5	ug/kg	97	95	80-120	2	30
Benzyl Chloride	1	U	1.	4	ug/kg	86	84	52-131	2	30
Bromobenzene	1	U	1.	5	ug/kg	90	88	80-120	2	30
Bromochloromethane	1	U	1.	5	ug/kg	101	98	75-129	2	30
Bromodichloromethane	1	U	1.	5	ug/kg	89	88	75-120	1	30
Bromoform	1	U	1.	5	ug/kg	94	91	70-120	3	30
Bromomethane	2	U	2.	5	ug/kg	102	99	32-162	3	30
n-Butanol	110 U		110.	250	ug/kg	78	77	55-120	2	30
2-Butanone	4	U	4.	10	ug/kg	91	87	38-146	5	30
t-Butyl alcohol	20	U	20.	100	ug/kg	87	88	60-149	1	30
n-Butylbenzene	1	U	1.	5	ug/kg	98	96	72-120	2	30
sec-Butylbenzene	1	U	1.	5	ug/kg	99	96	75-120	3	30
tert-Butylbenzene	1	U	1.	5	ug/kg	94	91	75-120	3	30
Carbon Disulfide	1	U	1.	5	ug/kg	104	100	63-128	4	30
Carbon Tetrachloride	1	U	1.	5	ug/kg	99	98	69-122	1	30
2-Chloro-1,3-butadiene	1	U	1.	5	ug/kg	98	95	72-126	3	30
Chlorobenzene	1	U	1.	5	ug/kg	93	90	80-120	4	30
Chloroethane	2	U	2.	5	ug/kg	104	102	17-171	2	30
Chloroform	1	U	1.	5	ug/kg	96	94	80-120	2	30
Chloromethane	2	U	2.	5	ug/kg	105	102	56-120	2	30
2-Chlorotoluene	1	U	1.	5	ug/kg	92	89	78-120	4	30
4-Chlorotoluene	1	U	1.	5	ug/kg	93	91	79-120	2	30
Cyclohexane	1	U	1.	5	ug/kg	99	97	63-124	2	30
Cyclohexanone	25	U	25.	250	ug/kg	70	65	51-138	7	30
1,2-Dibromo-3-chloropropane	2	U	2.	5	ug/kg	84	83	55-128	1	30
Dibromochloromethane	1	U	1.	5	ug/kg	93	89	77-120	4	30
1,2-Dibromoethane	1	U	1.	5	ug/kg	91	88	80-120	4	30
Dibromomethane	1	U	1.	5	ug/kg	92	90	80-120	2	30
trans-1,4-Dichloro-2-butene	10	U	10.	50	ug/kg	94	89	67-139	5	30
1,2-Dichlorobenzene	1	U	1.	5	ug/kg	92	90	80-120	2	30
1,3-Dichlorobenzene	1	U	1.	5	ug/kg	94	93	80-120	2	30
1,4-Dichlorobenzene	1	U	1.	5	ug/kg	92	91	80-120	1	30
Dichlorodifluoromethane	2	U	2.	5	ug/kg	104	101	32-120	2	30
1,1-Dichloroethane	1	U	1.	5	ug/kg	98	98	80-120	0	30
1,2-Dichloroethane	1	U	1.	5	ug/kg	93	91	72-126	3	30
1,1-Dichloroethene	1	U	1.	5	ug/kg	106	105	73-129	1	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1422302
Reported: 10/03/13 at 06:48 PM

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
cis-1,2-Dichloroethene	1	U	1.	5	ug/kg	99	97	80-120	2	30
trans-1,2-Dichloroethene	1	U	1.	5	ug/kg	106	105	79-120	2	30
1,2-Dichloropropane	1	U	1.	5	ug/kg	97	94	77-120	3	30
1,3-Dichloropropane	1	U	1.	5	ug/kg	91	87	80-120	4	30
2,2-Dichloropropane	1	U	1.	5	ug/kg	94	92	72-123	1	30
1,1-Dichloropropene	1	U	1.	5	ug/kg	97	95	77-120	3	30
cis-1,3-Dichloropropene	1	U	1.	5	ug/kg	93	92	74-120	0	30
trans-1,3-Dichloropropene	1	U	1.	5	ug/kg	85	82	77-120	3	30
Ethyl Methacrylate	1	U	1.	5	ug/kg	85	81	65-120	5	30
Ethyl t-butyl ether	1	U	1.	5	ug/kg	90	89	64-124	1	30
Ethylbenzene	1	U	1.	5	ug/kg	94	92	80-120	2	30
Freon 113	2	U	2.	10	ug/kg	106	101	64-137	5	30
n-Heptane	3	U	3.	5	ug/kg	102	100	49-129	2	30
Hexachlorobutadiene	2	U	2.	5	ug/kg	101	99	46-130	2	30
n-Hexane	1	U	1.	5	ug/kg	106	103	56-127	2	30
2-Hexanone	3	U	3.	10	ug/kg	72	69	40-129	5	30
Isobutyl Alcohol	100 U		100.	250	ug/kg	79	78	64-121	2	30
Isopropylbenzene	1	U	1.	5	ug/kg	94	93	76-120	1	30
p-Isopropyltoluene	1	U	1.	5	ug/kg	98	96	75-120	3	30
Methacrylonitrile	5	U	5.	50	ug/kg	97	95	65-122	2	30
Methyl Acetate	2	U	2.	5	ug/kg	120	118	62-158	2	30
Methyl Methacrylate	1	U	1.	5	ug/kg	88	86	60-120	3	30
Methyl Tertiary Butyl Ether	0.5	U	0.5	5	ug/kg	99	98	69-126	1	30
4-Methyl-2-pentanone	3	U	3.	10	ug/kg	74	72	52-125	2	30
Methylcyclohexane	1	U	1.	5	ug/kg	107	103	58-134	3	30
Methylene Chloride	2	U	2.	5	ug/kg	105	101	80-124	4	30
Naphthalene	1	U	1.	5	ug/kg	91	89	59-123	2	30
Pentachloroethane	1	U	1.	5	ug/kg	98	96	71-120	2	30
Propionitrile	30	U	30.	100	ug/kg	85	84	74-129	1	30
n-Propylbenzene	1	U	1.	5	ug/kg	99	97	77-120	3	30
Styrene	1	U	1.	5	ug/kg	96	91	76-120	5	30
1,1,1,2-Tetrachloroethane	1	U	1.	5	ug/kg	93	89	80-120	4	30
1,1,2,2-Tetrachloroethane	1	U	1.	5	ug/kg	86	85	71-123	2	30
Tetrachloroethene	1	U	1.	5	ug/kg	99	96	78-126	3	30
Tetrahydrofuran	4	U	4.	5	ug/kg	77	74	64-140	3	30
Toluene	1	U	1.	5	ug/kg	95	92	80-120	4	30
1,2,3-Trichlorobenzene	1	U	1.	5	ug/kg	95	94	64-120	2	30
1,2,4-Trichlorobenzene	1	U	1.	5	ug/kg	94	94	68-120	0	30
1,1,1-Trichloroethane	1	U	1.	5	ug/kg	85	85	71-125	1	30
1,1,2-Trichloroethane	1	U	1.	5	ug/kg	89	86	80-120	3	30
Trichloroethene	1	U	1.	5	ug/kg	97	94	80-120	3	30
1,2,4-Trimethylbenzene	1	U	1.	5	ug/kg	96	94	79-120	2	30
1,3,5-Trimethylbenzene	1	U	1.	5	ug/kg	96	93	78-120	3	30
Vinyl Acetate	2	U	2.	10	ug/kg	41	42	40-127	2	30
Vinyl Chloride	1	U	1.	5	ug/kg	110	107	53-120	3	30
m+p-Xylene	1	U	1.	5	ug/kg	95	91	80-120	5	30
o-Xylene	1	U	1.	5	ug/kg	91	89	80-120	2	30

Batch number: 13273820003B Sample number(s): 7216795
Moisture 100 99-101

Sample Matrix Quality Control

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1422302
Reported: 10/03/13 at 06:48 PM
Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Batch number: B132751AA Sample number(s): 7216795 BKG: P220109

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc		DUP Conc		DUP RPD	Dup RPD Max
Acetone						38		46		21 (1)	30
Acetonitrile						26	U	23	U	0 (1)	30
Acrolein						21	U	18	U	0 (1)	30
Acrylonitrile						4	U	4	U	0 (1)	30
Allyl Chloride						1	U	0.9	U	0 (1)	30
t-Amyl methyl ether						1	U	0.9	U	0 (1)	30
Benzene						0.5	U	0.5	U	0 (1)	30
Benzyl Chloride						1	U	0.9	U	0 (1)	30
Bromobenzene						1	U	0.9	U	0 (1)	30
Bromochloromethane						1	U	0.9	U	0 (1)	30
Bromodichloromethane						1	U	0.9	U	0 (1)	30
Bromoform						1	U	0.9	U	0 (1)	30
Bromomethane						2	U	2	U	0 (1)	30
n-Butanol						110	U	100	U	0 (1)	30
2-Butanone						4	U	4	U	0 (1)	30
t-Butyl alcohol						21	U	18	U	0 (1)	30
n-Butylbenzene						1	U	0.9	U	0 (1)	30
sec-Butylbenzene						1	U	0.9	U	0 (1)	30
tert-Butylbenzene						1	U	0.9	U	0 (1)	30
Carbon Disulfide						1	U	0.9	U	0 (1)	30
Carbon Tetrachloride						1	U	0.9	U	0 (1)	30
2-Chloro-1,3-butadiene						1	U	0.9	U	0 (1)	30
Chlorobenzene						1	U	0.9	U	0 (1)	30
Chloroethane						2	U	2	U	0 (1)	30
Chloroform						1	U	0.9	U	0 (1)	30
Chloromethane						2	U	2	U	0 (1)	30
2-Chlorotoluene						1	U	0.9	U	0 (1)	30
4-Chlorotoluene						1	U	0.9	U	0 (1)	30
Cyclohexane						1	U	0.9	U	0 (1)	30
Cyclohexanone						26	U	23	U	0 (1)	30
1,2-Dibromo-3-chloropropane						2	U	2	U	0 (1)	30
Dibromochloromethane						1	U	0.9	U	0 (1)	30
1,2-Dibromoethane						1	U	0.9	U	0 (1)	30
Dibromomethane						1	U	0.9	U	0 (1)	30
trans-1,4-Dichloro-2-butene						10	U	9	U	0 (1)	30
1,2-Dichlorobenzene						1	U	0.9	U	0 (1)	30
1,3-Dichlorobenzene						1	U	0.9	U	0 (1)	30
1,4-Dichlorobenzene						1	U	0.9	U	0 (1)	30
Dichlorodifluoromethane						2	U	2	U	0 (1)	30
1,1-Dichloroethane						1	U	0.9	U	0 (1)	30
1,2-Dichloroethane						1	U	0.9	U	0 (1)	30
1,1-Dichloroethene						1	U	0.9	U	0 (1)	30
cis-1,2-Dichloroethene						1	U	0.9	U	0 (1)	30
trans-1,2-Dichloroethene						1	U	0.9	U	0 (1)	30
1,2-Dichloropropane						1	U	0.9	U	0 (1)	30
1,3-Dichloropropane						1	U	0.9	U	0 (1)	30
2,2-Dichloropropane						1	U	0.9	U	0 (1)	30
1,1-Dichloropropene						1	U	0.9	U	0 (1)	30
cis-1,3-Dichloropropene						1	U	0.9	U	0 (1)	30
trans-1,3-Dichloropropene						1	U	0.9	U	0 (1)	30
Ethyl Methacrylate						1	U	0.9	U	0 (1)	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1422302
Reported: 10/03/13 at 06:48 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc		DUP Conc		DUP RPD	Dup RPD Max
Ethyl t-butyl ether						1	U	0.9	U	0 (1)	30
Ethylbenzene						1	U	0.9	U	0 (1)	30
Freon 113						2	U	2	U	0 (1)	30
n-Heptane						3	U	3	U	0 (1)	30
Hexachlorobutadiene						2	U	2	U	0 (1)	30
n-Hexane						1	U	0.9	U	0 (1)	30
2-Hexanone						3	U	3	U	0 (1)	30
Isobutyl Alcohol						100	U	92	U	0 (1)	30
Isopropylbenzene						1	U	0.9	U	0 (1)	30
p-Isopropyltoluene						1	U	0.9	U	0 (1)	30
Methacrylonitrile						5	U	5	U	0 (1)	30
Methyl Acetate						2	U	2	U	0 (1)	30
Methyl Methacrylate						1	U	0.9	U	0 (1)	30
Methyl Tertiary Butyl Ether						0.5	U	0.5	U	0 (1)	30
4-Methyl-2-pentanone						3	U	3	U	0 (1)	30
Methylcyclohexane						1	U	0.9	U	0 (1)	30
Methylene Chloride						4	J	5		26 (1)	30
Naphthalene						3	J	3	J	28 (1)	30
Pentachloroethane						1	U	0.9	U	0 (1)	30
Propionitrile						31	U	28	U	0 (1)	30
n-Propylbenzene						1	U	0.9	U	0 (1)	30
Styrene						1	U	0.9	U	0 (1)	30
1,1,1,2-Tetrachloroethane						1	U	0.9	U	0 (1)	30
1,1,2,2-Tetrachloroethane						1	U	0.9	U	0 (1)	30
Tetrachloroethene						1	U	0.9	U	0 (1)	30
Tetrahydrofuran						4	U	4	U	0 (1)	30
Toluene						1	U	0.9	U	0 (1)	30
1,2,3-Trichlorobenzene						1	U	0.9	U	0 (1)	30
1,2,4-Trichlorobenzene						1	U	0.9	U	0 (1)	30
1,1,1-Trichloroethane						1	U	0.9	U	0 (1)	30
1,1,2-Trichloroethane						1	U	0.9	U	0 (1)	30
Trichloroethene						1	U	0.9	U	0 (1)	30
1,2,4-Trimethylbenzene						1	U	0.9	U	0 (1)	30
1,3,5-Trimethylbenzene						1	U	0.9	U	0 (1)	30
Vinyl Acetate						2	U	2	U	0 (1)	30
Vinyl Chloride						1	U	0.9	U	0 (1)	30
m+p-Xylene						1	U	0.9	U	0 (1)	30
o-Xylene						1	U	0.9	U	0 (1)	30
Batch number: 13273820003B	Sample number(s): 7216795		BKG: P216395								
Moisture						72.1		75.3		4	5

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: GC/MS Volatiles
Batch number: B132751AA

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1422302
Reported: 10/03/13 at 06:48 PM

Surrogate Quality Control

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
7216795	100	101	98	95
Blank	98	101	102	94
DUP	100	99	100	93
LCS	99	100	100	95
LCSD	98	101	99	96
Limits:	50-141	54-135	52-141	50-131

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Services Analysis Request/Chain of Custody

eurofins | Lancaster Laboratories

COC#: 7000

Acct. # 12184 Group # 1422302 Sample # 7216795

Client:	Altamont Environmental
Project Name/#:	Chemtronics 2115.231
Project Manager:	Amy ~~Bondurant~~ Huffman
P.O. #:	2115.231
Sampler:	M. Gragg
Phone #:	828-281-3350
Quote #:	207662
State where sample(s) were collected:	NC

SF#: 128607

SCR#: 145381

Preservation Codes: H = HCl, T = Thiosulfate, N = HNO_3, B = NaOH, S = H_2SO_4, P = H_3PO_4, O = Other

Sample Identification	Collection Date	Collection Time	Grab	Composite	Sediment	Ground	Surface	Potable	NPDES	Soil	Water	Other:	Total # of Containers	GC/MS VOAs (8260)	Nitroaromatics/Amines (8330)	Perchlorate (6850)	Moisture (2540 G)	Remarks
VBW-14-13.5-15	9/27/13	930	X							X			4	X			X	do not send for validation

Turnaround Time Requested (TAT) (please check): Standard ☐ RUSH ☒

(RUSH TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 48 hr TAT

E-mail address to send RUSH results: AHuffman@AltamontEnvironmental.com

Data Package Options (please check if required)

Type I (Validation/non-CLP)	☐	MA MCP	☐	TX TRRP - 13	☐
Type III (Reduced non-CLP)	☐	CT RCP	☐		
Type IV (CLP SOW)	☐	ASP Type A	☐		
Type VI (Raw Data Only)	☐	ASP Type B	☐		

EDD Format: TerraBase

If site-specific QC (MS/MSD/Dup) required, indicate QC samples and submit triplicate volume.

Relinquished by:	Date	Time	Received by:	Date	Time
M. Gragg	9/27/13	1610			
				9/28/13	850

Airbill No.:

Relinquished by Commercial Carrier:

UPS X FedEx ____ Other ____

Temperature upon receipt 0.6 °C

eurofins | Lancaster Laboratories Environmental

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Data Qualifiers:

C – result confirmed by reanalysis.

J - estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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ANALYTICAL RESULTS

Prepared by:	Prepared for:
Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601	Altamont Environmental 231 Haywood Street Asheville NC 28801

October 09, 2013

Project: Chemtronics Site

Submittal Date: 10/04/2013
Group Number: 1423881
PO Number: 2115.231
State of Sample Origin: NC

Client Sample Description	Lancaster Labs (LL) #
VBW15C(10.5-12) Grab Soil	7224631

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Altamont Environmental	Attn: Amy Huffman
ELECTRONIC COPY TO	Altamont Environmental	Attn: Marta VanDussen

Respectfully Submitted,

Nancy Jean Bornholm

Nancy Jean Bornholm
Principal Specialist

(717) 556-7250

Sample Description: VBW15C(10.5-12) Grab Soil
Chemtronics Soil Sampling

LL Sample # SW 7224631
LL Group # 1423881
Account # 12184

Project Name: Chemtronics Site

Collected: 10/03/2013 14:50 by CP

Submitted: 10/04/2013 09:25
Reported: 10/09/2013 11:24

Altamont Environmental
231 Haywood Street
Asheville NC 28801

15C10

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		**ug/kg**		**ug/kg**	**ug/kg**	
10237	Acetone	67-64-1	7	U	7	19	0.81
10237	Acetonitrile	75-05-8	24	U	24	95	0.81
10237	Acrolein	107-02-8	19	U	19	95	0.81
10237	Acrylonitrile	107-13-1	4	U	4	19	0.81
10237	Allyl Chloride	107-05-1	1	U	1	5	0.81
10237	t-Amyl methyl ether	994-05-8	1	U	1	5	0.81
10237	Benzene	71-43-2	0.5	U	0.5	5	0.81
10237	Benzyl Chloride	100-44-7	1	U	1	4	0.81
10237	Bromobenzene	108-86-1	1	U	1	5	0.81
10237	Bromochloromethane	74-97-5	1	U	1	5	0.81
10237	Bromodichloromethane	75-27-4	1	U	1	5	0.81
10237	Bromoform	75-25-2	1	U	1	5	0.81
10237	Bromomethane	74-83-9	2	U	2	5	0.81
10237	n-Butanol	71-36-3	100	U	100	240	0.81
10237	2-Butanone	78-93-3	4	U	4	10	0.81
10237	t-Butyl alcohol	75-65-0	19	U	19	95	0.81
10237	n-Butylbenzene	104-51-8	1	U	1	5	0.81
10237	sec-Butylbenzene	135-98-8	1	U	1	5	0.81
10237	tert-Butylbenzene	98-06-6	1	U	1	5	0.81
10237	Carbon Disulfide	75-15-0	1	U	1	5	0.81
10237	Carbon Tetrachloride	56-23-5	1	U	1	5	0.81
10237	2-Chloro-1,3-butadiene	126-99-8	1	U	1	5	0.81
10237	Chlorobenzene	108-90-7	1	U	1	5	0.81
10237	Chloroethane	75-00-3	2	U	2	5	0.81
10237	Chloroform	67-66-3	1	U	1	5	0.81
10237	Chloromethane	74-87-3	2	U	2	5	0.81
10237	2-Chlorotoluene	95-49-8	1	U	1	5	0.81
10237	4-Chlorotoluene	106-43-4	1	U	1	5	0.81
10237	Cyclohexane	110-82-7	1	U	1	5	0.81
10237	Cyclohexanone	108-94-1	24	U	24	240	0.81
10237	1,2-Dibromo-3-chloropropane	96-12-8	2	U	2	5	0.81
10237	Dibromochloromethane	124-48-1	1	U	1	5	0.81
10237	1,2-Dibromoethane	106-93-4	1	U	1	5	0.81
10237	Dibromomethane	74-95-3	1	U	1	5	0.81
10237	trans-1,4-Dichloro-2-butene	110-57-6	10	U	10	48	0.81
10237	1,2-Dichlorobenzene	95-50-1	1	U	1	5	0.81
10237	1,3-Dichlorobenzene	541-73-1	1	U	1	5	0.81
10237	1,4-Dichlorobenzene	106-46-7	1	U	1	5	0.81
10237	Dichlorodifluoromethane	75-71-8	2	U	2	5	0.81
10237	1,1-Dichloroethane	75-34-3	1	U	1	5	0.81
10237	1,2-Dichloroethane	107-06-2	1	U	1	5	0.81
10237	1,1-Dichloroethene	75-35-4	1	U	1	5	0.81
10237	cis-1,2-Dichloroethene	156-59-2	1	U	1	5	0.81
10237	trans-1,2-Dichloroethene	156-60-5	1	U	1	5	0.81
10237	1,2-Dichloropropane	78-87-5	1	U	1	5	0.81
10237	1,3-Dichloropropane	142-28-9	1	U	1	5	0.81
10237	2,2-Dichloropropane	594-20-7	1	U	1	5	0.81
10237	1,1-Dichloropropene	563-58-6	1	U	1	5	0.81
10237	cis-1,3-Dichloropropene	10061-01-5	1	U	1	5	0.81
10237	trans-1,3-Dichloropropene	10061-02-6	1	U	1	5	0.81
10237	Ethyl Methacrylate	97-63-2	1	U	1	5	0.81

*=This limit was used in the evaluation of the final result

Sample Description: VBW15C(10.5-12) Grab Soil
Chemtronics Soil Sampling

LL Sample # SW 7224631
LL Group # 1423881
Account # 12184

Project Name: Chemtronics Site

Collected: 10/03/2013 14:50 by CP

Submitted: 10/04/2013 09:25
Reported: 10/09/2013 11:24

Altamont Environmental
231 Haywood Street
Asheville NC 28801

15C10

CAT No.	Analysis Name	CAS Number	Dry Result		Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B**		ug/kg		ug/kg	ug/kg	
10237	Ethyl t-butyl ether	637-92-3	1	U	1	5	0.81
10237	Ethylbenzene	100-41-4	1	U	1	5	0.81
10237	Freon 113	76-13-1	2	U	2	10	0.81
10237	n-Heptane	142-82-5	3	U	3	5	0.81
10237	Hexachlorobutadiene	87-68-3	2	U	2	5	0.81
10237	n-Hexane	110-54-3	1	U	1	5	0.81
10237	2-Hexanone	591-78-6	3	U	3	10	0.81
10237	Isobutyl Alcohol	78-83-1	95	U	95	240	0.81
10237	Isopropylbenzene	98-82-8	1	U	1	5	0.81
10237	p-Isopropyltoluene	99-87-6	1	U	1	5	0.81
10237	Methacrylonitrile	126-98-7	5	U	5	48	0.81
10237	Methyl Acetate	79-20-9	2	U	2	5	0.81
10237	Methyl Methacrylate	80-62-6	1	U	1	5	0.81
10237	Methyl Tertiary Butyl Ether	1634-04-4	0.5	U	0.5	5	0.81
10237	4-Methyl-2-pentanone	108-10-1	3	U	3	10	0.81
10237	Methylcyclohexane	108-87-2	1	U	1	5	0.81
10237	Methylene Chloride	75-09-2	2	U	2	5	0.81
10237	Naphthalene	91-20-3	1	U	1	5	0.81
10237	Pentachloroethane	76-01-7	1	U	1	5	0.81
10237	Propionitrile	107-12-0	29	U	29	95	0.81
10237	n-Propylbenzene	103-65-1	1	U	1	5	0.81
10237	Styrene	100-42-5	1	U	1	5	0.81
10237	1,1,1,2-Tetrachloroethane	630-20-6	1	U	1	5	0.81
10237	1,1,2,2-Tetrachloroethane	79-34-5	1	U	1	5	0.81
10237	Tetrachloroethene	127-18-4	1	U	1	5	0.81
10237	Tetrahydrofuran	109-99-9	4	U	4	5	0.81
10237	Toluene	108-88-3	1	U	1	5	0.81
10237	1,2,3-Trichlorobenzene	87-61-6	1	U	1	5	0.81
10237	1,2,4-Trichlorobenzene	120-82-1	1	U	1	5	0.81
10237	1,1,1-Trichloroethane	71-55-6	1	U	1	5	0.81
10237	1,1,2-Trichloroethane	79-00-5	1	U	1	5	0.81
10237	Trichloroethene	79-01-6	1	U	1	5	0.81
10237	1,2,4-Trimethylbenzene	95-63-6	1	U	1	5	0.81
10237	1,3,5-Trimethylbenzene	108-67-8	1	U	1	5	0.81
10237	Vinyl Acetate	108-05-4	2	U	2	10	0.81
10237	Vinyl Chloride	75-01-4	1	U	1	5	0.81
10237	m+p-Xylene	1330-20-7	1	U	1	5	0.81
10237	o-Xylene	95-47-6	1	U	1	5	0.81

Project defined calibration criteria are not met. The calibration is compliant with the method defined criteria.

Wet Chemistry	**SM 2540 G-1997**		%		%	%	
00111	Moisture	n.a.	15.3		0.50	0.50	1

Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.

*=This limit was used in the evaluation of the final result

eurofins
Lancaster Laboratories Environmental
2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Analysis Report

Sample Description: VBW15C(10.5-12) Grab Soil
Chemtronics Soil Sampling

LL Sample # SW 7224631
LL Group # 1423881
Account # 12184

Project Name: Chemtronics Site

Collected: 10/03/2013 14:50 by CP

Submitted: 10/04/2013 09:25
Reported: 10/09/2013 11:24

Altamont Environmental
231 Haywood Street
Asheville NC 28801

15C10

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10237	GC/MS Volatiles	SW-846 8260B	1	B132771AA	10/05/2013 00:22	Sara E Johnson	0.81
07320	GC/MS - LL DIH2O Encore Prep	SW-846 5035A	1	201327732651	10/04/2013 15:04	Mitchell R Washel	n.a.
07320	GC/MS - LL DIH2O Encore Prep	SW-846 5035A	2	201327732651	10/04/2013 15:04	Mitchell R Washel	n.a.
07578	GC/MS-HL Encore Prep-NC	SW-846 5035A	1	201327732651	10/04/2013 14:30	Mitchell R Washel	n.a.
00111	Moisture	SM 2540 G-1997	1	13277820001B	10/04/2013 21:03	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1423881
Reported: 10/09/13 at 11:24 AM

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: B132771AA	Sample number(s): 7224631									
Acetone	7	U	7.	20	ug/kg	135		23-171		
Acetonitrile	25	U	25.	100	ug/kg	89		61-147		
Acrolein	20	U	20.	100	ug/kg	80		50-137		
Acrylonitrile	4	U	4.	20	ug/kg	94		58-123		
Allyl Chloride	1	U	1.	5	ug/kg	107		56-139		
t-Amyl methyl ether	1	U	1.	5	ug/kg	92		63-130		
Benzene	0.5	U	0.5	5	ug/kg	100		80-120		
Benzyl Chloride	1	U	1.	4	ug/kg	86		52-131		
Bromobenzene	1	U	1.	5	ug/kg	88		80-120		
Bromochloromethane	1	U	1.	5	ug/kg	113		75-129		
Bromodichloromethane	1	U	1.	5	ug/kg	104		75-120		
Bromoform	1	U	1.	5	ug/kg	109		70-120		
Bromomethane	2	U	2.	5	ug/kg	117		32-162		
n-Butanol	110 U		110.	250	ug/kg	72		55-120		
2-Butanone	4	U	4.	10	ug/kg	98		38-146		
t-Butyl alcohol	20	U	20.	100	ug/kg	92		60-149		
n-Butylbenzene	1	U	1.	5	ug/kg	99		72-120		
sec-Butylbenzene	1	U	1.	5	ug/kg	97		75-120		
tert-Butylbenzene	1	U	1.	5	ug/kg	91		75-120		
Carbon Disulfide	1	U	1.	5	ug/kg	106		63-128		
Carbon Tetrachloride	1	U	1.	5	ug/kg	119		69-122		
2-Chloro-1,3-butadiene	1	U	1.	5	ug/kg	105		72-126		
Chlorobenzene	1	U	1.	5	ug/kg	98		80-120		
Chloroethane	2	U	2.	5	ug/kg	111		17-171		
Chloroform	1	U	1.	5	ug/kg	111		80-120		
Chloromethane	2	U	2.	5	ug/kg	106		56-120		
2-Chlorotoluene	1	U	1.	5	ug/kg	91		78-120		
4-Chlorotoluene	1	U	1.	5	ug/kg	91		79-120		
Cyclohexane	1	U	1.	5	ug/kg	93		63-124		
Cyclohexanone	25	U	25.	250	ug/kg	57		51-138		
1,2-Dibromo-3-chloropropane	2	U	2.	5	ug/kg	87		55-128		
Dibromochloromethane	1	U	1.	5	ug/kg	105		77-120		
1,2-Dibromoethane	1	U	1.	5	ug/kg	98		80-120		
Dibromomethane	1	U	1.	5	ug/kg	102		80-120		
trans-1,4-Dichloro-2-butene	10	U	10.	50	ug/kg	98		67-139		
1,2-Dichlorobenzene	1	U	1.	5	ug/kg	97		80-120		
1,3-Dichlorobenzene	1	U	1.	5	ug/kg	96		80-120		
1,4-Dichlorobenzene	1	U	1.	5	ug/kg	95		80-120		
Dichlorodifluoromethane	2	U	2.	5	ug/kg	117		32-120		
1,1-Dichloroethane	1	U	1.	5	ug/kg	105		80-120		
1,2-Dichloroethane	1	U	1.	5	ug/kg	117		72-126		
1,1-Dichloroethene	1	U	1.	5	ug/kg	113		73-129		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1423881
Reported: 10/09/13 at 11:24 AM

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
cis-1,2-Dichloroethene	1	U	1.	5	ug/kg	101		80-120		
trans-1,2-Dichloroethene	1	U	1.	5	ug/kg	112		79-120		
1,2-Dichloropropane	1	U	1.	5	ug/kg	99		77-120		
1,3-Dichloropropane	1	U	1.	5	ug/kg	97		80-120		
2,2-Dichloropropane	1	U	1.	5	ug/kg	106		72-123		
1,1-Dichloropropene	1	U	1.	5	ug/kg	101		77-120		
cis-1,3-Dichloropropene	1	U	1.	5	ug/kg	99		74-120		
trans-1,3-Dichloropropene	1	U	1.	5	ug/kg	91		77-120		
Ethyl Methacrylate	1	U	1.	5	ug/kg	81		65-120		
Ethyl t-butyl ether	1	U	1.	5	ug/kg	93		64-124		
Ethylbenzene	1	U	1.	5	ug/kg	96		80-120		
Freon 113	2	U	2.	10	ug/kg	111		64-137		
n-Heptane	3	U	3.	5	ug/kg	99		49-129		
Hexachlorobutadiene	2	U	2.	5	ug/kg	106		46-130		
n-Hexane	1	U	1.	5	ug/kg	98		56-127		
2-Hexanone	3	U	3.	10	ug/kg	75		40-129		
Isobutyl Alcohol	100 U		100.	250	ug/kg	80		64-121		
Isopropylbenzene	1	U	1.	5	ug/kg	99		76-120		
p-Isopropyltoluene	1	U	1.	5	ug/kg	99		75-120		
Methacrylonitrile	5	U	5.	50	ug/kg	97		65-122		
Methyl Acetate	2	U	2.	5	ug/kg	142		62-158		
Methyl Methacrylate	1	U	1.	5	ug/kg	87		60-120		
Methyl Tertiary Butyl Ether	0.5	U	0.5	5	ug/kg	108		69-126		
4-Methyl-2-pentanone	3	U	3.	10	ug/kg	74		52-125		
Methylcyclohexane	1	U	1.	5	ug/kg	106		58-134		
Methylene Chloride	2	U	2.	5	ug/kg	111		80-124		
Naphthalene	1	U	1.	5	ug/kg	91		59-123		
Pentachloroethane	1	U	1.	5	ug/kg	109		71-120		
Propionitrile	30	U	30.	100	ug/kg	80		74-129		
n-Propylbenzene	1	U	1.	5	ug/kg	98		77-120		
Styrene	1	U	1.	5	ug/kg	97		76-120		
1,1,1,2-Tetrachloroethane	1	U	1.	5	ug/kg	102		80-120		
1,1,2,2-Tetrachloroethane	1	U	1.	5	ug/kg	85		71-123		
Tetrachloroethene	1	U	1.	5	ug/kg	105		78-126		
Tetrahydrofuran	4	U	4.	5	ug/kg	71		64-140		
Toluene	1	U	1.	5	ug/kg	99		80-120		
1,2,3-Trichlorobenzene	1	U	1.	5	ug/kg	99		64-120		
1,2,4-Trichlorobenzene	1	U	1.	5	ug/kg	96		68-120		
1,1,1-Trichloroethane	1	U	1.	5	ug/kg	102		71-125		
1,1,2-Trichloroethane	1	U	1.	5	ug/kg	97		80-120		
Trichloroethene	1	U	1.	5	ug/kg	102		80-120		
1,2,4-Trimethylbenzene	1	U	1.	5	ug/kg	96		79-120		
1,3,5-Trimethylbenzene	1	U	1.	5	ug/kg	96		78-120		
Vinyl Acetate	2	U	2.	10	ug/kg	41		40-127		
Vinyl Chloride	1	U	1.	5	ug/kg	111		53-120		
m+p-Xylene	1	U	1.	5	ug/kg	97		80-120		
o-Xylene	1	U	1.	5	ug/kg	96		80-120		

Batch number: 13277820001B Sample number(s): 7224631

Moisture						100		99-101		

Sample Matrix Quality Control

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1423881
Reported: 10/09/13 at 11:24 AM
Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: B132771AA	Sample number(s): 7224631 UNSPK: P222821								
Acetone	160	153	31-195	2	30				
Acetonitrile	68	68	41-166	6	30				
Acrolein	77	68	10-165	9	30				
Acrylonitrile	88	90	48-139	6	30				
Allyl Chloride	105	109	55-154	7	30				
t-Amyl methyl ether	90	90	50-132	3	30				
Benzene	96	98	55-143	4	30				
Benzyl Chloride	63	70	30-130	12	30				
Bromobenzene	80	83	43-139	7	30				
Bromochloromethane	108	109	60-137	4	30				
Bromodichloromethane	99	101	53-136	4	30				
Bromoform	84	87	38-124	6	30				
Bromomethane	117	133	42-168	16	30				
n-Butanol	81	84	35-154	6	30				
2-Butanone	103	104	37-163	4	30				
t-Butyl alcohol	128	106	47-153	16	30				
n-Butylbenzene	60	54	30-146	8	30				
sec-Butylbenzene	71	67	33-157	2	30				
tert-Butylbenzene	75	72	41-152	1	30				
Carbon Disulfide	103	105	48-146	5	30				
Carbon Tetrachloride	116	117	45-153	3	30				
2-Chloro-1,3-butadiene	102	103	51-152	4	30				
Chlorobenzene	81	81	49-135	3	30				
Chloroethane	115	126	39-152	12	30				
Chloroform	111	112	61-142	4	30				
Chloromethane	108	125	36-143	18	30				
2-Chlorotoluene	75	78	42-146	6	30				
4-Chlorotoluene	74	73	39-145	3	30				
Cyclohexane	88	90	57-151	6	30				
Cyclohexanone	57	64	27-162	13	30				
1,2-Dibromo-3-chloropropane	71	80	30-139	14	30				
Dibromochloromethane	96	97	51-128	4	30				
1,2-Dibromoethane	88	89	54-129	4	30				
Dibromomethane	99	99	57-130	3	30				
trans-1,4-Dichloro-2-butene	102	106	31-144	7	30				
1,2-Dichlorobenzene	60	64	36-133	9	30				
1,3-Dichlorobenzene	66	68	34-134	6	30				
1,4-Dichlorobenzene	66	67	35-136	4	30				
Dichlorodifluoromethane	126	136	26-151	11	30				
1,1-Dichloroethane	104	107	63-142	6	30				
1,2-Dichloroethane	117	116	54-143	2	30				
1,1-Dichloroethene	114	116	61-149	5	30				
cis-1,2-Dichloroethene	102	101	53-146	2	30				
trans-1,2-Dichloroethene	109	111	51-153	5	30				
1,2-Dichloropropane	93	96	54-144	6	30				
1,3-Dichloropropane	90	92	51-140	6	30				
2,2-Dichloropropane	105	110	53-147	8	30				
1,1-Dichloropropene	96	99	54-145	5	30				
cis-1,3-Dichloropropene	91	93	45-137	5	30				
trans-1,3-Dichloropropene	84	87	41-129	7	30				
Ethyl Methacrylate	52	53	35-134	6	30				

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1423881
Reported: 10/09/13 at 11:24 AM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Ethyl t-butyl ether	91	93	58-124	5	30				
Ethylbenzene	80	75	44-141	4	30				
Freon 113	116	119	56-156	5	30				
n-Heptane	78	80	21-180	5	30				
Hexachlorobutadiene	44	39	10-155	8	30				
n-Hexane	86	90	33-169	8	30				
2-Hexanone	75	75	32-160	2	30				
Isobutyl Alcohol	110	97	44-158	10	30				
Isopropylbenzene	72	68	38-144	2	30				
p-Isopropyltoluene	69	64	29-152	4	30				
Methacrylonitrile	88	90	54-142	6	30				
Methyl Acetate	123	129	48-161	8	30				
Methyl Methacrylate	104	105	42-134	4	30				
Methyl Tertiary Butyl Ether	108	108	55-129	3	30				
4-Methyl-2-pentanone	71	71	46-139	3	30				
Methylcyclohexane	91	93	39-168	5	30				
Methylene Chloride	112	116	60-149	6	30				
Naphthalene	33	36	10-138	11	30				
Pentachloroethane	84	87	35-145	6	30				
Propionitrile	106	95	44-169	8	30				
n-Propylbenzene	77	75	39-157	0	30				
Styrene	73	70	35-134	1	30				
1,1,1,2-Tetrachloroethane	88	89	39-150	4	30				
1,1,2,2-Tetrachloroethane	81	87	40-152	11	30				
Tetrachloroethene	95	95	42-149	2	30				
Tetrahydrofuran	101	84	53-163	16	30				
Toluene	90	91	50-146	4	30				
1,2,3-Trichlorobenzene	29	30	10-140	8	30				
1,2,4-Trichlorobenzene	32	34	10-136	9	30				
1,1,1-Trichloroethane	100	102	52-146	5	30				
1,1,2-Trichloroethane	92	90	47-161	1	30				
Trichloroethene	95	95	53-144	3	30				
1,2,4-Trimethylbenzene	75	75	37-149	2	30				
1,3,5-Trimethylbenzene	78	77	38-150	2	30				
Vinyl Acetate	5*	2*	21-139	81*	30				
Vinyl Chloride	111	126	50-154	15	30				
m+p-Xylene	77	74	44-137	1	30				
o-Xylene	75	72	42-137	1	30				

Batch number: 13277820001B Sample number(s): 7224631 BKG: P221938

Moisture	19.6	16.7	16*	5

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: GC/MS Volatiles
Batch number: B132771AA

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1423881
Reported: 10/09/13 at 11:24 AM

Surrogate Quality Control

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
7224631	111	100	96	96
Blank	110	105	99	96
LCS	106	102	101	103
MS	108	102	105	92
MSD	110	104	104	91
Limits:	50-141	54-135	52-141	50-131

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Services Analysis Request/Chain of Custody

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COC#: 7000

Acct. # 12184 Group # 1423881 Sample # 7224631

Client:	Altamont Environmental
Project Name/#:	Chemtronics 2115-231
Project Manager:	Amy ~~Bondurant~~ Huffman
P.O. #:	2115.231
Sampler:	[signature]
Phone #:	828-281-5350
Quote #:	207662
State where sample(s) were collected:	NC

SF#: 128607

SCR#: 145381

Preservation Codes: H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; P = H_3PO_4; O = Other

Sample Identification	Collection Date	Collection Time	Grab	Composite	Soil	Sediment	Potable Water	Ground Water	Surface Water	NPDES Water	Other:	Total # of Containers	GC/MS VOAs (8260)	Nitroaromatics/Amines (8330)	Perchlorate (6850)	Moisture (2540 G)	Remarks
VBW15C (10.5-12)	10-3-13	14:50	X		X							4	X			X	do not send for validation

Turnaround Time Requested (TAT) (please check): Standard ☐ RUSH ☒

(RUSH TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 48 hr TAT

E-mail address to send RUSH results: AHuffman@AltamontEnvironmental.com

Data Package Options (please check if required)

Type I (Validation/non-CLP)	☐	MA MCP	☐	TX TRRP - 13	☐
Type III (Reduced non-CLP)	☐	CT RCP	☐		
Type IV (CLP SOW)	☐	ASP Type A	☐		
Type VI (Raw Data Only)	☐	ASP Type B	☐		

EDD Format: TerraBase

If site-specific QC (MS/MSD/Dup) required, indicate QC samples and submit triplicate volume.

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	9/16/13	11:15			
[signature]	10-3-13	8:30	UPS	10-3-13	8:30
			[signature]	10-4-13	925

Airbill No.:

Relinquished by Commercial Carrier:

UPS ☒ FedEx ____ Other ____

Temperature upon receipt 1.0 °C

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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Data Qualifiers:

C – result confirmed by reanalysis.

J - estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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Groundwater Sampling Field Sheets

ALTAMONT ENVIRONMENTAL, INC.
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Screen: 84-99' bgs

Development Well ~~Sampling~~ Log

PROJECT NAME: Chemtronics ~~Annual~~
PROJECT NUMBER: 2115.2
SAMPLING PERSONNEL: P Brooks

DATE: 10/02/13
WEATHER: 70s pt cloudy
SAMPLE TIME:

WELL NUMBER: MW254
WELL DIAMETER: 2"
TYPE OF CASING: PVC
MEASURING POINT: TOC
FLUSH MOUNT / STICK-UP
COMMENTS: pump is running ≈ ~~1 gal/min~~ 1.5 gal/min (140ft)

WELL DEPTH IN FEET (WD): ~~101.88~~ 104.8 mG ~~TOC~~ BGS
WATER LEVEL IN FEET (WL): ~~16.72~~ 14.0 ~~TOC~~ BGS
LENGTH OF WATER COLUMN: ~~85.16~~ mG ~~88.08~~ 90.8 FEET
(WD) - (WL) = (LWC)
ONE CASING VOLUME: ~~14.4772~~ mG 15.436 GALLONS
(LWC) x (WCV)
THREE CASING VOLUMES: ~~43.4316~~ 46.308 mG GALLONS
ACTUAL VOLUME PURGED: 200 GALLONS

WELL CASING VOLUMES (WCV)
1" = 0.041 Gal/Ft 2" = 0.17 Gal/Ft 3" = 0.38 Gal/Ft 4" = 0.66 Gal/Ft 6" = 1.5 Gal/Ft 8" = 2.6 Gal/Ft 12" = 5.8 Gal/Ft

PURGE METHOD: BAILER-DISP. BAILER-TEFLON DEDICATED PUMP WHALE PUMP GRUNDFOS OTHER: Waterra/Grundfos
SAMPLE METHOD: BAILER-DISP. BAILER-TEFLON DEDICATED PUMP WHALE PUMP GRUNDFOS OTHER:

READING	TIME	GALLONS PURGED	TEMP (°C)	SPECIFIC COND. (µS)	DISSOLVED OXYGEN (mg/L)	pH (S.U.) report to 0.1 S.U.	OXIDATION REDUCTION POTENTIAL (mV)	TURBIDITY (NTU)	COMMENTS ~~GFmod~~
1	1321	Ø	17.76	296	8.35	10.59	53.5	75.25	pump (waterra) @ 95' TO
2	1340	≈15	15.49	140	5.02	8.62	45.7	887.4	DTW → 42.34 TOC 95 - WT
3	1406	≈45	14.92	180	4.54	6.44	115.2	677.9	DTW → 48.39 TOC 90 ft - W
4	1426	≈75	14.87	141	4.06	6.17	132.0	695.9	DTW → 48.71 90ft - WT
5	1446	≈105	14.48	120	4.51	6.20	116.7	471.7	DTW → 47.14 88ft - W
6	1506	≈135	14.77	119	4.17	6.23	122.9	654.7	DTW-56.31 88ft - WT
7	1526	≈165	14.66	110	3.71	6.03	139.5	197.7	DTW-56.89 90ft - WT
8	1534	≈165	14.58	113	3.73	6.12	126.1	213.9	DTW-48.16 90ft - GF
9	1550	≈175	14.87	117	3.65	6.08	130.3	156.8	DTW 52.14 90ft - GF
10	1608	≈200	15.03	102	3.51	6.09	130.4	29.23	DTW - 56.18 90 ft - G

SAMPLING CONTAINER	NUMBER OF CONTAINERS	REQUESTED ANALYSIS
500 mL PLASTIC		
250 mL PLASTIC		
125 mL PLASTIC		
40 mL GLASS		
1 L GLASS		
OTHER		

PROTECTIVE CASING: ok PAD: no LOCK: no VEGETATION: ok ACCESS: ok

Sampling Personnel Signature: Date: 10/02/13

Notes: °C = degrees Celsius
µS = micro-Siemen
mg/L = milligrams per liter
S.U. = Standard Units
mV = millivolt
NTU = nephelometric turbidity units
Samples are analyzed immediately upon collection.

WT = waterra
GF = grundfos

P:\Templates\GW Drilling Forms\Well Sampling Log.xls

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Low-Flow Sampling Log

PROJECT NAME: Chemtronics
PROJECT NUMBER: 2115
LOCATION: Swannanoa, NC
DATE: 10/04/13
SAMPLING PERSONNEL: P Brooks
WEATHER: 70s cloudy

Well ID: MW 254
Screen Interval: 84-99 bgs
Depth to Water: 17.07 toc
Stickup: 3.0
Depth of Pump Intake: 94.5 toc
Drawdown Set: 18.07 toc

Arrive at Well: 934
Start Time: 947
Sample Time: 1017
Finish Sample Time: 1020
Leave Well: 1030
Well Diameter: 2"

COMMENTS: 48 hr rush

Time	DTW (feet)	Temp (°C)	Specific Cond. (µS)	DO (mg/L)	pH (S.U.) report to 0.1 S.U.	ORP (mV)	Turbidity (NTU)
947	17.37	15.60	220	7.65	8.85	141.0	22.00
950	18.07	15.19	203	8.80	7.94	172.4	36.60
953	18.07	15.41	192	6.52	7.15	156.0	62.16
956	18.07	15.65	184	4.35	6.68	134.9	55.21
959	18.07	15.71	183	4.01	6.63	127.6	50.23
1002	18.07	15.75	182	3.49	6.59	124.1	49.84
1005	18.07	15.74	178	3.21	6.56	113.7	36.34
1008	18.07	15.73	177	3.11	6.55	110.0	35.57
1011	18.07	15.80	174	3.08	6.53	106.1	32.70
~~98~~ 1014	18.07	15.91	172	3.06	6.53	101.0	31.12
1017	18.07	15.93	171	3.04	6.53	99.2	30.41

Time between recharge during sample collection: 40 sec @ 4CPM

Sampling Personnel Signature: [signature]
Date: 10/04/13

NOTES:

STABILIZATION
3 successive readings, 3 minutes apart:
within +/- 10% DO and turbidity; +/- 3% Conductivity; +/- 0.1 pH unit; +/- 10 mV for ORP
from *EPA - Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures*, April 1996

bgs = below ground surface
toc = top of casing
°C = degrees Celsius
µS = micro-Siemen
DO = dissolved oxygen
mg/L = milligrams per liter
Samples are analyzed immediately upon collection.

S.U. = standard units
ORP = oxidation reduction potential
mV = millivolt
NTU = nephelometric turbidity units

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sheet 1 of 2

Screen: ~~85~~ 50-65' bgs

Well ~~Sampling~~ Development Log

PROJECT NAME:	Chemtronics ~~Annual~~	DATE:	10/03/13
PROJECT NUMBER:	2115.2	WEATHER:	70s cloudy
SAMPLING PERSONNEL:	P Brooks	SAMPLE TIME:	/
WELL NUMBER:	MW25S	WELL DEPTH IN FEET (WD):	~~102.18~~ mg 76.75 TOC
WELL DIAMETER:	2"	WATER LEVEL IN FEET (WL):	18.81
TYPE OF CASING:	PVC	LENGTH OF WATER COLUMN: (WD) - (WL) = (LWC)	~~43.37~~ mg 57.94 FEET
MEASURING POINT:	Yes	ONE CASING VOLUME: (LWC) x (WCV)	~~7.3729~~ mg 9.8498 GALLONS
FLUSH MOUNT / STICK-UP		THREE CASING VOLUMES:	~~22.1187~~ mg 29.5494 GALLONS
COMMENTS:	very muddy and turbid at start, while cloudy swirling particulates pumping at max ≈ 1.5 gal/min; verified 1023; 940 -	ACTUAL VOLUME PURGED:	220 GALLONS

WELL CASING VOLUMES (WCV)

1" = 0.041 Gal/Ft 2" = 0.17 Gal/Ft 3" = 0.38 Gal/Ft 4" = 0.66 Gal/Ft 6" = 1.5 Gal/Ft 8" = 2.6 Gal/Ft 12" = 5.8 Gal/Ft

PURGE METHOD: BAILER-DISP. BAILER-TEFLON DEDICATED PUMP WHALE PUMP GRUNDFOS OTHER: Waterra/Grundfos

SAMPLE METHOD: BAILER-DISP. BAILER-TEFLON DEDICATED PUMP WHALE PUMP GRUNDFOS OTHER:

READING	TIME	GALLONS PURGED	TEMP (°C)	SPECIFIC COND. (µS)	DISSOLVED OXYGEN (mg/L)	pH (S.U.) report to 0.1 S.U.	OXIDATION REDUCTION POTENTIAL (mV)	TURBIDITY (NTU)	COMMENTS
1	935	0	15.73	147	3.18	7.03	-156.1	>1100	DTW - ~~12.84~~ 17.89
2	945	≈15	14.96	158	1.85	6.43	-126.7	912.4	DTW - 27.41 65ft - WT
3	~~1000~~	~~≈75~~ 50							~~65ft - WT~~
4	1000	≈40	14.82	158	2.00	6.29	-113.4	>1100	DTW - 27.92 65ft - WT
5	1015	≈60	15.87	161	1.93	6.39	-121.2	>1100	DTW - 29.25 60ft - WT
6	1030	≈80	15.64	169	2.41	6.41	-108.5	>1100	DTW - 29.59 55ft - WT
7	1045	≈100	15.81	158	2.25	6.60	-77.4	681.8	DTW - 32.48 55ft - WT
8	1100	≈125	15.50	156	1.87	6.32	-71.9	949.1	DTW 34.74 60ft - WT
9	1115	≈150	15.58	152	1.85	6.27	-74.1	665.4	DTW 44.18 65ft - WT
10	1219	≈150	15.17	154	1.96	6.26	-72.9	911.2	DTW - 27.18 60ft - GF

SAMPLING CONTAINER	NUMBER OF CONTAINERS	REQUESTED ANALYSIS
500 mL PLASTIC		
250 mL PLASTIC		
125 mL PLASTIC		
40 mL GLASS		
1 L GLASS		
OTHER		

PROTECTIVE CASING: no PAD: no LOCK: no VEGETATION: ok ACCESS: ok

Sampling Personnel Signature: [signature] Date: 10/03/13

Notes: °C = degrees Celsius
µS = micro-Siemen
mg/L = milligrams per liter
S.U. = Standard Units
mV = millivolt
NTU = nephelometric turbidity units
Samples are analyzed immediately upon collection.

WT = waterra pump
GF = Grundfos pump

1006 - moved pump from 65' to 60' TOC
1032 - moved WT from 60' to 55' TOC
1106 - moved WT from 60' to 65' TOC
1047 - moved WT from 55' to 60' TOC

1115 - 1219 - rewired grundfos plug that came apart

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Sheet 2 of 2

Well Sampling Log

PROJECT NAME: Chemtronics-Annual
PROJECT NUMBER: 2115.2
SAMPLING PERSONNEL: P B. Cook

DATE: 10/03/13
WEATHER: 70s cloudy
SAMPLE TIME:

WELL NUMBER: MW 255
WELL DIAMETER: 2"
TYPE OF CASING: PVC
MEASURING POINT: Top
FLUSH MOUNT / STICK-UP
COMMENTS: See sheet 1; Rate verified at 1.5 gal/min - 1057

WELL DEPTH IN FEET (WD):
WATER LEVEL IN FEET (WL):
LENGTH OF WATER COLUMN : FEET
(WD) - (WL) = (LWC)
ONE CASING VOLUME: GALLONS See sheet 1
(LWC) x (WCV)
THREE CASING VOLUMES: GALLONS
ACTUAL VOLUME PURGED: GALLONS

WELL CASING VOLUMES (WCV)
1" = 0.041 Gal/Ft 2" = 0.17 Gal/Ft 3" = 0.38 Gal/Ft 4" = 0.66 Gal/Ft 6" = 1.5 Gal/Ft 8" = 2.6 Gal/Ft 12" = 5.8 Gal/Ft

PURGE METHOD: BAILER-DISP. BAILER-TEFLON DEDICATED PUMP WHALE PUMP GRUNDFOS OTHER: Waterra / grundfos
SAMPLE METHOD: BAILER-DISP. BAILER-TEFLON DEDICATED PUMP WHALE PUMP GRUNDFOS OTHER:

READING	TIME	GALLONS PURGED	TEMP (°C)	SPECIFIC COND. (µS)	DISSOLVED OXYGEN (mg/L)	pH (S.U.) report to 0.1 S.U.	OXIDATION REDUCTION POTENTIAL (mV)	TURBIDITY (NTU)	COMMENTS
1	1234	≈170	15.37	152	1.69	6.21	-69.1	587.4	DTW-29.68' 65' -GF
2	1247	≈190	15.25	152	1.79	6.22	-69.2	348.9	DTW 32.03' 65' -GF
3	1255	≈200	15.26	150	1.77	6.13	-51.7	122.6	DTW-32.41' 65' -GF
4	1310	≈220	15.53	149	1.47	6.07	-48.6	92.17	DTW-32.81' 65' -GF
5									
6									
7									
8									
9									
10									

SAMPLING CONTAINER	NUMBER OF CONTAINERS	REQUESTED ANALYSIS
500 mL PLASTIC		
250 mL PLASTIC		
125 mL PLASTIC		
40 mL GLASS		
1 L GLASS		
OTHER		

PROTECTIVE CASING: no PAD: no LOCK: no VEGETATION: ok ACCESS: ok

Sampling Personnel Signature: Date: 10/03/13

had to rewire plug on rental pump; came off maybe during transit

Notes: °C = degrees Celsius
µS = micro-Siemen
mg/L = milligrams per liter
S.U. = Standard Units
mV = millivolt
NTU = nephelometric turbidity units
Samples are analyzed immediately upon collection.

WT = Waterra pump
GF = Grundfos pump

P:\Templates\GW Drilling Forms\Well Sampling Log.xls

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Low-Flow Sampling Log

PROJECT NAME: Chemtronics
PROJECT NUMBER: 2115
LOCATION: Swannanoa, NC
DATE: 10/04/13
SAMPLING PERSONNEL: P Brooks
WEATHER: 70s cloudy

Well ID: MW 255
Screen Interval: 50 - 65 bgs
Depth to Water: 18.95 toc
Stickup: 3.0
Depth of Pump Intake: 60.5 toc
Drawdown Set: 19.35 toc

Arrive at Well: 1030
Start Time: 1037
Sample Time: 1116
Finish Sample Time: 1121
Leave Well: 1135
Well Diameter: 2"

COMMENTS:

Time	DTW (feet)	Temp (°C)	Specific Cond. (µS)	DO (mg/L)	pH (S.U.) report to 0.1 S.U.	ORP (mV)	Turbidity (NTU)
1037	19.21	19.14	156	6.72	6.59	-6.3	88.77
1040	19.35	18.39	160	1.66	6.26	-78.5	134.2
1043	19.35	18.36	161	1.42	6.24	-72.6	149.5
1046	19.35	18.30	160	0.88	6.24	-89.1	174.0
1049	19.35	18.16	160	0.74	6.21	-94.8	150.0
1052	19.35	17.88	160	0.71	6.21	-93.8	137.0
1055	19.35	17.83	160	0.74	6.21	-115.7	119.5
1058	19.35	17.94	161	0.65	6.23	-100.5	111.8
1101	19.35	17.71	161	0.60	6.23	-122.9	101.5
1104	19.35	17.91	161	0.61	6.23	-128.6	92.31
1107	19.35	17.99	161	0.59	6.24	-91.5	88.26
1110	19.35	17.96	161	0.58	6.23	-114.3	83.75
1113	19.35	17.91	161	0.60	6.23	-110.7	80.91
1116	19.35	17.96	161	0.60	6.23	-109.4	78.47

Time between recharge during sample collection: 11 sec @ 4 GPM

Sampling Personnel Signature: [signature]
Date: 10/04/13

NOTES:

STABILIZATION
3 successive readings, 3 minutes apart:
within +/- 10% DO and turbidity; +/- 3% Conductivity; +/- 0.1 pH unit; +/- 10 mV for ORP
from *EPA - Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures*, April 1996

bgs = below ground surface
toc = top of casing
°C = degrees Celsius
µS = micro-Siemen
DO = dissolved oxygen
mg/L = milligrams per liter
Samples are analyzed immediately upon collection.

S.U. = standard units
ORP = oxidation reduction potential
mV = millivolt
NTU = nephelometric turbidity units

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Development Well ~~Sampling~~ Log

PROJECT NAME: Chemtronics
PROJECT NUMBER: 2115.231
SAMPLING PERSONNEL: M. Gregg

DATE: 11/22/13
WEATHER: cloudy, 60's
SAMPLE TIME: —

WELL NUMBER: MW256-M25CD
WELL DIAMETER: 2"
TYPE OF CASING: PVC
MEASURING POINT: TOC
FLUSH MOUNT / STICK-UP
COMMENTS: 2.8' stickup
screen: 72.5–87.5 bgs (75.3–90.3 TOC)
waterra set @ 80'

WELL DEPTH IN FEET (WD): 87.5'
WATER LEVEL IN FEET (WL): 19.71'
LENGTH OF WATER COLUMN: 67.79 FEET
(WD) - (WL) = (LWC)
ONE CASING VOLUME: 11.5 GALLONS
(LWC) x (WCV)
THREE CASING VOLUMES: 34.6 GALLONS
ACTUAL VOLUME PURGED: 200 GALLONS

WELL CASING VOLUMES (WCV)
1" = 0.041 Gal/Ft 2" = 0.17 Gal/Ft 3" = 0.38 Gal/Ft 4" = 0.66 Gal/Ft 6" = 1.5 Gal/Ft 8" = 2.6 Gal/Ft 12" = 5.8 Gal/Ft

PURGE METHOD: BAILER-DISP. BAILER-TEFLON DEDICATED PUMP WHALE PUMP GRUNDFOS OTHER:
SAMPLE METHOD: BAILER-DISP. BAILER-TEFLON DEDICATED PUMP WHALE PUMP GRUNDFOS OTHER:

READING	TIME	GALLONS PURGED	TEMP (°C)	SPECIFIC COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	pH (S.U.) report to 0.1 S.U.	OXIDATION REDUCTION POTENTIAL (mV)	TURBIDITY (NTU)	COMMENTS
1	1215 ~~before~~	0	15.69	2266	4.24	7.94	-5.3	72.31	DTW: 19.71 pump @ ~~80' bgs~~ 83
2	~~25~~ 1315	35	14.52	2770	1.83	4.80	81.5	397.3	DTW: 31.15 pump @ ~~80' bgs~~ 83
3	~~70~~ 1406	70	14.15	3070	3.52	4.82	71.2	574.3	DTW: 29.73 pump @ ~~84' bgs~~ 87 TOC
4	~~105~~ 1503	105	14.23	3191	1.83	4.85	76.1	313.6	DTW: 30.41 pump @ 87' TOC
5	~~140~~ 1542	140	14.12	3197	2.03	4.86	80.5	260.1	pump @ 78' TOC DTW: 33.82
6	~~175~~ 1635	175	14.56	3286	1.72	4.85	80.2	17.96	DTW: 32.59 pump @ 83' TOC
7	~~210~~ 1704	200	14.53	3224	1.23	4.86	81.7	5.47	DTW: 32.10 pump @ 83' TOC
8									
9									
10									

SAMPLING CONTAINER	NUMBER OF CONTAINERS	REQUESTED ANALYSIS
500 mL PLASTIC		
250 mL PLASTIC		
125 mL PLASTIC		
40 mL GLASS		
1 L GLASS		
OTHER		

PROTECTIVE CASING: ok PAD: OK LOCK: no VEGETATION: ok ACCESS: OK

Sampling Personnel Signature: M H Gregg Date: 11/22/13

Notes: °C = degrees Celsius
µS/cm = micro-Siemen per centimeter
mg/L = milligrams per liter
S.U. = Standard Units
mV = millivolt
NTU = nephelometric turbidity units
Samples are analyzed immediately upon collection.

1255 water tote leaking. will replace.
1308 resume pumping w/ waterra. Tote replaced.
1320 pump moved to ~~84' bgs~~ 87' TOC
1506 pump moved to 78' TOC
1549 purge 150 gallons - switching to Grundfos
1613 resume pumping - using Grundfos. pump set @ 83' TOC

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Low-Flow Sampling Log

PROJECT NAME: Chemtronics
PROJECT NUMBER: 2115.231
LOCATION: Swannanoa, NC
DATE: 12/11/13
SAMPLING PERSONNEL: T Brooks
WEATHER: 40s clear

Well ID: MW256-M25CD
Screen Interval: 72.5-87.5 bgs
Depth to Water: 19.43 toc
Stickup: 2.8
Depth of Pump Intake: 82.8 toc
Drawdown Set: 19.73 toc

Arrive at Well: 1401
Start Time: 1412
Sample Time: 1440
Finish Sample Time:
Leave Well:
Well Diameter: 2"

COMMENTS:

Time	DTW (feet)	Temp (°C)	Specific Cond. (µS)	DO (mg/L)	pH (S.U.) *report to 0.1 S.U.*	ORP (mV)	Turbidity (NTU)
1412	19.73	12.39	714	7.51	5.47	-24.3	38.48
1415	19.73	12.57	993	7.90	5.70	-39.3	113.4
1418	19.73	12.94	1028	4.09	5.74	-57.3	174.5
1422	19.73	12.94	1054	3.33	5.74	-62.8	212.6
1425	19.73	13.01	1067	2.73	5.73	-62.2	162.1
1428	19.73	12.95	1068	2.74	5.73	-62.9	126.6
1431	19.73	12.99	1068	2.71	5.72	-61.8	166.5
1434	19.73	13.02	1070	2.43	5.72	-63.4	117.2
1437	19.73	13.00	1069	2.36	5.72	-64.1	110.7
1440	19.73	13.03	1069	2.34	5.72	-64.0	109.1

Time between recharge during sample collection:

Sampling Personnel Signature: Date: 12/11/13

NOTES:

STABILIZATION
3 successive readings, 3 minutes apart:
within +/- 10% DO and turbidity; +/- 3% Conductivity; +/- 0.1 pH unit; +/- 10 mV for ORP
from *EPA - Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures*, April 1996

bgs = below ground surface
toc = top of casing
°C = degrees Celsius
µS = micro-Siemen
DO = dissolved oxygen
mg/L = milligrams per liter
Samples are analyzed immediately upon collection.

S.U. = standard units
ORP = oxidation reduction potential
mV = millivolt
NTU = nephelometric turbidity units

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Well Development Log

FACILITY NAME: Chemtronics 215.271
LOCATION: Acid Pits
FIELD PERSONNEL: M. Gray

DATE: 12/3/13
ARRIVE TIME: 10:15
WEATHER: cloudy, 50's

WELL NUMBER: MW257-MW256D
WELL DIAMETER: 2"
TYPE OF CASING: PVC
MEASURING POINT: ~~STICKUP~~ TOC
FLUSH MOUNT (STICK-UP)
COMMENTS: waterra set @ ~~101~~ 98' TOC
Stickup: 3.2'
Screen: 86.2 - 101.2' TOC

WELL DEPTH IN FEET (WD): 101.2' TOC
START TIME: 1059
WATER LEVEL IN FEET (WL): 25.96' TOC
LENGTH OF WATER COLUMN: 75.2 FEET
(WD) - (WL) = (LWC)
ONE CASING VOLUME: 12.8 GALLONS
(LWC) x (WCV)
THREE CASING VOLUMES: 38.4 GALLONS
ACTUAL VOLUME DEVELOPED: 220 GALLONS

WELL CASING VOLUMES (WCV)
2" = 0.17 Gal/Ft 3" = 0.38 Gal/Ft 4" = 0.66 Gal/Ft 6" = 1.5 Gal/Ft 8" = 2.6 Gal/Ft 12" = 5.8 Gal/Ft

TIME	DEVELOPMENT METHOD	ESTIMATED FLOW RATE (gpm)	GALLONS PURGED	pH UNITS	SPECIFIC COND. (µS)	TEMP (C°)	DISSOLVED OXYGEN (mg/L)	OXIDATION REDUCTION POTENTIAL (mV)	TURBIDITY (NTU)	DEPTH TO WATER (feet TOC)
1100	waterra	—	~~20~~ 0	4.56	3354	13.70	2.03	54.3	cloudy/muddy	25.96
1120	"	0.67	~~40~~ 20	4.06	5300	17.71	0.94	61.8	v. cloudy	42.50
1205	"	0.69	~~60~~ 40	4.11	5284	17.83	1.05	-21.4	v. cloudy	45.35
1225	"	1.0	~~80~~ 60	4.08	5259	13.81	1.40	31.1	cloudy/muddy	42.45
1240	"	1.33	~~100~~ 80	4.11	5265	13.76	1.02	28.7	cloudy/muddy	47.60
1308	"	0.71	~~120~~ 100	4.10	5299	13.69	0.87	74.6	v. cloudy	45.35
1337	"	0.69	~~140~~ 120	4.13	5280	13.68	0.99	67.2	v. cloudy	46.88
1401	"	0.83	~~160~~ 140	4.16	5303	13.68	0.90	39.9	cloudy	47.09
1423	"	0.91	~~180~~ 160	4.17	5307	13.43	1.82	47.2	cloudy	49.10
1448	"	0.80	~~200~~ 180	4.15	5306	13.69	1.20	66.9	cloudy	44.48
1511	"	0.87	200	4.14	5339	13.67	1.17	73.9	786.9	45.24
1548	"	0.54	220	4.07	5381	13.47	1.19	76.3	1030	39.99

PROTECTIVE CASING: ✓ PAD: ✓ LOCK: ✓ VEGETATION: Muddy ACCESS: ✓

Field Personnel Signature: M. Gray Date: 12/3/13

Comments: Water consistently shows yellow tint and strong odor.
Turbidity only improved slightly during development.
1100 Turb. meter not working. will recalibrate ASAP.
1120 stop pump - coupling broke.
1126 Coupling fixed, resume pumping
1214 waterra moved to 91' TOC, resume pumping
1340 " " " 87' TOC, resume pumping
1430 " " " 98' TOC, " "
1509 Turb. meter working correctly.

Notes: µS = micro-Siemen
C° = degrees Celsius
mg/L = milligrams per liter
mV = millivolt
NTU = nephelometric turbidity units

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Low-Flow Sampling Log

PROJECT NAME: Chemtronics 2115,231 PROJECT NUMBER: 2115,231
LOCATION: Swannanoa, NC DATE: 12/11/13
SAMPLING PERSONNEL: P Brooks WEATHER: 40s clear

Well ID: MW257-M25CD Arrive at Well: 1300
Screen Interval: 83-98 bgs Start Time: 1309
Depth to Water: 25.84' toc Sample Time: 1336
Stickup: 3.5' Finish Sample Time:
Depth of Pump Intake: 94' toc Leave Well:
Drawdown Set: 26.84 toc Well Diameter: 2"

COMMENTS: bright yellow color to water, bad odor

Time	DTW (feet)	Temp (°C)	Specific Cond. (µS)	DO (mg/L)	pH (S.U.) report to 0.1 S.U.	ORP (mV)	Turbidity (NTU)
1309	26.14	12.28	2159	7.45	4.32	136.7	11.39
1312	26.84	13.26	4269	7.27	4.10	182.1	13.73
1315	26.84	13.48	5560	6.87	4.19	195.2	257.3
1318	26.84	13.34	5561	7.35	4.38	185.7	245.1
1321	26.84	13.37	5549	8.51	4.53	175.9	265.3
1324	26.84	13.49	5541	6.71	4.63	162.5	302.4
1327	26.84	13.34	5540	7.46	4.69	156.3	327.2
1330	26.84	13.53	5536	6.04	4.69	153.7	310.4
1333	26.84	13.50	5534	5.99	4.71	150.9	302.1
1336	26.84	13.34	5538	6.06	4.73	149.1	298.7

Time between recharge during sample collection: 12 sec @ 4CPM

Sampling Personnel Signature: Date: 12/11/13

NOTES:

STABILIZATION
3 successive readings, 3 minutes apart:
within +/- 10% DO and turbidity; +/- 3% Conductivity; +/- 0.1 pH unit; +/- 10 mV for ORP
from *EPA - Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures*, April 1996

bgs = below ground surface
toc = top of casing
°C = degrees Celsius
µS = micro-Siemen
DO = dissolved oxygen
mg/L = milligrams per liter
Samples are analyzed immediately upon collection.

S.U. = standard units
ORP = oxidation reduction potential
mV = millivolt
NTU = nephelometric turbidity units

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Well Sampling Log

FACILITY NAME: Chemtrics
LOCATION: Swannanoa, NC
SAMPLING PERSONNEL: P Brooks

DATE: 01/10/14
SAMPLING TIME: 1044
WEATHER: 40s rain heavy

WELL NUMBER: P-5D
WELL DIAMETER: 2"
TYPE OF CASING: PVC
MEASURING POINT: TOC
FLUSH MOUNT / STICK-UP
COMMENTS: pump at 64.2' odor/TCE black particulates

WELL DEPTH IN FEET (WD): _____ START TIME: _____
WATER LEVEL IN FEET (WL): 16.21
LENGTH OF WATER COLUMN : _____ FEET
(WD) - (WL) = (LWC)
ONE CASING VOLUME: _____ GALLONS
(LWC) x (WCV)
THREE CASING VOLUMES: _____ GALLONS
ACTUAL VOLUME PURGED: _____ GALLONS

WELL CASING VOLUMES (WCV)
1" = 0.041 Gal/Ft 2" = 0.17 Gal/Ft 3" = 0.38 Gal/Ft 4" = 0.66 Gal/Ft 6" = 1.5 Gal/Ft 8" = 2.6 Gal/Ft 12" = 5.8 Gal/Ft

PURGE METHOD: BAILER-DISP. BAILER-TEFLON DEDICATED PUMP WHALE PUMP GRUNDFOS OTHER:
SAMPLE METHOD: BAILER-DISP. BAILER-TEFLON DEDICATED PUMP WHALE PUMP GRUNDFOS OTHER:

READING	TIME	~~GALLONS PURGED~~ DTW	TEMP (C°)	SPECIFIC COND. (µS)	DISSOLVED OXYGEN (mg/L)	pH (S.U.)	OXIDATION REDUCTION POTENTIAL (mV)	TURBIDITY (NTU)	COMMENTS
1	1020	16.51	11.49	1387	5.94	6.22	-70.2	15.23	
2	1023	17.21	12.33	1427	4.41	6.24	-67.2	641.8	
3	1026	"	11.76	1400	1.97	6.28	-73.9	14.34	
4	1029	"	12.47	1433	1.98	6.28	-79.1	12.75	
5	1032	"	12.29	1461	0.76	6.26	-80.1	13.79	
6	1035	"	12.27	1459	0.40	6.26	-88.2	12.44	
7	1038		12.37	1471	0.20	6.27	-92.6	11.86	
8	1041		12.36	1471	0.20	6.27	-94.6	11.52	
9	1044		12.35	1470	0.21	6.27	-93.4	11.26	

SAMPLING CONTAINER	NUMBER OF CONTAINERS	REQUESTED ANALYSIS
250 ml PLASTIC		
40 ml GLASS		
1 L GLASS		
OTHER		

PROTECTIVE CASING: ok PAD: ok LOCK: ok VEGETATION: ok ACCESS: ok

Sampling Personnel Signature: _____ **Date:** 01/10/14

Notes:
µS = micro-Siemen
C° = degrees Celsius
mg/L = milligrams per liter
mV = millivolt
S.U. = Standard Units
NTU = nephelometric turbidity units

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Well Sampling Log

PROJECT NAME: Chemtronics	DATE: 1/8/14 (purge) 1/10/14 (Sample)
PROJECT NUMBER: 2115	WEATHER: 40's, sunny
SAMPLING PERSONNEL: M. Gragg / P. Brooks	SAMPLE TIME: 1312 1/10/14
WELL NUMBER: P-70	WELL DEPTH IN FEET (WD): 62.04 (muddy)
WELL DIAMETER: 2"	WATER LEVEL IN FEET (WL): 14.33
TYPE OF CASING: PVC	LENGTH OF WATER COLUMN: 47.71 FEET
MEASURING POINT: yes	(WD) - (WL) = (LWC)
FLUSH MOUNT / STICK-UP	ONE CASING VOLUME: 8.11 GALLONS
COMMENTS: slight yellow-green color to water.	(LWC) x (WCV)
looked dry shortly after 1 well volume	THREE CASING VOLUMES: 24.3 GALLONS
	ACTUAL VOLUME PURGED: GALLONS

WELL CASING VOLUMES (WCV)

1" = 0.041 Gal/Ft 2" = 0.17 Gal/Ft 3" = 0.38 Gal/Ft 4" = 0.66 Gal/Ft 6" = 1.5 Gal/Ft 8" = 2.6 Gal/Ft 12" = 5.8 Gal/Ft

PURGE METHOD: BAILER-DISP. BAILER-TEFLON DEDICATED PUMP WHALE PUMP GRUNDFOS OTHER:

SAMPLE METHOD: BAILER-DISP BAILER-TEFLON DEDICATED PUMP WHALE PUMP GRUNDFOS OTHER:

READING	TIME	GALLONS PURGED	TEMP (°C)	SPECIFIC COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	pH (S.U.) report to 0.1 S.U.	OXIDATION REDUCTION POTENTIAL (mV)	TURBIDITY (NTU)	COMMENTS
1	1404	0	12.88	873	4.03	6.98	191.2	15.04	
2	1524	10	11.07	780	4.39	7.04	199.7	88.05	
3									
4	1312	0	12.76	[illegible]	3.12	7.08	-2.7	51.56	DTW → 17.21
5				6.39					
6									
7									
8									
9									
10									

SAMPLING CONTAINER	NUMBER OF CONTAINERS	REQUESTED ANALYSIS
500 mL PLASTIC	1	TDS
250 mL PLASTIC	2	Total Hardness, Metals
125 mL PLASTIC		
40 mL GLASS	11	VOCs, Volatile Headspace Hydrocarbons, perchlorate, picric acid, TOC
1 L GLASS	1	Nitroaromatics / Anilines
OTHER gallons amber	15	? (Geosystems)

PROTECTIVE CASING: ok PAD: ok LOCK: ok VEGETATION: ok ACCESS: ok

Sampling Personnel Signature: Date: 01/10/14

Bromide, chloride, sulfate, nitrate nitrogen, Nitrite nitrogen

Notes: °C = degrees Celsius
µS/cm = micro-Siemen per centimeter
mg/L = milligrams per liter
S.U. = Standard Units
mV = millivolt
NTU = nephelometric turbidity units
Samples are analyzed immediately upon collection.

01/13/14 DTW - 16.92

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Equipment Documentation & Instrument Calibration Data Sheet

Project Name: Chemtronics
Project Number: 2115
Project Location: Swannanoa, NC

Calibration Documentation
Person Conducting Calibration:
Date of Calibration:
Date of Field Measurements:

Equipment Documentation

Equipment or meters used to take measurements (e.g. water level meters, survey equipment, etc.):

Equipment Type	Serial Number	Brand	Date of Use
150-ft Water Level	26154	Solinist	
150-ft Water Level	22754	Solinist	
150-ft Water Level	150	Testwell	
150-ft Drawdown	MP30-1527	QED	

Micro TPW Turbidity Meter

Calibration Time	Calibration	Instrument	Instrument Reading		
			1000 NTU	10.0 NTU	0.02 NTU
900		200601045	Initial: 980 Cal: 1000	Initial: 12.0 Cal: 10.0	Initial: 1.3 Cal: 0.02

YSI 556 Multiparameter Meter

Instrument Serial Number	Instrument Readings							
	Dissolved Oxygen	pH 7 S.U.	pH 4 S.U.	pH 10 S.U.	QC* pH 7 S.U.	Spec. Cond. ~~447/84/23~~ 1413 µS	QC* ~~84~~ 1413 µS	ORP 200 mV
07D100979	Time: 903 mmHg: 776.17 Initial: 8.72 Cal: 9.86 1034.8mb	Time: 843 Initial: 6.97 Cal: 7.00	Time: 846 Initial: 4.02 Cal: 4.00	Time: 848 Initial: 10.05 Cal: 10.01	Time: 857 Initial: 7.02 Cal: Time: Check: Time: Check:	Time: 838 Initial: 1223 Cal: 1414	Time: 854 Initial: 1368 Cal: Time: Check: Time: Check:	Time: 851 Initial: 208.9 Cal: 200
Calibration Expiration Date	NA	5/15	10/14	5/15	5/15	3/14	3/14	1/14

Comments:

Signature and Date: [signature] 1/8/14

Notes:
1. Electronic equipment calibrated according to the manufacturer's operation manual.
2. Specific Conductivity should be calibrated according to values representative of historic range.
3. Order of Calibration is as follows : Specific Conductivity, pH 7, pH 4, pH 10, ORP, QC checks.
4. QC Acceptable Ranges: pH +/- 0.1 S.U. and Specific Conductivity 10% of the true value. If readings are out of these ranges, meter needs to be recalibrated.
5. * indicates that a QC check must be performed in the morning, afternoon, and the end of the day.

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Equipment Documentation & Instrument Calibration Data Sheet

Project Name: Chemtronics
Project Number: 2115.224
Project Location: Swannanoa, NC

Calibration Documentation
Person Conducting Calibration: P Brooks
Date of Calibration: 01/10/14
Date of Field Measurements: 01/10/14

Equipment Documentation

Equipment or meters used to take measurements (e.g. water level meters, survey equipment, etc.):

Equipment Type	Serial Number	Brand	Date of Use
150-ft Water Level	26154	Solinist	
150-ft Water Level	22754	Solinist	
150-ft Water Level	150	Testwell	
150-ft Drawdown	MP30-1527	QED	01/10/14
Other			

Micro TPW Turbidity Meter

Calibration Standards Exp Date	Instrument Serial #	Instrument Reading		
		0.02 NTU	10.0 NTU	1000 NTU
6/15	200601045	Initial: 0.15	Initial: 12.72	Initial: 841.2
		Cal: 0.02	Cal: 10.0	Cal: 1000
		Time: 901	Time: 859	Time: 857

YSI 556 Multiparameter Meter

Instrument Serial Number	12L101057						
Instrument Readings =1026.5 mb							Calibration Expiration Date
Dissolved Oxygen	Initial: 10.91	Cal: 9.51	mmHg: 769.94	Time: 903			NA
pH 7 S.U. *report to 0.1 S.U.*	Initial: 7.02	pHmV:	Cal: 7.00	pHmV:	Time: 842		5/15
pH 4 S.U. *report to 0.1 S.U.*	Initial: 4.03	pHmV:	Cal: 4.00	pHmV:	Time: 850		10/14
pH 10 S.U. *report to 0.1 S.U.*	Initial: 10.02	pHmV:	Cal: 10.00	pHmV:	Time: 855		
QC* pH 7 S.U. *report to 0.1 S.U.*	AM Time: 920	Meas: 6.99	Mid Day Time:	Check:	PM Time:	Check:	
Spec. Cond. 1413/447/84/23 µS/cm**	Initial: 1336	Cal: 1413	Time: 835				3/14
QC* 84 µS/cm	AM Time: 915	Meas: 1408	Mid Day Time:	Check:	PM Time:	Check:	
ORP 240 mV	Initial: 228.9	Cal: 240.0	Time: 915				

Comments:
Signature: [signature] Date: 1/10/14

Notes:
1. Electronic equipment calibrated according to the manufacturer's operation manual.
2. Specific Conductivity should be calibrated according to values representative of historic range.
3. Order of Calibration is as follows : Specific Conductivity, pH 7, pH 4, pH 10, ORP, QC checks.
4. QC Acceptable Ranges: pH +/- 0.1 S.U. and Specific Conductivity 10% of the true value. If readings are out of these ranges, meter needs to be recalibrated.
5. * Indicates that a QC check must be performed in the morning, afternoon, and the end of the day, or every four hours.
6. ** Indicates to choose a Specific Conductivity buffer of 1413, 447, 84, or 23 mS which is closest to historical readings from the project location.

Groundwater Analytical Results

ANALYTICAL RESULTS

Prepared by:	Prepared for:
Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601	Altamont Environmental 231 Haywood Street Asheville NC 28801

October 29, 2013

Project: Chemtronics Site

Submittal Date: 10/25/2013
Group Number: 1429245
PO Number: 2115.229
State of Sample Origin: NC

Client Sample Description	Lancaster Labs (LL) #
VBW-6 Grab Groundwater	7252356
Trip Blank Water	7252357

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Altamont Environmental	Attn: Amy Huffman
ELECTRONIC COPY TO	Altamont Environmental	Attn: Marta VanDussen

Respectfully Submitted,

Nancy Jean Bornholm

Nancy Jean Bornholm
Principal Specialist

(717) 556-7250

Sample Description: VBW-6 Grab Groundwater Chemtronics

LL Sample # WW 7252356
LL Group # 1429245
Account # 12184

Project Name: Chemtronics Site

Collected: 10/24/2013 13:05 by MG

Submitted: 10/25/2013 09:20
Reported: 10/29/2013 16:22

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW-6

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	4,200	J	3,000	5,000	1000
02898	Acetonitrile	75-05-8	7,000	U	7,000	20,000	1000
02898	Acrolein	107-02-8	5,000	U	5,000	25,000	1000
02898	Acrylonitrile	107-13-1	1,000	U	1,000	5,000	1000
02898	Allyl Chloride	107-05-1	100	U	100	500	1000
02898	t-Amyl methyl ether	994-05-8	100	U	100	500	1000
02898	Benzene	71-43-2	170	J	100	500	1000
02898	Benzyl Chloride	100-44-7	100	U	100	500	1000
02898	Bromobenzene	108-86-1	100	U	100	500	1000
02898	Bromochloromethane	74-97-5	100	U	100	500	1000
02898	Bromodichloromethane	75-27-4	100	U	100	500	1000
02898	Bromoform	75-25-2	100	U	100	500	1000
02898	Bromomethane	74-83-9	100	U	100	500	1000
02898	n-Butanol	71-36-3	20,000	U	20,000	50,000	1000
02898	2-Butanone	78-93-3	1,000	U	1,000	5,000	1000
02898	t-Butyl Alcohol	75-65-0	48,000		4,000	10,000	1000
02898	n-Butylbenzene	104-51-8	100	U	100	500	1000
02898	sec-Butylbenzene	135-98-8	100	U	100	500	1000
02898	tert-Butylbenzene	98-06-6	100	U	100	500	1000
02898	Carbon Disulfide	75-15-0	400	U	400	500	1000
02898	Carbon Tetrachloride	56-23-5	100	U	100	500	1000
02898	2-Chloro-1,3-Butadiene	126-99-8	100	U	100	500	1000
02898	Chlorobenzene	108-90-7	100	U	100	500	1000
02898	Chloroethane	75-00-3	100	U	100	500	1000
02898	Chloroform	67-66-3	24,000		1,000	5,000	10000
02898	Chloromethane	74-87-3	200	U	200	500	1000
02898	2-Chlorotoluene	95-49-8	100	U	100	500	1000
02898	4-Chlorotoluene	106-43-4	100	U	100	500	1000
02898	Cyclohexane	110-82-7	26,000		1,000	5,000	10000
02898	Cyclohexanone	108-94-1	5,000	U	5,000	25,000	1000
02898	1,2-Dibromo-3-chloropropane	96-12-8	200	U	200	500	1000
02898	Dibromochloromethane	124-48-1	100	U	100	500	1000
02898	1,2-Dibromoethane	106-93-4	100	U	100	500	1000
02898	Dibromomethane	74-95-3	100	U	100	500	1000
02898	trans-1,4-Dichloro-2-butene	110-57-6	1,000	U	1,000	5,000	1000
02898	1,2-Dichlorobenzene	95-50-1	100	U	100	500	1000
02898	1,3-Dichlorobenzene	541-73-1	100	U	100	500	1000
02898	1,4-Dichlorobenzene	106-46-7	100	U	100	500	1000
02898	Dichlorodifluoromethane	75-71-8	100	U	100	500	1000
02898	1,1-Dichloroethane	75-34-3	100	U	100	500	1000
02898	1,2-Dichloroethane	107-06-2	79,000		1,000	5,000	10000
02898	1,1-Dichloroethene	75-35-4	100	U	100	500	1000
02898	cis-1,2-Dichloroethene	156-59-2	100	U	100	500	1000
02898	trans-1,2-Dichloroethene	156-60-5	100	U	100	500	1000
02898	1,2-Dichloropropane	78-87-5	930		100	500	1000
02898	1,3-Dichloropropane	142-28-9	100	U	100	500	1000
02898	2,2-Dichloropropane	594-20-7	100	U	100	500	1000
02898	1,1-Dichloropropene	563-58-6	100	U	100	500	1000
02898	cis-1,3-Dichloropropene	10061-01-5	100	U	100	500	1000
02898	trans-1,3-Dichloropropene	10061-02-6	100	U	100	500	1000

*=This limit was used in the evaluation of the final result

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Lancaster Laboratories Environmental
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Analysis Report

Sample Description: VBW-6 Grab Groundwater Chemtronics

LL Sample # WW 7252356
LL Group # 1429245
Account # 12184

Project Name: Chemtronics Site

Collected: 10/24/2013 13:05 by MG

Submitted: 10/25/2013 09:20
Reported: 10/29/2013 16:22

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW-6

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	110	J	100	500	1000
02898	Ethyl t-butyl ether	637-92-3	100	U	100	500	1000
02898	Ethylbenzene	100-41-4	100	U	100	500	1000
02898	Freon 113	76-13-1	200	U	200	500	1000
02898	n-Heptane	142-82-5	200	U	200	500	1000
02898	Hexachlorobutadiene	87-68-3	100	U	100	500	1000
02898	n-Hexane	110-54-3	100	U	100	500	1000
02898	2-Hexanone	591-78-6	1,000	U	1,000	5,000	1000
02898	Isobutyl Alcohol	78-83-1	10,000	U	10,000	25,000	1000
02898	Isopropylbenzene	98-82-8	100	U	100	500	1000
02898	p-Isopropyltoluene	99-87-6	100	U	100	500	1000
02898	Methacrylonitrile	126-98-7	1,000	U	1,000	5,000	1000
02898	Methyl Acetate	79-20-9	300	U	300	1,000	1000
02898	Methyl Methacrylate	80-62-6	100	U	100	500	1000
02898	Methyl Tertiary Butyl Ether	1634-04-4	200	J	100	500	1000
02898	4-Methyl-2-Pentanone	108-10-1	1,000	U	1,000	5,000	1000
02898	Methylcyclohexane	108-87-2	100	U	100	500	1000
02898	Methylene Chloride	75-09-2	330	J	200	500	1000
02898	Naphthalene	91-20-3	100	U	100	500	1000
02898	Pentachloroethane	76-01-7	200	U	200	500	1000
02898	Propionitrile	107-12-0	2,000	U	2,000	10,000	1000
02898	n-Propylbenzene	103-65-1	100	U	100	500	1000
02898	Styrene	100-42-5	100	U	100	500	1000
02898	1,1,1,2-Tetrachloroethane	630-20-6	100	U	100	500	1000
02898	1,1,2,2-Tetrachloroethane	79-34-5	100	U	100	500	1000
02898	Tetrachloroethene	127-18-4	100	U	100	500	1000
02898	Tetrahydrofuran	109-99-9	7,300		2,000	5,000	1000
02898	Toluene	108-88-3	100	U	100	500	1000
02898	1,2,3-Trichlorobenzene	87-61-6	100	U	100	500	1000
02898	1,2,4-Trichlorobenzene	120-82-1	100	U	100	500	1000
02898	1,1,1-Trichloroethane	71-55-6	100	U	100	500	1000
02898	1,1,2-Trichloroethane	79-00-5	100	U	100	500	1000
02898	Trichloroethene	79-01-6	1,400		100	500	1000
02898	1,2,4-Trimethylbenzene	95-63-6	100	U	100	500	1000
02898	1,3,5-Trimethylbenzene	108-67-8	100	U	100	500	1000
02898	Vinyl Acetate	108-05-4	200	U	200	500	1000
02898	Vinyl Chloride	75-01-4	100	U	100	500	1000
02898	m+p-Xylene	1330-20-7	100	U	100	500	1000
02898	o-Xylene	95-47-6	100	U	100	500	1000

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: VBW-6 Grab Groundwater
Chemtronics

LL Sample # WW 7252356
LL Group # 1429245
Account # 12184

Project Name: Chemtronics Site

Collected: 10/24/2013 13:05 by MG

Submitted: 10/25/2013 09:20
Reported: 10/29/2013 16:22

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW-6

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	I133011AA	10/28/2013 21:06	Jason M Long	1000
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	I133011AA	10/28/2013 21:27	Jason M Long	10000
01163	GC/MS VOA Water Prep	SW-846 5030B	1	I133011AA	10/28/2013 21:06	Jason M Long	1000
01163	GC/MS VOA Water Prep	SW-846 5030B	2	I133011AA	10/28/2013 21:27	Jason M Long	10000

*=This limit was used in the evaluation of the final result

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Lancaster Laboratories Environmental
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Analysis Report

Sample Description: Trip Blank Water
Chemtronics

LL Sample # WW 7252357
LL Group # 1429245
Account # 12184

Project Name: Chemtronics Site

Collected: 10/24/2013

Submitted: 10/25/2013 09:20
Reported: 10/29/2013 16:22

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW6T

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.1	U	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	0.5	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-Butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	0.1	U	0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	0.1	U	0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.1	U	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

Sample Description: Trip Blank Water
Chemtronics

LL Sample # WW 7252357
LL Group # 1429245
Account # 12184

Project Name: Chemtronics Site

Collected: 10/24/2013

Submitted: 10/25/2013 09:20
Reported: 10/29/2013 16:22

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW6T

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-Pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.1	U	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Analysis Report

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Sample Description: Trip Blank Water
Chemtronics

LL Sample # WW 7252357
LL Group # 1429245
Account # 12184

Project Name: Chemtronics Site

Collected: 10/24/2013

Submitted: 10/25/2013 09:20
Reported: 10/29/2013 16:22

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW6T

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	I133011AA	10/28/2013 16:09	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	I133011AA	10/28/2013 16:09	Jason M Long	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1429245
Reported: 10/29/13 at 04:22 PM

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: I133011AA	Sample number(s): 7252356-7252357									
Acetone	3.0	U	3.0	5.0	ug/l	109		60-139		
Acetonitrile	7.0	U	7.0	20	ug/l	100	92	41-158	8	30
Acrolein	5.0	U	5.0	25	ug/l	99		36-137		
Acrylonitrile	1.0	U	1.0	5.0	ug/l	108		69-136		
Allyl Chloride	0.1	U	0.1	0.5	ug/l	93		61-130		
t-Amyl methyl ether	0.1	U	0.1	0.5	ug/l	86		80-124		
Benzene	0.1	U	0.1	0.5	ug/l	99		80-120		
Benzyl Chloride	0.1	U	0.1	0.5	ug/l	94		62-120		
Bromobenzene	0.1	U	0.1	0.5	ug/l	97		80-120		
Bromochloromethane	0.1	U	0.1	0.5	ug/l	90		80-125		
Bromodichloromethane	0.1	U	0.1	0.5	ug/l	91		80-120		
Bromoform	0.1	U	0.1	0.5	ug/l	84		73-128		
Bromomethane	0.1	U	0.1	0.5	ug/l	71		62-126		
n-Butanol	20	U	20.	50	ug/l	106		65-138		
2-Butanone	1.0	U	1.0	5.0	ug/l	102		70-130		
t-Butyl Alcohol	4.0	U	4.0	10	ug/l	94		68-140		
n-Butylbenzene	0.1	U	0.1	0.5	ug/l	105		80-120		
sec-Butylbenzene	0.1	U	0.1	0.5	ug/l	105		80-120		
tert-Butylbenzene	0.1	U	0.1	0.5	ug/l	98		80-120		
Carbon Disulfide	0.4	U	0.4	0.5	ug/l	104		80-128		
Carbon Tetrachloride	0.1	U	0.1	0.5	ug/l	90		80-129		
2-Chloro-1,3-Butadiene	0.1	U	0.1	0.5	ug/l	95		80-127		
Chlorobenzene	0.1	U	0.1	0.5	ug/l	97		80-120		
Chloroethane	0.1	U	0.1	0.5	ug/l	73		68-120		
Chloroform	0.1	U	0.1	0.5	ug/l	97		80-120		
Chloromethane	0.2	U	0.2	0.5	ug/l	70		55-120		
2-Chlorotoluene	0.1	U	0.1	0.5	ug/l	102		80-120		
4-Chlorotoluene	0.1	U	0.1	0.5	ug/l	101		80-120		
Cyclohexane	0.1	U	0.1	0.5	ug/l	97		75-123		
Cyclohexanone	5.0	U	5.0	25	ug/l	98	105	38-149	7	30
1,2-Dibromo-3-chloropropane	0.2	U	0.2	0.5	ug/l	89		64-141		
Dibromochloromethane	0.1	U	0.1	0.5	ug/l	91		80-126		
1,2-Dibromoethane	0.1	U	0.1	0.5	ug/l	99		80-120		
Dibromomethane	0.1	U	0.1	0.5	ug/l	91		80-120		
trans-1,4-Dichloro-2-butene	1.0	U	1.0	5.0	ug/l	88		14-166		
1,2-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	103		80-120		
1,3-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	102		80-120		
1,4-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	101		80-120		
Dichlorodifluoromethane	0.1	U	0.1	0.5	ug/l	70		39-120		
1,1-Dichloroethane	0.1	U	0.1	0.5	ug/l	100		80-120		
1,2-Dichloroethane	0.1	U	0.1	0.5	ug/l	96		80-127		
1,1-Dichloroethene	0.1	U	0.1	0.5	ug/l	100		80-123		
cis-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	95		80-120		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1429245
Reported: 10/29/13 at 04:22 PM

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
trans-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	100		80-120		
1,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	104		80-120		
1,3-Dichloropropane	0.1	U	0.1	0.5	ug/l	101		80-120		
2,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	89		75-122		
1,1-Dichloropropene	0.1	U	0.1	0.5	ug/l	99		80-121		
cis-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	91		80-123		
trans-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	96		80-120		
Ethyl Methacrylate	0.1	U	0.1	0.5	ug/l	98		80-120		
Ethyl t-butyl ether	0.1	U	0.1	0.5	ug/l	89		76-120		
Ethylbenzene	0.1	U	0.1	0.5	ug/l	98		80-120		
Freon 113	0.2	U	0.2	0.5	ug/l	96		78-132		
n-Heptane	0.2	U	0.2	0.5	ug/l	96		75-132		
Hexachlorobutadiene	0.1	U	0.1	0.5	ug/l	96		73-120		
n-Hexane	0.1	U	0.1	0.5	ug/l	100		76-131		
2-Hexanone	1.0	U	1.0	5.0	ug/l	103		69-131		
Isobutyl Alcohol	10	U	10.	25	ug/l	110		71-128		
Isopropylbenzene	0.1	U	0.1	0.5	ug/l	96		80-120		
p-Isopropyltoluene	0.1	U	0.1	0.5	ug/l	100		80-120		
Methacrylonitrile	1.0	U	1.0	5.0	ug/l	102		68-138		
Methyl Acetate	0.3	U	0.3	1.0	ug/l	101		69-126		
Methyl Methacrylate	0.1	U	0.1	0.5	ug/l	96		64-149		
Methyl Tertiary Butyl Ether	0.1	U	0.1	0.5	ug/l	88		80-120		
4-Methyl-2-Pentanone	1.0	U	1.0	5.0	ug/l	97		69-135		
Methylcyclohexane	0.1	U	0.1	0.5	ug/l	93		80-127		
Methylene Chloride	0.2	U	0.2	0.5	ug/l	101		80-120		
Naphthalene	0.1	U	0.1	0.5	ug/l	105		65-120		
Pentachloroethane	0.2	U	0.2	0.5	ug/l	97		75-126		
Propionitrile	2.0	U	2.0	10	ug/l	109		71-138		
n-Propylbenzene	0.1	U	0.1	0.5	ug/l	107		80-120		
Styrene	0.1	U	0.1	0.5	ug/l	96		80-120		
1,1,1,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	95		80-120		
1,1,2,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	114		80-125		
Tetrachloroethene	0.1	U	0.1	0.5	ug/l	92		80-120		
Tetrahydrofuran	2.0	U	2.0	5.0	ug/l	95		65-131		
Toluene	0.1	U	0.1	0.5	ug/l	98		80-120		
1,2,3-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	101		63-120		
1,2,4-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	98		70-120		
1,1,1-Trichloroethane	0.1	U	0.1	0.5	ug/l	90		80-120		
1,1,2-Trichloroethane	0.1	U	0.1	0.5	ug/l	102		80-120		
Trichloroethene	0.1	U	0.1	0.5	ug/l	96		80-120		
1,2,4-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	103		80-120		
1,3,5-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	104		80-120		
Vinyl Acetate	0.2	U	0.2	0.5	ug/l	105	105	45-132	1	30
Vinyl Chloride	0.1	U	0.1	0.5	ug/l	71		65-127		
m+p-Xylene	0.1	U	0.1	0.5	ug/l	95		80-120		
o-Xylene	0.1	U	0.1	0.5	ug/l	96		80-120		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

MS	MSD	MS/MSD	RPD	BKG	DUP	DUP	Dup RPD

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1429245
Reported: 10/29/13 at 04:22 PM

Analysis Name	%REC	%REC	Limits	RPD	MAX	Conc	Conc	RPD	Max
Batch number: I133011AA	Sample number(s): 7252356-7252357 UNSPK: P252480								
Acetone	103	124	57-163	18	30				
Acrolein	84	125	29-149	39*	30				
Acrylonitrile	99	142	56-161	35*	30				
Allyl Chloride	91	103	56-160	13	30				
t-Amyl methyl ether	87	95	74-127	9	30				
Benzene	100	127*	87-126	11	30				
Benzyl Chloride	96	100	62-125	4	30				
Bromobenzene	98	112	80-123	13	30				
Bromochloromethane	91	97	82-125	7	30				
Bromodichloromethane	90	98	82-133	9	30				
Bromoform	84	87	60-138	3	30				
Bromomethane	69	79	66-130	14	30				
n-Butanol	107	90	55-144	17	30				
2-Butanone	94	133	56-160	34*	30				
t-Butyl Alcohol	154 (2)	67 (2)	55-154	15	30				
n-Butylbenzene	104	118	83-131	12	30				
sec-Butylbenzene	103	118	84-128	14	30				
tert-Butylbenzene	97	112	84-135	15	30				
Carbon Disulfide	100	113	84-141	13	30				
Carbon Tetrachloride	87	97	81-148	12	30				
2-Chloro-1,3-Butadiene	92	105	87-145	13	30				
Chlorobenzene	95	107	78-133	12	30				
Chloroethane	70	81	70-139	14	30				
Chloroform	95	107	86-136	11	30				
Chloromethane	71	79	49-135	10	30				
2-Chlorotoluene	100	114	75-134	13	30				
4-Chlorotoluene	99	114	76-134	14	30				
Cyclohexane	-39 (2)	215 (2)	69-149	11	30				
1,2-Dibromo-3-chloropropane	81	111	43-143	31*	30				
Dibromochloromethane	89	96	79-125	7	30				
1,2-Dibromoethane	100	106	84-127	6	30				
Dibromomethane	93	97	83-126	5	30				
trans-1,4-Dichloro-2-butene	74	116	11-172	44*	30				
1,2-Dichlorobenzene	102	114	83-117	11	30				
1,3-Dichlorobenzene	101	115	79-132	13	30				
1,4-Dichlorobenzene	100	114	79-120	13	30				
Dichlorodifluoromethane	71	78	28-136	9	30				
1,1-Dichloroethane	98	110	88-136	12	30				
1,2-Dichloroethane	198 (2)	311 (2)	82-135	5	30				
1,1-Dichloroethene	98	110	83-150	12	30				
cis-1,2-Dichloroethene	94	107	82-129	11	30				
trans-1,2-Dichloroethene	98	111	88-127	13	30				
1,2-Dichloropropane	119	151*	91-126	10	30				
1,3-Dichloropropane	101	109	80-127	7	30				
2,2-Dichloropropane	85	96	80-134	12	30				
1,1-Dichloropropene	97	109	86-139	12	30				
cis-1,3-Dichloropropene	90	100	74-132	11	30				
trans-1,3-Dichloropropene	94	103	71-128	9	30				
Ethyl Methacrylate	98	105	73-134	7	30				
Ethyl t-butyl ether	87	97	61-131	11	30				
Ethylbenzene	96	111	80-140	13	30				
Freon 113	92	103	77-147	11	30				
n-Heptane	96	107	86-147	11	30				
Hexachlorobutadiene	95	108	65-128	13	30				
n-Hexane	99	113	82-149	13	30				

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1429245
Reported: 10/29/13 at 04:22 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
2-Hexanone	108	107	59-169	1	30				
Isobutyl Alcohol	128	128	65-146	0	30				
Isopropylbenzene	92	105	81-133	13	30				
p-Isopropyltoluene	97	112	84-124	14	30				
Methacrylonitrile	87	134	58-155	42*	30				
Methyl Acetate	109	99	53-142	9	30				
Methyl Methacrylate	81	133	48-152	49*	30				
Methyl Tertiary Butyl Ether	98	107	82-132	6	30				
4-Methyl-2-Pentanone	103	98	69-149	5	30				
Methylcyclohexane	95	107	74-140	12	30				
Methylene Chloride	100	110	77-135	9	30				
Naphthalene	114	113	70-131	1	30				
Pentachloroethane	96	109	68-145	12	30				
Propionitrile	108	125	63-147	15	30				
n-Propylbenzene	105	121	79-131	14	30				
Styrene	95	106	63-151	11	30				
1,1,1,2-Tetrachloroethane	92	102	87-126	10	30				
1,1,2,2-Tetrachloroethane	117	122	75-131	4	30				
Tetrachloroethene	91	102	75-129	12	30				
Tetrahydrofuran	86	131	56-154	37*	30				
Toluene	96	110	83-127	13	30				
1,2,3-Trichlorobenzene	105	110	73-125	5	30				
1,2,4-Trichlorobenzene	100	109	77-120	8	30				
1,1,1-Trichloroethane	87	98	85-140	12	30				
1,1,2-Trichloroethane	102	109	85-129	6	30				
Trichloroethene	98	113	85-131	11	30				
1,2,4-Trimethylbenzene	102	117	87-126	13	30				
1,3,5-Trimethylbenzene	102	117	89-129	14	30				
Vinyl Chloride	72	80	62-135	10	30				
m+p-Xylene	94	106	81-137	12	30				
o-Xylene	95	108	81-137	12	30				

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed
unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: GC/MS Volatiles
Batch number: I133011AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
7252356	98	97	101	94
7252357	97	103	100	96
Blank	96	98	100	95
LCS	97	101	102	99
LCSD	95	97	101	99
MS	97	100	101	99
MSD	96	96	102	98

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1429245
Reported: 10/29/13 at 04:22 PM

Surrogate Quality Control

Limits:	77-114	74-113	77-110	78-110

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Services Analysis Request/Chain of Custody

eurofins

Acct. # 12184 Group # 1429245 Sample # 7252356-57

COC#: 6775

Client: Altamont Environmental		Matrix				Analyses Requested	For Lab Use Only
Project Name/#: Chemtronics						Preservation Codes	SF#: 186903
Project Manager: Amy Bondurant	P.O. #: 2115.229						SCR#: 143697
Sampler: M. Gragg							
Phone #: 828 281 3350	Quote #: 207662						
State where sample(s) were collected: NC							

Preservation Codes: H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; P = H_3PO_4; O = Other

Matrix: Sediment ☐; Soil ☐; Water ☒ (Ground ☒, Surface ☐, Potable ☐, NPDES ☐); Other:

Sample Identification	Collection Date	Collection Time	Grab	Composite	Soil	Water	Other:	Total # of Containers	GC/MS VOAs (8260)	Moisture (2540 G)								Remarks
VBW-6	10/24/13	1305	X			X		3	X									Please Rush
Trip Blank	10/24/13							2	X									Samples
																		48 hr TAT

Turnaround Time Requested (TAT) (please check): Standard ☐ RUSH ☒

(RUSH TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 48 Hr. TAT

E-mail address to send RUSH results: ahuffman@altamontenvironmental.com

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	10/24/13	1800			
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by: [signature]	10/25/13	0920

Data Package Options (please check if required)

Type I (Validation/non-CLP)	☐	MA MCP	☐	TX TRRP - 13	☐
Type III (Reduced non-CLP)	☐	CT RCP	☐		
Type IV (CLP SOW)	☐	ASP Type A	☐		
Type VI (Raw Data Only)	☐	ASP Type B	☐		

EDD Format: TerraBase

If site-specific QC (MS/MSD/Dup) required, indicate QC samples and submit triplicate volume.

Airbill No.:

Relinquished by Commercial Carrier: UPS ✓ FedEx ______ Other ______

Temperature upon receipt 2.1-2.4 °C

eurofins | Lancaster Laboratories Environmental

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Data Qualifiers:

C – result confirmed by reanalysis.

J - estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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ANALYTICAL RESULTS

Prepared by:	Prepared for:
Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601	Altamont Environmental 231 Haywood Street Asheville NC 28801

November 01, 2013

Project: Chemtronics Site

Submittal Date: 10/31/2013
Group Number: 1430406
PO Number: 2115.231
State of Sample Origin: NC

Client Sample Description	Lancaster Labs (LL) #
VBW-8 Grab Water	7258514
Trip Blank Water	7258515

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Altamont Environmental	Attn: Amy Huffman
ELECTRONIC COPY TO	Altamont Environmental	Attn: Marta VanDussen

Respectfully Submitted,

Nancy Jean Bornholm

Nancy Jean Bornholm
Principal Specialist

(717) 556-7250

Sample Description: VBW-8 Grab Water
Chemtronics

LL Sample # WW 7258514
LL Group # 1430406
Account # 12184

Project Name: Chemtronics Site

Collected: 10/30/2013 08:30 by MG

Submitted: 10/31/2013 09:15
Reported: 11/01/2013 16:13

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW-8

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	9,600		150	250	50
02898	Acetonitrile	75-05-8	350	U	350	1,000	50
02898	Acrolein	107-02-8	250	U	250	1,300	50
02898	Acrylonitrile	107-13-1	50	U	50	250	50
02898	Allyl Chloride	107-05-1	5.0	U	5.0	25	50
02898	t-Amyl methyl ether	994-05-8	5.0	U	5.0	25	50
02898	Benzene	71-43-2	140		5.0	25	50
02898	Benzyl Chloride	100-44-7	5.0	U	5.0	25	50
02898	Bromobenzene	108-86-1	5.0	U	5.0	25	50
02898	Bromochloromethane	74-97-5	5.0	U	5.0	25	50
02898	Bromodichloromethane	75-27-4	5.0	U	5.0	25	50
02898	Bromoform	75-25-2	5.0	U	5.0	25	50
02898	Bromomethane	74-83-9	5.0	U	5.0	25	50
02898	n-Butanol	71-36-3	1,000	U	1,000	2,500	50
02898	2-Butanone	78-93-3	290		50	250	50
02898	t-Butyl Alcohol	75-65-0	22,000		200	500	50
02898	n-Butylbenzene	104-51-8	5.0	U	5.0	25	50
02898	sec-Butylbenzene	135-98-8	5.0	U	5.0	25	50
02898	tert-Butylbenzene	98-06-6	5.0	U	5.0	25	50
02898	Carbon Disulfide	75-15-0	20	U	20	25	50
02898	Carbon Tetrachloride	56-23-5	5.0	U	5.0	25	50
02898	2-Chloro-1,3-Butadiene	126-99-8	5.0	U	5.0	25	50
02898	Chlorobenzene	108-90-7	5.0	U	5.0	25	50
02898	Chloroethane	75-00-3	5.0	U	5.0	25	50
02898	Chloroform	67-66-3	440		5.0	25	50
02898	Chloromethane	74-87-3	10	U	10	25	50
02898	2-Chlorotoluene	95-49-8	5.0	U	5.0	25	50
02898	4-Chlorotoluene	106-43-4	5.0	U	5.0	25	50
02898	Cyclohexane	110-82-7	26,000		500	2,500	5000
02898	Cyclohexanone	108-94-1	250	U	250	1,300	50
02898	1,2-Dibromo-3-chloropropane	96-12-8	10	U	10	25	50
02898	Dibromochloromethane	124-48-1	5.0	U	5.0	25	50
02898	1,2-Dibromoethane	106-93-4	17	J	5.0	25	50
02898	Dibromomethane	74-95-3	5.0	U	5.0	25	50
02898	trans-1,4-Dichloro-2-butene	110-57-6	50	U	50	250	50
02898	1,2-Dichlorobenzene	95-50-1	5.0	U	5.0	25	50
02898	1,3-Dichlorobenzene	541-73-1	5.0	U	5.0	25	50
02898	1,4-Dichlorobenzene	106-46-7	5.0	U	5.0	25	50
02898	Dichlorodifluoromethane	75-71-8	5.0	U	5.0	25	50
02898	1,1-Dichloroethane	75-34-3	5.0	U	5.0	25	50
02898	1,2-Dichloroethane	107-06-2	2,000		50	250	500
02898	1,1-Dichloroethene	75-35-4	5.0	U	5.0	25	50
02898	cis-1,2-Dichloroethene	156-59-2	13	J	5.0	25	50
02898	trans-1,2-Dichloroethene	156-60-5	5.0	U	5.0	25	50
02898	1,2-Dichloropropane	78-87-5	100		5.0	25	50
02898	1,3-Dichloropropane	142-28-9	5.0	U	5.0	25	50
02898	2,2-Dichloropropane	594-20-7	5.0	U	5.0	25	50
02898	1,1-Dichloropropene	563-58-6	5.0	U	5.0	25	50
02898	cis-1,3-Dichloropropene	10061-01-5	5.0	U	5.0	25	50
02898	trans-1,3-Dichloropropene	10061-02-6	5.0	U	5.0	25	50

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: VBW-8 Grab Water
Chemtronics

LL Sample # WW 7258514
LL Group # 1430406
Account # 12184

Project Name: Chemtronics Site

Collected: 10/30/2013 08:30 by MG

Submitted: 10/31/2013 09:15
Reported: 11/01/2013 16:13

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW-8

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	5.0	U	5.0	25	50
02898	Ethyl t-butyl ether	637-92-3	5.0	U	5.0	25	50
02898	Ethylbenzene	100-41-4	5.4	J	5.0	25	50
02898	Freon 113	76-13-1	14	J	10	25	50
02898	n-Heptane	142-82-5	10	U	10	25	50
02898	Hexachlorobutadiene	87-68-3	5.0	U	5.0	25	50
02898	n-Hexane	110-54-3	5.0	U	5.0	25	50
02898	2-Hexanone	591-78-6	50	U	50	250	50
02898	Isobutyl Alcohol	78-83-1	500	U	500	1,300	50
02898	Isopropylbenzene	98-82-8	5.0	U	5.0	25	50
02898	p-Isopropyltoluene	99-87-6	5.0	U	5.0	25	50
02898	Methacrylonitrile	126-98-7	50	U	50	250	50
02898	Methyl Acetate	79-20-9	1,200		15	50	50
02898	Methyl Methacrylate	80-62-6	5.0	U	5.0	25	50
02898	Methyl Tertiary Butyl Ether	1634-04-4	200		5.0	25	50
02898	4-Methyl-2-Pentanone	108-10-1	50	U	50	250	50
02898	Methylcyclohexane	108-87-2	5.0	U	5.0	25	50
02898	Methylene Chloride	75-09-2	43		10	25	50
02898	Naphthalene	91-20-3	5.0	U	5.0	25	50
02898	Pentachloroethane	76-01-7	10	U	10	25	50
02898	Propionitrile	107-12-0	100	U	100	500	50
02898	n-Propylbenzene	103-65-1	5.0	U	5.0	25	50
02898	Styrene	100-42-5	5.0	U	5.0	25	50
02898	1,1,1,2-Tetrachloroethane	630-20-6	5.0	U	5.0	25	50
02898	1,1,2,2-Tetrachloroethane	79-34-5	5.0	U	5.0	25	50
02898	Tetrachloroethene	127-18-4	5.0	U	5.0	25	50
02898	Tetrahydrofuran	109-99-9	11,000		100	250	50
02898	Toluene	108-88-3	210		5.0	25	50
02898	1,2,3-Trichlorobenzene	87-61-6	5.0	U	5.0	25	50
02898	1,2,4-Trichlorobenzene	120-82-1	5.0	U	5.0	25	50
02898	1,1,1-Trichloroethane	71-55-6	5.0	U	5.0	25	50
02898	1,1,2-Trichloroethane	79-00-5	5.0	U	5.0	25	50
02898	Trichloroethene	79-01-6	590		5.0	25	50
02898	1,2,4-Trimethylbenzene	95-63-6	5.0	U	5.0	25	50
02898	1,3,5-Trimethylbenzene	108-67-8	5.0	U	5.0	25	50
02898	Vinyl Acetate	108-05-4	10	U	10	25	50
02898	Vinyl Chloride	75-01-4	5.0	U	5.0	25	50
02898	m+p-Xylene	1330-20-7	8.7	J	5.0	25	50
02898	o-Xylene	95-47-6	5.0	U	5.0	25	50

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: VBW-8 Grab Water
Chemtronics

LL Sample # WW 7258514
LL Group # 1430406
Account # 12184

Project Name: Chemtronics Site

Collected: 10/30/2013 08:30 by MG

Submitted: 10/31/2013 09:15
Reported: 11/01/2013 16:13

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW-8

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	I133041AA	10/31/2013 16:54	Jason M Long	50
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	I133041AA	10/31/2013 17:15	Jason M Long	500
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	I133041AA	10/31/2013 19:22	Jason M Long	5000
01163	GC/MS VOA Water Prep	SW-846 5030B	1	I133041AA	10/31/2013 16:54	Jason M Long	50
01163	GC/MS VOA Water Prep	SW-846 5030B	2	I133041AA	10/31/2013 17:15	Jason M Long	500
01163	GC/MS VOA Water Prep	SW-846 5030B	3	I133041AA	10/31/2013 19:22	Jason M Long	5000

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: Trip Blank Water
Chemtronics

LL Sample # WW 7258515
LL Group # 1430406
Account # 12184

Project Name: Chemtronics Site

Collected: 10/30/2013

Submitted: 10/31/2013 09:15
Reported: 11/01/2013 16:13

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW8T

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		**ug/l**		**ug/l**	**ug/l**	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.1	U	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	0.5	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-Butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	0.1	U	0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	0.1	U	0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.1	U	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: Trip Blank Water
Chemtronics

LL Sample # WW 7258515
LL Group # 1430406
Account # 12184

Project Name: Chemtronics Site

Collected: 10/30/2013

Submitted: 10/31/2013 09:15
Reported: 11/01/2013 16:13

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW8T

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		**ug/l**		**ug/l**	**ug/l**	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-Pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.1	U	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: Trip Blank Water
Chemtronics

LL Sample # WW 7258515
LL Group # 1430406
Account # 12184

Project Name: Chemtronics Site

Collected: 10/30/2013

Submitted: 10/31/2013 09:15
Reported: 11/01/2013 16:13

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW8T

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	I133041AA	10/31/2013 16:33	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	I133041AA	10/31/2013 16:33	Jason M Long	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1430406
Reported: 11/01/13 at 04:13 PM

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: I133041AA	Sample number(s): 7258514-7258515									
Acetone	3.0	U	3.0	5.0	ug/l	106		60-139		
Acetonitrile	7.0	U	7.0	20	ug/l	97	94	41-158	3	30
Acrolein	5.0	U	5.0	25	ug/l	75		36-137		
Acrylonitrile	1.0	U	1.0	5.0	ug/l	103		69-136		
Allyl Chloride	0.1	U	0.1	0.5	ug/l	115		61-130		
t-Amyl methyl ether	0.1	U	0.1	0.5	ug/l	98		80-124		
Benzene	0.1	U	0.1	0.5	ug/l	105		80-120		
Benzyl Chloride	0.1	U	0.1	0.5	ug/l	99		62-120		
Bromobenzene	0.1	U	0.1	0.5	ug/l	103		80-120		
Bromochloromethane	0.1	U	0.1	0.5	ug/l	95		80-125		
Bromodichloromethane	0.1	U	0.1	0.5	ug/l	101		80-120		
Bromoform	0.1	U	0.1	0.5	ug/l	93		73-128		
Bromomethane	0.1	U	0.1	0.5	ug/l	70		62-126		
n-Butanol	20	U	20.	50	ug/l	107		65-138		
2-Butanone	1.0	U	1.0	5.0	ug/l	99		70-130		
t-Butyl Alcohol	4.0	U	4.0	10	ug/l	95		68-140		
n-Butylbenzene	0.1	U	0.1	0.5	ug/l	113		80-120		
sec-Butylbenzene	0.1	U	0.1	0.5	ug/l	112		80-120		
tert-Butylbenzene	0.1	U	0.1	0.5	ug/l	106		80-120		
Carbon Disulfide	0.4	U	0.4	0.5	ug/l	115		80-128		
Carbon Tetrachloride	0.1	U	0.1	0.5	ug/l	98		80-129		
2-Chloro-1,3-Butadiene	0.1	U	0.1	0.5	ug/l	108		80-127		
Chlorobenzene	0.1	U	0.1	0.5	ug/l	102		80-120		
Chloroethane	0.1	U	0.1	0.5	ug/l	76		68-120		
Chloroform	0.1	U	0.1	0.5	ug/l	104		80-120		
Chloromethane	0.2	U	0.2	0.5	ug/l	67		55-120		
2-Chlorotoluene	0.1	U	0.1	0.5	ug/l	109		80-120		
4-Chlorotoluene	0.1	U	0.1	0.5	ug/l	107		80-120		
Cyclohexane	0.1	U	0.1	0.5	ug/l	108		75-123		
Cyclohexanone	5.0	U	5.0	25	ug/l	99	115	38-149	15	30
1,2-Dibromo-3-chloropropane	0.2	U	0.2	0.5	ug/l	86		64-141		
Dibromochloromethane	0.1	U	0.1	0.5	ug/l	99		80-126		
1,2-Dibromoethane	0.1	U	0.1	0.5	ug/l	103		80-120		
Dibromomethane	0.1	U	0.1	0.5	ug/l	96		80-120		
trans-1,4-Dichloro-2-butene	1.0	U	1.0	5.0	ug/l	69		14-166		
1,2-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	108		80-120		
1,3-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	108		80-120		
1,4-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	108		80-120		
Dichlorodifluoromethane	0.1	U	0.1	0.5	ug/l	47		39-120		
1,1-Dichloroethane	0.1	U	0.1	0.5	ug/l	110		80-120		
1,2-Dichloroethane	0.1	U	0.1	0.5	ug/l	103		80-127		
1,1-Dichloroethene	0.1	U	0.1	0.5	ug/l	105		80-123		
cis-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	101		80-120		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental
Reported: 11/01/13 at 04:13 PM

Group Number: 1430406

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
trans-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	105		80-120		
1,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	114		80-120		
1,3-Dichloropropane	0.1	U	0.1	0.5	ug/l	107		80-120		
2,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	98		75-122		
1,1-Dichloropropene	0.1	U	0.1	0.5	ug/l	107		80-121		
cis-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	101		80-123		
trans-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	103		80-120		
Ethyl Methacrylate	0.1	U	0.1	0.5	ug/l	110		80-120		
Ethyl t-butyl ether	0.1	U	0.1	0.5	ug/l	104		76-120		
Ethylbenzene	0.1	U	0.1	0.5	ug/l	105		80-120		
Freon 113	0.2	U	0.2	0.5	ug/l	100		78-132		
n-Heptane	0.2	U	0.2	0.5	ug/l	114		75-132		
Hexachlorobutadiene	0.1	U	0.1	0.5	ug/l	105		73-120		
n-Hexane	0.1	U	0.1	0.5	ug/l	113		76-131		
2-Hexanone	1.0	U	1.0	5.0	ug/l	117		69-131		
Isobutyl Alcohol	10	U	10.	25	ug/l	112		71-128		
Isopropylbenzene	0.1	U	0.1	0.5	ug/l	102		80-120		
p-Isopropyltoluene	0.1	U	0.1	0.5	ug/l	107		80-120		
Methacrylonitrile	1.0	U	1.0	5.0	ug/l	93		68-138		
Methyl Acetate	0.3	U	0.3	1.0	ug/l	118		69-126		
Methyl Methacrylate	0.1	U	0.1	0.5	ug/l	91		64-149		
Methyl Tertiary Butyl Ether	0.1	U	0.1	0.5	ug/l	100		80-120		
4-Methyl-2-Pentanone	1.0	U	1.0	5.0	ug/l	112		69-135		
Methylcyclohexane	0.1	U	0.1	0.5	ug/l	106		80-127		
Methylene Chloride	0.2	U	0.2	0.5	ug/l	106		80-120		
Naphthalene	0.1	U	0.1	0.5	ug/l	110		65-120		
Pentachloroethane	0.2	U	0.2	0.5	ug/l	111		75-126		
Propionitrile	2.0	U	2.0	10	ug/l	109		71-138		
n-Propylbenzene	0.1	U	0.1	0.5	ug/l	116		80-120		
Styrene	0.1	U	0.1	0.5	ug/l	102		80-120		
1,1,1,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	102		80-120		
1,1,2,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	120		80-125		
Tetrachloroethene	0.1	U	0.1	0.5	ug/l	97		80-120		
Tetrahydrofuran	2.0	U	2.0	5.0	ug/l	89		65-131		
Toluene	0.1	U	0.1	0.5	ug/l	104		80-120		
1,2,3-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	105		63-120		
1,2,4-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	106		70-120		
1,1,1-Trichloroethane	0.1	U	0.1	0.5	ug/l	98		80-120		
1,1,2-Trichloroethane	0.1	U	0.1	0.5	ug/l	105		80-120		
Trichloroethene	0.1	U	0.1	0.5	ug/l	102		80-120		
1,2,4-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	112		80-120		
1,3,5-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	112		80-120		
Vinyl Acetate	0.2	U	0.2	0.5	ug/l	117	116	45-132	1	30
Vinyl Chloride	0.1	U	0.1	0.5	ug/l	69		65-127		
m+p-Xylene	0.1	U	0.1	0.5	ug/l	101		80-120		
o-Xylene	0.1	U	0.1	0.5	ug/l	101		80-120		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

MS	MSD	MS/MSD	RPD	BKG	DUP	DUP	Dup RPD

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1430406
Reported: 11/01/13 at 04:13 PM

Analysis Name	%REC	%REC	Limits	RPD	MAX	Conc	Conc	RPD	Max
Batch number: I133041AA	Sample number(s): 7258514-7258515 UNSPK: P255629								
Acetone	113	102	57-163	6	30				
Acrolein	75	66	29-149	14	30				
Acrylonitrile	120	116	56-161	3	30				
Allyl Chloride	105	103	56-160	2	30				
t-Amyl methyl ether	95	95	74-127	0	30				
Benzene	97	95	87-126	1	30				
Benzyl Chloride	99	96	62-125	3	30				
Bromobenzene	101	99	80-123	2	30				
Bromochloromethane	90	88	82-125	2	30				
Bromodichloromethane	97	96	82-133	2	30				
Bromoform	96	91	60-138	5	30				
Bromomethane	61*	60*	66-130	3	30				
n-Butanol	101	93	55-144	8	30				
2-Butanone	117	112	56-160	5	30				
t-Butyl Alcohol	-54 (2)	-15 (2)	55-154	5	30				
n-Butylbenzene	107	106	83-131	1	30				
sec-Butylbenzene	108	106	84-128	2	30				
tert-Butylbenzene	100	100	84-135	0	30				
Carbon Disulfide	111	109	84-141	2	30				
Carbon Tetrachloride	95	93	81-148	2	30				
2-Chloro-1,3-Butadiene	102	101	87-145	1	30				
Chlorobenzene	98	97	78-133	1	30				
Chloroethane	71	69*	70-139	2	30				
Chloroform	92	90	86-136	1	30				
Chloromethane	57	57	49-135	0	30				
2-Chlorotoluene	103	102	75-134	1	30				
4-Chlorotoluene	103	101	76-134	2	30				
Cyclohexane	40 (2)	3 (2)	69-149	3	30				
1,2-Dibromo-3-chloropropane	99	94	43-143	5	30				
Dibromochloromethane	96	94	79-125	2	30				
1,2-Dibromoethane	100	100	84-127	1	30				
Dibromomethane	92	92	83-126	0	30				
trans-1,4-Dichloro-2-butene	34	21	11-172	47*	30				
1,2-Dichlorobenzene	103	101	83-117	2	30				
1,3-Dichlorobenzene	104	102	79-132	2	30				
1,4-Dichlorobenzene	103	102	79-120	1	30				
Dichlorodifluoromethane	41	41	28-136	1	30				
1,1-Dichloroethane	103	103	88-136	0	30				
1,2-Dichloroethane	-9 (2)	-41 (2)	82-135	1	30				
1,1-Dichloroethene	99	98	83-150	1	30				
cis-1,2-Dichloroethene	95	95	82-129	0	30				
trans-1,2-Dichloroethene	99	99	88-127	0	30				
1,2-Dichloropropane	109	106	91-126	1	30				
1,3-Dichloropropane	102	102	80-127	0	30				
2,2-Dichloropropane	92	91	80-134	1	30				
1,1-Dichloropropene	102	101	86-139	1	30				
cis-1,3-Dichloropropene	93	90	74-132	3	30				
trans-1,3-Dichloropropene	94	89	71-128	5	30				
Ethyl Methacrylate	106	105	73-134	1	30				
Ethyl t-butyl ether	98	98	61-131	0	30				
Ethylbenzene	102	100	80-140	2	30				
Freon 113	96	91	77-147	5	30				
n-Heptane	111	107	86-147	4	30				
Hexachlorobutadiene	100	99	65-128	1	30				
n-Hexane	110	110	82-149	0	30				

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1430406
Reported: 11/01/13 at 04:13 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
2-Hexanone	115	114	59-169	1	30				
Isobutyl Alcohol	102	98	65-146	3	30				
Isopropylbenzene	97	96	81-133	1	30				
p-Isopropyltoluene	102	100	84-124	1	30				
Methacrylonitrile	107	102	58-155	4	30				
Methyl Acetate	103	99	53-142	3	30				
Methyl Methacrylate	107	103	48-152	4	30				
Methyl Tertiary Butyl Ether	95	93	82-132	1	30				
4-Methyl-2-Pentanone	111	108	69-149	3	30				
Methylcyclohexane	101	98	74-140	3	30				
Methylene Chloride	98	97	77-135	1	30				
Naphthalene	105	104	70-131	1	30				
Pentachloroethane	104	101	68-145	2	30				
Propionitrile	128	117	63-147	9	30				
n-Propylbenzene	109	109	79-131	1	30				
Styrene	97	96	63-151	1	30				
1,1,1,2-Tetrachloroethane	98	97	87-126	2	30				
1,1,2,2-Tetrachloroethane	117	115	75-131	1	30				
Tetrachloroethene	92	91	75-129	1	30				
Tetrahydrofuran	108	97	56-154	4	30				
Toluene	98	98	83-127	0	30				
1,2,3-Trichlorobenzene	100	100	73-125	0	30				
1,2,4-Trichlorobenzene	101	99	77-120	1	30				
1,1,1-Trichloroethane	94	93	85-140	1	30				
1,1,2-Trichloroethane	103	102	85-129	1	30				
Trichloroethene	80 (2)	76 (2)	85-131	1	30				
1,2,4-Trimethylbenzene	106	105	87-126	1	30				
1,3,5-Trimethylbenzene	106	104	89-129	2	30				
Vinyl Chloride	64	61*	62-135	4	30				
m+p-Xylene	96	95	81-137	1	30				
o-Xylene	98	97	81-137	1	30				

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed
unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: GC/MS Volatiles
Batch number: I133041AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
7258514	98	99	101	98
7258515	97	98	101	98
Blank	96	97	101	97
LCS	98	100	102	100
LCSD	96	96	102	100
MS	99	100	102	101
MSD	99	98	102	100

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1430406
Reported: 11/01/13 at 04:13 PM

Surrogate Quality Control

Limits:	77-114	74-113	77-110	78-110

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Services Analysis Request/Chain of Custody

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COC#: 7007

Acct. # 12184 Group # 1430406 Sample # 7258514-15

Client:	Altamont Environmental
Project Name/#:	Chemtronics
Project Manager:	Amy Bondurant
P.O. #:	2115.231
Sampler:	MGragg
Phone #:	828 284 3350
Quote #:	207662
State where sample(s) were collected:	NC

SF#: 190423

SCR#: 145435

Sample Identification	Collection Date	Collection Time	Grab	Composite	Matrix: Soil	Matrix: Sediment	Matrix: Potable Water	Matrix: Ground	Matrix: NPDES	Matrix: Surface	Matrix: Other:	Total # of Containers	GC/MS VOAs (8260)	Nitroaromatics/Amines (8330)	Perchlorate (6850)	Moisture (2540 G)	Remarks
VBW-8	10/30/13	830	X				X					3	X				
trip blank																	
																	DO NOT VALIDATE

Preservation Codes: H = HCl, T = Thiosulfate, N = HNO_3, B = NaOH, S = H_2SO_4, P = H_3PO_4, O = Other

Turnaround Time Requested (TAT) (please check): Standard ☐ RUSH ☒

(RUSH TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 24hr

E-mail address to send RUSH results:

Data Package Options (please check if required)

Type I (Validation/non-CLP) ☐ MA MCP ☐ TX TRRP - 13 ☐

Type III (Reduced non-CLP) ☐ CT RCP ☐

Type IV (CLP SOW) ☐ ASP Type A ☐

Type VI (Raw Data Only) ☐ ASP Type B ☐

EDD Format: TerraBase

If site-specific QC (MS/MSD/Dup) required, indicate QC samples and submit triplicate volume.

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	10/30/13	17:00			
			[signature]	10-31-13	915

Airbill No.:

Relinquished by Commercial Carrier:

UPS ____ FedEx ____ Other ____

Temperature upon receipt 1.1 °C

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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Data Qualifiers:

C – result confirmed by reanalysis.

J - estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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ANALYTICAL RESULTS

Prepared by:	Prepared for:
Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601	Altamont Environmental 231 Haywood Street Asheville NC 28801

November 08, 2013

Project: Chemtronics Site

Submittal Date: 11/07/2013
Group Number: 1432066
PO Number: 2115.233
State of Sample Origin: NC

Client Sample Description	Lancaster Labs (LL) #
VBW-9 Groundwater	7267246
Trip Blank Water	7267247

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Altamont Environmental	Attn: Amy Huffman
ELECTRONIC COPY TO	Altamont Environmental	Attn: Marta VanDussen

Respectfully Submitted,

Nancy Jean Bornholm

Nancy Jean Bornholm
Principal Specialist

(717) 556-7250

eurofins
Lancaster Laboratories Environmental
2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Analysis Report

Sample Description: VBW-9 Groundwater Chemtronics Site

LL Sample # WW 7267246
LL Group # 1432066
Account # 12184

Project Name: Chemtronics Site

Collected: 11/05/2013 08:30 by MG

Submitted: 11/07/2013 09:25
Reported: 11/08/2013 16:17

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW-9

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	600	U	600	1,000	200
02898	Acetonitrile	75-05-8	1,400	U	1,400	4,000	200
02898	Acrolein	107-02-8	1,000	U	1,000	5,000	200
02898	Acrylonitrile	107-13-1	200	U	200	1,000	200
02898	Allyl Chloride	107-05-1	20	U	20	100	200
02898	t-Amyl methyl ether	994-05-8	20	U	20	100	200
02898	Benzene	71-43-2	20	U	20	100	200
02898	Benzyl Chloride	100-44-7	20	U	20	100	200
02898	Bromobenzene	108-86-1	20	U	20	100	200
02898	Bromochloromethane	74-97-5	20	U	20	100	200
02898	Bromodichloromethane	75-27-4	20	U	20	100	200
02898	Bromoform	75-25-2	20	U	20	100	200
02898	Bromomethane	74-83-9	20	U	20	100	200
02898	n-Butanol	71-36-3	4,000	U	4,000	10,000	200
02898	2-Butanone	78-93-3	200	U	200	1,000	200
02898	t-Butyl Alcohol	75-65-0	800	U	800	2,000	200
02898	n-Butylbenzene	104-51-8	20	U	20	100	200
02898	sec-Butylbenzene	135-98-8	20	U	20	100	200
02898	tert-Butylbenzene	98-06-6	20	U	20	100	200
02898	Carbon Disulfide	75-15-0	80	U	80	100	200
02898	Carbon Tetrachloride	56-23-5	20	U	20	100	200
02898	2-Chloro-1,3-Butadiene	126-99-8	20	U	20	100	200
02898	Chlorobenzene	108-90-7	20	U	20	100	200
02898	Chloroethane	75-00-3	20	U	20	100	200
02898	Chloroform	67-66-3	70	J	20	100	200
02898	Chloromethane	74-87-3	40	U	40	100	200
02898	2-Chlorotoluene	95-49-8	20	U	20	100	200
02898	4-Chlorotoluene	106-43-4	20	U	20	100	200
02898	Cyclohexane	110-82-7	4,700		20	100	200
02898	Cyclohexanone	108-94-1	1,000	U	1,000	5,000	200
02898	1,2-Dibromo-3-chloropropane	96-12-8	40	U	40	100	200
02898	Dibromochloromethane	124-48-1	20	U	20	100	200
02898	1,2-Dibromoethane	106-93-4	20	U	20	100	200
02898	Dibromomethane	74-95-3	20	U	20	100	200
02898	trans-1,4-Dichloro-2-butene	110-57-6	200	U	200	1,000	200
02898	1,2-Dichlorobenzene	95-50-1	20	U	20	100	200
02898	1,3-Dichlorobenzene	541-73-1	20	U	20	100	200
02898	1,4-Dichlorobenzene	106-46-7	20	U	20	100	200
02898	Dichlorodifluoromethane	75-71-8	20	U	20	100	200
02898	1,1-Dichloroethane	75-34-3	20	U	20	100	200
02898	1,2-Dichloroethane	107-06-2	31,000		200	1,000	2000
02898	1,1-Dichloroethene	75-35-4	20	U	20	100	200
02898	cis-1,2-Dichloroethene	156-59-2	24	J	20	100	200
02898	trans-1,2-Dichloroethene	156-60-5	20	U	20	100	200
02898	1,2-Dichloropropane	78-87-5	20	U	20	100	200
02898	1,3-Dichloropropane	142-28-9	20	U	20	100	200
02898	2,2-Dichloropropane	594-20-7	20	U	20	100	200
02898	1,1-Dichloropropene	563-58-6	20	U	20	100	200
02898	cis-1,3-Dichloropropene	10061-01-5	20	U	20	100	200
02898	trans-1,3-Dichloropropene	10061-02-6	20	U	20	100	200

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: VBW-9 Groundwater
Chemtronics Site

LL Sample # WW 7267246
LL Group # 1432066
Account # 12184

Project Name: Chemtronics Site

Collected: 11/05/2013 08:30 by MG

Submitted: 11/07/2013 09:25
Reported: 11/08/2013 16:17

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW-9

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	20	U	20	100	200
02898	Ethyl t-butyl ether	637-92-3	20	U	20	100	200
02898	Ethylbenzene	100-41-4	20	U	20	100	200
02898	Freon 113	76-13-1	49	J	40	100	200
02898	n-Heptane	142-82-5	40	U	40	100	200
02898	Hexachlorobutadiene	87-68-3	20	U	20	100	200
02898	n-Hexane	110-54-3	20	U	20	100	200
02898	2-Hexanone	591-78-6	200	U	200	1,000	200
02898	Isobutyl Alcohol	78-83-1	2,000	U	2,000	5,000	200
02898	Isopropylbenzene	98-82-8	20	U	20	100	200
02898	p-Isopropyltoluene	99-87-6	20	U	20	100	200
02898	Methacrylonitrile	126-98-7	200	U	200	1,000	200
02898	Methyl Acetate	79-20-9	60	U	60	200	200
02898	Methyl Methacrylate	80-62-6	20	U	20	100	200
02898	Methyl Tertiary Butyl Ether	1634-04-4	20	U	20	100	200
02898	4-Methyl-2-Pentanone	108-10-1	200	U	200	1,000	200
02898	Methylcyclohexane	108-87-2	20	U	20	100	200
02898	Methylene Chloride	75-09-2	1,800		40	100	200
02898	Naphthalene	91-20-3	20	U	20	100	200
02898	Pentachloroethane	76-01-7	40	U	40	100	200
02898	Propionitrile	107-12-0	400	U	400	2,000	200
02898	n-Propylbenzene	103-65-1	20	U	20	100	200
02898	Styrene	100-42-5	20	U	20	100	200
02898	1,1,1,2-Tetrachloroethane	630-20-6	20	U	20	100	200
02898	1,1,2,2-Tetrachloroethane	79-34-5	20	U	20	100	200
02898	Tetrachloroethene	127-18-4	720		20	100	200
02898	Tetrahydrofuran	109-99-9	14,000		400	1,000	200
02898	Toluene	108-88-3	20	U	20	100	200
02898	1,2,3-Trichlorobenzene	87-61-6	20	U	20	100	200
02898	1,2,4-Trichlorobenzene	120-82-1	20	U	20	100	200
02898	1,1,1-Trichloroethane	71-55-6	20	U	20	100	200
02898	1,1,2-Trichloroethane	79-00-5	20	U	20	100	200
02898	Trichloroethene	79-01-6	18,000		200	1,000	2000
02898	1,2,4-Trimethylbenzene	95-63-6	20	U	20	100	200
02898	1,3,5-Trimethylbenzene	108-67-8	20	U	20	100	200
02898	Vinyl Acetate	108-05-4	40	U	40	100	200
02898	Vinyl Chloride	75-01-4	20	U	20	100	200
02898	m+p-Xylene	1330-20-7	41	J	20	100	200
02898	o-Xylene	95-47-6	20	U	20	100	200

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: VBW-9 Groundwater
Chemtronics Site

LL Sample # WW 7267246
LL Group # 1432066
Account # 12184

Project Name: Chemtronics Site

Collected: 11/05/2013 08:30 by MG

Submitted: 11/07/2013 09:25
Reported: 11/08/2013 16:17

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBW-9

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	G133121AA	11/08/2013 10:37	Jason M Long	200
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	G133121AA	11/08/2013 10:59	Jason M Long	2000
01163	GC/MS VOA Water Prep	SW-846 5030B	1	G133121AA	11/08/2013 10:37	Jason M Long	200
01163	GC/MS VOA Water Prep	SW-846 5030B	2	G133121AA	11/08/2013 10:59	Jason M Long	2000

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: Trip Blank Water
Chemtronics Site

LL Sample # WW 7267247
LL Group # 1432066
Account # 12184

Project Name: Chemtronics Site

Collected: 11/05/2013

Submitted: 11/07/2013 09:25
Reported: 11/08/2013 16:17

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBWTB

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		**ug/l**		**ug/l**	**ug/l**	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.1	U	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	0.5	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-Butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	0.1	U	0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	0.1	U	0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.1	U	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

Sample Description: Trip Blank Water
Chemtronics Site

LL Sample # WW 7267247
LL Group # 1432066
Account # 12184

Project Name: Chemtronics Site

Collected: 11/05/2013

Submitted: 11/07/2013 09:25
Reported: 11/08/2013 16:17

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBWTB

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-Pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.1	U	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: Trip Blank Water
Chemtronics Site

LL Sample # WW 7267247
LL Group # 1432066
Account # 12184

Project Name: Chemtronics Site

Collected: 11/05/2013

Submitted: 11/07/2013 09:25
Reported: 11/08/2013 16:17

Altamont Environmental
231 Haywood Street
Asheville NC 28801

VBWTB

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	G133121AA	11/08/2013 11:20	Jason M Long	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	G133121AA	11/08/2013 11:20	Jason M Long	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1432066
Reported: 11/08/13 at 04:17 PM

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: G133121AA	Sample number(s): 7267246-7267247									
Acetone	3.0	U	3.0	5.0	ug/l	84		60-139		
Acetonitrile	7.0	U	7.0	20	ug/l	84		41-158		
Acrolein	5.0	U	5.0	25	ug/l	85		36-137		
Acrylonitrile	1.0	U	1.0	5.0	ug/l	91		69-136		
Allyl Chloride	0.1	U	0.1	0.5	ug/l	75		61-130		
t-Amyl methyl ether	0.1	U	0.1	0.5	ug/l	93		80-124		
Benzene	0.1	U	0.1	0.5	ug/l	97		80-120		
Benzyl Chloride	0.1	U	0.1	0.5	ug/l	88		62-120		
Bromobenzene	0.1	U	0.1	0.5	ug/l	105		80-120		
Bromochloromethane	0.1	U	0.1	0.5	ug/l	109		80-125		
Bromodichloromethane	0.1	U	0.1	0.5	ug/l	97		80-120		
Bromoform	0.1	U	0.1	0.5	ug/l	106		73-128		
Bromomethane	0.1	U	0.1	0.5	ug/l	120		62-126		
n-Butanol	20	U	20.	50	ug/l	83		65-138		
2-Butanone	1.0	U	1.0	5.0	ug/l	83		70-130		
t-Butyl Alcohol	4.0	U	4.0	10	ug/l	98		68-140		
n-Butylbenzene	0.1	U	0.1	0.5	ug/l	95		80-120		
sec-Butylbenzene	0.1	U	0.1	0.5	ug/l	97		80-120		
tert-Butylbenzene	0.1	U	0.1	0.5	ug/l	101		80-120		
Carbon Disulfide	0.4	U	0.4	0.5	ug/l	92		80-128		
Carbon Tetrachloride	0.1	U	0.1	0.5	ug/l	97		80-129		
2-Chloro-1,3-Butadiene	0.1	U	0.1	0.5	ug/l	85		80-127		
Chlorobenzene	0.1	U	0.1	0.5	ug/l	103		80-120		
Chloroethane	0.1	U	0.1	0.5	ug/l	98		68-120		
Chloroform	0.1	U	0.1	0.5	ug/l	100		80-120		
Chloromethane	0.2	U	0.2	0.5	ug/l	92		55-120		
2-Chlorotoluene	0.1	U	0.1	0.5	ug/l	101		80-120		
4-Chlorotoluene	0.1	U	0.1	0.5	ug/l	103		80-120		
Cyclohexane	0.1	U	0.1	0.5	ug/l	76		75-123		
Cyclohexanone	5.0	U	5.0	25	ug/l	85		38-149		
1,2-Dibromo-3-chloropropane	0.2	U	0.2	0.5	ug/l	107		64-141		
Dibromochloromethane	0.1	U	0.1	0.5	ug/l	101		80-126		
1,2-Dibromoethane	0.1	U	0.1	0.5	ug/l	98		80-120		
Dibromomethane	0.1	U	0.1	0.5	ug/l	100		80-120		
trans-1,4-Dichloro-2-butene	1.0	U	1.0	5.0	ug/l	80		14-166		
1,2-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	101		80-120		
1,3-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	106		80-120		
1,4-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	104		80-120		
Dichlorodifluoromethane	0.1	U	0.1	0.5	ug/l	98		39-120		
1,1-Dichloroethane	0.1	U	0.1	0.5	ug/l	94		80-120		
1,2-Dichloroethane	0.1	U	0.1	0.5	ug/l	97		80-127		
1,1-Dichloroethene	0.1	U	0.1	0.5	ug/l	99		80-123		
cis-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	101		80-120		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1432066
Reported: 11/08/13 at 04:17 PM

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
trans-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	101		80-120		
1,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	92		80-120		
1,3-Dichloropropane	0.1	U	0.1	0.5	ug/l	91		80-120		
2,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	95		75-122		
1,1-Dichloropropene	0.1	U	0.1	0.5	ug/l	94		80-121		
cis-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	96		80-123		
trans-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	86		80-120		
Ethyl Methacrylate	0.1	U	0.1	0.5	ug/l	80		80-120		
Ethyl t-butyl ether	0.1	U	0.1	0.5	ug/l	88		76-120		
Ethylbenzene	0.1	U	0.1	0.5	ug/l	97		80-120		
Freon 113	0.2	U	0.2	0.5	ug/l	95		78-132		
n-Heptane	0.2	U	0.2	0.5	ug/l	75		75-132		
Hexachlorobutadiene	0.1	U	0.1	0.5	ug/l	99		73-120		
n-Hexane	0.1	U	0.1	0.5	ug/l	79		76-131		
2-Hexanone	1.0	U	1.0	5.0	ug/l	74		69-131		
Isobutyl Alcohol	10	U	10.	25	ug/l	88		71-128		
Isopropylbenzene	0.1	U	0.1	0.5	ug/l	98		80-120		
p-Isopropyltoluene	0.1	U	0.1	0.5	ug/l	98		80-120		
Methacrylonitrile	1.0	U	1.0	5.0	ug/l	100		68-138		
Methyl Acetate	0.3	U	0.3	1.0	ug/l	87		69-126		
Methyl Methacrylate	0.1	U	0.1	0.5	ug/l	91		64-149		
Methyl Tertiary Butyl Ether	0.1	U	0.1	0.5	ug/l	92		80-120		
4-Methyl-2-Pentanone	1.0	U	1.0	5.0	ug/l	77		69-135		
Methylcyclohexane	0.1	U	0.1	0.5	ug/l	95		80-127		
Methylene Chloride	0.2	U	0.2	0.5	ug/l	98		80-120		
Naphthalene	0.1	U	0.1	0.5	ug/l	80		65-120		
Pentachloroethane	0.2	U	0.2	0.5	ug/l	99		75-126		
Propionitrile	2.0	U	2.0	10	ug/l	102		71-138		
n-Propylbenzene	0.1	U	0.1	0.5	ug/l	95		80-120		
Styrene	0.1	U	0.1	0.5	ug/l	99		80-120		
1,1,1,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	100		80-120		
1,1,2,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	90		80-125		
Tetrachloroethene	0.1	U	0.1	0.5	ug/l	108		80-120		
Tetrahydrofuran	2.0	U	2.0	5.0	ug/l	98		65-131		
Toluene	0.1	U	0.1	0.5	ug/l	97		80-120		
1,2,3-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	83		63-120		
1,2,4-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	93		70-120		
1,1,1-Trichloroethane	0.1	U	0.1	0.5	ug/l	101		80-120		
1,1,2-Trichloroethane	0.1	U	0.1	0.5	ug/l	96		80-120		
Trichloroethene	0.1	U	0.1	0.5	ug/l	102		80-120		
1,2,4-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	97		80-120		
1,3,5-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	97		80-120		
Vinyl Acetate	0.2	U	0.2	0.5	ug/l	96		45-132		
Vinyl Chloride	0.1	U	0.1	0.5	ug/l	102		65-127		
m+p-Xylene	0.1	U	0.1	0.5	ug/l	100		80-120		
o-Xylene	0.1	U	0.1	0.5	ug/l	100		80-120		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

MS	MSD	MS/MSD	RPD	BKG	DUP	DUP	Dup RPD

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1432066
Reported: 11/08/13 at 04:17 PM

Analysis Name	%REC	%REC	Limits	RPD	MAX	Conc	Conc	RPD	Max
Batch number: G133121AA	Sample number(s): 7267246-7267247 UNSPK: P266118								
Acetone	87	103	57-163	17	30				
Acetonitrile	82	73*	77-129	12	30				
Acrolein	83	98	29-149	16	30				
Acrylonitrile	88	105	56-161	18	30				
Allyl Chloride	79	81	56-160	2	30				
t-Amyl methyl ether	94	99	74-127	5	30				
Benzene	104	109	87-126	4	30				
Benzyl Chloride	89	98	62-125	10	30				
Bromobenzene	107	114	80-123	6	30				
Bromochloromethane	114	119	82-125	5	30				
Bromodichloromethane	100	106	82-133	6	30				
Bromoform	106	118	60-138	10	30				
Bromomethane	124	131*	66-130	5	30				
n-Butanol	81	95	55-144	17	30				
2-Butanone	84	97	56-160	14	30				
t-Butyl Alcohol	97	111	55-154	14	30				
n-Butylbenzene	101	109	83-131	8	30				
sec-Butylbenzene	104	112	84-128	7	30				
tert-Butylbenzene	106	115	84-135	8	30				
Carbon Disulfide	103	107	84-141	4	30				
Carbon Tetrachloride	111	118	81-148	6	30				
2-Chloro-1,3-Butadiene	94	100	87-145	6	30				
Chlorobenzene	107	113	78-133	6	30				
Chloroethane	107	110	70-139	3	30				
Chloroform	281 (2)	751 (2)	86-136	27	30				
Chloromethane	98	101	49-135	3	30				
2-Chlorotoluene	105	112	75-134	7	30				
4-Chlorotoluene	106	114	76-134	7	30				
Cyclohexane	88	92	69-149	4	30				
Cyclohexanone	79	78	50-126	2	30				
1,2-Dibromo-3-chloropropane	108	129	43-143	18	30				
Dibromochloromethane	102	110	79-125	7	30				
1,2-Dibromoethane	97	103	84-127	7	30				
Dibromomethane	104	109	83-126	5	30				
trans-1,4-Dichloro-2-butene	80	99	11-172	21	30				
1,2-Dichlorobenzene	105	111	83-117	5	30				
1,3-Dichlorobenzene	110	117	79-132	6	30				
1,4-Dichlorobenzene	106	113	79-120	7	30				
Dichlorodifluoromethane	109	112	28-136	3	30				
1,1-Dichloroethane	97	101	88-136	4	30				
1,2-Dichloroethane	100	106	82-135	6	30				
1,1-Dichloroethene	112	117	83-150	5	30				
cis-1,2-Dichloroethene	109	115	82-129	5	30				
trans-1,2-Dichloroethene	110	116	88-127	5	30				
1,2-Dichloropropane	96	101	91-126	5	30				
1,3-Dichloropropane	92	97	80-127	6	30				
2,2-Dichloropropane	104	109	80-134	5	30				
1,1-Dichloropropene	103	110	86-139	6	30				
cis-1,3-Dichloropropene	99	104	74-132	5	30				
trans-1,3-Dichloropropene	85	93	71-128	8	30				
Ethyl Methacrylate	80	86	73-134	8	30				
Ethyl t-butyl ether	90	94	61-131	5	30				
Ethylbenzene	103	110	80-140	6	30				
Freon 113	110	115	77-147	5	30				
n-Heptane	90	93	86-147	3	30				

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1432066
Reported: 11/08/13 at 04:17 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Hexachlorobutadiene	106	115	65-128	7	30				
n-Hexane	93	98	82-149	5	30				
2-Hexanone	73	77	59-169	6	30				
Isobutyl Alcohol	87	103	65-146	17	30				
Isopropylbenzene	104	111	81-133	7	30				
p-Isopropyltoluene	105	111	84-124	5	30				
Methacrylonitrile	98	118	58-155	18	30				
Methyl Acetate	83	90	53-142	9	30				
Methyl Methacrylate	91	106	48-152	15	30				
Methyl Tertiary Butyl Ether	94	99	82-132	5	30				
4-Methyl-2-Pentanone	76	83	69-149	8	30				
Methylcyclohexane	111	115	74-140	4	30				
Methylene Chloride	104	109	77-135	4	30				
Naphthalene	81	87	70-131	8	30				
Pentachloroethane	101	107	68-145	6	30				
Propionitrile	104	111	63-147	7	30				
n-Propylbenzene	102	109	79-131	6	30				
Styrene	102	108	63-151	7	30				
1,1,1,2-Tetrachloroethane	102	109	87-126	7	30				
1,1,2,2-Tetrachloroethane	89	95	75-131	6	30				
Tetrachloroethene	134*	205*	75-129	21	30				
Tetrahydrofuran	97	116	56-154	18	30				
Toluene	103	110	83-127	6	30				
1,2,3-Trichlorobenzene	85	94	73-125	9	30				
1,2,4-Trichlorobenzene	95	104	77-120	9	30				
1,1,1-Trichloroethane	109	115	85-140	5	30				
1,1,2-Trichloroethane	100	107	85-129	8	30				
Trichloroethene	166 (2)	320 (2)	85-131	24	30				
1,2,4-Trimethylbenzene	101	108	87-126	7	30				
1,3,5-Trimethylbenzene	101	108	89-129	7	30				
Vinyl Acetate	98	97	45-136	1	30				
Vinyl Chloride	112	116	62-135	4	30				
m+p-Xylene	106	113	81-137	6	30				
o-Xylene	104	112	81-137	7	30				

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed
unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: GC/MS Volatiles
Batch number: G133121AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
7267246	102	105	95	90
7267247	103	104	95	90
Blank	100	103	95	89
LCS	103	100	96	92
MS	104	101	95	91

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1432066
Reported: 11/08/13 at 04:17 PM

Surrogate Quality Control

MSD	102	99	96	91
Limits:	77-114	74-113	77-110	78-110

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Services Analysis Request/Chain of Custody

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Acct. # 12184 Group # 1432066 Sample # 7267246-47

COC#: 7285

Client: **Altamont Environmental**

Project Name/#: 2115.231

Project Manager: Amy Huffman P.O. #: 2115.233

Sampler: M. Gray

Phone #: 828-281-2350 Quote #: 207662

State where sample(s) were collected: NC

SF#: 149644

SCR#: 146415

Preservation Codes: H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; P = H_3PO_4; O = Other

Sample Identification	Collection Date	Collection Time	Grab	Composite	Soil	Sediment	Potable Water	Ground Water	NPDES Surface Water	Other:	Total # of Containers	GC/MS VOAs (8260)	Picric Acid (8015B)	Perchlorate (6850)	Nitroaromatics/Amines (8330)	Remarks
VBW-9	11/5/13	830						X			3	X				
TRIP BLANK	11/5/13										2	X				Do not Validate

Turnaround Time Requested (TAT) (please check): Standard ☐ RUSH ☒

(RUSH TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 24 hrs

E-mail address to send RUSH results: AHuffman@AltamontEnvironmental.com

Data Package Options (please check if required)

Type I (Validation/non-CLP) ☐ MA MCP ☐ TX TRRP - 13 ☐

Type III (Reduced non-CLP) ☐ CT RCP ☐

Type IV (CLP SOW) ☐ ASP Type A ☐

Type VI (Raw Data Only) ☐ ASP Type B ☐

EDD Format: TerraBase

If site-specific QC (MS/MSD/Dup) required, indicate QC samples and submit triplicate volume.

Relinquished by:	Date	Time	Received by:	Date	Time
M. Gray	11/6/13	1812			

Airbill No :

Relinquished by Commercial Carrier:

UPS ✓ FedEx ____ Other ____

Temperature upon receipt 0.4 °C

Eurofins Lancaster Laboratories Environmental • 2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300

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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Data Qualifiers:

C – result confirmed by reanalysis.

J - estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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ANALYTICAL RESULTS

Prepared by:	Prepared for:
Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601	Altamont Environmental 231 Haywood Street Asheville NC 28801

October 09, 2013

Project: Chemtronics Site

Submittal Date: 10/05/2013
Group Number: 1424142
PO Number: 2115.22
State of Sample Origin: NC

Client Sample Description	Lancaster Labs (LL) #
MW254 Grab Groundwater	7226107
MW255 Grab Groundwater	7226108
TRIPBLANK Water	7226109

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Altamont Environmental	Attn: Amy Huffman
ELECTRONIC COPY TO	Altamont Environmental	Attn: Marta VanDussen
ELECTRONIC COPY TO	Altamont Environmental	Attn: Stu Ryman

Respectfully Submitted,

Nancy Jean Bornholm

Nancy Jean Bornholm
Principal Specialist

(717) 556-7250

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Analysis Report

Sample Description: MW254 Grab Groundwater Chemtronics Site

LL Sample # WW 7226107
LL Group # 1424142
Account # 12184

Project Name: Chemtronics Site

Collected: 10/04/2013 10:17 by PB

Submitted: 10/05/2013 10:15
Reported: 10/09/2013 13:45

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CHTR1

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.2	J	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.3	J	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	0.5	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-Butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	4.6		0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	240		1.0	5.0	10
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.2	J	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.1	J	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.5	J	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW254 Grab Groundwater Chemtronics Site

LL Sample # WW 7226107
LL Group # 1424142
Account # 12184

Project Name: Chemtronics Site

Collected: 10/04/2013 10:17 by PB

Submitted: 10/05/2013 10:15
Reported: 10/09/2013 13:45

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CHTR1

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		**ug/l**		**ug/l**	**ug/l**	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-Pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.4	J	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.9		0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	24		0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	J	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1
Perchlorate	**SW-846 6850 1/2007**		**ug/l**		**ug/l**	**ug/l**	
06386	Perchlorate	14797-73-0	20		0.20	1.0	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW254 Grab Groundwater
Chemtronics Site

LL Sample # WW 7226107
LL Group # 1424142
Account # 12184

Project Name: Chemtronics Site

Collected: 10/04/2013 10:17 by PB

Submitted: 10/05/2013 10:15
Reported: 10/09/2013 13:45

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CHTR1

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	I132811AA	10/08/2013 16:50	Kerri E Legerlotz	10
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	I132811AA	10/08/2013 17:53	Kerri E Legerlotz	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	I132811AA	10/08/2013 16:50	Kerri E Legerlotz	10
01163	GC/MS VOA Water Prep	SW-846 5030B	2	I132811AA	10/08/2013 17:53	Kerri E Legerlotz	1
06386	Perchlorate	SW-846 6850 1/2007	1	132810001A	10/08/2013 12:44	Richard A Shober	1

*=This limit was used in the evaluation of the final result

Sample Description: MW255 Grab Groundwater
Chemtronics Site

LL Sample # WW 7226108
LL Group # 1424142
Account # 12184

Project Name: Chemtronics Site

Collected: 10/04/2013 11:16 by PB

Submitted: 10/05/2013 10:15
Reported: 10/09/2013 13:45

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CHTR2

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		**ug/l**		**ug/l**	**ug/l**	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.2	J	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	0.5	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-Butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	20		0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	0.5	J	0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	8.3		0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	7.3		0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

Sample Description: MW255 Grab Groundwater
Chemtronics Site

LL Sample # WW 7226108
LL Group # 1424142
Account # 12184

Project Name: Chemtronics Site

Collected: 10/04/2013 11:16 by PB

Submitted: 10/05/2013 10:15
Reported: 10/09/2013 13:45

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CHTR2

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		**ug/l**		**ug/l**	**ug/l**	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-Pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.6		0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	28		1.0	5.0	10
02898	Tetrahydrofuran	109-99-9	10		2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	130		1.0	5.0	10
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1
Perchlorate	**SW-846 6850 1/2007**		**ug/l**		**ug/l**	**ug/l**	
06386	Perchlorate	14797-73-0	700		20	100	100

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW255 Grab Groundwater
Chemtronics Site

LL Sample # WW 7226108
LL Group # 1424142
Account # 12184

Project Name: Chemtronics Site

Collected: 10/04/2013 11:16 by PB

Submitted: 10/05/2013 10:15
Reported: 10/09/2013 13:45

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CHTR2

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	I132811AA	10/08/2013 17:32	Kerri E Legerlotz	1
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	I132811AA	10/08/2013 18:36	Kerri E Legerlotz	10
01163	GC/MS VOA Water Prep	SW-846 5030B	1	I132811AA	10/08/2013 17:32	Kerri E Legerlotz	1
01163	GC/MS VOA Water Prep	SW-846 5030B	2	I132811AA	10/08/2013 18:36	Kerri E Legerlotz	10
06386	Perchlorate	SW-846 6850 1/2007	1	132810001A	10/08/2013 14:19	Richard A Shober	100

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: TRIPBLANK Water
Chemtronics Site

LL Sample # WW 7226109
LL Group # 1424142
Account # 12184

Project Name: Chemtronics Site

Collected: 10/04/2013

Submitted: 10/05/2013 10:15
Reported: 10/09/2013 13:45

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CHTRT

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.1	U	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	0.5	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-Butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	0.1	U	0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	0.1	U	0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.1	U	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

Sample Description: TRIPBLANK Water
Chemtronics Site

LL Sample # WW 7226109
LL Group # 1424142
Account # 12184

Project Name: Chemtronics Site

Collected: 10/04/2013

Submitted: 10/05/2013 10:15
Reported: 10/09/2013 13:45

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CHTRT

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-Pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.1	U	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: TRIPBLANK Water
Chemtronics Site

LL Sample # WW 7226109
LL Group # 1424142
Account # 12184

Project Name: Chemtronics Site

Collected: 10/04/2013

Submitted: 10/05/2013 10:15
Reported: 10/09/2013 13:45

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CHTRT

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	I132811AA	10/08/2013 16:29	Kerri E Legerlotz	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	I132811AA	10/08/2013 16:29	Kerri E Legerlotz	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1424142
Reported: 10/09/13 at 01:45 PM

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: I132811AA	Sample number(s): 7226107-7226109									
Acetone	3.0	U	3.0	5.0	ug/l	99		60-139		
Acetonitrile	7.0	U	7.0	20	ug/l	100	103	41-158	3	30
Acrolein	5.0	U	5.0	25	ug/l	67		36-137		
Acrylonitrile	1.0	U	1.0	5.0	ug/l	95		69-136		
Allyl Chloride	0.1	U	0.1	0.5	ug/l	93		61-130		
t-Amyl methyl ether	0.1	U	0.1	0.5	ug/l	92		80-124		
Benzene	0.1	U	0.1	0.5	ug/l	97		80-120		
Benzyl Chloride	0.1	U	0.1	0.5	ug/l	96		62-120		
Bromobenzene	0.1	U	0.1	0.5	ug/l	93		80-120		
Bromochloromethane	0.1	U	0.1	0.5	ug/l	95		80-125		
Bromodichloromethane	0.1	U	0.1	0.5	ug/l	94		80-120		
Bromoform	0.1	U	0.1	0.5	ug/l	96		73-128		
Bromomethane	0.1	U	0.1	0.5	ug/l	91		62-126		
n-Butanol	20	U	20.	50	ug/l	98		65-138		
2-Butanone	1.0	U	1.0	5.0	ug/l	92		70-130		
t-Butyl Alcohol	4.0	U	4.0	10	ug/l	88		68-140		
n-Butylbenzene	0.1	U	0.1	0.5	ug/l	98		80-120		
sec-Butylbenzene	0.1	U	0.1	0.5	ug/l	98		80-120		
tert-Butylbenzene	0.1	U	0.1	0.5	ug/l	95		80-120		
Carbon Disulfide	0.4	U	0.4	0.5	ug/l	100		80-128		
Carbon Tetrachloride	0.1	U	0.1	0.5	ug/l	96		80-129		
2-Chloro-1,3-Butadiene	0.1	U	0.1	0.5	ug/l	93		80-127		
Chlorobenzene	0.1	U	0.1	0.5	ug/l	94		80-120		
Chloroethane	0.1	U	0.1	0.5	ug/l	94		68-120		
Chloroform	0.1	U	0.1	0.5	ug/l	96		80-120		
Chloromethane	0.2	U	0.2	0.5	ug/l	99		55-120		
2-Chlorotoluene	0.1	U	0.1	0.5	ug/l	95		80-120		
4-Chlorotoluene	0.1	U	0.1	0.5	ug/l	95		80-120		
Cyclohexane	0.1	U	0.1	0.5	ug/l	94		75-123		
Cyclohexanone	5.0	U	5.0	25	ug/l	64	58	38-149	10	30
1,2-Dibromo-3-chloropropane	0.2	U	0.2	0.5	ug/l	88		64-141		
Dibromochloromethane	0.1	U	0.1	0.5	ug/l	95		80-126		
1,2-Dibromoethane	0.1	U	0.1	0.5	ug/l	95		80-120		
Dibromomethane	0.1	U	0.1	0.5	ug/l	96		80-120		
trans-1,4-Dichloro-2-butene	1.0	U	1.0	5.0	ug/l	90		14-166		
1,2-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	96		80-120		
1,3-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	97		80-120		
1,4-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	96		80-120		
Dichlorodifluoromethane	0.1	U	0.1	0.5	ug/l	101		39-120		
1,1-Dichloroethane	0.1	U	0.1	0.5	ug/l	100		80-120		
1,2-Dichloroethane	0.1	U	0.1	0.5	ug/l	97		80-127		
1,1-Dichloroethene	0.1	U	0.1	0.5	ug/l	100		80-123		
cis-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	95		80-120		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1424142
Reported: 10/09/13 at 01:45 PM

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
trans-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	97		80-120		
1,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	102		80-120		
1,3-Dichloropropane	0.1	U	0.1	0.5	ug/l	97		80-120		
2,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	93		75-122		
1,1-Dichloropropene	0.1	U	0.1	0.5	ug/l	96		80-121		
cis-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	102		80-123		
trans-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	94		80-120		
Ethyl Methacrylate	0.1	U	0.1	0.5	ug/l	95		80-120		
Ethyl t-butyl ether	0.1	U	0.1	0.5	ug/l	92		76-120		
Ethylbenzene	0.1	U	0.1	0.5	ug/l	93		80-120		
Freon 113	0.2	U	0.2	0.5	ug/l	94		78-132		
n-Heptane	0.2	U	0.2	0.5	ug/l	100		75-132		
Hexachlorobutadiene	0.1	U	0.1	0.5	ug/l	96		73-120		
n-Hexane	0.1	U	0.1	0.5	ug/l	101		76-131		
2-Hexanone	1.0	U	1.0	5.0	ug/l	100		69-131		
Isobutyl Alcohol	10	U	10.	25	ug/l	98		71-128		
Isopropylbenzene	0.1	U	0.1	0.5	ug/l	92		80-120		
p-Isopropyltoluene	0.1	U	0.1	0.5	ug/l	95		80-120		
Methacrylonitrile	1.0	U	1.0	5.0	ug/l	88		68-138		
Methyl Acetate	0.3	U	0.3	1.0	ug/l	115		69-126		
Methyl Methacrylate	0.1	U	0.1	0.5	ug/l	84		64-149		
Methyl Tertiary Butyl Ether	0.1	U	0.1	0.5	ug/l	93		80-120		
4-Methyl-2-Pentanone	1.0	U	1.0	5.0	ug/l	101		69-135		
Methylcyclohexane	0.1	U	0.1	0.5	ug/l	100		80-127		
Methylene Chloride	0.2	U	0.2	0.5	ug/l	99		80-120		
Naphthalene	0.1	U	0.1	0.5	ug/l	100		65-120		
Pentachloroethane	0.2	U	0.2	0.5	ug/l	99		75-126		
Propionitrile	2.0	U	2.0	10	ug/l	102		71-138		
n-Propylbenzene	0.1	U	0.1	0.5	ug/l	98		80-120		
Styrene	0.1	U	0.1	0.5	ug/l	92		80-120		
1,1,1,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	92		80-120		
1,1,2,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	105		80-125		
Tetrachloroethene	0.1	U	0.1	0.5	ug/l	91		80-120		
Tetrahydrofuran	2.0	U	2.0	5.0	ug/l	87		65-131		
Toluene	0.1	U	0.1	0.5	ug/l	92		80-120		
1,2,3-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	97		63-120		
1,2,4-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	94		70-120		
1,1,1-Trichloroethane	0.1	U	0.1	0.5	ug/l	94		80-120		
1,1,2-Trichloroethane	0.1	U	0.1	0.5	ug/l	98		80-120		
Trichloroethene	0.1	U	0.1	0.5	ug/l	95		80-120		
1,2,4-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	96		80-120		
1,3,5-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	96		80-120		
Vinyl Acetate	0.2	U	0.2	0.5	ug/l	115	111	45-132	4	30
Vinyl Chloride	0.1	U	0.1	0.5	ug/l	98		65-127		
m+p-Xylene	0.1	U	0.1	0.5	ug/l	93		80-120		
o-Xylene	0.1	U	0.1	0.5	ug/l	91		80-120		
Batch number: 132810001A	Sample number(s): 7226107-7226108									
Perchlorate	0.20	U	0.20	1.0	ug/l	95		80-120		

Sample Matrix Quality Control

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1424142
Reported: 10/09/13 at 01:45 PM
Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: I132811AA	Sample number(s): 7226107-7226109 UNSPK: P226802								
Acetone	153	163	57-163	6	30				
Acrolein	61	66	29-149	9	30				
Acrylonitrile	89	98	56-161	9	30				
Allyl Chloride	92	92	56-160	0	30				
t-Amyl methyl ether	84	89	74-127	6	30				
Benzene	92	93	87-126	1	30				
Benzyl Chloride	89	94	62-125	6	30				
Bromobenzene	88	91	80-123	3	30				
Bromochloromethane	93	92	82-125	1	30				
Bromodichloromethane	88	92	82-133	5	30				
Bromoform	88	94	60-138	7	30				
Bromomethane	93	92	66-130	0	30				
n-Butanol	92	114	55-144	22	30				
2-Butanone	111	123	56-160	10	30				
t-Butyl Alcohol	86	101	55-154	16	30				
n-Butylbenzene	95	96	83-131	1	30				
sec-Butylbenzene	94	96	84-128	3	30				
tert-Butylbenzene	90	93	84-135	4	30				
Carbon Disulfide	95	95	84-141	1	30				
Carbon Tetrachloride	91	92	81-148	1	30				
2-Chloro-1,3-Butadiene	91	91	87-145	0	30				
Chlorobenzene	89	92	78-133	4	30				
Chloroethane	96	96	70-139	0	30				
Chloroform	91	93	86-136	2	30				
Chloromethane	101	101	49-135	0	30				
2-Chlorotoluene	91	93	75-134	2	30				
4-Chlorotoluene	90	93	76-134	3	30				
Cyclohexane	92	93	69-149	1	30				
1,2-Dibromo-3-chloropropane	84	98	43-143	14	30				
Dibromochloromethane	88	94	79-125	7	30				
1,2-Dibromoethane	90	95	84-127	6	30				
Dibromomethane	90	94	83-126	4	30				
trans-1,4-Dichloro-2-butene	87	102	11-172	15	30				
1,2-Dichlorobenzene	92	95	83-117	3	30				
1,3-Dichlorobenzene	92	96	79-132	4	30				
1,4-Dichlorobenzene	92	95	79-120	3	30				
Dichlorodifluoromethane	104	105	28-136	0	30				
1,1-Dichloroethane	95	95	88-136	1	30				
1,2-Dichloroethane	91	94	82-135	3	30				
1,1-Dichloroethene	96	96	83-150	1	30				
cis-1,2-Dichloroethene	89	91	82-129	2	30				
trans-1,2-Dichloroethene	93	93	88-127	0	30				
1,2-Dichloropropane	96	100	91-126	3	30				
1,3-Dichloropropane	93	97	80-127	4	30				
2,2-Dichloropropane	88	89	80-134	1	30				
1,1-Dichloropropene	92	94	86-139	1	30				
cis-1,3-Dichloropropene	96	101	74-132	5	30				
trans-1,3-Dichloropropene	88	94	71-128	7	30				
Ethyl Methacrylate	91	96	73-134	6	30				
Ethyl t-butyl ether	84	88	61-131	5	30				
Ethylbenzene	90	92	80-140	3	30				

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1424142
Reported: 10/09/13 at 01:45 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Freon 113	92	93	77-147	1	30				
n-Heptane	99	99	86-147	0	30				
Hexachlorobutadiene	92	95	65-128	3	30				
n-Hexane	98	99	82-149	1	30				
2-Hexanone	114	120	59-169	5	30				
Isobutyl Alcohol	96	109	65-146	13	30				
Isopropylbenzene	88	92	81-133	5	30				
p-Isopropyltoluene	91	93	84-124	2	30				
Methacrylonitrile	84	96	58-155	14	30				
Methyl Acetate	107	106	53-142	1	30				
Methyl Methacrylate	80	94	48-152	16	30				
Methyl Tertiary Butyl Ether	84	88	82-132	5	30				
4-Methyl-2-Pentanone	99	105	69-149	6	30				
Methylcyclohexane	102	102	74-140	0	30				
Methylene Chloride	92	93	77-135	1	30				
Naphthalene	95	100	70-131	5	30				
Pentachloroethane	85	83	68-145	3	30				
Propionitrile	94	105	63-147	11	30				
n-Propylbenzene	94	97	79-131	3	30				
Styrene	87	91	63-151	4	30				
1,1,1,2-Tetrachloroethane	88	91	87-126	4	30				
1,1,2,2-Tetrachloroethane	99	106	75-131	7	30				
Tetrachloroethene	98	100	75-129	3	30				
Tetrahydrofuran	83	95	56-154	14	30				
Toluene	87	89	83-127	3	30				
1,2,3-Trichlorobenzene	90	94	73-125	5	30				
1,2,4-Trichlorobenzene	88	92	77-120	5	30				
1,1,1-Trichloroethane	90	91	85-140	2	30				
1,1,2-Trichloroethane	94	98	85-129	4	30				
Trichloroethene	93	95	85-131	3	30				
1,2,4-Trimethylbenzene	92	94	87-126	2	30				
1,3,5-Trimethylbenzene	92	94	89-129	2	30				
Vinyl Chloride	103	103	62-135	0	30				
m+p-Xylene	88	91	81-137	3	30				
o-Xylene	86	89	81-137	4	30				

Batch number: 132810001A Sample number(s): 7226107-7226108 UNSPK: 7226107

Perchlorate	124 (2)	122 (2)	80-120	0	20

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed
unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: GC/MS Volatiles
Batch number: I132811AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
7226107	100	105	97	97

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1424142
Reported: 10/09/13 at 01:45 PM

Surrogate Quality Control

7226108	102	103	97	96
7226109	100	103	98	96
Blank	101	105	98	97
LCS	102	107	98	99
LCSD	100	107	97	99
MS	102	108	98	99
MSD	102	110	98	100
Limits:	77-114	74-113	77-110	78-110

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

eurofins

Lancaster Laboratories

Environmental Services Analysis Request/Chain of Custody

Acct. #: 12184 Group #: Sample #:

COC#: 6199

Client: **Altamont Environmental**

Project Name/#: Chemtronics

Project Manager: Amy Bondurant P.O. #: 2115.22

Sampler: P Brooks

Phone #: 828 281 3350 Quote #: 207662

State where sample(s) were collected: NC

For Lab Use Only

SF#: 181523

SCR#: 140976

Preservation Codes: H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; P = H_3PO_4; O = Other

Sample Identification	Collection Date	Collection Time	Grab	Composite	Sediment	Ground	Surface	Potable	NPDES	Soil	Water	Other:	Total # of Containers	GC/MS VOAs (8260) (H)	Dissolved Gases (8015) (H)	Cl-, SO4-, NO2, NO3 (300.0)	TOC (SM20 5310 C) (P)	S2- (4500 S2 D) (O)	Perchlorate (6850)	Remarks
MW 254	10/4/13	1017	X			X					X		4	X					X	
MW 255	10/4/13	~~1116~~ 1116	X			X					X		4	X					X	48 Hr TAT
Trip Blank	10/4/13												2	X						

Turnaround Time Requested (TAT) (please check): Standard ☐ RUSH ☒

(RUSH TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 48 HR TAT

E-mail address to send RUSH results: ahuffman@altamontenvironmental.com

Data Package Options (please check if required)

Type I (Validation/non-CLP) ☐ MA MCP ☐ TX TRRP - 13 ☐

Type III (Reduced non-CLP) ☐ CT RCP ☐

Type IV (CLP SOW) ☐ ASP Type A ☐

Type VI (Raw Data Only) ☐ ASP Type B ☐

EDD Format:

If site-specific QC (MS/MSD/Dup) required, indicate QC samples and submit triplicate volume.

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	10/04/13	1230			
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

Airbill No.:

Relinquished by Commercial Carrier:

UPS _____ FedEx _____ Other _____

Temperature upon receipt _____ °C

eurofins | Lancaster Laboratories Environmental

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Data Qualifiers:

C – result confirmed by reanalysis.

J - estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

ANALYTICAL RESULTS

Prepared by:	Prepared for:
Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601	Altamont Environmental 231 Haywood Street Asheville NC 28801

December 26, 2013

Project: Pilot Test Area

Submittal Date: 12/12/2013
Group Number: 1440447
PO Number: 2115.220
State of Sample Origin: NC

Client Sample Description	Lancaster Labs (LL) #
MW253-J39D Grab Groundwater	7310947
MW253-J39D Filtered Grab Groundwater	7310948
MW256-M25CD Grab Groundwater	7310949
MW257-M25CD Grab Groundwater	7310950
Equipment Blank Grab Water	7310951
Trip Blank Water	7310952

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Altamont Environmental	Attn: Amy Huffman
ELECTRONIC COPY TO	Altamont Environmental	Attn: Stu Ryman

Respectfully Submitted,

Nancy Jean Bornholm

Nancy Jean Bornholm
Principal Specialist

(717) 556-7250

Sample Description: MW256-M25CD Grab Groundwater Pilot Test Area

LL Sample # WW 7310949
LL Group # 1440447
Account # 12184

Project Name: Pilot Test Area

Collected: 12/11/2013 14:40 by PB

Submitted: 12/12/2013 09:30
Reported: 12/26/2013 12:35

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CF256

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	690	J	600	1,000	200
02898	Acetonitrile	75-05-8	1,400	U	1,400	4,000	200
02898	Acrolein	107-02-8	1,000	U	1,000	5,000	200
02898	Acrylonitrile	107-13-1	200	U	200	1,000	200
02898	Allyl Chloride	107-05-1	20	U	20	100	200
02898	t-Amyl methyl ether	994-05-8	20	U	20	100	200
02898	Benzene	71-43-2	140		20	100	200
02898	Benzyl Chloride	100-44-7	20	U	20	100	200
02898	Bromobenzene	108-86-1	20	U	20	100	200
02898	Bromochloromethane	74-97-5	20	U	20	100	200
02898	Bromodichloromethane	75-27-4	20	U	20	100	200
02898	Bromoform	75-25-2	20	U	20	100	200
02898	Bromomethane	74-83-9	20	U	20	100	200
02898	n-Butanol	71-36-3	4,000	U	4,000	10,000	200
02898	2-Butanone	78-93-3	200	U	200	1,000	200
02898	t-Butyl Alcohol	75-65-0	6,000		800	2,000	200
02898	n-Butylbenzene	104-51-8	20	U	20	100	200
02898	sec-Butylbenzene	135-98-8	20	U	20	100	200
02898	tert-Butylbenzene	98-06-6	20	U	20	100	200
02898	Carbon Disulfide	75-15-0	80	U	80	100	200
02898	Carbon Tetrachloride	56-23-5	20	U	20	100	200
02898	2-Chloro-1,3-Butadiene	126-99-8	20	U	20	100	200
02898	Chlorobenzene	108-90-7	20	U	20	100	200
02898	Chloroethane	75-00-3	20	U	20	100	200
02898	Chloroform	67-66-3	120		20	100	200
02898	Chloromethane	74-87-3	40	U	40	100	200
02898	2-Chlorotoluene	95-49-8	20	U	20	100	200
02898	4-Chlorotoluene	106-43-4	20	U	20	100	200
02898	Cyclohexane	110-82-7	14,000		200	1,000	2000
02898	Cyclohexanone	108-94-1	1,000	U	1,000	5,000	200
02898	1,2-Dibromo-3-chloropropane	96-12-8	40	U	40	100	200
02898	Dibromochloromethane	124-48-1	20	U	20	100	200
02898	1,2-Dibromoethane	106-93-4	20	U	20	100	200
02898	Dibromomethane	74-95-3	20	U	20	100	200
02898	trans-1,4-Dichloro-2-butene	110-57-6	200	U	200	1,000	200
02898	1,2-Dichlorobenzene	95-50-1	20	U	20	100	200
02898	1,3-Dichlorobenzene	541-73-1	20	U	20	100	200
02898	1,4-Dichlorobenzene	106-46-7	20	U	20	100	200
02898	Dichlorodifluoromethane	75-71-8	20	U	20	100	200
02898	1,1-Dichloroethane	75-34-3	20	U	20	100	200
02898	1,2-Dichloroethane	107-06-2	2,400		20	100	200
02898	1,1-Dichloroethene	75-35-4	20	U	20	100	200
02898	cis-1,2-Dichloroethene	156-59-2	21	J	20	100	200
02898	trans-1,2-Dichloroethene	156-60-5	20	U	20	100	200
02898	1,2-Dichloropropane	78-87-5	20	U	20	100	200
02898	1,3-Dichloropropane	142-28-9	20	U	20	100	200
02898	2,2-Dichloropropane	594-20-7	20	U	20	100	200
02898	1,1-Dichloropropene	563-58-6	20	U	20	100	200
02898	cis-1,3-Dichloropropene	10061-01-5	20	U	20	100	200
02898	trans-1,3-Dichloropropene	10061-02-6	20	U	20	100	200

*=This limit was used in the evaluation of the final result

Sample Description: MW256-M25CD Grab Groundwater Pilot Test Area

LL Sample # WW 7310949
LL Group # 1440447
Account # 12184

Project Name: Pilot Test Area

Collected: 12/11/2013 14:40 by PB

Submitted: 12/12/2013 09:30
Reported: 12/26/2013 12:35

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CF256

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		**ug/l**		**ug/l**	**ug/l**	
02898	Ethyl Methacrylate	97-63-2	20	U	20	100	200
02898	Ethyl t-butyl ether	637-92-3	20	U	20	100	200
02898	Ethylbenzene	100-41-4	20	U	20	100	200
02898	Freon 113	76-13-1	40	U	40	100	200
02898	n-Heptane	142-82-5	40	U	40	100	200
02898	Hexachlorobutadiene	87-68-3	20	U	20	100	200
02898	n-Hexane	110-54-3	20	U	20	100	200
02898	2-Hexanone	591-78-6	200	U	200	1,000	200
02898	Isobutyl Alcohol	78-83-1	2,000	U	2,000	5,000	200
02898	Isopropylbenzene	98-82-8	20	U	20	100	200
02898	p-Isopropyltoluene	99-87-6	20	U	20	100	200
02898	Methacrylonitrile	126-98-7	200	U	200	1,000	200
02898	Methyl Acetate	79-20-9	77	J	60	200	200
02898	Methyl Methacrylate	80-62-6	20	U	20	100	200
02898	Methyl Tertiary Butyl Ether	1634-04-4	43	J	20	100	200
02898	4-Methyl-2-Pentanone	108-10-1	200	U	200	1,000	200
02898	Methylcyclohexane	108-87-2	20	U	20	100	200
02898	Methylene Chloride	75-09-2	99	J	40	100	200
02898	Naphthalene	91-20-3	20	U	20	100	200
02898	Pentachloroethane	76-01-7	40	U	40	100	200
02898	Propionitrile	107-12-0	400	U	400	2,000	200
02898	n-Propylbenzene	103-65-1	20	U	20	100	200
02898	Styrene	100-42-5	20	U	20	100	200
02898	1,1,1,2-Tetrachloroethane	630-20-6	20	U	20	100	200
02898	1,1,2,2-Tetrachloroethane	79-34-5	20	U	20	100	200
02898	Tetrachloroethene	127-18-4	33	J	20	100	200
02898	Tetrahydrofuran	109-99-9	930	J	400	1,000	200
02898	Toluene	108-88-3	24	J	20	100	200
02898	1,2,3-Trichlorobenzene	87-61-6	20	U	20	100	200
02898	1,2,4-Trichlorobenzene	120-82-1	20	U	20	100	200
02898	1,1,1-Trichloroethane	71-55-6	20	U	20	100	200
02898	1,1,2-Trichloroethane	79-00-5	20	U	20	100	200
02898	Trichloroethene	79-01-6	1,600		20	100	200
02898	1,2,4-Trimethylbenzene	95-63-6	20	U	20	100	200
02898	1,3,5-Trimethylbenzene	108-67-8	20	U	20	100	200
02898	Vinyl Acetate	108-05-4	40	U	40	100	200
02898	Vinyl Chloride	75-01-4	20	U	20	100	200
02898	m+p-Xylene	1330-20-7	20	U	20	100	200
02898	o-Xylene	95-47-6	20	U	20	100	200

The LCS and/or LCSD recoveries are outside the stated QC window but within the marginal exceedance allowance of +/- 4 standard deviations as defined in the NELAC Standards. The following analytes are accepted based on this allowance: n-hexane.

Perchlorate	**SW-846 6850 1/2007**		**ug/l**		**ug/l**	**ug/l**	
06386	Perchlorate	14797-73-0	7.3		0.20	1.0	1

*=This limit was used in the evaluation of the final result

Sample Description: MW256-M25CD Grab Groundwater Pilot Test Area

LL Sample # WW 7310949
LL Group # 1440447
Account # 12184

Project Name: Pilot Test Area

Collected: 12/11/2013 14:40 by PB

Submitted: 12/12/2013 09:30
Reported: 12/26/2013 12:35

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CF256

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C133491AA	12/16/2013 02:54	Brett W Kenyon	200
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C133491AA	12/16/2013 03:16	Brett W Kenyon	2000
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C133491AA	12/16/2013 02:54	Brett W Kenyon	200
01163	GC/MS VOA Water Prep	SW-846 5030B	2	C133491AA	12/16/2013 03:16	Brett W Kenyon	2000
06386	Perchlorate	SW-846 6850 1/2007	1	133520029A	12/19/2013 19:28	Richard A Shober	1

*=This limit was used in the evaluation of the final result

Sample Description: MW257-M25CD Grab Groundwater Pilot Test Area

LL Sample # WW 7310950
LL Group # 1440447
Account # 12184

Project Name: Pilot Test Area

Collected: 12/11/2013 13:36 by PB

Submitted: 12/12/2013 09:30
Reported: 12/26/2013 12:35

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CF257

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	110,000		3,000	5,000	1000
02898	Acetonitrile	75-05-8	7,000	U	7,000	20,000	1000
02898	Acrolein	107-02-8	5,000	U	5,000	25,000	1000
02898	Acrylonitrile	107-13-1	1,000	U	1,000	5,000	1000
02898	Allyl Chloride	107-05-1	100	U	100	500	1000
02898	t-Amyl methyl ether	994-05-8	100	U	100	500	1000
02898	Benzene	71-43-2	800		100	500	1000
02898	Benzyl Chloride	100-44-7	100	U	100	500	1000
02898	Bromobenzene	108-86-1	100	U	100	500	1000
02898	Bromochloromethane	74-97-5	100	U	100	500	1000
02898	Bromodichloromethane	75-27-4	100	U	100	500	1000
02898	Bromoform	75-25-2	400	J	100	500	1000
02898	Bromomethane	74-83-9	100	U	100	500	1000
02898	n-Butanol	71-36-3	20,000	U	20,000	50,000	1000
02898	2-Butanone	78-93-3	2,200	J	1,000	5,000	1000
02898	t-Butyl Alcohol	75-65-0	690,000		40,000	100,000	10000
02898	n-Butylbenzene	104-51-8	100	U	100	500	1000
02898	sec-Butylbenzene	135-98-8	100	U	100	500	1000
02898	tert-Butylbenzene	98-06-6	100	U	100	500	1000
02898	Carbon Disulfide	75-15-0	400	U	400	500	1000
02898	Carbon Tetrachloride	56-23-5	100	U	100	500	1000
02898	2-Chloro-1,3-Butadiene	126-99-8	100	U	100	500	1000
02898	Chlorobenzene	108-90-7	100	U	100	500	1000
02898	Chloroethane	75-00-3	100	U	100	500	1000
02898	Chloroform	67-66-3	680		100	500	1000
02898	Chloromethane	74-87-3	200	U	200	500	1000
02898	2-Chlorotoluene	95-49-8	100	U	100	500	1000
02898	4-Chlorotoluene	106-43-4	100	U	100	500	1000
02898	Cyclohexane	110-82-7	22,000		100	500	1000
02898	Cyclohexanone	108-94-1	5,000	U	5,000	25,000	1000
02898	1,2-Dibromo-3-chloropropane	96-12-8	200	U	200	500	1000
02898	Dibromochloromethane	124-48-1	100	U	100	500	1000
02898	1,2-Dibromoethane	106-93-4	100	U	100	500	1000
02898	Dibromomethane	74-95-3	100	U	100	500	1000
02898	trans-1,4-Dichloro-2-butene	110-57-6	1,000	U	1,000	5,000	1000
02898	1,2-Dichlorobenzene	95-50-1	100	U	100	500	1000
02898	1,3-Dichlorobenzene	541-73-1	100	U	100	500	1000
02898	1,4-Dichlorobenzene	106-46-7	100	U	100	500	1000
02898	Dichlorodifluoromethane	75-71-8	100	U	100	500	1000
02898	1,1-Dichloroethane	75-34-3	100	U	100	500	1000
02898	1,2-Dichloroethane	107-06-2	11,000		100	500	1000
02898	1,1-Dichloroethene	75-35-4	100	U	100	500	1000
02898	cis-1,2-Dichloroethene	156-59-2	100	U	100	500	1000
02898	trans-1,2-Dichloroethene	156-60-5	100	U	100	500	1000
02898	1,2-Dichloropropane	78-87-5	460	J	100	500	1000
02898	1,3-Dichloropropane	142-28-9	100	U	100	500	1000
02898	2,2-Dichloropropane	594-20-7	100	U	100	500	1000
02898	1,1-Dichloropropene	563-58-6	100	U	100	500	1000
02898	cis-1,3-Dichloropropene	10061-01-5	100	U	100	500	1000
02898	trans-1,3-Dichloropropene	10061-02-6	100	U	100	500	1000

*=This limit was used in the evaluation of the final result

Sample Description: MW257-M25CD Grab Groundwater Pilot Test Area

LL Sample # WW 7310950
LL Group # 1440447
Account # 12184

Project Name: Pilot Test Area

Collected: 12/11/2013 13:36 by PB

Submitted: 12/12/2013 09:30
Reported: 12/26/2013 12:35

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CF257

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		**ug/l**		**ug/l**	**ug/l**	
02898	Ethyl Methacrylate	97-63-2	100	U	100	500	1000
02898	Ethyl t-butyl ether	637-92-3	100	U	100	500	1000
02898	Ethylbenzene	100-41-4	100	U	100	500	1000
02898	Freon 113	76-13-1	200	U	200	500	1000
02898	n-Heptane	142-82-5	200	U	200	500	1000
02898	Hexachlorobutadiene	87-68-3	100	U	100	500	1000
02898	n-Hexane	110-54-3	100	U	100	500	1000
02898	2-Hexanone	591-78-6	1,000	U	1,000	5,000	1000
02898	Isobutyl Alcohol	78-83-1	10,000	U	10,000	25,000	1000
02898	Isopropylbenzene	98-82-8	100	U	100	500	1000
02898	p-Isopropyltoluene	99-87-6	100	U	100	500	1000
02898	Methacrylonitrile	126-98-7	1,000	U	1,000	5,000	1000
02898	Methyl Acetate	79-20-9	16,000		300	1,000	1000
02898	Methyl Methacrylate	80-62-6	100	U	100	500	1000
02898	Methyl Tertiary Butyl Ether	1634-04-4	3,000		100	500	1000
02898	4-Methyl-2-Pentanone	108-10-1	1,000	U	1,000	5,000	1000
02898	Methylcyclohexane	108-87-2	100	U	100	500	1000
02898	Methylene Chloride	75-09-2	270	J	200	500	1000
02898	Naphthalene	91-20-3	100	U	100	500	1000
02898	Pentachloroethane	76-01-7	200	U	200	500	1000
02898	Propionitrile	107-12-0	2,000	U	2,000	10,000	1000
02898	n-Propylbenzene	103-65-1	100	U	100	500	1000
02898	Styrene	100-42-5	100	U	100	500	1000
02898	1,1,1,2-Tetrachloroethane	630-20-6	100	U	100	500	1000
02898	1,1,2,2-Tetrachloroethane	79-34-5	100	U	100	500	1000
02898	Tetrachloroethene	127-18-4	100	U	100	500	1000
02898	Tetrahydrofuran	109-99-9	230,000		2,000	5,000	1000
02898	Toluene	108-88-3	200	J	100	500	1000
02898	1,2,3-Trichlorobenzene	87-61-6	100	U	100	500	1000
02898	1,2,4-Trichlorobenzene	120-82-1	100	U	100	500	1000
02898	1,1,1-Trichloroethane	71-55-6	100	U	100	500	1000
02898	1,1,2-Trichloroethane	79-00-5	100	U	100	500	1000
02898	Trichloroethene	79-01-6	1,300		100	500	1000
02898	1,2,4-Trimethylbenzene	95-63-6	100	U	100	500	1000
02898	1,3,5-Trimethylbenzene	108-67-8	100	U	100	500	1000
02898	Vinyl Acetate	108-05-4	200	U	200	500	1000
02898	Vinyl Chloride	75-01-4	100	U	100	500	1000
02898	m+p-Xylene	1330-20-7	100	U	100	500	1000
02898	o-Xylene	95-47-6	100	U	100	500	1000

The LCS and/or LCSD recoveries are outside the stated QC window but within the marginal exceedance allowance of +/- 4 standard deviations as defined in the NELAC Standards. The following analytes are accepted based on this allowance: n-hexane.

Perchlorate	**SW-846 6850 1/2007**		**ug/l**		**ug/l**	**ug/l**	
06386	Perchlorate	14797-73-0	5,000		200	1,000	1000

*=This limit was used in the evaluation of the final result

Sample Description: MW257-M25CD Grab Groundwater Pilot Test Area

LL Sample # WW 7310950
LL Group # 1440447
Account # 12184

Project Name: Pilot Test Area

Collected: 12/11/2013 13:36 by PB

Submitted: 12/12/2013 09:30
Reported: 12/26/2013 12:35

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CF257

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C133491AA	12/16/2013 03:38	Brett W Kenyon	1000
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C133491AA	12/16/2013 04:00	Brett W Kenyon	10000
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C133491AA	12/16/2013 03:38	Brett W Kenyon	1000
01163	GC/MS VOA Water Prep	SW-846 5030B	2	C133491AA	12/16/2013 04:00	Brett W Kenyon	10000
06386	Perchlorate	SW-846 6850 1/2007	1	133520029A	12/20/2013 11:56	Richard A Shober	1000

*=This limit was used in the evaluation of the final result

Sample Description: Equipment Blank Grab Water
Pilot Test Area

LL Sample # WW 7310951
LL Group # 1440447
Account # 12184

Project Name: Pilot Test Area

Collected: 12/11/2013 15:30 by PB

Submitted: 12/12/2013 09:30
Reported: 12/26/2013 12:35

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CFVEB

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.1	U	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	0.5	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-Butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	0.1	U	0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	0.1	U	0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.1	U	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

Sample Description: Equipment Blank Grab Water
Pilot Test Area

LL Sample # WW 7310951
LL Group # 1440447
Account # 12184

Project Name: Pilot Test Area

Collected: 12/11/2013 15:30 by PB

Submitted: 12/12/2013 09:30
Reported: 12/26/2013 12:35

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CFVEB

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		**ug/l**		**ug/l**	**ug/l**	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-Pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.1	U	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1

The LCS and/or LCSD recoveries are outside the stated QC window but within the marginal exceedance allowance of +/- 4 standard deviations as defined in the NELAC Standards. The following analytes are accepted based on this allowance: n-hexane.

Explosives	**SW-846 8015B**		**ug/l**		**ug/l**	**ug/l**	
02265	Picric Acid	88-89-1	50	U	50	200	1
Explosives	**SW-846 8330**		**ug/l**		**ug/l**	**ug/l**	
06916	4-Amino-2,6-Dinitrotoluene	19406-51-0	0.30	U	0.30	0.60	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: Equipment Blank Grab Water
Pilot Test Area

LL Sample # WW 7310951
LL Group # 1440447
Account # 12184

Project Name: Pilot Test Area

Collected: 12/11/2013 15:30 by PB

Submitted: 12/12/2013 09:30
Reported: 12/26/2013 12:35

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CFVEB

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Explosives	**SW-846 8330**		**ug/l**		**ug/l**	**ug/l**	
06916	2-Amino-4,6-Dinitrotoluene	35572-78-2	0.20	U	0.20	0.60	1
06916	1,2-Dinitrobenzene	528-29-0	0.20	U	0.20	0.60	1
06916	1,3-Dinitrobenzene	99-65-0	0.20	U	0.20	0.60	1
06916	1,4-Dinitrobenzene	100-25-4	0.30	U	0.30	0.60	1
06916	2,4-Dinitrotoluene	121-14-2	0.72	U	0.72	2.0	1
06916	2,6-Dinitrotoluene	606-20-2	0.45	U	0.45	1.3	1
06916	HMX	2691-41-0	0.65	U	0.65	2.0	1
06916	Nitrobenzene	98-95-3	0.20	U	0.20	0.60	1
06916	Nitroglycerin	55-63-0	5.2	U	5.2	15	1
06916	1-Nitronaphthalene	86-57-7	0.20	U	0.20	0.60	1
06916	2-Nitrotoluene	88-72-2	0.25	U	0.25	0.75	1
06916	3-Nitrotoluene	99-08-1	0.40	U	0.40	1.2	1
06916	4-Nitrotoluene	99-99-0	0.60	U	0.60	1.2	1
06916	PETN	78-11-5	6.0	U	6.0	18	1
06916	RDX	121-82-4	0.20	U	0.20	0.50	1
06916	Tetryl	479-45-8	0.40	U	0.40	0.60	1
06916	1,3,5-Trinitrobenzene	99-35-4	0.20	U	0.20	0.60	1
06916	2,4,6-Trinitrotoluene	118-96-7	0.20	U	0.20	0.60	1
Perchlorate	**SW-846 6850 1/2007**		**ug/l**		**ug/l**	**ug/l**	
06386	Perchlorate	14797-73-0	0.20	U	0.20	1.0	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C133491AA	12/15/2013 20:59	Brett W Kenyon	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C133491AA	12/15/2013 20:59	Brett W Kenyon	1
02265	Picric Acid	SW-846 8015B	1	133520033A	12/19/2013 17:07	Jessica L Miller	1
06916	Nitroaromatics/Amines	SW-846 8330	1	133480019A	12/21/2013 03:44	James H Place	1
06386	Perchlorate	SW-846 6850 1/2007	1	133520029A	12/19/2013 19:53	Richard A Shober	1
06915	Nitroaromatics/Amines Wat Ext	SW-846 8330	1	133480019A	12/16/2013 14:00	Kelli M Barto	1

*=This limit was used in the evaluation of the final result

Sample Description: Trip Blank Water
Pilot Test Area

LL Sample # WW 7310952
LL Group # 1440447
Account # 12184

Project Name: Pilot Test Area

Collected: 12/11/2013

Submitted: 12/12/2013 09:30
Reported: 12/26/2013 12:35

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CFVTB

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		**ug/l**		**ug/l**	**ug/l**	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.1	U	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	0.5	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-Butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	0.1	U	0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	0.1	U	0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.1	U	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

Sample Description: Trip Blank Water
Pilot Test Area

LL Sample # WW 7310952
LL Group # 1440447
Account # 12184

Project Name: Pilot Test Area

Collected: 12/11/2013

Submitted: 12/12/2013 09:30
Reported: 12/26/2013 12:35

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CFVTB

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-Pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.1	U	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1

The LCS and/or LCSD recoveries are outside the stated QC window but within the marginal exceedance allowance of +/- 4 standard deviations as defined in the NELAC Standards. The following analytes are accepted based on this allowance: n-hexane.

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: Trip Blank Water
Pilot Test Area

LL Sample # WW 7310952
LL Group # 1440447
Account # 12184

Project Name: Pilot Test Area

Collected: 12/11/2013

Submitted: 12/12/2013 09:30
Reported: 12/26/2013 12:35

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CFVTB

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C133491AA	12/15/2013 21:21	Brett W Kenyon	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C133491AA	12/15/2013 21:21	Brett W Kenyon	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1440447
Reported: 12/26/13 at 12:35 PM

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: C133491AA	Sample number(s): 7310947,7310949-7310952									
Acetone	3.0	U	3.0	5.0	ug/l	116	108	60-139	7	30
Acetonitrile	7.0	U	7.0	20	ug/l	119	111	41-158	7	30
Acrolein	5.0	U	5.0	25	ug/l	62	59	36-137	5	30
Acrylonitrile	1.0	U	1.0	5.0	ug/l	101	95	69-136	6	30
Allyl Chloride	0.1	U	0.1	0.5	ug/l	79	82	61-130	5	30
t-Amyl methyl ether	0.1	U	0.1	0.5	ug/l	87	90	80-124	3	30
Benzene	0.1	U	0.1	0.5	ug/l	97	100	80-120	3	30
Benzyl Chloride	0.1	U	0.1	0.5	ug/l	92	96	62-120	4	30
Bromobenzene	0.1	U	0.1	0.5	ug/l	100	103	80-120	3	30
Bromochloromethane	0.1	U	0.1	0.5	ug/l	116	116	80-125	0	30
Bromodichloromethane	0.1	U	0.1	0.5	ug/l	107	107	80-120	0	30
Bromoform	0.1	U	0.1	0.5	ug/l	121	119	73-128	2	30
Bromomethane	0.1	U	0.1	0.5	ug/l	113	115	62-126	2	30
n-Butanol	20	U	20.	50	ug/l	101	97	65-138	4	30
2-Butanone	1.0	U	1.0	5.0	ug/l	94	89	70-130	6	30
t-Butyl Alcohol	4.0	U	4.0	10	ug/l	126	119	68-140	6	30
n-Butylbenzene	0.1	U	0.1	0.5	ug/l	96	98	80-120	2	30
sec-Butylbenzene	0.1	U	0.1	0.5	ug/l	96	98	80-120	2	30
tert-Butylbenzene	0.1	U	0.1	0.5	ug/l	94	99	80-120	5	30
Carbon Disulfide	0.4	U	0.4	0.5	ug/l	96	98	80-128	2	30
Carbon Tetrachloride	0.1	U	0.1	0.5	ug/l	114	115	80-129	2	30
2-Chloro-1,3-Butadiene	0.1	U	0.1	0.5	ug/l	88	90	80-127	3	30
Chlorobenzene	0.1	U	0.1	0.5	ug/l	106	107	80-120	1	30
Chloroethane	0.1	U	0.1	0.5	ug/l	100	104	68-120	3	30
Chloroform	0.1	U	0.1	0.5	ug/l	108	110	80-120	1	30
Chloromethane	0.2	U	0.2	0.5	ug/l	102	106	55-120	4	30
2-Chlorotoluene	0.1	U	0.1	0.5	ug/l	99	99	80-120	0	30
4-Chlorotoluene	0.1	U	0.1	0.5	ug/l	100	102	80-120	2	30
Cyclohexane	0.1	U	0.1	0.5	ug/l	77	80	75-123	4	30
Cyclohexanone	5.0	U	5.0	25	ug/l	78	92	38-149	16	30
1,2-Dibromo-3-chloropropane	0.2	U	0.2	0.5	ug/l	109	102	64-141	7	30
Dibromochloromethane	0.1	U	0.1	0.5	ug/l	112	113	80-126	1	30
1,2-Dibromoethane	0.1	U	0.1	0.5	ug/l	103	106	80-120	3	30
Dibromomethane	0.1	U	0.1	0.5	ug/l	108	109	80-120	1	30
trans-1,4-Dichloro-2-butene	1.0	U	1.0	5.0	ug/l	97	90	14-166	7	30
1,2-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	107	108	80-120	1	30
1,3-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	105	105	80-120	0	30
1,4-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	103	106	80-120	3	30
Dichlorodifluoromethane	0.1	U	0.1	0.5	ug/l	122*	125*	39-120	2	30
1,1-Dichloroethane	0.1	U	0.1	0.5	ug/l	93	95	80-120	2	30
1,2-Dichloroethane	0.1	U	0.1	0.5	ug/l	109	110	80-127	1	30
1,1-Dichloroethene	0.1	U	0.1	0.5	ug/l	95	97	80-123	2	30
cis-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	101	102	80-120	1	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1440447
Reported: 12/26/13 at 12:35 PM

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
trans-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	103	105	80-120	2	30
1,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	97	101	80-120	4	30
1,3-Dichloropropane	0.1	U	0.1	0.5	ug/l	96	97	80-120	1	30
2,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	97	100	75-122	3	30
1,1-Dichloropropene	0.1	U	0.1	0.5	ug/l	97	100	80-121	2	30
cis-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	93	96	80-123	3	30
trans-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	97	99	80-120	3	30
Ethyl Methacrylate	0.1	U	0.1	0.5	ug/l	84	86	80-120	3	30
Ethyl t-butyl ether	0.1	U	0.1	0.5	ug/l	82	84	76-120	3	30
Ethylbenzene	0.1	U	0.1	0.5	ug/l	98	100	80-120	2	30
Freon 113	0.2	U	0.2	0.5	ug/l	97	97	78-132	0	30
n-Heptane	0.2	U	0.2	0.5	ug/l	75	77	75-132	3	30
Hexachlorobutadiene	0.1	U	0.1	0.5	ug/l	103	107	73-120	3	30
n-Hexane	0.1	U	0.1	0.5	ug/l	72*	75*	76-131	5	30
2-Hexanone	1.0	U	1.0	5.0	ug/l	88	91	69-131	3	30
Isobutyl Alcohol	10	U	10.	25	ug/l	120	114	71-128	5	30
Isopropylbenzene	0.1	U	0.1	0.5	ug/l	101	102	80-120	1	30
p-Isopropyltoluene	0.1	U	0.1	0.5	ug/l	95	98	80-120	2	30
Methacrylonitrile	1.0	U	1.0	5.0	ug/l	100	95	68-138	6	30
Methyl Acetate	0.3	U	0.3	1.0	ug/l	79	82	69-126	4	30
Methyl Methacrylate	0.1	U	0.1	0.5	ug/l	86	83	64-149	4	30
Methyl Tertiary Butyl Ether	0.1	U	0.1	0.5	ug/l	89	93	80-120	4	30
4-Methyl-2-Pentanone	1.0	U	1.0	5.0	ug/l	90	93	69-135	3	30
Methylcyclohexane	0.1	U	0.1	0.5	ug/l	91	94	80-127	4	30
Methylene Chloride	0.2	U	0.2	0.5	ug/l	102	103	80-120	1	30
Naphthalene	0.1	U	0.1	0.5	ug/l	82	87	65-120	6	30
Pentachloroethane	0.2	U	0.2	0.5	ug/l	108	111	75-126	3	30
Propionitrile	2.0	U	2.0	10	ug/l	110	105	71-138	4	30
n-Propylbenzene	0.1	U	0.1	0.5	ug/l	94	96	80-120	2	30
Styrene	0.1	U	0.1	0.5	ug/l	103	104	80-120	1	30
1,1,1,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	112	113	80-120	1	30
1,1,2,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	99	99	80-125	1	30
Tetrachloroethene	0.1	U	0.1	0.5	ug/l	104	106	80-120	3	30
Tetrahydrofuran	2.0	U	2.0	5.0	ug/l	101	96	65-131	5	30
Toluene	0.1	U	0.1	0.5	ug/l	99	100	80-120	1	30
1,2,3-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	87	92	63-120	6	30
1,2,4-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	92	96	70-120	4	30
1,1,1-Trichloroethane	0.1	U	0.1	0.5	ug/l	107	109	80-120	2	30
1,1,2-Trichloroethane	0.1	U	0.1	0.5	ug/l	105	106	80-120	1	30
Trichloroethene	0.1	U	0.1	0.5	ug/l	106	107	80-120	1	30
1,2,4-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	98	100	80-120	2	30
1,3,5-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	97	99	80-120	1	30
Vinyl Acetate	0.2	U	0.2	0.5	ug/l	77	79	45-132	2	30
Vinyl Chloride	0.1	U	0.1	0.5	ug/l	107	111	65-127	3	30
m+p-Xylene	0.1	U	0.1	0.5	ug/l	102	104	80-120	2	30
o-Xylene	0.1	U	0.1	0.5	ug/l	100	102	80-120	2	30
Batch number: C133491AB	Sample number(s): 7310947									
Chloroform	0.1	U	0.1	0.5	ug/l	109	109	80-120	0	30
Batch number: 133480019A	Sample number(s): 7310947,7310951									
4-Amino-2,6-Dinitrotoluene	0.30	U	0.30	0.60	ug/l	108	108	97-156	0	30
2-Amino-4,6-Dinitrotoluene	0.20	U	0.20	0.60	ug/l	98	95	65-107	3	30
1,2-Dinitrobenzene	0.20	U	0.20	0.60	ug/l	97	96	90-118	2	30
1,3-Dinitrobenzene	0.20	U	0.20	0.60	ug/l	105	104	78-121	1	30
1,4-Dinitrobenzene	0.30	U	0.30	0.60	ug/l	101	100	81-108	1	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1440447
Reported: 12/26/13 at 12:35 PM

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
2,4-Dinitrotoluene	0.72	U	0.72	2.0	ug/l	100	101	71-111	0	30
2,6-Dinitrotoluene	0.45	U	0.45	1.3	ug/l	103	96	84-157	7	30
HMX	0.65	U	0.65	2.0	ug/l	95	93	73-112	1	30
Nitrobenzene	0.20	U	0.20	0.60	ug/l	95	92	71-111	3	30
Nitroglycerin	5.2	U	5.2	15	ug/l	105	105	73-116	1	30
1-Nitronaphthalene	0.20	U	0.20	0.60	ug/l	99	96	69-125	3	30
2-Nitrotoluene	0.25	U	0.25	0.75	ug/l	100	99	74-115	1	30
3-Nitrotoluene	0.40	U	0.40	1.2	ug/l	106	105	76-115	0	30
4-Nitrotoluene	0.60	U	0.60	1.2	ug/l	103	98	76-120	5	30
PETN	6.0	U	6.0	18	ug/l	102	100	73-126	2	30
RDX	0.20	U	0.20	0.50	ug/l	105	103	70-117	1	30
Tetryl	0.40	U	0.40	0.60	ug/l	92	86	43-133	8	30
1,3,5-Trinitrobenzene	0.20	U	0.20	0.60	ug/l	104	102	72-119	1	30
2,4,6-Trinitrotoluene	0.20	U	0.20	0.60	ug/l	105	103	75-119	2	30
Batch number: 133520033A	Sample number(s): 7310947,7310951									
Picric Acid	50	U	50.	200	ug/l	102		70-130		
Batch number: 133520029A	Sample number(s): 7310947,7310949-7310951									
Perchlorate	0.20	U	0.20	1.0	ug/l	87		80-120		
Batch number: 133510030A	Sample number(s): 7310947									
Ethane	1.0	U	1.0	5.0	ug/l	104		80-120		
Ethene	1.0	U	1.0	5.0	ug/l	104		80-120		
Methane	3.0	U	3.0	5.0	ug/l	108		80-120		
Batch number: 133501848005	Sample number(s): 7310948									
Cobalt	0.0013	U	0.0013	0.0050	mg/l	103		90-110		
Iron	0.0430	U	0.0430	0.200	mg/l	99		90-112		
Lithium	0.0047	U	0.0047	0.0200	mg/l	103		90-110		
Manganese	0.00083	U	0.00083	0.0050	mg/l	103		90-110		
Selenium	0.0084	U	0.0084	0.0200	mg/l	98		80-120		
Thallium	0.0054	U	0.0054	0.0300	mg/l	104		90-118		
Vanadium	0.0020	U	0.0020	0.0050	mg/l	104		90-110		
Batch number: 13346347902A	Sample number(s): 7310947									
Chloride	0.20	U	0.20	0.40	mg/l	95		90-110		
Nitrate Nitrogen	0.050	U	0.050	0.10	mg/l	93		90-110		
Nitrite Nitrogen	0.080	U	0.080	0.10	mg/l	96		90-110		
Sulfate	0.30	U	0.30	1.0	mg/l	100		90-110		
Batch number: 13352049507A	Sample number(s): 7310947									
Total Organic Carbon	0.50	U	0.50	1.0	mg/l	99		91-113		
Batch number: 13347023001A	Sample number(s): 7310947									
Sulfide	0.054	U	0.054	0.16	mg/l	109		90-110		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

MS	MSD	MS/MSD	RPD	BKG	DUP	DUP	Dup RPD

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1440447
Reported: 12/26/13 at 12:35 PM

Analysis Name	%REC	%REC	Limits	RPD	MAX	Conc		Conc		RPD	Max
Batch number: C133491AA	Sample number(s): 7310947,7310949-7310952 BKG: P305684										
Acetone						3.0	U	3.0	U	0 (1)	30
Acetonitrile						7.0	U	7.0	U	0 (1)	30
Acrolein						5.0	U	5.0	U	0 (1)	30
Acrylonitrile						1.0	U	1.0	U	0 (1)	30
Allyl Chloride						0.1	U	0.1	U	0 (1)	30
t-Amyl methyl ether						0.1	U	0.1	U	0 (1)	30
Benzene						0.1	U	0.1	U	0 (1)	30
Benzyl Chloride						0.1	U	0.1	U	0 (1)	30
Bromobenzene						0.1	U	0.1	U	0 (1)	30
Bromochloromethane						0.1	U	0.1	U	0 (1)	30
Bromodichloromethane						0.1	U	0.1	U	0 (1)	30
Bromoform						0.1	U	0.1	U	0 (1)	30
Bromomethane						0.1	U	0.1	U	0 (1)	30
n-Butanol						20	U	20	U	0 (1)	30
2-Butanone						1.0	U	1.0	U	0 (1)	30
t-Butyl Alcohol						4.0	U	4.0	U	0 (1)	30
n-Butylbenzene						0.1	U	0.1	U	0 (1)	30
sec-Butylbenzene						0.1	U	0.1	U	0 (1)	30
tert-Butylbenzene						0.1	U	0.1	U	0 (1)	30
Carbon Disulfide						0.4	U	0.4	U	0 (1)	30
Carbon Tetrachloride						0.1	U	0.1	U	0 (1)	30
2-Chloro-1,3-Butadiene						0.1	U	0.1	U	0 (1)	30
Chlorobenzene						0.1	U	0.1	U	0 (1)	30
Chloroethane						0.1	U	0.1	U	0 (1)	30
Chloroform						0.1	U	0.1	U	0 (1)	30
Chloromethane						0.2	U	0.2	U	0 (1)	30
2-Chlorotoluene						0.1	U	0.1	U	0 (1)	30
4-Chlorotoluene						0.1	U	0.1	U	0 (1)	30
Cyclohexane						0.1	U	0.1	U	0 (1)	30
Cyclohexanone						5.0	U	5.0	U	0 (1)	30
1,2-Dibromo-3-chloropropane						0.2	U	0.2	U	0 (1)	30
Dibromochloromethane						0.1	U	0.1	U	0 (1)	30
1,2-Dibromoethane						0.1	U	0.1	U	0 (1)	30
Dibromomethane						0.1	U	0.1	U	0 (1)	30
trans-1,4-Dichloro-2-butene						1.0	U	1.0	U	0 (1)	30
1,2-Dichlorobenzene						0.1	U	0.1	U	0 (1)	30
1,3-Dichlorobenzene						0.1	U	0.1	U	0 (1)	30
1,4-Dichlorobenzene						0.1	U	0.1	U	0 (1)	30
Dichlorodifluoromethane						0.1	U	0.1	U	0 (1)	30
1,1-Dichloroethane						0.1	U	0.1	U	0 (1)	30
1,2-Dichloroethane						0.1	U	0.1	U	0 (1)	30
1,1-Dichloroethene						0.1	U	0.1	U	0 (1)	30
cis-1,2-Dichloroethene						0.1	U	0.1	U	0 (1)	30
trans-1,2-Dichloroethene						0.1	U	0.1	U	0 (1)	30
1,2-Dichloropropane						0.1	U	0.1	U	0 (1)	30
1,3-Dichloropropane						0.1	U	0.1	U	0 (1)	30
2,2-Dichloropropane						0.1	U	0.1	U	0 (1)	30
1,1-Dichloropropene						0.1	U	0.1	U	0 (1)	30
cis-1,3-Dichloropropene						0.1	U	0.1	U	0 (1)	30
trans-1,3-Dichloropropene						0.1	U	0.1	U	0 (1)	30
Ethyl Methacrylate						0.1	U	0.1	U	0 (1)	30
Ethyl t-butyl ether						0.1	U	0.1	U	0 (1)	30
Ethylbenzene						0.1	U	0.1	U	0 (1)	30
Freon 113						0.2	U	0.2	U	0 (1)	30
n-Heptane						0.2	U	0.2	U	0 (1)	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1440447
Reported: 12/26/13 at 12:35 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc		DUP Conc		DUP RPD	Dup RPD Max
Hexachlorobutadiene						0.1	U	0.1	U	0 (1)	30
n-Hexane						0.1	U	0.1	U	0 (1)	30
2-Hexanone						1.0	U	1.0	U	0 (1)	30
Isobutyl Alcohol						10	U	10	U	0 (1)	30
Isopropylbenzene						0.1	U	0.1	U	0 (1)	30
p-Isopropyltoluene						0.1	U	0.1	U	0 (1)	30
Methacrylonitrile						1.0	U	1.0	U	0 (1)	30
Methyl Acetate						0.3	U	0.3	U	0 (1)	30
Methyl Methacrylate						0.1	U	0.1	U	0 (1)	30
Methyl Tertiary Butyl Ether						0.1	U	0.1	U	0 (1)	30
4-Methyl-2-Pentanone						1.0	U	1.0	U	0 (1)	30
Methylcyclohexane						0.1	U	0.1	U	0 (1)	30
Methylene Chloride						0.2	U	0.2	U	0 (1)	30
Naphthalene						0.1	U	0.1	U	0 (1)	30
Pentachloroethane						0.2	U	0.2	U	0 (1)	30
Propionitrile						2.0	U	2.0	U	0 (1)	30
n-Propylbenzene						0.1	U	0.1	U	0 (1)	30
Styrene						0.1	U	0.1	U	0 (1)	30
1,1,1,2-Tetrachloroethane						0.1	U	0.1	U	0 (1)	30
1,1,2,2-Tetrachloroethane						0.1	U	0.1	U	0 (1)	30
Tetrachloroethene						0.1	U	0.1	U	0 (1)	30
Tetrahydrofuran						2.0	U	2.0	U	0 (1)	30
Toluene						0.1	U	0.1	U	0 (1)	30
1,2,3-Trichlorobenzene						0.1	U	0.1	U	0 (1)	30
1,2,4-Trichlorobenzene						0.1	U	0.1	U	0 (1)	30
1,1,1-Trichloroethane						0.1	U	0.1	U	0 (1)	30
1,1,2-Trichloroethane						0.1	U	0.1	U	0 (1)	30
Trichloroethene						0.1	U	0.1	U	0 (1)	30
1,2,4-Trimethylbenzene						0.1	U	0.1	U	0 (1)	30
1,3,5-Trimethylbenzene						0.1	U	0.1	U	0 (1)	30
Vinyl Acetate						0.2	U	0.2	U	0 (1)	30
Vinyl Chloride						0.1	U	0.1	U	0 (1)	30
m+p-Xylene						0.1	U	0.1	U	0 (1)	30
o-Xylene						0.1	U	0.1	U	0 (1)	30
Batch number: C133491AB Sample number(s): 7310947 BKG: P305684											
Chloroform						0.1	U	0.1	U	0 (1)	30
Batch number: 133520033A Sample number(s): 7310947,7310951 UNSPK: 7310947											
Picric Acid	104	103	70-130	2	30						
Batch number: 133520029A Sample number(s): 7310947,7310949-7310951 UNSPK: P308311											
Perchlorate	81	91	80-120	8	20						
Batch number: 133510030A Sample number(s): 7310947 UNSPK: P310127											
Ethane	91	88	32-129	3	20						
Ethene	96	94	35-162	2	20						
Methane	-281 (2)	-355 (2)	35-157	2	20						
Batch number: 133501848005 Sample number(s): 7310948 UNSPK: P308407 BKG: P308407											
Cobalt	101	98	82-112	3	20	0.0013	U	0.0013	U	0 (1)	20

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1440447
Reported: 12/26/13 at 12:35 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Iron	101	98	75-125	3	20	0.0430 U	0.0430 U	0 (1)	20
Lithium	104	102	90-115	2	20	0.0047 U	0.0047 U	0 (1)	20
Manganese	96	93	75-125	3	20	0.0891	0.0878	1	20
Selenium	96	95	75-125	1	20	0.0084 U	0.0084 U	0 (1)	20
Thallium	103	102	75-125	1	20	0.0054 U	0.0054 U	0 (1)	20
Vanadium	105	103	90-117	3	20	0.0020 U	0.0020 U	0 (1)	20
Batch number: 13346347902A	Sample number(s): 7310947 UNSPK: P310404 BKG: P310404								
Chloride	92		90-110			36.8	37.5	2	20
Nitrate Nitrogen	92		90-110			17.0	17.5	3	20
Nitrite Nitrogen	139*		90-110			2.1	2.1	1 (1)	20
Sulfate	157*		90-110			1.5 U	1.5 U	0 (1)	20
Batch number: 13352049507A	Sample number(s): 7310947 UNSPK: P313970 BKG: P313970								
Total Organic Carbon	111		63-142			0.50 U	0.50 U	0 (1)	4
Batch number: 13347023001A	Sample number(s): 7310947 UNSPK: 7310947 BKG: 7310947								
Sulfide	87	87	42-131	1	16	0.054 U	0.054 U	0 (1)	5

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed
unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: GC/MS Volatiles
Batch number: C133491AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
7310947	114	109	93	92
7310949	108	108	95	93
7310950	110	108	97	93
7310951	108	106	95	94
7310952	108	106	96	94
Blank	108	106	95	95
DUP	110	106	96	95
LCS	105	104	98	99
LCSD	104	106	97	98
Limits:	77-114	74-113	77-110	78-110

Analysis Name: Nitroaromatics/Amines
Batch number: 133480019A

	2-Nitro-m-xylene
7310947	181*
7310951	95
Blank	82
LCS	87
LCSD	86

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1440447
Reported: 12/26/13 at 12:35 PM

Surrogate Quality Control

Limits: 73-122

Analysis Name: Picric Acid
Batch number: 133520033A

	2-NMX
7310947	105
7310951	98
Blank	99
LCS	92
MS	99
MSD	93

Limits: 40-157

Analysis Name: Volatile Headspace Hydrocarbon
Batch number: 133510030A

	Propene
7310947	78
Blank	107
LCS	105
MS	81
MSD	79

Limits: 42-131

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

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Environmental Services Analysis Request/Chain of Custody

Acct. #: 12184 Group #: 1440447 Sample #: 7310947-52

COC#: 5047

Client: **Altamont Environmental**

Project Name/#: Chemtronics FV Treatability and Pilot Test

Project Manager: Amy ~~Bondurant~~ Huffman P.O. #: 2115.22

Sampler: P Brock

Phone #: 828 280 3350 Quote #: 207662

State where sample(s) were collected: NC

For Lab Use Only

SF#: 165823

SCR#: 130703

Preservation Codes: H = HCl, T = Thiosulfate, N = HNO_3, B = NaOH, S = H_2SO_4, P = H_3PO_4, O = Other

Sample Identification	Collection Date	Collection Time	Grab	Composite	Soil	Potable	Ground	Surface	NPDES	Water	Other:	Total # of Containers	GC/MS VOAs (8260)	Fe, Mn (6010)	Picric Acid (8015B)	Perchlorate (6850)	RDX (8330)	Cl-, SO4-, NO2, NO3 (300.0)	TOC (SM20 5310 C)	Dissolved Gases (8015)	Sulfide	Metals	Nitroaromatics/Aniline		Remarks
													H	N					O		O	N			
MW253-J39D	12/11/13	1125	X					X		X		14	X		X	X		X	X	X	X	X	X		
MW256-M25CD	12/11/13	1440	X					X		X		4	X			X									
MW257-M25CD	12/11/13	1336	X					X		X		4	X			X									
Equipment Blank Grundfos	12/11/13	1530	X					X		X		6	X		X	X							X		
Trip Blanks	12/11/13											2	X												Trip Blanks

Turnaround Time Requested (TAT) (please check): Standard ☒ RUSH ☐

(RUSH TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: Standard

E-mail address to send RUSH results: ahuffman@altamontenvironmental.com

Data Package Options (please check if required)

Type I (Validation/non-CLP) ☐ MA MCP ☐ TX TRRP - 13 ☐

Type III (Reduced non-CLP) ☐ CT RCP ☐

Type IV (CLP SOW) ☐ ASP Type A ☐

Type VI (Raw Data Only) ☐ ASP Type B ☐

EDD Format:

If site-specific QC (MS/MSD/Dup) required, indicate QC samples and submit triplicate volume.

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	12/11/13	1610			
			Received by: [signature]	12/12/13	0930

Airbill No.:

Relinquished by Commercial Carrier:

UPS ✓ FedEx _____ Other _____

Temperature upon receipt 0.4 °C

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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Data Qualifiers:

C – result confirmed by reanalysis.

J - estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

ANALYTICAL RESULTS

Prepared by:	Prepared for:
Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601	Altamont Environmental 231 Haywood Street Asheville NC 28801

December 12, 2013

Project: Chemtronics

Submittal Date: 12/04/2013
Group Number: 1438345
PO Number: 2115.231
State of Sample Origin: NC

Client Sample Description	Lancaster Labs (LL) #
Hydrant Water	7300878

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Altamont Environmental	Attn: Amy Huffman
ELECTRONIC COPY TO	Altamont Environmental	Attn: Marta VanDussen

Respectfully Submitted,

Nancy Jean Bornholm

Nancy Jean Bornholm
Principal Specialist

(717) 556-7250

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Analysis Report

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Sample Description: Hydrant Water
Chemtronics

LL Sample # WW 7300878
LL Group # 1438345
Account # 12184

Project Name: Chemtronics

Collected: 12/03/2013 12:30 by AH

Submitted: 12/04/2013 10:05
Reported: 12/12/2013 17:06

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2340 C-1997**		**mg/l as CaCO3**	**mg/l as CaCO3**	**mg/l as CaCO3**	
12147	Total Hardness	471-34-1	32.3	3.0	5.0	1
	SM 2540 C-1997		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	65.0	9.7	30.0	1
	SM 4500-H+ B-2000		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	10.2	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
12147	Total Hardness	SM 2340 C-1997	1	13339001101A	12/05/2013 11:47	Susan A Engle	1
00212	Total Dissolved Solids	SM 2540 C-1997	1	13340021201A	12/06/2013 14:55	Carolyn M Mastropietro	1
12152	pH	SM 4500-H+ B-2000	1	13339003203A	12/05/2013 19:30	Michele L Graham	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1438345
Reported: 12/12/13 at 05:06 PM

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 13339001101A	Sample number(s): 7300878									
Total Hardness	3.0	U	3.0	5.0	mg/l as CaCO3	102		96-110		
Batch number: 13339003203A	Sample number(s): 7300878									
pH						100		90-110		
Batch number: 13340021201A	Sample number(s): 7300878									
Total Dissolved Solids	9.7	U	9.7	30.0	mg/l	97		80-120		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: 13339001101A	Sample number(s): 7300878 UNSPK: P301162 BKG: P301162								
Total Hardness	96		67-120			50.4	50.5	0	5
Batch number: 13339003203A	Sample number(s): 7300878 BKG: P299987								
pH						5.4	5.4	1	3
Batch number: 13340021201A	Sample number(s): 7300878 UNSPK: P296209 BKG: P292758								
Total Dissolved Solids	100		51-144			25,300	24,800	2	5

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

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Environmental Services Analysis Request/Chain of Custody

COC#: 7673

Acct. #: 12184 Group #: 1438345 Sample #: 7300878

Client:	Altamont Environmental
Project Name/#:	Chemtronics
Project Manager:	Amy Huffman
P.O. #:	2115.231
Sampler:	AHuffman
Phone #:	828-281-3350
Quote #:	207662
State where sample(s) were collected:	NC

For Lab Use Only
SF#: 194843
SCR#: 148200

Preservation Codes: H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; P = H_3PO_4; O = Other

Sample Identification	Collection Date	Collection Time	Grab	Composite	Soil	Sediment	Potable	Ground	Surface	NPDES	Water	Other:	Total # of Containers	GC/MS VOAs (8260)	Picric Acid (8015B)	Perchlorate (6850)	Nitroaromatics/Amines (8330)	Cl-, SO4-, NO2, NO3, Br- (300.0)	Dissolved Gases (8015)	Diss. Al, Ca, Fe, Mg, Mn, K, Na (6010)	TOC (SM20 5310 C)	Total Hardness (2340 C)	TDS (2540 C)	Pit	Remarks
														H			P		H	N		N			
Hydrant	12/3/13	1230									X		3									X	X	X	

Turnaround Time Requested (TAT) (please check): Standard ☑ RUSH ☐
(RUSH TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 2 weeks

E-mail address to send RUSH results:

Data Package Options (please check if required)

Type I (Validation/non-CLP) ☐ MA MCP ☐ TX TRRP - 13 ☐
Type III (Reduced non-CLP) ☐ CT RCP ☐
Type IV (CLP SOW) ☐ ASP Type A ☐
Type VI (Raw Data Only) ☐ ASP Type B ☐

EDD Format:

If site-specific QC (MS/MSD/Dup) required, indicate QC samples and submit triplicate volume.

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	12/3/13	1300			
			[signature]	12/4/13	1005

Airbill No.:
Relinquished by Commercial Carrier:
UPS ✓ FedEx _____ Other _____

Temperature upon receipt 3.0 °C

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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Data Qualifiers:

C – result confirmed by reanalysis.

J - estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers		Inorganic Qualifiers	
A	TIC is a possible aldol-condensation product	**B**	Value is <CRDL, but ≥IDL
B	Analyte was also detected in the blank	**E**	Estimated due to interference
C	Pesticide result confirmed by GC/MS	**M**	Duplicate injection precision not met
D	Compound quantitated on a diluted sample	**N**	Spike sample not within control limits
E	Concentration exceeds the calibration range of the instrument	**S**	Method of standard additions (MSA) used for calculation
N	Presumptive evidence of a compound (TICs only)	**U**	Compound was not detected
P	Concentration difference between primary and confirmation columns >25%	**W**	Post digestion spike out of control limits
U	Compound was not detected	*****	Duplicate analysis not within control limits
X,Y,Z	Defined in case narrative	**+**	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

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Environmental Services Analysis Request/Chain of Custody

Acct. #: 12184 Group #: Sample #:

COC#: 7673

Client: **Altamont Environmental**

Project Name/#:

Project Manager: Amy Huffman P.O. #: 2115.231

Sampler: P. Brooks

Phone #: 828 281 3350 Quote #: 207662

State where sample(s) were collected: NC

For Lab Use Only

SF#: 194843

SCR#: 148200

Preservation Codes

H = HCl T = Thiosulfate

N = HNO_3 B = NaOH

S = H_2SO_4 P = H_3PO_4

O = Other

Sample Identification	Collection Date	Collection Time	Grab	Composite	Soil	Sediment	Potable Water	Ground Water	Surface Water	NPDES Water	Other:	Total # of Containers	GC/MS VOAs (8260)	Picric Acid (8015B)	Perchlorate (6850)	Nitroaromatics/Amines (8330)	Cl-, SO4-, NO2, NO3, Br- (300.0)	Dissolved Gases (8015)	Diss. Al, Ca, Fe, Mg, Mn, K, Na (6010)	TOC (SM20 5310 C)	Total Hardness (2340 C)	TDS (2540 C)			Remarks
													H			P		H	N		N				
~~P5~~ P5-D	1/10/14	1044	X					X				15	X	X	X	X	X	X	X	X	X	X			Please Filter
P7-D	1/10/14	1312	X					X				15	X	X	X	X	X	X	X	X	X	X			Metal samples
Trip Blank	1/10/14											2	X												

Turnaround Time Requested (TAT) (please check): Standard ☒ RUSH ☐

(RUSH TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: Standard

E-mail address to send RUSH results: ahuffman@altamontenvironmental.com

Data Package Options (please check if required)

Type I (Validation/non-CLP) ☐ MA MCP ☐ TX TRRP - 13 ☐

Type III (Reduced non-CLP) ☐ CT RCP ☐

Type IV (CLP SOW) ☐ ASP Type A ☐

Type VI (Raw Data Only) ☐ ASP Type B ☐

EDD Format:

If site-specific QC (MS/MSD/Dup) required, indicate QC samples and submit triplicate volume.

Relinquished by:	Date	Time	Received by:	Date	Time
S Deline	11/7/13	1350			
	1/10/14	1715			

Airbill No.:

Relinquished by Commercial Carrier:

UPS _____ FedEx _____ Other _____

Temperature upon receipt _____ °C

Appendix D

Work Area Management Activities

Site Management Activities

Liquid Investigation Derived Waste

Liquid investigation derived waste (LIDW) produced during drilling activities was pumped directly into caged 275-gallon polyethylene tanks (cage tanks). LIDW was then transported to an on-site frac tank for temporary storage to allow settling of suspended materials. LIDW will be pumped from the frac-tank into the on-Site Back Valley groundwater treatment system for treatment prior to discharge to the Metropolitan Sewerage District (MSD) of Buncombe County in accordance with the Permit to Discharge Remediated Water from Groundwater Recovery (Permit).

Solid Investigation Derived Waste

Solid investigation derived waste (SIDW) consists of soil cuttings brought to the surface during drilling activities. SIDW was placed in a backhoe bucket as it was brought to the surface and was then transported to on-Site lined roll-off containers (roll-offs). The soil material in the roll-offs was sampled by Altamont personnel and submitted to an analytical laboratory for waste characterization prior to disposal at the Union County Landfill in South Carolina.

Decontamination Procedures

Decontamination of all downhole equipment was performed by AE Drilling Services (AE) personnel between each soil boring. Decontamination of the downhole equipment consisted of steam, pressure washing within a designated decontamination pad that consisted of sloped three-sided pad with high walls lined with heavy plastic. The drill rig was also decontaminated after particularly muddy or contaminated boring locations. Drill rig decontamination procedures were carried out over a larger plastic-lined decon pad in order to contain contaminated water and soil produced during the decontamination process. Decontamination water was pumped from the plastic lined pads and into cage tanks. The cage tanks were emptied into a 20,000-gallon frac tank for disposal as a LIDW. Plastic liners and soil produced during the decontamination process where deposited in roll-offs located on-Site. The soil material in the roll-offs will be sampled by Altamont personnel in accordance with the SIDW procedures described above.

Decontamination of sampling equipment (i.e., split spoons, trowels, etc.) was carried out by Altamont personnel and consisted of washing equipment with a solution of Liquinox™ and water followed by rinsing in potable water. Decontamination and rinse solutions were disposed of in the on-Site frac tank used for other decontamination fluids (see above).

Exclusion Zones

An exclusion zone consisting of a perimeter of orange cones and caution tape was set up around each soil boring location in accordance with the Site-Specific Health and Safety Plan. The purpose of the exclusion zone was to limit egress and regress in the work area in order to help contain IDW produced during drilling activities. All drilling and sampling activities were carried out within the exclusion zone.

Egress and regress to and from the exclusion zone occurred at a designated location. Donning of appropriate PPE was required prior to ingress into the exclusion zone. At the entrance of the exclusion zone, two boot-wash bins, one with a solution of Liquinox™ and water and the other with a rinse solution of potable water, were provided for boot washing prior to regress from the exclusion zone. Washing of boots and removal of contaminated PPE was required before egress from the exclusion zone.

Soil within the exclusion zone, particularly in the area surrounding the borehole, was scraped with a backhoe and deposited within roll-offs located on-Site. IDW produced during the drilling process was deposited into on-Site roll-offs as well. Roll-offs were sampled by Altamont personnel and disposed of as an SIDW.

Vapor Monitoring and Upgrades

Altamont observed geotechnical drilling activities near the APA and DA9 at the Site. Because the groundwater concentrations in the vicinity of the APA and DA9 are relatively high, vapor monitoring was required. Workers performing these activities were required to participate in a respiratory protection program satisfying the requirements of 29 Code of Federal Regulations (CFR) 1910.134. A flame ionization detector (FID) was used to screen the collected media and ambient air in and around the work area.

An adjusted action level (concentration at which an employee must don a respirator) of 8.5 parts per million (ppm) was calculated based on the historical VOC constituents detected in groundwater in the planned drilling area, each constituent's Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) for an 8-hour time-weighted average (TWA), and each constituent's relative concentration in groundwater. This calculation assumed that the relative concentration of a constituent volatilized to air from impacted media was approximately the same as the relative concentration of the constituent in groundwater (after being adjusted for molecular weight). Additionally, a safety factor of 5 was used to determine the final adjusted action level.

For practicality, an action level of 5 ppm was the threshold used to trigger respiratory protection. Monitored air concentrations were sustained for approximately a 1-minute period before action was taken (donning or doffing a respirator). Based on an Assigned Protection Factor (APF) of 10 for the half-face respirator and the adjusted action level, described above, the maximum use concentration (MUC) for the half-face respirator is 85 ppm. MUC levels were not exceeded for more than a 1-minute period.

Geotechnical boreholes were advanced with hollow-stem auger and rock coring methods. Split-spoon samples, rock cores, and bulk soil samples were collected as the boreholes were advanced to final depths. The FID was used to screen the collected media. Media impacted with volatile organic compounds (VOCs) was encountered in the sub-surface in many of the drilling areas.

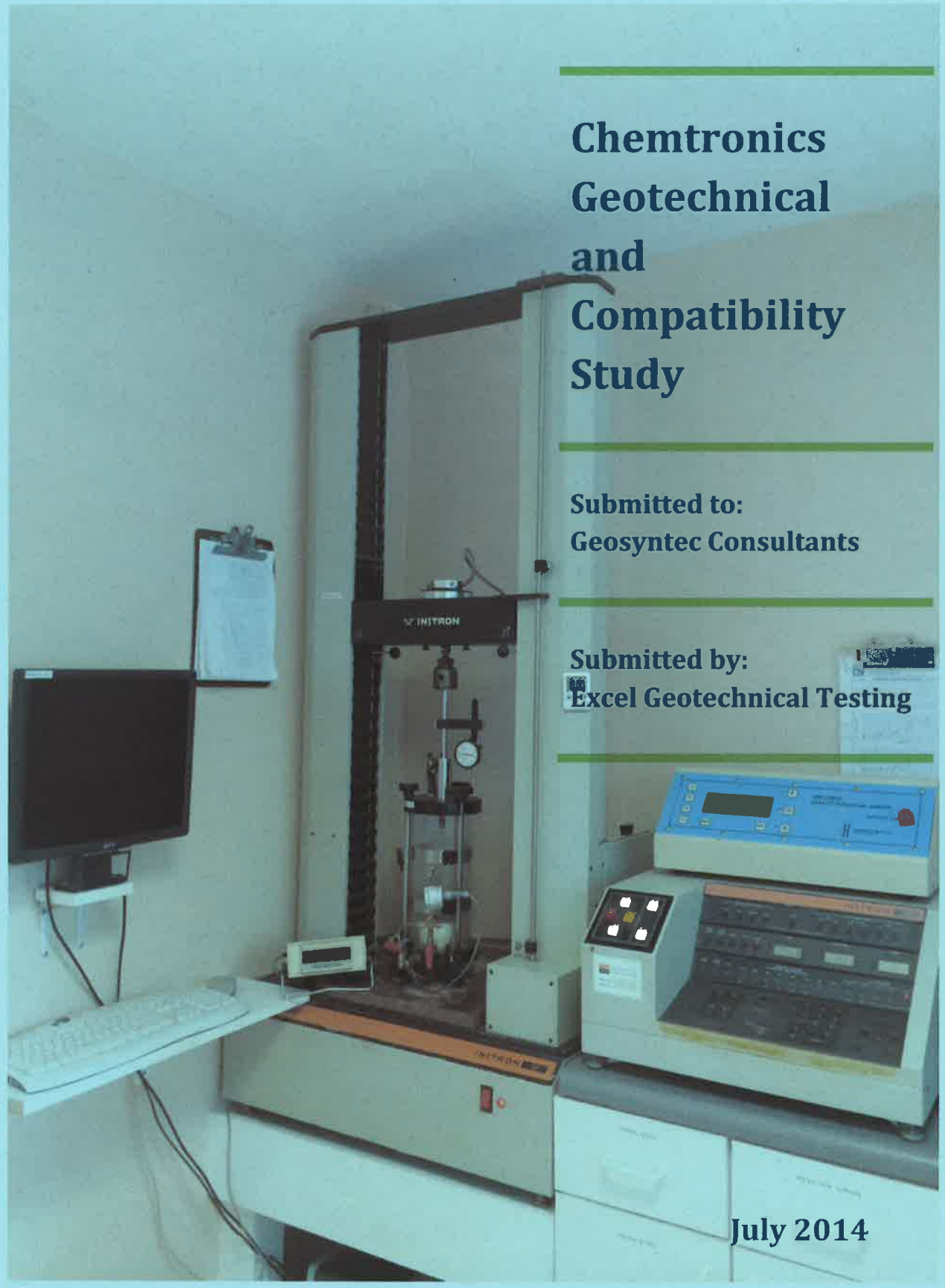
During drilling activities atmospheric monitoring was conducted with the FID. Potentially explosive atmospheres were not encountered. Monitoring of the work area and breathing zone was conducted on a regular schedule and at any observed change in conditions that indicated a potential change in vapor concentrations. Monitoring results were recorded on the boring logs and other field records.

If elevated VOCs were detected, engineering controls were used to minimize potential exposure to harmful chemicals. The engineering controls included box fans, which were placed in the work area to increase air flow and decrease potential concentrations of harmful chemicals in the work area. Fans were adjusted so that air flow was directed across impacted media and away from Site workers. Respirators were only used in the event monitoring indicated that engineering controls were not adequate in maintaining conditions below the established action levels.

Respirators were used by AE Drilling Services personnel (the driller and one driller's helper) during drilling activities at VBW-06, VBW-08, VBW-09, and VBW-18, generally along the south and east sides of the APA. FID readings that triggered respirator use at these borings ranged from 11.59 ppm at VBW-9 to 117 ppm, briefly, at VBW-8. Respirator use ranged from less than 30 minutes at VBW-18 to nearly 3 hours at VBW-6. Altamont personnel and a second driller's helper used respirators only when it was necessary to enter the work area.

APPENDIX B

Chemtronics Geotechnical and Compatibility Study Report
(Excel Geotechnical Testing, Inc., 2014)



Chemtronics Geotechnical and Compatibility Study

Submitted to:
Geosyntec Consultants

Submitted by:
Excel Geotechnical Testing

July 2014

Chemtronics Geotechnical and Compatibility Testing

Purpose

The testing program was performed to design various Soil Cement Bentonite, Soil Bentonite, and Cement Bentonite Mixes and evaluate their permeability and strength, as well as provide a general understanding of the compatibility of the mixes with the Site Ground Waters.

Test Program

Testing program consisted of the following four phases:

Phase 1: Index Testing of Site Soil and Composite Soil Samples - Phase 1 of the testing program was performed to obtain general information about the index properties of the site soils, and three Composite Soil mixes.

Phase 2: Bentonite and Cement Bentonite Slurry Evaluation and Compatibility - Phase 2 of the testing program was performed to obtain general information about the slurry index properties of the test Bentonite when mixed with Site Hydrant Water, Site Ground Waters and, when applicable, cement.

Phase 3: Soil Cement Bentonite, Soil Bentonite, and Cement Bentonite Mix Design and Evaluation - Phase 3 of the testing program was performed to evaluate slump, permeability, and strength characteristics of various Soil Cement Bentonite, Soil Bentonite, and Cement Bentonite mixes. Bentonite and Cement Bentonite slurries prepared with Site Hydrant Water, dry Bentonite, and a composite soil sample were used at different ratios when preparing the test specimens. Site Ground Waters were used when saturating, consolidating, and permeating the permeability test specimens.

Phase 4: Soil Cement Bentonite, Soil Bentonite, and Cement Bentonite Mix Design and Compatibility - Phase 4 of the testing program was performed to evaluate permeability and strength characteristics of various Soil Cement Bentonite, Soil Bentonite, and Cement Bentonite mixes. Bentonite and Cement Bentonite slurries prepared with Site Ground Waters, dry Bentonite, and a composite soil sample were used at different ratios when preparing the test specimens. Site Ground Waters were used when saturating, consolidating, and permeating the permeability test specimens.

7-23-14
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Test Material

Test materials consisted of:

- Soil samples from the site;
- Site Hydrant Water (SHW);
- Two Site Ground Waters (SGWs);
- WYO-BEN, Inc. HYDROGEL Bentonite; and
- Cement Type I / II obtained from a local Home Depot store.

Test Applicability and Limitations

It should be noted that:

- The testing program was designed to provide a general understanding of the compatibility of the Soil Cement Bentonite, Soil Bentonite, and Cement Bentonite Mixes with the SHW and the two SGWs;
- The duration of various compatibility tests and the observations made may not be long enough to fully understand the compatibility of the test Bentonite and the mixes with the two SGWs; and
- The test results are applicable only for the materials received at the laboratory and tested which may or may not be accurate representation of the materials used at the site.

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Phase 1

Classification of Site Soils and Composite Soil Mixes

Purpose

Phase 1 of the testing program was performed to obtain general information about the index properties of the site soils, and three Composite Soil mixes.

Test Material

The test material consisted of:

- Split Spoon soil samples from the site;
- Bulk soil samples from the site; and
- Three Composite Soil mixes (CS-01, CS-02, and CS-03) formed in the laboratory utilizing bulk soil samples at various ratios.

Test Results

The testing program consisted of moisture content determination, sieve and hydrometer analysis, and Atterberg Limits determination. The test results for various test samples are provided in the following attachments:

Split Spoon Soil Samples – Test results are provided in Attachment P1-A. The results are summarized in Table P1-A-01 and are presented in the accompanying figures.

Bulk Soil Samples – Test results are provided in Attachment P1-B. The results are summarized in Table P1-B-01 and are presented in the accompanying figures.

Composite Soil Mixes – Test results are provided in Attachment P1-C. Composite Soil mix ratios are presented in Table P1-C-01. The results are summarized in Table P1-C-02 and are shown in the accompanying figures.

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Phase 1

Classification of Site Soils and Composite Soil Mixes

Attachment P1-A

Split Spoon Index Test Results

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Table P1-A-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information		Test Information										
Site ID	Lab No.	Moisture Content ASTM D 2216	Grain Size Analysis ASTM D 422					Atterberg Limits ASTM D 4318			Engineering Classification ASTM D 2487	Remarks
			Gravel Content	Sand Content	Fines Content	Silt Content	Clay Content	LL	PL	PI		
(-)	(-)	(%)	(%)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(-)	
VBW-1-0-1.5	13L041E											
VBW-1-1.5-3	13L042E											
VBW-1-3-4.5	13L043E	21.8	5.0	28.8	66.2			57	29	28	CH	
VBW-1-4.5-6	13L044E											
VBW-1-6-7.5	13L045E											
VBW-1-7.5-9	13L046E	25.9										
VBW-1-9-10.5	13L047E											
VBW-1-10.5-12	13L048E											
VBW-1-12-13.5	13L049E											
VBW-1-13.5-15	13L050E											
VBW-1-15-16.5	13L051E	55.2	0.1	28.5	71.4	21.0	50.4	93	66	27	MH	
VBW-1-16.5-18	13L052E											
VBW-1-18-19.5	13L053E	48.4										
VBW-1-19.5-21	13L054E											
VBW-1-21-22.5	13L055E											
VBW-1-22.5-24.0	13L056E	32.5	0.1	23.8	76.1	64.3	11.8	52	36	16	MH	
VBW-1-24-25.5	13L057E											
VBW-1-25.5-27	13L058E	9.3	35.4	38.4	26.2	21.8	4.4	NP	NP	NP	SM	
VBW-1-27-28.5	13L059E											
VBW-1-28.5-30	13L060E											
VBW-2-0-1.5	13L061E											
VBW-2-4-5.5	13L062E	10.4	0	44.4	55.6			NP	NP	NP	ML	
VBW-2-9-10.5	13L063E	9.8										
VBW-2-Residuum/PWR	13L010E											
VBW-3-0-1.5	13L064E											
VBW-3-1.5-3	13L065E	26.8	0.9	26.3	72.8			61	33	28	MH	
VBW-3-3-4.5	13L066E											
VBW-3-4.5-6	13L067E											
VBW-3-6-7.5	13L068E	18.6	1.3	56.5	42.2			NP	NP	NP	SM	
VBW-3-7.5-9	13L069E											
VBW-3-9-10.5	13L070E											
VBW-3-10.5-12	13L071E											
VBW-3-12-13.5	13L072E											

Notes:

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Excel Geotechnical Testing, Inc.
"Excellence in Testing"

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			Gravel Content	Sand Content	Fines Content	Silt Content	Clay Content	LL	PL	PI		
(-)	(-)	(%)	(%)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(-)	
VBW-3-13.5-15	13L073E											
VBW-3-15-16.5	13L074E											
VBW-3-16.5-18	13L075E											
VBW-3-18-19.5	13L076E											
VBW-3-19.5-21	13L077E	41.0	1.4	53.4	45.2			72	58	14	SM	
VBW-3-21-22.5	13L078E											
VBW-3-22.5-24	13L079E											
VBW-3-24-25.5	13L080E											
VBW-3-25.5-27	13L081E											
VBW-3-27-28.5	13L082E	20.8										
VBW-3-28.5-30	13L083E											
VBW-3-30-31.5	13L084E											
VBW-3-31.5-33	13L085E											
VBW-3-33-34.5	13L086E											
VBW-3-34.5-36	13L087E											
VBW-3-36-37.5	13L088E	56.1	0.6	87.0	12.4			NP	NP	NP	SM	
VBW-3-37.5-39	13L089E											
VBW-4-0-1.5	13L090E											
VBW-4-2.5-4	13L091E											
VBW-4B-2.5-4	13L092E	4.5	71.5	13.7	14.8			47	29	18	GM	
VBW-4B-7.5-9	13L093E											
VBW-4B-12.5-14	13L094E	18.1	0.4	68.6	31.0			NP	NP	NP	SM	
VBW-4B-22.5-24	13L095E											
VBW-4B-27.5-29	13L096E											
VBW-4B-37.5-39	13L097E											
VBW-4B-42.5-44	13L098E											
VBW-4B-47.5-49	13L099E	21.2	3.6	67.1	29.3	21.2	8.1	NP	NP	NP	SM	
VBW-4B-52.5-54	13L100E											
VBW-4B-57.5-59	13L101E											
VBW-4B-Residuum	13L014E											
VBW-4B-Saprolite	13L015E											
VBW-5-0-1.5	13L102E											
VBW-5-4-5.5	13L103E											

Notes:

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Excel Geotechnical Testing, Inc.
"Excellence in Testing"

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Table P1-A-01

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			Gravel Content	Sand Content	Fines Content	Silt Content	Clay Content	LL	PL	PI		
(-)	(-)	(%)	(%)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(-)	
VBW-5-9-10.5	13L104E	22.0	7.5	58.8	33.7	25.5	8.2	NP	NP	NP	SM	
VBW-5-19-20.5	13L105E	39.2										
VBW-5-29-30.5	13L106E	36.9	3.6	61.6	34.8			NP	NP	NP	SM	
VBW-5-34-35.5	13L107E											
VBW-5-39-40.5	13L108E	38.3	0.1	65.6	34.3			NP	NP	NP	SM	
VBW-5-44-45.5	13L109E											
VBW-5-49-50.5	13L110E											
VBW-5-54-55.5	13L111E											
VBW-5-59-60.5	13L112E	19.6	6.2	57.3	36.5			NP	NP	NP	SM	
VBW-5-64-65.5	13L113E											
VBW-5-69-70.5	13L114E											
VBW-5-74-75.5	13L115E	18.6	0	68.7	31.3			NP	NP	NP	SM	
VBW-5-Residuum	13L016E											
VBW-5-Saprolite	13L017E											
VBW-5-PWR	13L018E											
VBW-6-3.5-5	13L116E	11.7	44.2	26.7	29.1			NP	NP	NP	GM	
VBW-6-8.5-10	13L117E	27.6	1.6	59.4	39.0	23.7	15.3	NP	NP	NP	SM	
VBW-6-18.5-20	13L118E											
VBW-6-23.5-25	13L119E											
VBW-6-28.5-30	13L120E											
VBW-6-33.5-35	13L121E	31.0										
VBW-6-38.5-40	13L122E											
VBW-6-43.5-45	13L123E	11.7	57.1	17.5	25.4			NP	NP	NP	GM	
VBW-6-48.5-50	13L124E											
VBW-6-53.5-55	13L125E	14.9	5.5	70.9	23.6			NP	NP	NP	SM	
VBW-6-58.5-60	13L126E											
VBW-6-63.5-65	13L127E											
VBW-6-68.5-70	13L128E											
VBW-6-73.5-75	13L129E	8.0	2.5	68.7	28.8	21.8	7.0	NP	NP	NP	SM	
VBW-6-Residuum	13L019E											
VBW-6-Saprolite	13L020E											
VBW-6-PWR	13L021E											
VBW-7-0-1.5	13L130E											

Notes:

7-14-14
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			Gravel Content	Sand Content	Fines Content	Silt Content	Clay Content	LL	PL	PI		
(-)	(-)	(%)	(%)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(-)	
VBW-7-1.5-3	13L131E											
VBW-7-3-4.5	13L132E											
VBW-7-4.5-6	13L133E											
VBW-7-6-7.5	13L134E											
VBW-7-7.5-9	13L135E											
VBW-7-10.5-12	13L136E											
VBW-7-12-13.5	13L137E											
VBW-7-13.5-15	13L138E											
VBW-7-15-16.5	13L139E											
VBW-7-16.5-18	13L140E											
VBW-7-18-19.5	13L141E											
VBW-7-19.5-21	13L142E											
VBW-7-21-22.5	13L143E											
VBW-7-22.5-24	13L144E											
VBW-7-24-25.5	13L145E											
VBW-7-25.5-27	13L146E											
VBW-7-27-28.5	13L147E	26.7	0.2	62.1	37.7			NP	NP	NP	SM	
VBW-7-28.5-30	13L148E											
VBW-7-30-31.5	13L149E											
VBW-7-31.5-33	13L150E											
VBW-7-33-34.5	13L151E											
VBW-7-34.5-36	13L152E	15.9										
VBW-7-36-37.5	13L153E											
VBW-7-37.5-39	13L154E											
VBW-7-39-40.5	13L155E											
VBW-7-40.5-42	13L156E											
VBW-7-42-43.5	13L157E											
VBW-7-43.5-45	13L158E											
VBW-7-45-46.5	13L159E											
VBW-7-46.5-48	13L160E											
VBW-7-48-49.5	13L161E											
VBW-7-49.5-51	13L162E											
VBW-7-51-52.5	13L163E											

Notes:

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TR/VSR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
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Table P1-A-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information		Test Information										
Site ID	Lab No.	Moisture Content ASTM D 2216	Grain Size Analysis ASTM D 422					Atterberg Limits ASTM D 4318			Engineering Classification ASTM D 2487	Remarks
			Gravel Content	Sand Content	Fines Content	Silt Content	Clay Content	LL	PL	PI		
(-)	(-)	(%)	(%)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(-)	
VBW-7-52.5-54	13L164E											
VBW-7-54-55.5	13L165E	16.6	1.3	73.8	24.9	17.4	7.5	NP	NP	NP	SM	
VBW-7-55.5-57	13L166E											
VBW-7-57-58.5	13L167E											
VBW-7-58.5-60	13L168E											
VBW-7-60-61.5	13L169E											
VBW-7-61.5-63	13L170E	18.1										
VBW-7-63-64.5	13L171E											
VBW-7-64.5-66	13L172E											
VBW-7-66-67.5	13L173E											
VBW-7-67.5-69	13L174E	18.7	0.5	46.2	53.3			NP	NP	NP	ML	
VBW-7-69-70.5	13L175E											
VBW-7-70.5-72	13L176E											
VBW-7-72-73.5	13L177E											
VBW-7-73.5-75	13L178E											
VBW-7-75-76.5	13L179E	14.3	11.7	44.7	43.6			NP	NP	NP	SM	
VBW-8-4-5.5	13L180E	21.6	7.2	38.5	54.3			46	23	23	CL	
VBW-8-9-10.5	13L181E	17.1	32.1	43.9	24.0	14.0	10.0	NP	NP	NP	SM	
VBW-8-19-20.5	13L182E											
VBW-8-29-30.5	13L183E	30.5	0	69.6	30.4			NP	NP	NP	SM	
VBW-8-34-35.5	13L184E											
VBW-8-39-40.5	13L185E											
VBW-8-44-45.5	13L186E											
VBW-8-49-50.5	13L187E											
VBW-8-54-55.5	13L188E	9.1										
VBW-8-59-60.5	13L189E											
VBW-8-64-65.5	13L190E											
VBW-8-69-70.5	13L191E											
VBW-8-74-75.5	13L192E	12.4	34.1	42.1	23.8			NP	NP	NP	SM	
VBW-8-79-80.5	13L193E											
VBW-8-Residuum	13L022E											
VBW-8-Saprolite	13L023E											
VBW-8-PWR	13L024E											
VBW-9-4-5.5	13L194E	18.9	22.5	22.7	54.8			57	32	25	MH	

Notes:

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Table P1-A-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information		Test Information										
Site ID	Lab No.	Moisture Content ASTM D 2216	Grain Size Analysis ASTM D 422					Atterberg Limits ASTM D 4318			Engineering Classification ASTM D 2487	Remarks
			Gravel Content	Sand Content	Fines Content	Silt Content	Clay Content	LL	PL	PI		
(-)	(-)	(%)	(%)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(-)	
VBW-9-9-10.5	13L195E											
VBW-9-14-15.5	13L196E											
VBW-9-24-25.5	13L197E											
VBW-9-29-30.5	13L198E											
VBW-9-34-35.5	13L199E	27.7	3.3	60.1	36.6			NP	NP	NP	SM	
VBW-9-39-40.5	13L200E											
VBW-9-44-45.5	13L201E	18.8	4.6	63.1	32.3			NP	NP	NP	SM	
VBW-9-49-50.5	13L202E											
VBW-9-54-55.5	13L203E											
VBW-9-59-60.5	13L204E											
VBW-9-64-65.5	13L205E											
VBW-9-69-70.5	13L206E											
VBW-9-74-75.5	13L207E											
VBW-9-79-80.5	13L208E	11.6	0.4	62.1	37.5			NP	NP	NP	SM	
VBW-9-84-85.5	13L209E											
VBW-9-Residuum	13L025E											
VBW-Saprolite	13L026E											
VBW-PWR	13L027E											
VBW-10-0-1.5	13L210E											
VBW-10-1.5-3	13L211E											
VBW-10-3-4.5	13L212E											
VBW-10-4.5-6	13L213E	35.7										
VBW-10-6-7.5	13L214E											
VBW-10-7.5-9	13L215E											
VBW-10-9-10.5	13L216E											
VBW-10-10.5-12	13L217E											
VBW-10-12-13.5	13L218E											
VBW-10-13.5-15	13L219E	36.0	0.1	37.5	62.4			NP	NP	NP	ML	
VBW-10-15-16.5	13L220E											
VBW-10-16.5-18	13L221E											
VBW-10-18-19.5	13L222E											
VBW-10-19.5-21	13L223E	47.1										
VBW-10-21-22.5	13L224E											

Notes:

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TR, NSR

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Table P1-A-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information		Test Information										
Site ID	Lab No.	Moisture Content ASTM D 2216	Grain Size Analysis ASTM D 422					Atterberg Limits ASTM D 4318			Engineering Classification ASTM D 2487	Remarks
			Gravel Content	Sand Content	Fines Content	Silt Content	Clay Content	LL	PL	PI		
(-)	(-)	(%)	(%)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(-)	
VBW-10-22.5-24	13L225E	42.3	0	69.4	30.6			NP	NP	NP	SM	
VBW-10-24-25.5	13L226E											
VBW-10-25.5-27	13L227E											
VBW-10-27-28.5	13L228E	38.7	2.5	68.6	28.9	18.1	10.8	NP	NP	NP	SM	
VBW-10-28.5-30	13L229E											
VBW-10-30-31.5	13L230E											
VBW-10-31.5-33	13L231E											
VBW-10-33-34.5	13L232E											
VBW-10-34.5-36	13L233E											
VBW-10-36-37.5	13L234E											
VBW-11-1-1.5	13L235E	23.9										
VBW-11-3-4.5	13L236E											
VBW-11-8-9.5	13L237E	42.0	0.2	31.0	68.8	30.0	38.8	NP	NP	NP	ML	
VBW-11-13-14.5	13L238E											
VBW-11-18-19.5	13L239E											
VBW-11-23-24.5	13L240E	25.6	2.7	68.8	28.5			NP	NP	NP	SM	
VBW-11-28-29.5	13L241E											
VBW-11-33-34.5	13L242E	23.7										
VBW-11-43-44.5	13L243E											
VBW-11-48-49.5	13L244E	23.1	0	68.8	31.2			NP	NP	NP	SM	
VBW-11-53-54.5	13L245E											
VBW-11-58-59.5	13L246E											
VBW-11-63-64.5	13L247E											
VBW-11-68-69.5	13L248E											
VBW-11-73-74.5	13L249E	17.7	0.6	63.4	36.0	25.4	10.6	NP	NP	NP	SM	
VBW-11-78-79.5	13L250E											
VBW-11-83-84.5	13L251E											
VBW-11-88-89.5	13L252E	13.9	5.7	75.5	18.8	11.8	7.0	NP	NP	NP	SM	
VBW-11-Residuum	13L028E											
VBW-11-Saprolite	13L029E											Note 1
VBW-12-4-5.5	13L253E	23.5										
VBW-12-8-9.5	13L254E											
VBW-12-13-14.5	13L255E	7.0	29.1	55.5	15.4			NP	NP	NP	SM	

Notes:
1. Sample was labeled VBW-18-Saprolite, the Site ID was changed to VBW-11-Saprolite

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Table P1-A-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information		Test Information										
Site ID	Lab No.	Moisture Content ASTM D 2216	Grain Size Analysis ASTM D 422					Atterberg Limits ASTM D 4318			Engineering Classification ASTM D 2487	Remarks
			Gravel Content	Sand Content	Fines Content	Silt Content	Clay Content	LL	PL	PI		
(-)	(-)	(%)	(%)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(-)	
VBW-12-18-19.5	13L256E											
VBW-12-23-24.5	13L257E											
VBW-12-Residuum	13L030E											
VBW-12-Saprolite	13L031E											
VBW-13-0-1.5	13L258E	32.6										
VBW-13-1.5-3	13L259E											
VBW-13-3-4.5	13L260E	32.6	4.8	41.2	54.0			40	26	14	CL	
VBW-13-4.5-6	13L261E											
VBW-13-6-7.5	13L262E											
VBW-13-7.5-9	13L263E	53.2										
VBW-13-9-10.5	13L264E											
VBW-13-10.5-12	13L265E											
VBW-13-13.5-15	13L266E											
VBW-13-15-16.5	13L267E											
VBW-13-16.5-18	13L268E	8.6	57.3	29.7	13.0			NP	NP	NP	GM	
VBW-13-18-19.5	13L269E											
VBW-13-19.5-21	13L270E											
VBW-13-21-22.5	13L271E											
VBW-13-22.5-24	13L272E											
VBW-13-24-25.5	13L273E											
VBW-13-25.5-27	13L274E	45.3	0	53.6	46.4			NP	NP	NP	SM	
VBW-13-27-28.5	13L275E											
VBW-13-28.5-30	13L276E											
VBW-13-30-31.5	13L277E											
VBW-13-31.5-33	13L278E											
VBW-13-33-34.5	13L279E	12.9	4.7	73.8	21.5	15.4	6.1	NP	NP	NP	SM	
VBW-13-34.5-36	13L280E											
VBW-14-0-1.5	13L281E											
VBW-14-1.5-3	13L282E											
VBW-14-3-4.5	13L283E	24.7	8.1	62.1	29.8	10.8	19.0	46	33	13	SM	
VBW-14-4.5-6	13L284E											
VBW-14-6-7.5	13L285E											
VBW-14-7.5-9	13L286E											

Notes:

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Table P1-A-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information		Test Information										
Site ID	Lab No.	Moisture Content ASTM D 2216	Grain Size Analysis ASTM D 422					Atterberg Limits ASTM D 4318			Engineering Classification ASTM D 2487	Remarks
			Gravel Content	Sand Content	Fines Content	Silt Content	Clay Content	LL	PL	PI		
(-)	(-)	(%)	(%)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(-)	
VBW-14-9-10.5	13L287E											
VBW-14-10.5-12	13L288E											
VBW-14-12-13.5	13L289E	56.3	1.5	42.0	56.5			NP	NP	NP	ML	
VBW-14-13.5-15	13L290E											
VBW-14-15-16.5	13L291E											
VBW-14-16.5-18	13L292E											
VBW-14-18-19.5	13L293E											
VBW-14-19.5-21	13L294E											
VBW-14-21-22.5	13L295E											
VBW-14-22.5-24	13L296E											
VBW-14-24-25.5	13L297E											
VBW-14-25.5-27	13L298E	27.6										
VBW-14-27-28.5	13L299E											
VBW-14-28.5-30	13L300E											
VBW-14-30-31.5	13L301E											
VBW-14-31.5-33	13L302E											
VBW-14-33-34.5	13L303E											
VBW-14-34.5-36	13L304E											
VBW-14-36-37.5	13L305E											
VBW-14-37.5-39	13L306E											
VBW-14-39-40.5	13L307E											
VBW-14-40.5-42	13L308E											
VBW-14-42-43.5	13L309E											
VBW-14-43.5-45	13L310E											
VBW-14-45-46.5	13L311E											
VBW-14-46.5-48	13L312E											
VBW-14-48-49.5	13L313E	16.6	0	53.0	47.0			NP	NP	NP	SM	
VBW-14-49.5-51	13L314E	16.9	0	63.3	36.7			NP	NP	NP	SM	
VBW-14-51-52.5	13L315E											
VBW-14-52.5-54	13L316E											
VBW-14-54-55.5	13L317E											
VBW-14-55.5-57	13L318E											
VBW-14-57-58.5	13L319E											

Notes:

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Table P1-A-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information		Test Information										
Site ID	Lab No.	Moisture Content ASTM D 2216	Grain Size Analysis ASTM D 422					Atterberg Limits ASTM D 4318			Engineering Classification ASTM D 2487	Remarks
			Gravel Content	Sand Content	Fines Content	Silt Content	Clay Content	LL	PL	PI		
(-)	(-)	(%)	(%)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(-)	
VBW-14-58.5-60	13L320E											
VBW-14-60-61.5	13L321E											
VBW-14-61.5-63	13L322E											
VBW-14-63-64.5	13L323E	19.9	0	61.8	38.2			NP	NP	NP	SM	
VBW-14-64.5-66	13L324E											
VBW-14-66-67.5	13L325E											
VBW-14-67.5-69	13L326E											
VBW-14-Residuum	13L032E											
VBW-14-Saprolite	13L033E											
VBW-14-Deep Saprolite	13L034E											
VBW-15A-0-1.5	13L327E	24.9										
VBW-15A-1.5-3	13L328E											
VBW-15A-3-4.5	13L329E											
VBW-15A-4.5-6	13L330E											
VBW-15C-4.5-6	13L331E											
VBW-15C-6-7.5	13L332E											
VBW-15C-7.5-9	13L333E	21.1	3.0	60.9	36.1			NP	NP	NP	SM	
VBW-15C-9-10.5	13L334E											
VBW-15C-10.5-12	13L335E	20.2										
VBW-15C-12-13.5	13L336E											
VBW-15C-13.5-15	13L337E											
VBW-15C-15-16.5	13L338E	30.3	3.1	66.5	30.4	20.3	10.1	NP	NP	NP	SM	
VBW-15C-16.5-18	13L339E											
VBW-15C-18-19.5	13L340E											
VBW-15C-19.5-21	13L341E	31.2										
VBW-15C-21-22.5	13L342E											
VBW-15C-22.5-24	13L343E											
VBW-15C-24-25.5	13L344E											
VBW-15C-25.5-27	13L345E	31.7	2.6	50.5	46.9			38	32	6	SM	
VBW-15C-27-28.5	13L346E											
VBW-15C-28.5-30	13L347E	15.9										
VBW-15C-30-31.5	13L348E											
VBW-15C-31.5-33	13L349E											

Notes:

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Table P1-A-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information		Test Information										
Site ID	Lab No.	Moisture Content ASTM D 2216	Grain Size Analysis ASTM D 422					Atterberg Limits ASTM D 4318			Engineering Classification ASTM D 2487	Remarks
			Gravel Content	Sand Content	Fines Content	Silt Content	Clay Content	LL	PL	PI		
(-)	(-)	(%)	(%)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(-)	
VBW-15C-33-34.5	13L350E											
VBW-15C-34.5-36	13L351E											
VBW-15C-36-37.5	13L352E											
VBW-15C-37.5-39	13L353E	19.3	0.3	72.5	27.2			NP	NP	NP	SM	
VBW-15C-39-40.5	13L354E											
VBW-15C-40.5-42	13L355E											
VBW-15C-42-43.5	13L356E											
VBW-15C-43.5-45	13L357E											
VBW-15C-45-46.5	13L358E	14.1	0.5	60.8	38.7	27.4	11.3	NP	NP	NP	SM	
VBW-15C-46.5-48	13L359E											
VBW-15C-48-49.5	13L360E											
VBW-15C-49.5-51	13L361E											
VBW-15C-51-52.5	13L362E											
VBW-15C-52.5-54	13L363E											
VBW-15C-54-55.5	13L364E											
VBW-15C-55.5-57	13L365E											
VBW-15C-57-58.5	13L366E	10.2	0.1	64.9	35.0			NP	NP	NP	SM	
VBW-15C-58.5-60	13L367E											
VBW-15C-60-61.5	13L368E											
VBW-15C-61.5-63	13L369E											
VBW-15C-63-64.5	13L370E											
VBW-15C-64.5-66	13L371E											
VBW-15C-66-67.5	13L372E	10.9	0	65.7	34.3			NP	NP	NP	SM	
VBW-15C-67.5-69	13L373E											
VBW-15C-69-70.5	13L374E											
VBW-15C-70.5-72	13L375E											
VBW-15C-72-73.5	13L376E	5.4										
VBW-15C-73.5-75	13L377E	14.1	10.2	58.2	31.6			NP	NP	NP	SM	
VBW-15C-75-76.5	13L378E											
VBW-15C-76.5-78	13L379E											
VBW-15C-78-79.5	13L380E											
VBW-15C-79.5-81	13L381E											
VBW-15C-81-82.5	13L382E											

Notes:

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Table P1-A-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information		Test Information										
Site ID	Lab No.	Moisture Content ASTM D 2216	Grain Size Analysis ASTM D 422					Atterberg Limits ASTM D 4318			Engineering Classification ASTM D 2487	Remarks
			Gravel Content	Sand Content	Fines Content	Silt Content	Clay Content	LL	PL	PI		
(-)	(-)	(%)	(%)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(-)	
VBW-15C-82.5-84	13L383E											
VBW-15C-84-85.5	13L384E											
VBW-15C-85.5-87	13L385E											
VBW-15C-87-88.5	13L386E	12.7										
VBW-15C-88.5-90	13L387E											
VBW-15C-90-91.5	13L388E											
VBW-15C-91.58-93	13L389E											
VBW-15C-93-94.5	13L390E											
VBW-15C-94.5-96	13L391E	6.3	67.9	19.8	12.3			NP	NP	NP	GM	
VBW-16-0-1.5	13L392E											
VBW-16-1.5-3	13L393E	34.1	1.0	34.9	64.1			61	31	30	CH	
VBW-16-3-4.5	13L394E											
VBW-16-4.5-6	13L395E											
VBW-16-6-7.5	13L396E											
VBW-16-7.5-9	13L397E											
VBW-16-9-10.5	13L398E											
VBW-16-10.5-12	13L399E											
VBW-16-12-13.5	13L400E	36.4	0.8	45.4	53.8	35.3	18.5	NP	NP	NP	ML	
VBW-16-13.5-15	13L401E											
VBW-16-15-16.5	13L402E											
VBW-16-16.5-18	13L403E	35.9	0	62.7	37.3			NP	NP	NP	SM	
VBW-16-18-19.5	13L404E											
VBW-16-19.5-21	13L405E											
VBW-16-21-22.5	13L406E											
VBW-16-22.5-24	13L407E											
VBW-16-24-25.5	13L408E											
VBW-16-25.5-27	13L409E											
VBW-16-27-28.5	13L410E											
VBW-16-28.5-30	13L411E											
VBW-16-30-31.5	13L412E	18.0	0	73.0	27.0			NP	NP	NP	SM	
VBW-16-31.5-33	13L413E											
VBW-16-33-34.5	13L414E											
VBW-16-34.5-36	13L415E											

Notes:

I-14-14
TR, NSB

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Table P1-A-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information		Test Information										
Site ID	Lab No.	Moisture Content ASTM D 2216	Grain Size Analysis ASTM D 422					Atterberg Limits ASTM D 4318			Engineering Classification ASTM D 2487	Remarks
			Gravel Content	Sand Content	Fines Content	Silt Content	Clay Content	LL	PL	PI		
(-)	(-)	(%)	(%)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(-)	
VBW-16-36-37.5	13L416E											
VBW-16-37.5-39	13L417E											
VBW-16-39-40.5	13L418E											
VBW-16-40.5-42	13L419E											
VBW-16-42-43.5	13L420E											
VBW-16-43.5-45	13L421E	15.6	0.8	70.3	28.9			NP	NP	NP	SM	
VBW-16-45-46.5	13L422E											
VBW-16-46.5-48	13L423E											
VBW-16-48-49.5	13L424E											
VBW-16-49.5-51	13L425E											
VBW-16-51-52.5	13L426E											
VBW-16-52.5-54	13L427E											
VBW-16-54-55.5	13L428E											
VBW-16-55.5-57	13L429E											
VBW-16-57-58.5	13L430E											
VBW-16-58.8-60	13L431E											
VBW-16-60-61.5	13L432E											
VBW-16-61.5-63	13L433E	20.7	0.3	47.4	52.3	39.5	12.8	NP	NP	NP	ML	
VBW-17-3-.45	13L434E											
VBW-17-8-9.5	13L435E											
VBW-17-13-14.5	13L436E	20.2	0.3	69.2	30.5			NP	NP	NP	SM	
VBW-17-18-19.5	13L437E											
VBW-17-23-24.5	13L438E											
VBW-17-28-29.5	13L439E											
VBW-17-33-34.5	13L440E											
VBW-17-38-39.5	13L441E	21.4	0.7	69.4	29.9	18.8	11.1	NP	NP	NP	SM	
VBW-17-43-44.5	13L442E											
VBW-17-48-49.5	13L443E											
VBW-17-53-54.5	13L444E											
VBW-17-58-59.5	13L445E											
VBW-17-63-64.5	13L446E	13.6	4.4	68.5	27.1			NP	NP	NP	SM	
VBW-17-68-69.5	13L447E											
VBW-17-73-74.5	13L448E											

Notes:

7-14-14
TR/SR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Table P1-A-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information		Test Information										
Site ID	Lab No.	Moisture Content ASTM D 2216	Grain Size Analysis ASTM D 422					Atterberg Limits ASTM D 4318			Engineering Classification ASTM D 2487	Remarks
			Gravel Content	Sand Content	Fines Content	Silt Content	Clay Content	LL	PL	PI		
(-)	(-)	(%)	(%)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(-)	
VBW-17-Residuum	13L035E											
VBW-17-Saprolite	13L036E											
VBW-17-Saprolite/PWR	13L037E											
VBW-18-3-4.5	13L449E											
VBW-18B-3-4.5	13L450E											
VBW-18B-8-9.5	13L451E											
VBW-18B-13-14.5	13L452E	26.8	0	49.9	50.1			NP	NP	NP	ML	
VBW-18B-18-19.5	13L453E											
VBW-18B-23-24.5	13L454E	20.0	0	76.2	23.8			NP	NP	NP	SM	
VBW-18B-28-29.5	13L455E											
VBW-18B-33-34.5	13L456E											
VBW-18B-38-39.5	13L457E											
VBW-18B-43-44.5	13L458E	13.6	1.7	61.4	36.9			NP	NP	NP	SM	
VBW-18B-48-49.5	13L459E											
VBW-18B-53-54.5	13L460E											
VBW-18B-58-59.5	13L461E											
VBW-18B-63-64.5	13L462E											
VBW-18B-68-69.5	13L463E	17.1	1.2	55.1	43.7			NP	NP	NP	SM	
VBW-18B-73-74.5	13L464E											
VBW-18B-78-79.5	13L465E											
VBW-18B-83-84.5	13L466E	12.3	0.8	62.0	37.2			NP	NP	NP	SM	
VBW-18B-Residuum	13L038E											
VBW-18B-Saprolite	13L039E											
VBW-18B-Saprolite/PWR	13L040E											

Notes:

7-14-14
TL, NSR

Excel Geotechnical Testing, Inc.
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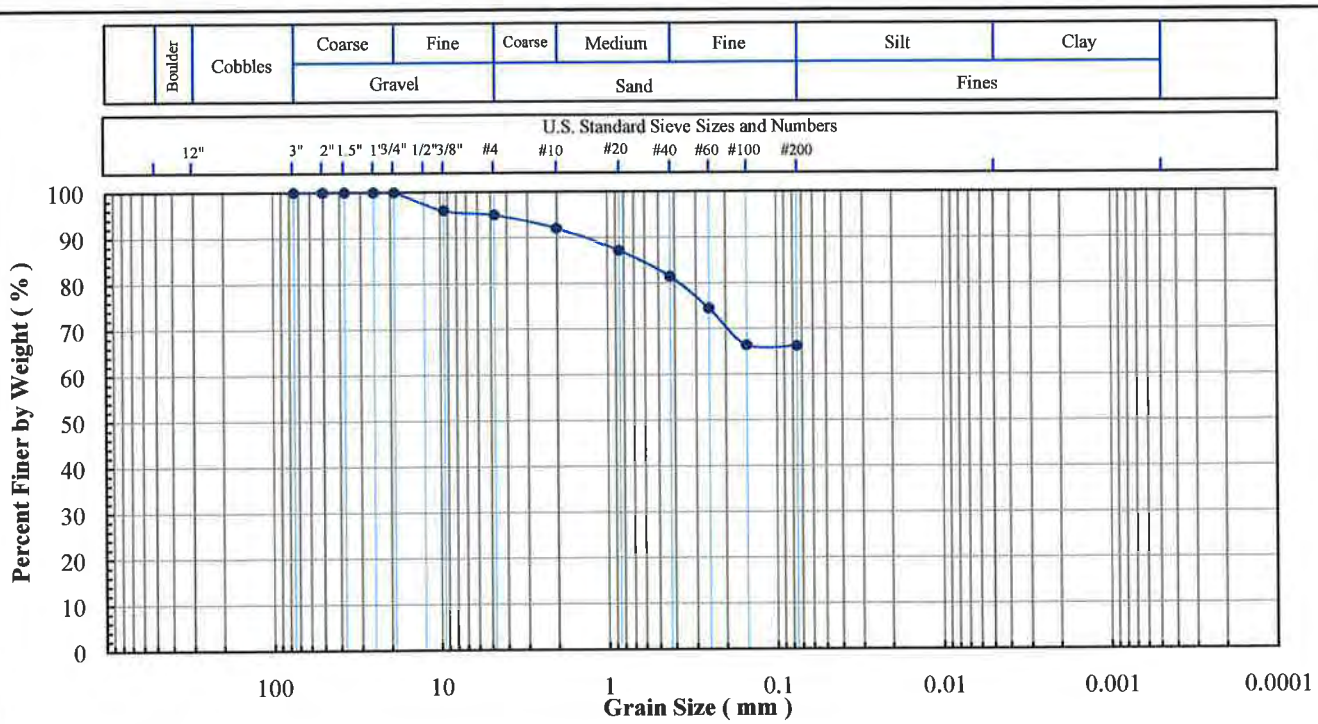
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-1 (3.0-4.5')
Lab Sample No:	13L043E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



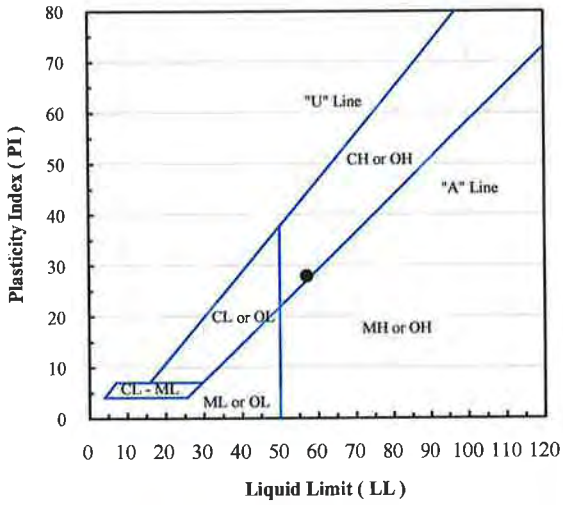
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	96.0
#4	4.75	95.0
#10	2.00	92.1
#20	0.850	87.2
#40	0.425	81.4
#60	0.250	74.4
#100	0.150	66.4
#200	0.075	66.2

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	5.0
Sand (%):	28.8
Fines (%):	66.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-1 (3.0-4.5')	13L043E	21.8	66.2	57	29	28	CH - Sandy fat clay

Note(s):

1-6-14
RD, NSR

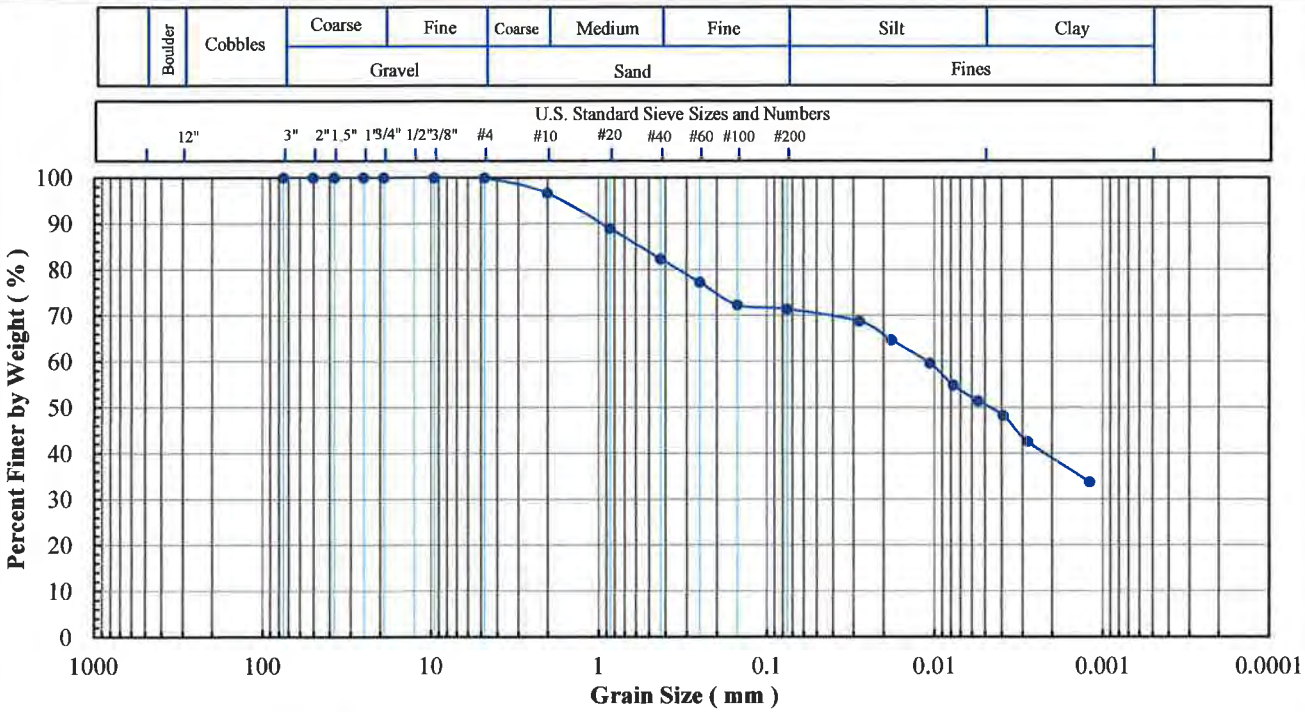
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-1 (15.0-16.5')
Lab Sample No:	13L051E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



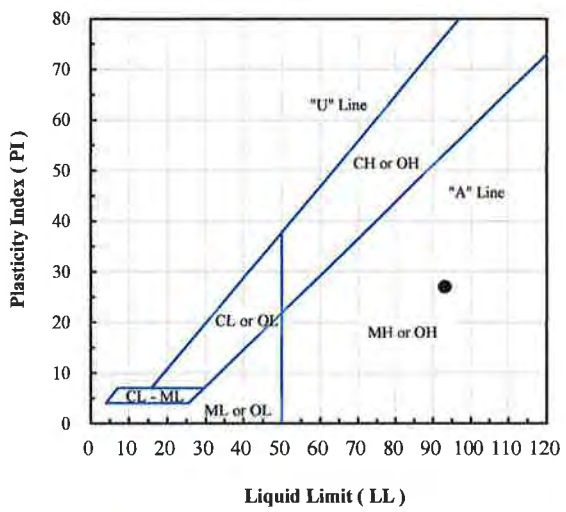
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.9
#10	2.00	96.6
#20	0.850	88.9
#40	0.425	82.3
#60	0.250	77.2
#100	0.150	72.3
#200	0.075	71.4

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0277	68.7
0.0106	59.6
0.0055	51.4
0.0028	42.6
0.0012	33.8

Gravel (%):	0.1
Sand (%):	28.5
Fines (%):	71.4
Silt (%):	21.0
Clay (%):	50.4

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-1 (15.0-16.5')	13L051E	55.2	71.4	93	66	27	MH - Elastic silt with sand

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.

1.6.14
PD.NSR

Excel Geotechnical Testing, Inc.
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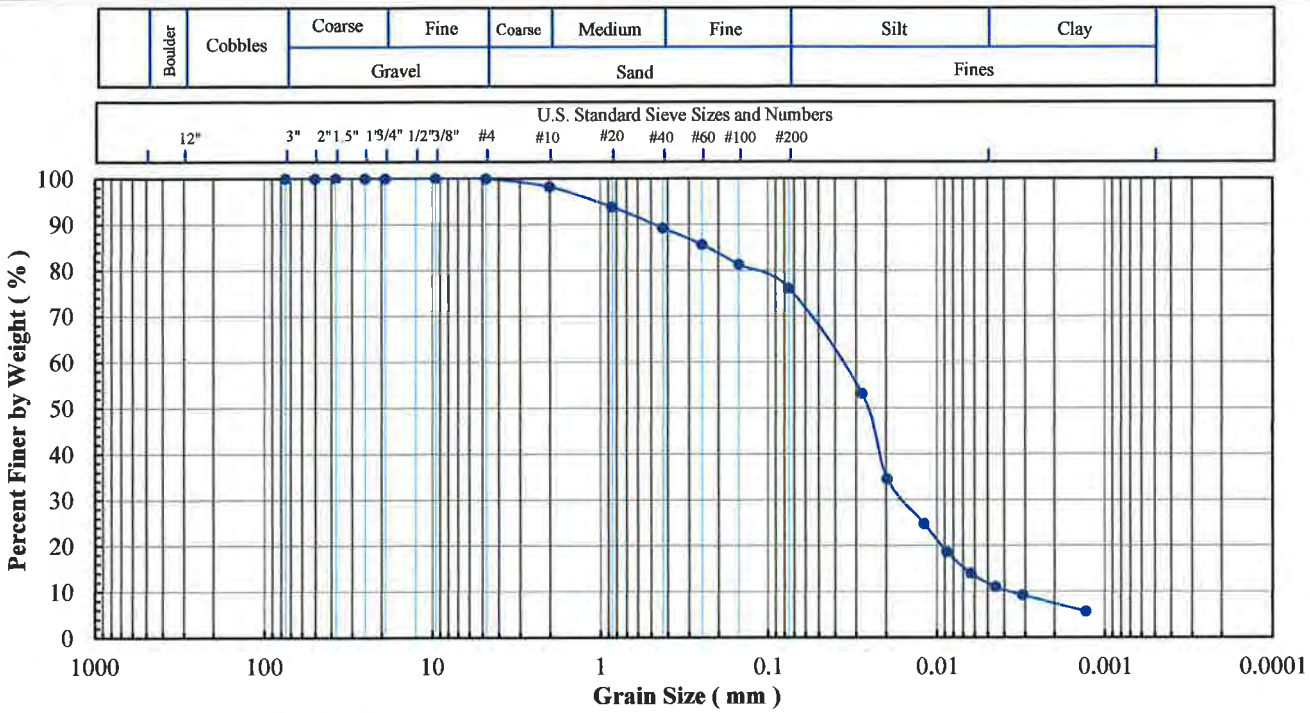
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-1 (22.5-24.0')
Lab Sample No:	13L056E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



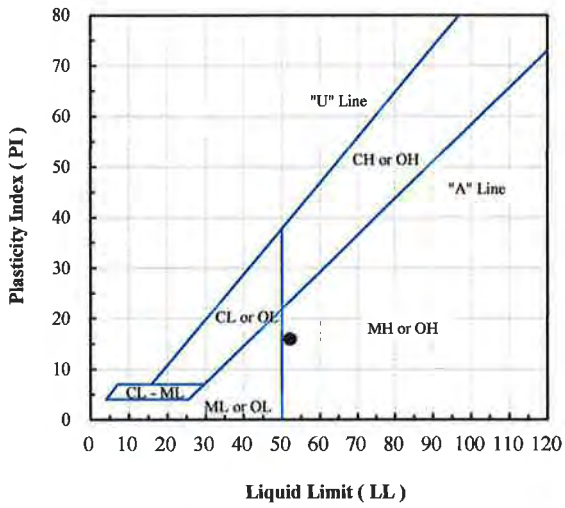
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.9
#10	2.00	98.2
#20	0.850	93.8
#40	0.425	89.2
#60	0.250	85.6
#100	0.150	81.3
#200	0.075	76.1

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0277	53.2
0.0119	24.8
0.0063	14.0
0.0031	9.2
0.0013	5.7

Gravel (%):	0.1
Sand (%):	23.8
Fines (%):	76.1
Silt (%):	64.3
Clay (%):	11.8

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-1 (22.5-24.0')	13L056E	32.5	76.1	52	36	16	MH - Elastic silt

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.

1.6.14
PD INSK

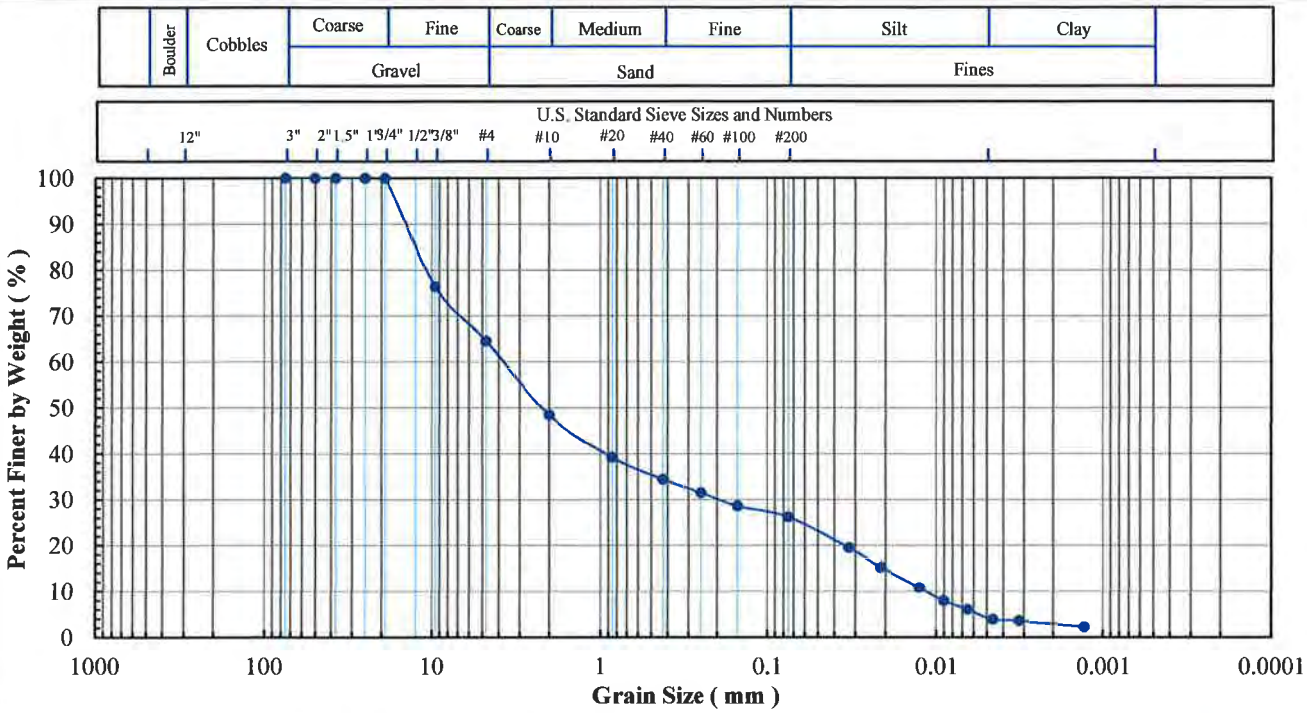
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-1 (25.5-27.0')
Lab Sample No:	13L058E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



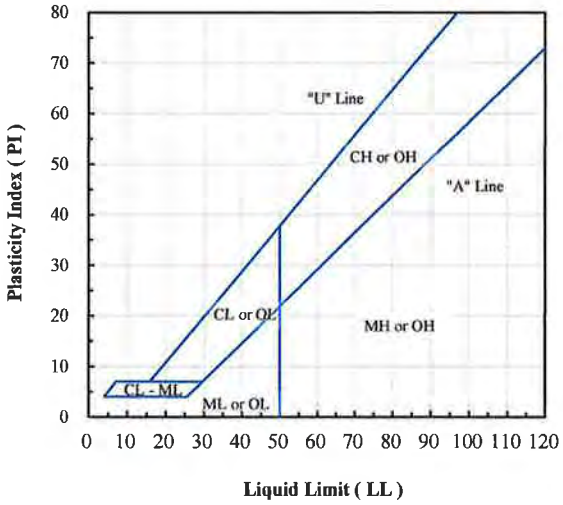
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	76.4
#4	4.75	64.6
#10	2.00	48.5
#20	0.850	39.2
#40	0.425	34.4
#60	0.250	31.5
#100	0.150	28.6
#200	0.075	26.2

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0327	19.5
0.0126	10.9
0.0065	6.1
0.0032	3.6
0.0013	2.5

Gravel (%):	35.4
Sand (%):	38.4
Fines (%):	26.2
Silt (%):	21.8
Clay (%):	4.4

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-1 (25.5-27.0')	13L058E	9.3	26.2	NP	NP	NP	SM - Silty sand with gravel

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.
Engineering classification is based on the assumption that the fines are either ML or MH.

1·6·'14
PD, NSR

Excel Geotechnical Testing, Inc.
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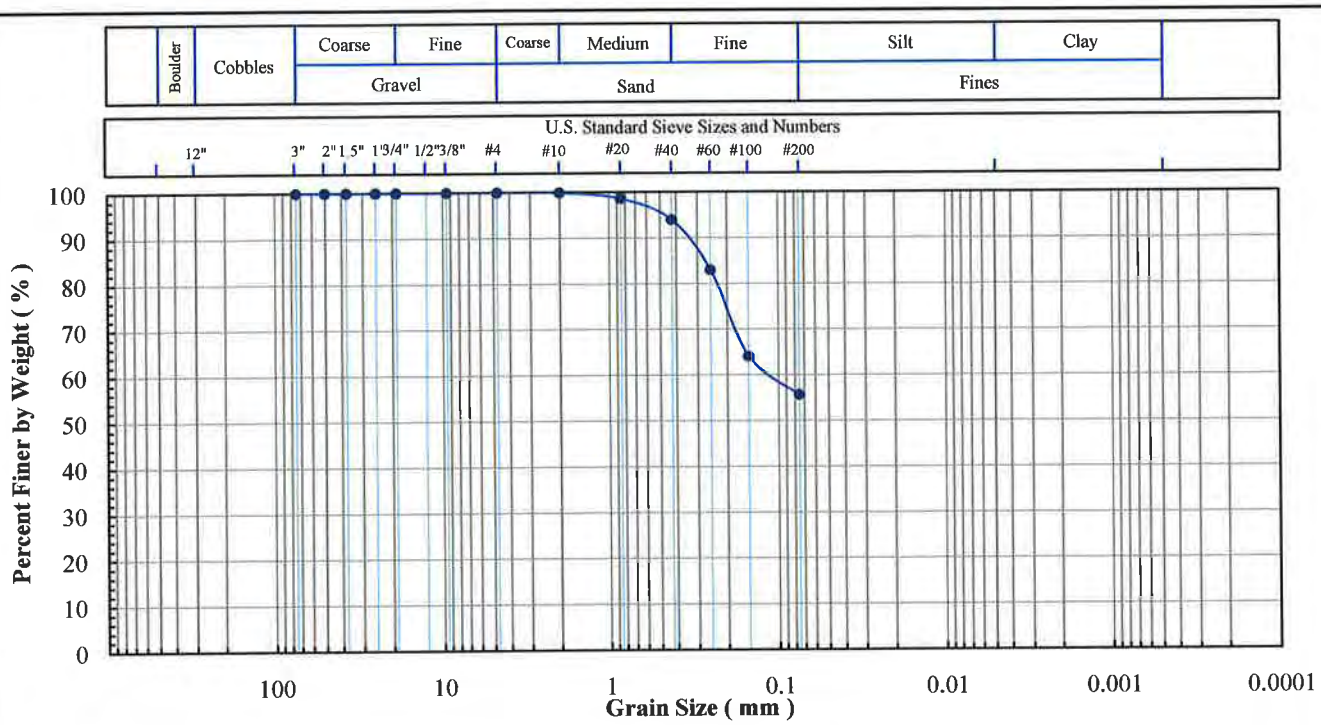
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-2 (4.0-5.5')
Lab Sample No:	13L062E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



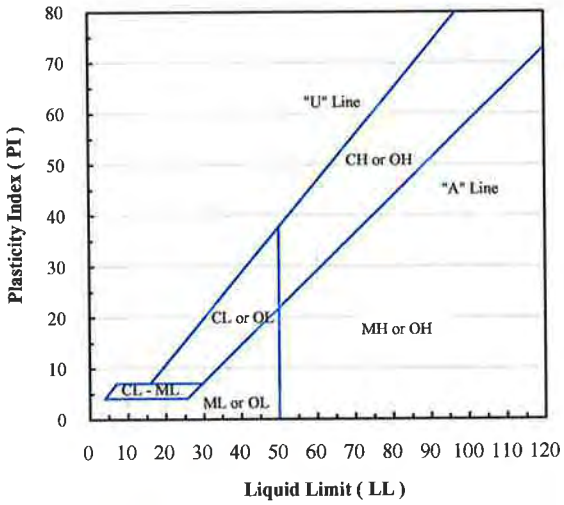
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	98.6
#40	0.425	94.0
#60	0.250	83.0
#100	0.150	64.1
#200	0.075	55.6

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	44.4
Fines (%):	55.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-2 (4.0-5.5')	13L062E	10.4	55.6	NP	NP	NP	ML - Sandy silt

Note(s):

1-6-14 PD, NSH

Excel Geotechnical Testing, Inc.
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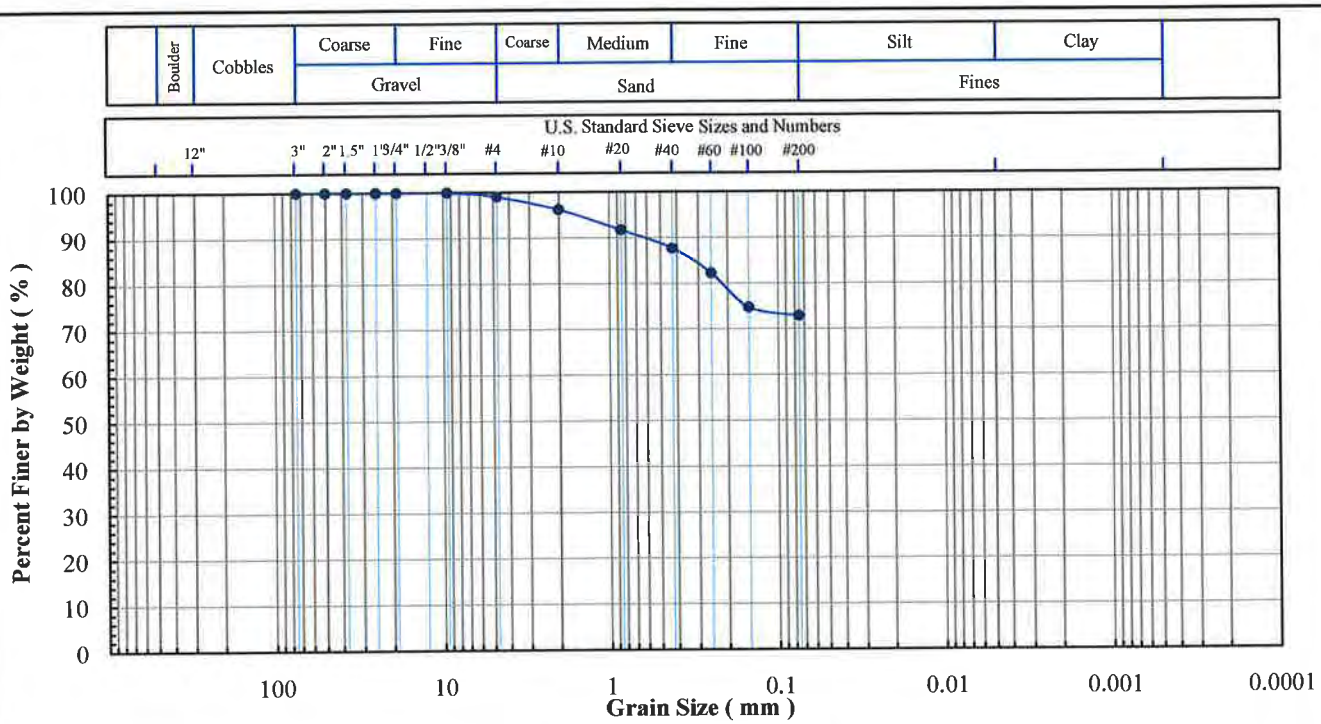
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-3 (1.5-3.0')
Lab Sample No:	13L065E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



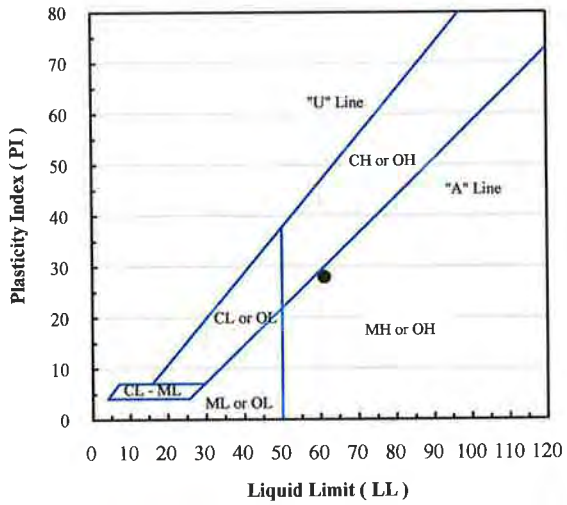
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.1
#10	2.00	96.2
#20	0.850	91.7
#40	0.425	87.7
#60	0.250	82.2
#100	0.150	74.7
#200	0.075	72.8

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.9
Sand (%):	26.3
Fines (%):	72.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-3 (1.5-3.0')	13L065E	26.8	72.8	61	33	28	MH - Elastic silt with sand

Note(s):

1-6-14
RD. NSE

Excel Geotechnical Testing, Inc.
"Excellence in Testing"
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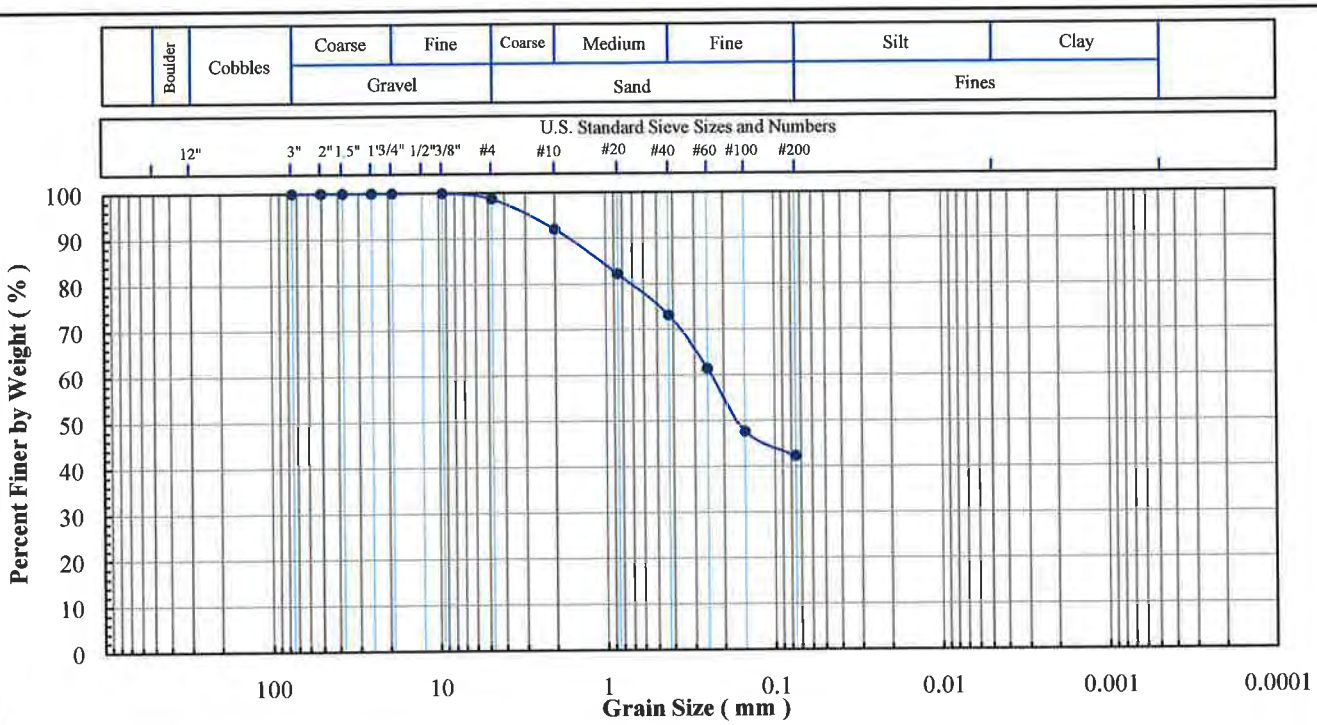
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-3 (6.0-7.5')
Lab Sample No:	13L068E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



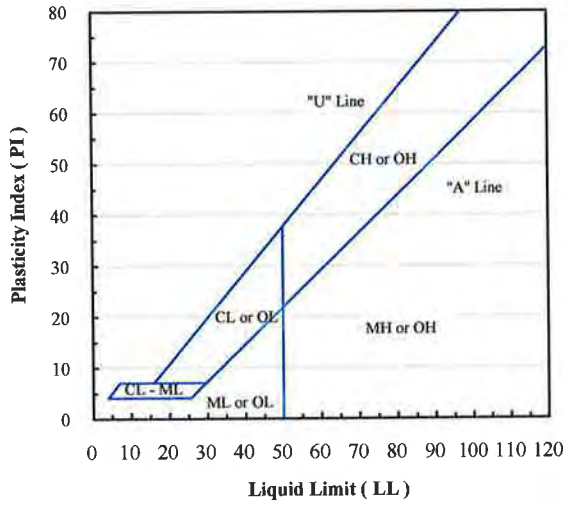
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.7
#10	2.00	92.1
#20	0.850	82.2
#40	0.425	73.2
#60	0.250	61.4
#100	0.150	47.6
#200	0.075	42.2

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.3
Sand (%):	56.5
Fines (%):	42.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-3 (6.0-7.5')	13L068E	18.6	42.2	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PD, NSR

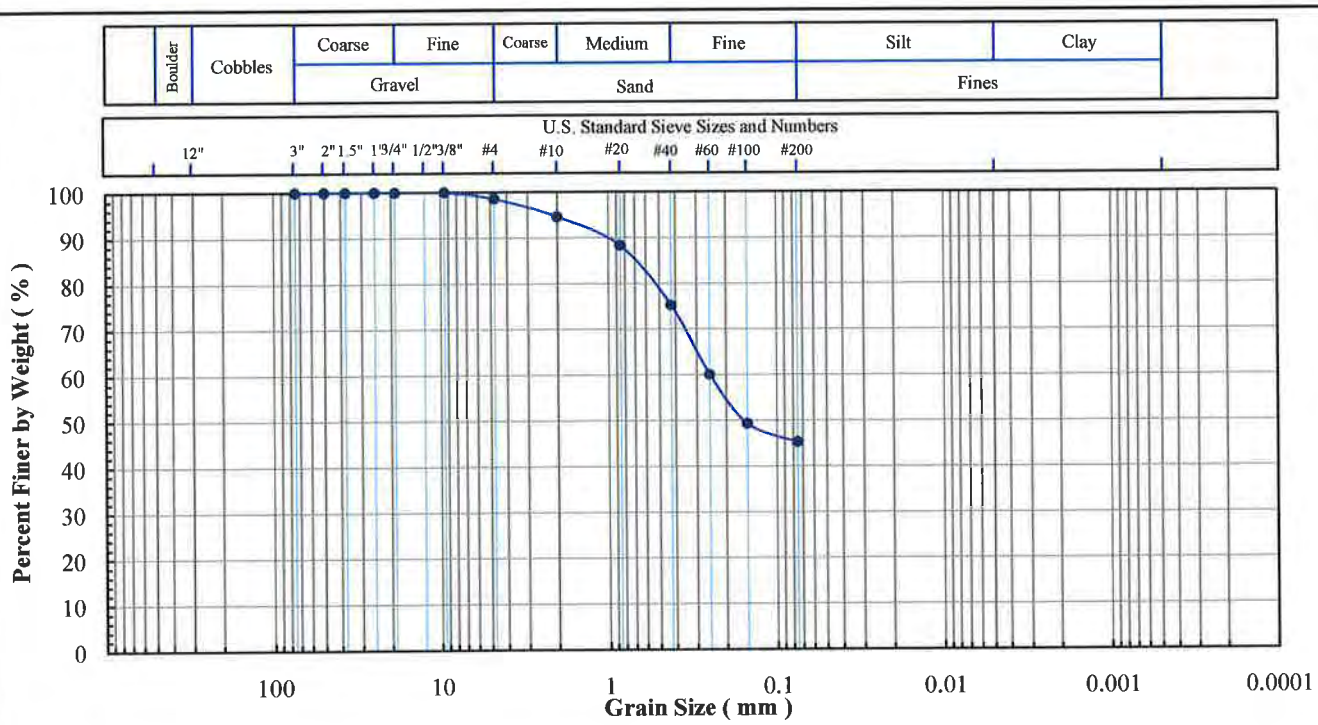
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-3 (19.5-21.0')
Lab Sample No:	13L077E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



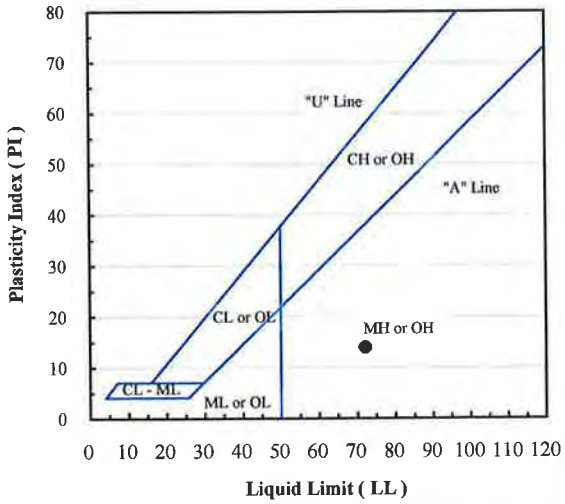
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.6
#10	2.00	94.6
#20	0.850	88.3
#40	0.425	75.3
#60	0.250	60.1
#100	0.150	49.3
#200	0.075	45.2

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.4
Sand (%):	53.4
Fines (%):	45.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-3 (19.5-21.0')	13L077E	41.0	45.2	72	58	14	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PD, Ase

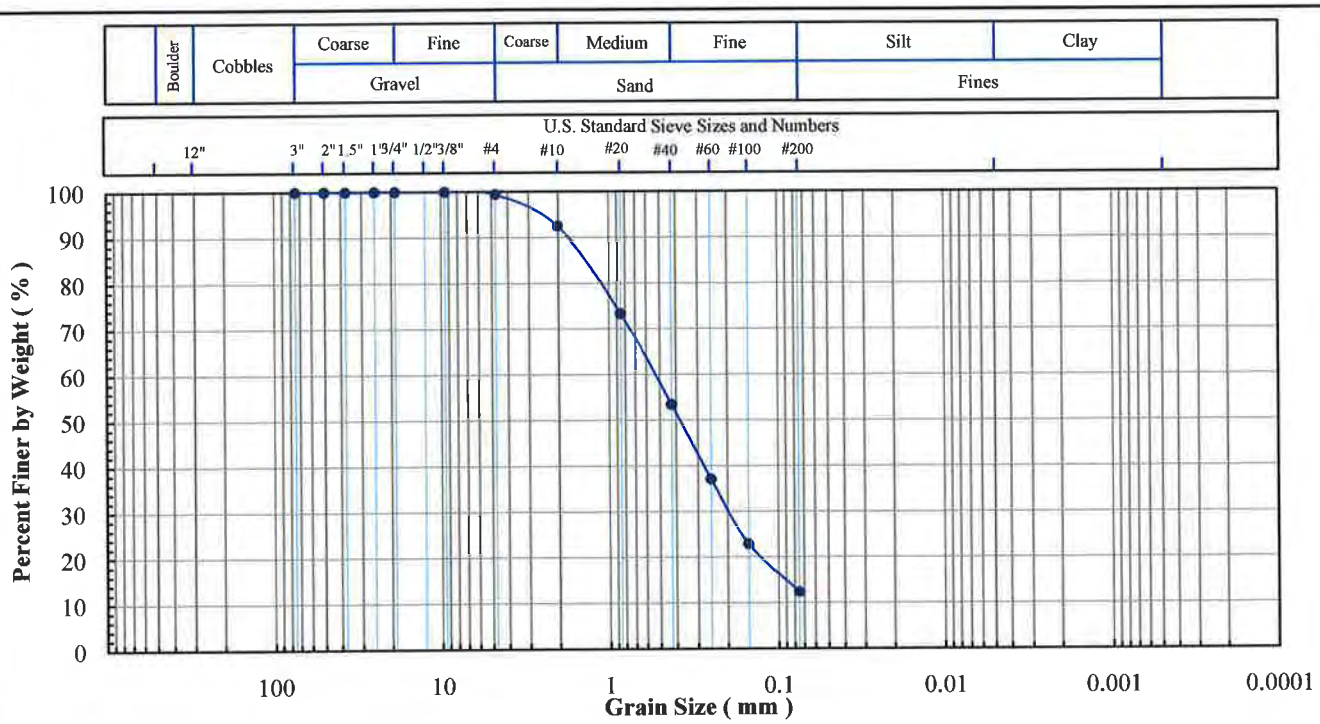
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-3 (36.0-37.5')
Lab Sample No:	13L088E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



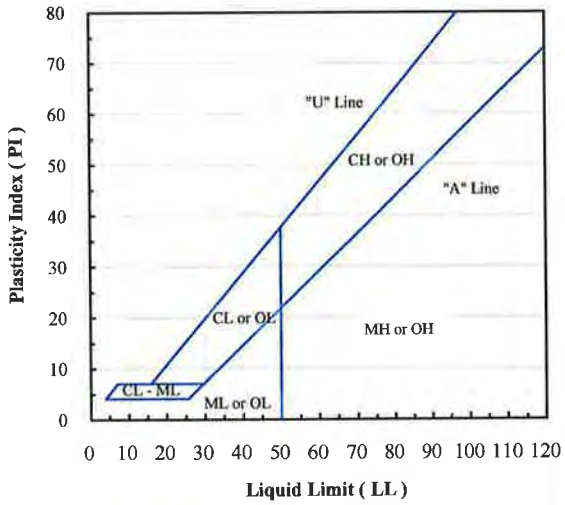
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.4
#10	2.00	92.5
#20	0.850	73.3
#40	0.425	53.4
#60	0.250	37.0
#100	0.150	22.8
#200	0.075	12.4

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.6
Sand (%):	87.0
Fines (%):	12.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-3 (36.0-37.5')	13L088E	56.1	12.4	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14 PD, NJR

Excel Geotechnical Testing, Inc.
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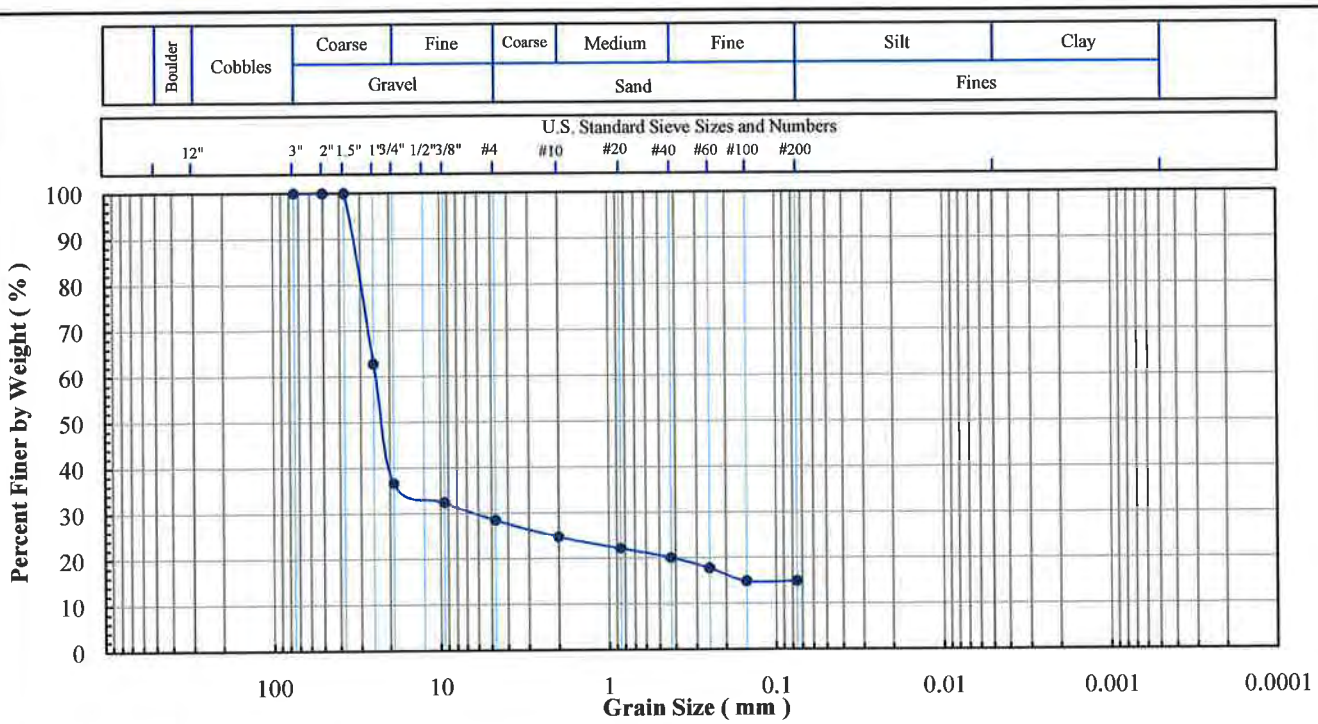
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-4B (2.5-4.0')
Lab Sample No:	13L092E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



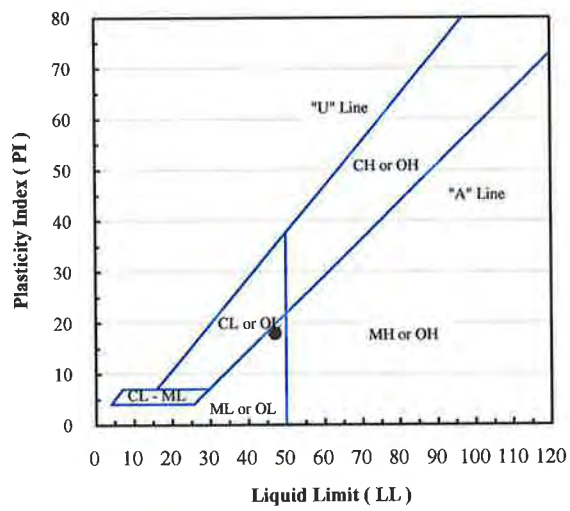
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	62.8
3/4"	19	36.7
3/8"	9.5	32.4
#4	4.75	28.5
#10	2.00	24.8
#20	0.850	22.2
#40	0.425	20.1
#60	0.250	17.7
#100	0.150	14.8
#200	0.075	14.8

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	71.5
Sand (%):	13.7
Fines (%):	14.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-4B (2.5-4.0')	13L092E	4.5	14.8	47	29	18	GM - Silty gravel

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14 AD, NSR

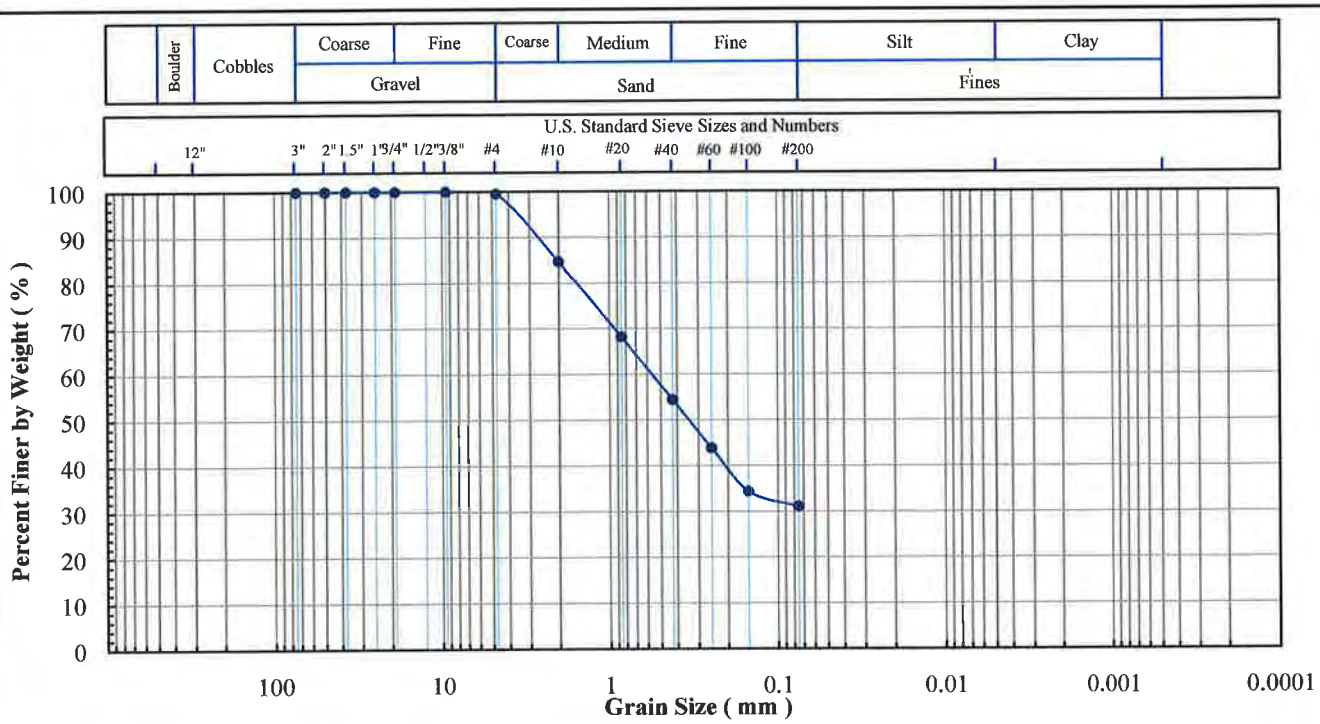
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-4B (12.5-14.0')
Lab Sample No:	13L094E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



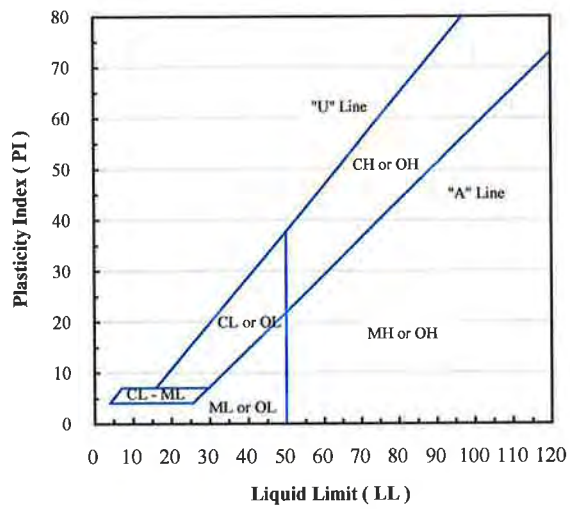
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	84.7
#20	0.850	68.2
#40	0.425	54.4
#60	0.250	43.8
#100	0.150	34.4
#200	0.075	31.0

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	68.6
Fines (%):	31.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-4B (12.5-14.0')	13L094E	18.1	31.0	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
TD, NSR

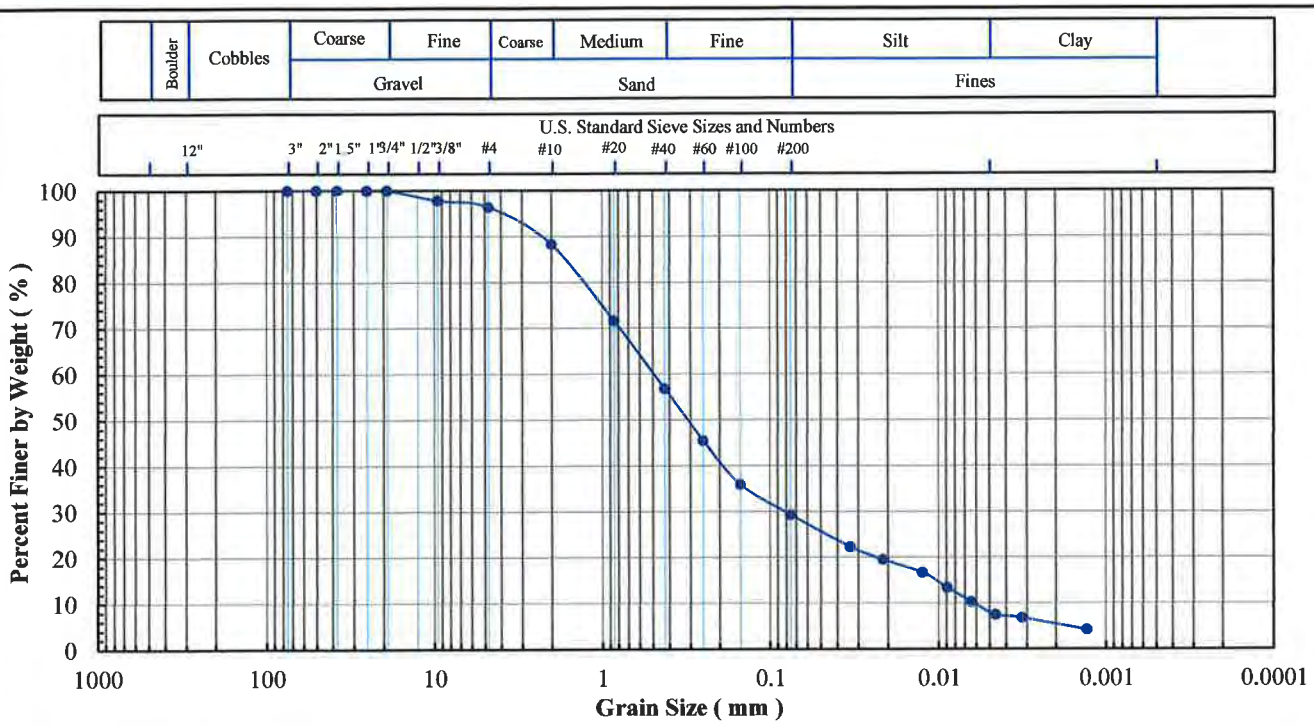
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-4B (47.5-49.0')
Lab Sample No:	13L099E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



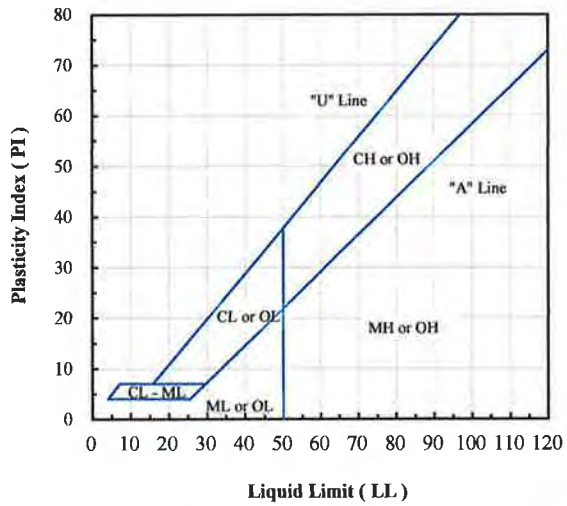
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	97.8
#4	4.75	96.4
#10	2.00	88.3
#20	0.850	71.6
#40	0.425	56.8
#60	0.250	45.5
#100	0.150	35.9
#200	0.075	29.3

Hydrometer Particle Diameter (mm)	% Finer
0.0334	22.3
0.0125	16.7
0.0064	10.3
0.0032	6.8
0.0013	4.2

Gravel (%):	3.6
Sand (%):	67.1
Fines (%):	29.3
Silt (%):	21.2
Clay (%):	8.1

Specific Gravity (-):	2.65

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-4B (47.5-49.0')	13L099E	21.2	29.3	NP	NP	NP	SM - Silty Sand

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.
Engineering classification is based on the assumption that the fines are either ML or MH.

1.6.'14
PD, NSR

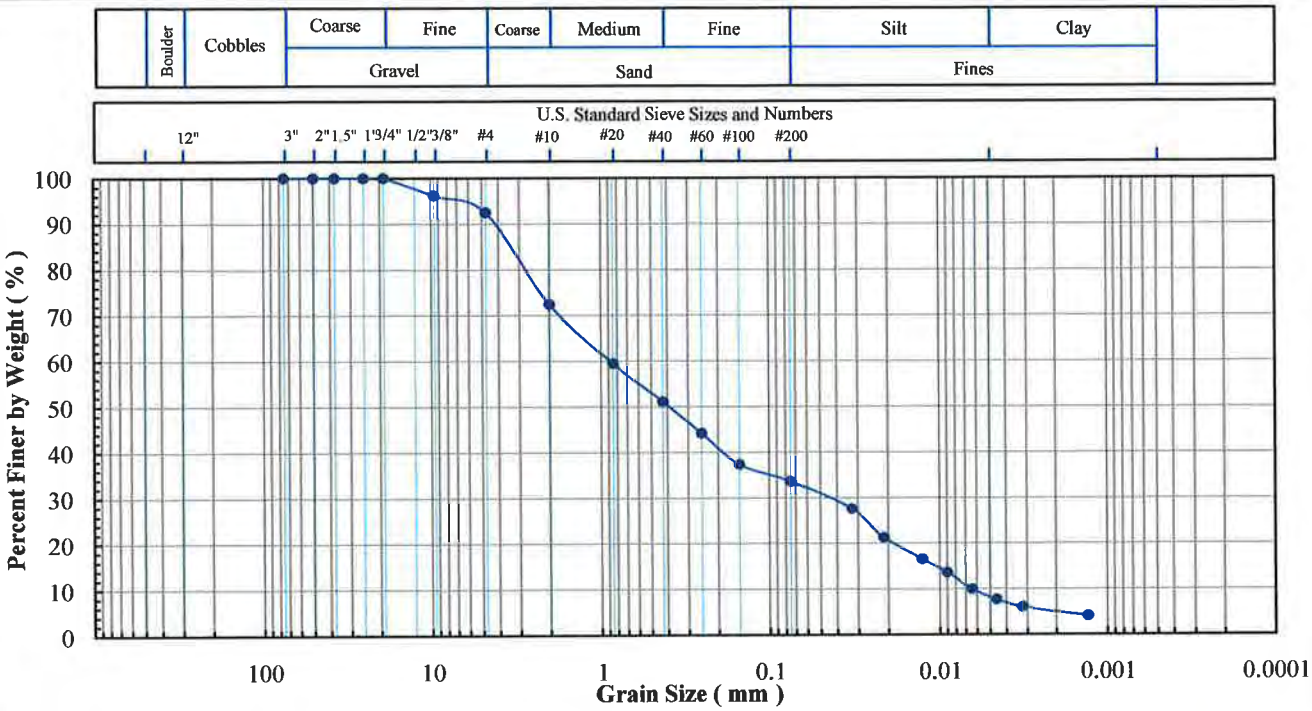
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-5 (9.0-10.5')
Lab Sample No:	13L104E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



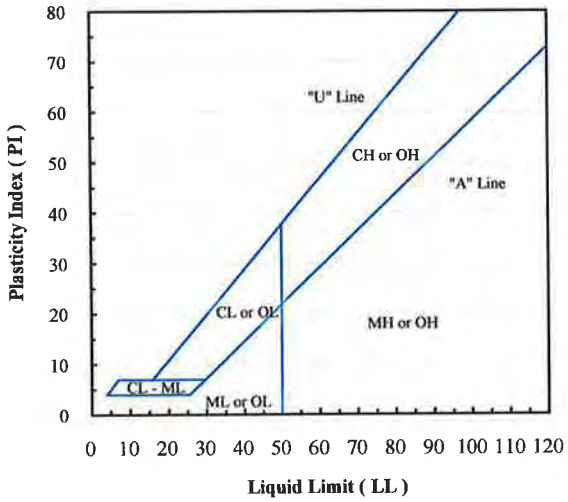
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	96.2
#4	4.75	92.5
#10	2.00	72.5
#20	0.850	59.5
#40	0.425	51.1
#60	0.250	44.2
#100	0.150	37.4
#200	0.075	33.7

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0328	27.7
0.0126	16.7
0.0064	10.0
0.0032	6.2
0.0013	4.2

Gravel (%):	7.5
Sand (%):	58.8
Fines (%):	33.7
Silt (%):	25.5
Clay (%):	8.2

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-5 (9.0-10.5')	13L104E	22.0	33.7	NP	NP	NP	SM - Silty sand

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.
Engineering classification is based on the assumption that the fines are either ML or MH.

1.6.'14
PD, NSB

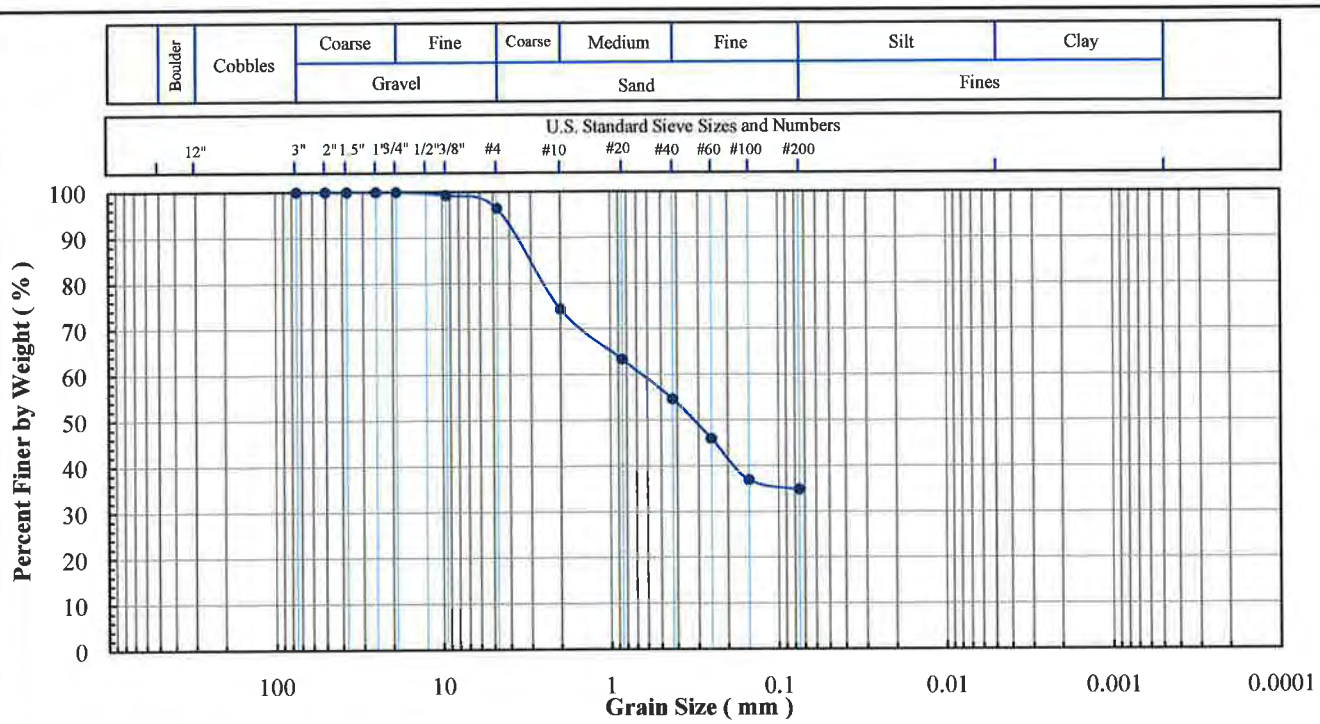
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-5 (29.0-30.5')
Lab Sample No:	13L106E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



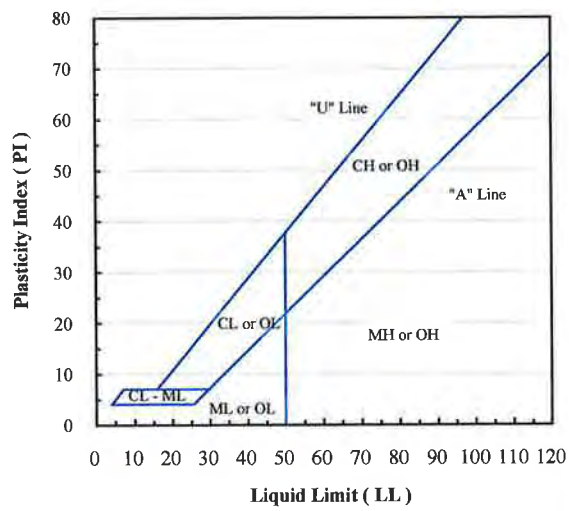
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	99.3
#4	4.75	96.4
#10	2.00	74.4
#20	0.850	63.4
#40	0.425	54.6
#60	0.250	45.9
#100	0.150	36.9
#200	0.075	34.8

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3.6
Sand (%):	61.6
Fines (%):	34.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-5 (29.0-30.5')	13L106E	36.9	34.8	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14 PD, NSR

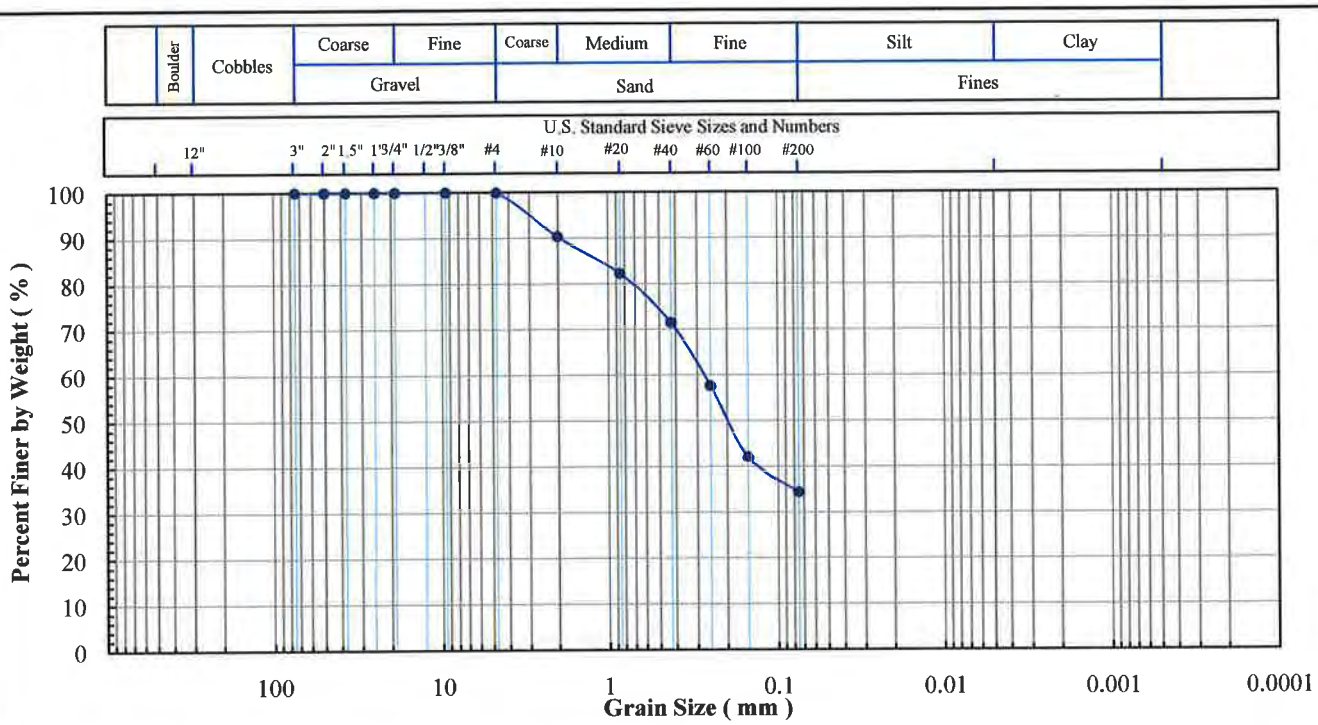
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-5 (39.0-40.5')
Lab Sample No:	13L108E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



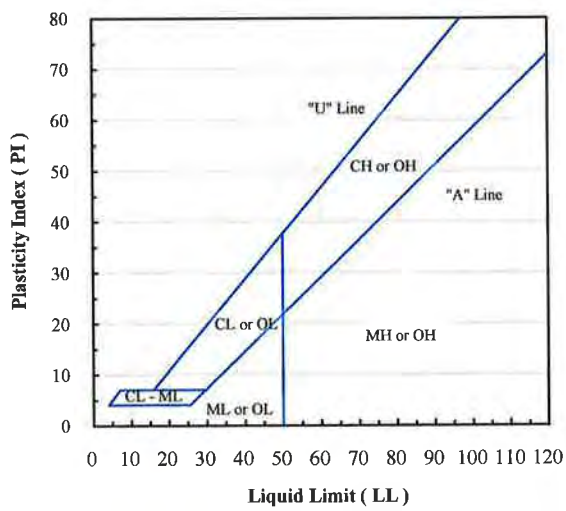
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.9
#10	2.00	90.3
#20	0.850	82.2
#40	0.425	71.5
#60	0.250	57.6
#100	0.150	42.1
#200	0.075	34.3

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.1
Sand (%):	65.6
Fines (%):	34.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-5 (39.0-40.5')	13L108E	38.3	34.3	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PD, NSR

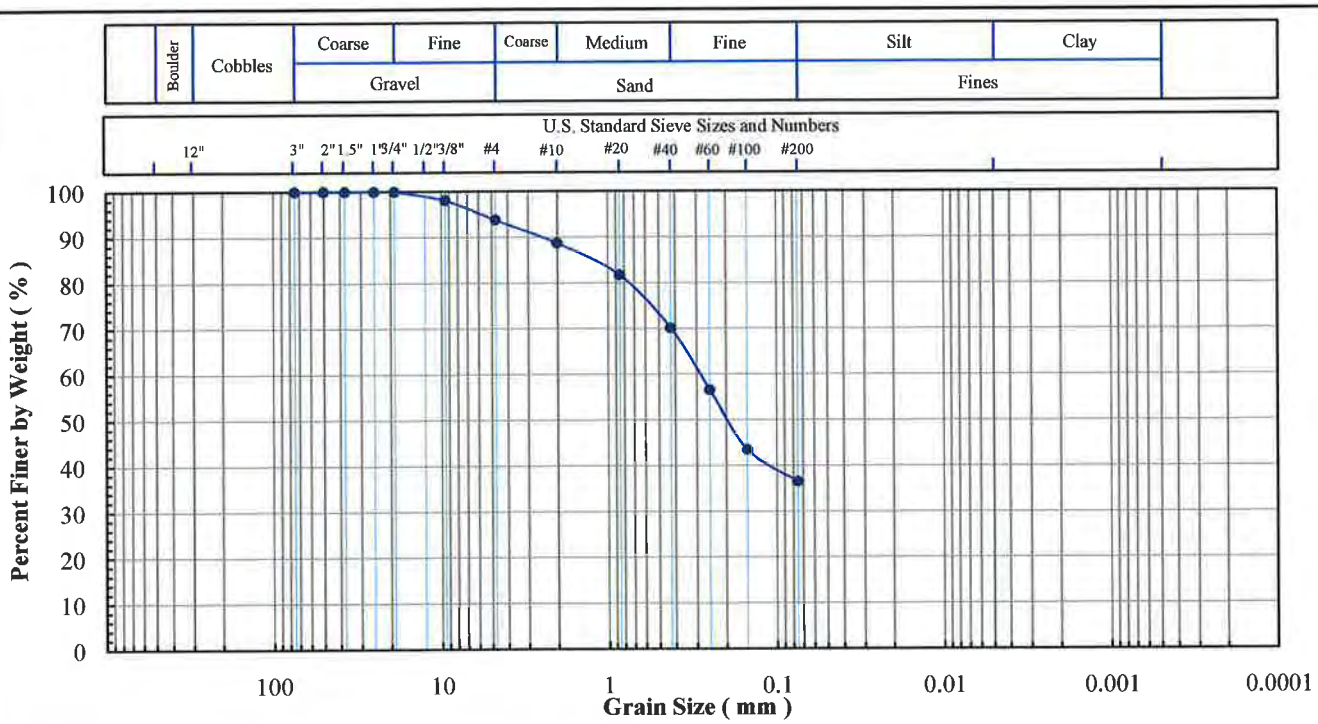
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-5 (59.0-60.5')
Lab Sample No:	13L112E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



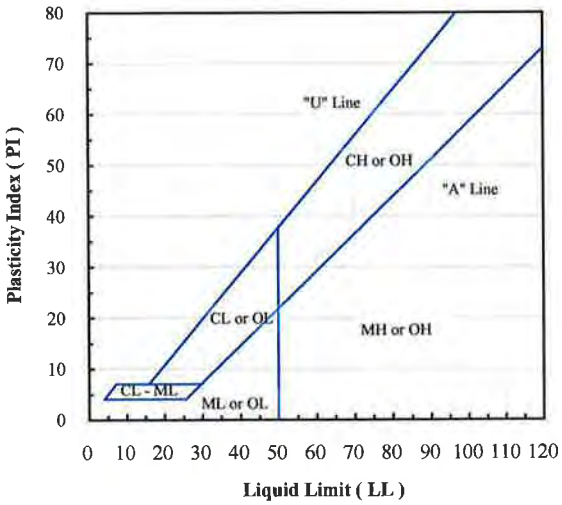
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	98.1
#4	4.75	93.8
#10	2.00	88.7
#20	0.850	81.7
#40	0.425	70.1
#60	0.250	56.6
#100	0.150	43.5
#200	0.075	36.5

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	6.2
Sand (%):	57.3
Fines (%):	36.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-5 (59.0-60.5')	13L112E	19.6	36.5	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PD, ASR

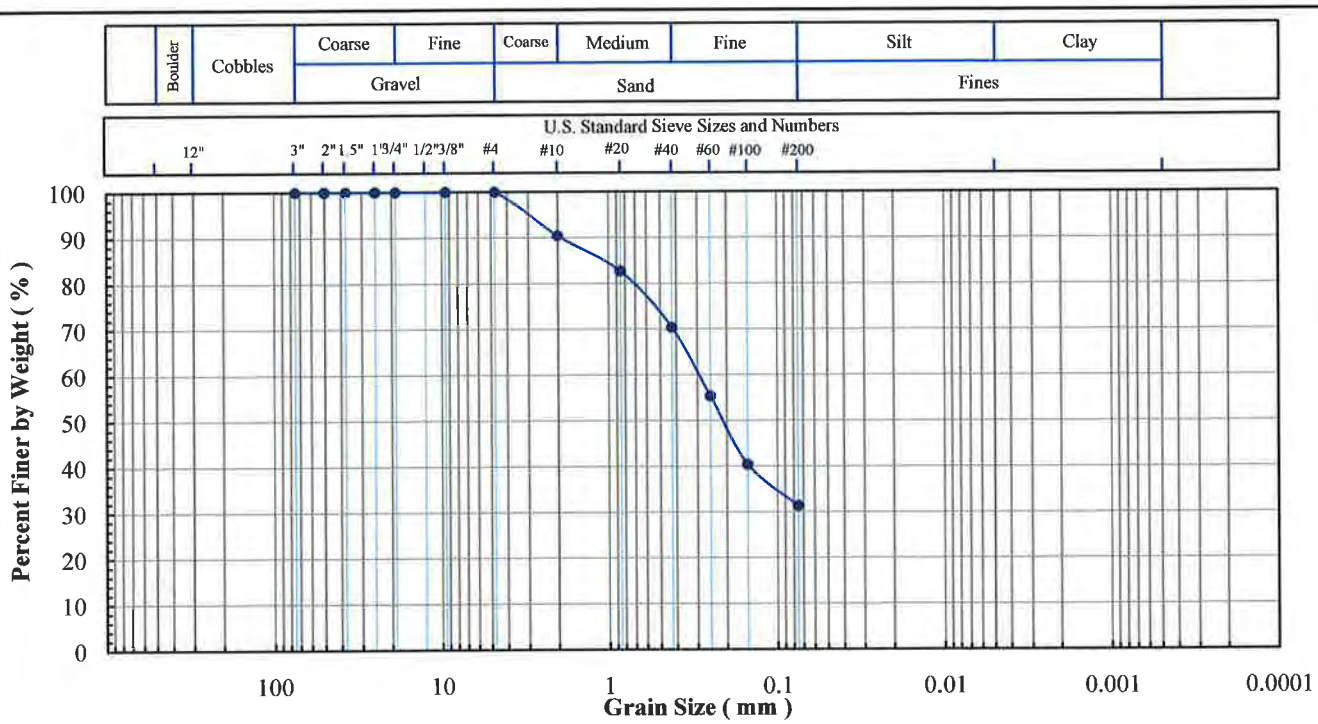
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-5 (74.0-75.5')
Lab Sample No:	13L115E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



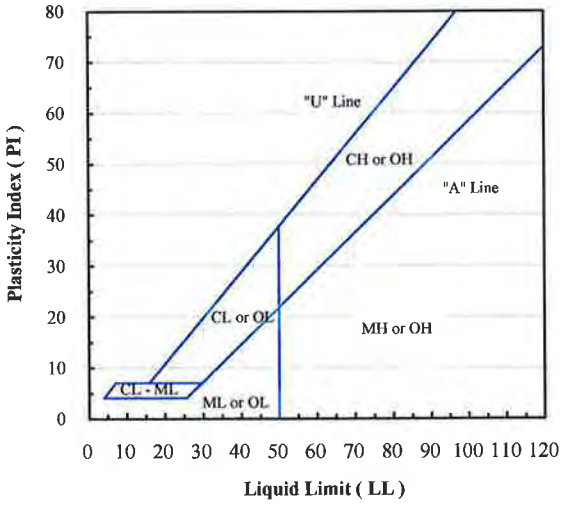
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	90.5
#20	0.850	82.7
#40	0.425	70.4
#60	0.250	55.3
#100	0.150	40.3
#200	0.075	31.3

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	68.7
Fines (%):	31.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-5 (74.0-75.5')	13L115E	18.6	31.3	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14 PD,NSR

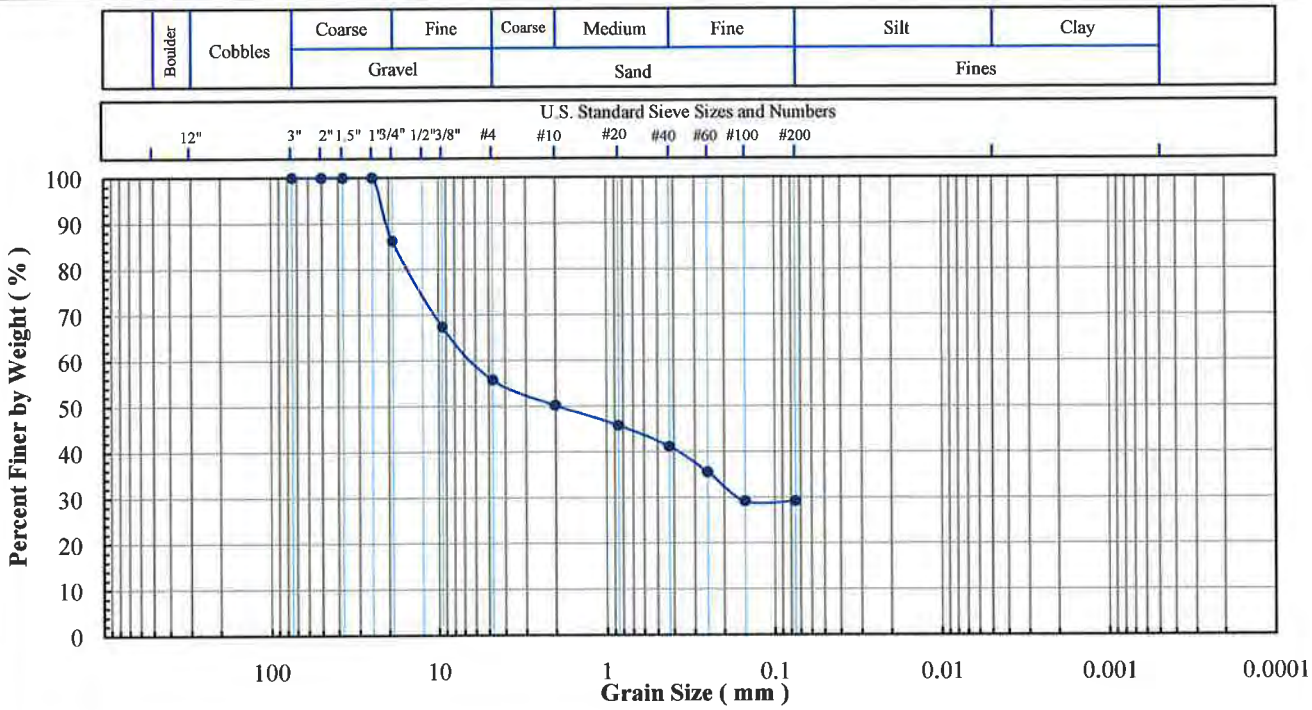
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-6 (3.5-5.0')
Lab Sample No:	13L116E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



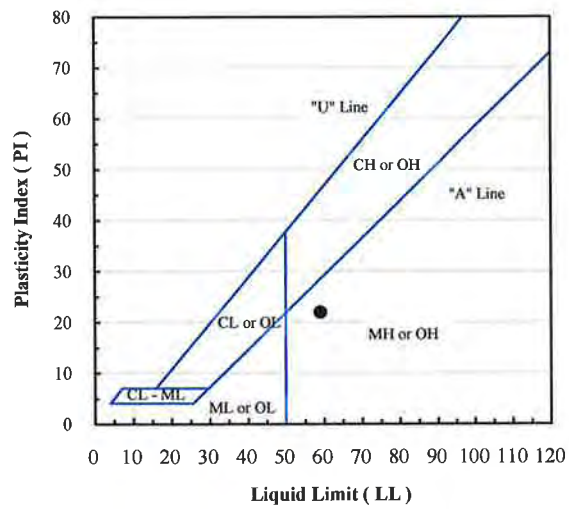
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	86.2
3/8"	9.5	67.4
#4	4.75	55.8
#10	2.00	50.2
#20	0.850	45.8
#40	0.425	41.2
#60	0.250	35.5
#100	0.150	29.1
#200	0.075	29.1

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	44.2
Sand (%):	26.7
Fines (%):	29.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-6 (3.5-5.0')	13L116E	11.7	29.1	59	37	22	GM - Silty gravel with sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PD, NSR

Excel Geotechnical Testing, Inc.
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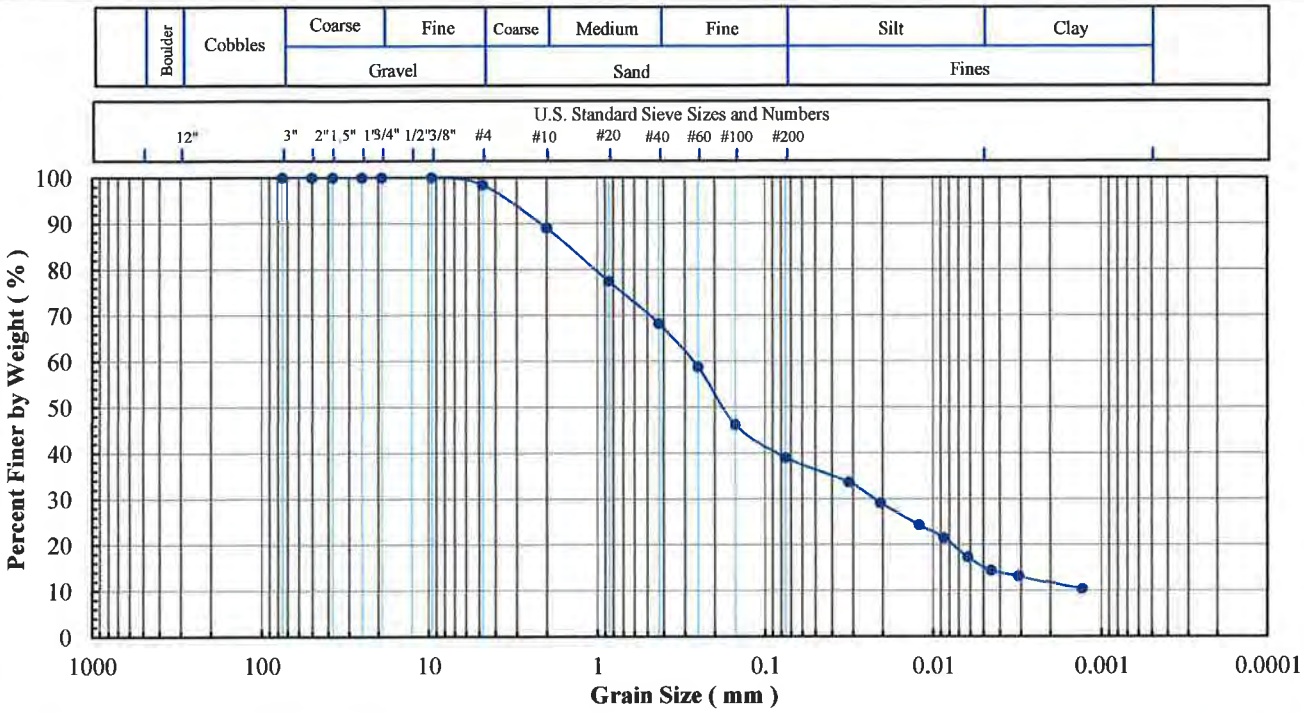
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-6 (8.5-10.0')
Lab Sample No:	13L117E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



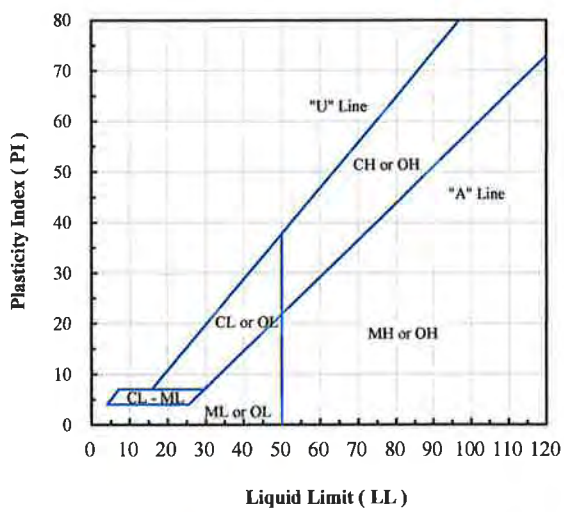
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.4
#10	2.00	89.0
#20	0.850	77.4
#40	0.425	68.2
#60	0.250	58.7
#100	0.150	46.2
#200	0.075	39.0

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0317	33.6
0.0121	24.4
0.0062	17.3
0.0031	13.2
0.0013	10.4

Gravel (%):	1.6
Sand (%):	59.4
Fines (%):	39.0
Silt (%):	23.7
Clay (%):	15.3

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-6 (8.5-10.0')	13L117E	27.6	39.0	NP	NP	NP	SM - Silty sand

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.
Engineering classification is based on the assumption that the fines are either ML or MH.

1·6·'14
PD, NSR

Excel Geotechnical Testing, Inc.
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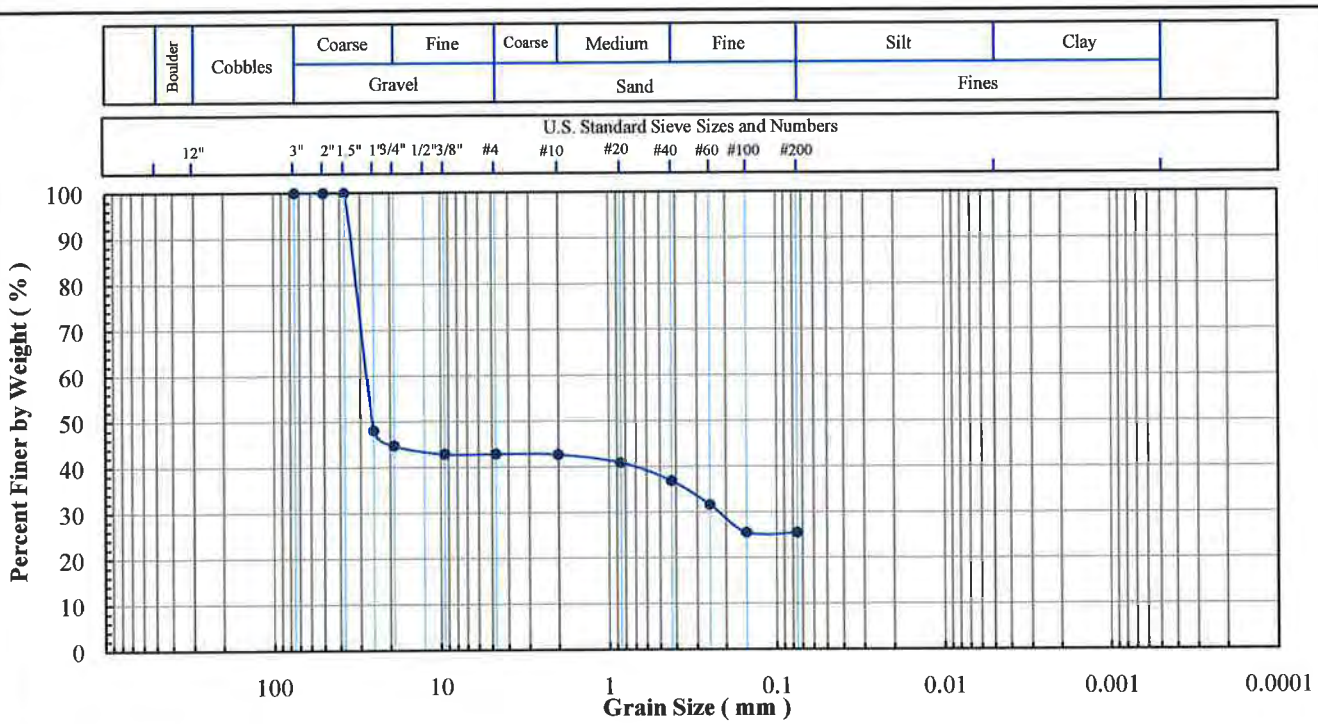
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-6 (43.5-45.0')
Lab Sample No:	13L123E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



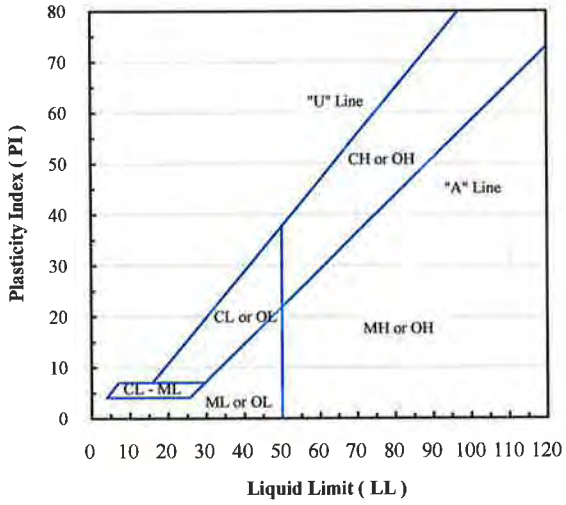
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	48.2
3/4"	19	44.8
3/8"	9.5	42.9
#4	4.75	42.9
#10	2.00	42.7
#20	0.850	40.9
#40	0.425	36.8
#60	0.250	31.6
#100	0.150	25.5
#200	0.075	25.4

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	57.1
Sand (%):	17.5
Fines (%):	25.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-6 (43.5-45.0')	13L123E	11.7	25.4	NP	NP	NP	GM - Silty gravel with sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PD, NSR

Excel Geotechnical Testing, Inc.
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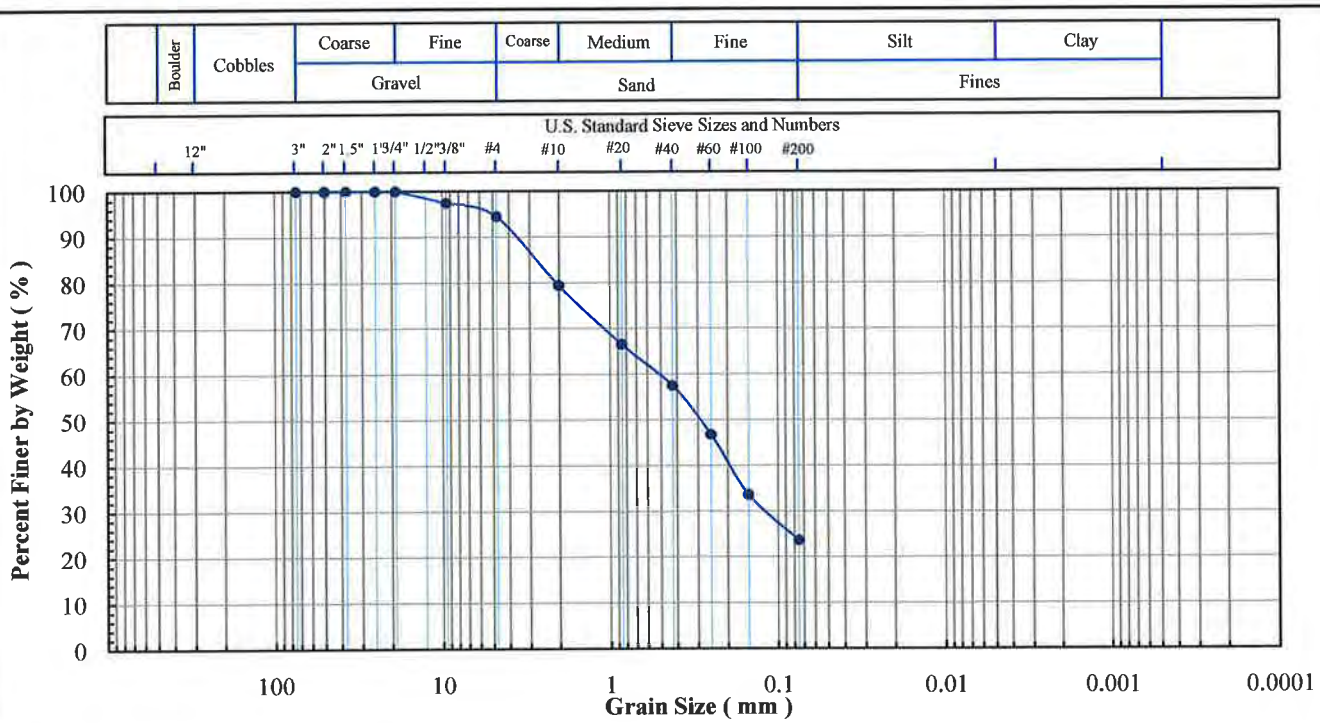
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-6 (53.5-55.0')
Lab Sample No:	13L125E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



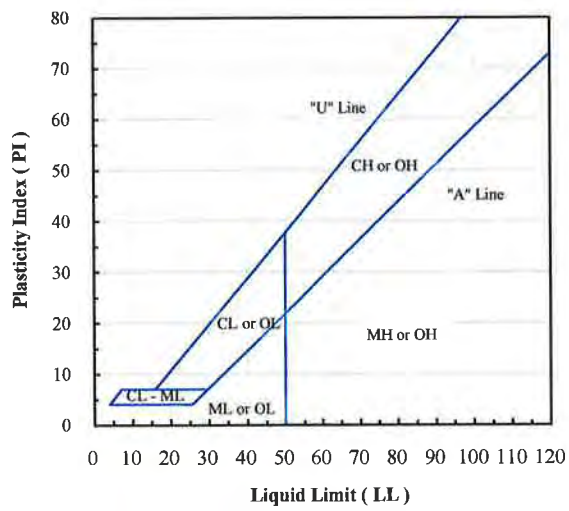
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	97.5
#4	4.75	94.5
#10	2.00	79.4
#20	0.850	66.5
#40	0.425	57.5
#60	0.250	46.8
#100	0.150	33.5
#200	0.075	23.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	5.5
Sand (%):	70.9
Fines (%):	23.6
Silt (%):	
Clay (%):	

Specific Gravity (-):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-6 (53.5-55.0')	13L125E	14.9	23.6	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14 JD NSR

Excel Geotechnical Testing, Inc.
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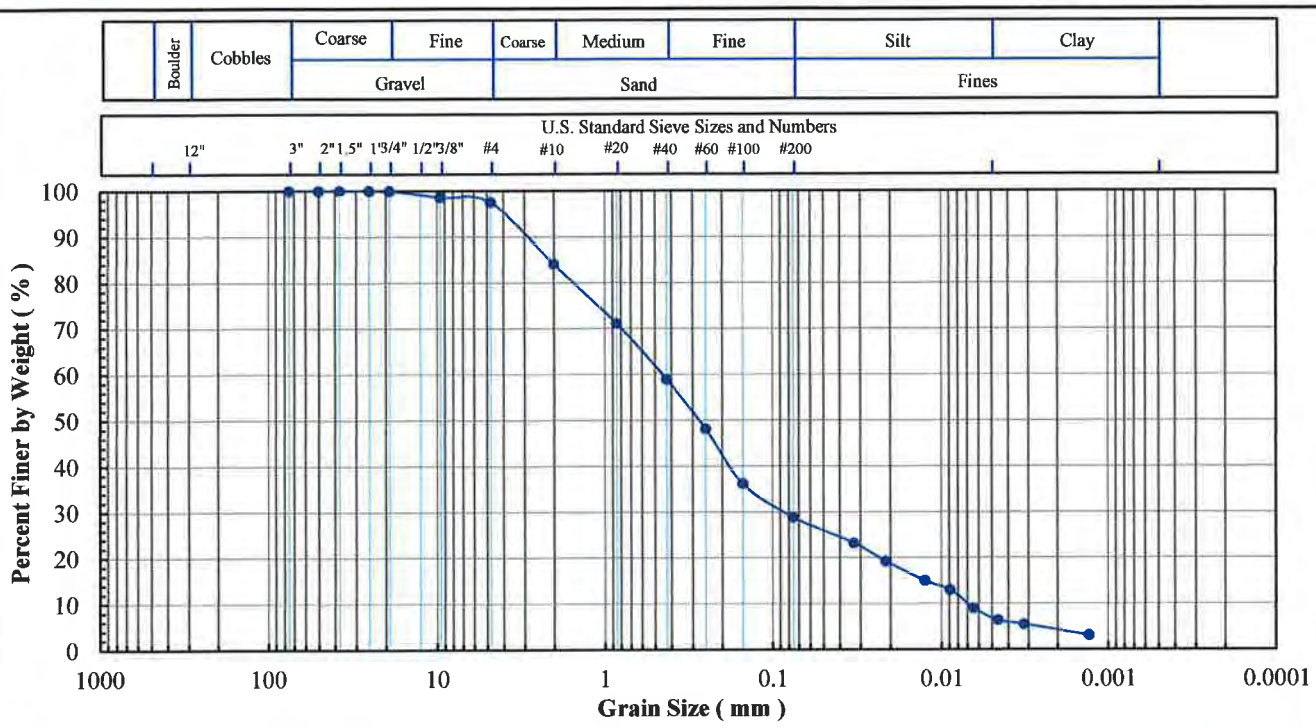
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-6 (73.5-75.0')
Lab Sample No:	13L129E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



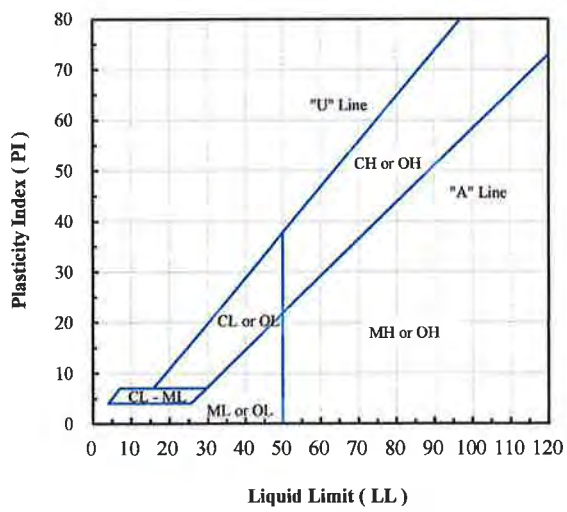
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	98.6
#4	4.75	97.5
#10	2.00	84.1
#20	0.850	71.1
#40	0.425	58.9
#60	0.250	48.1
#100	0.150	36.2
#200	0.075	28.8

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0328	23.2
0.0125	15.1
0.0064	9.0
0.0032	5.5
0.0013	3.2

Gravel (%):	2.5
Sand (%):	68.7
Fines (%):	28.8
Silt (%):	21.8
Clay (%):	7.0

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-6 (73.5-75.0')	13L129E	8.0	28.8	NP	NP	NP	SM - Silty sand

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.
Engineering classification is based on the assumption that the fines are either ML or MH.

1.6.'14
RD, NSR

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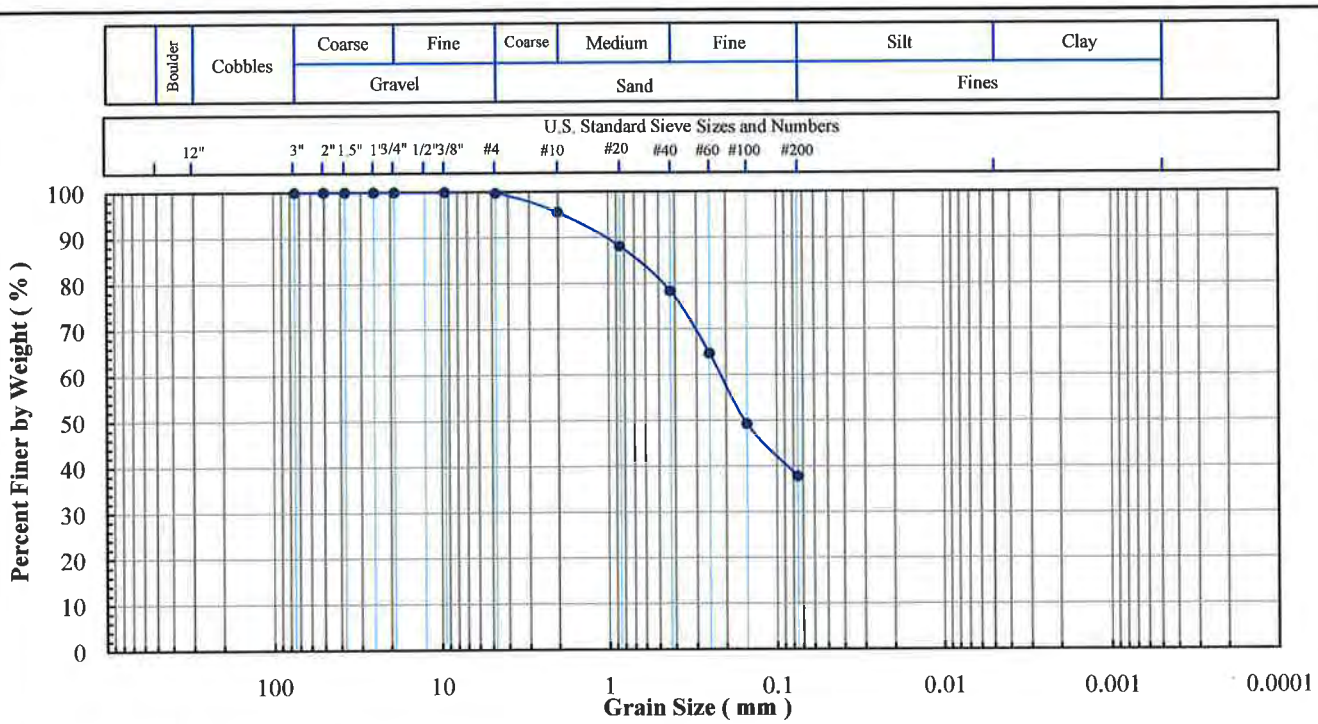
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-7 (27.0-28.5')
Lab Sample No:	13L147E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



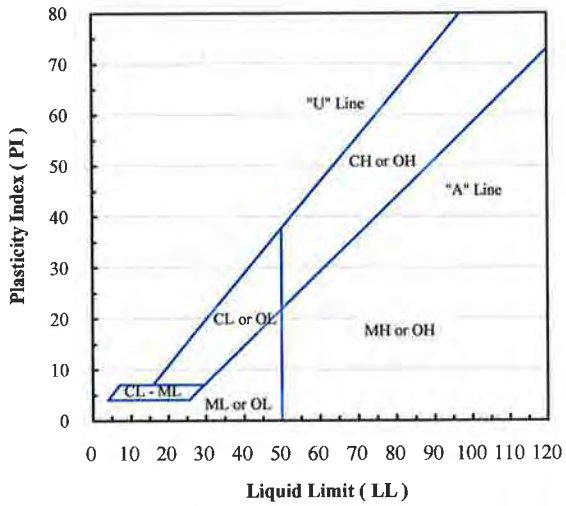
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	95.6
#20	0.850	88.1
#40	0.425	78.3
#60	0.250	64.6
#100	0.150	49.2
#200	0.075	37.7

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	62.1
Fines (%):	37.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-7 (27.0-28.5')	13L147E	26.7	37.7	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
DD, NSR

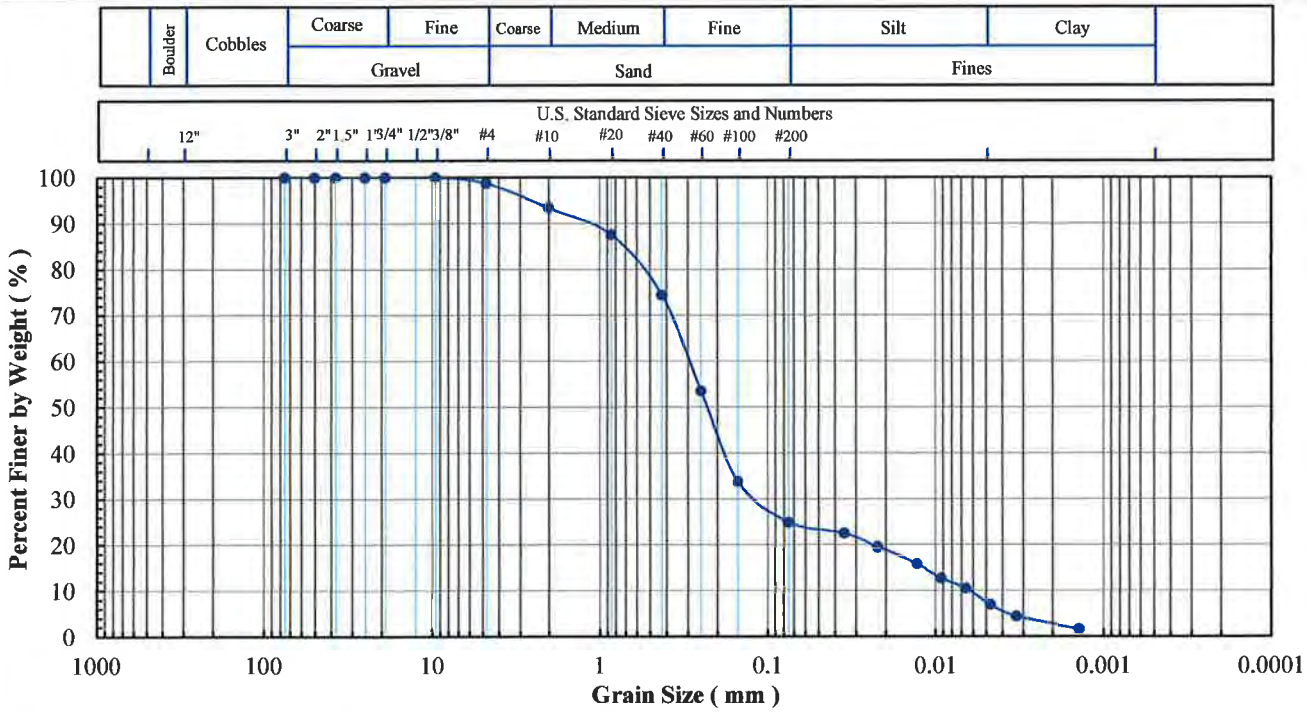
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-7 (54.0-55.5')
Lab Sample No:	13L165E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



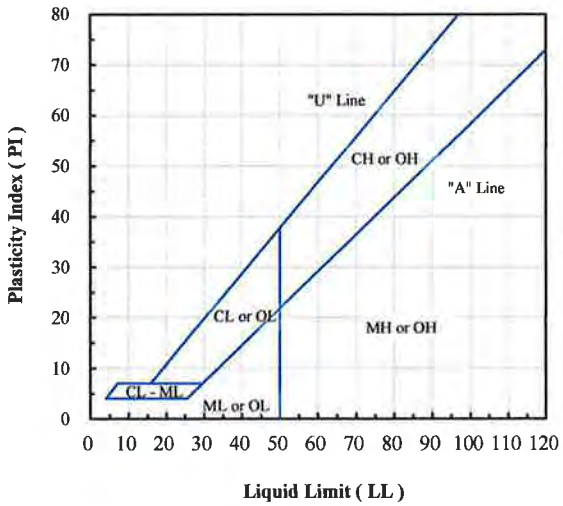
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.7
#10	2.00	93.4
#20	0.850	87.5
#40	0.425	74.4
#60	0.250	53.5
#100	0.150	33.8
#200	0.075	24.9

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0352	22.5
0.0130	16.0
0.0066	10.5
0.0033	4.4
0.0014	1.8

Gravel (%):	1.3
Sand (%):	73.8
Fines (%):	24.9
Silt (%):	17.4
Clay (%):	7.5

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-7 (54.0-55.5')	13L165E	16.6	24.9	NP	NP	NP	SM - Silty sand

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.
Engineering classification is based on the assumption that the fines are either ML or MH.

1 · 6 · '14
PD, NSB

Excel Geotechnical Testing, Inc.
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953 Forrest Street, Roswell, Georgia 30075
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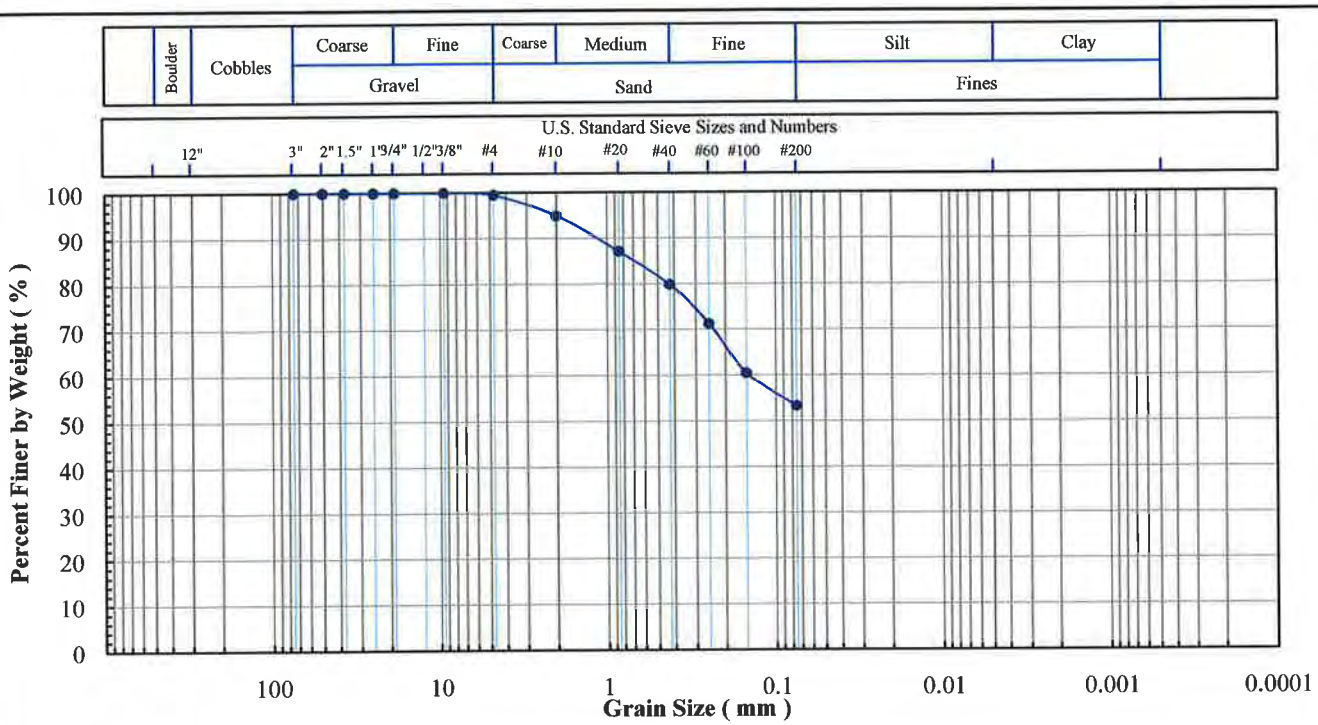
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-7 (67.5-69.0')
Lab Sample No:	13L174E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



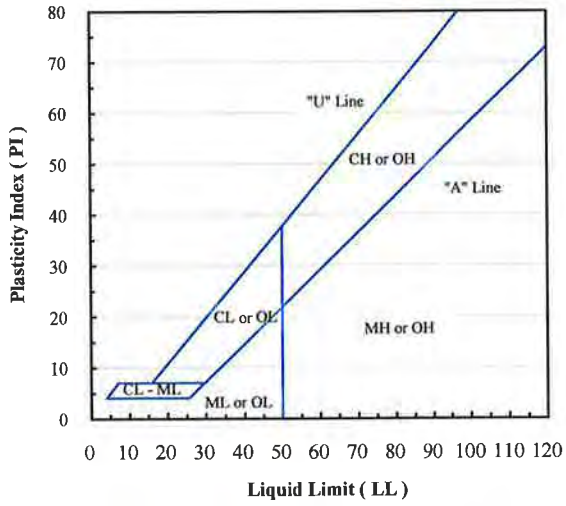
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	94.9
#20	0.850	87.1
#40	0.425	79.8
#60	0.250	71.3
#100	0.150	60.4
#200	0.075	53.3

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.5
Sand (%):	46.2
Fines (%):	53.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-7 (67.5-69.0')	13L174E	18.7	53.3	NP	NP	NP	ML - Sandy silt

Note(s):

1-6-14
PD, NSR

Excel Geotechnical Testing, Inc.
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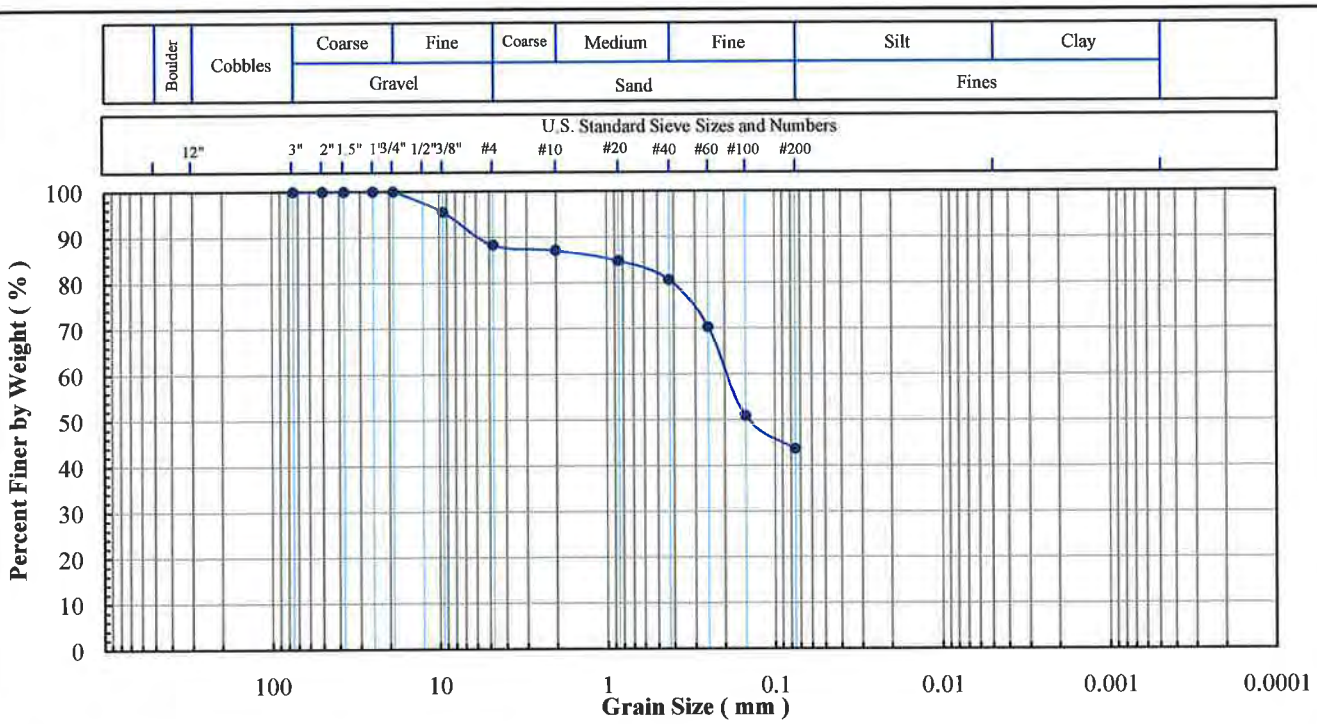
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-7 (75.0-76.5')
Lab Sample No:	13L179E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



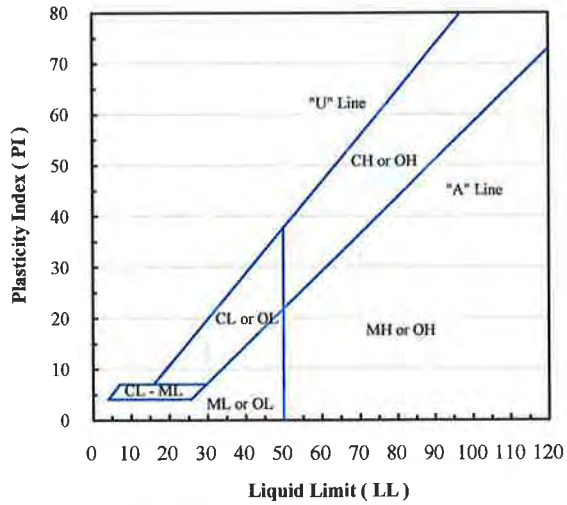
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	95.5
#4	4.75	88.3
#10	2.00	87.1
#20	0.850	84.8
#40	0.425	80.6
#60	0.250	70.2
#100	0.150	50.8
#200	0.075	43.6

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	11.7
Sand (%):	44.7
Fines (%):	43.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-7 (75.0-76.5')	13L179E	14.3	43.6	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
TD, NSR

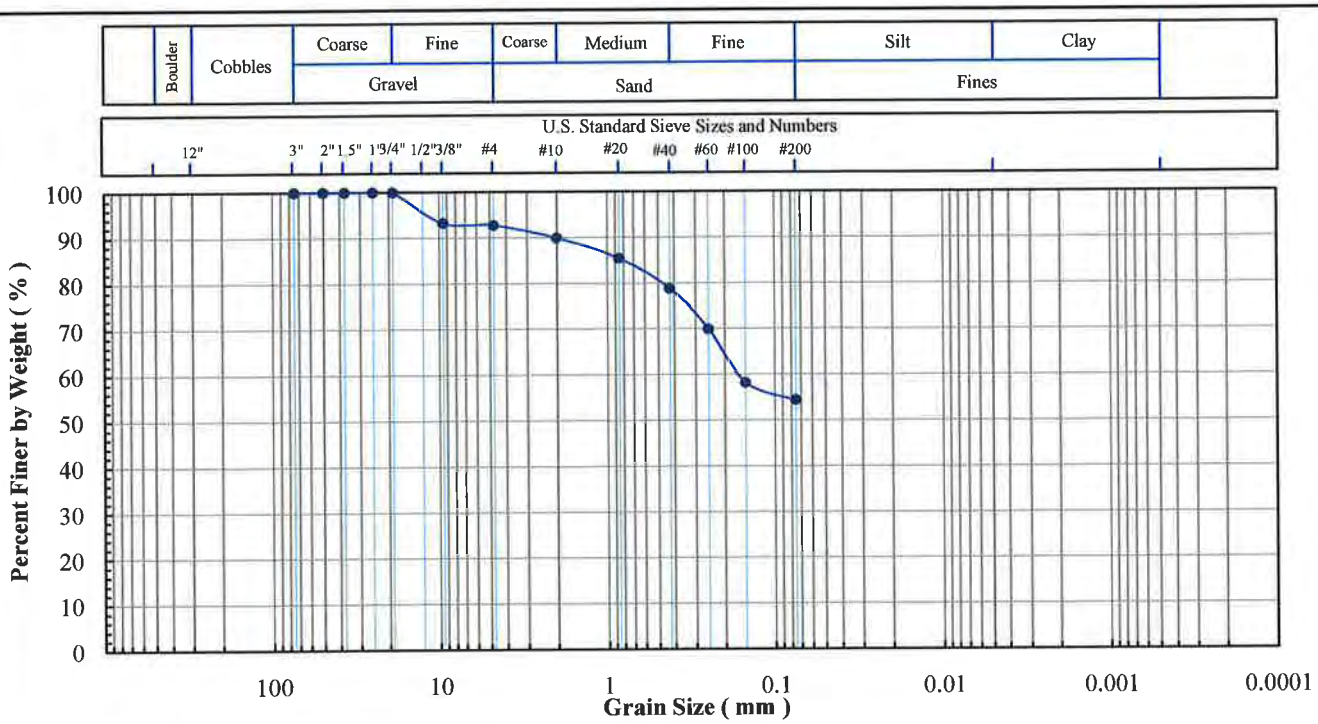
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-8 (4.0-5.5')
Lab Sample No:	13L180E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



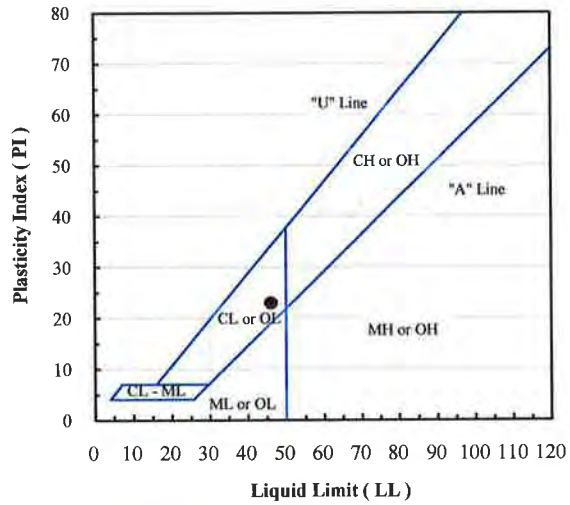
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	93.3
#4	4.75	92.8
#10	2.00	90.0
#20	0.850	85.4
#40	0.425	78.8
#60	0.250	69.9
#100	0.150	58.2
#200	0.075	54.3

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	7.2
Sand (%):	38.5
Fines (%):	54.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-8 (4.0-5.5')	13L180E	21.6	54.3	46	23	23	CL - Sandy lean clay

Note(s):

1-6-14
DD, NSE

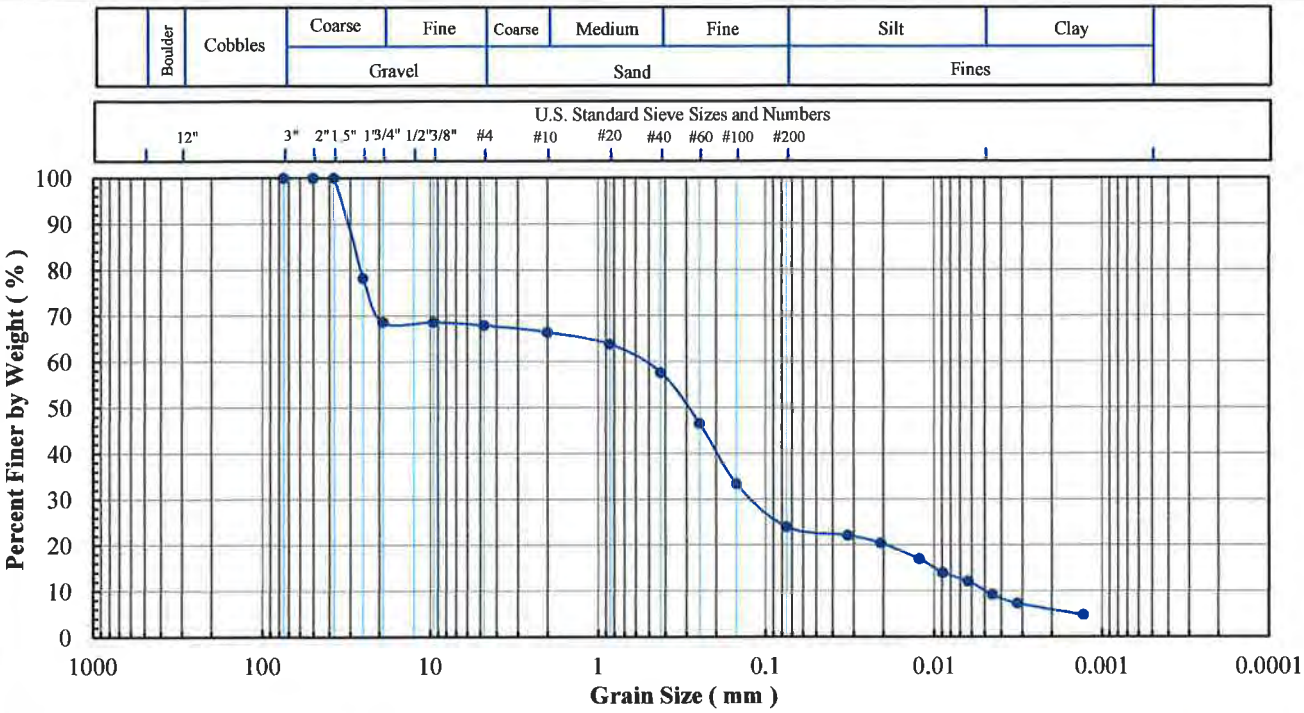
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-8 (9.0-10.5')
Lab Sample No:	13L181E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



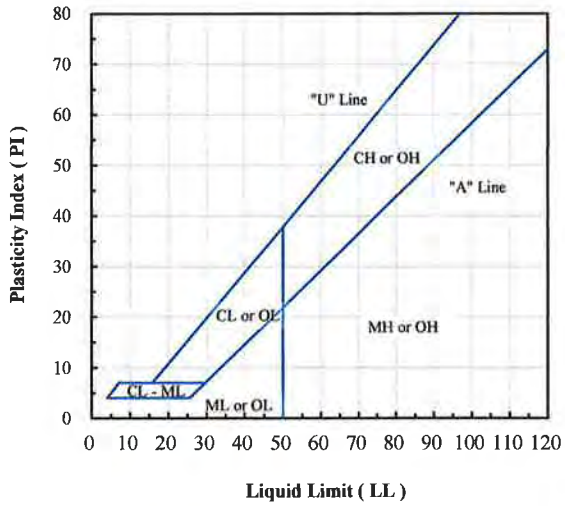
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	78.2
3/4"	19	68.6
3/8"	9.5	68.6
#4	4.75	67.9
#10	2.00	66.4
#20	0.850	63.8
#40	0.425	57.6
#60	0.250	46.5
#100	0.150	33.4
#200	0.075	24.0

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0324	22.1
0.0123	17.0
0.0063	12.1
0.0032	7.3
0.0013	4.8

Gravel (%):	32.1
Sand (%):	43.9
Fines (%):	24.0
Silt (%):	14.0
Clay (%):	10.0

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-8 (9.0-10.5')	13L181E	17.1	24.0	NP	NP	NP	SM - Silty sand with gravel

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.
Engineering classification is based on the assumption that the fines are either ML or MH.

1.6.'14
DD, NSR

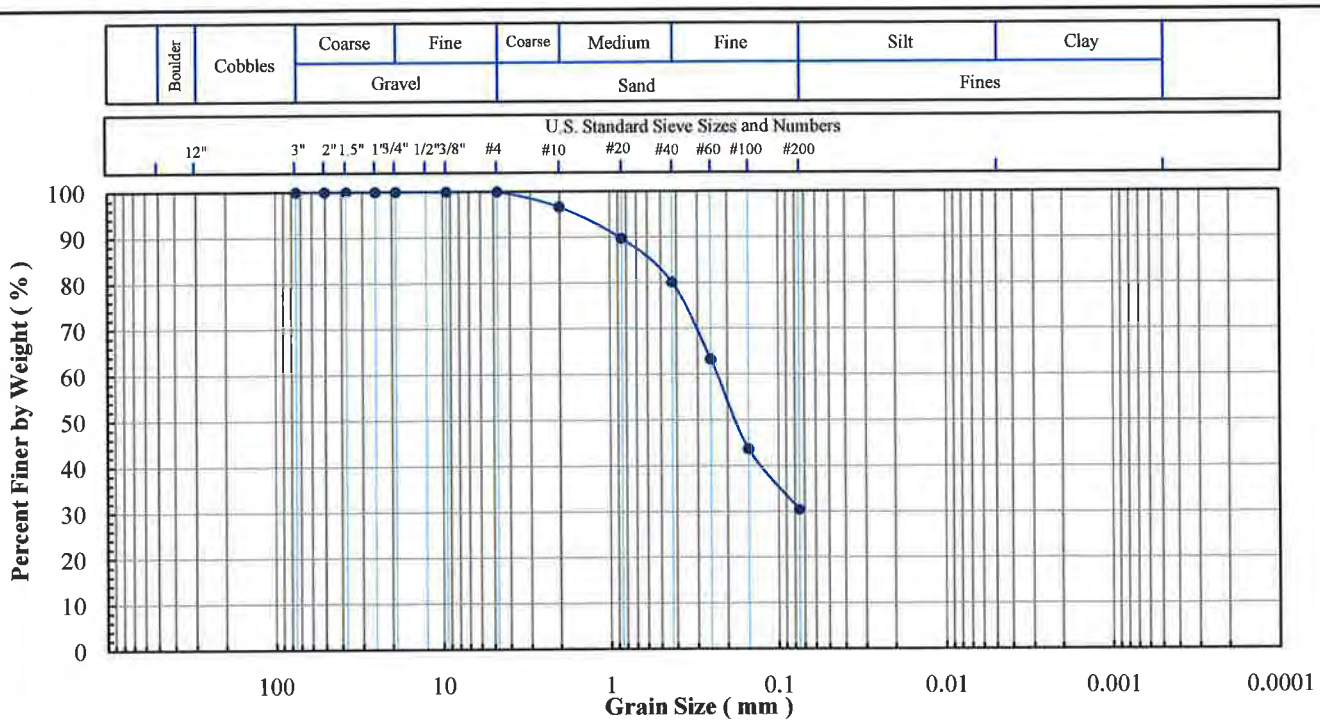
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-8 (29.0-30.5')
Lab Sample No:	13L183E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



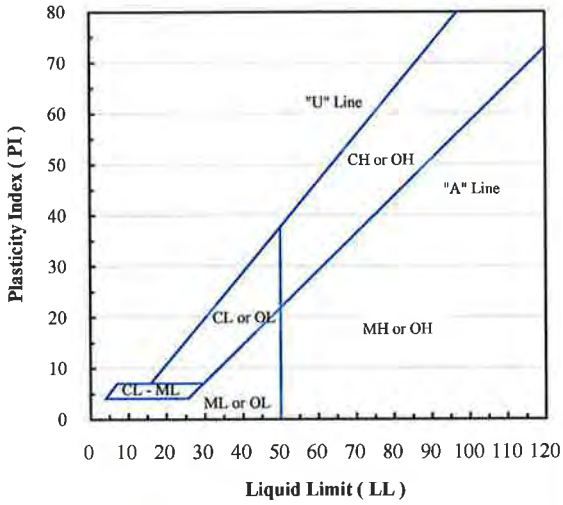
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	96.6
#20	0.850	89.7
#40	0.425	80.1
#60	0.250	63.2
#100	0.150	43.6
#200	0.075	30.4

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	69.6
Fines (%):	30.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-8 (29.0-30.5')	13L183E	30.5	30.4	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
TD, JSE

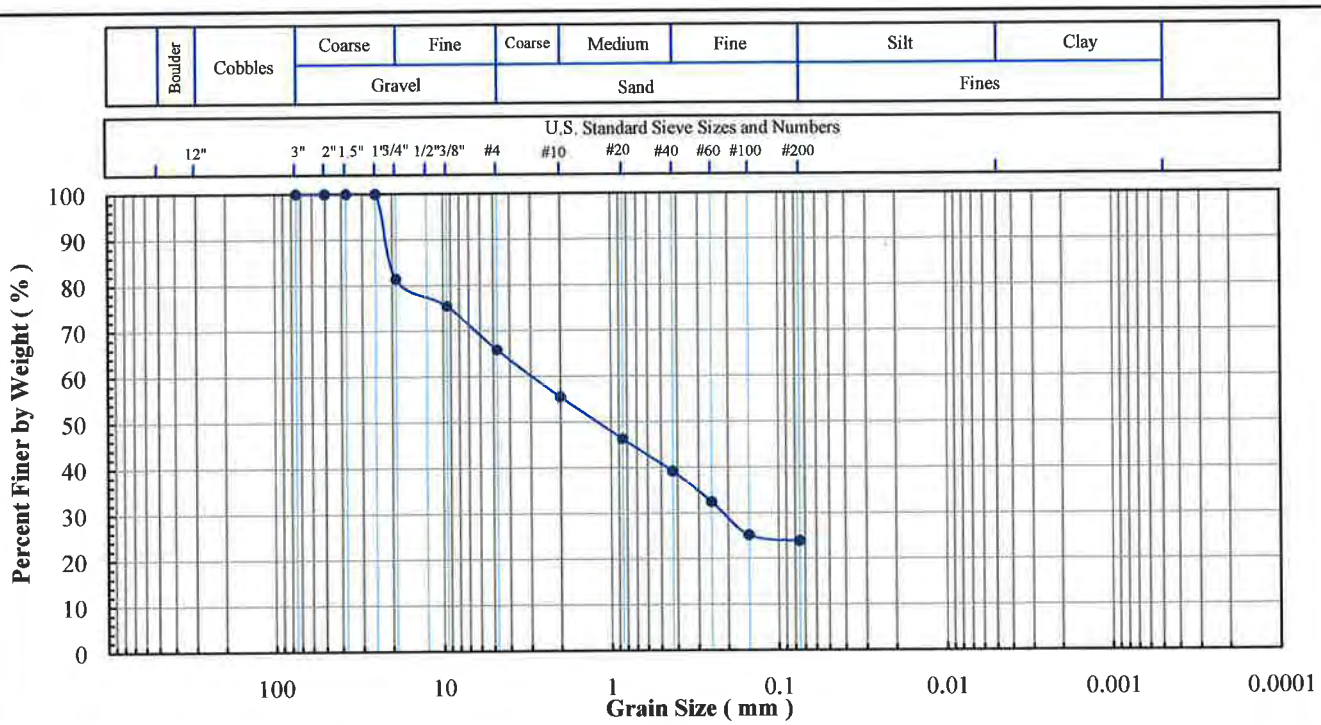
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-8 (74.0-75.5')
Lab Sample No:	13L192E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



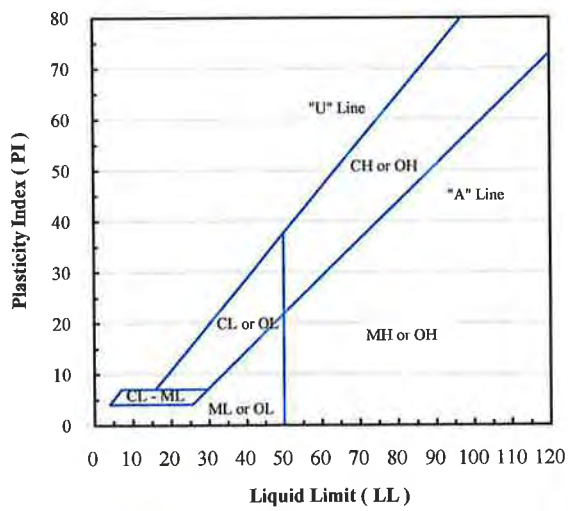
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	81.4
3/8"	9.5	75.5
#4	4.75	65.9
#10	2.00	55.5
#20	0.850	46.3
#40	0.425	39.1
#60	0.250	32.4
#100	0.150	25.1
#200	0.075	23.8

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	34.1
Sand (%):	42.1
Fines (%):	23.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-8 (74.0-75.5')	13L192E	12.4	23.8	NP	NP	NP	SM - Silty sand with gravel

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PD, ASE

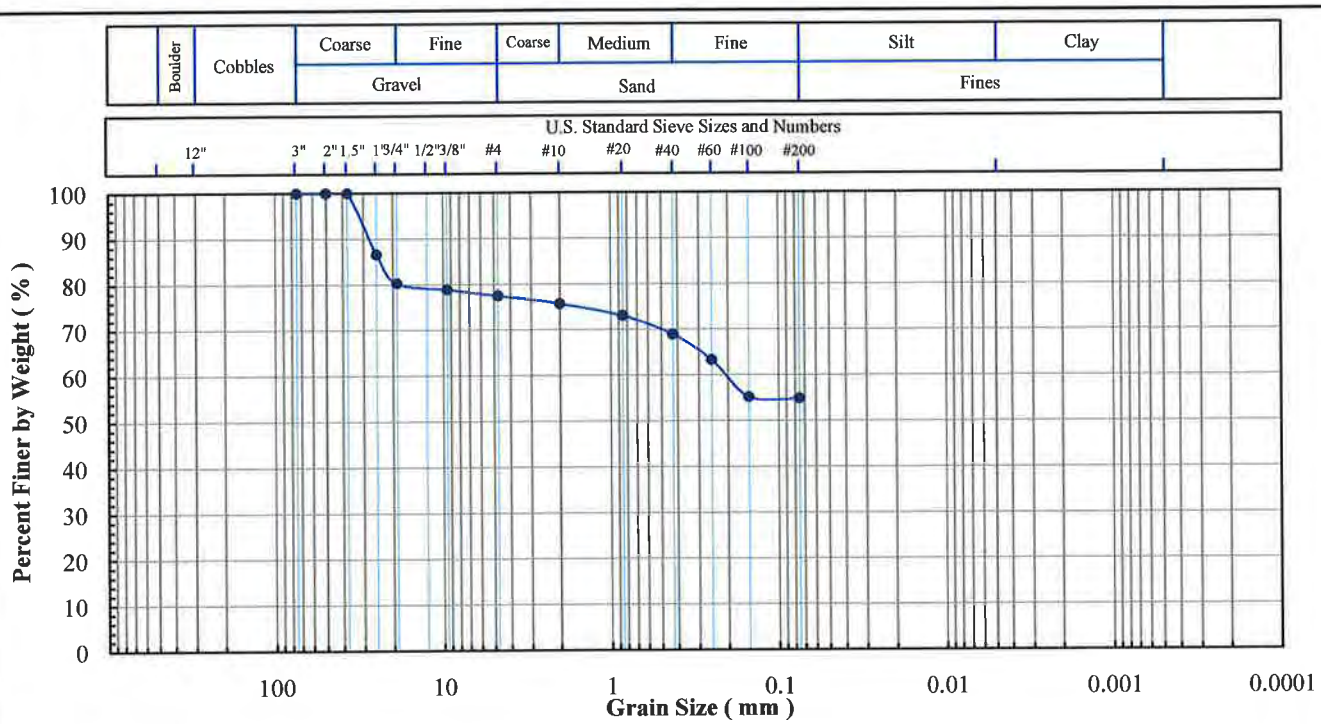
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-9 (4.0-5.5')
Lab Sample No:	13L194E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



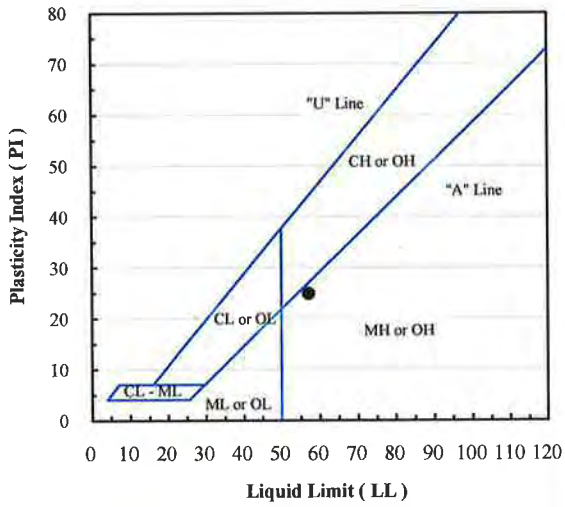
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	86.6
3/4"	19	80.3
3/8"	9.5	78.9
#4	4.75	77.5
#10	2.00	75.7
#20	0.850	73.0
#40	0.425	68.9
#60	0.250	63.3
#100	0.150	55.2
#200	0.075	54.8

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	22.5
Sand (%):	22.7
Fines (%):	54.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-9 (4.0-5.5')	13L194E	18.9	54.8	57	32	25	MH - Sandy elastic silt with gravel

Note(s):

1-6-14

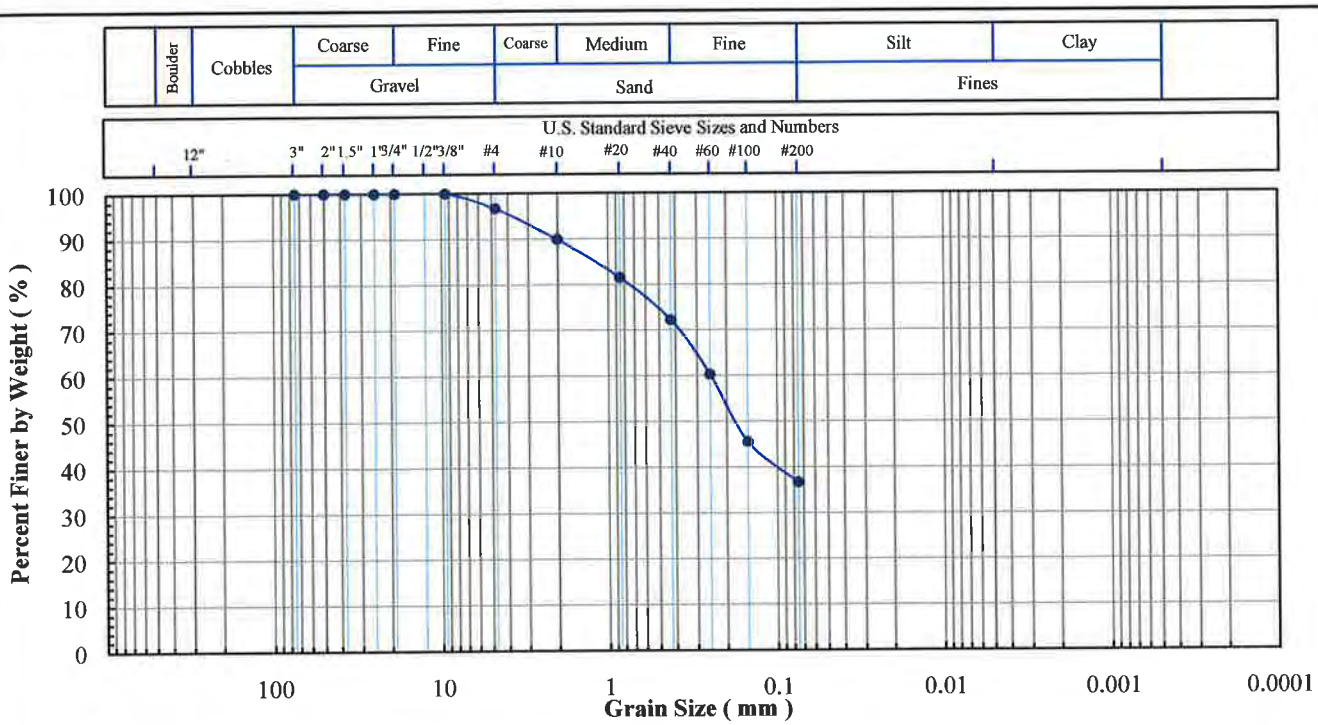
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-9 (34.0-35.5')
Lab Sample No:	13L199E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



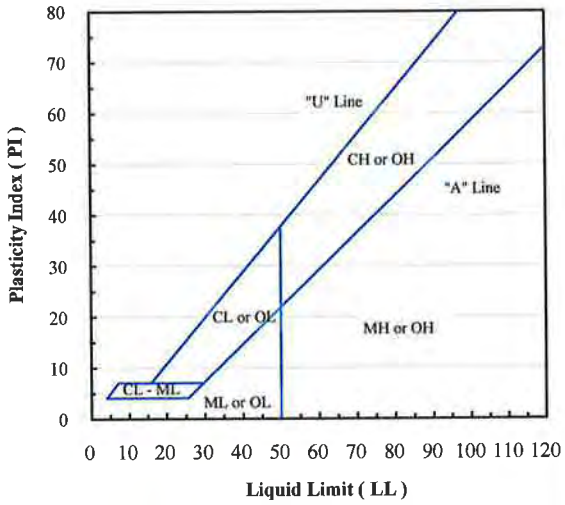
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	96.7
#10	2.00	89.9
#20	0.850	81.5
#40	0.425	72.2
#60	0.250	60.2
#100	0.150	45.5
#200	0.075	36.6

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3.3
Sand (%):	60.1
Fines (%):	36.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-9 (34.0-35.5')	13L199E	27.7	36.6	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PP, ASR

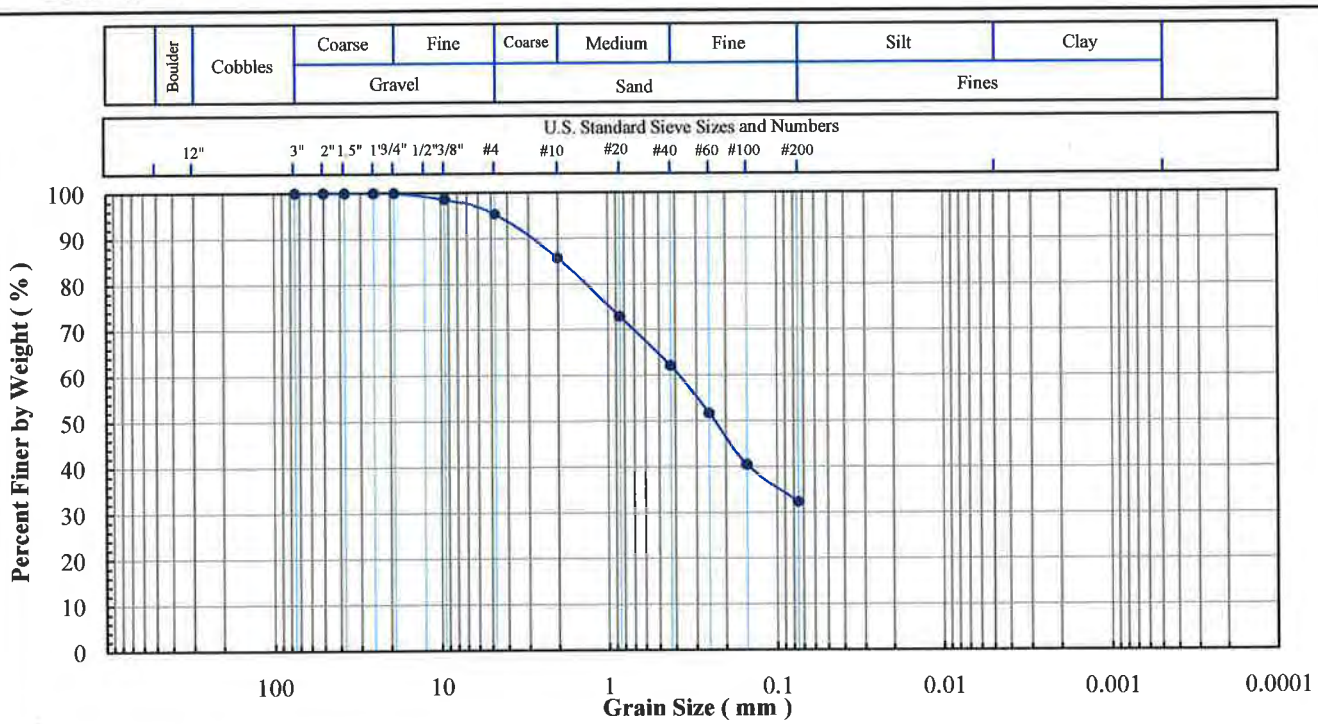
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-9 (44.0-45.5')
Lab Sample No:	13L201E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



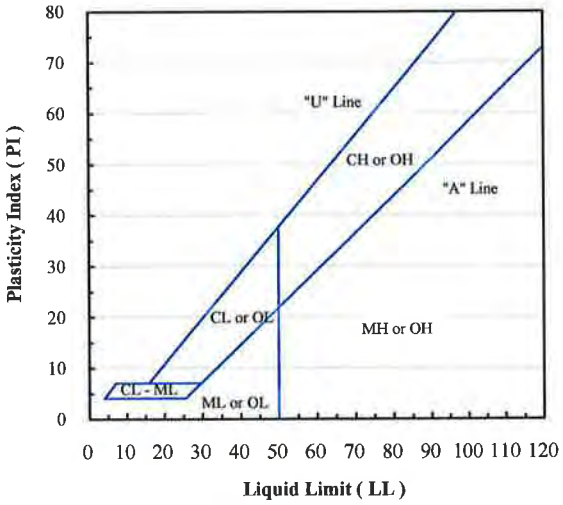
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	98.6
#4	4.75	95.4
#10	2.00	85.8
#20	0.850	72.9
#40	0.425	62.1
#60	0.250	51.7
#100	0.150	40.4
#200	0.075	32.3

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	4.6
Sand (%):	63.1
Fines (%):	32.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-9 (44.0-45.5')	13L201E	18.8	32.3	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14 DD, NSR

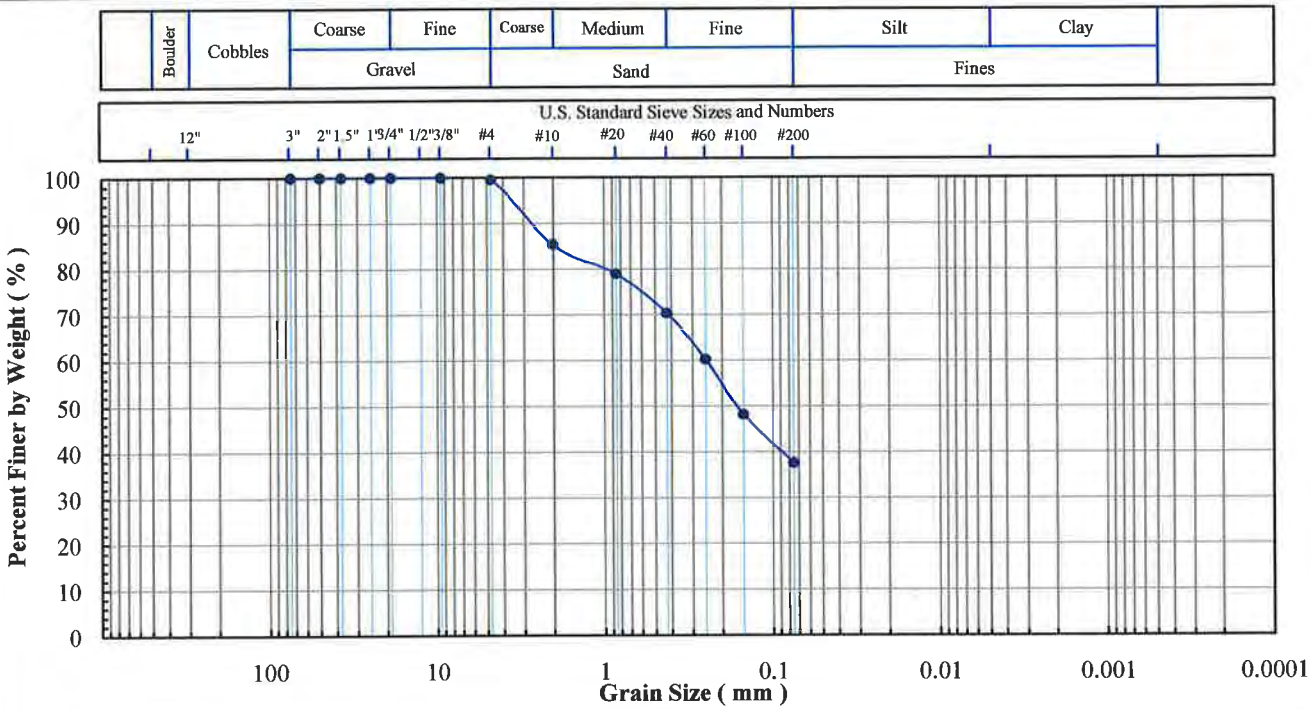
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-9 (79.0-80.5')
Lab Sample No:	13L208E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



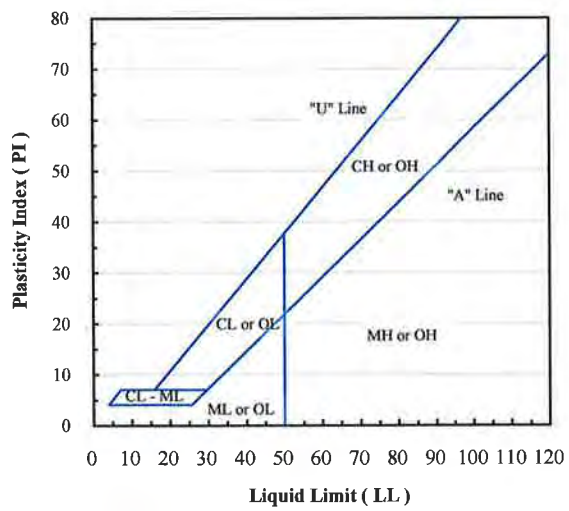
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	85.4
#20	0.850	79.0
#40	0.425	70.4
#60	0.250	60.2
#100	0.150	48.2
#200	0.075	37.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	62.1
Fines (%):	37.5
Silt (%):	
Clay (%):	

Specific Gravity (-):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-9 (79.0-80.5')	13L208E	11.6	37.5	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PP, NSR

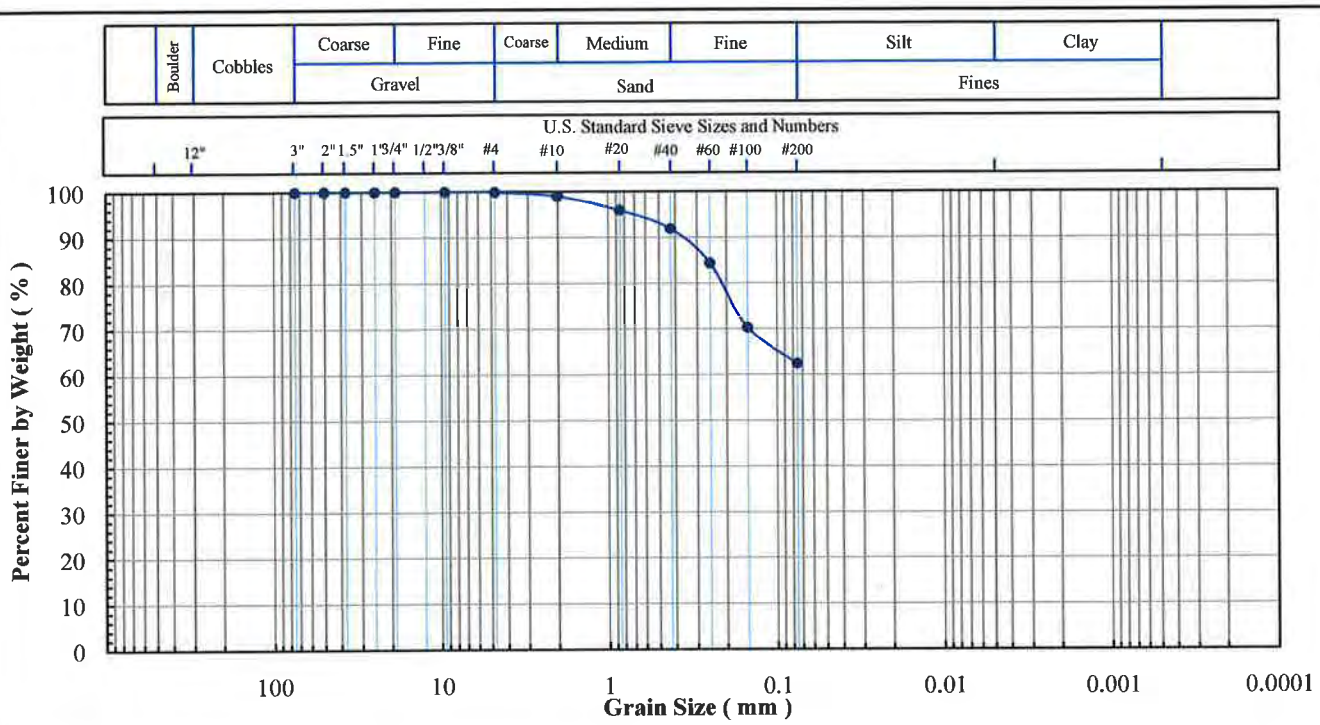
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-10 (13.5-15.0')
Lab Sample No:	13L219E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



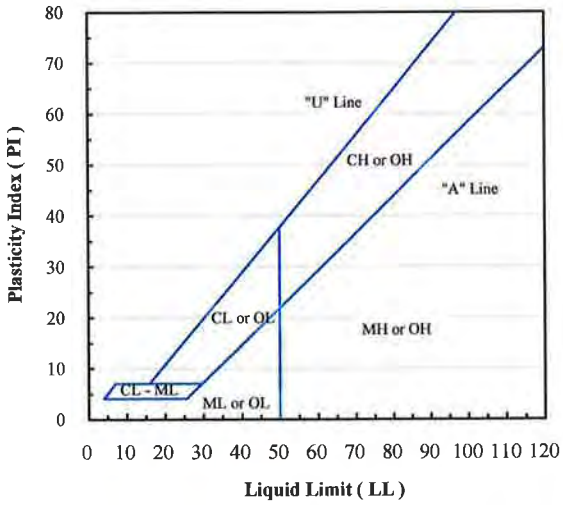
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.9
#10	2.00	99.0
#20	0.850	95.9
#40	0.425	91.9
#60	0.250	84.3
#100	0.150	70.2
#200	0.075	62.4

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.1
Sand (%):	37.5
Fines (%):	62.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-10 (13.5-15.0')	13L219E	36.0	62.4	NP	NP	NP	ML - Sandy silt

Note(s):

1-6-14
PD, NSE

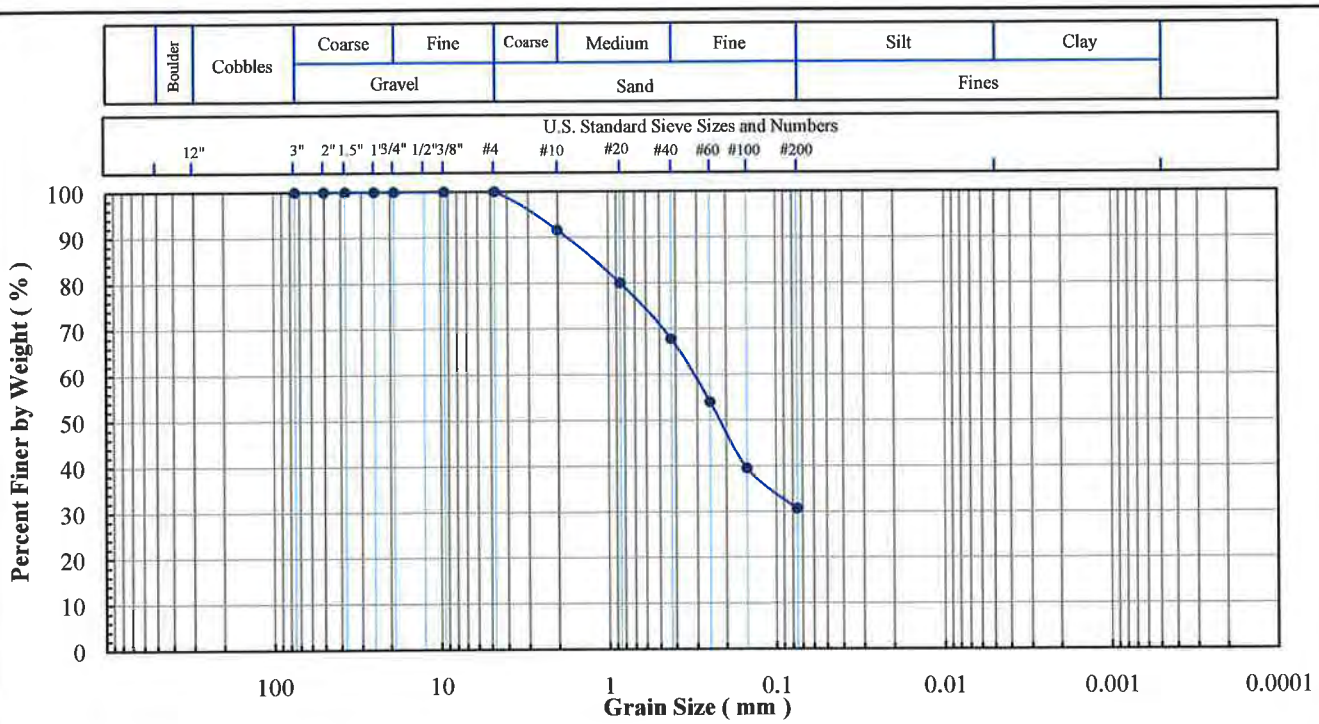
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-10 (22.5-24.0')
Lab Sample No:	13L225E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



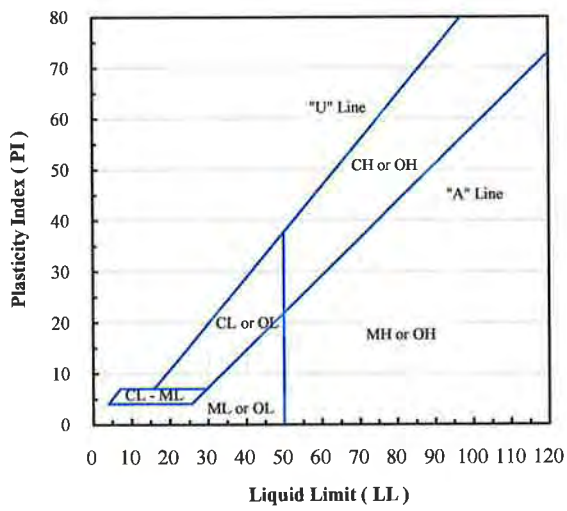
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	91.6
#20	0.850	80.0
#40	0.425	67.8
#60	0.250	54.0
#100	0.150	39.4
#200	0.075	30.6

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	69.4
Fines (%):	30.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-10 (22.5-24.0')	13L225E	42.3	30.6	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PD, NSK

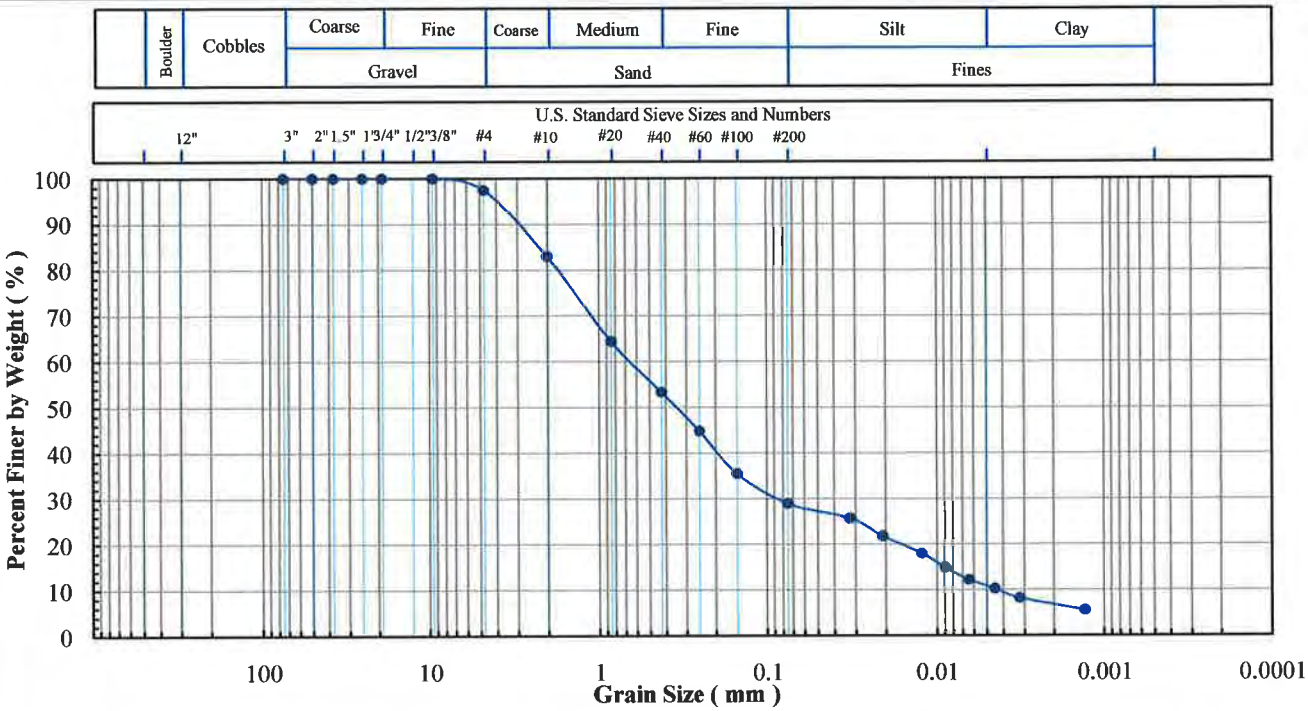
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-10 (27.0-28.5')
Lab Sample No:	13L228E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



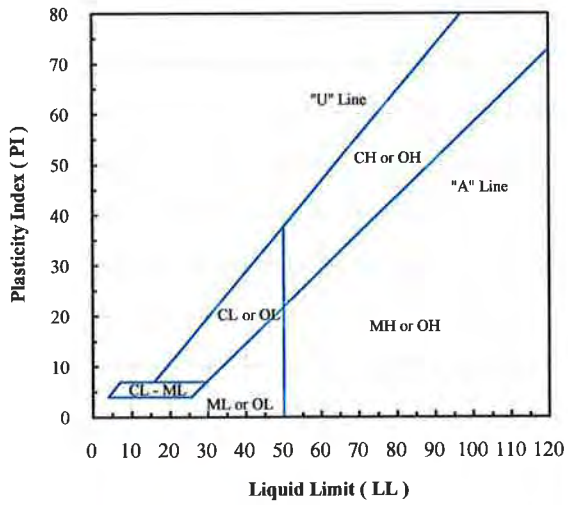
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.5
#10	2.00	83.0
#20	0.850	64.4
#40	0.425	53.4
#60	0.250	44.8
#100	0.150	35.5
#200	0.075	28.9

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0323	25.7
0.0123	18.1
0.0064	12.3
0.0032	8.3
0.0013	5.6

Gravel (%):	2.5
Sand (%):	68.6
Fines (%):	28.9
Silt (%):	18.1
Clay (%):	10.8

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-10 (27.0-28.5')	13L228E	38.7	28.9	NP	NP	NP	SM - Silty sand

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.
Engineering classification is based on the assumption that the fines are either ML or MH.

1.6.'14
PD, NSR

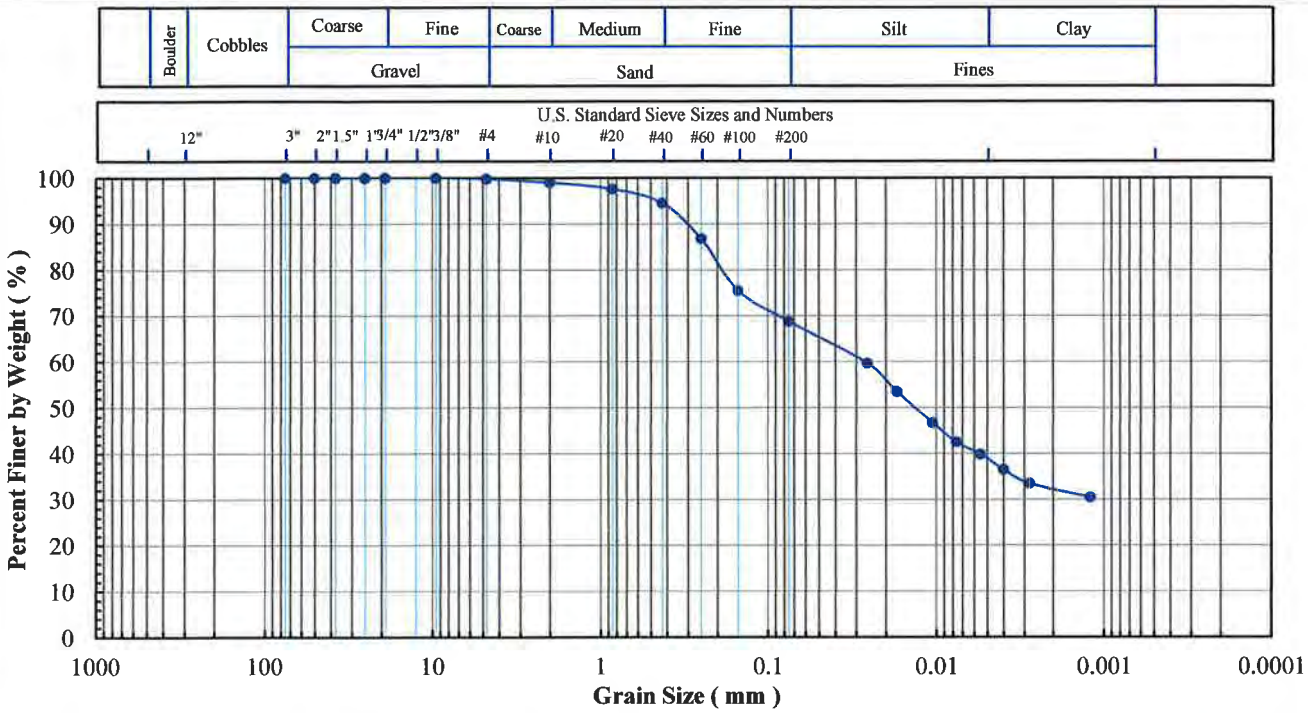
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-11 (8.0-9.5')
Lab Sample No:	13L237E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



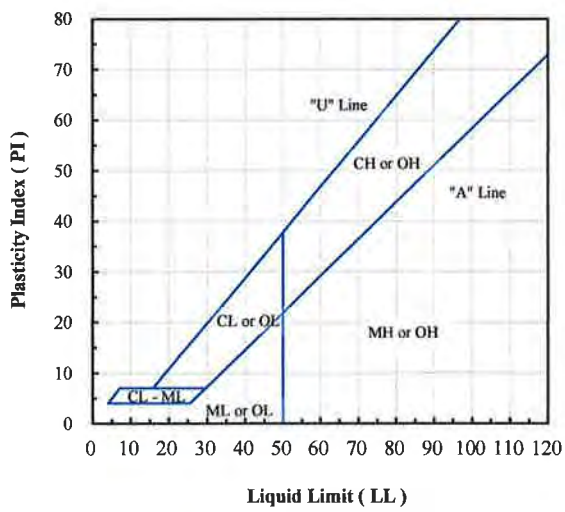
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	99.0
#20	0.850	97.6
#40	0.425	94.5
#60	0.250	86.8
#100	0.150	75.5
#200	0.075	68.8

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0258	59.7
0.0105	46.7
0.0055	39.9
0.0028	33.5
0.0012	30.5

Gravel (%):	0.2
Sand (%):	31.0
Fines (%):	68.8
Silt (%):	30.0
Clay (%):	38.8

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-11 (8.0-9.5')	13L237E	42.0	68.8	NP	NP	NP	ML - Sandy silt

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.
Engineering classification is based on the assumption that the fines are either ML or MH.

1.6.'14
PD, NSR

Excel Geotechnical Testing, Inc.
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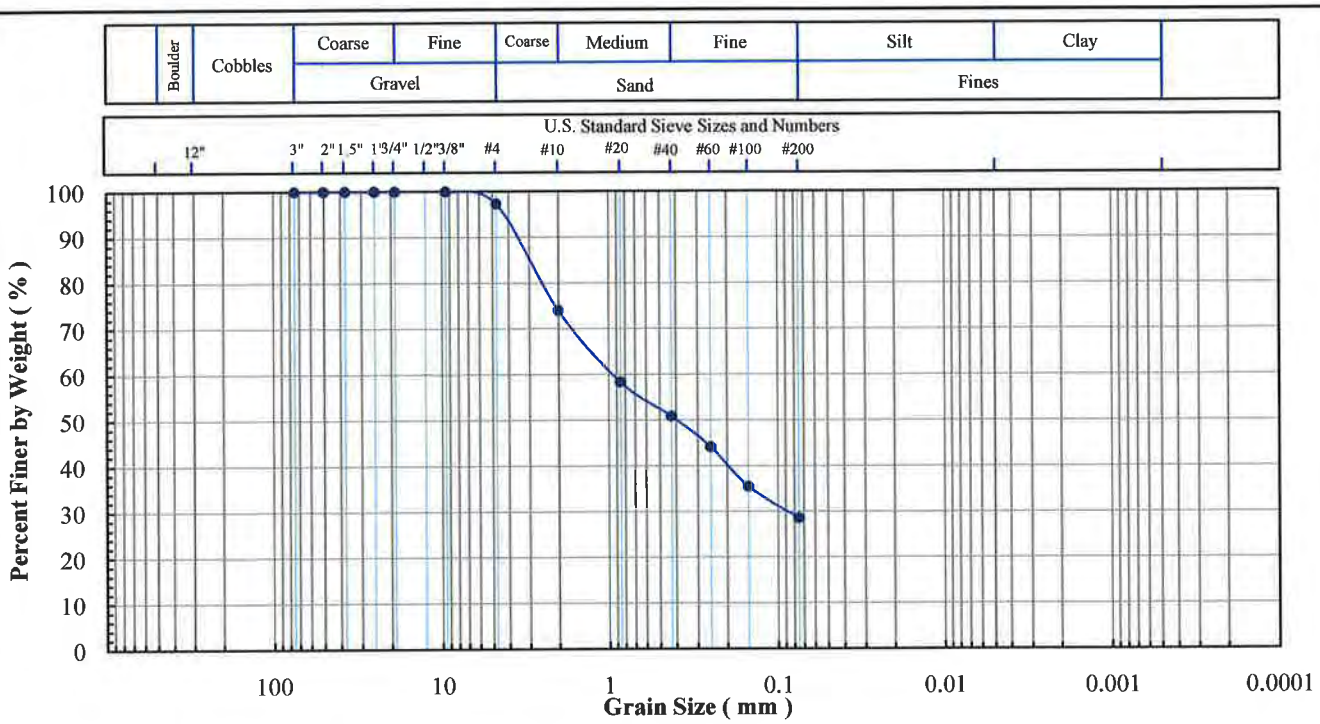
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-11 (23.0-24.5')
Lab Sample No:	13L240E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



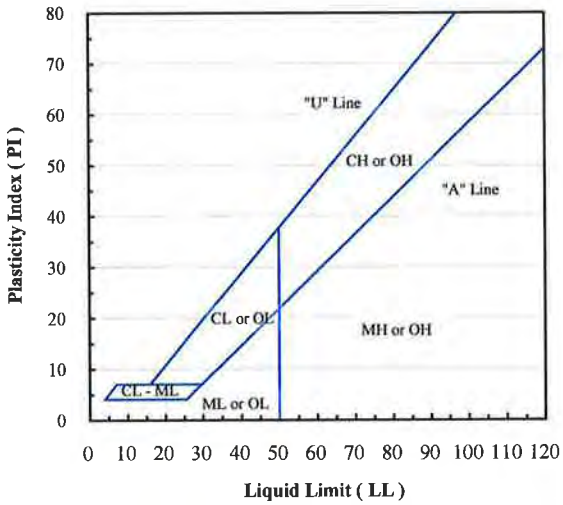
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.3
#10	2.00	74.0
#20	0.850	58.3
#40	0.425	50.8
#60	0.250	44.1
#100	0.150	35.4
#200	0.075	28.5

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.7
Sand (%):	68.8
Fines (%):	28.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-11 (23.0-24.5')	13L240E	25.6	28.5	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PD, NSR

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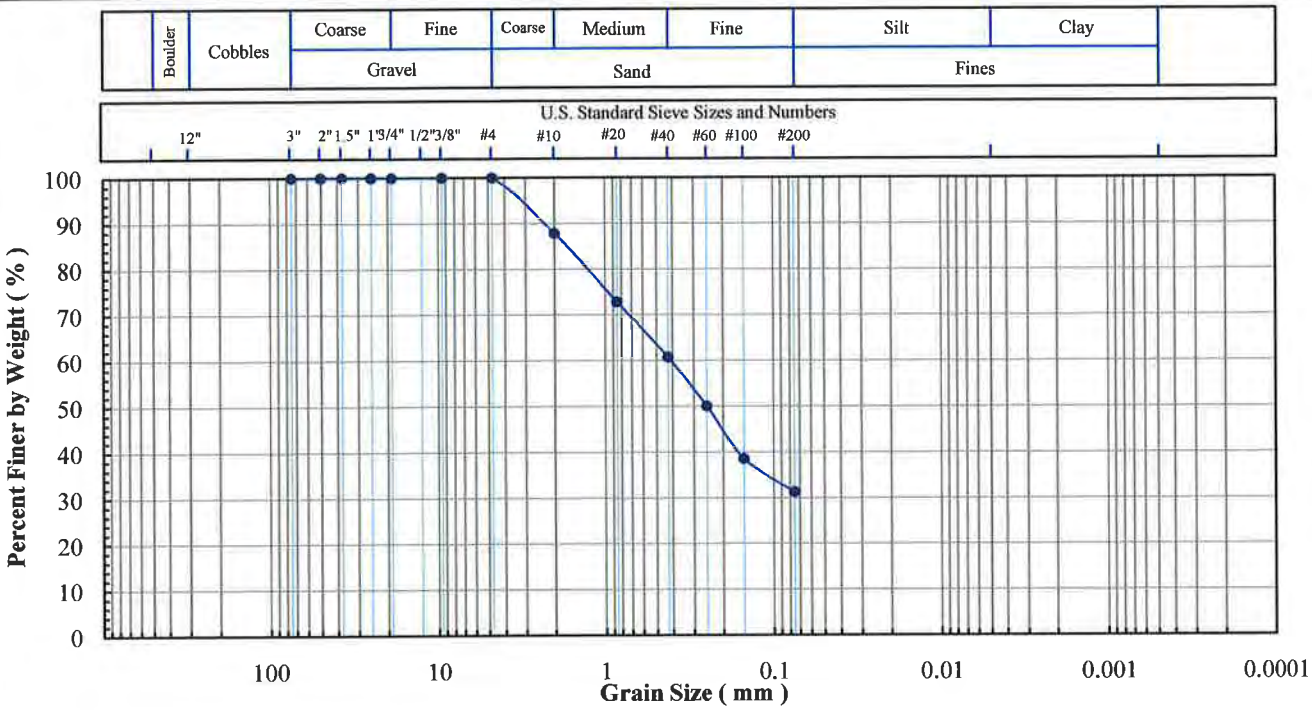
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-11 (48.0-49.5')
Lab Sample No:	13L244E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



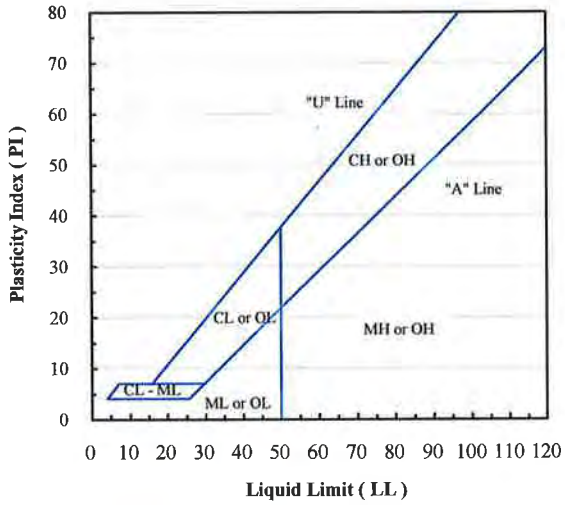
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	87.9
#20	0.850	72.8
#40	0.425	60.7
#60	0.250	50.0
#100	0.150	38.5
#200	0.075	31.2

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	68.8
Fines (%):	31.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-11 (48.0-49.5')	13L244E	23.1	31.2	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
DD, NSR

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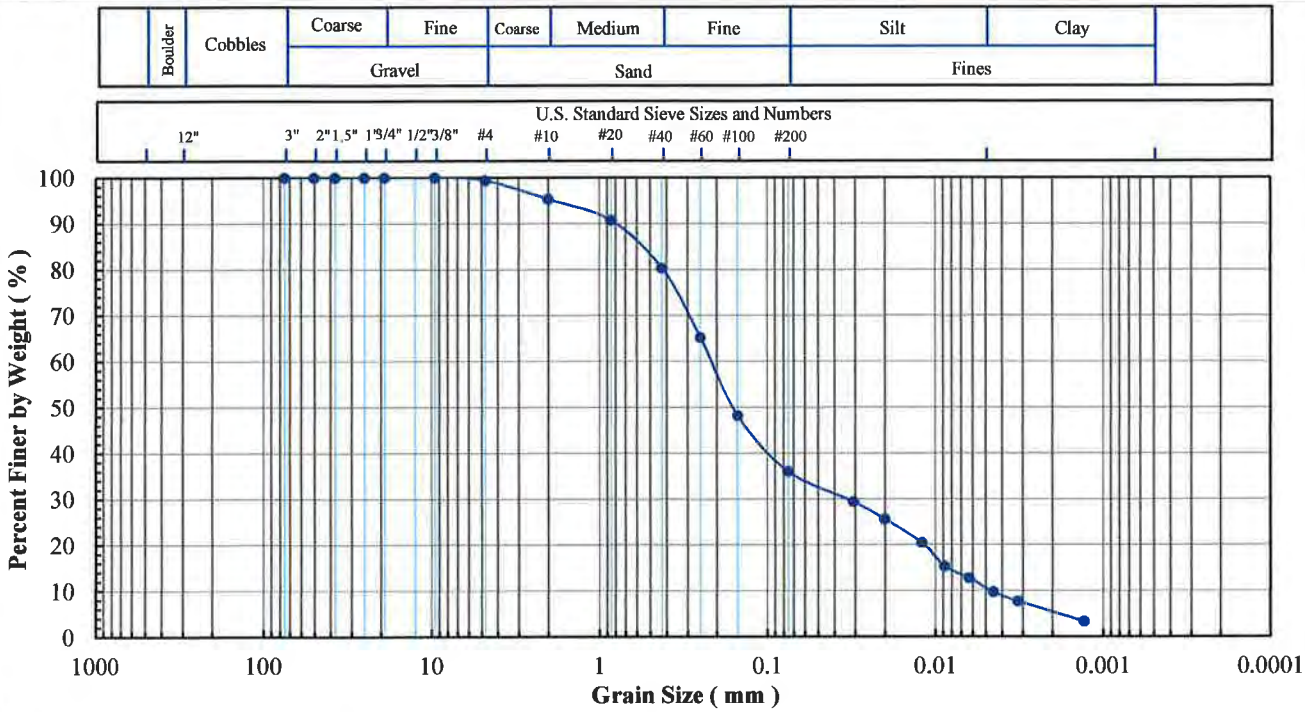
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-11 (73.0-74.5')
Lab Sample No:	13L249E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



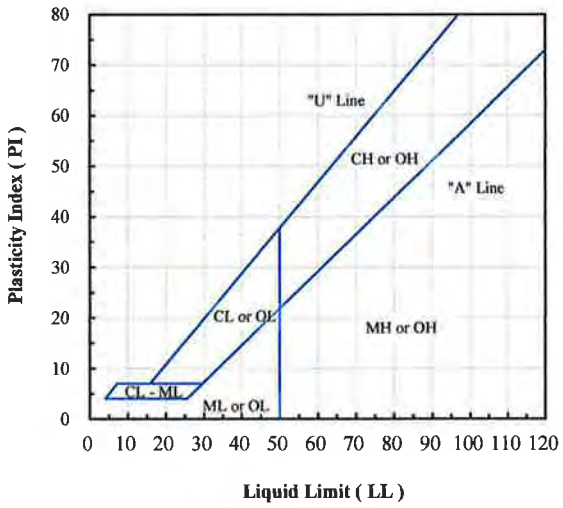
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.4
#10	2.00	95.3
#20	0.850	90.7
#40	0.425	80.3
#60	0.250	65.2
#100	0.150	48.2
#200	0.075	36.0

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0308	29.4
0.0120	20.4
0.0063	12.8
0.0032	7.7
0.0013	3.3

Gravel (%):	0.6
Sand (%):	63.4
Fines (%):	36.0
Silt (%):	25.4
Clay (%):	10.6

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-11 (73.0-74.5')	13L249E	17.7	36.0	NP	NP	NP	SM - Silty sand

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.
Engineering classification is based on the assumption that the fines are either ML or MH.

1 · 6 · '14
DD, NSR

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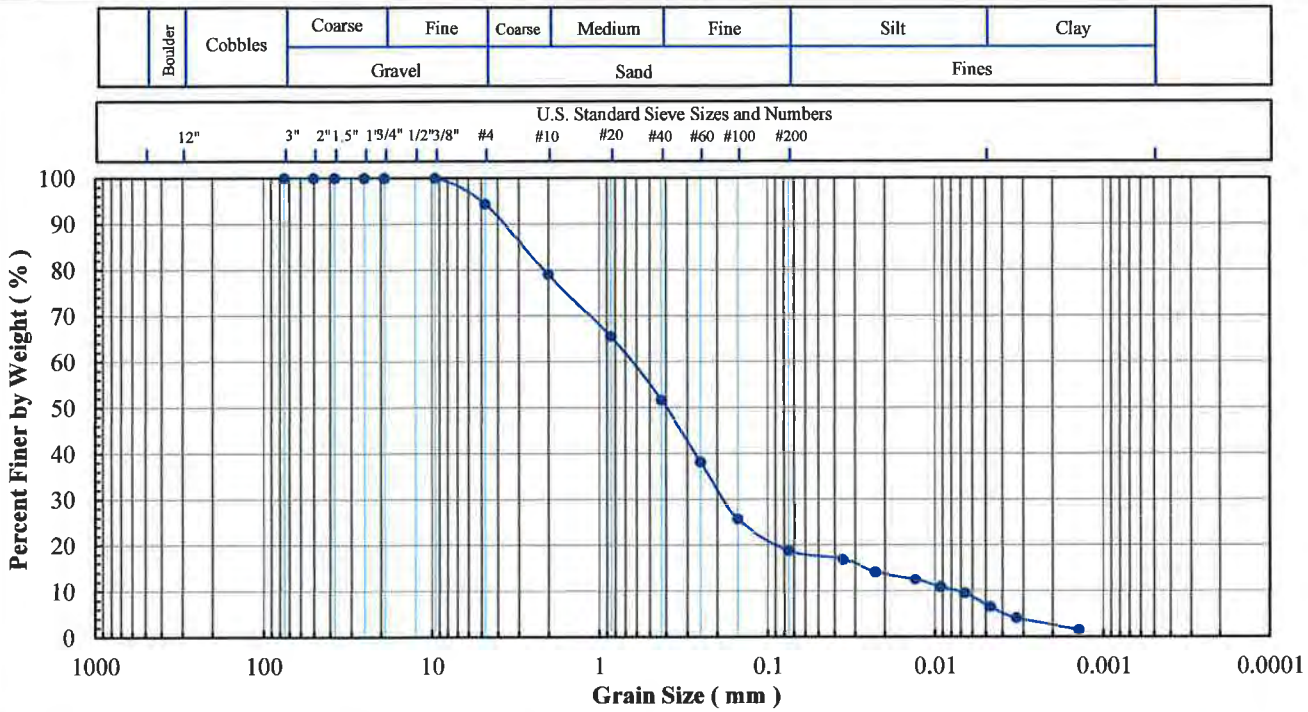
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-11 (88.0-89.5')
Lab Sample No:	13L252E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



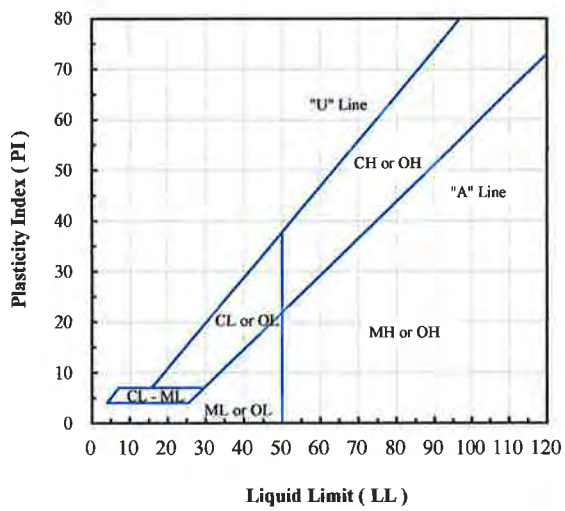
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	94.3
#10	2.00	79.0
#20	0.850	65.5
#40	0.425	51.6
#60	0.250	38.1
#100	0.150	25.7
#200	0.075	18.8

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0356	17.0
0.0131	12.6
0.0066	9.5
0.0033	4.1
0.0014	1.7

Gravel (%):	5.7
Sand (%):	75.5
Fines (%):	18.8
Silt (%):	11.8
Clay (%):	7.0

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-11 (88.0-89.5')	13L252E	13.9	18.8	NP	NP	NP	SM - Silty sand

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.
Engineering classification is based on the assumption that the fines are either ML or MH.

1 · 6 · '14
PD, NSR

Excel Geotechnical Testing, Inc.
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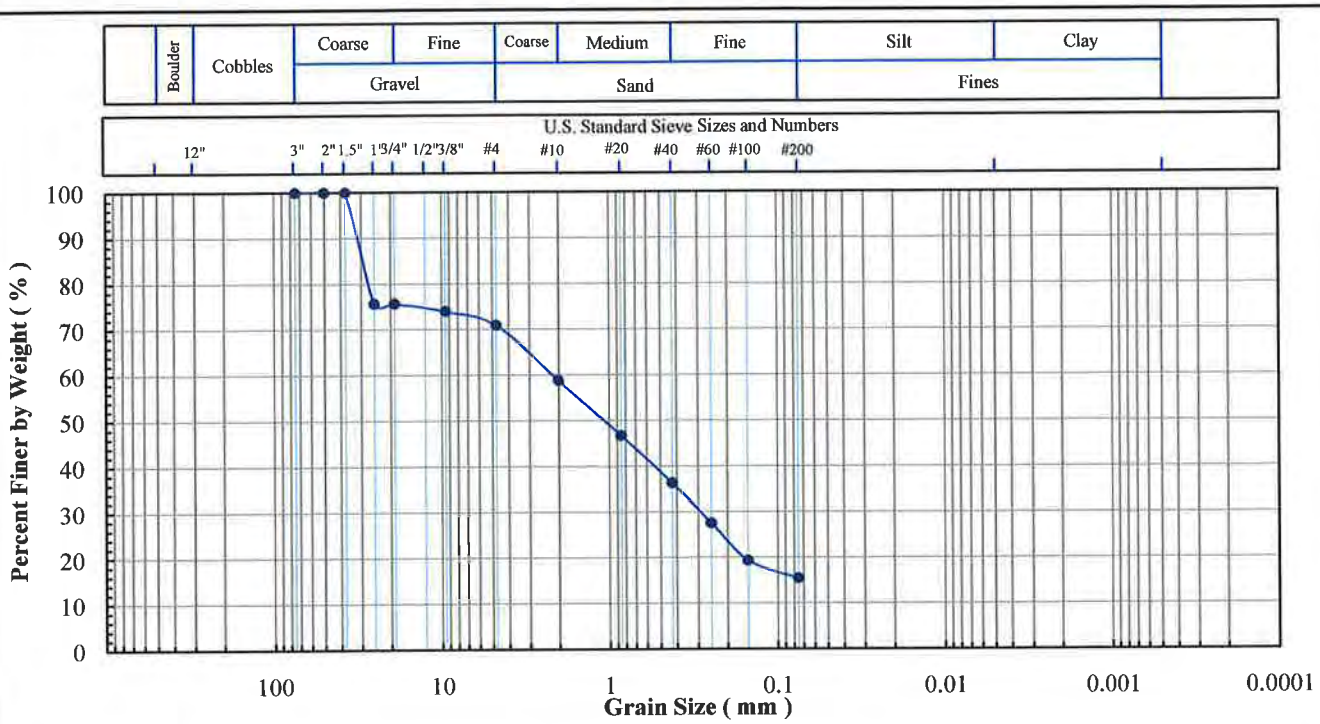
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-12 (13.0-14.5')
Lab Sample No:	13L255E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



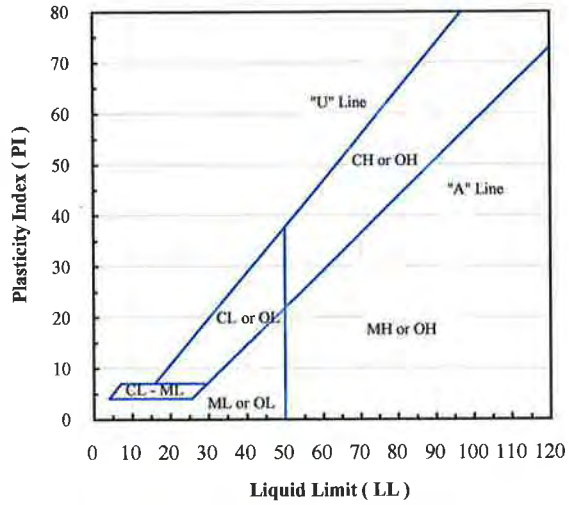
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	75.7
3/4"	19	75.7
3/8"	9.5	74.0
#4	4.75	70.9
#10	2.00	58.8
#20	0.850	46.7
#40	0.425	36.3
#60	0.250	27.5
#100	0.150	19.3
#200	0.075	15.4

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	29.1
Sand (%):	55.5
Fines (%):	15.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-12 (13.0-14.5')	13L255E	7.0	15.4	NP	NP	NP	SM - Silty sand with gravel

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PD-NSR

Excel Geotechnical Testing, Inc.
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953 Forrest Street, Roswell, Georgia 30075
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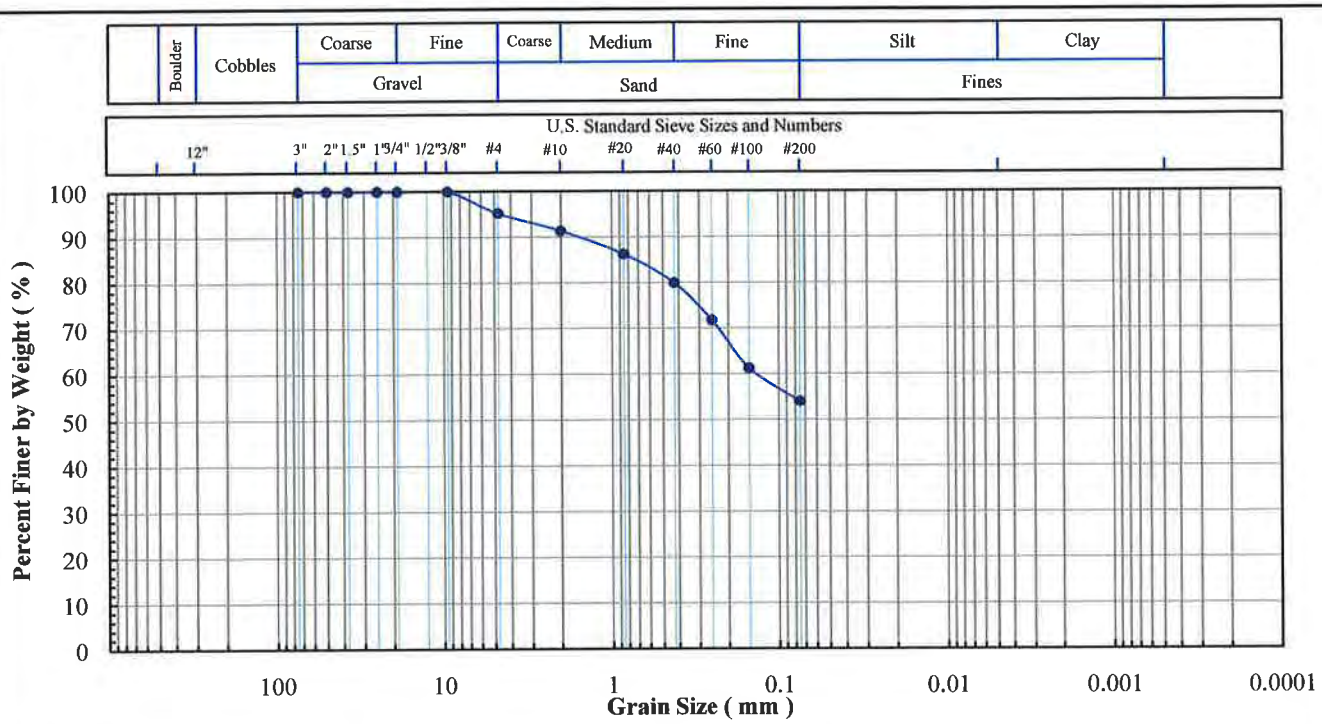
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-13 (3.0-4.5')
Lab Sample No:	13L260E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



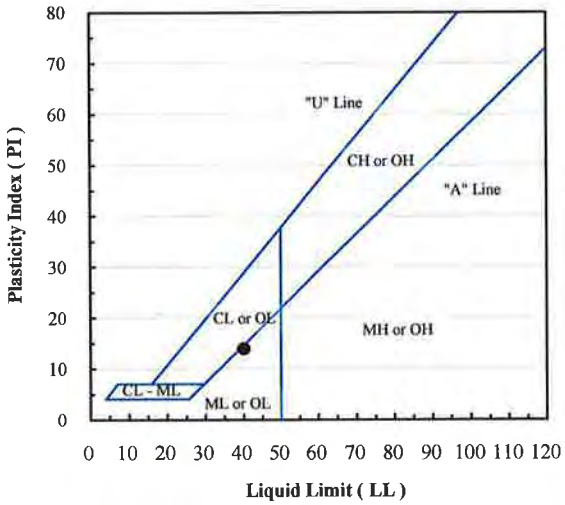
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	95.2
#10	2.00	91.4
#20	0.850	86.3
#40	0.425	79.9
#60	0.250	71.7
#100	0.150	61.2
#200	0.075	54.0

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	4.8
Sand (%):	41.2
Fines (%):	54.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-13 (3.0-4.5')	13L260E	32.6	54.0	40	26	14	CL - Sandy lean clay

Note(s):

1-6-14
PD, NSR

Excel Geotechnical Testing, Inc.
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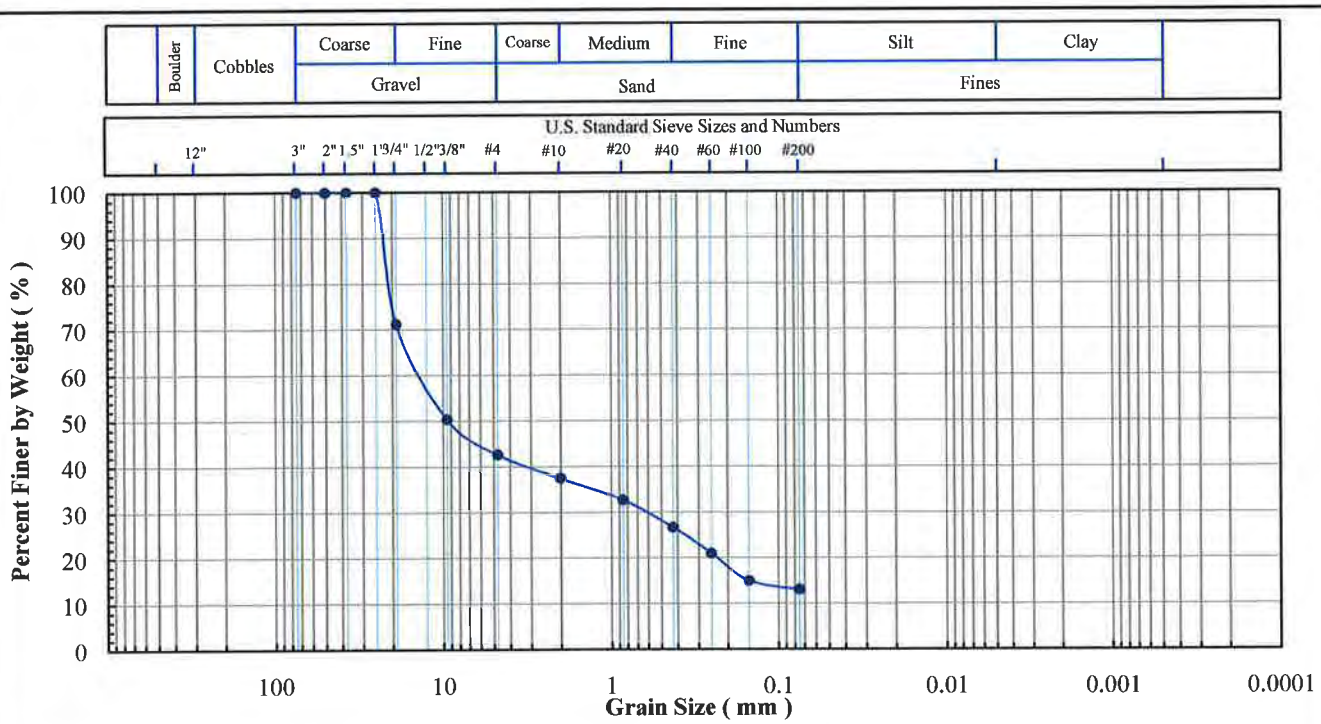
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-13 (16.5-18.0')
Lab Sample No:	13L268E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



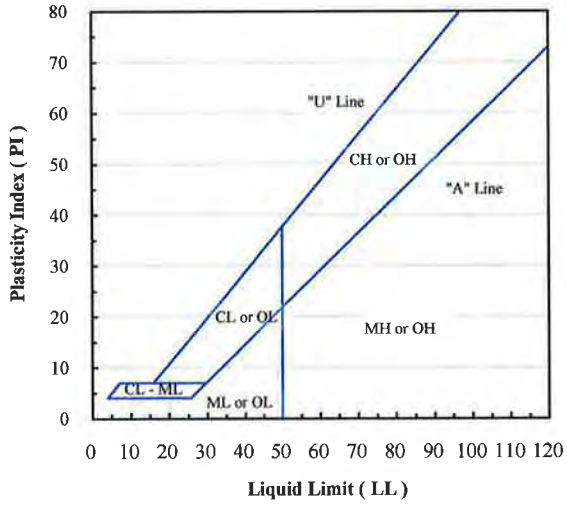
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	71.2
3/8"	9.5	50.4
#4	4.75	42.7
#10	2.00	37.5
#20	0.850	32.7
#40	0.425	26.7
#60	0.250	20.9
#100	0.150	15.0
#200	0.075	13.0

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	57.3
Sand (%):	29.7
Fines (%):	13.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-13 (16.5-18.0')	13L268E	8.6	13.0	NP	NP	NP	GM - Silty gravel with sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PD, NSR

Excel Geotechnical Testing, Inc.
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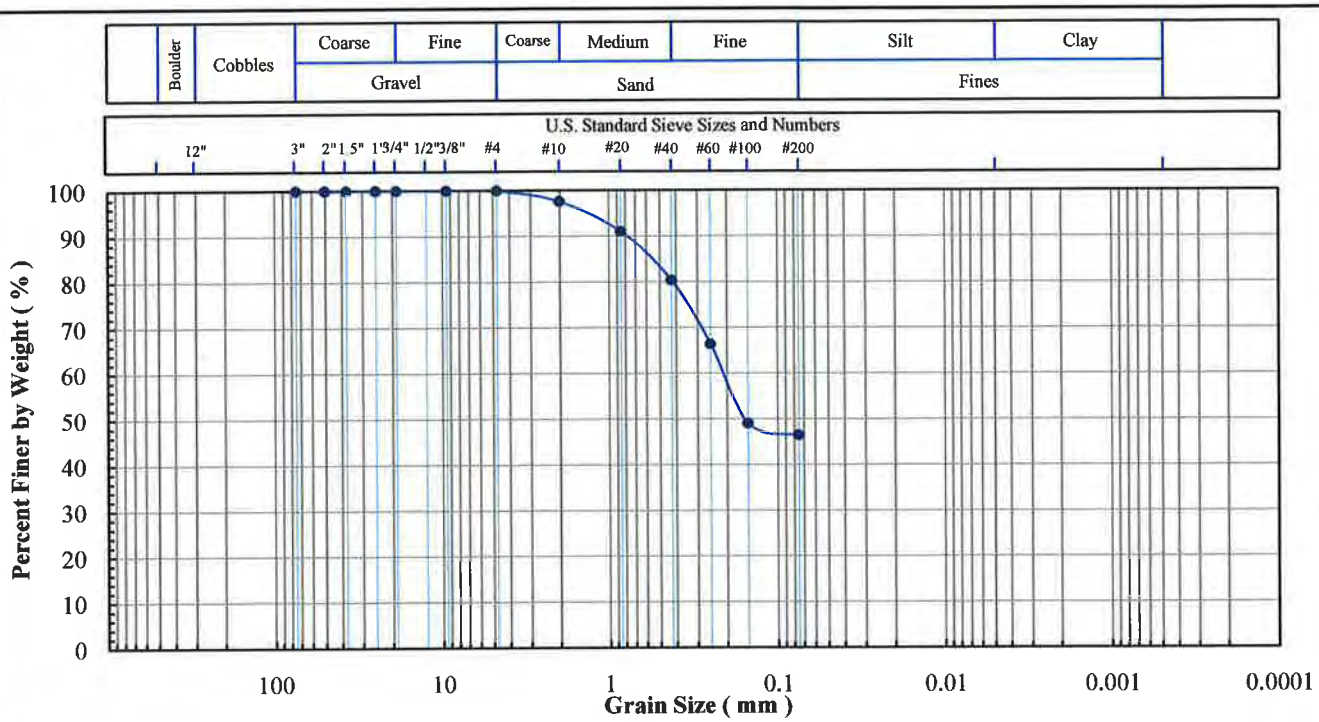
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-13 (25.5-27.0')
Lab Sample No:	13L274E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



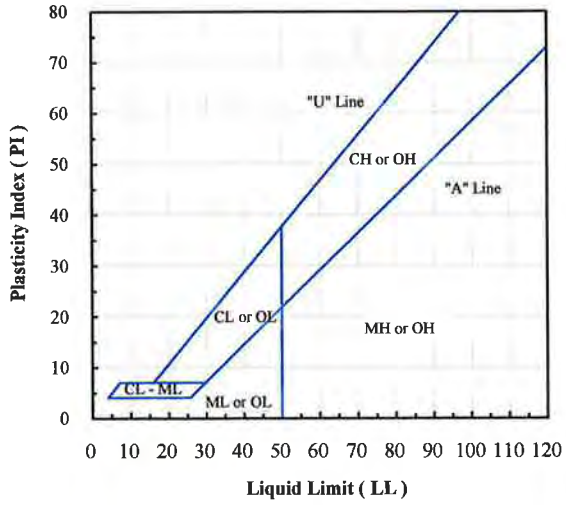
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	97.6
#20	0.850	91.0
#40	0.425	80.4
#60	0.250	66.4
#100	0.150	49.0
#200	0.075	46.4

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	53.6
Fines (%):	46.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-13 (25.5-27.0')	13L274E	45.3	46.4	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

7-23-14
TR, NSE

Excel Geotechnical Testing, Inc.
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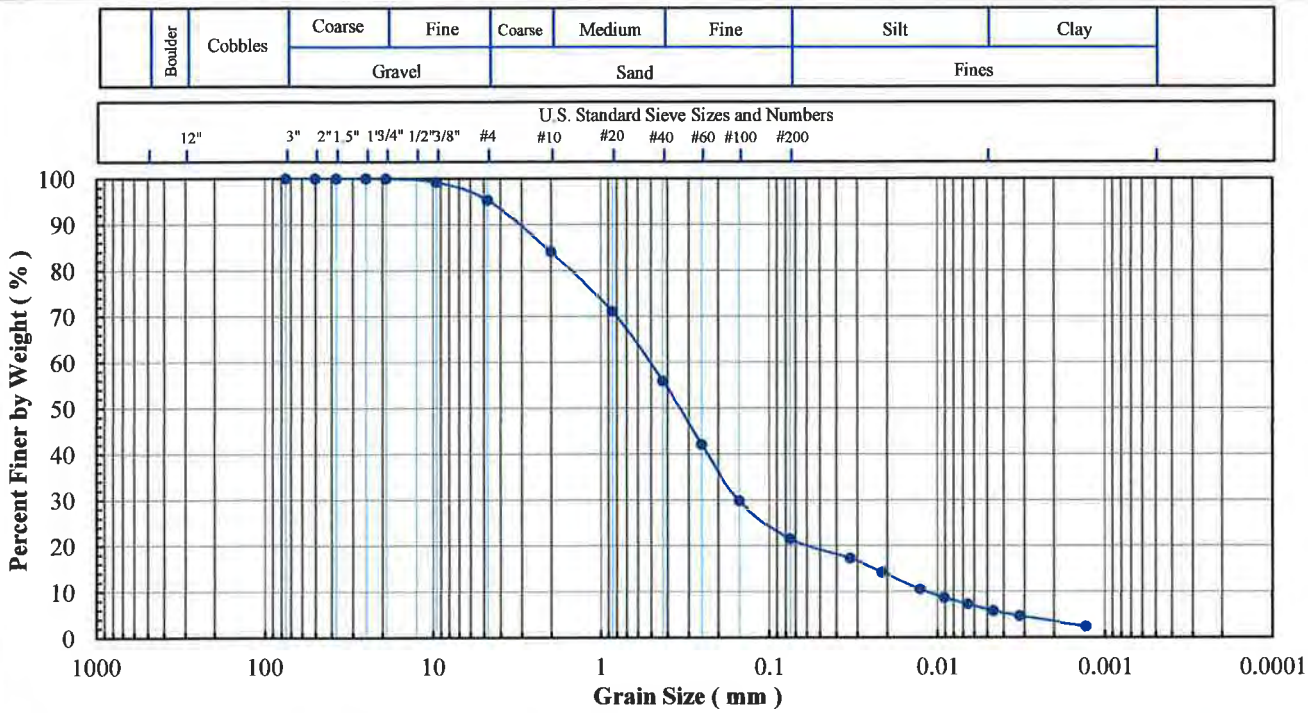
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-13 (33.0-34.5')
Lab Sample No:	13L279E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



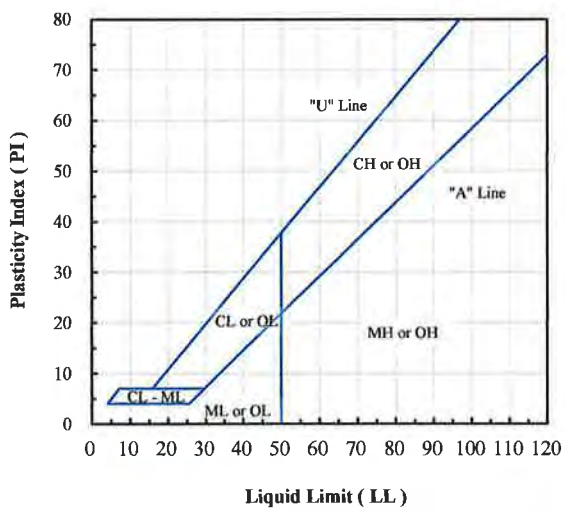
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	99.2
#4	4.75	95.3
#10	2.00	84.1
#20	0.850	71.1
#40	0.425	55.9
#60	0.250	42.1
#100	0.150	29.8
#200	0.075	21.5

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0331	17.3
0.0127	10.6
0.0065	7.3
0.0032	4.7
0.0013	2.6

Gravel (%):	4.7
Sand (%):	73.8
Fines (%):	21.5
Silt (%):	15.4
Clay (%):	6.1

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-13 (33.0-34.5')	13L279E	12.9	21.5	NP	NP	NP	SM - Silty sand

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.
Engineering classification is based on the assumption that the fines are either ML or MH.

1 · 6 · '14
RD, NSR

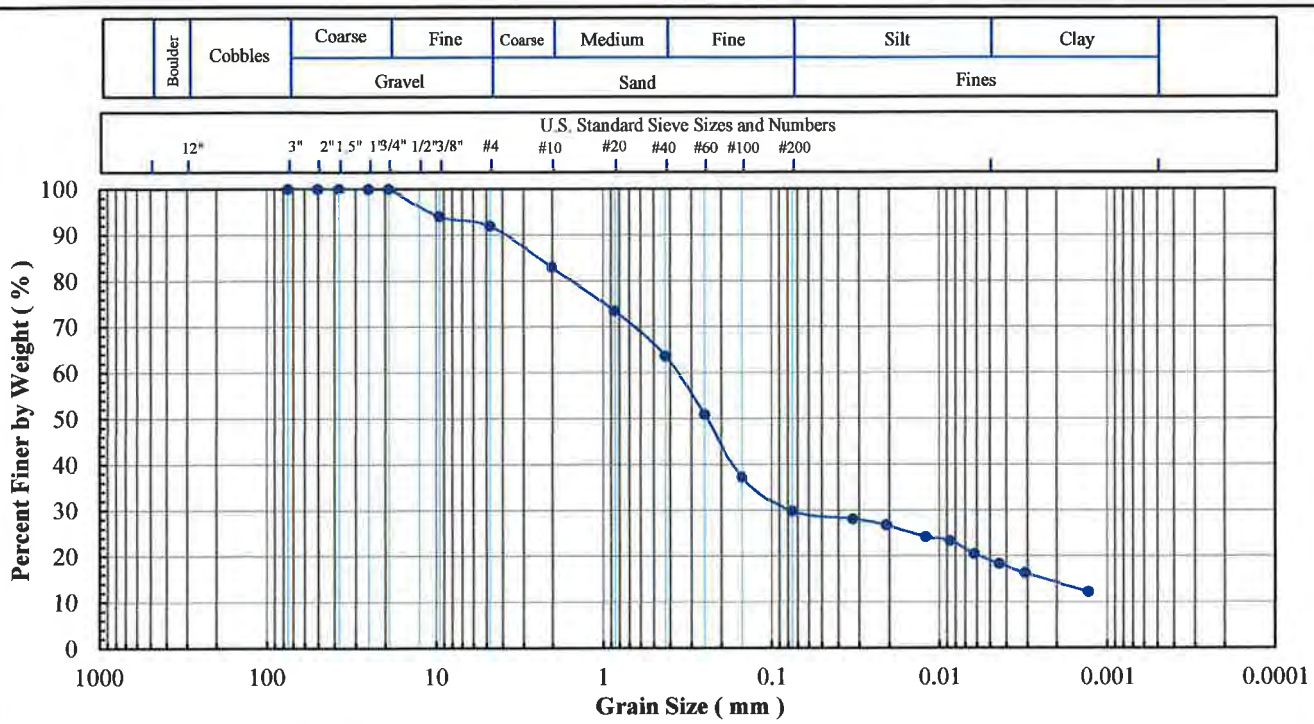
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-14 (3.0-4.5')
Lab Sample No:	13L283E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



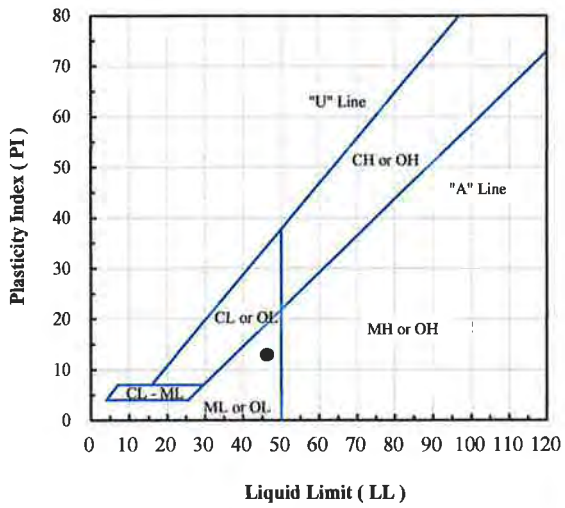
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	94.0
#4	4.75	91.9
#10	2.00	83.0
#20	0.850	73.4
#40	0.425	63.6
#60	0.250	50.9
#100	0.150	37.2
#200	0.075	29.8

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0327	28.1
0.0121	24.4
0.0062	20.5
0.0031	16.3
0.0013	12.4

Gravel (%):	8.1
Sand (%):	62.1
Fines (%):	29.8
Silt (%):	10.8
Clay (%):	19.0

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-14 (3.0-4.5')	13L283E	24.7	29.8	46	33	13	SM - Silty sand

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.
Engineering classification is based on the assumption that the fines are either ML or MH.

1 . 6 . '14
PD, NSR

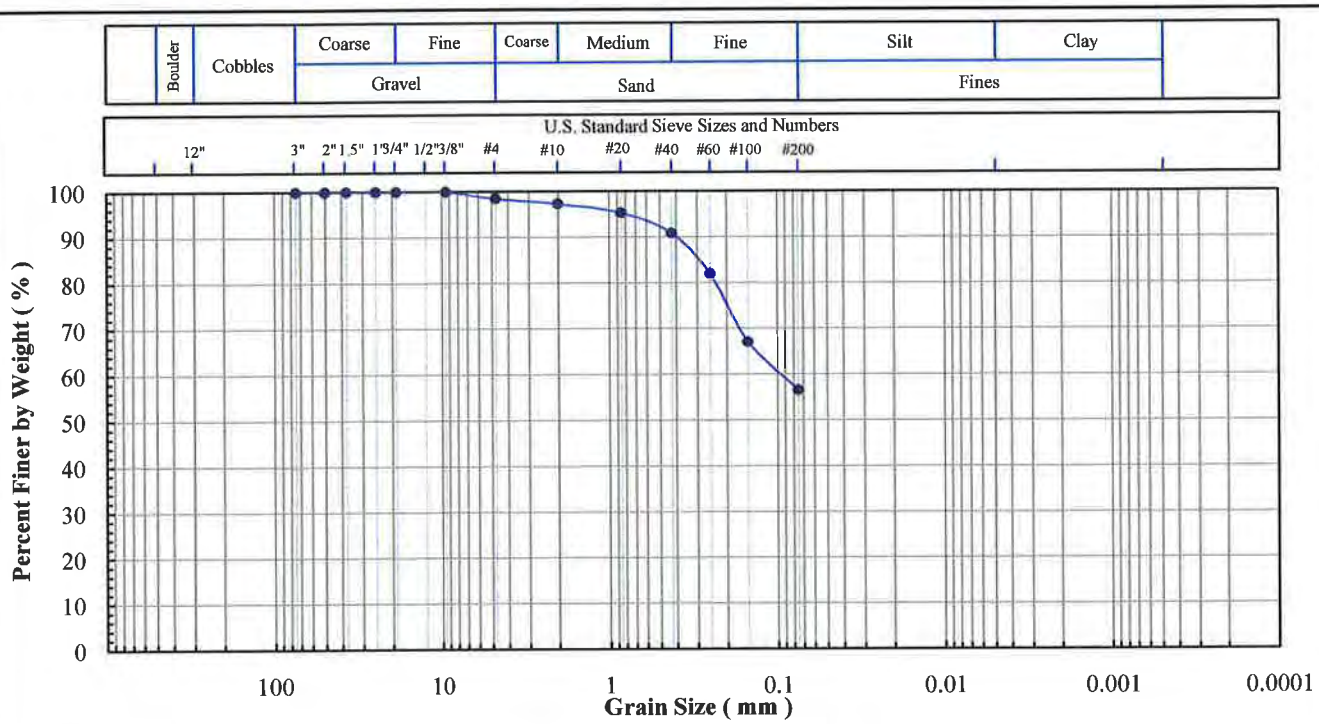
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-14 (12.0-13.5')
Lab Sample No:	13L289E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



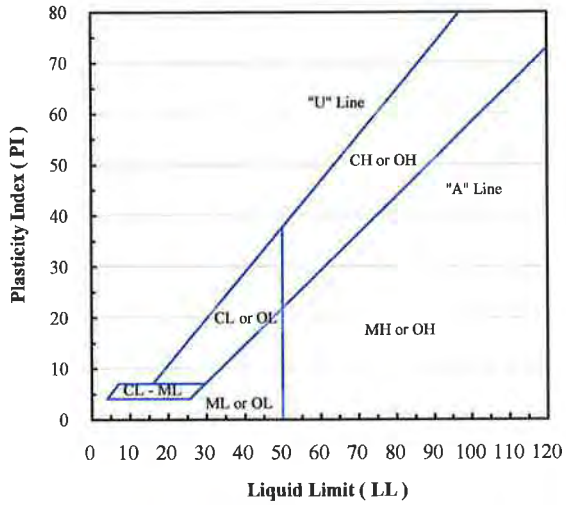
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.5
#10	2.00	97.3
#20	0.850	95.3
#40	0.425	90.8
#60	0.250	81.7
#100	0.150	67.1
#200	0.075	56.5

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.5
Sand (%):	42.0
Fines (%):	56.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-14 (12.0-13.5')	13L289E	56.3	56.5	NP	NP	NP	ML - Sandy silt

Note(s):

1-6-14
PD, NSR

Excel Geotechnical Testing, Inc.
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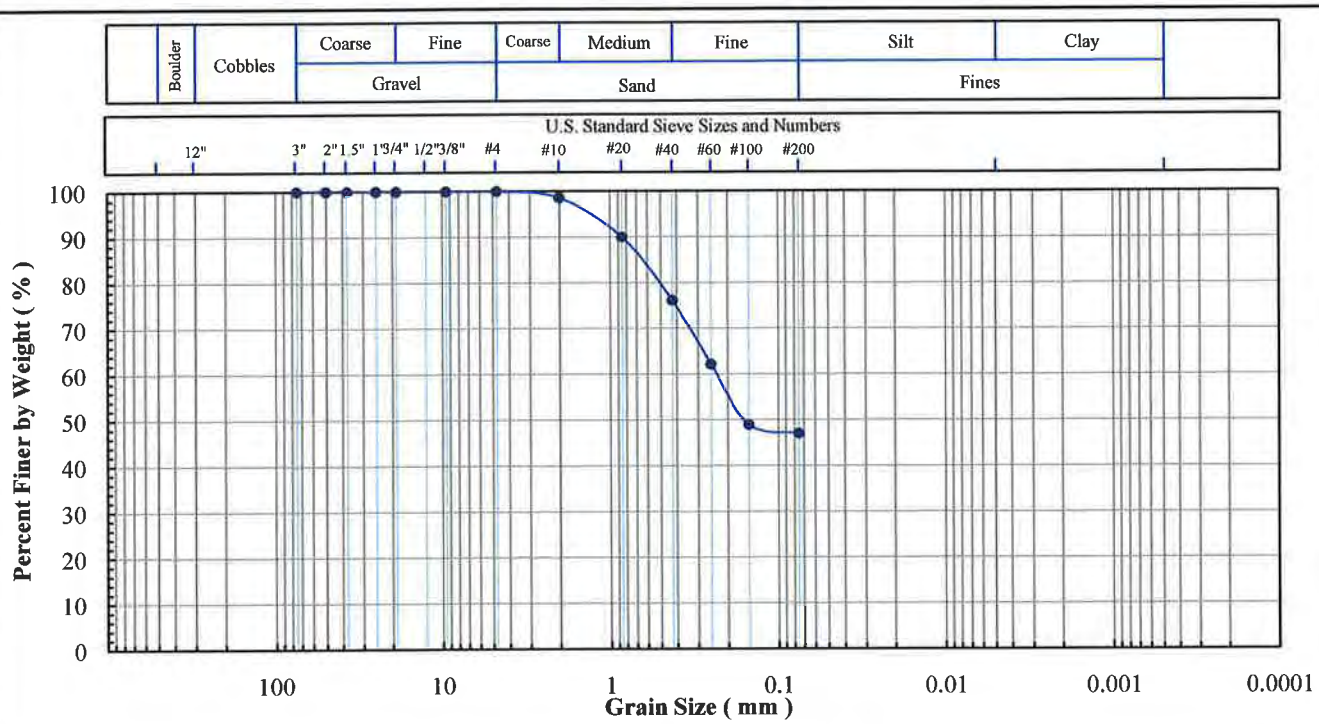
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-14 (48.0-49.5')
Lab Sample No:	13L313E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



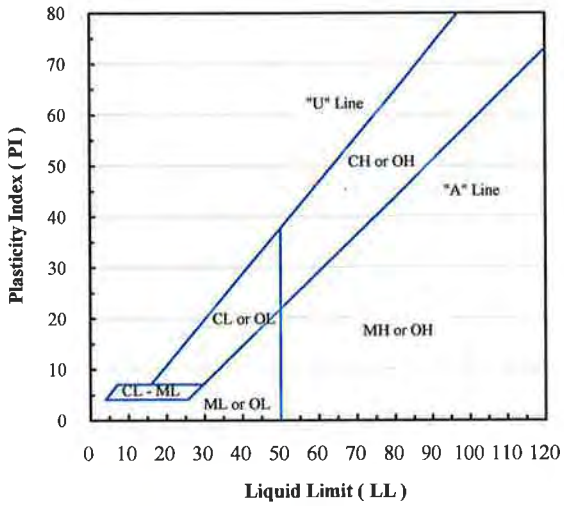
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	98.6
#20	0.850	90.0
#40	0.425	76.1
#60	0.250	62.1
#100	0.150	48.9
#200	0.075	47.0

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	53.0
Fines (%):	47.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-14 (48.0-49.5')	13L313E	16.6	47.0	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-C-M
PD, NSX

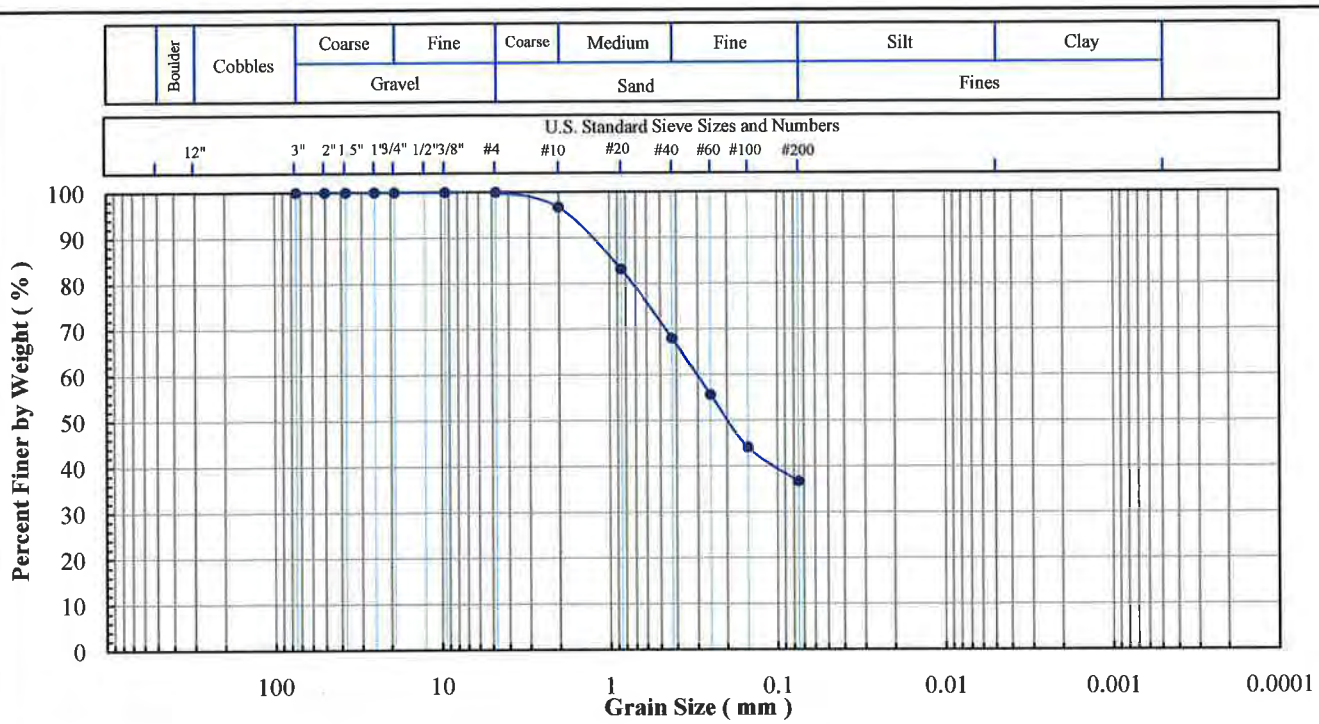
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-14 (49.5-51.0')
Lab Sample No:	13L314E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



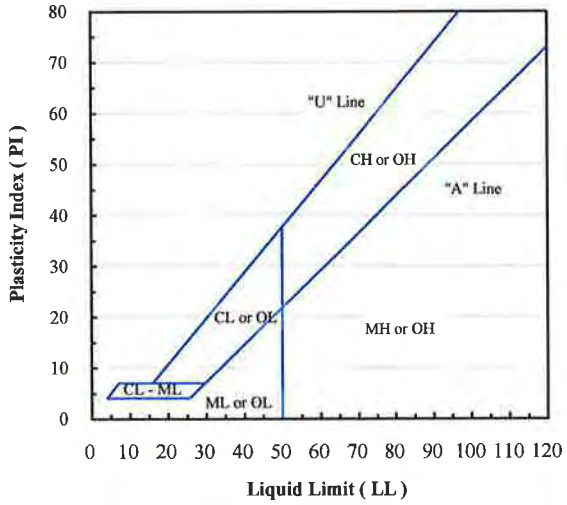
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	96.7
#20	0.850	83.1
#40	0.425	68.0
#60	0.250	55.6
#100	0.150	44.1
#200	0.075	36.7

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	63.3
Fines (%):	36.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-14 (49.5-51.0')	13L314E	16.9	36.7	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
NSA

Excel Geotechnical Testing, Inc.
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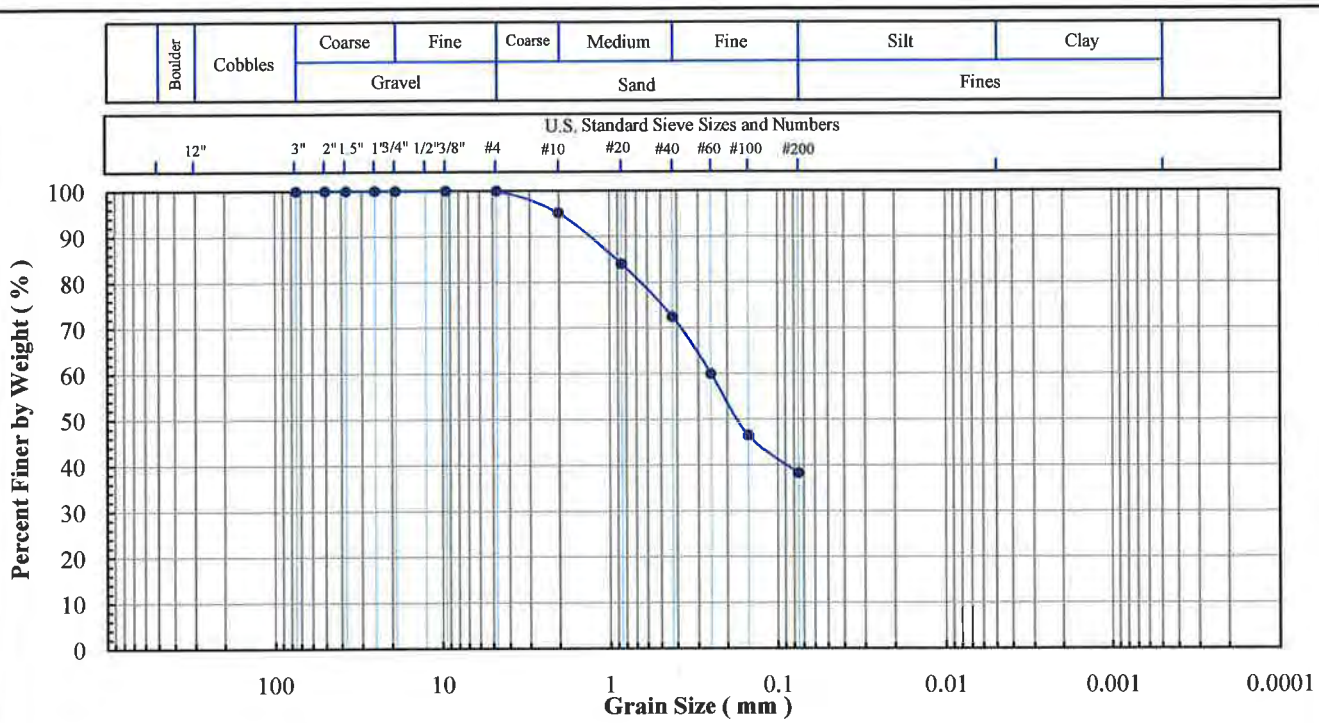
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-14 (63.0-64.5')
Lab Sample No:	13L323E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



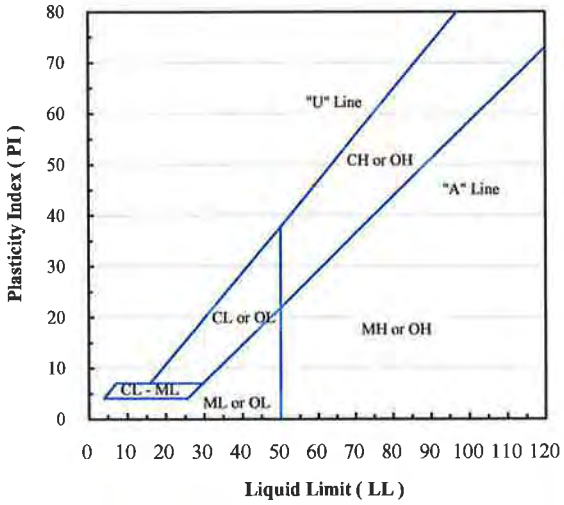
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	95.2
#20	0.850	84.0
#40	0.425	72.4
#60	0.250	59.9
#100	0.150	46.5
#200	0.075	38.2

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	61.8
Fines (%):	38.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-14 (63.0-64.5')	13L323E	19.9	38.2	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
NSR

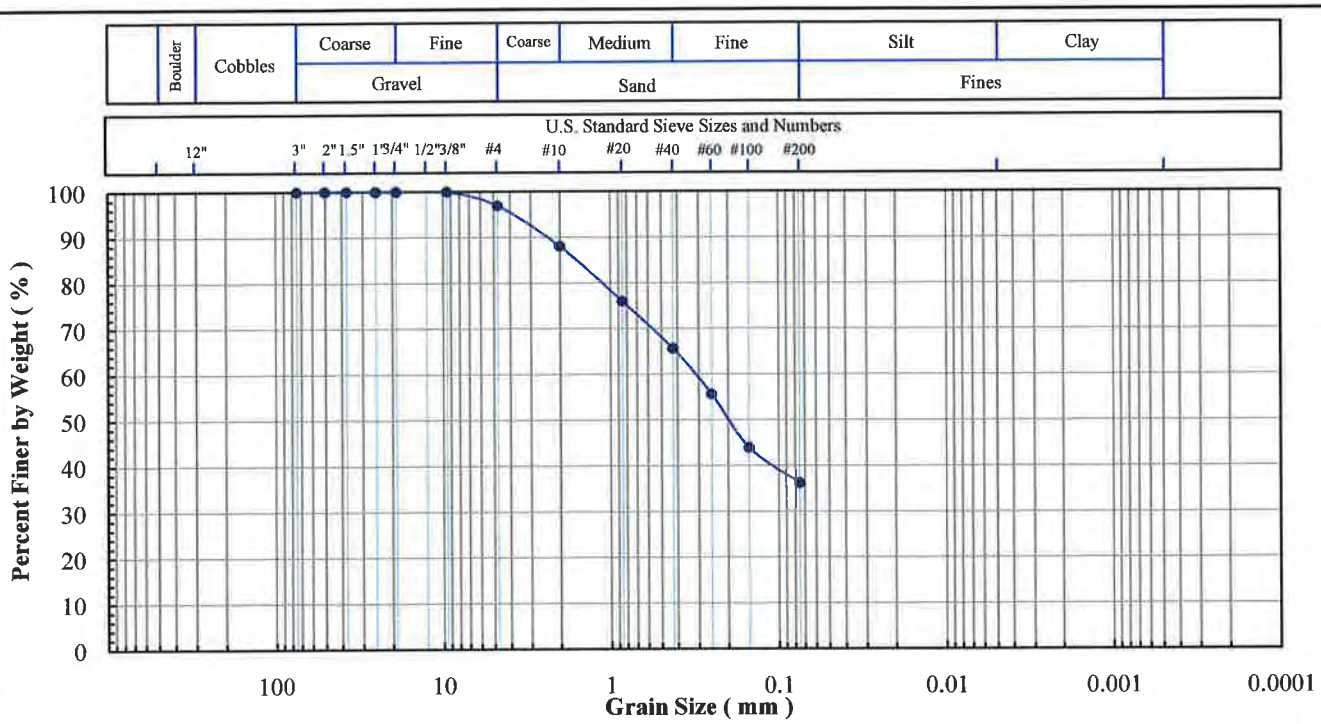
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-15C (7.5-9.0')
Lab Sample No:	13L333E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



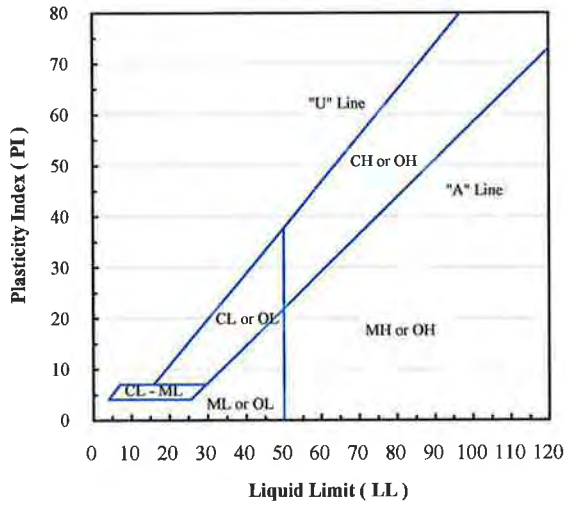
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.0
#10	2.00	88.1
#20	0.850	76.0
#40	0.425	65.6
#60	0.250	55.6
#100	0.150	43.9
#200	0.075	36.1

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3.0
Sand (%):	60.9
Fines (%):	36.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-15C (7.5-9.0')	13L333E	21.1	36.1	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
NSR

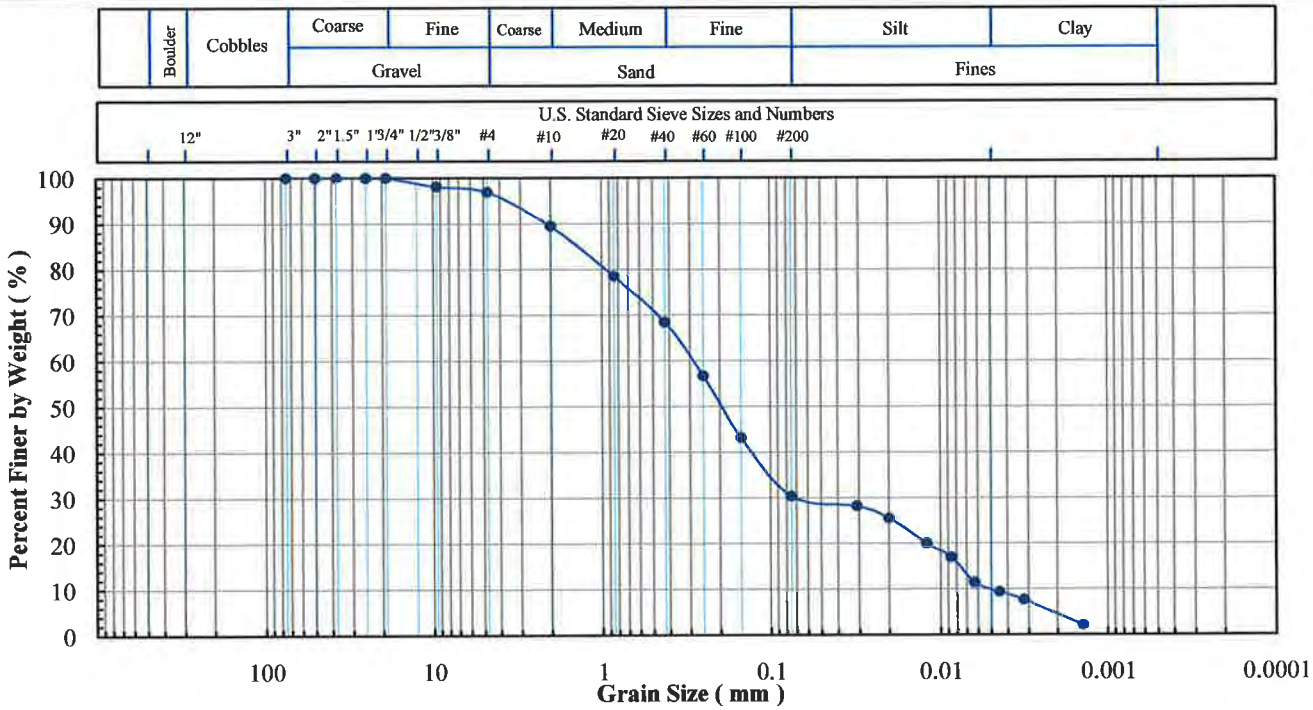
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-15C (15.0-16.5')
Lab Sample No:	13L338E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



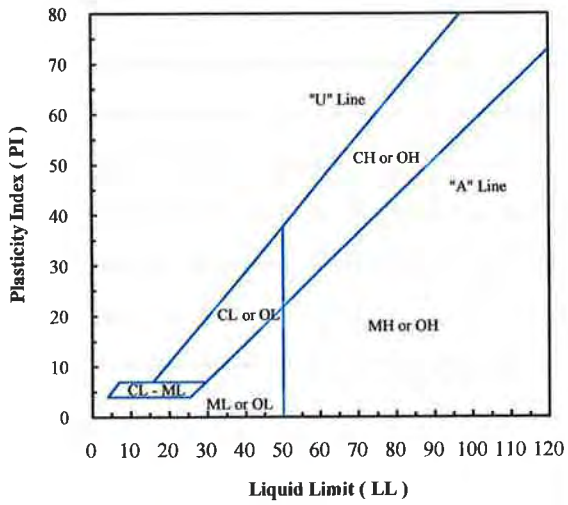
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	98.1
#4	4.75	96.9
#10	2.00	89.5
#20	0.850	78.6
#40	0.425	68.5
#60	0.250	56.7
#100	0.150	43.2
#200	0.075	30.4

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0311	28.2
0.0120	20.1
0.0063	11.5
0.0032	7.7
0.0014	2.2

Gravel (%):	3.1
Sand (%):	66.5
Fines (%):	30.4
Silt (%):	20.3
Clay (%):	10.1

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-15C (15.0-16.5')	13L338E	30.3	30.4	NP	NP	NP	SM - Silty sand

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.
Engineering classification is based on the assumption that the fines are either ML or MH.

1.6.'14
RD, NSR

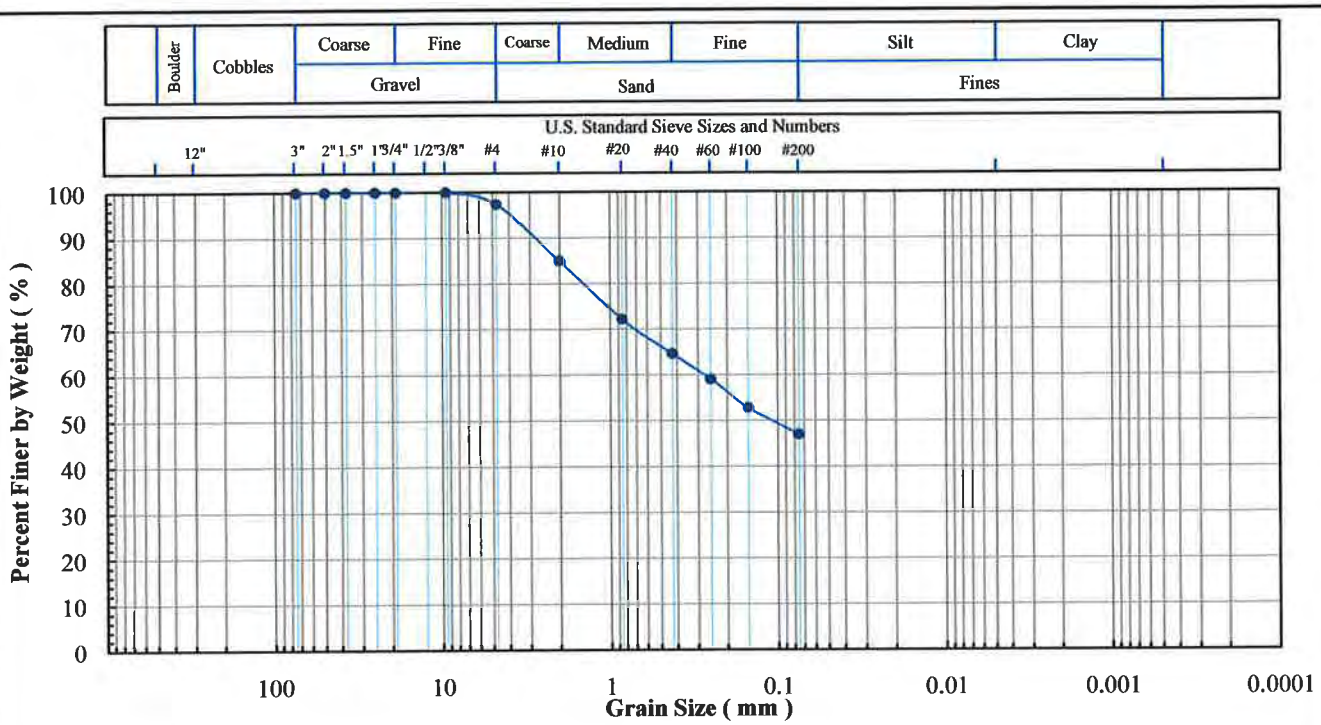
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-15C (25.5-27.0')
Lab Sample No:	13L345E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



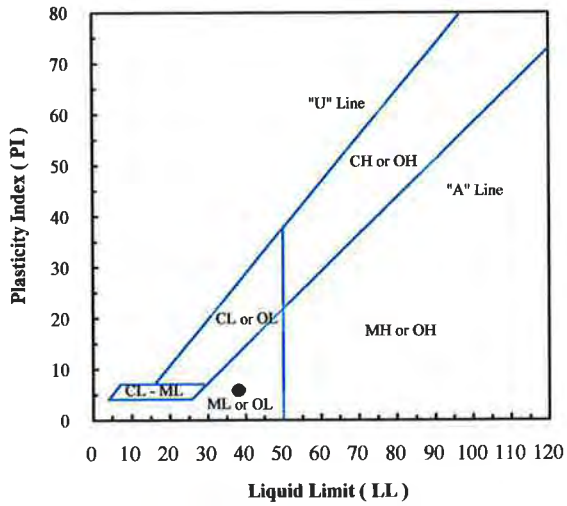
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.4
#10	2.00	85.0
#20	0.850	72.2
#40	0.425	64.6
#60	0.250	59.0
#100	0.150	52.8
#200	0.075	46.9

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.6
Sand (%):	50.5
Fines (%):	46.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-15C (25.5-27.0')	13L345E	31.7	46.9	38	32	6	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
DD, NSR

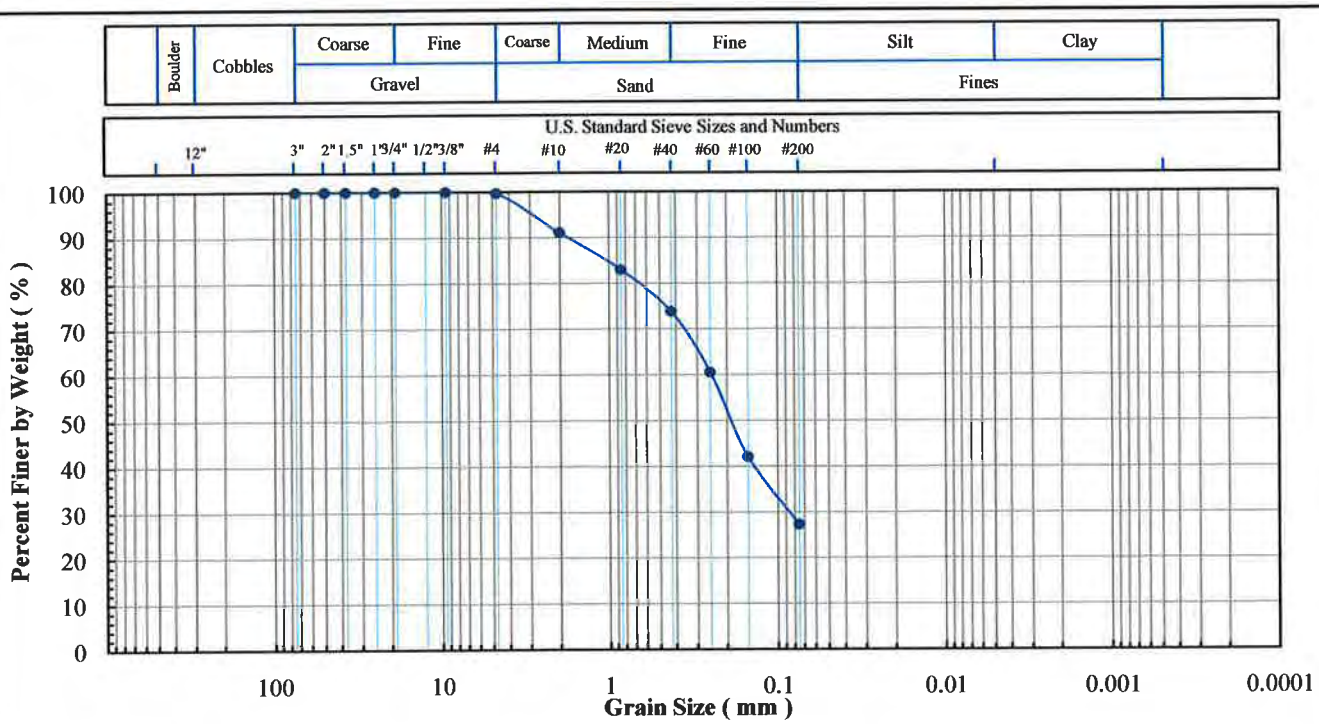
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-15C (37.5-39.0')
Lab Sample No:	13L353E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



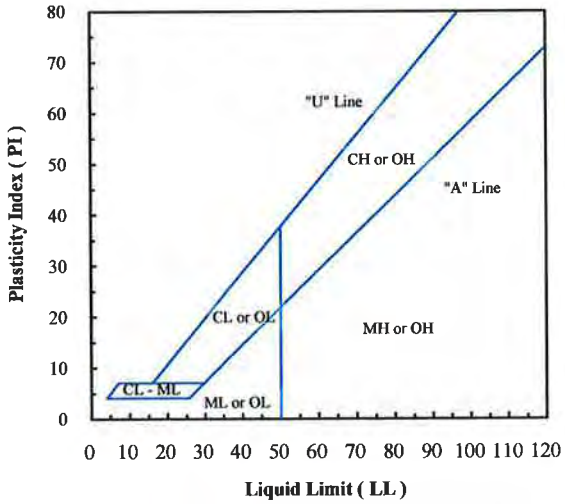
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	91.1
#20	0.850	83.0
#40	0.425	73.8
#60	0.250	60.5
#100	0.150	42.0
#200	0.075	27.2

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	72.5
Fines (%):	27.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-15C (37.5-39.0')	13L353E	19.3	27.2	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PD, NSK

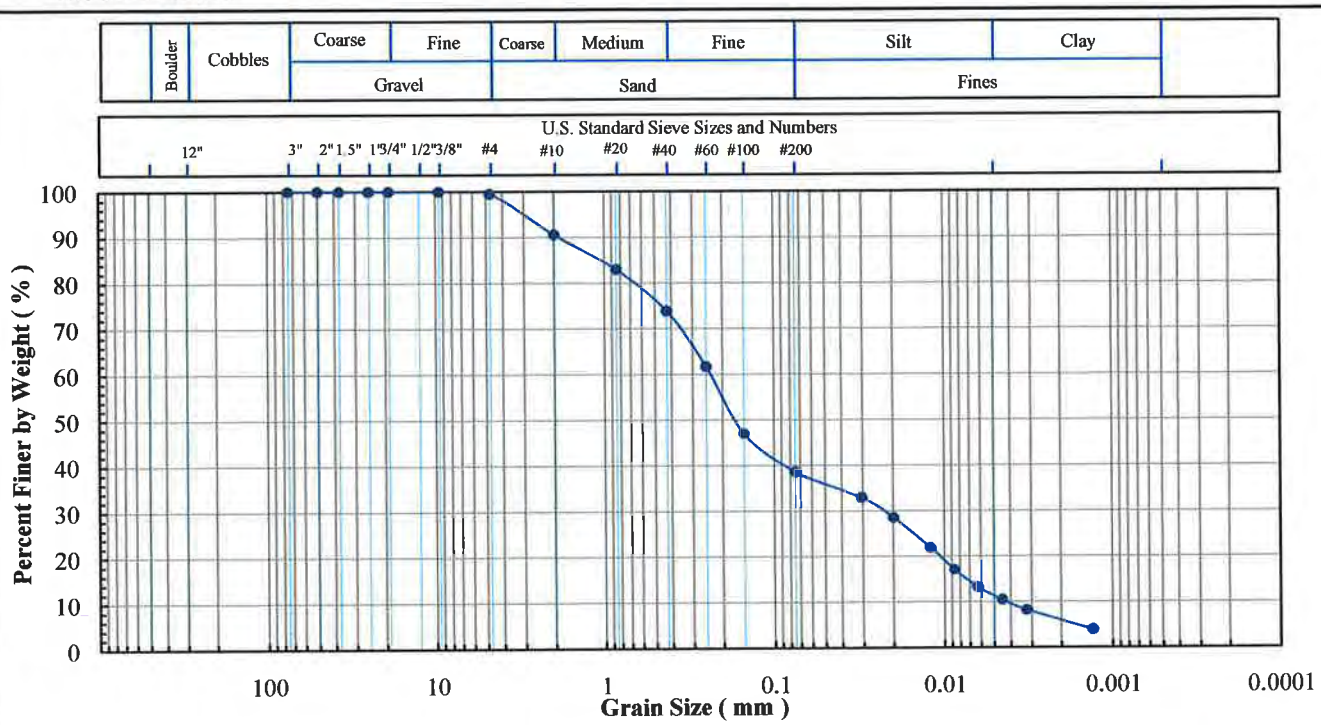
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-15C (45.0-46.5')
Lab Sample No:	13L358E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



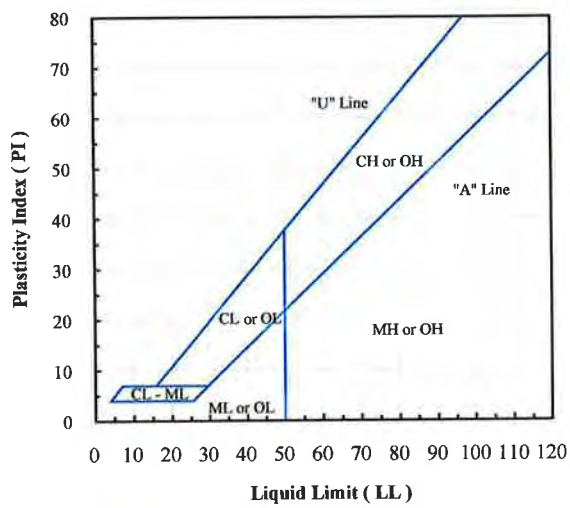
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	90.6
#20	0.850	83.0
#40	0.425	73.9
#60	0.250	61.7
#100	0.150	47.1
#200	0.075	38.7

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0306	33.0
0.0120	21.9
0.0063	13.4
0.0032	8.3
0.0013	4.0

Gravel (%):	0.5
Sand (%):	60.8
Fines (%):	38.7
Silt (%):	27.4
Clay (%):	11.3

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-15C (45.0-46.5')	13L358E	14.1	38.7	NP	NP	NP	SM - Silty sand

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.
Engineering classification is based on the assumption that the fines are either ML or MH.

1 · 6 · '14
PD, NSB

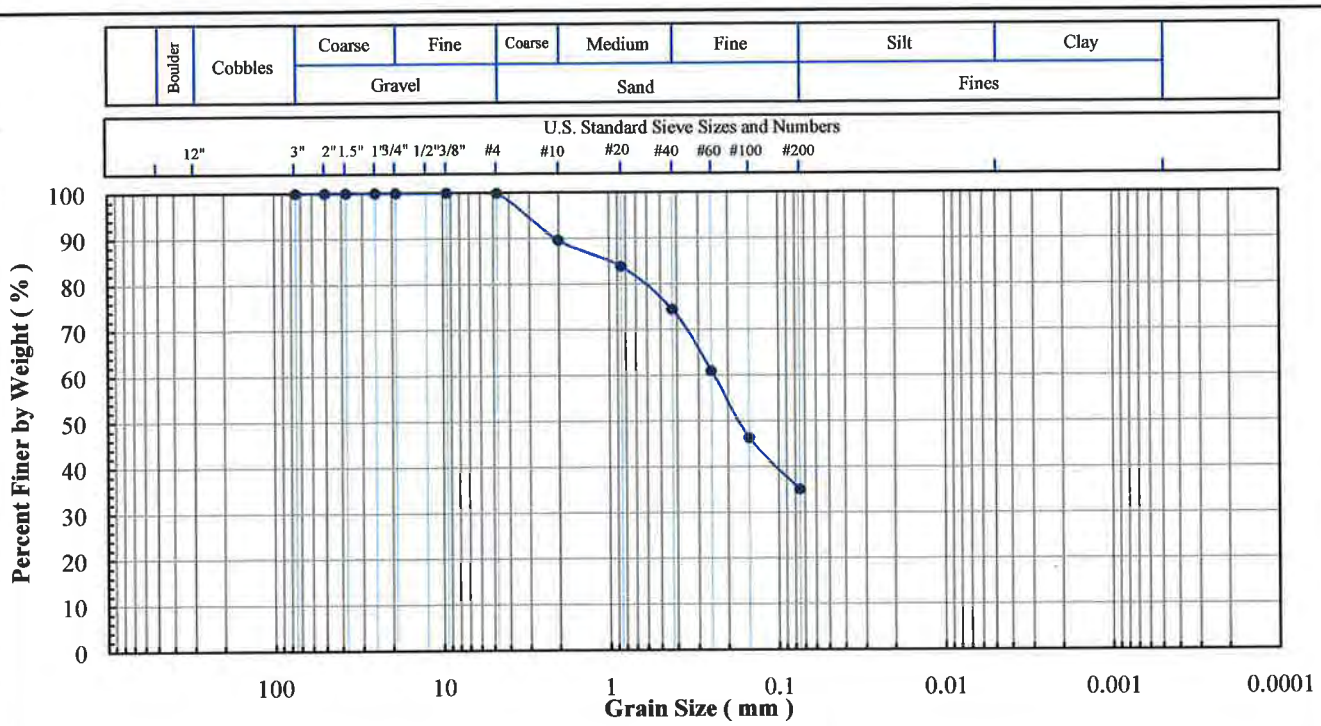
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-15C (57.0-58.5')
Lab Sample No:	13L366E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



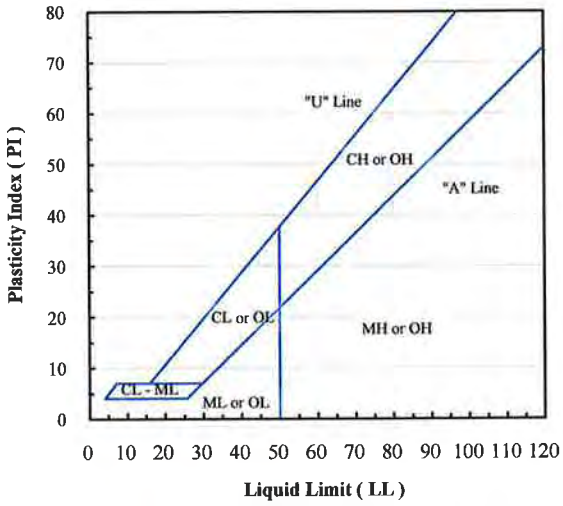
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.9
#10	2.00	89.6
#20	0.850	83.9
#40	0.425	74.4
#60	0.250	61.0
#100	0.150	46.3
#200	0.075	35.0

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.1
Sand (%):	64.9
Fines (%):	35.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-15C (57.0-58.5')	13L366E	10.2	35.0	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14 DD, NSR

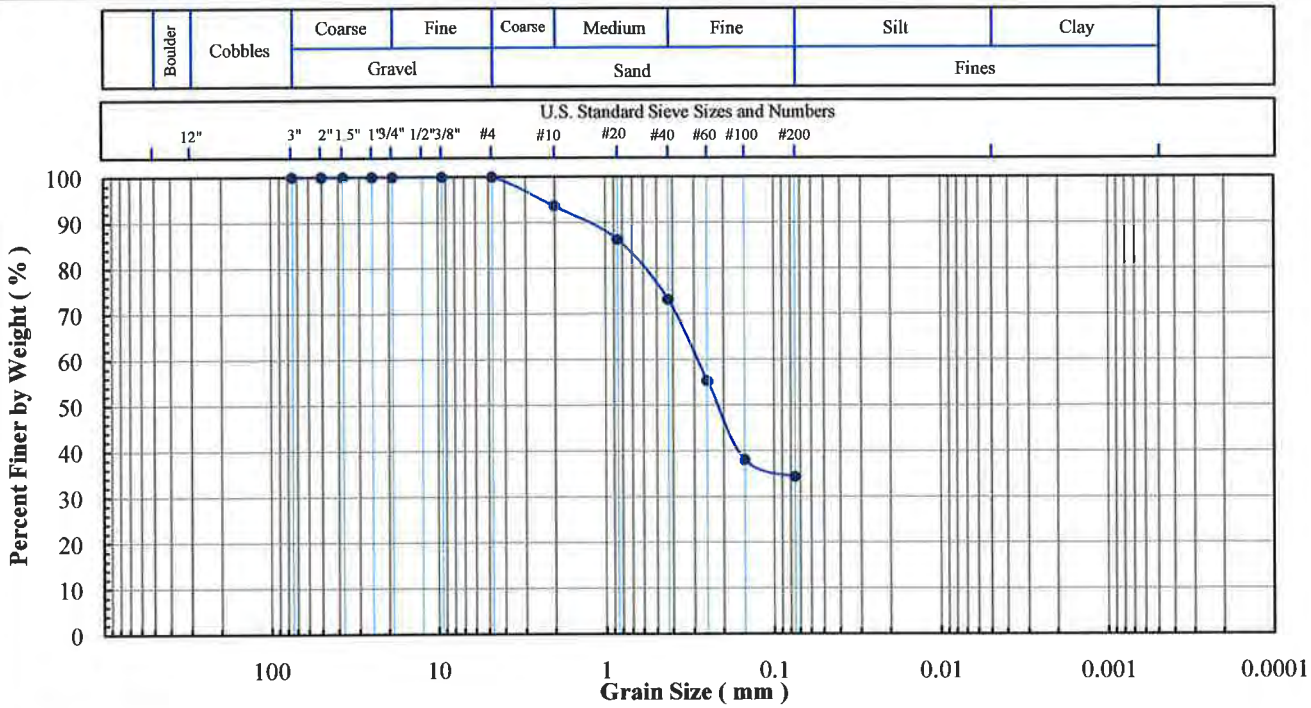
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-15C (66.0-67.5')
Lab Sample No:	13L372E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



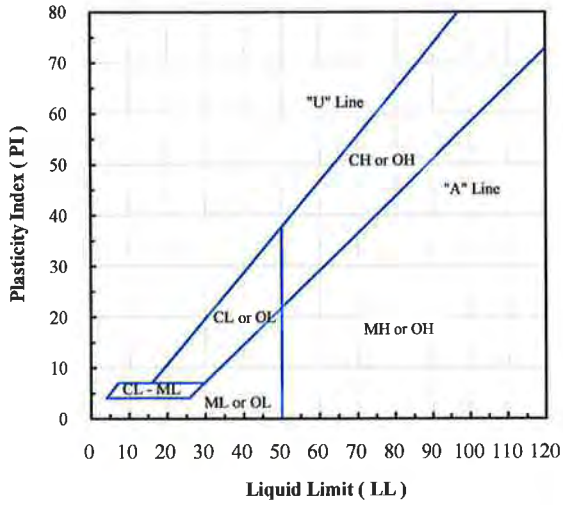
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	93.7
#20	0.850	86.3
#40	0.425	73.1
#60	0.250	55.3
#100	0.150	38.0
#200	0.075	34.3

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	65.7
Fines (%):	34.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-15C (66.0-67.5')	13L372E	10.9	34.3	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14 RD, NSR

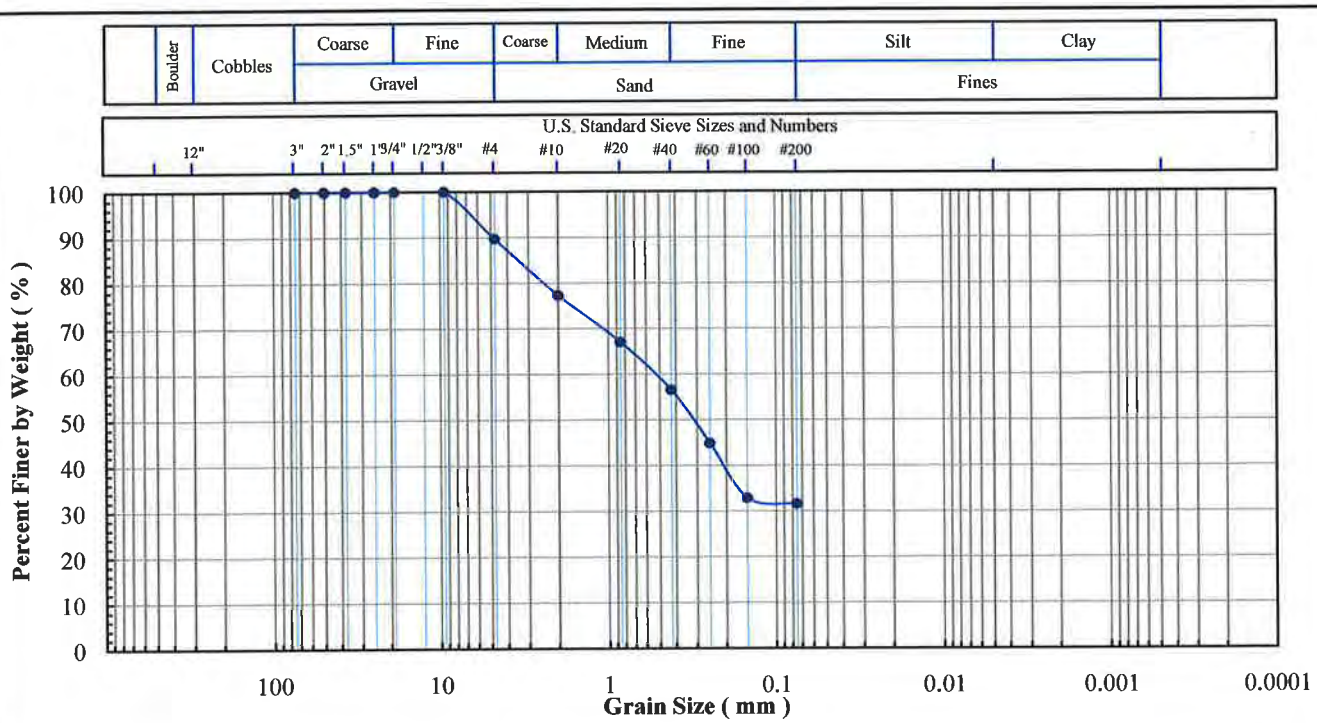
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-15C (73.5-75.0')
Lab Sample No:	13L377E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



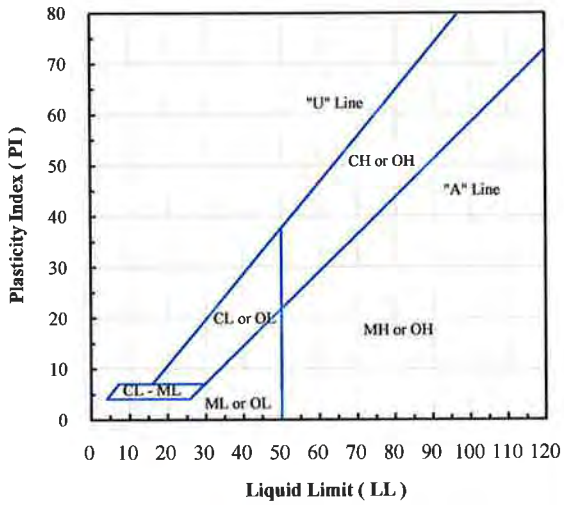
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	89.8
#10	2.00	77.4
#20	0.850	67.1
#40	0.425	56.6
#60	0.250	44.9
#100	0.150	32.8
#200	0.075	31.6

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	10.2
Sand (%):	58.2
Fines (%):	31.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-15C (73.5-75.0')	13L377E	14.1	31.6	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14 JD, NSE

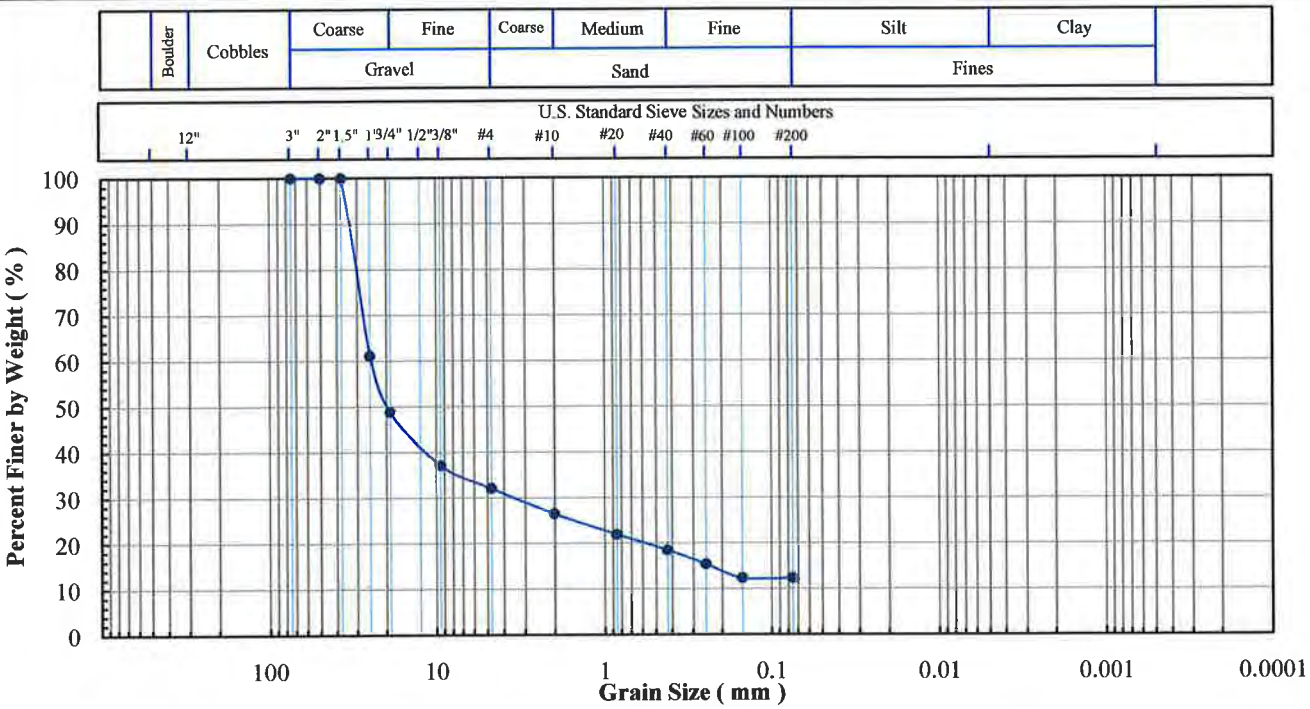
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-15C (94.5-96.0')
Lab Sample No:	13L391E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



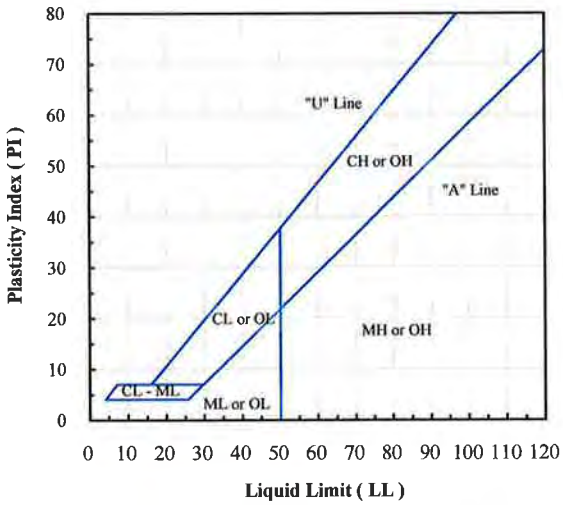
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	61.2
3/4"	19	48.9
3/8"	9.5	37.2
#4	4.75	32.1
#10	2.00	26.5
#20	0.850	22.0
#40	0.425	18.5
#60	0.250	15.4
#100	0.150	12.3
#200	0.075	12.3

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	67.9
Sand (%):	19.8
Fines (%):	12.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-15C (94.5-96.0')	13L391E	6.3	12.3	NP	NP	NP	GM - Silty gravel with sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PP, NSR

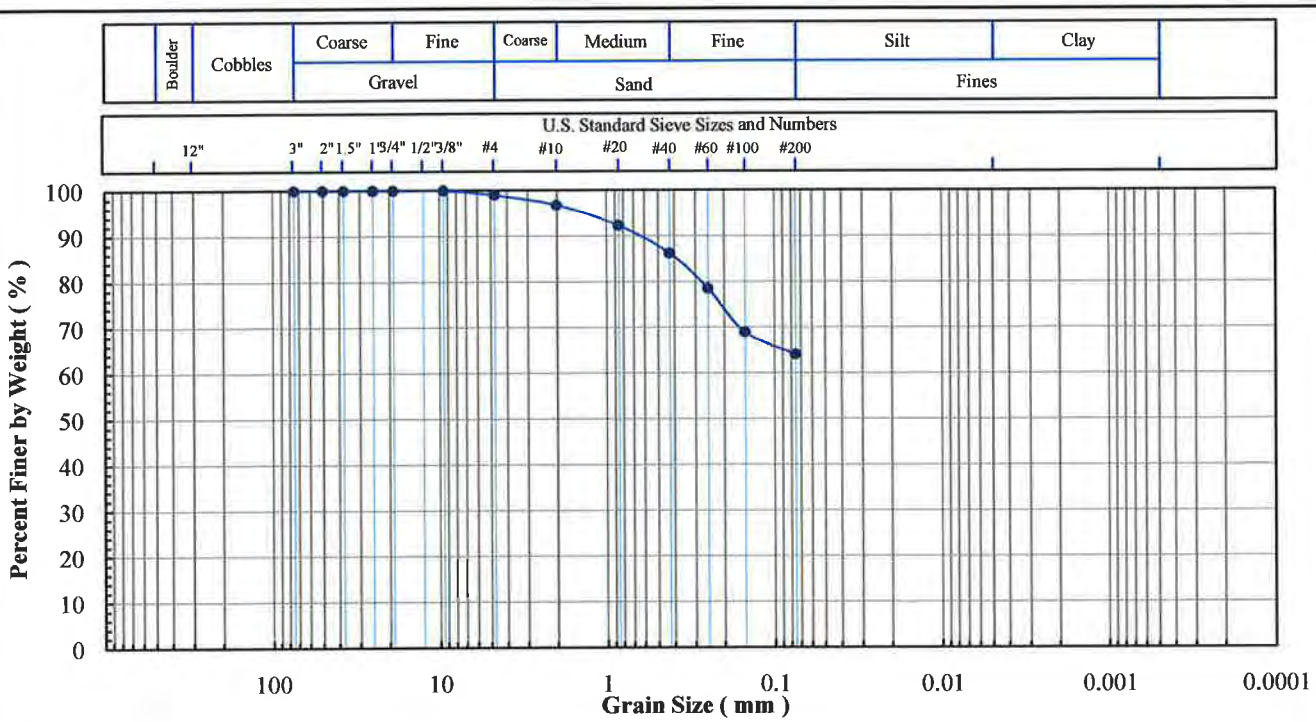
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-16 (1.5-3.0')
Lab Sample No:	13L393E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



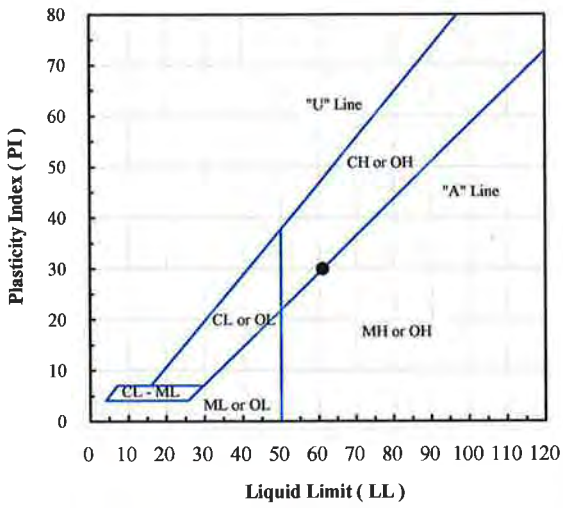
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.0
#10	2.00	96.8
#20	0.850	92.3
#40	0.425	86.2
#60	0.250	78.5
#100	0.150	68.9
#200	0.075	64.1

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.0
Sand (%):	34.9
Fines (%):	64.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-16 (1.5-3.0')	13L393E	34.1	64.1	61	31	30	CH - Sandy fat clay

Note(s):

1-6-14
PD, NSE

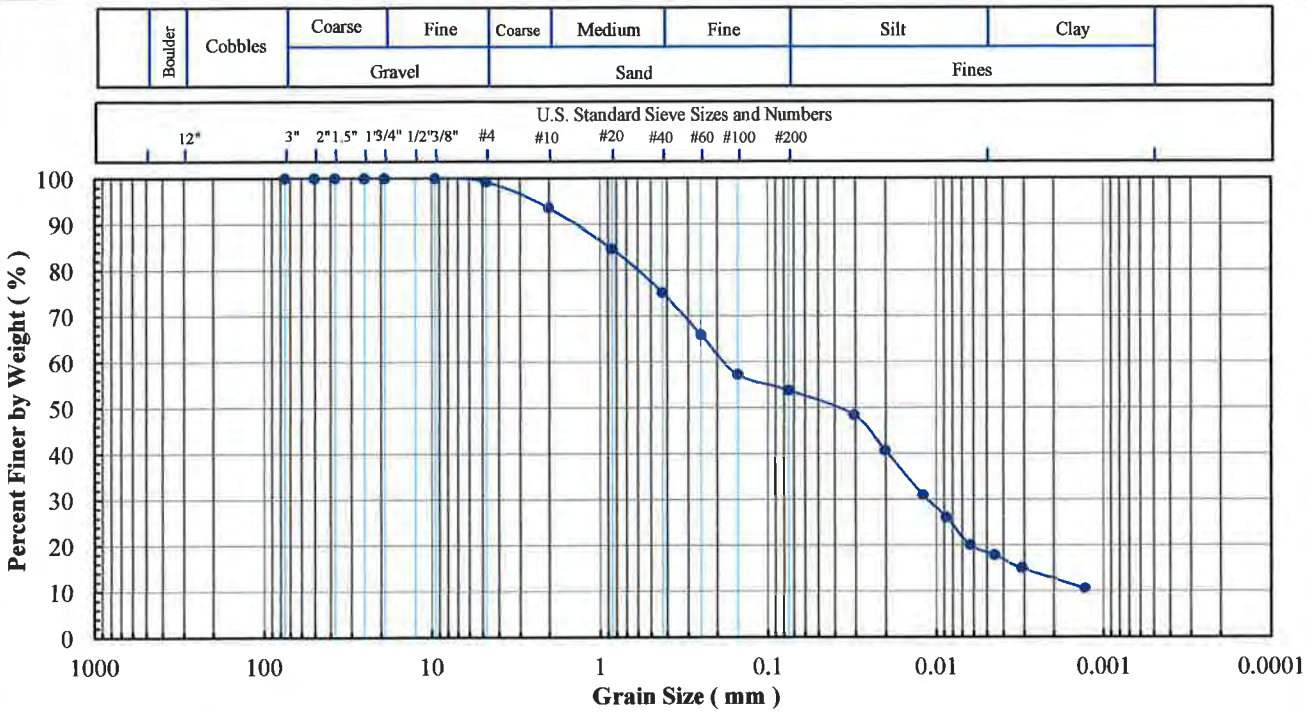
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-16 (12.0-13.5')
Lab Sample No:	13L400E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



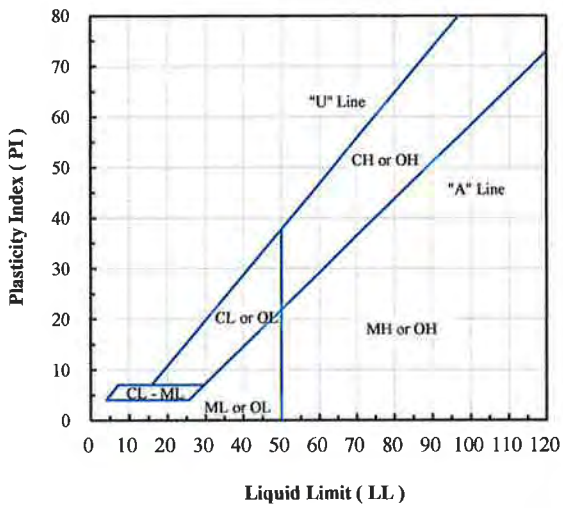
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	93.6
#20	0.850	84.6
#40	0.425	75.1
#60	0.250	65.9
#100	0.150	57.3
#200	0.075	53.8

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0306	48.4
0.0120	31.1
0.0063	20.1
0.0031	15.1
0.0013	10.7

Gravel (%):	0.8
Sand (%):	45.4
Fines (%):	53.8
Silt (%):	35.3
Clay (%):	18.5

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-16 (12.0-13.5')	13L400E	36.4	53.8	NP	NP	NP	ML - Sandy silt

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.

1.6.'14
PD, NSR

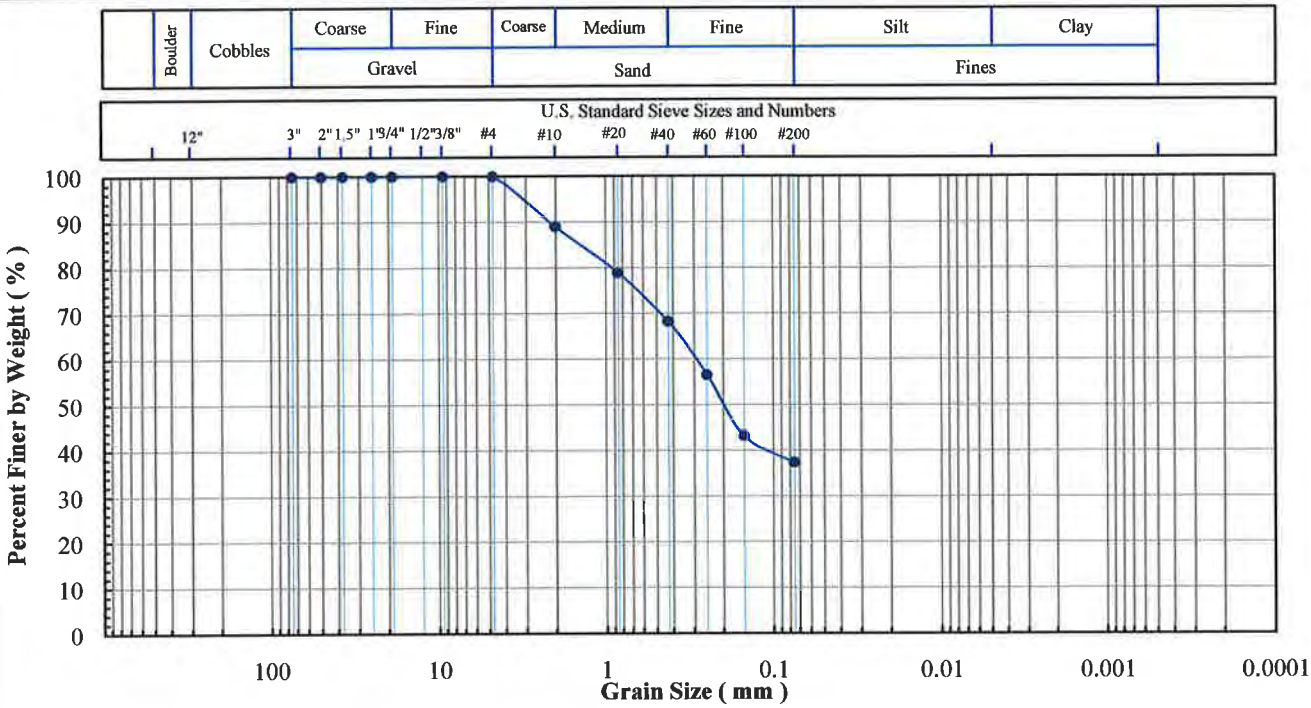
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-16 (16.5-18.0')
Lab Sample No:	13L403E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



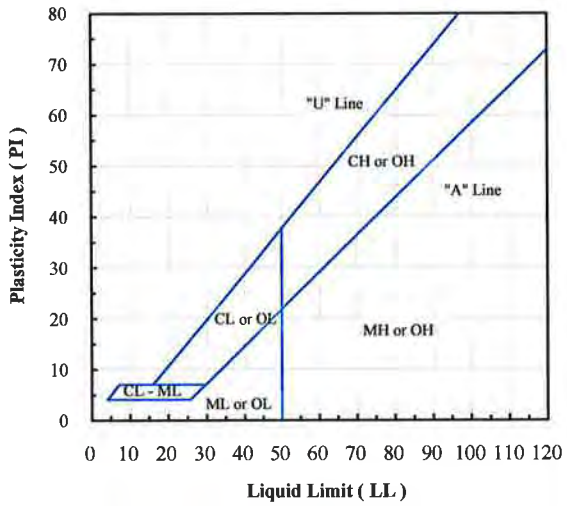
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	89.0
#20	0.850	78.9
#40	0.425	68.2
#60	0.250	56.5
#100	0.150	43.2
#200	0.075	37.3

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	62.7
Fines (%):	37.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-16 (16.5-18.0')	13L403E	35.9	37.3	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PD, NSE

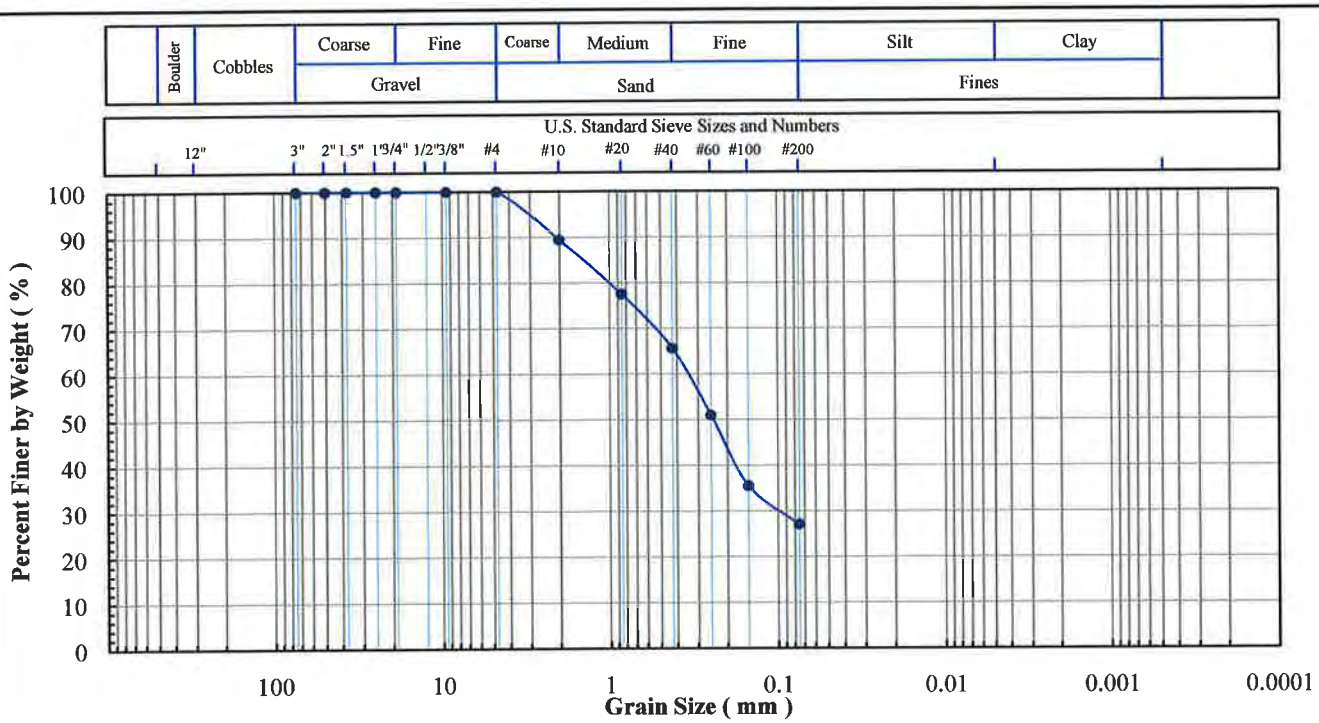
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-16 (30.0-31.5')
Lab Sample No:	13L412E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



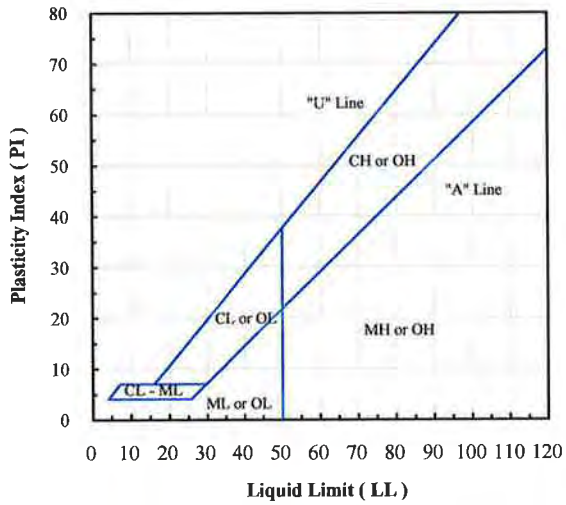
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	89.5
#20	0.850	77.5
#40	0.425	65.7
#60	0.250	51.0
#100	0.150	35.5
#200	0.075	27.0

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	73.0
Fines (%):	27.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-16 (30.0-31.5')	13L412E	18.0	27.0	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14 RD, NSE

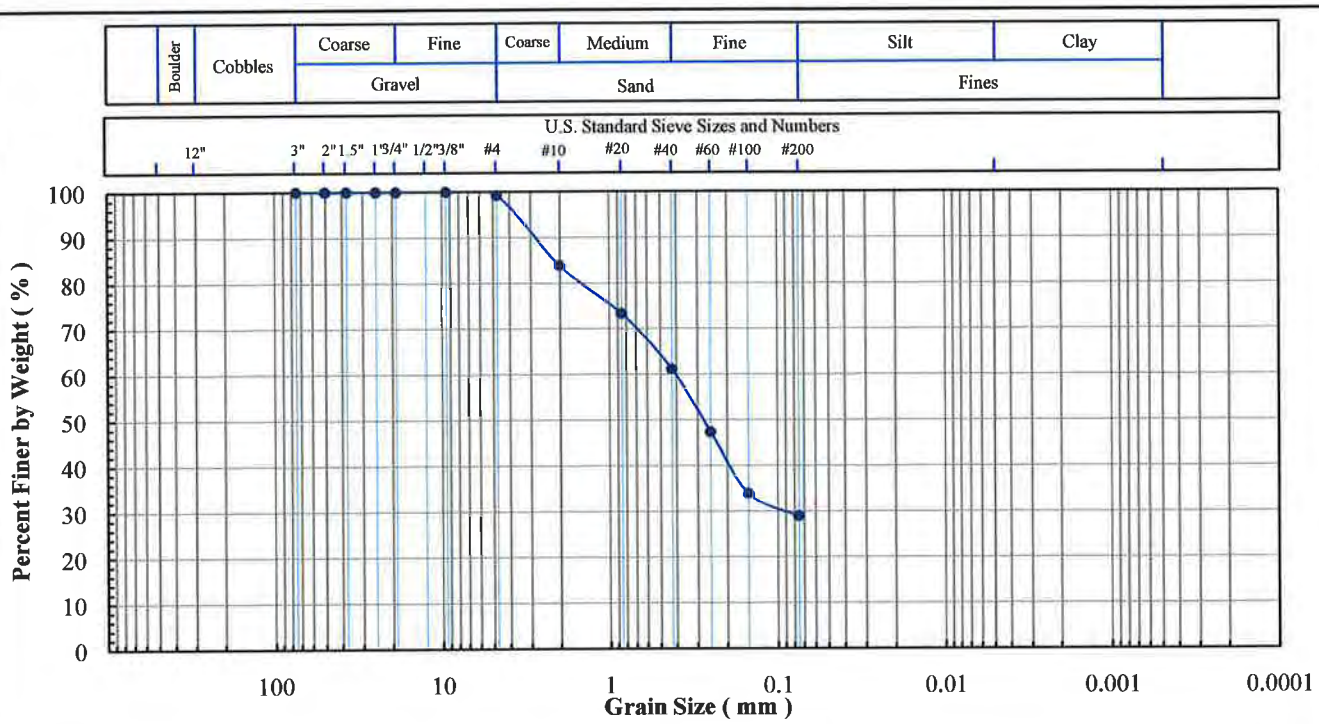
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-16 (43.5-45.0')
Lab Sample No:	13L421E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



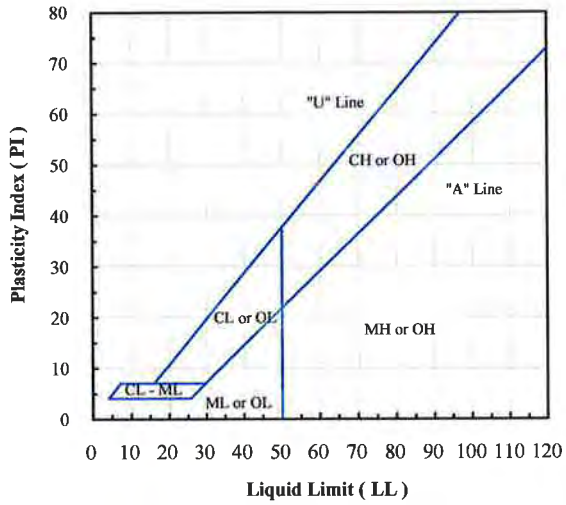
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	83.9
#20	0.850	73.3
#40	0.425	61.1
#60	0.250	47.3
#100	0.150	33.9
#200	0.075	28.9

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	70.3
Fines (%):	28.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-16 (43.5-45.0')	13L421E	15.6	28.9	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14 PD, NSR

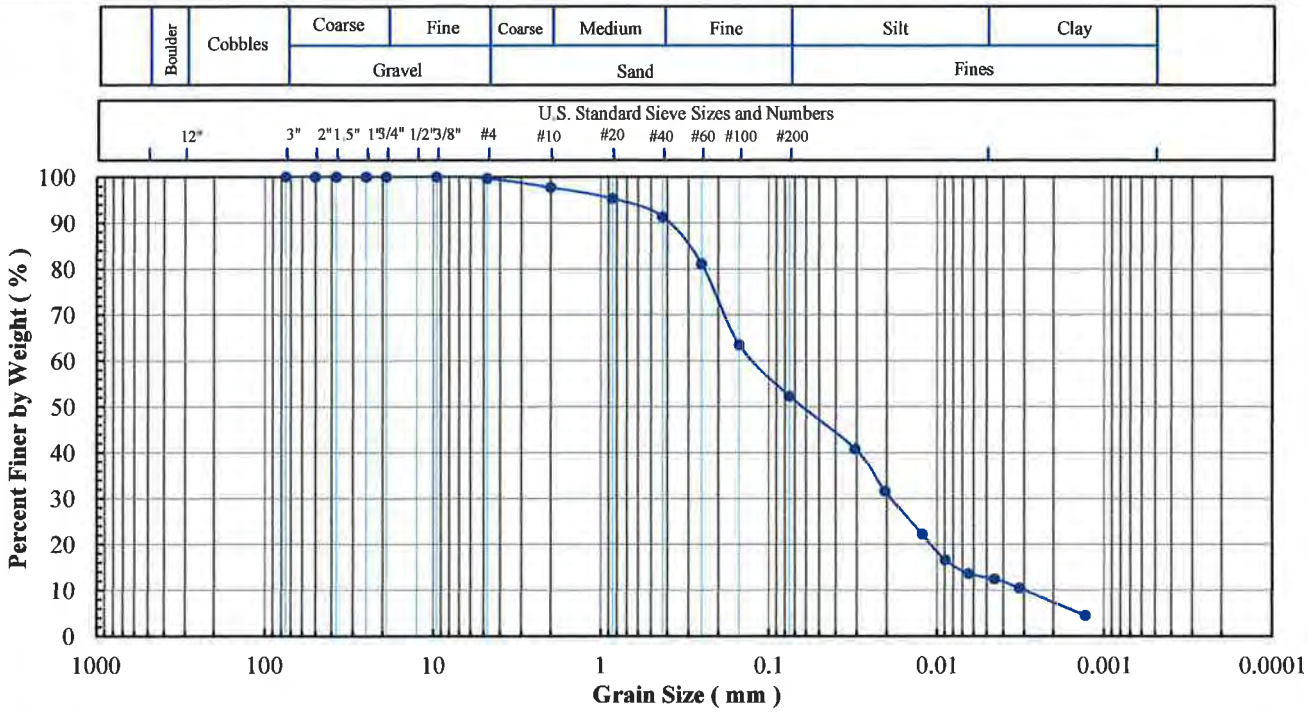
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-16 (61.5-63.0')
Lab Sample No:	13L433E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



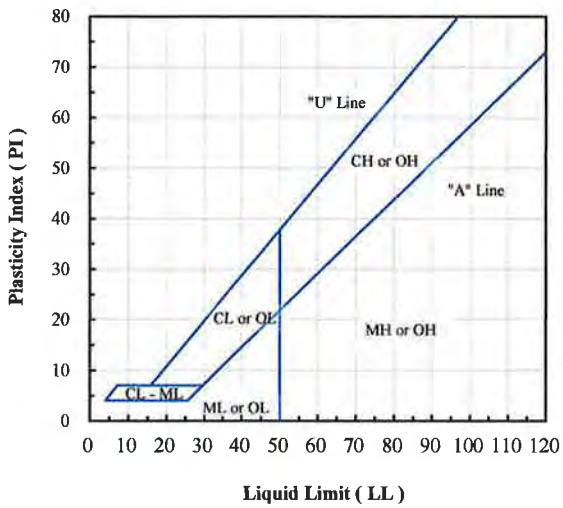
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	97.7
#20	0.850	95.3
#40	0.425	91.3
#60	0.250	81.1
#100	0.150	63.5
#200	0.075	52.3

Hydrometer Particle Diameter (mm)	% Finer
0.0306	40.8
0.0123	22.2
0.0064	13.7
0.0032	10.5
0.0013	4.5

Gravel (%):	0.3
Sand (%):	47.4
Fines (%):	52.3
Silt (%):	39.5
Clay (%):	12.8

Specific Gravity (-):	2.65

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-16 (61.5-63.0')	13L433E	20.7	52.3	NP	NP	NP	ML - Sandy silt

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.

1 · 6 · '14
PD, NSR

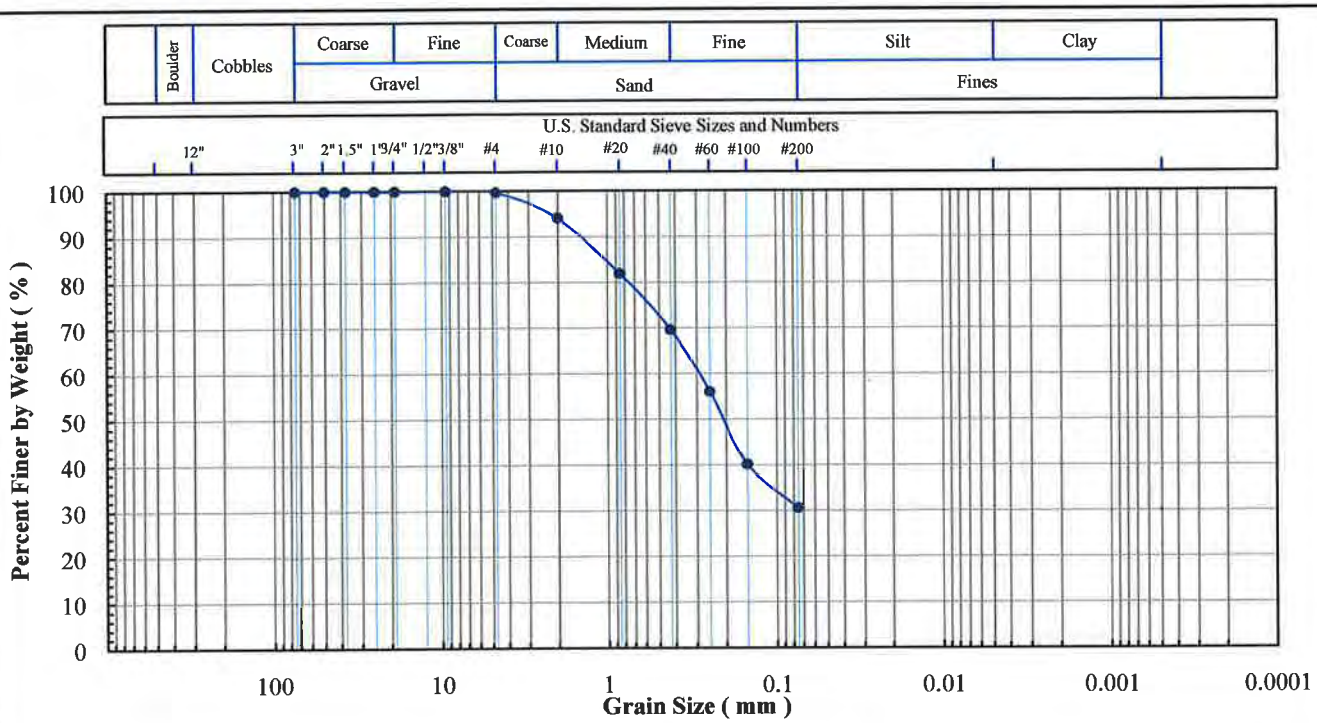
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-17 (13.0-14.5')
Lab Sample No:	13L436E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



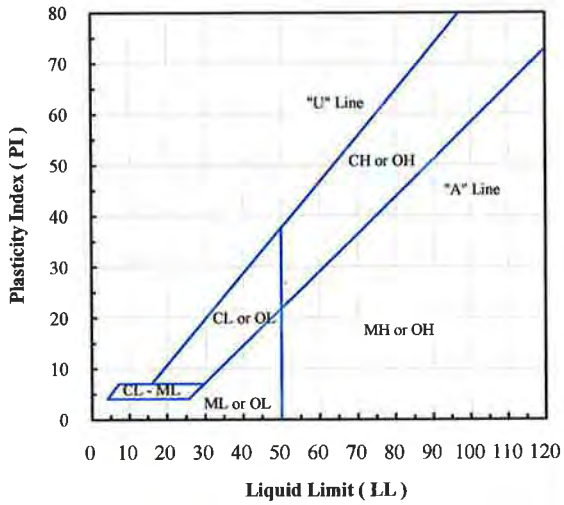
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	94.1
#20	0.850	81.9
#40	0.425	69.6
#60	0.250	56.1
#100	0.150	40.1
#200	0.075	30.5

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	69.2
Fines (%):	30.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-17 (13.0-14.5')	13L436E	20.2	30.5	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14 PD, NSE

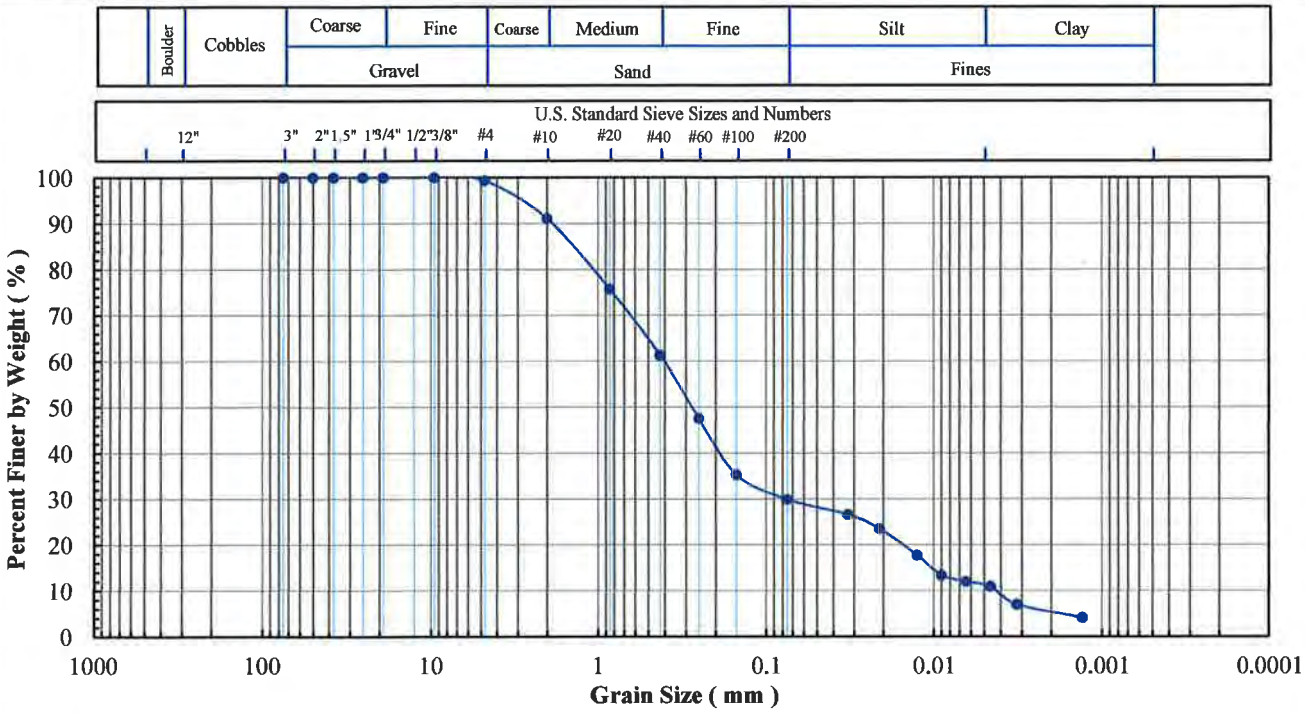
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-17 (38.0-39.5')
Lab Sample No:	13L441E

ASTM C 136, D 422, D 854, D 1140, D 2216, D 2487, D 4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Atterberg Limits



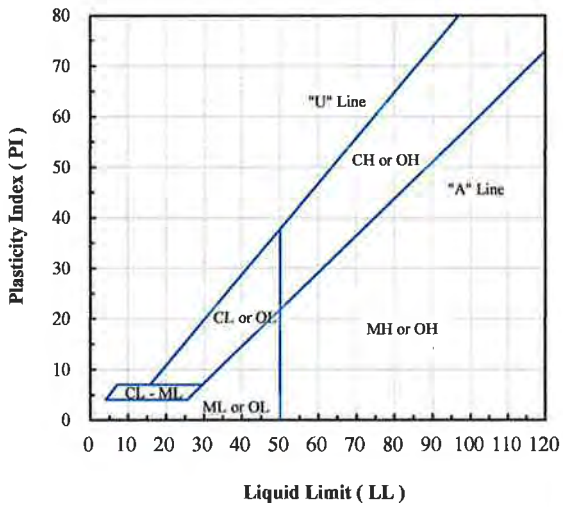
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.3
#10	2.00	91.1
#20	0.850	75.7
#40	0.425	61.3
#60	0.250	47.5
#100	0.150	35.3
#200	0.075	29.9

Specific Gravity (-):	2.65

Hydrometer Particle Diameter (mm)	% Finer
0.0326	26.6
0.0125	17.7
0.0064	12.0
0.0032	7.0
0.0013	4.1

Gravel (%):	0.7
Sand (%):	69.4
Fines (%):	29.9
Silt (%):	18.8
Clay (%):	11.1

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-17 (38.0-39.5')	13L441E	21.4	29.9	NP	NP	NP	SM - Silty sand

Note(s): An assumed specific gravity of 2.65 was used when analyzing the hydrometer test results.
Engineering classification is based on the assumption that the fines are either ML or MH.

1·6·'14
RD, NSR

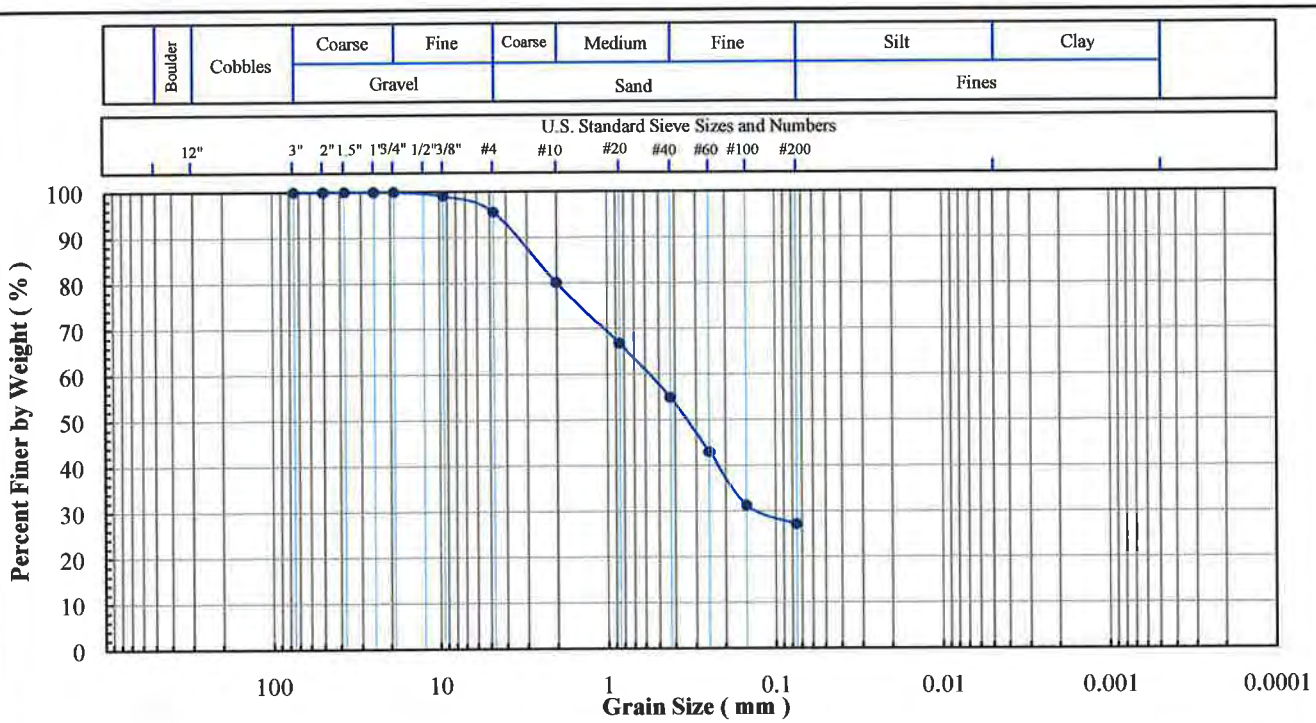
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-17 (63.0-64.5')
Lab Sample No:	13L446E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



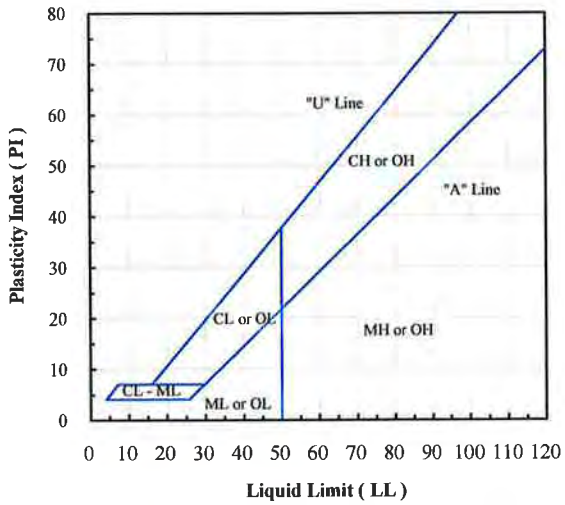
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	99.1
#4	4.75	95.6
#10	2.00	80.1
#20	0.850	66.8
#40	0.425	54.9
#60	0.250	43.0
#100	0.150	31.2
#200	0.075	27.1

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	4.4
Sand (%):	68.5
Fines (%):	27.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-17 (63.0-64.5')	13L446E	13.6	27.1	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14 PD, NSR

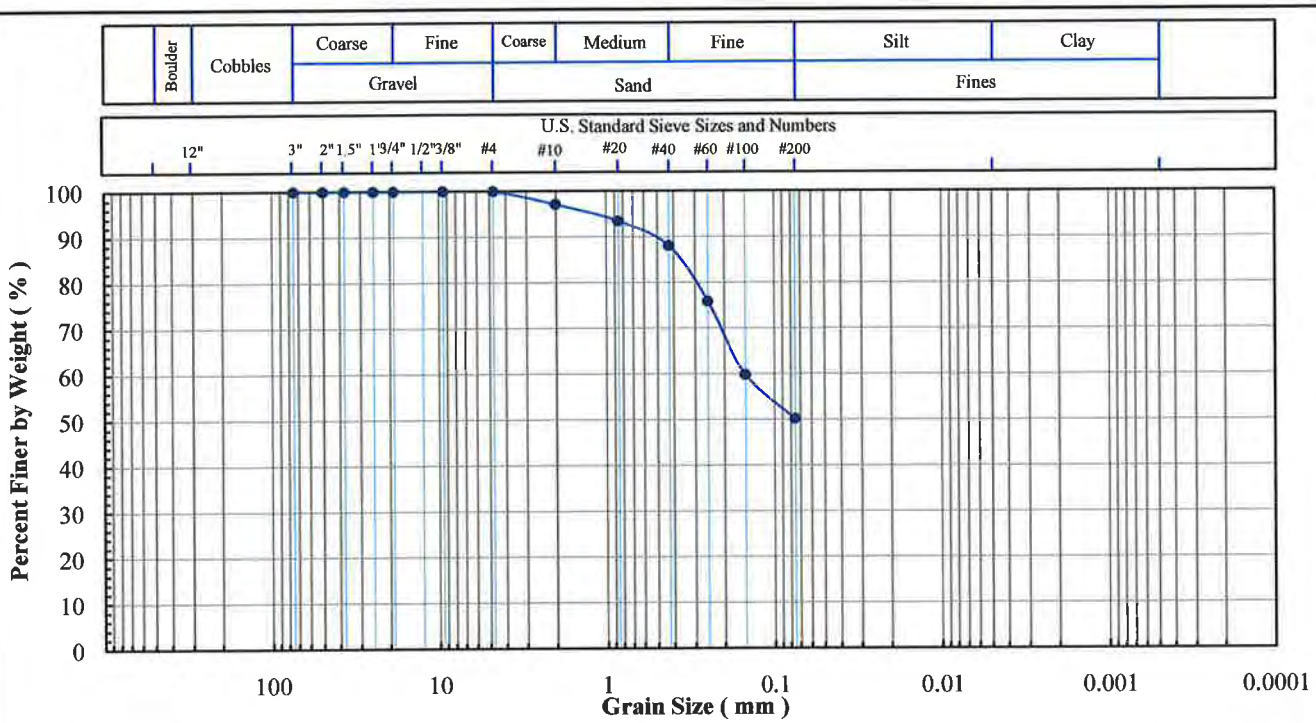
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-18B (13.0-14.5')
Lab Sample No:	13L452E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



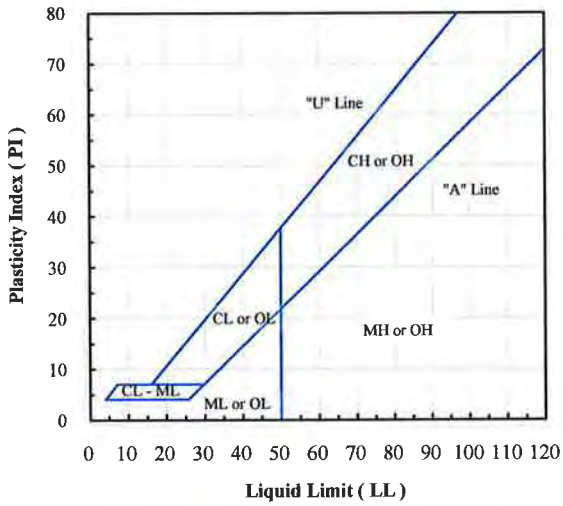
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	97.1
#20	0.850	93.5
#40	0.425	88.0
#60	0.250	75.8
#100	0.150	59.8
#200	0.075	50.1

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	49.9
Fines (%):	50.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-18B (13.0-14.5')	13L452E	26.8	50.1	NP	NP	NP	ML - Sandy silt

Note(s):

1-6-14 PD, NSR

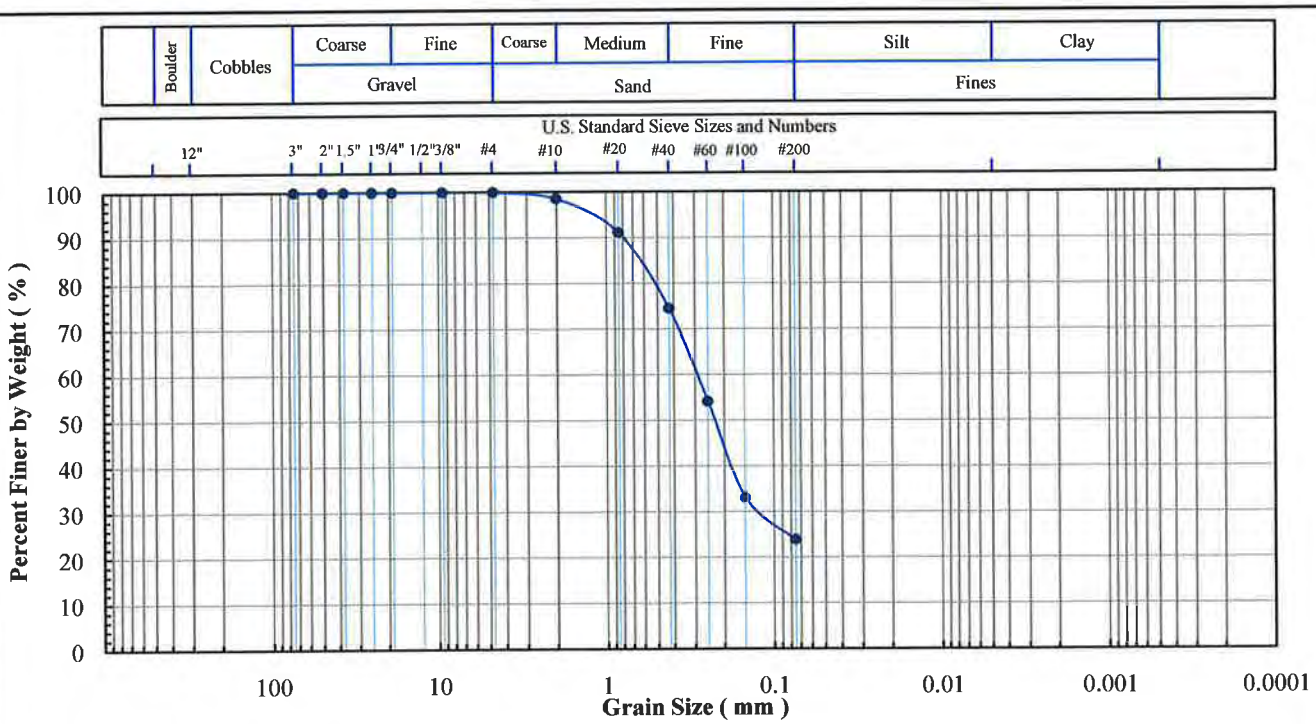
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-18B (23.0-24.5')
Lab Sample No:	13L454E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



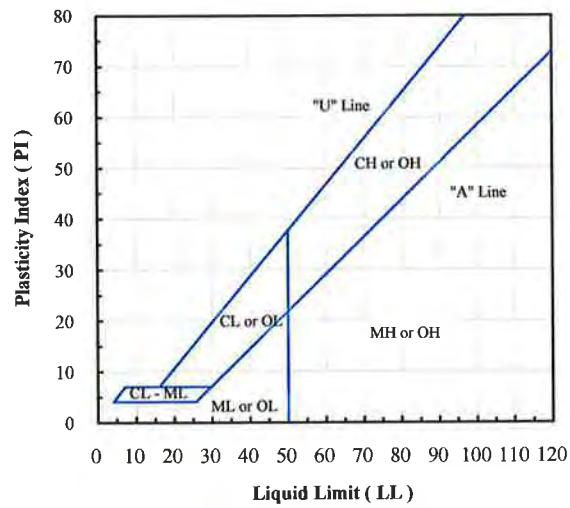
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	98.5
#20	0.850	91.2
#40	0.425	74.5
#60	0.250	54.1
#100	0.150	33.2
#200	0.075	23.8

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	76.2
Fines (%):	23.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-18B (23.0-24.5')	13L454E	20.0	23.8	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14

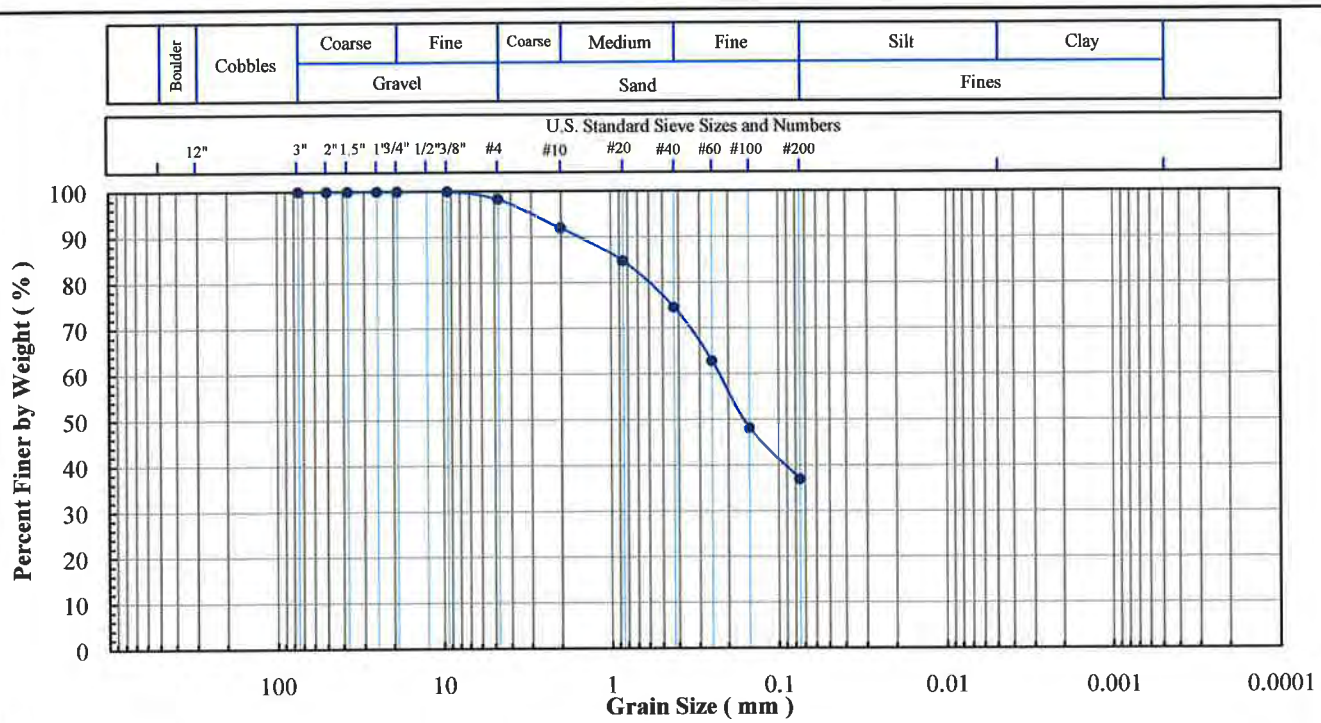
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-18B (43.0-44.5')
Lab Sample No:	13L458E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



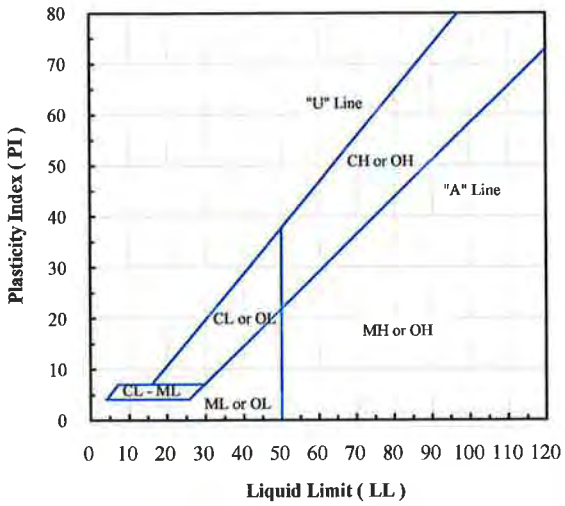
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.3
#10	2.00	92.0
#20	0.850	84.7
#40	0.425	74.6
#60	0.250	62.8
#100	0.150	48.2
#200	0.075	36.9

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.7
Sand (%):	61.4
Fines (%):	36.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-18B (43.0-44.5')	13L458E	13.6	36.9	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PD, NSR

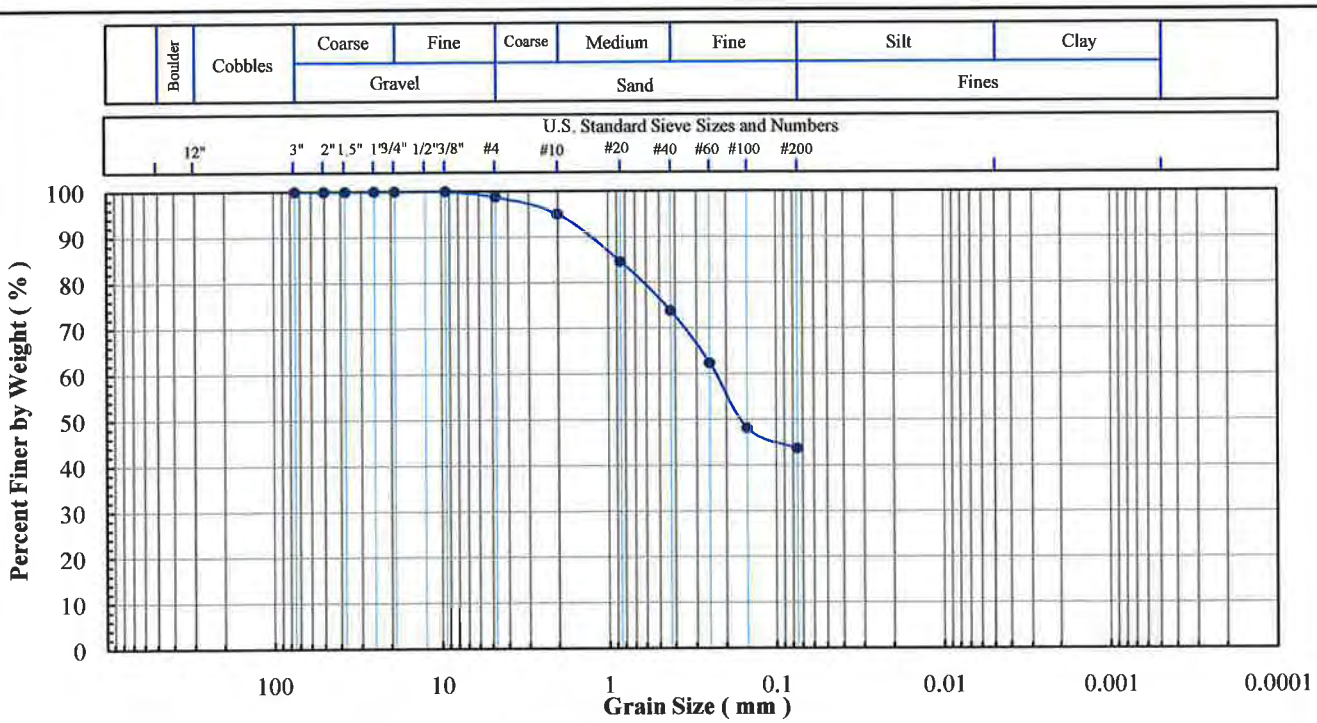
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-18B (68.0-69.5')
Lab Sample No:	13L463E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



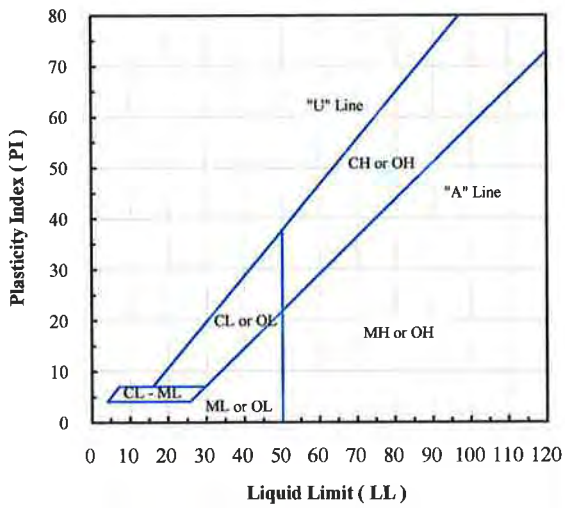
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.8
#10	2.00	95.0
#20	0.850	84.6
#40	0.425	73.8
#60	0.250	62.4
#100	0.150	48.2
#200	0.075	43.7

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.2
Sand (%):	55.1
Fines (%):	43.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-18B (68.0-69.5')	13L463E	17.1	43.7	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PD, NJR

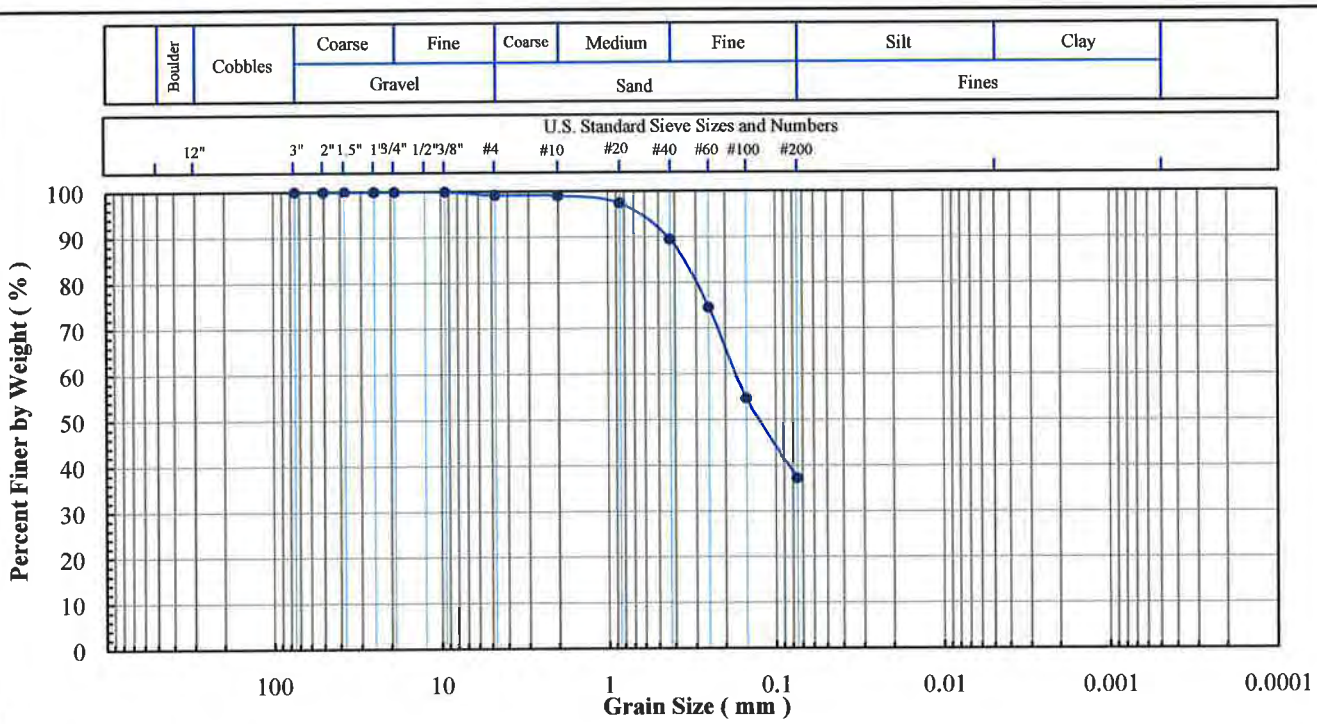
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-18B (83.0-84.5')
Lab Sample No:	13L466E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



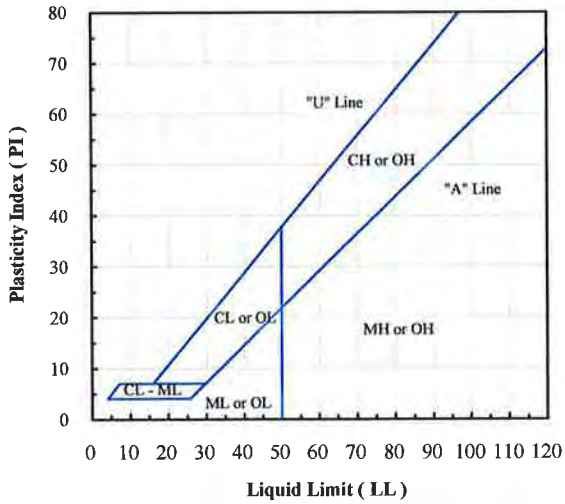
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	99.1
#20	0.850	97.4
#40	0.425	89.4
#60	0.250	74.5
#100	0.150	54.7
#200	0.075	37.2

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	62.0
Fines (%):	37.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-18B (83.0-84.5')	13L466E	12.3	37.2	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

1-6-14
PD, NSR

Phase 1

Classification of Site Soils and Composite Soil Mixes

Attachment P1-B

Bulk Samples Index Test Results

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Table P1-B-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information		Test Information										
Site ID	Lab No.	Moisture Content ASTM D 2216	Grain Size Analysis ASTM D 422					Atterberg Limits ASTM D 4318			Engineering Classification ASTM D 2487	Organic Content Method C ASTM D 2974
			Gravel Content	Sand Content	Fines Content	Silt Content	Clay Content	LL	PL	PI		
(-)	(-)	(%)	(%)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(-)	(%)
VBW-4B-Residum (0.0-12.5')	13L014E	17.8	12.9	36.6	50.5			NP	NP	NP	ML	2.8
VBW-4B-Saprolite (12.5-69.5')	13L015E	25.7	0.7	61.0	38.3			NP	NP	NP	SM	
VBW-6-Residuum (0.0-18.5')	13L019E	16.7	31.1	31.7	37.2			NP	NP	NP	SM	3.9
VBW-6-Saprolite (18.5-55.0')	13L020E	28.5	1.0	46.3	52.7			NP	NP	NP	ML	
VBW-6-PWR (55.0-77.5')	13L021E	35.6	0.7	60.4	38.9			NP	NP	NP	SM	
VBW-9-Residuum (0.0-14.0')	13L025E	19.4	8.6	42.8	48.6			45	32	13	SM	4.0
VBW-9-Saprolite (14.0-69.0')	13L026E	33.2	0.5	60.9	38.6			NP	NP	NP	SM	
VBW-9-PWR (69.0-85.5')	13L027E	38.1	0.8	57.9	41.3			NP	NP	NP	SM	
VBW-11-Residuum (0.0-23.0')	13L028E	33.4	1.4	29.2	69.4			NP	NP	NP	ML	6.5
VBW-11-Saprolite (23.0-83.0')	13L029E	48.5	0.2	54.6	45.2			NP	NP	NP	SM	
VBW-14-Residuum (1.5-9.0')	13L032E	22.3	3.6	59.0	37.4			43	25	18	SC	
VBW-14-Saprolite (9.0-45.0')	13L033E	47.0	0.1	48.9	51.0			NP	NP	NP	ML	
VBW-14-Deep Saprolite (45.0-69.0')	13L034E	38.3	0.0	61.9	38.1			62	41	21	SM	
VBW-17-Residuum (0.0-13.0')	13L035E	27.2	1.7	39.5	58.8			74	43	31	MH	
VBW-17-Saprolite (13.0-58.0')	13L036E	39.3	0.7	45.4	53.9			NP	NP	NP	ML	
VBW-17-Saprolite/PWR (58.0-76.5')	13L037E	42.9	0.1	48.0	51.9			47	27	20	CL	
VBW-18B-Residuum (0.0-13.0')	13L038E	29.2	1.0	28.8	70.2			78	45	33	MH	5.6
VBW-18B-Saprolite (13.0-43.0')	13L039E	25.8	0.1	57.0	42.9			NP	NP	NP	SM	
VBW-18B-Saprolite/PWR (43.0-87.0')	13L040E	40.1	0.1	58.1	41.8			48	28	20	SM	

Notes:

7-24-14
TR, NSR

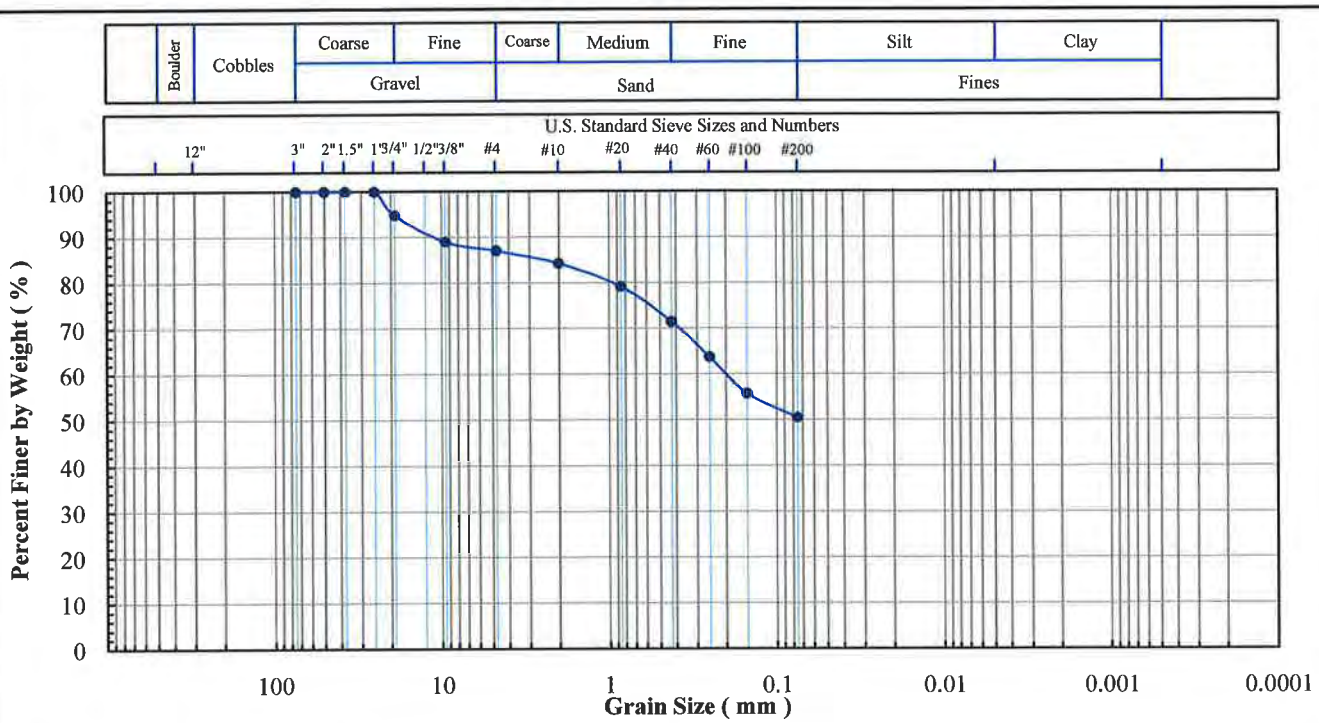
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-4B-Residuum (0.0-12.5')
Lab Sample No:	13L014E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



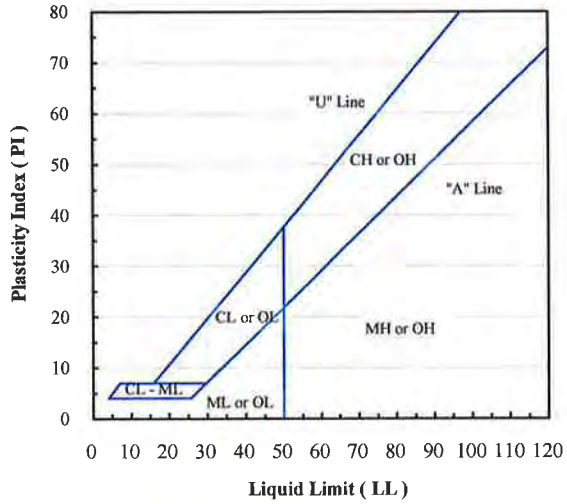
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	94.9
3/8"	9.5	89.1
#4	4.75	87.1
#10	2.00	84.3
#20	0.850	79.2
#40	0.425	71.5
#60	0.250	63.7
#100	0.150	55.7
#200	0.075	50.5

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	12.9
Sand (%):	36.6
Fines (%):	50.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-4B-Residuum (0.0-12.5')	13L014E	17.8	50.5	NP	NP	NP	ML - Sandy silt

Note(s):

2-9-14
NSR

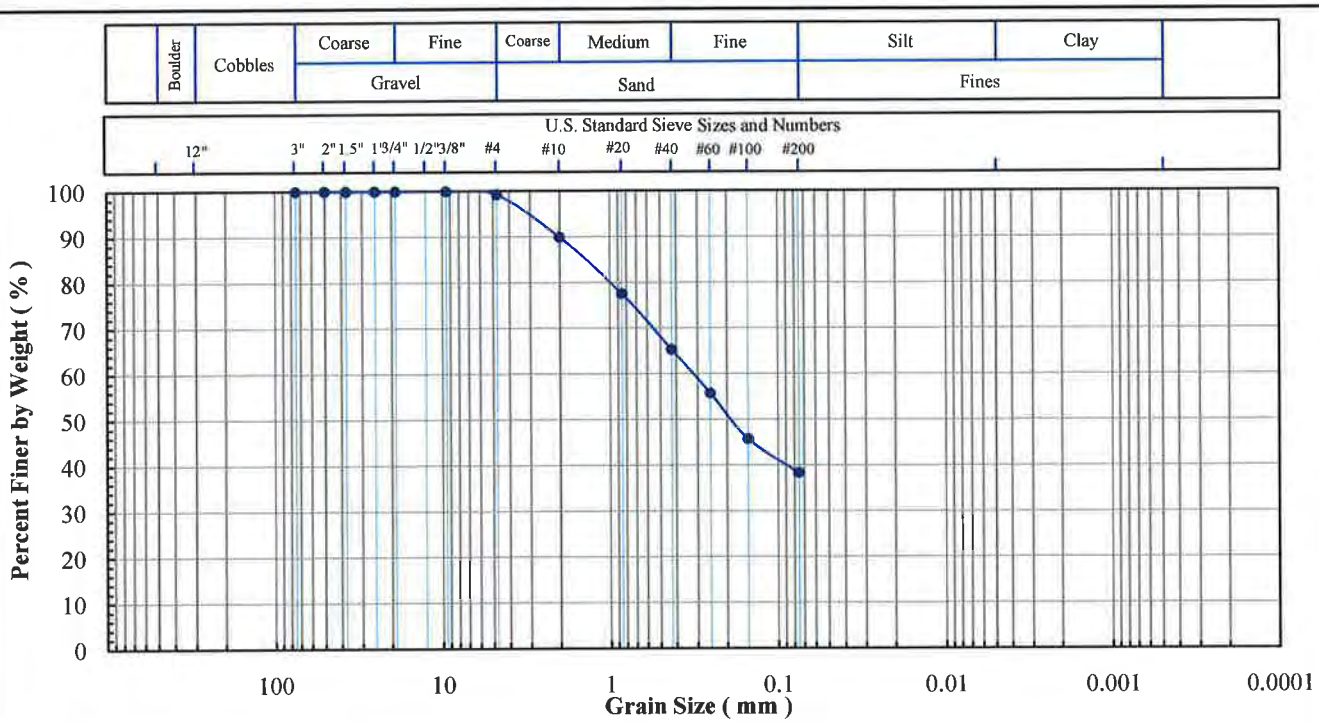
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-4B-Saprolite (12.5-69.5')
Lab Sample No:	13L015E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



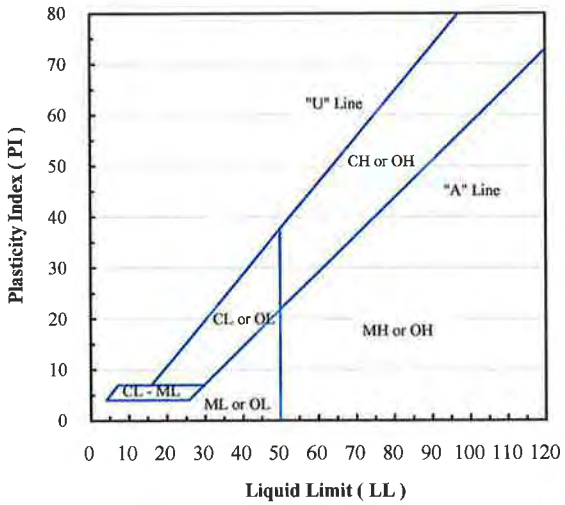
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.3
#10	2.00	90.0
#20	0.850	77.6
#40	0.425	65.3
#60	0.250	55.7
#100	0.150	45.7
#200	0.075	38.3

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.7
Sand (%):	61.0
Fines (%):	38.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-4B-Saprolite (12.5-69.5')	13L015E	25.7	38.3	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

2-9-14
NSR

Excel Geotechnical Testing, Inc.
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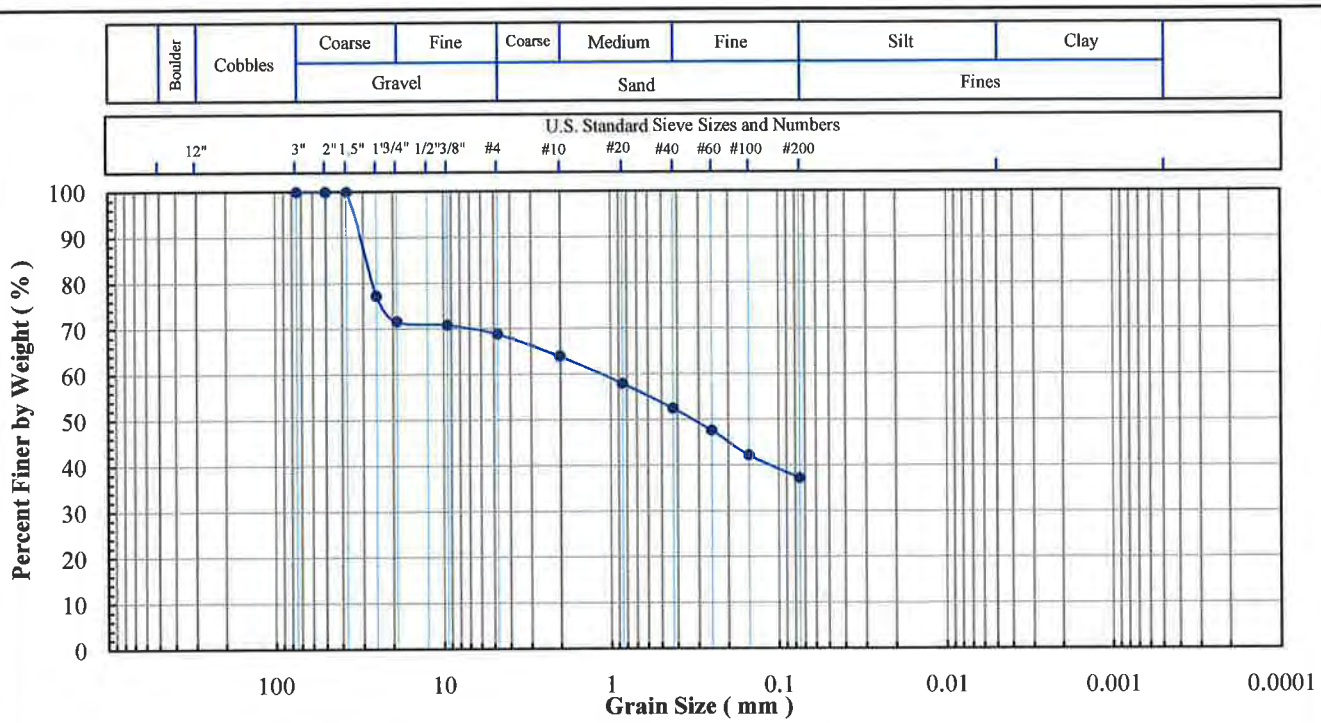
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-6-Residuum (0.0-18.5')
Lab Sample No:	13L019E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



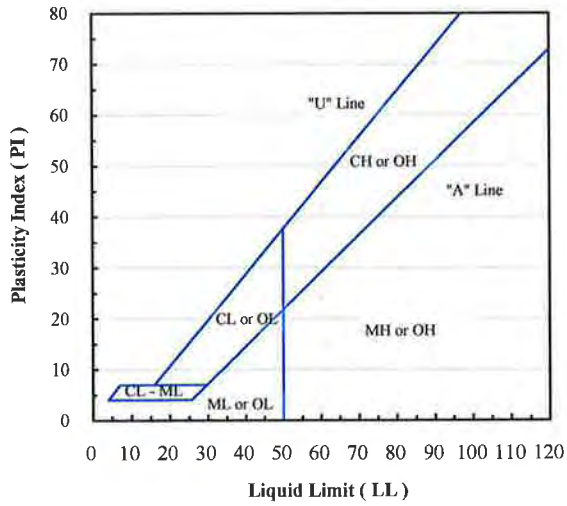
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	77.3
3/4"	19	71.7
3/8"	9.5	70.9
#4	4.75	68.9
#10	2.00	64.0
#20	0.850	58.0
#40	0.425	52.5
#60	0.250	47.6
#100	0.150	42.2
#200	0.075	37.2

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	31.1
Sand (%):	31.7
Fines (%):	37.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-6-Residuum (0.0-18.5')	13L019E	16.7	37.2	NP	NP	NP	SM - Silty sand with gravel

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

2-9-14
NSR

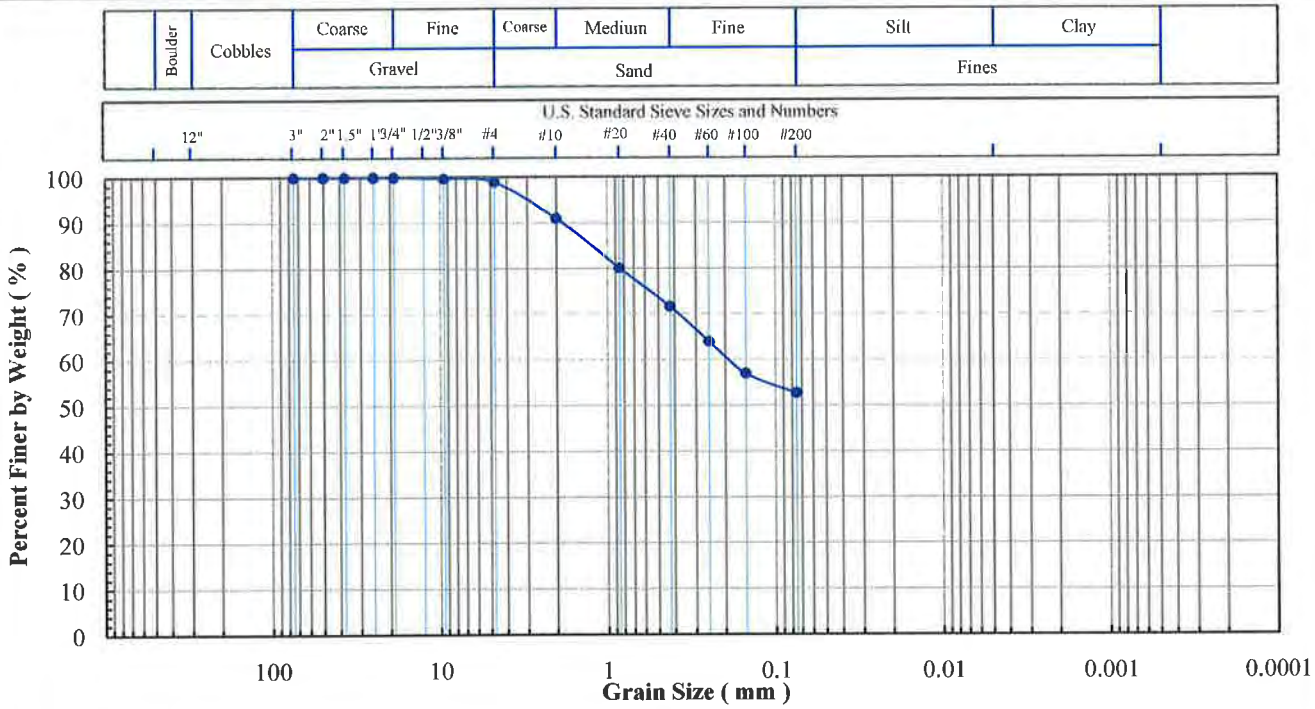
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-6-Saprolite (18.5-55.0')
Lab Sample No:	13L020E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



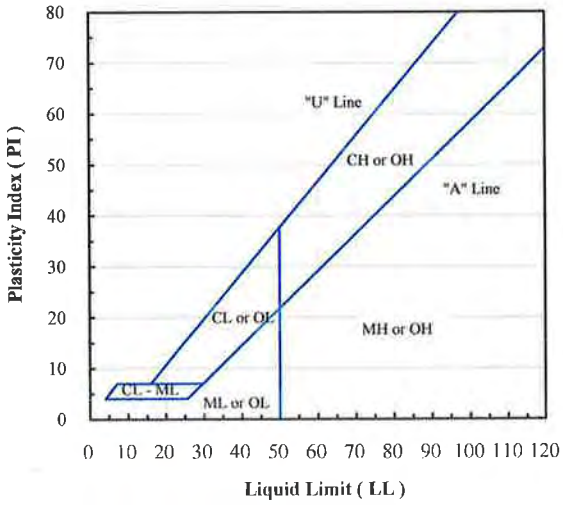
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	99.8
#4	4.75	99.0
#10	2.00	91.0
#20	0.850	80.2
#40	0.425	71.7
#60	0.250	64.1
#100	0.150	57.0
#200	0.075	52.7

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.0
Sand (%):	46.3
Fines (%):	52.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-6-Saprolite (18.5-55.0')	13L020E	28.5	52.7	NP	NP	NP	ML - Sandy silt

Note(s):

2-9-14
NSR

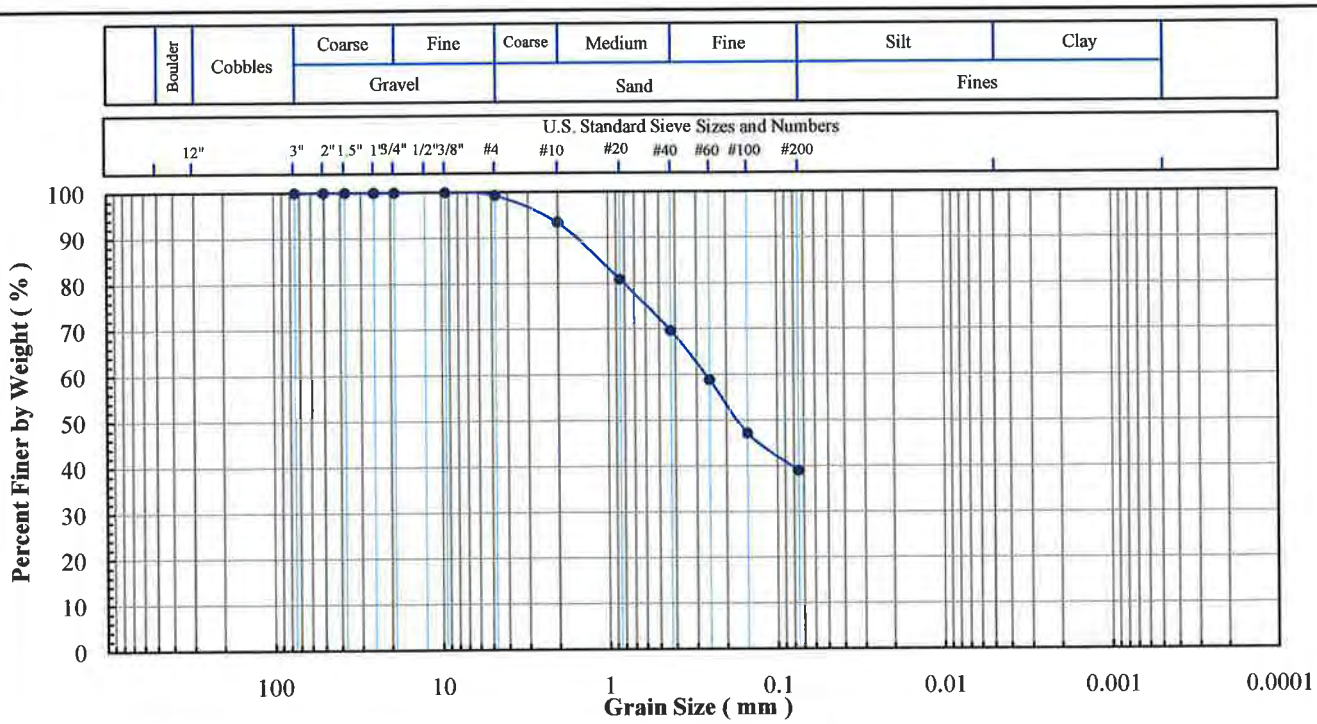
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-6-PWR (55.0-77.5')
Lab Sample No:	13L021E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



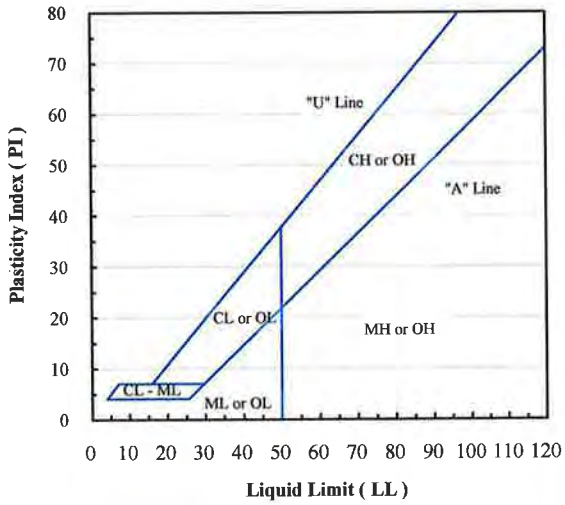
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.3
#10	2.00	93.4
#20	0.850	80.9
#40	0.425	69.6
#60	0.250	58.8
#100	0.150	47.1
#200	0.075	38.9

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.7
Sand (%):	60.4
Fines (%):	38.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-6-PWR (55.0-77.5')	13L021E	35.6	38.9	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

2-9-14
NSR

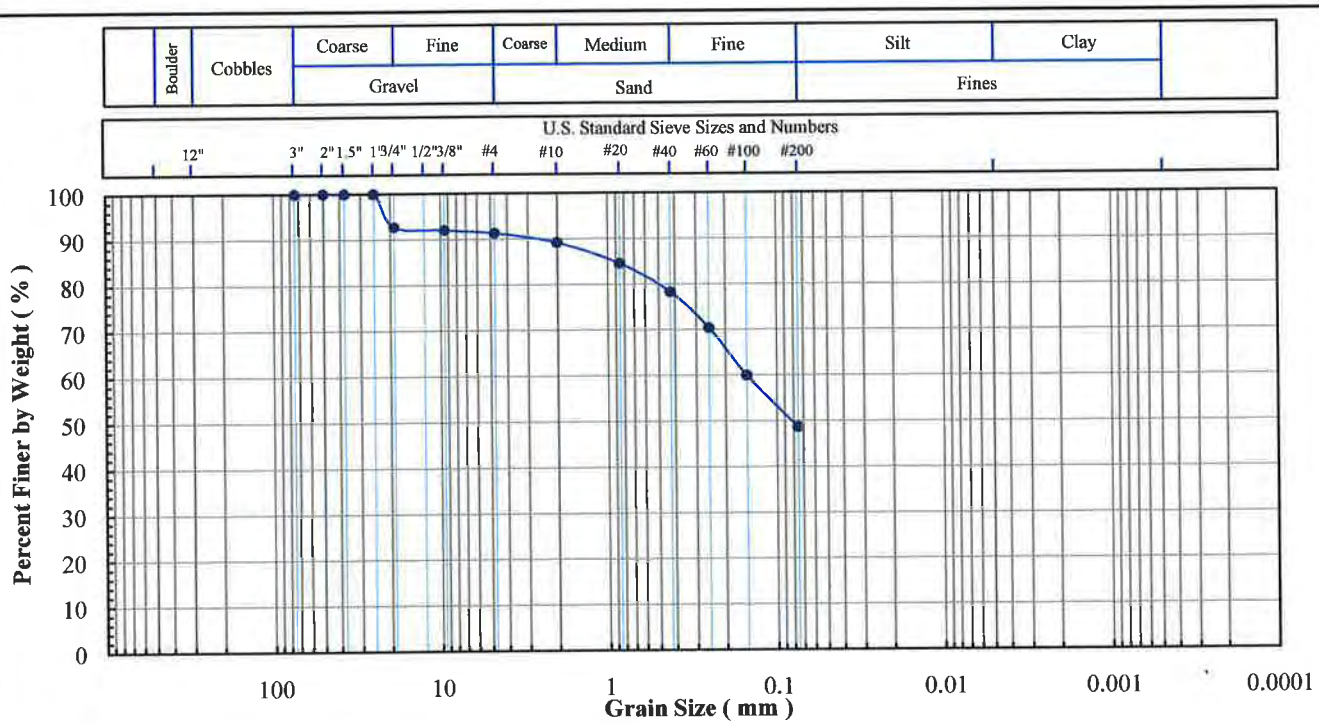
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-9-Residuum (0.0-14.0')
Lab Sample No:	13L025E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



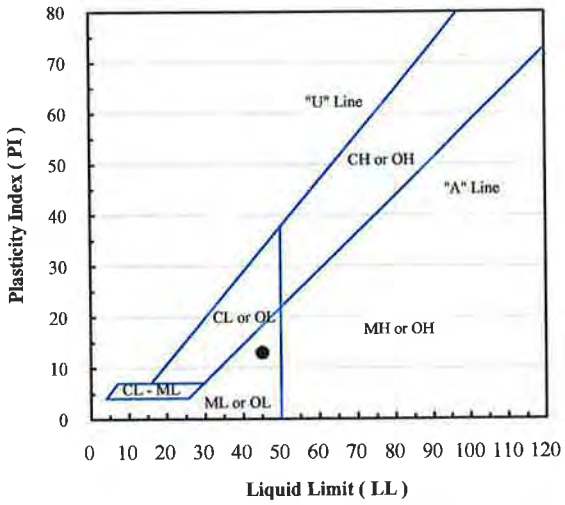
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	92.8
3/8"	9.5	92.1
#4	4.75	91.4
#10	2.00	89.2
#20	0.850	84.6
#40	0.425	78.3
#60	0.250	70.4
#100	0.150	59.9
#200	0.075	48.6

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	8.6
Sand (%):	42.8
Fines (%):	48.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-9-Residuum (0.0-14.0')	13L025E	19.4	48.6	45	32	13	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

2-9-14
NSR

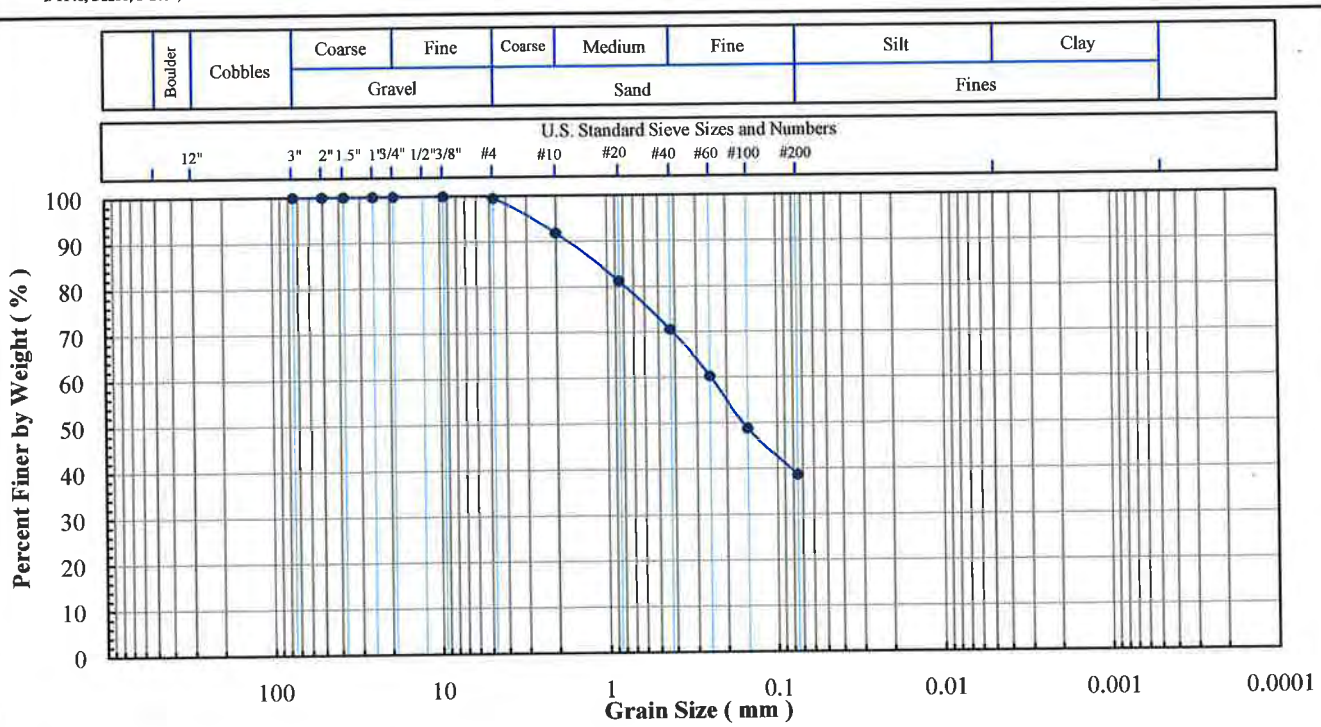
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-9-Saprolite (14.0-69.0')
Lab Sample No:	13L026E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



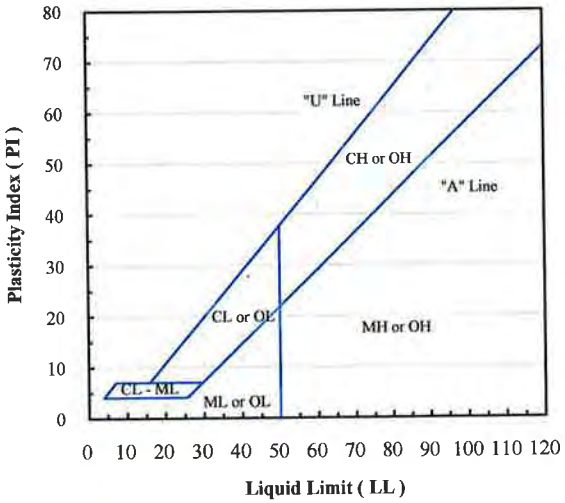
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	91.9
#20	0.850	81.2
#40	0.425	70.6
#60	0.250	60.3
#100	0.150	48.7
#200	0.075	38.6

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.5
Sand (%):	60.9
Fines (%):	38.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-9-Saprolite (14.0-69.0')	13L026E	33.2	38.6	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

2-19-14
JSR

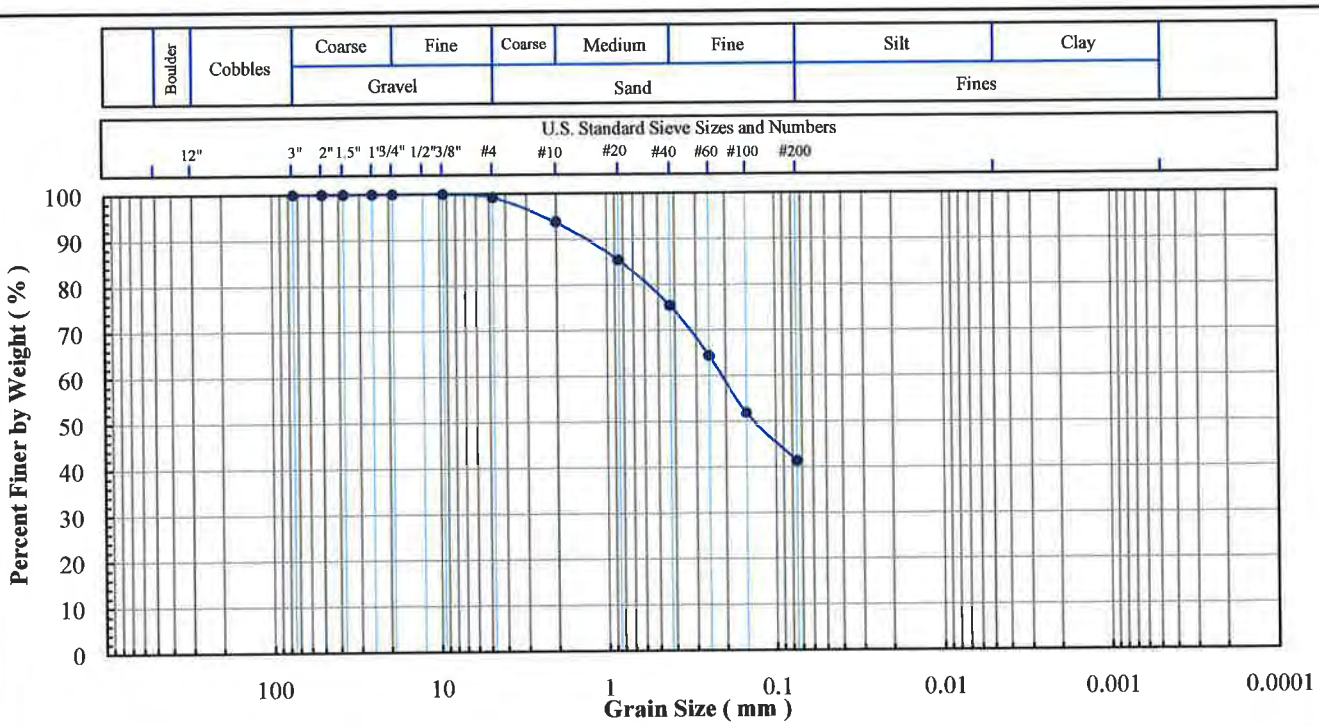
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-9-PWR (69.0-85.5')
Lab Sample No:	13L027E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



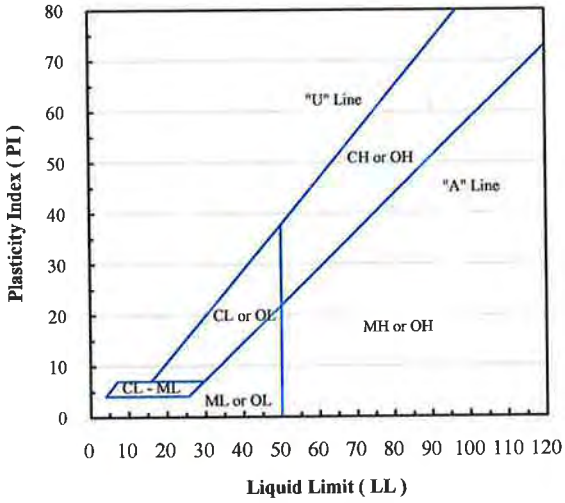
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	93.8
#20	0.850	85.4
#40	0.425	75.4
#60	0.250	64.4
#100	0.150	51.9
#200	0.075	41.3

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	57.9
Fines (%):	41.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-9-PWR (69.0-85.5')	13L027E	38.1	41.3	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

2-9-14
NSR

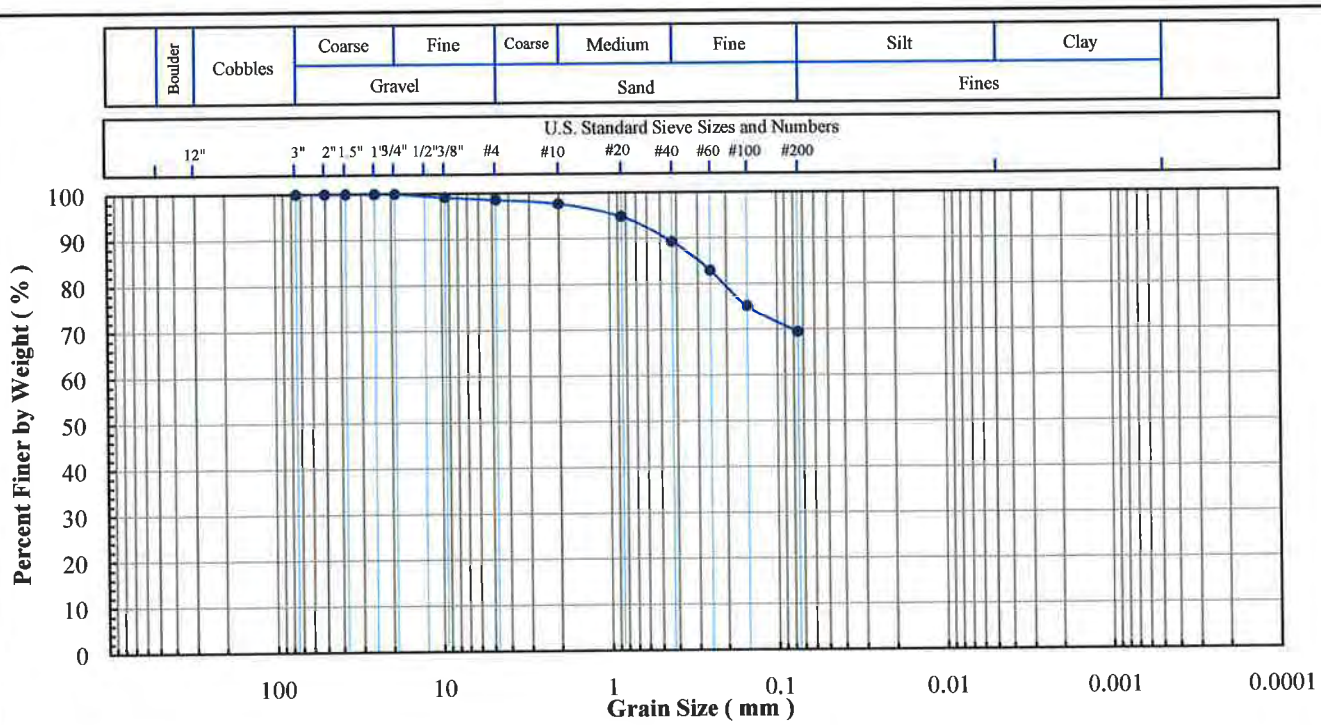
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-11-Residuum (0.0-23.0')
Lab Sample No:	13L028E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



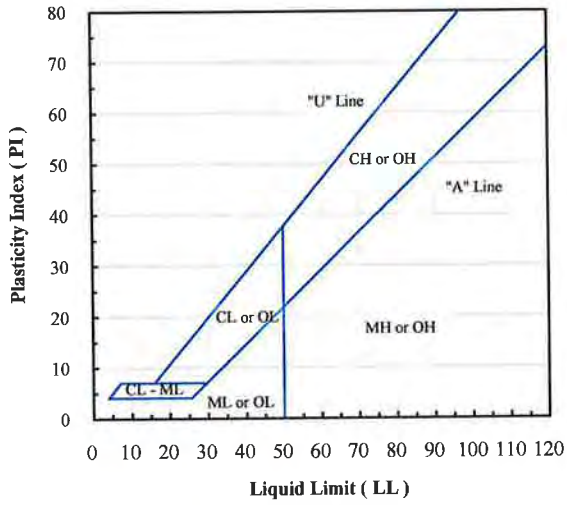
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	99.2
#4	4.75	98.6
#10	2.00	97.7
#20	0.850	94.8
#40	0.425	89.3
#60	0.250	82.9
#100	0.150	75.1
#200	0.075	69.4

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.4
Sand (%):	29.2
Fines (%):	69.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-11-Residuum (0.0-23.0')	13L028E	33.4	69.4	NP	NP	NP	ML - Sandy silt

Note(s):

2-9-14
NSR

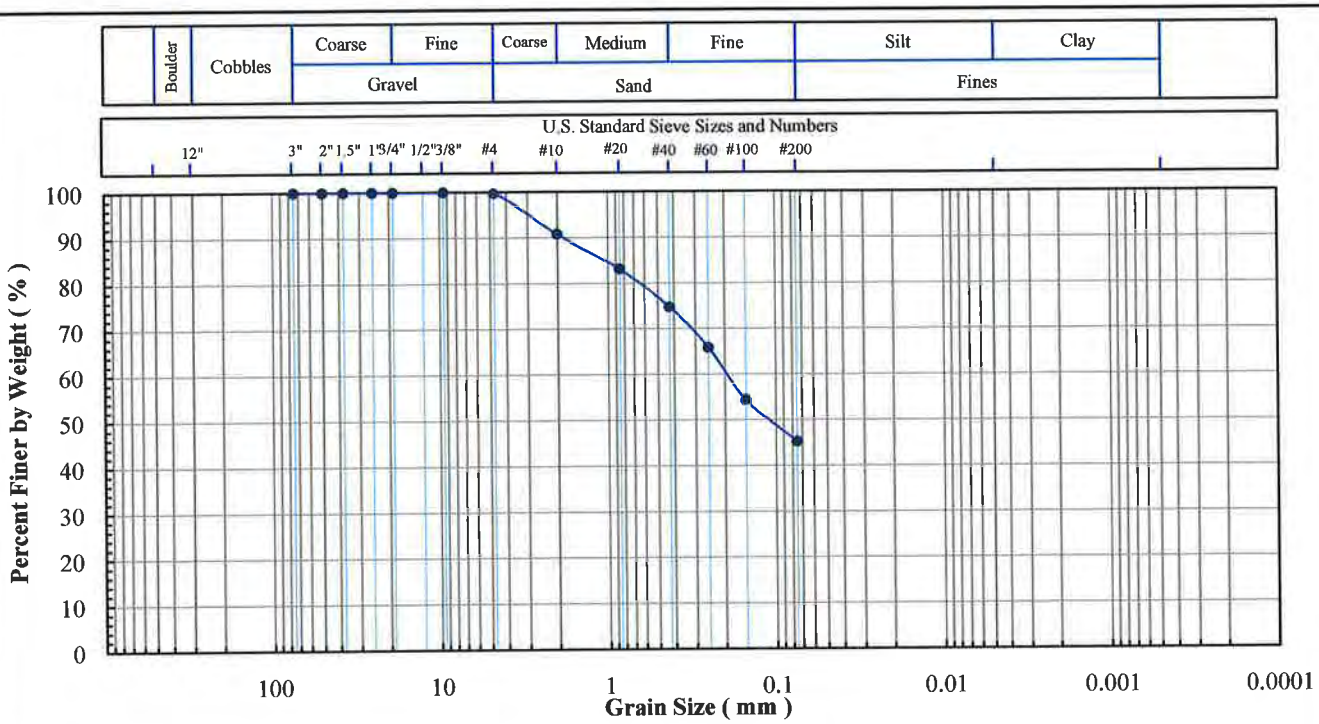
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-11-Saprolite (23.0-83.0')
Lab Sample No:	13L029E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



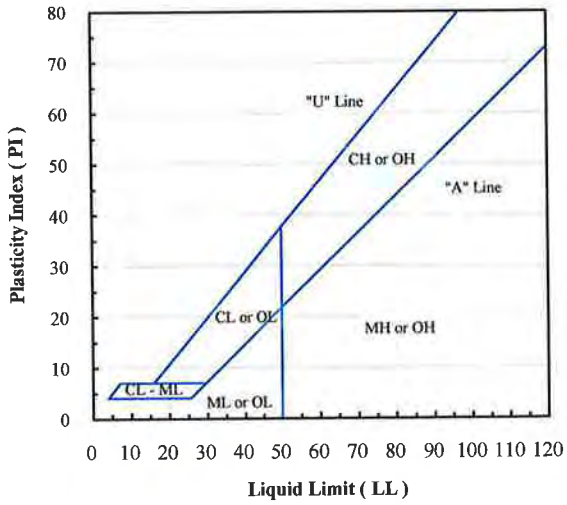
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	90.8
#20	0.850	83.1
#40	0.425	74.8
#60	0.250	65.8
#100	0.150	54.4
#200	0.075	45.2

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	54.6
Fines (%):	45.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-11-Saprolite (23.0-83.0')	13L029E	48.5	45.2	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

2-9-14 JSR

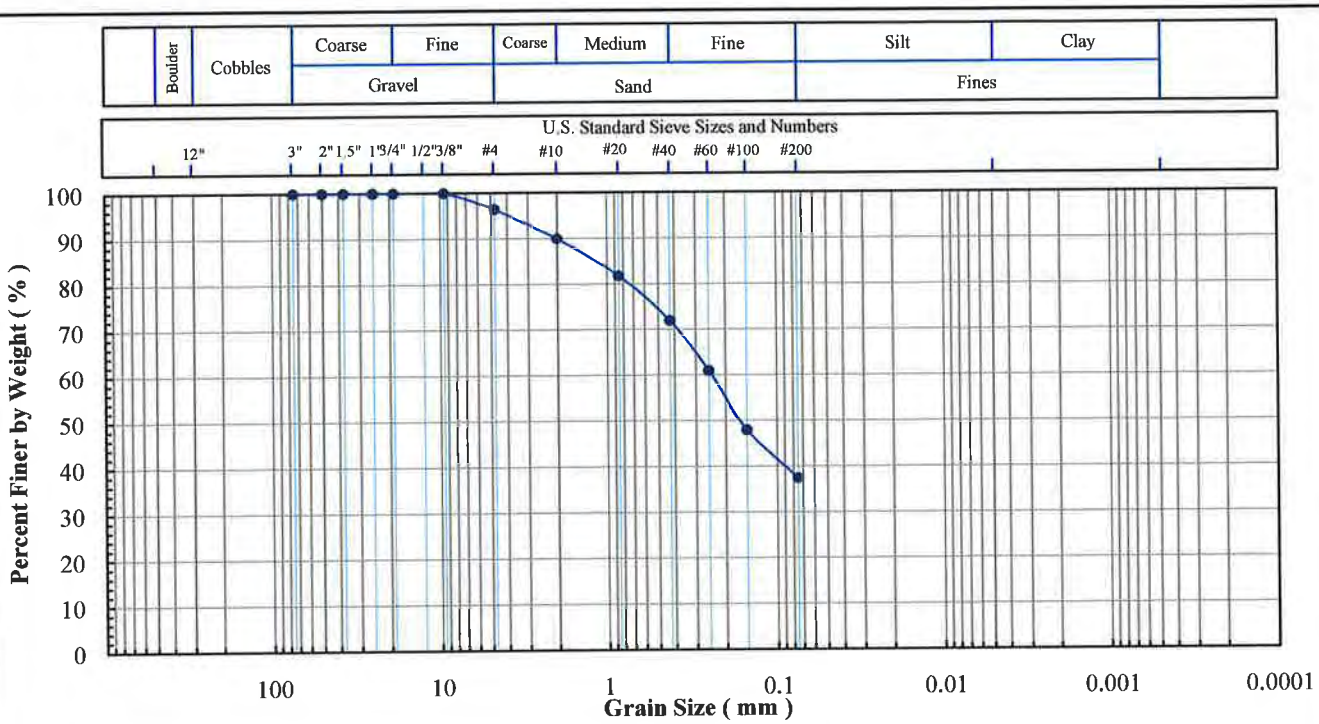
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-14-Residuum (1.5-9.0')
Lab Sample No:	13L032E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



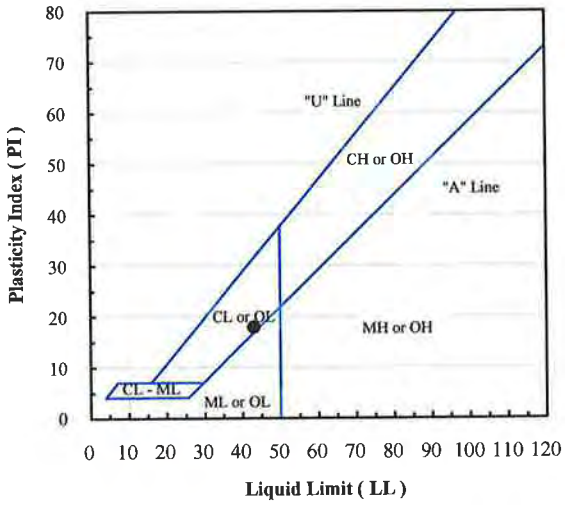
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	96.4
#10	2.00	90.0
#20	0.850	81.8
#40	0.425	71.9
#60	0.250	60.9
#100	0.150	47.9
#200	0.075	37.4

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	3.6
Sand (%):	59.0
Fines (%):	37.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-14-Residuum (1.5-9.0')	13L032E	22.3	37.4	43	25	18	SC - Clayey sand

Note(s): Engineering classification is based on the assumption that the fines are either CL or CH.

2-9-14
NSR

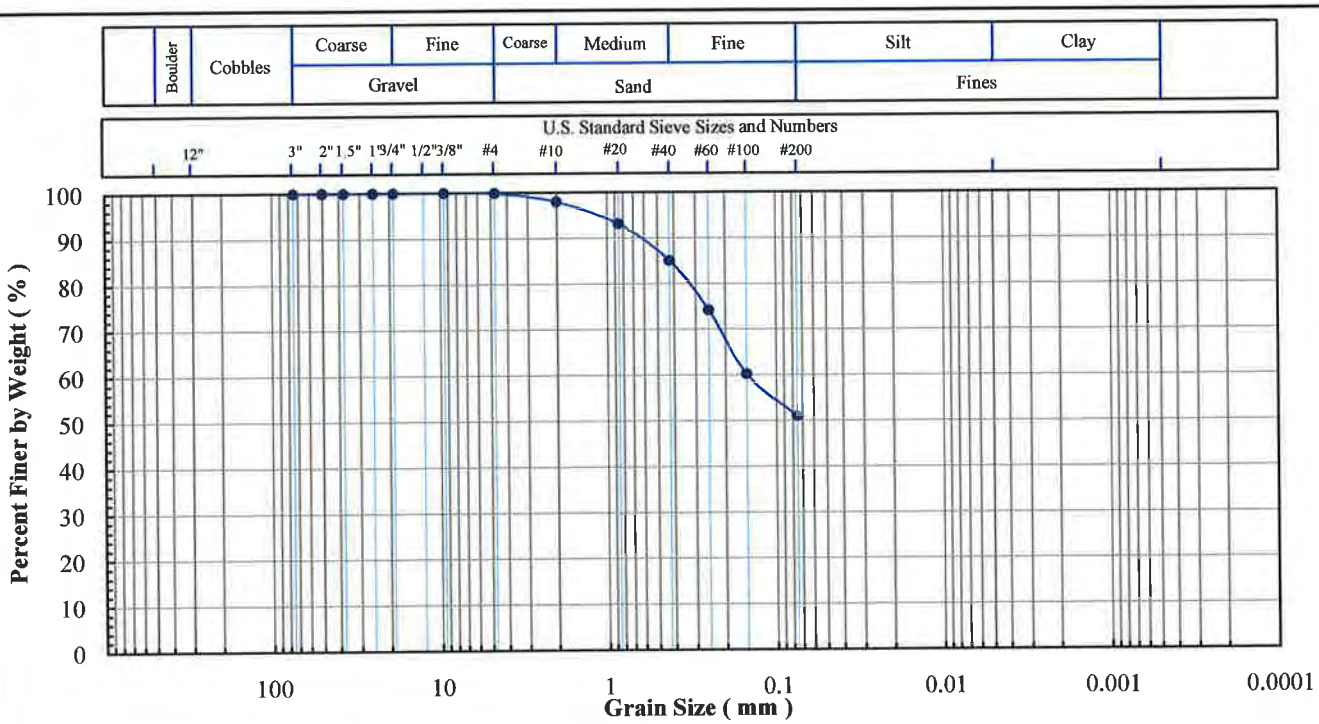
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-14-Saprolite (9.0-45.0')
Lab Sample No:	13L033E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



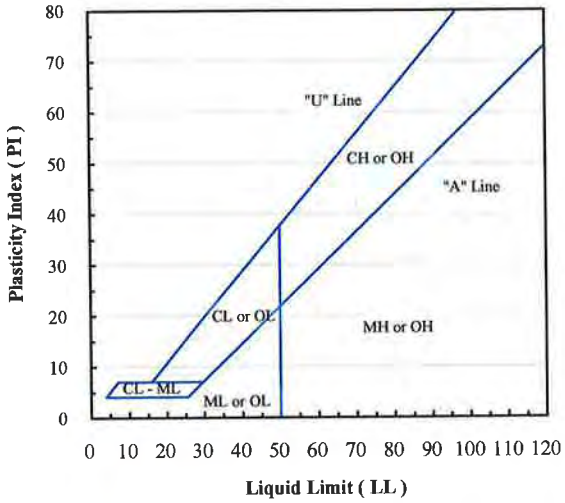
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.9
#10	2.00	98.0
#20	0.850	93.1
#40	0.425	85.1
#60	0.250	74.2
#100	0.150	60.2
#200	0.075	51.0

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.1
Sand (%):	48.9
Fines (%):	51.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-14-Saprolite (9.0-45.0')	13L033E	47.0	51.0	NP	NP	NP	ML - Sandy silt

Note(s):

2-9-14
JSR

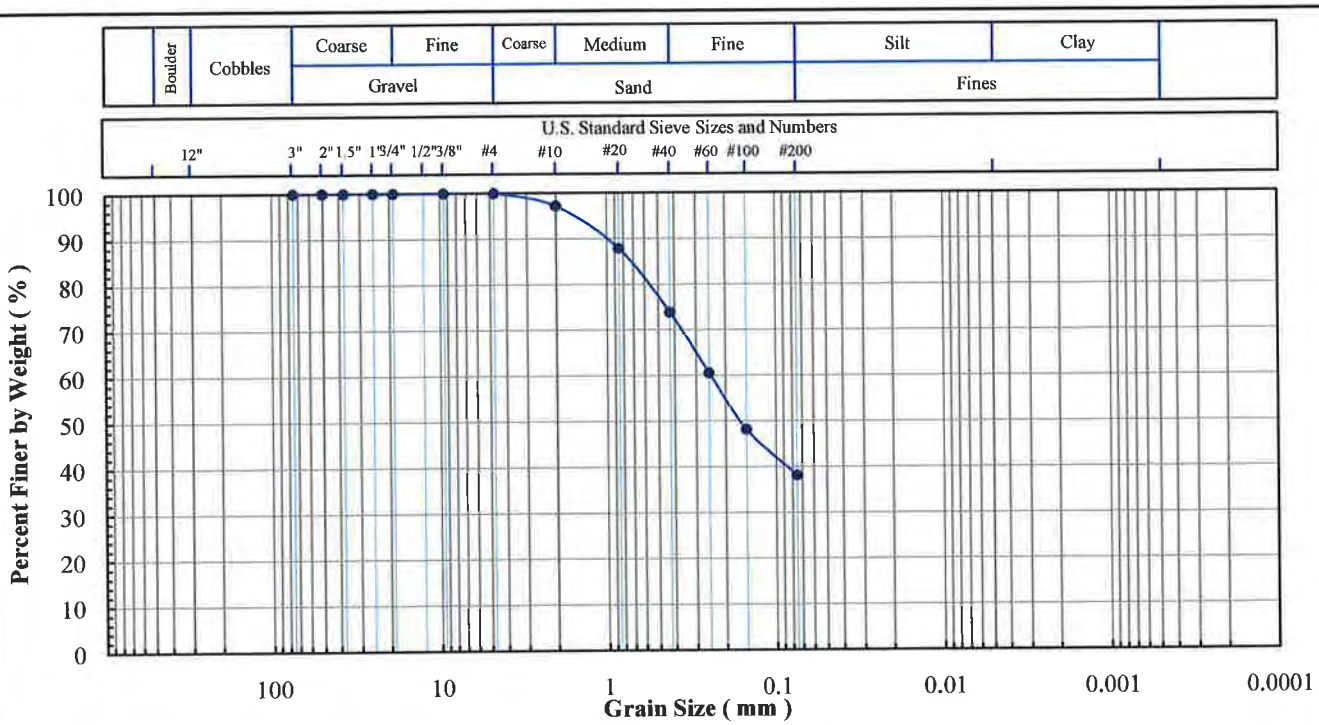
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-14-Deep Saprolite (45.0-69.0')
Lab Sample No:	13L034E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



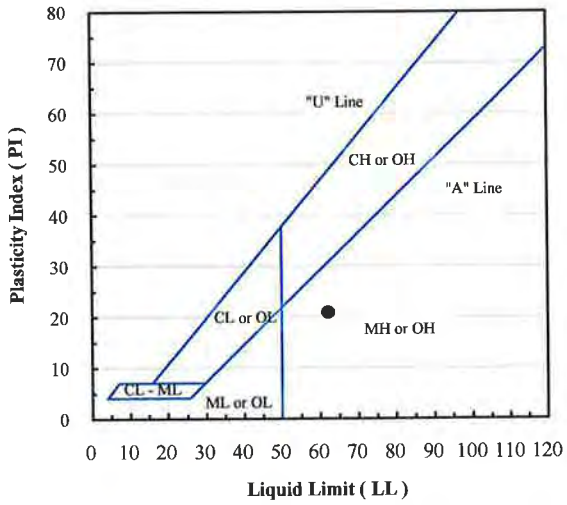
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	97.2
#20	0.850	87.9
#40	0.425	73.8
#60	0.250	60.5
#100	0.150	48.1
#200	0.075	38.1

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	61.9
Fines (%):	38.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-14-Deep Saprolite (45.0-69.0')	13L034E	38.3	38.1	62	41	21	SM - Silty Sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

4-7-14
NSR

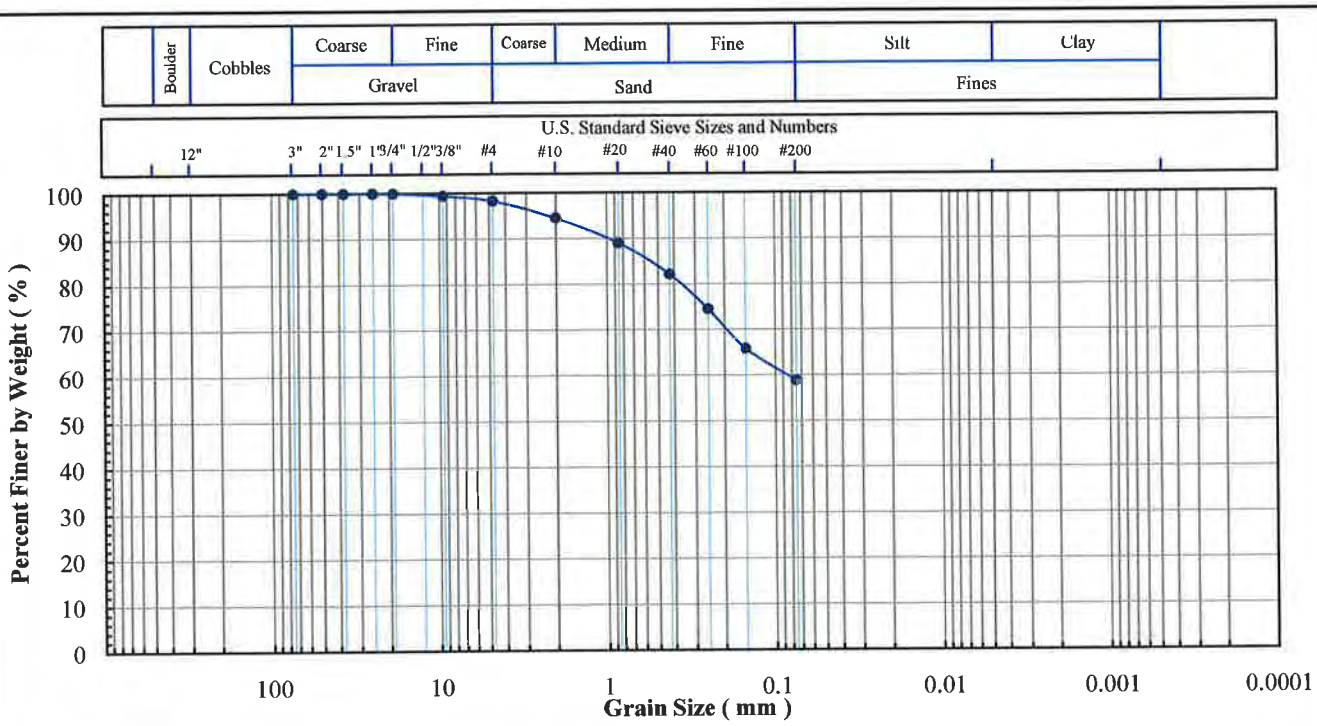
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-17-Residuum (0.0-13.0')
Lab Sample No:	13L035E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



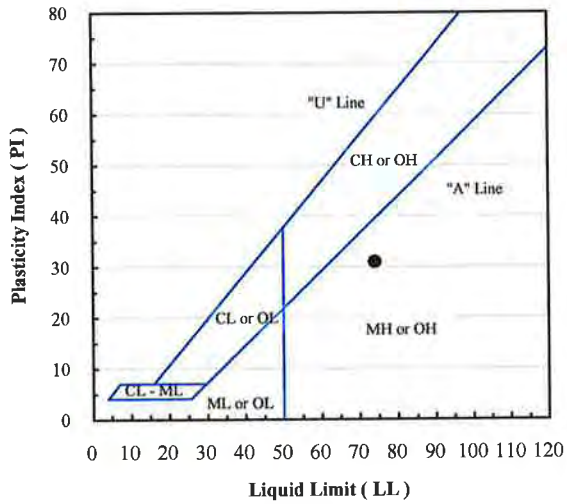
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	99.4
#4	4.75	98.3
#10	2.00	94.5
#20	0.850	89.0
#40	0.425	82.1
#60	0.250	74.5
#100	0.150	65.8
#200	0.075	58.8

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.7
Sand (%):	39.5
Fines (%):	58.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-17-Residuum (0.0-13.0')	13L035E	27.2	58.8	74	43	31	MH - Sandy elastic silt

Note(s):

2-9-14
NSR

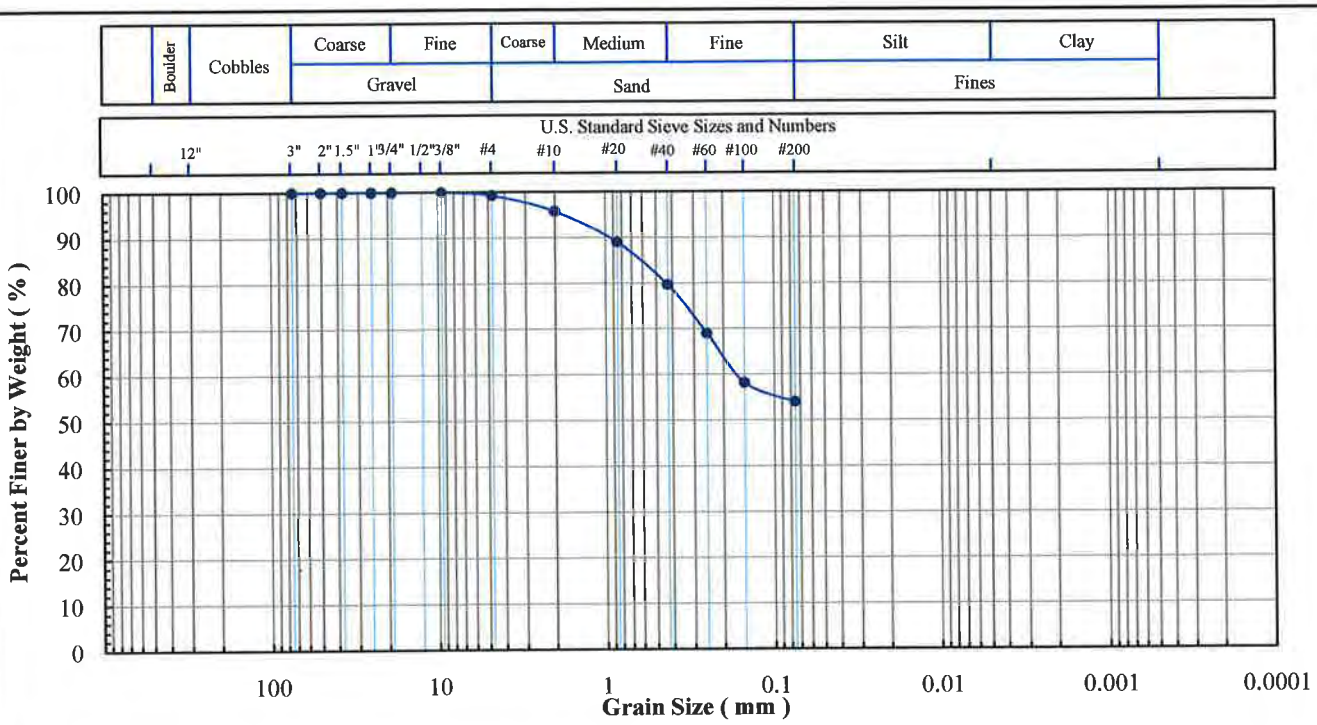
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-17-Saprolite (13.0-58.0')
Lab Sample No:	13L036E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



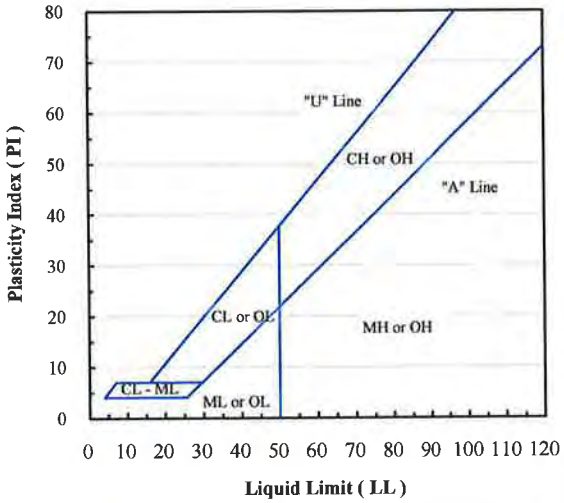
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.3
#10	2.00	95.8
#20	0.850	89.0
#40	0.425	79.6
#60	0.250	69.0
#100	0.150	58.1
#200	0.075	53.9

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.7
Sand (%):	45.4
Fines (%):	53.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-17-Saprolite (13.0-58.0')	13L036E	39.3	53.9	NP	NP	NP	ML - Sandy silt

Note(s):

2-9-14
NSA

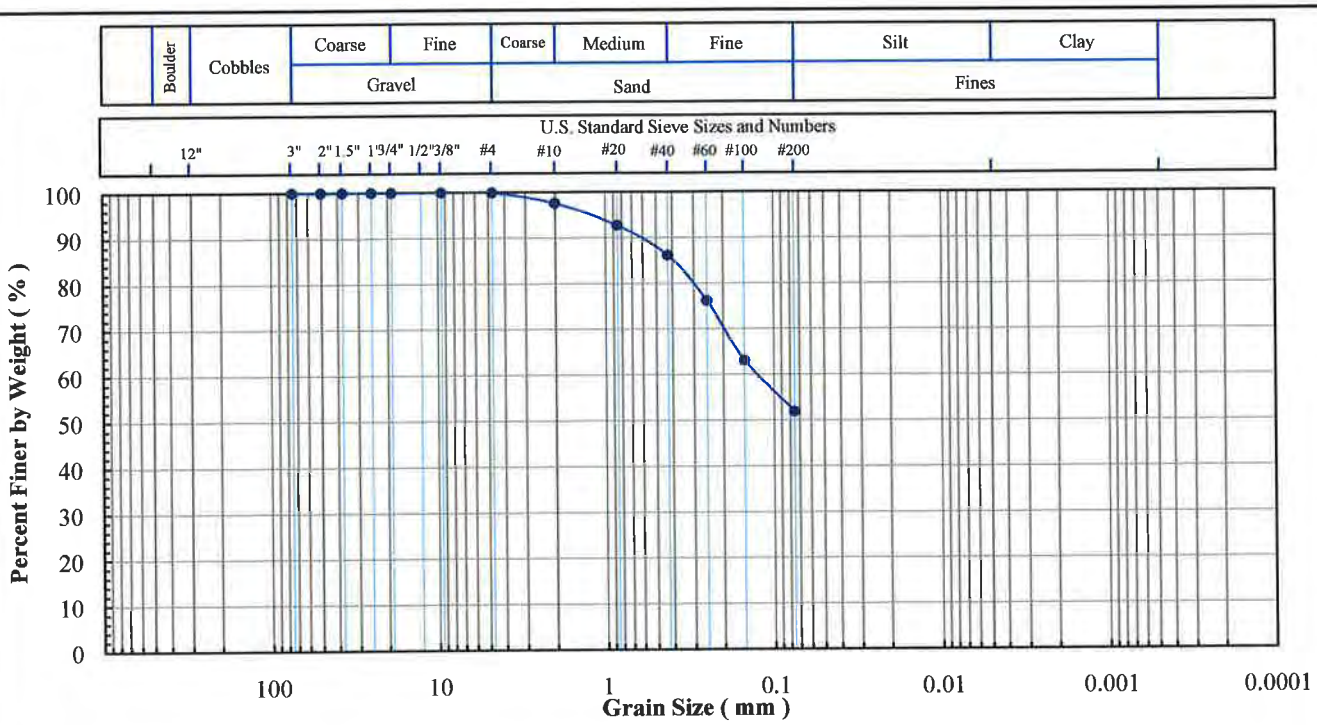
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-17-Saprolite/PWR (58.0-76.5')
Lab Sample No:	13L037E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



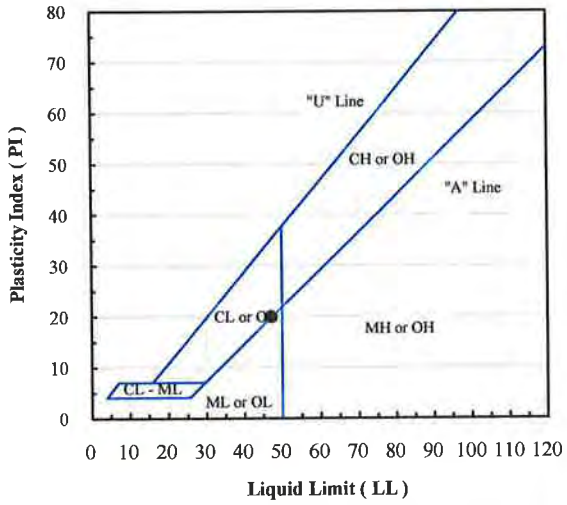
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.9
#10	2.00	97.6
#20	0.850	92.7
#40	0.425	86.1
#60	0.250	76.2
#100	0.150	63.1
#200	0.075	51.9

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.1
Sand (%):	48.0
Fines (%):	51.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-17-Saprolite/PWR (58.0-76.5')	13L037E	42.9	51.9	47	27	20	CL - Sandy lean clay

Note(s):

2-9-14
JSR

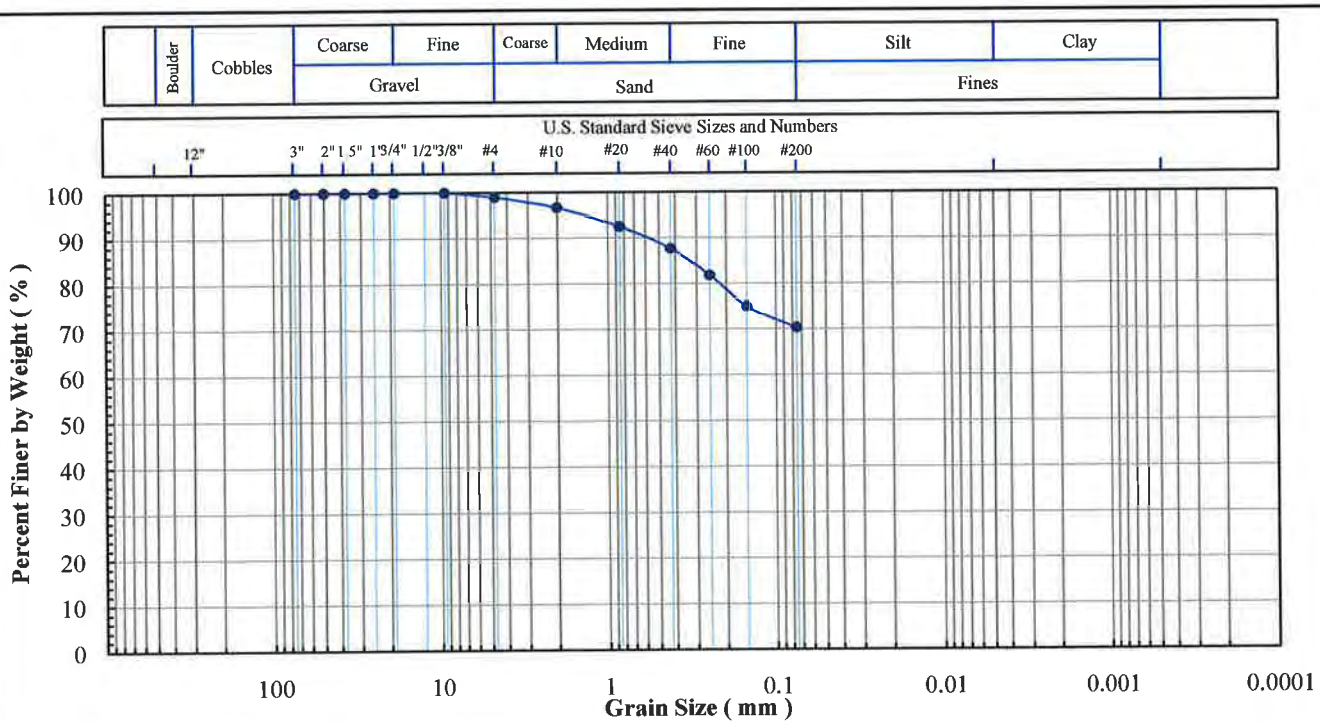
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing\
Project No:	621
Client Sample ID:	VBW-18B-Residuum (0.0-13.0')
Lab Sample No:	13L038E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



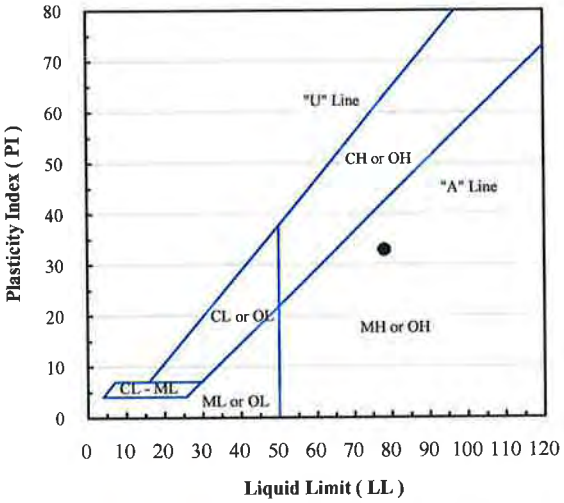
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.0
#10	2.00	96.7
#20	0.850	92.5
#40	0.425	87.7
#60	0.250	81.8
#100	0.150	75.0
#200	0.075	70.2

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.0
Sand (%):	28.8
Fines (%):	70.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-18B-Residuum (0.0-13.0')	13L038E	29.2	70.2	78	45	33	MH - Elastic silt with sand

Note(s):

2-9-14
NSB

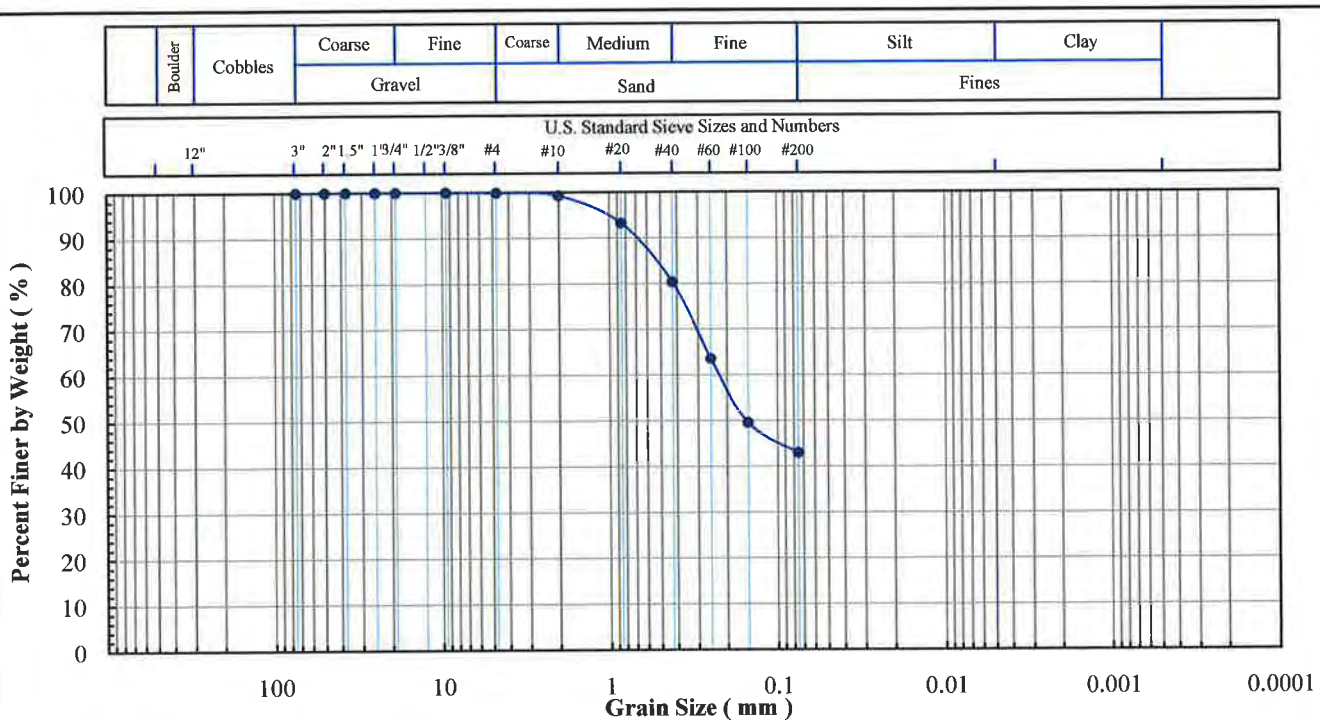
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-18B-Saprolite (13.0-43.0')
Lab Sample No:	13L039E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



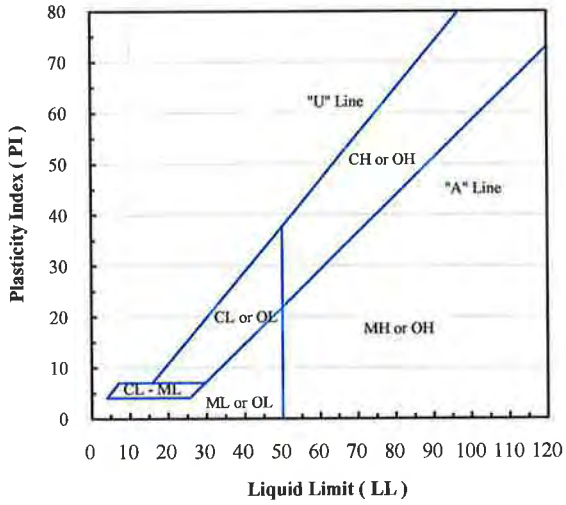
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.9
#10	2.00	99.3
#20	0.850	93.3
#40	0.425	80.3
#60	0.250	63.6
#100	0.150	49.5
#200	0.075	42.9

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.1
Sand (%):	57.0
Fines (%):	42.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-18B-Saprolite (13.0-43.0')	13L039E	25.8	42.9	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

2-9-14
NSP

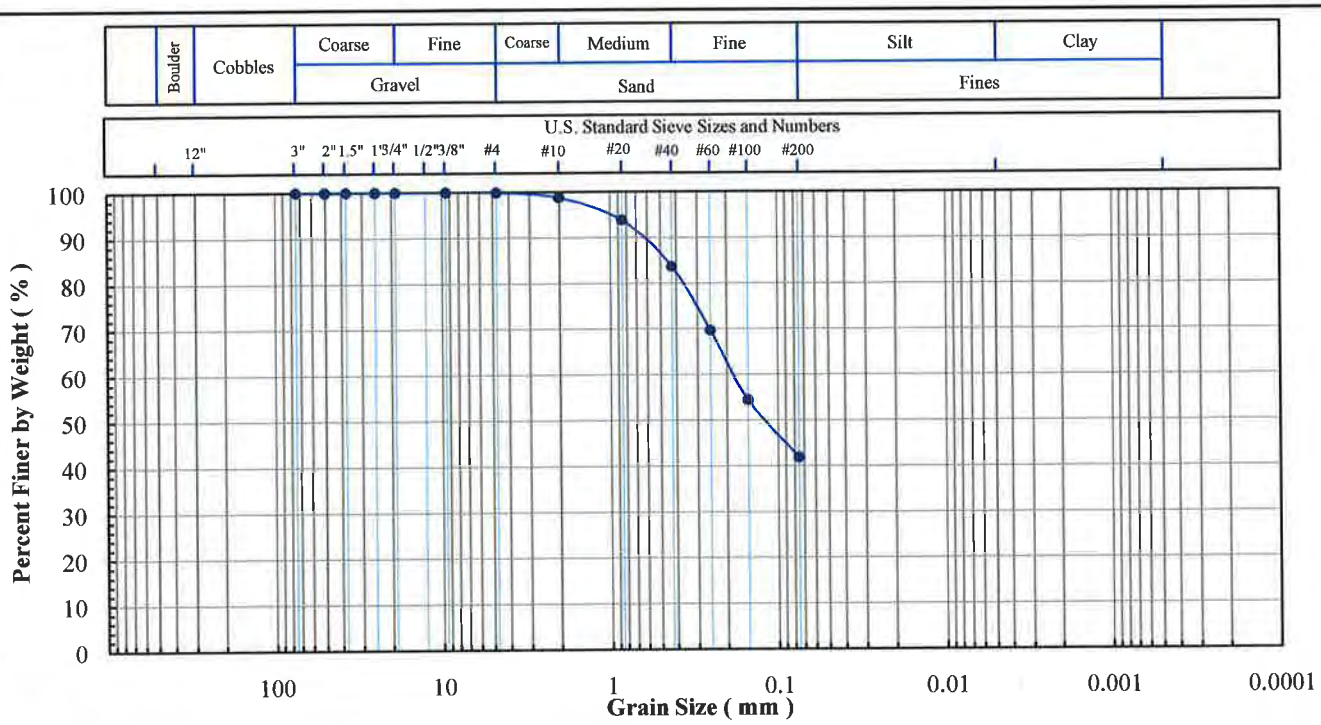
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	VBW-18B-Saprolite/PWR (43.0-87.0')
Lab Sample No:	13L040E

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



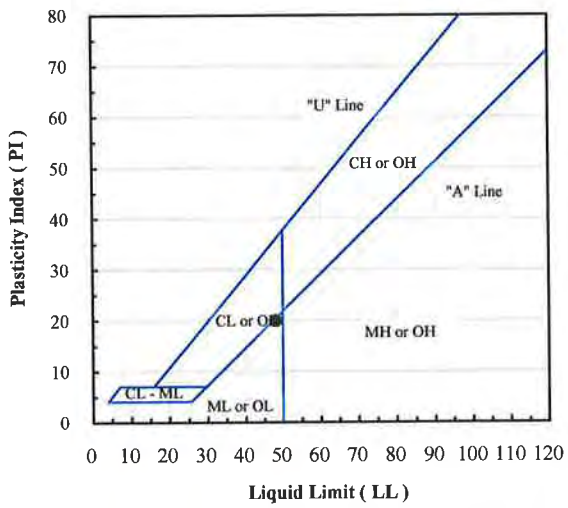
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.9
#10	2.00	98.8
#20	0.850	93.8
#40	0.425	83.7
#60	0.250	69.7
#100	0.150	54.4
#200	0.075	41.8

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.1
Sand (%):	58.1
Fines (%):	41.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
VBW-18B-Saprolite/PWR (43.0-87.0')	13L040E	40.1	41.8	48	28	20	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

2-9-14
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Phase 1

Classification of Site Soils and Composite Soil Mixes

Attachment P1-C

Composite Soil Index Test Results

Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Table P1-C-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information		Composite Soil Ratio			Remarks
Site ID (-)	Lab. No. (-)	CS-01 (-)	CS-02 (-)	CS-03 (-)	
VBW-4B-Residum (0.0-12.5')	13L014E	1.0			
VBW-4B-Saprolite (12.5-69.5')	13L015E		1.0	0.3	
VBW-6-Residuum (0.0-18.5')	13L019E	1.0		0.1	
VBW-6-Saprolite (18.5-55.0')	13L020E		0.6		
VBW-6-PWR (55.0-77.5')	13L021E		0.4	0.1	
VBW-9-Residuum (0.0-14.0')	13L025E	1.0			
VBW-9-Saprolite (14.0-69.0')	13L026E		0.8	0.3	
VBW-9-PWR (69.0-85.5')	13L027E		0.2		
VBW-11-Residuum (0.0-23.0')	13L028E	1.0			
VBW-11-Saprolite (23.0-83.0')	13L029E		1.0		
VBW-14-Residuum (1.5-9.0')	13L032E	1.0		0.1	
VBW-14-Saprolite (9.0-45.0')	13L033E		0.6		
VBW-14-Deep Saprolite (45.0-69.0')	13L034E		0.4	0.1	
VBW-17-Residuum (0.0-13.0')	13L035E	1.0			
VBW-17-Saprolite (13.0-58.0')	13L036E		0.7		
VBW-17-Saprolite/PWR (58.0-76.5')	13L037E		0.3		
VBW-18B-Residuum (0.0-13.0')	13L038E	1.0			
VBW-18B-Saprolite (13.0-43.0')	13L039E		0.4		
VBW-18B-Saprolite/PWR (43.0-87.0')	13L040E		0.6		

Notes:

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"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
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Table P1-C-02

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information		Test Information										
Site ID	Lab No.	Moisture Content ASTM D 2216	Grain Size Analysis ASTM D 422					Atterberg Limits ASTM D 4318			Engineering Classification ASTM D 2487	Remarks
			Gravel Content	Sand Content	Fines Content	Silt Content	Clay Content	LL	PL	PI		
(-)	(-)	(%)	(%)	(%)	(%)	(%)	(%)	(-)	(-)	(-)	(-)	
CS-01	14B033	21.7	6.3	42.4	51.3			NP	NP	NP	ML	
CS-02	14B034	34.1	0.6	57.2	42.2			NP	NP	NP	SM	
CS-03	14C061	34.5	0.8	57.5	41.7			49	35	14	SM	

Notes:

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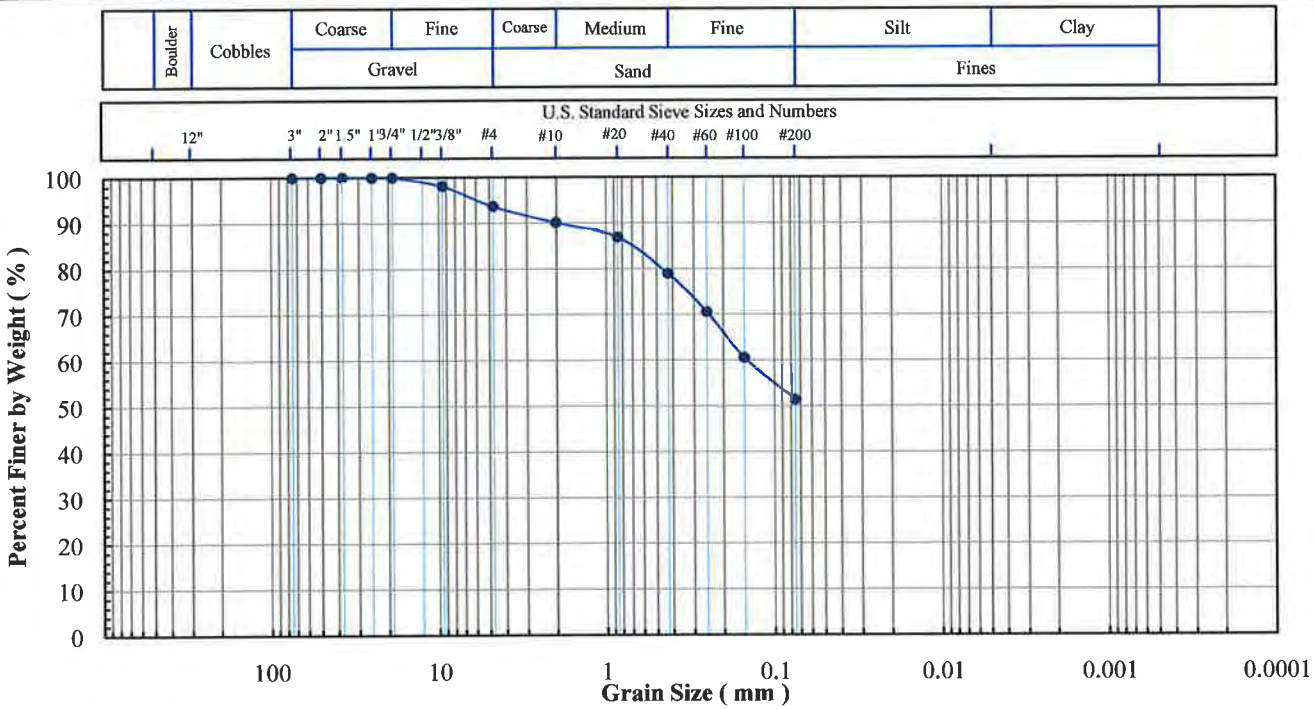
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CS-01
Lab Sample No:	14B033

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



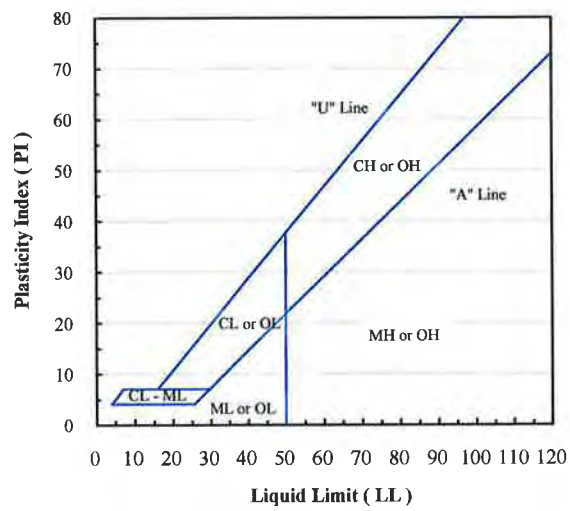
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	98.1
#4	4.75	93.7
#10	2.00	90.1
#20	0.850	86.9
#40	0.425	78.9
#60	0.250	70.5
#100	0.150	60.5
#200	0.075	51.3

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	6.3
Sand (%):	42.4
Fines (%):	51.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
CS-01	14B033	21.7	51.3	NP	NP	NP	ML - Sandy silt

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.
One particle larger than 1.5 in. was discarded.

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Excel Geotechnical Testing, Inc.
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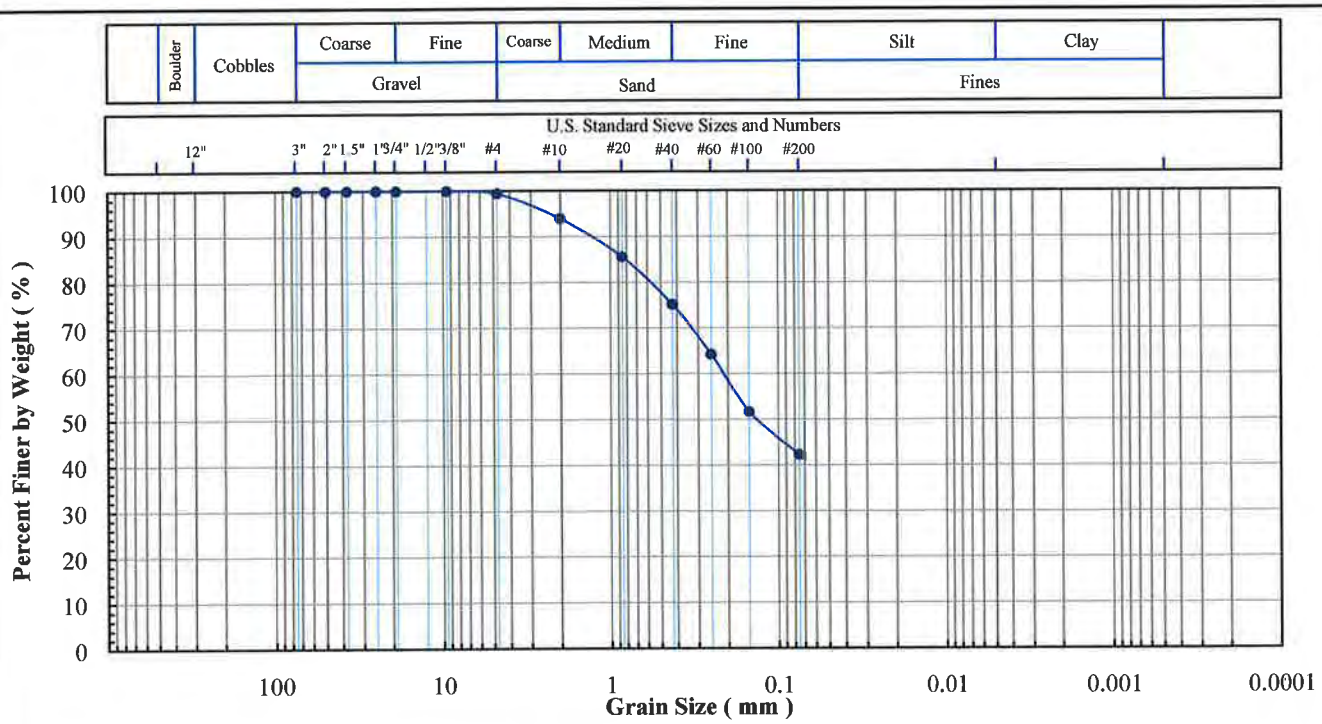
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CS-02
Lab Sample No:	14B034

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



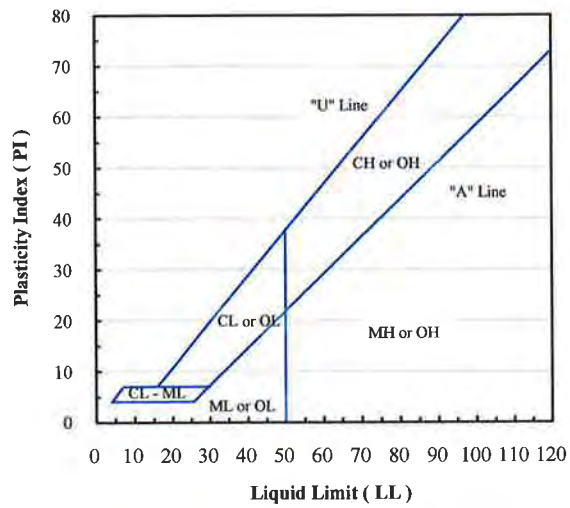
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.4
#10	2.00	94.0
#20	0.850	85.6
#40	0.425	75.1
#60	0.250	64.2
#100	0.150	51.7
#200	0.075	42.2

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.6
Sand (%):	57.2
Fines (%):	42.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
CS-02	14B034	34.1	42.2	NP	NP	NP	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

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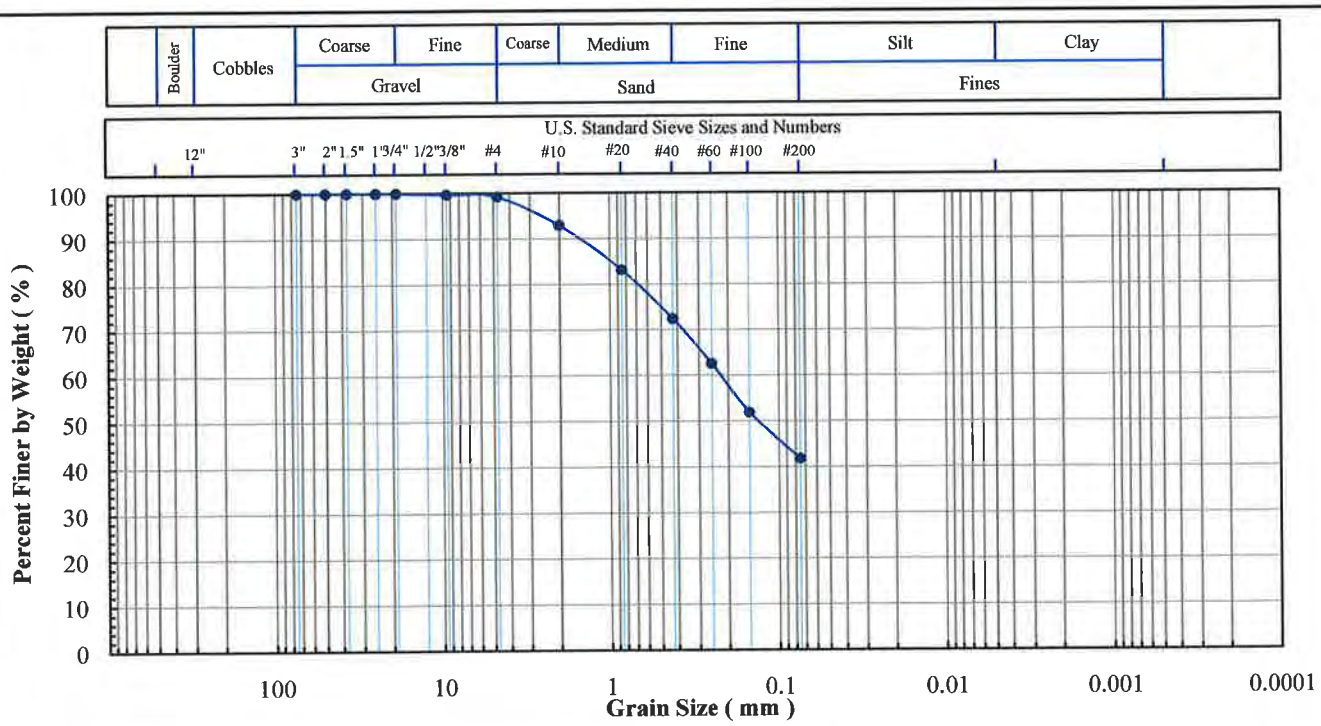
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CS-03
Lab Sample No:	14C061

ASTM C 136, D 422, D 854, D 1140, D2216, D 2487, D4318

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Content, Eng. Classification, Atterberg Limits



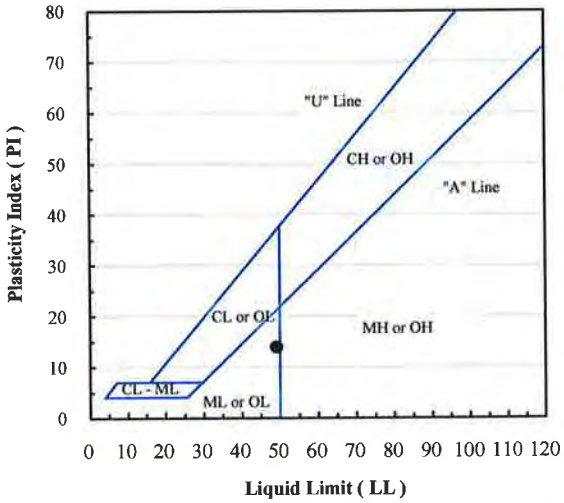
Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	99.7
#4	4.75	99.2
#10	2.00	92.9
#20	0.850	83.2
#40	0.425	72.4
#60	0.250	62.5
#100	0.150	51.9
#200	0.075	41.7

Specific Gravity (-):	

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	57.5
Fines (%):	41.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
CS-03	14C061	34.5	41.7	49	35	14	SM - Silty sand

Note(s): Engineering classification is based on the assumption that the fines are either ML or MH.

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Phase 2

Bentonite Slurry Evaluation and Compatibility

Purpose

Phase 2 of the testing program was performed to obtain general information about the slurry index properties of the test Bentonite when mixed with Site Hydrant Water (SHW), Site Ground Waters (SGWs) and, when applicable, cement.

Test Material

The test material consisted of:

- Site Hydrant Water;
- Two Site Ground Waters (P-5D & P-7D);
- WYO-BEN, Inc. HYDROGEL (Bentonite); and
- Cement Type I / II obtained from a local Home Depot store.

Bentonite slurry mixes were formed using SHW, P-5D, and P-7D at various mix ratios. Each Bentonite slurry was formed by adding the test Bentonite to the mix liquid and mixing it with a hand-held high speed blender to a uniform and smooth consistency. The Bentonite slurry mixes were then hydrated for a minimum of 24 hours before testing.

When applicable, cement was added to the hydrated Bentonite slurry and mixed with a hand-held high speed blender to a uniform and smooth consistency. The Cement Bentonite slurry mixes were tested immediately after mixing the cement.

The various slurry mixes and their respective compositions are presented in Table P2-01.

Test Results

The testing program consisted of general Bentonite slurry index tests as wells as observation of sedimentation (clear liquid appearing on top of the slurry) and flocculation (change in consistency and creation of cloud type layers within the slurry) in clear glass tubes. The test results are provided in the following attachments:

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Slurry Index Tests – The test results are provided in Attachment P2-A. The testing program consisted of Unit Weight, Marsh Funnel Viscosity, Filtrate Loss, and pH. The test results are summarized in Table P2-A-01

Observations – The test results are provided in Attachment P2-B. The Bentonite and Cement Bentonite slurry mixes made with SHW, P-5D, and P-7D were placed in 1500 cc glass observation tubes approximately 8 cm in diameter and 26 cm in height. Sedimentation and flocculation were monitored and pictures of the glass observation tubes were taken periodically during the test. The observations made are summarized in the following paragraphs and Table P2-B-01. The pictures of the glass observation tubes at different time intervals are provided in Picture P2-B-01 through Picture P2-B-08. For abbreviations used (e.g., B1-HW, B1-GW1, and B1-GW2) refer to Table P2-01.

- B1-HW, B1-GW1, and B1-GW2 (Picture P2-B-01) – the following observations were made.
    - B1-HW: A shim of water was observed at the top of the glass observations tube after approximately 6 days. The thickness of the water on top of the slurry increased with time. The thickness of the water measured at various time intervals is presented in Table P2-B-01. No flocculation was observed during the test period.
    - B1-GW1: A shim of water was observed at the top of the glass observation tube after approximately 1 hour. The thickness of the water on top of the slurry increased with time. The thickness of the water measured at various time intervals is presented in Table P2-B-01. Some minor flocculation was observed during the test period.
    - B1-GW2: A shim of water was observed at the top of the glass observation tube after approximately 1 hour. The thickness of the water on top of the slurry increased with time. The thickness of the water measured at various time intervals is presented in Table P2-B-01. No flocculation was observed during the test period.

- B2-HW, B2-GW1, and B2-GW2 (Picture P2-B-02) – the following observations were made.
    - B2-HW: A shim of water was observed at the top of the glass observation tube after approximately 28 days. The thickness of the water on top of the slurry increased with time. The thickness of the water measured at various time intervals is presented in Table P2-B-01. No flocculation was observed during the test period.
    - B2-GW1: A shim of water was observed at the top of the glass observation tube after approximately 1 hour. The thickness of the water on top of the slurry increased with time. The thickness of the water measured at various time intervals is presented in Table P2-B-01. Some minor flocculation was observed during the test period.
    - B2-GW2: A shim of water was observed at the top of the glass observation tube after approximately 12 days. The thickness of the water

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on top of the slurry increased with time. The thickness of the water measured at various time intervals is presented in Table P2-B-01. No flocculation was observed during the test period.

- B3-HW, B3-GW1, and B3-GW2 (Picture P2-B-03) – the following observations were made.
  - B3-HW: A shim of water was observed at the top of the glass observation tube after approximately 95 days. The thickness of the water on top of the slurry increased with time. The thickness of the water measured at various time intervals is presented in Table P2-B-01. No flocculation was observed during the test period.
  - B3-GW1: A shim of water was observed at the top of the glass observation tube after approximately 1 hour. The thickness of the water on top of the slurry increased with time. The thickness of the water measured at various time intervals is presented in Table P2-B-01. Some minor flocculation was observed during the test period.
  - B3-GW2: A shim of water was observed at the top of the glass observation tube after approximately 77 days. The thickness of the water on top of the slurry increased with time. The thickness of the water measured at various time intervals is presented in Table P2-B-01. No flocculation was observed during the test period.

- B4-HW, B4-GW1, B5-HW, and B5-GW1 (Picture P2-B-04) – the following observations were made.
  - B4-HW: Sedimentation and flocculation were not observed. The sample remained unchanged for the 124 day duration of the test.
  - B4-GW1: A shim of water was observed at the top of the glass observation tube after approximately 1 hour. The thickness of the water on top of the slurry increased with time. The thickness of the water measured at various time intervals is presented in Table P2-B-01. No flocculation was observed during the test period.
  - B5-HW: Sedimentation and flocculation were not observed. The sample remained unchanged for the 124 day duration of the test.
  - B5-GW1: A shim of water was observed at the top of the glass observation tube after approximately 1 hour. The thickness of the water on top of the slurry increased with time. The thickness of the water measured at various time intervals is presented in Table P2-B-01. No flocculation was observed during the test period.

- CB1-HW, CB1-GW1, and CB1-GW2 (Picture P2-B-05) – the following observations were made.
  - CB1-HW: The sample was observed for approximately 119 days and did not exhibit sedimentation or flocculation. The sample hardened within the first 7 days and changed color from a dark grey to a khaki color.

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- CB1-GW1: The sample was observed for approximately 119 days and did not exhibit sedimentation or flocculation. The sample hardened within the first 7 days and changed color from a dark grey to a khaki color.
- CB1-GW2: The sample was observed for approximately 119 days and did not exhibit sedimentation or flocculation. The sample hardened within the first 7 days and changed color from a dark grey to a khaki color.

- CB2-HW, CB2-GW1, and CB2-GW2 (Picture P2-B-06) – the following observations were made.
  - CB2-HW: The sample was observed for approximately 119 days and did not exhibit sedimentation or flocculation. The sample hardened within the first 7 days and changed color from a dark grey to a khaki color. Cracks approximately 0.1 cm thick that encompassed the sample were observed approximately 17, 19, and 20 cm from the bottom of the sample during the test period.
  - CB2-GW1: The sample was observed for approximately 119 days and did not exhibit sedimentation or flocculation. The sample hardened within the first 7 days and changed color from a dark grey to a khaki color.
  - CB2-GW2: The sample was observed for approximately 119 days and did not exhibit sedimentation or flocculation. The sample hardened within the first 7 days and changed color from a dark grey to a khaki color. Cracks approximately 0.1 cm thick and 5.0 cm to 7.0 cm in length were observed approximately 21 cm from the bottom of the sample during the test period.

- CB3-HW, CB3-GW1, and CB3-GW2 (Picture P2-B-07) – the following observations were made.
  - CB3-HW: The sample was observed for approximately 119 days and did not exhibit sedimentation or flocculation. The sample hardened within the first 7 days and changed color from a dark grey to a khaki color.
  - CB3-GW1: The sample was observed for approximately 119 days and did not exhibit sedimentation or flocculation. The sample hardened within the first 7 days and changed color from a dark grey to a khaki color. Cracks approximately 0.3 cm thick and 5.0 cm in length were observed approximately 22 cm from the bottom of the sample during the test period.
  - CB3-GW2: The sample was observed for approximately 119 days and did not exhibit sedimentation or flocculation. The sample hardened within the first 7 days and changed color from a dark grey to a khaki color. Cracks approximately 0.1 cm thick and 6.0 cm in length were observed approximately 12 cm from the bottom of the sample during the test period.
- CB4-HW (Picture P2-B-08) was observed for approximately 124 days. The sample showed no signs of sedimentation or flocculation. The sample hardened within the first 7 days and changed color from a dark grey to a khaki color.

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Table P2-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information		Slurry Properties			Remarks
Site ID (-)	Lab. No. (-)	Mix Liquid (-)	Bentonite Added [1] (%)	Cement to Mix Liquid Ratio [2] (-)	
B1-HW	14B014	Hydrant Water	4	-	
B1-GW1	14B015	Groundwater (P-5D)	4	-	
B1-GW2	14B016	Groundwater (P-7D)	4	-	
B2-HW	14B017	Hydrant Water	5	-	
B2-GW1	14B018	Groundwater (P-5D)	5	-	
B2-GW2	14B019	Groundwater (P-7D)	5	-	
B3-HW	14B020	Hydrant Water	6	-	
B3-GW1	14B021	Groundwater (P-5D)	6	-	
B3-GW2	14B022	Groundwater (P-7D)	6	-	
B4-HW	14C012	Hydrant Water	7	-	
B4-GW1	14C013	Groundwater (P-5D)	7	-	
B4-GW2	-	Groundwater (P-7D)	-	-	Note 3
B5-HW	14C014	Hydrant Water	8	-	
B5-GW1	14C015	Groundwater (P-5D)	8	-	
B5-GW2	-	Groundwater (P-7D)	-	-	Note 3
CB1-HW	14B023	Hydrant Water	6	0.16	
CB1-GW1	14B024	Groundwater (P-5D)	6	0.16	
CB1-GW2	14B025	Groundwater (P-7D)	6	0.16	
CB2-HW	14B026	Hydrant Water	6	0.19	
CB2-GW1	14B027	Groundwater (P-5D)	6	0.19	
CB2-GW2	14B028	Groundwater (P-7D)	6	0.19	
CB3-HW	14B029	Hydrant Water	5	0.21	
CB3-GW1	14B030	Groundwater (P-5D)	5	0.21	
CB3-GW2	14B031	Groundwater (P-7D)	5	0.21	
CB4-HW	14C080	Hydrant Water	7	0.19	
CB4-GW1	-	Groundwater (P-5D)	-	-	Note 3
CB4-GW2	-	Groundwater (P-7D)	-	-	Note 3

Notes:
1. Weight of Betonite to weight of the Mix Liquid.
2. Weight of Cement to weight of the Mix Liquid.
3. Slurry mix was not requested.

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Phase 2

Bentonite Slurry Evaluation and Compatibility

Attachment P2-A

Slurry Index Test Results

Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
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Table P2-A-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Site ID (-)	Lab. No. (-)	Unit Weight API 13B-1 Temp. (°F)	Unit Weight API 13B-1 Unit Weight (pcf)	Marsh Funnel Viscosity API 13B-1 Temp. 68 (°F)	Marsh Funnel Viscosity API 13B-1 Time (Sec)	Filtrate Loss API 13B-1 Temp. (°F)	Filtrate Loss API 13B-1 Volume (ml)	Filtrate Loss API 13B-1 Cake Thickness (in.)	Filtrate Loss API 13B-1 Consistency (-)	pH (1) Modified ASTM D 4972 Method B	Notes
Hydrogel	14B003	-	-	-	-	-	-	-	-	-	
Cement Type I/II from Home Depot	14B032	-	-	-	-	-	-	-	-	-	
Hydrant Water	13L467	-	-	-	-	-	-	-	-	6.3	
Groundwater (P-5D)	14A035-A	-	-	-	-	-	-	-	-	7.4	
Groundwater (P-7D)	14A035-B	-	-	-	-	-	-	-	-	7.4	
B1-HW (4% Bentonite, 0% Cement, Hydrant Water)	14B014	64.4	62.9	64.4	31	63.5	19.5	0.043	Firm, Rubbery	7.3	
B2-HW (5% Bentonite, 0% Cement, Hydrant Water)	14B017	65.3	63.6	65.3	36	61.9	17.5	0.055	Firm, Rubbery	7.1	
B3-HW (6% Bentonite, 0% Cement, Hydrant Water)	14B020	65.3	63.7	65.3	46	64.4	14.0	0.059	Firm, Rubbery	7.1	
B4-HW (7% Bentonite, 0% Cement, Hydrant Water)	14C012	68.3	64.1	68.3	74	68.3	13.2	0.067	Firm, Rubbery	7.1	
B5-HW (8% Bentonite, 0% Cement, Hydrant Water)	14C014	66.7	64.6	66.7	148	66.7	12.2	0.071	Firm, Rubbery	7.1	
B1-GW1 (4% Bentonite, 0% Cement, P-5D)	14B015	63.8	63.2	63.8	27	64.4	50.6	0.062	Firm, Rubbery	7.3	
B2-GW1 (5% Bentonite, 0% Cement, P-5D)	14B018	64.8	63.6	64.8	28	64.0	40.6	0.069	Firm, Rubbery	7.2	
B3-GW1 (6% Bentonite, 0% Cement, P-5D)	14B021	63.5	63.7	63.5	30	63.7	35.0	0.072	Firm, Rubbery	7.3	
B4-GW1 (7% Bentonite, 0% Cement, P-5D)	14C013	65.4	63.9	65.4	33	65.4	28.3	0.086	Firm, Rubbery	7.2	
B5-GW1 (8% Bentonite, 0% Cement, P-5D)	14C015	65.5	64.3	65.5	35	65.5	26.4	0.093	Firm, Rubbery	7.2	
B1-GW2 (4% Bentonite, 0% Cement, P-7D)	14B016	62.4	63.6	62.4	31	60.7	20.4	0.043	Firm, Rubbery	7.1	
B2-GW2 (5% Bentonite, 0% Cement, P-7D)	14B019	64.0	63.7	64.0	34	61.8	17.2	0.05	Firm, Rubbery	7.1	
B3-GW2 (6% Bentonite, 0% Cement, P-7D)	14B022	64.2	63.8	64.2	37	63.8	16.2	0.057	Firm, Rubbery	7.2	
B4-GW2 (-% Bentonite, -% Cement, P-7D)	-	-	-	-	-	-	-	-	-	-	5
B5-GW2 (-% Bentonite, -% Cement, P-7D)	-	-	-	-	-	-	-	-	-	-	5
CB1-HW (6% Bentonite, 16% Cement, Hydrant Water)	14B023	65.4	69.9	65.4	Note 2	-	-	-	-	Above 13	3
CB2-HW (6% Bentonite, 19% Cement, Hydrant Water)	14B026	66.7	70.7	66.7	Note 2	-	-	-	-	Above 13	4
CB3-HW (5% Bentonite 21% Cement, Hydrant Water)	14B029	69.0	71.0	69.0	Note 2	-	-	-	-	Above 13	3
CB4-HW (7% Bentonite, 19% Cement, Hydrant Water)	14C080	62.8	72.0	62.8	Note 2	-	-	-	-	Above 13	3
CB1-GW1 (6% Bentonite, 16% Cement, P-5D)	14B024	66.2	68.1	66.2	42	-	-	-	-	Above 13	4
CB2-GW1 (6% Bentontie, 19% Cement, P-5D)	14B027	66.7	65.1	66.7	53	-	-	-	-	Above 13	4
CB3-GW1 (5% Bentonite, 21% Cement, P-5D)	14B030	68.8	62.1	68.8	39	-	-	-	-	Above 13	3
CB4-GW1 (-% Bentonite, -% Cement, P-5D)	-	-	-	-	-	-	-	-	-	-	5
CB1-GW2 (6% Bentonite, 16% Cement, P-7D)	14B025	63.6	70.3	63.6	Note 2	-	-	-	-	Above 13	4
CB2-GW2 (6% Benonite, 19% Cement, P-7D)	14B028	68.0	71.0	68.0	Note 2	-	-	-	-	Above 13	4
CB3-GW2 (5% Bentonite, 21% Cement, P-7D)	14B031	68.0	71.1	68.0	Note 2	-	-	-	-	Above 13	3
CB4-GW2 (-% Bentonite, -% Cement, P-7D)	-	-	-	-	-	-	-	-	-	-	5

Notes:
1. pH was obtained from the mixed test slurries.
2. Test slurry was too thick to pass through the Marsh Funnel.
3. Test slurry contained a lot of trapped air bubbles after mixing.
4. Test slurry contained some trapped air bubbles after mixing.
5. Tests were not requested.

7-25-14
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Phase 2

Bentonite Slurry Evaluation and Compatibility

Attachment P2-B

Bentonite Slurry Observations

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Table P2-B-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information		Liquid Thickness on top of Slurry (cm)								Remarks
Site ID	Lab. No.	Approximate Time Interval (Days)								
(-)	(-)	1	4	7	15	30	60	90	120	
B1-HW	14B014	0.0	0.0	0.2	0.7	0.8	2.0	2.4	2.8	
B1-GW1	14B015	11.3	11.9	12.2	12.4	12.6	12.9	12.9	12.9	
B1-GW2	14B016	0.6	1.3	2.0	3.0	3.6	5.8	6.6	7.1	
B2-HW	14B017	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.9	
B2-GW1	14B018	11.5	11.9	12.2	12.1	12.2	12.4	12.7	12.5	
B2-GW2	14B019	0.0	0.0	0.0	0.0	0.3	0.8	1.6	1.8	
B3-HW	14B020	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	
B3-GW1	14B021	8.6	9.2	9.9	10.2	10.6	10.9	11.4	11.7	
B3-GW2	14B022	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.7	
B4-HW	14C012	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
B4-GW1	14C013	1.2	2.7	2.9	3.6	4.0	4.8	4.8	5.1	
B4-GW2	-	-	-	-	-	-	-	-	-	Note 1
B5-HW	14C014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
B5-GW1	14C015	0.0	0.4	0.5	0.7	1.3	1.9	2.0	2.5	
B5-GW2	-	-	-	-	-	-	-	-	-	Note 1
CB1-HW	14B023	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CB1-GW1	14B024	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CB1-GW2	14B025	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CB2-HW	14B026	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CB2-GW1	14B027	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CB2-GW2	14B028	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CB3-HW	14B029	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CB3-GW1	14B030	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CB3-GW2	14B031	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CB4-HW	14C080	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CB4-GW1	-	-	-	-	-	-	-	-	-	Note 1
CB4-GW2	-	-	-	-	-	-	-	-	-	Note 1

Notes: 1. Slurry Mix was not requested.

7-21-14
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Picture P2-B-01

Project Name: Chemtronics Geotechnical Testing
Project No: 621

(a) 2/20/2014
Day 3

(b) 3/14/2014
Day 25

(c) 4/18/2014
Day 60

(d) 6/16/2014
Day 119

Notes:

B1-HW (14B014) - Hydrant Water mixed with 4% Bentonite and 0% Cement (Left Observation Tube).
B1-GW1 (14B015) - Ground water (P-5D) mixed with 4% Bentonite and 0% Cement (Middle Observation Tube).
B1-GW2 (14B016) - Ground water (P-7D) mixed with 4% Bentonite and 0% Cement (Right Observation Tube).

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Picture P2-B-02

Project Name: Chemtronics Geotechnical Testing
Project No: 621

(a) 2/20/2014
Day 3

(b) 3/14/2014
Day 25

(c) 4/18/2014
Day 60

(d) 6/16/2014
Day 119

Notes:

B2-HW (14B017) - Hydrant Water mixed with 5% Bentonite and 0% Cement (Left Observation Tube).
B2-GW1 (14B018) - Ground water (P-5D) mixed with 5% Bentonite and 0% Cement (Middle Observation Tube).
B2-GW2 (14B019) - Ground water (P-7D) mixed with 5% Bentonite and 0% Cement (Right Observation Tube).

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Picture P2-B-03

Project Name: Chemtronics Geotechnical Testing
Project No: 621

(a) 2/20/2014
Day 3

(b) 3/14/2014
Day 25

(c) 4/18/2014
Day 60

(d) 6/16/2014
Day 119

Notes:

B3-HW (14B020) -Hydrant Water mixed with 6% Bentonite and 0% Cement (Left Observation Tube).
B3-GW1 (14B021) - Ground water (P-5D) mixed with 6% Bentonite and 0% Cement (Middle Observation Tube).
B3-GW2 (14B022) - Ground water (P-7D) mixed with 6% Bentonite and 0% Cement (Right Observation Tube).

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Picture P2-B-04

Project Name: Chemtronics Geotechnical Testing
Project No: 621

(a) 3/14/2014
Day 1

(b) 4/18/2014
Day 35

(c) 6/16/2014
Day 94

(d) 7/16/2014
Day 124

Notes:

B4-HW (14C012) - Hydrant Water mixed with 7% Bentonite and 0% Cement (Left Observation Tube).
B4-GW1 (14C013) - Ground water (P-5D) mixed with 7% Bentonite and 0% Cement (Middle Left Observation Tube).
B5-HW (14C014) - Hydrant Water mixed with 8% Bentonite and 0% Cement (Middle Right Observation Tube).
B5-GW1 (14C015) - Ground water (P-5D) mixed with 8% Bentonite and 0% Cement (Right Observation Tube).

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Picture P2-B-05

Project Name: Chemtronics Geotechnical Testing
Project No: 621

(a) 2/20/2014
Day 2

(b) 3/14/2014
Day 23

(c) 4/18/2014
Day 58

(d) 6/16/2014
Day 117

Notes:

CB1-HW (14B023) - Hydrant Water mixed with 6% Bentonite and 16% Cement (Left Observation Tube).
CB1-GW1 (14B024) - Ground water (P-5D) mixed with 6% Bentonite and 16% Cement (Middle Observation Tube).
CB1-GW2 (14B025) - Ground water (P-7D) mixed with 6% Bentonite and 16% Cement (Right Observation Tube).

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Picture P2-B-06

Project Name: Chemtronics Geotechnical Testing
Project No: 621

(a) 2/20/2014
Day 2

(b) 3/14/2014
Day 23

(c) 4/18/2014
Day 58

(d) 6/16/2014
Day 117

Notes:

CB2-HW (14C026) - Hydrant Water mixed with 6% Bentonite and 19% Cement (Left Observation Tube).
CB2-GW1 (14C027) - Ground water (P-5D) mixed with 6% Bentonite and 19% Cement (Middle Observation Tube).
CB2-GW2 (14C028) - Ground water (P-7D) mixed with 6% Bentonite and 19% Cement (Right Observation Tube).

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Picture P2-B-07

Project Name: Chemtronics Geotechnical Testing
Project No: 621

(a) 2/20/2014
Day 2

(b) 3/14/2014
Day 23

(c) 4/18/2014
Day 58

(d) 6/16/2014
Day 117

Notes:

CB3-HW (14B029) - Hydrant Water mixed with 5% Bentonite and 21% Cement(Left Observation Tube) .
CB3-GW1 (14B030) - Ground water (P-5D) mixed with 5% Bentonite and 21% Cement (Middle Observation Tube).
CB3-GW2 (14B031) - Ground water (P-7D) mixed with 5% Bentonite and 21% Cement (Right Observation Tube).

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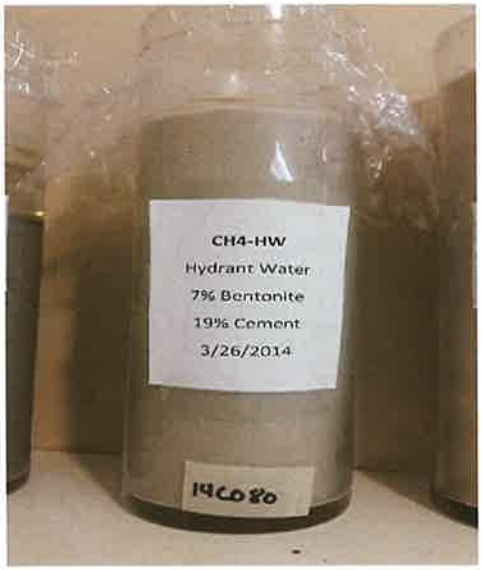
Picture P2-B-08

Project Name: Chemtronics Geotechnical Testing
Project No: 621

(a) 4/18/2014
Day 23

(b) 6/16/2014
Day 82

(c) 6/28/2014
Day 94



(d) 7/16/2014
Day 112

Notes:

CB4-HW (14C080) - Hydrant Water mixed with 7% Bentonite and 19% Cement.

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Sample was mislabeled in the photographs as CH4-HW. The actual Site ID is CB4-HW.

Phase 3

Soil Cement Bentonite, Soil Bentonite, and Cement Bentonite Mix Design and Evaluation

Purpose

Phase 3 of the testing program was performed to evaluate slump, permeability, and strength characteristics of various Soil Cement Bentonite, Soil Bentonite, and Cement Bentonite mixes. Bentonite and Cement Bentonite slurries prepared with Site Hydrant Water (SHW), dry Bentonite, and a composite soil sample were used at different ratios when preparing the test specimens (see Table P3-01). Site Ground Waters (SGWs) were used when saturating, consolidating, and permeating the permeability test specimens.

Test Material

The test material consisted of:

- Site Hydrant Water;
- Two Site Ground Waters (P-5D & P-7D);
- WYO-BEN, Inc. HYDROGEL (Bentonite);
- Cement Type I / II obtained form a local Home Depot store; and
- Composite soil samples CS-02 and CS-03.

Test Results

The test results are presented in the following attachments:

Baseline Permeability Testing of CS-02 – Test results are shown in Attachment P3-A. Two permeability tests were conducted on compacted CS-02 specimens; one specimen was formed using high compaction energy and the other specimen was formed using low compaction energy.

Slump Testing – Test results are shown in Attachment P3-B. Based on the initial soil index tests performed on composite soil samples (see Phase1), CS-03 was selected for further investigation. To avoid the need for a substantial amount of each soil slurry mix for the slump testing, both Standard Slump Cone (SSC) as well as a Mini Slump Cone

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(MSC) was used (Picture P3-B-01). The SSC was approximately 4 inches in top diameter, 8 inches in bottom diameter, and 12 inches in height. The MSC was approximately 2.7 inches in top diameter, 3.6 inches in bottom diameter, and 5.3 inches in height.

Since not enough CS-03 was available, CS-02 was used to obtain the correlation between the SSC and the MSC. The relationships between moisture content of the mix and its slump for both slump-cones are presented in Figure P3-B-01. The correlation for the slump values obtained for both slump-cones is depicted in Figure P3-B-02. The following equation was used to calculate the MSC slump necessary to achieve a SSC slump of 4 to 6 inches for the remaining Soil Cement Bentonite and Soil Bentonite Mixes:

$$MCS = 0.363 * (SSC) + 0.085$$

Permeability and Unconfined Compressive Strength Testing – Test results are shown in Attachments P3-C and P3-D for permeability and unconfined compressive strength, respectively.

The Bentonite slurries used were prepared with SHW and allowed to hydrate for at least 24 hours. The following procedures were used to form the test mixes:

- Soil Cement Bentonite Mix - Cement was added to the hydrated Bentonite slurry and mixed with a hand-held high speed blender to a uniform and smooth consistency. The resulted Cement Bentonite slurry was added to CS-03 and thoroughly mixed. If required, dry Bentonite was then added to the test material (based on the dry weight of the test soil) and thoroughly mixed. A MSC slump test was then performed on the resulted Soil Cement Bentonite mix. If needed, more Cement Bentonite slurry was added and thoroughly mixed and another MSC slump test was performed until a MSC slump equivalent to a SSC slump of 4 to 6 inches was achieved.
- Soil Bentonite Mix - Hydrated Bentonite slurry was added to CS-03 and thoroughly mixed. If required, dry Bentonite was then added to the test material (based on the dry weight of the test soil) and thoroughly mixed. A MSC slump test was then performed on the resulted Soil Bentonite mix. If needed, more Bentonite slurry was added and thoroughly mixed and another MSC slump test was performed until a MSC slump equivalent to a SSC slump of 4 to 6 inches was achieved.
- Cement Bentonite Mix - Cement was added to the Bentonite slurry and mixed with a hand-held high speed blender to a uniform and smooth consistency.

Test specimens for each set of permeability and strength testing were prepared at the same time to ensure uniformity. The following procedures were used to form the test specimens:

- Soil Cement Bentonite – Samples were prepared in 3 inch diameter by 6 inch high plastic cylinder molds in approximately 1 inch thick layers. Each layer was

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rodded with a half an inch diameter rod to remove air bubbles. The samples were kept in a high humidity cooler for the duration of the curing period. The following specific conditions were used:

  - Permeability test specimens were prepared in 3 approximately 1 inch thick layers and cured for 28 days. Each test specimen was trimmed after curing to a height of approximately 2.25 inches.
  - Unconfined compressive strength test specimens were prepared in 6 approximately 1 inch layers and tested at two different curing periods of 7 and 28 days. Each test specimen was trimmed after curing to a height of approximately 6.0 inches.

- Soil Bentonite – Test specimens were prepared in a stainless steel tube, approximately 2.8 inches in diameter and 2.3 inches in height. Each sample was prepared in 3 approximately 1 inch thick layers. Each layer was rodded with a half an inch diameter rod to remove air bubbles. Each test specimen was tested immediately after specimen preparation. Only permeability testing was performed.
- Cement Bentonite – Samples were prepared in 3 inch diameter by 6 inch high plastic cylinder molds in approximately 1 inch thick layers. Each layer was rodded with a half an inch diameter rod to remove air bubbles. The samples were placed in a high humidity cooler for the duration of the curing period. The following procedures were used when preparing the test specimens:
  - Permeability test specimens were prepared in 3 approximately 1 inch layers and cured for 28 days. Each test specimen was trimmed after curing to a height of approximately 2.25 inches.
  - Unconfined compressive strength test specimens were prepared in 6 approximately 1 inch thick layers and tested at two different curing periods of 7 and 28 days. Each test specimen was trimmed after curing to a height of approximately 6.0 inches.

Permeability Testing – Test results are shown in Attachment P3-C. All test specimens were saturated with the requested test permeant and then consolidated under a consolidation pressure of 5.0 psi for 2 to 3 days before being permeated. The test results are summarized in Table P3-C-01 and presented in the accompanying figures.

Unconfined Compressive Strength – Test results are shown in Attachment P3-D. The tests were run at a displacement rate of 0.050 inches per minute with the load and displacement being monitored. The test results are summarized in Table P3-D-01 and are presented in the accompanying figures.

7-23-14
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Table P3-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Identification		Soil Composite	Dry Bent. to Dry Soil	Slurry Properties			Permeant Liquid	Notes
Design Phase (-)	Site ID (-)		(%)	Bentonite Added[1] (%)	Cement to Mix Liquid Ratio[2] (-)	Mix Liquid Type (-)	(-)	
Soil-Cement-Bentonite Mix Design	SCB-Mix1	CS-03	0	7	0.16	Hydrant	P-5D	
	SCB-Mix2	CS-03	1	7	0.19	Hydrant	P-5D	
	SCB-Mix3	CS-03	2	7	0.21	Hydrant	P-5D	
	SCB-Mix4	CS-03	0	7	0.16	Hydrant	P-7D	
	SCB-Mix5	CS-03	1	7	0.19	Hydrant	P-7D	
	SCB-Mix6	CS-03	2	7	0.21	Hydrant	P-7D	
Soil-Bentonite Mix Design	SB-Mix1	CS-03	0	7	-	Hydrant	P-5D	
	SB-Mix2	CS-03	1	7	-	Hydrant	P-5D	
	SB-Mix3	CS-03	2	7	-	Hydrant	P-5D	
	SB-Mix4	CS-03	0	7	-	Hydrant	P-7D	
	SB-Mix5	CS-03	1	7	-	Hydrant	P-7D	
	SB-Mix6	CS-03	2	7	-	Hydrant	P-7D	
Cement-Bentonite Mix Desigh	CB-Mix1	-	-	8	0.19	Hydrant	P-5D	
	CB-Mix2	-	-	7	0.19	Hydrant	P-5D	
	CB-Mix3	-	-	6	0.19	Hydrant	P-5D	
	CB-Mix4	-	-	6	0.16	Hydrant	P-5D	
	CB-Mix5	-	-	8	0.19	Hydrant	P-7D	
	CB-Mix6	-	-	7	0.19	Hydrant	P-7D	
	CB-Mix7	-	-	6	0.19	Hydrant	P-7D	
	CB-Mix8	-	-	6	0.16	Hydrant	P-7D	
	CB-Mix11	-	-	6	0.23	Hydrant	P-5D	
	CB-Mix12	-	-	6	0.23	Hydrant	P-7D	

Notes:

1. Weight of Betonite to weight of the Mix Liquid.
2. Weight of Cement to weight of the Mix Liquid.

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Phase 3

Soil Cement Bentonite, Soil Bentonite, and Cement Bentonite Mix Design and Evaluation

Attachment P3-A

Baseline Permeability Testing of CS-02

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	CS-02
Lab Sample Number:	13B034
Material Type:	Soil
Permeant Liquid	DDI
Date Test Started:	2/26/2014

High Compaction Energy

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[7]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid[6]	Average Gradient[7]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 2 to 5	6.19	7.22	94.6	29.1	80.0	70.0	10.0	DDI	15	3.1E-7

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. All particles larger than 3/8 inch, if any, were discarded when forming the remolded specimen.
3. Remolded specimen was formed by tamping the soil in 0.5 in. thick layers.
4. Remolded specimen approximately 2.84 inches in diameter and 2.50 inches in height.
5. High compaction energy was used to form the test specimen.
6. Type of permeant liquid: DTW = Deaired Tap Water, DDI = Deaired Deionized Water
7. Average of last 4 readings.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

T-21-14
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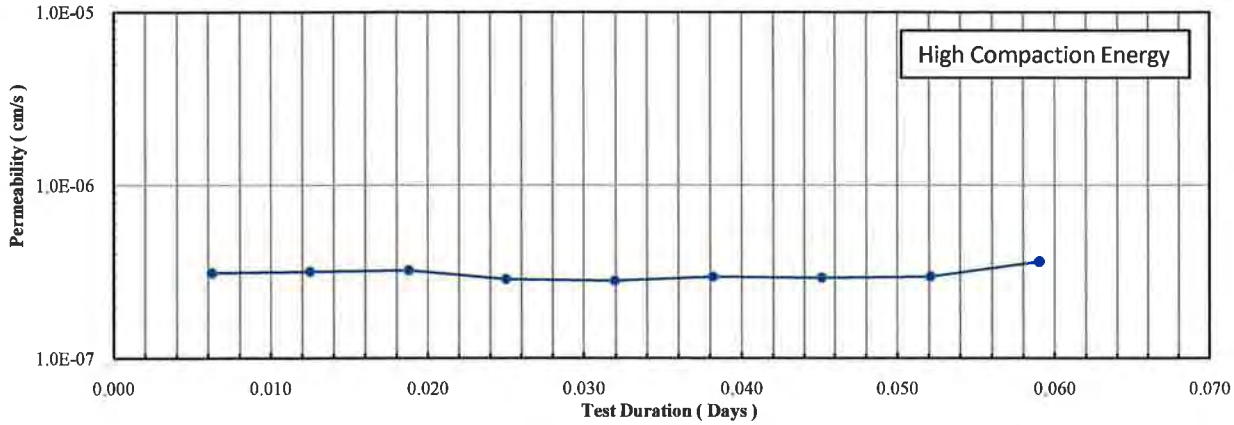
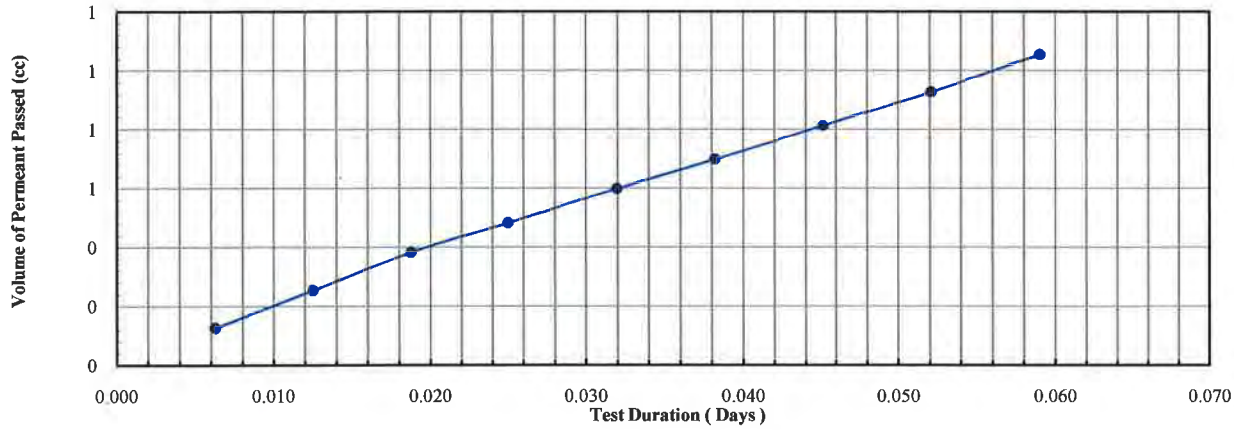
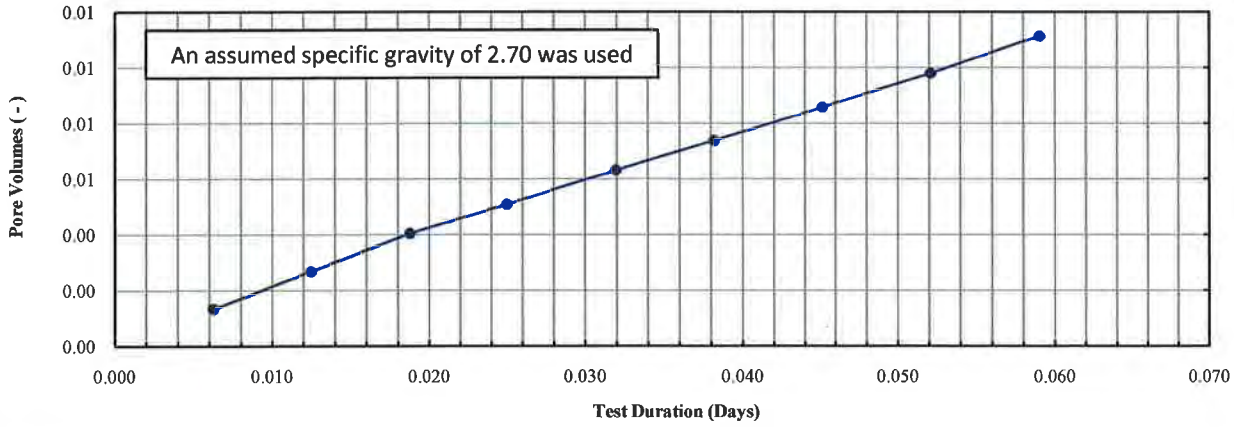
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CS-02
Lab Sample No:	13B034

ASTM D 5084

PERMEABILITY TESTING







Note(s):

7-21-14
TR, NSR

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	CS-02
Lab Sample Number:	13B034
Material Type:	Soil
Permeant Liquid	DDI
Date Test Started:	2/26/2014

Low Compaction Energy

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[7]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid[6]	Average Gradient[7]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 2 to 5	6.07	7.20	92.4	29.1	80.0	70.0	10.0	DDI	9	4.3E-7

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. All particles larger than 3/8 inch, if any, were discarded when forming the remolded specimen.
3. Remolded specimen was formed by tamping the soil in 0.5 in. thick layers.
4. Remolded specimen approximately 2.84 inches in diameter and 2.50 inches in height.
5. High compaction energy was used to form the test specimen.
6. Type of permeant liquid: DTW = Deaired Tap Water, DDI = Deaired Deionized Water
7. Average of last 4 readings.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented

4-21-14
TR, NJR

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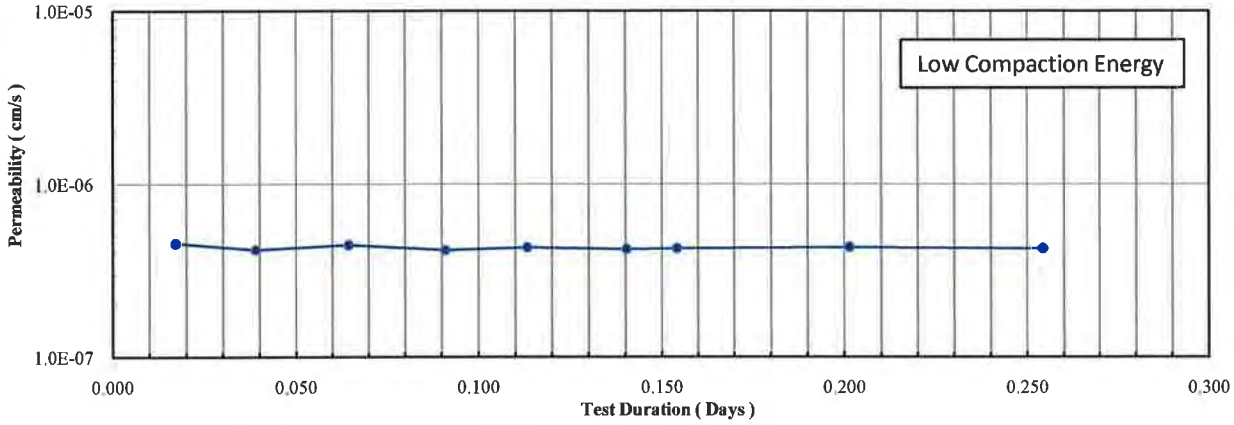
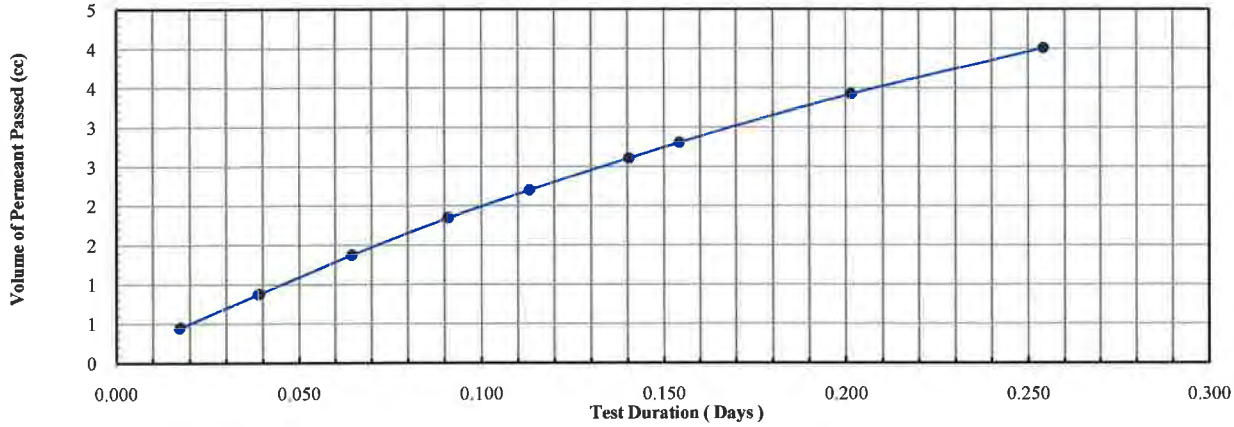
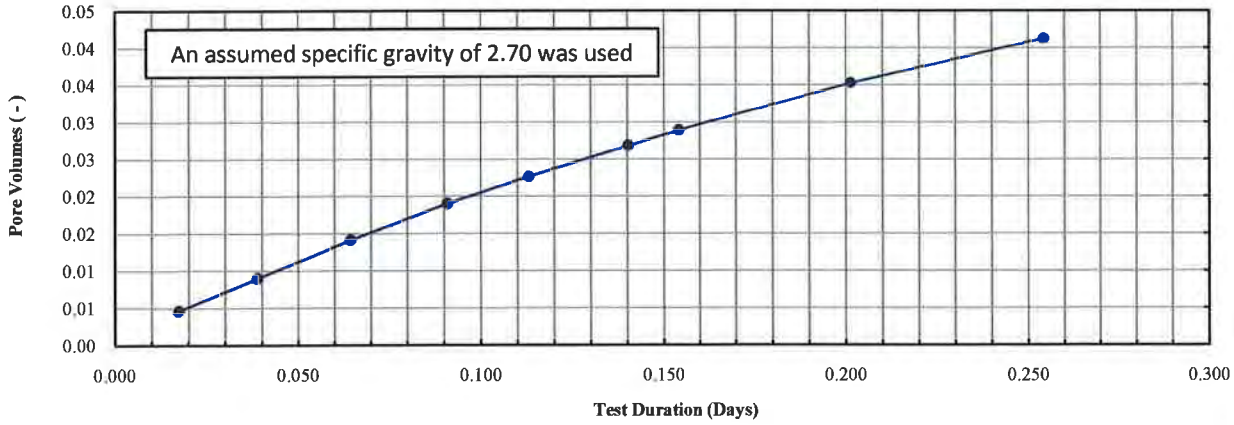
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CS-02
Lab Sample No:	13B034

ASTM D 5084

PERMEABILITY TESTING







Note(s):

7-21-14
TR, WSR

Phase 3

Soil Cement Bentonite, Soil Bentonite, and Cement Bentonite Mix Design and Evaluation

Attachment P3-B

Slump Test Results

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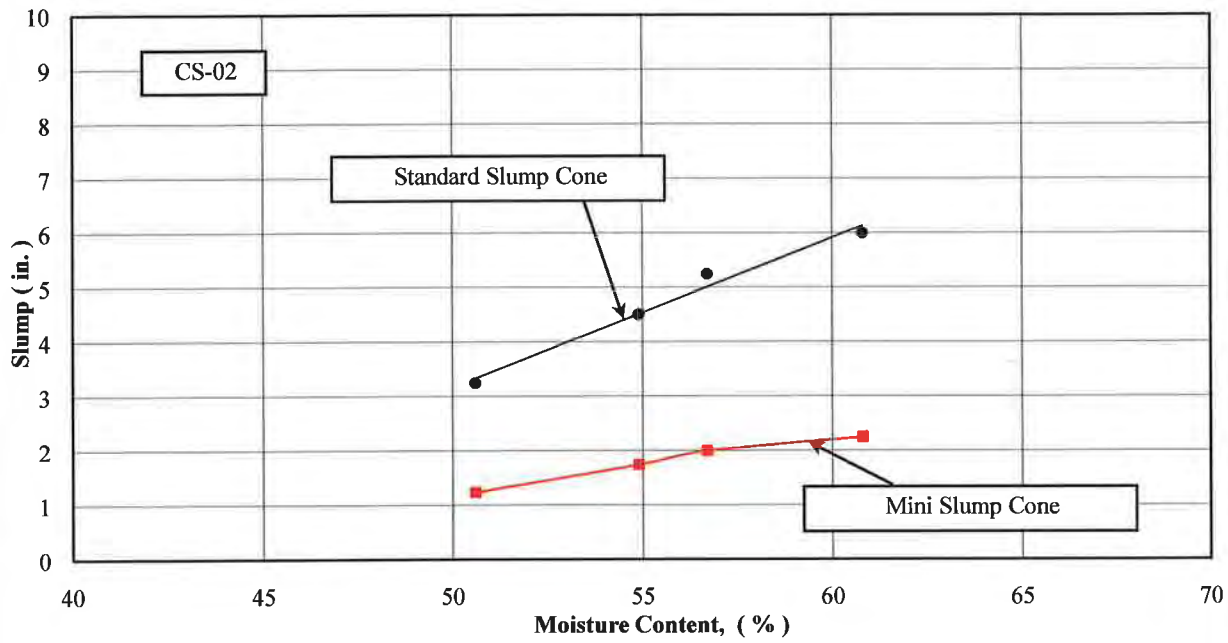
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Sample ID:	CS-02
Lab Sample No:	14B034

ASTM C 143

SLUMP TEST

Figure P3-B-01



Correlation Between Moisture Content and Slump for CS-02.

Notes:

7-22-14
TR, NSR

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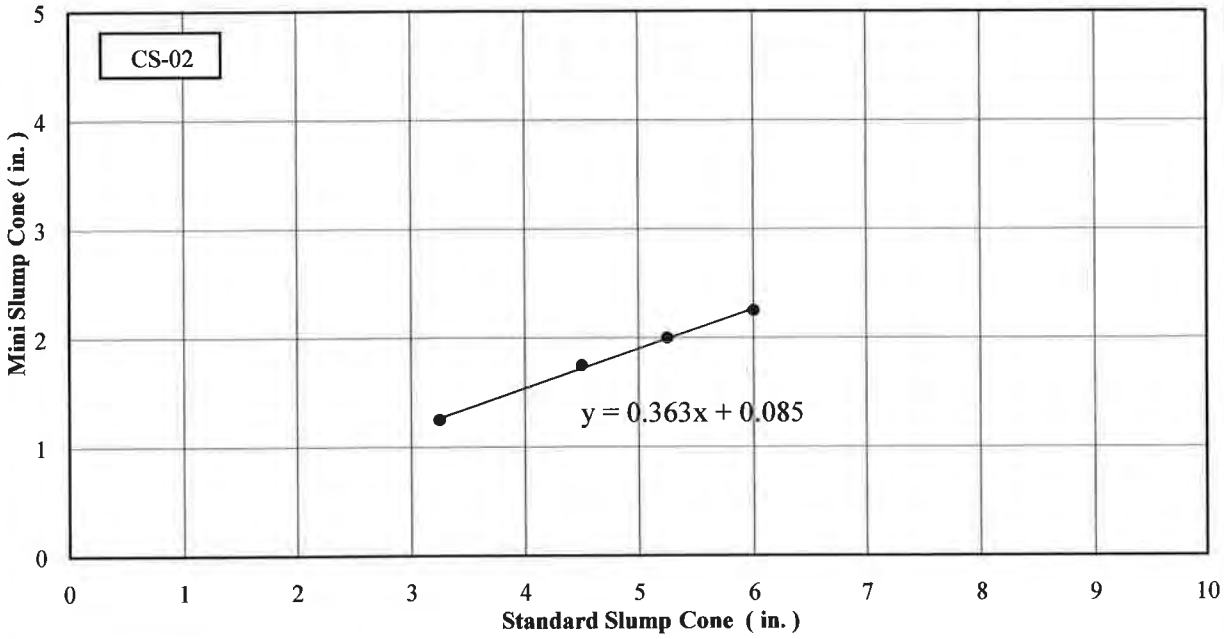
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Sample ID:	CS-02
Lab Sample No:	14B034

ASTM C 143

SLUMP TEST

Figure P3-B-02



Correlation Between Standard and Mini Slump Cone for CS-02.

Notes:

7-22-14
TR, NSR

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Picture P3-B-01

Project Name: Chemtronics Geotechnical Testing
Project No: 621

Standard Slump Cone (SSC) and Mini Slump Cone (MSC)

Notes:

7-22-14
TR, NSR

Phase 3

Soil Cement Bentonite, Soil Bentonite, and Cement Bentonite Mix Design and Evaluation

Attachment P3-C

Permeability Test Results

Excel Geotechnical Testing, Inc.
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Table P3-C-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information							Hydraulic Conductivity				Notes
Sample Identification		Sample Mix									
Site ID (-)	Lab No. (-)	Bentonite Slurry (%)	Cement added (%)	Dry Bent. to Soil (%)	Water Mix Type (-)	Permeant Liquid (-)	Dry Unit Weight (pcf)	Moisture Content (%)	Average Gradient[1] (-)	Hydraulic Conductivity[1] (cm/s)	
SCB-Mix1	14D109	7	16	0	Hydrant	P-5D	60.4	62.9	25	2.7E-7	
SCB-Mix2	14D117	7	19	1	Hydrant	P-5D	63.5	59.2	27	8.3E-8	
SCB-Mix3	14D125	7	21	2	Hydrant	P-5D	64.9	56.9	23	4.1E-8	
SCB-Mix4	14D111	7	16	0	Hydrant	P-7D	72.2	37.3	29	2.7E-7	
SCB-Mix5	14D119	7	19	1	Hydrant	P-7D	63.9	58.5	29	5.3E-8	
SCB-Mix6	14D127	7	21	2	Hydrant	P-7D	64.0	56.6	26	3.3E-8	
SB-Mix1	14D059	7	0	0	Hydrant	P-5D	58.0	71.3	14	8.1E-8	
SB-Mix2	14D072	7	0	1	Hydrant	P-5D	63.8	59.9	16	5.9E-8	
SB-Mix3	14D140	7	0	2	Hydrant	P-5D	64.5	62.1	16	3.3E-8	
SB-Mix4	14D060	7	0	0	Hydrant	P-7D	58.2	71.3	15	6.9E-8	
SB-Mix5	14D073	7	0	1	Hydrant	P-7D	62.9	59.9	21	3.9E-8	
SB-Mix6	14D141	7	0	2	Hydrant	P-7D	64.6	62.1	15	4.7E-8	
CB-Mix1	14C087	8	19	0	Hydrant	P-5D	14.8	368.3	13	2.4E-6	
CB-Mix2	14C099	7	19	0	Hydrant	P-5D	15.9	332.7	13	2.4E-6	
CB-Mix3	14C124	6	19	0	Hydrant	P-5D	17.2	318.6	12	2.7E-6	
CB-Mix4	14D010	6	16	0	Hydrant	P-5D	14.4	381.0	12	2.8E-6	
CB-Mix5	14C092	8	19	0	Hydrant	P-7D	14.9	368.3	16	1.9E-6	
CB-Mix6	14C104	7	19	0	Hydrant	P-7D	17.3	301.4	18	1.3E-6	
CB-Mix7	14C125	6	19	0	Hydrant	P-7D	17.0	320.2	14	2.4E-6	
CB-Mix8	14D012	6	16	0	Hydrant	P-7D	16.9	322.1	12	2.8E-6	
CB-Mix11	14D147	6	23	0	Hydrant	P-5D	18.3	302.3	31	2.3E-6	
CB-Mix12	14E148	6	23	0	Hydrant	P-7D	19.4	280.0	26	1.9E-6	

Notes: 1. Average of the last 4 measurements.

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	SCB-Mix1
Lab Sample Number:	14D109
Material Type:	7% Bentonite Slurry with Hydrant Water, 0% Dry Bentonite, 16% Cement, CS-03 Soil (Note 2)
Permeant Liquid	P-5D
Date Test Started:	5/9/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.56	7.64	60.4	62.9	75.0	70.0	5.0	P-5D	25	5.5E-7

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement. The Bentonite Cement slurry was added to CS-03 to form a sample with a slump of 4 to 6 inches.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Soil Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) thick layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

7-22-14
TH, NSR

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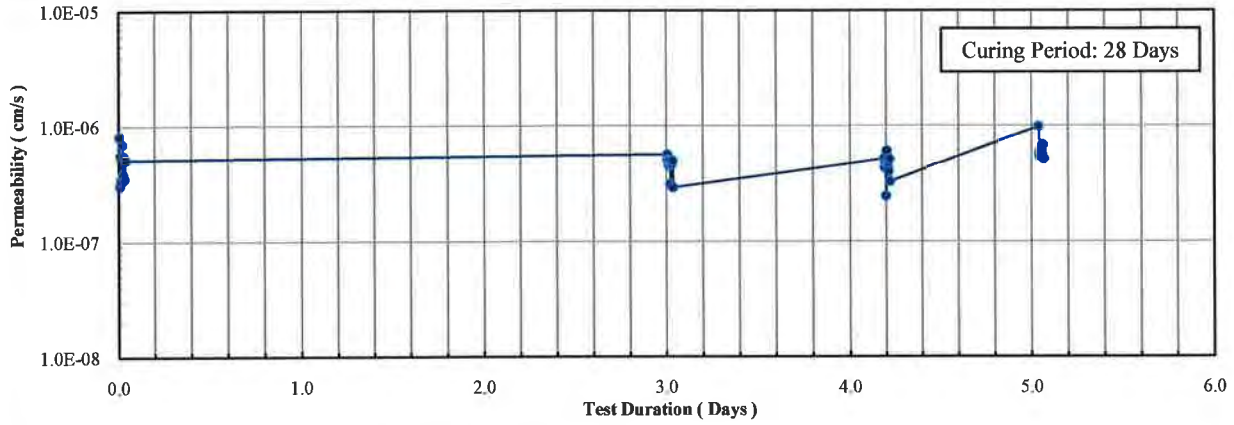
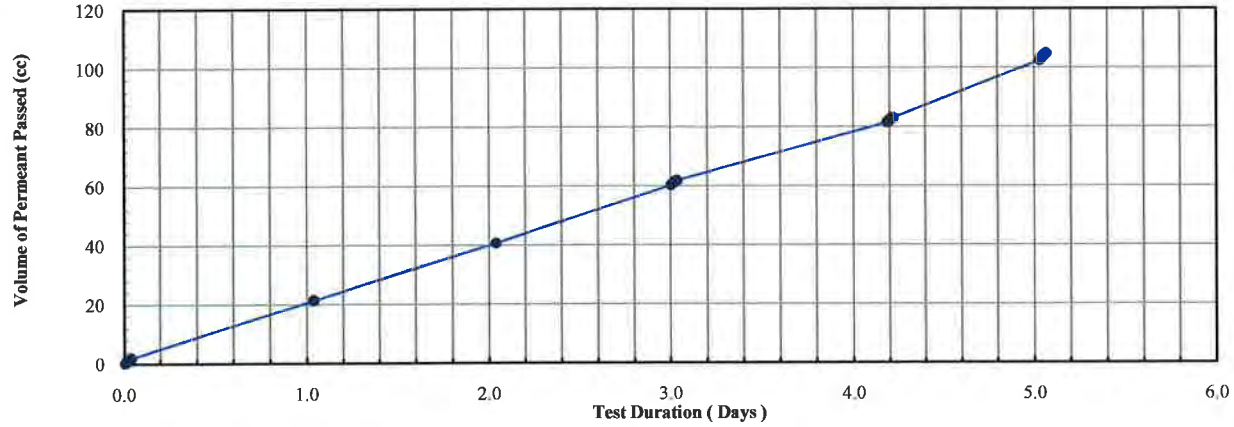
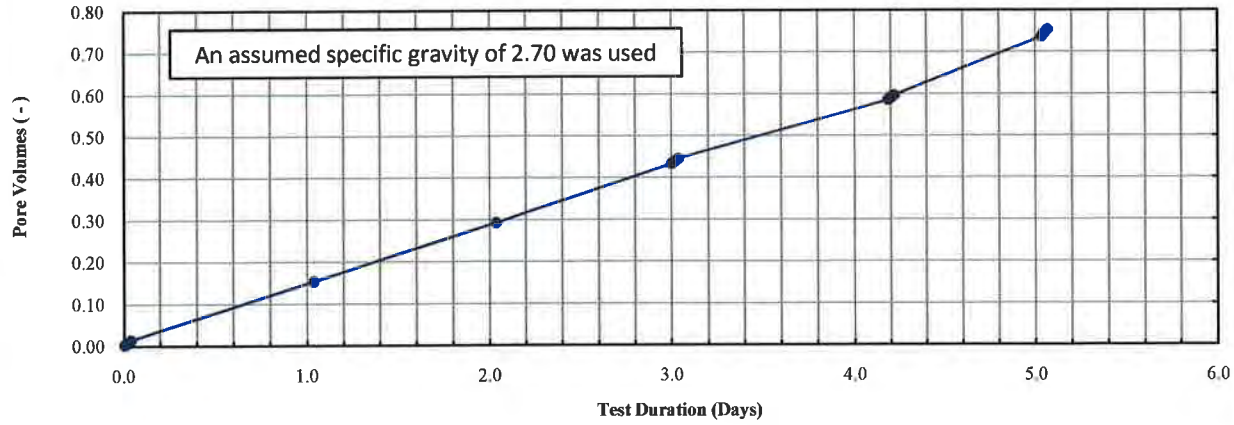
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	SCB-Mix1
Lab Sample No:	14D109

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

7-22-14
TR, NSR

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	SCB-Mix2
Lab Sample Number:	14D117
Material Type:	7% Bentonite Slurry with Hydrant Water, 1% Dry Bentonite ,19% Cement, CS-03 Soil (Note 2)
Permeant Liquid	P-5D
Date Test Started:	5/12/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.62	7.63	63.5	59.2	75.0	70.0	5.0	P-5D	27	1.6E-7

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement. The Bentonite Cement slurry was added to CS-03 to form a sample with a slump of 4 to 6 inches.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Soil Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) thick layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C

Test specimen final conditions are not presented

7-22-14
TR, NSR

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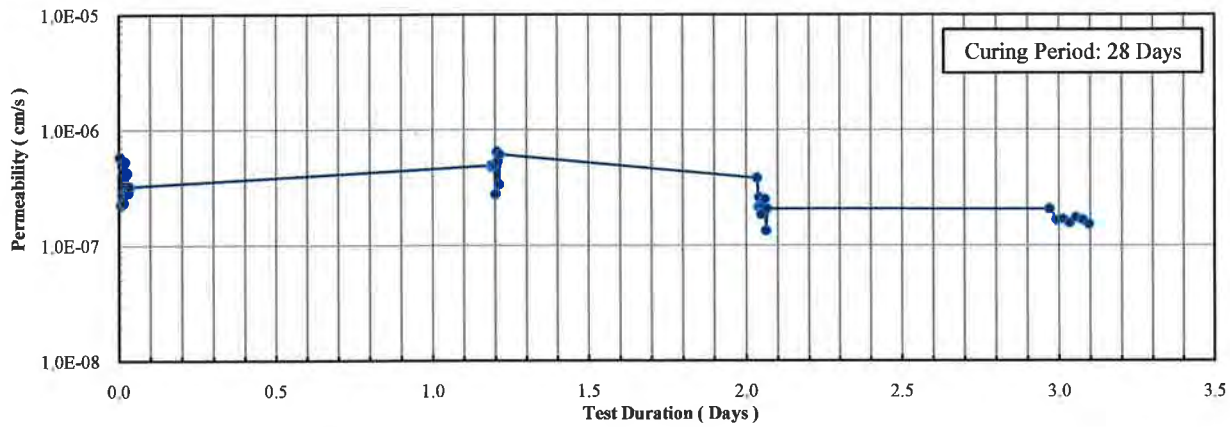
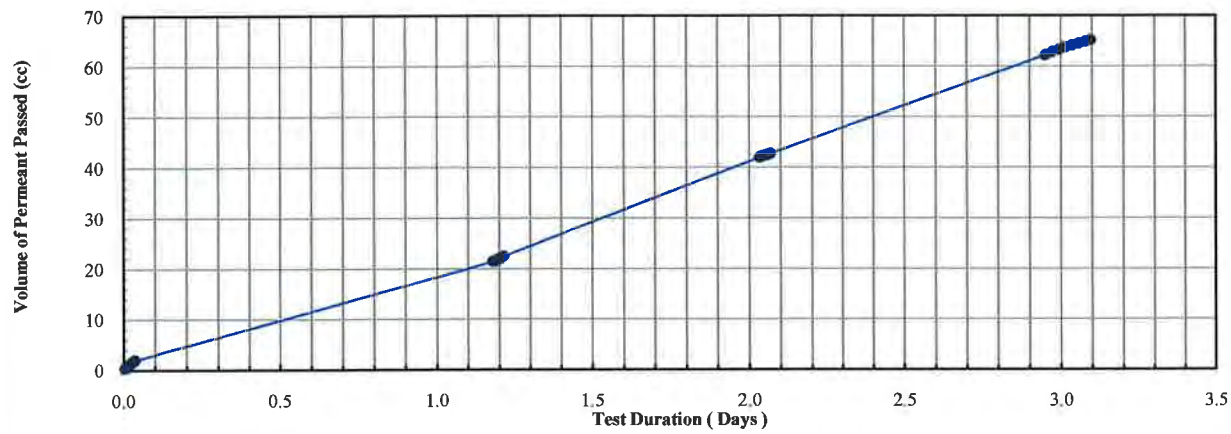
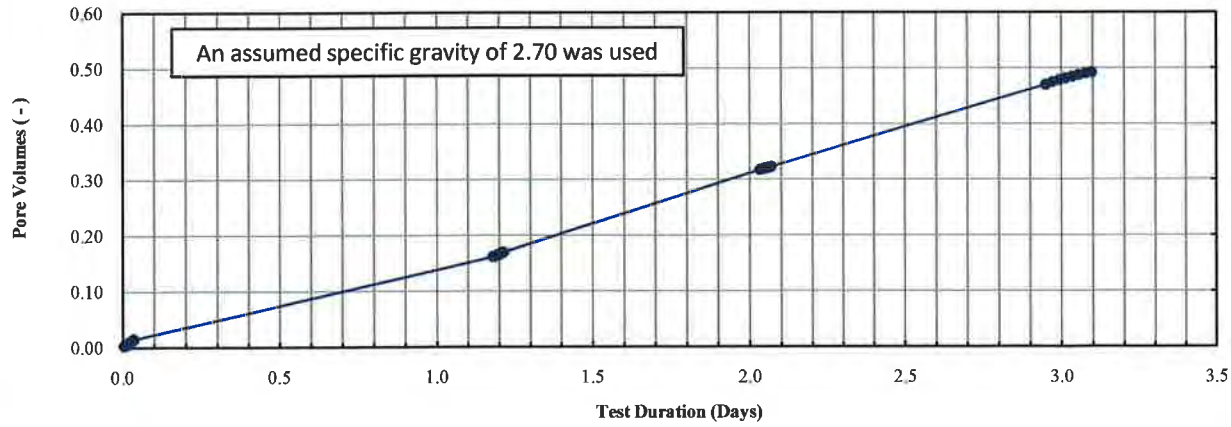
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	SCB-Mix2
Lab Sample No:	14D117

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

7-22-14
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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	SCB-Mix3
Lab Sample Number:	14D125
Material Type:	7% Bentonite Slurry with Hydrant Water, 2% dry Bentonite, 21% Cement, CS-03 (Note 2)
Permeant Liquid	P-5D
Date Test Started:	5/12/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.62	7.63	64.9	56.9	75.0	70.0	5.0	P-5D	23	8.7E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement. The Bentonite Cement slurry was added to CS-03 to form a sample with a slump of 4 to 6 inches.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Soil Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) thick layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

7-22-14
TR, NSR

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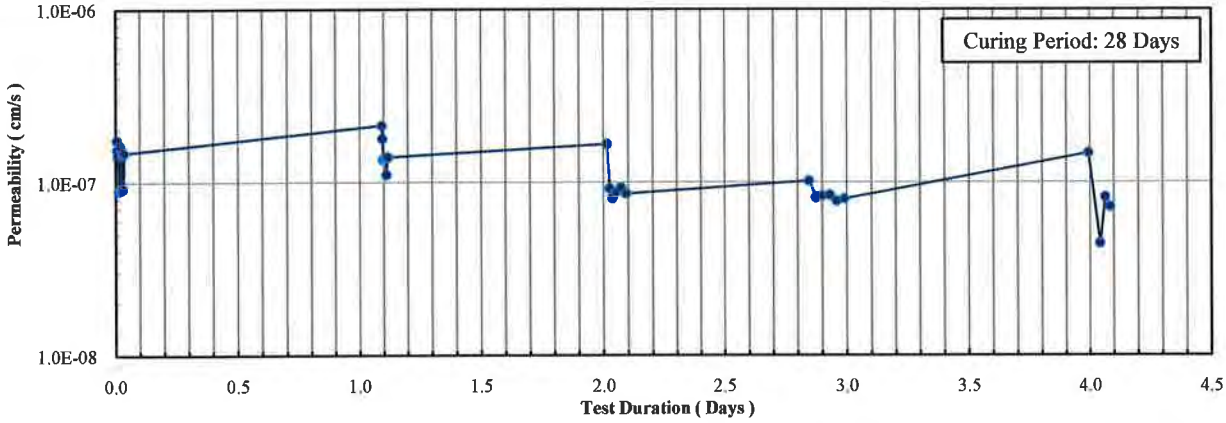
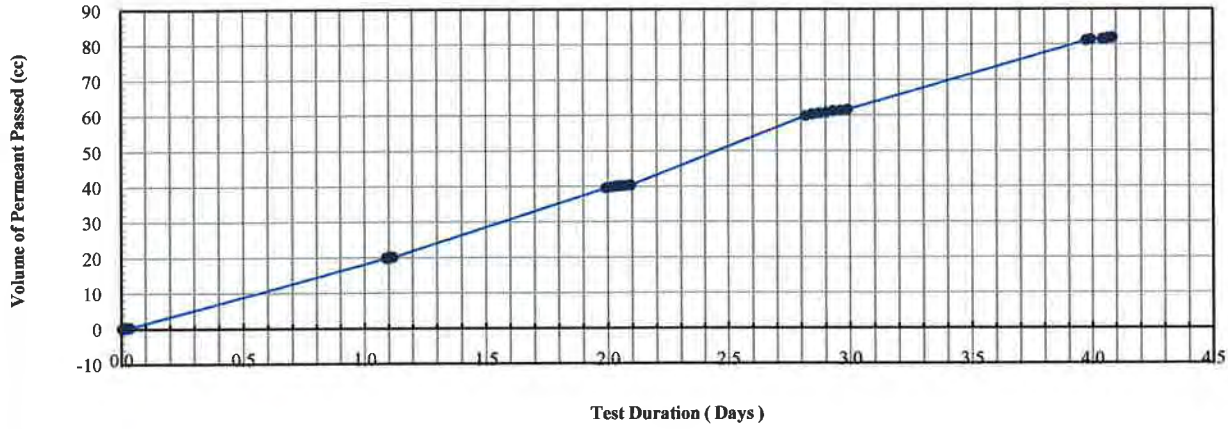
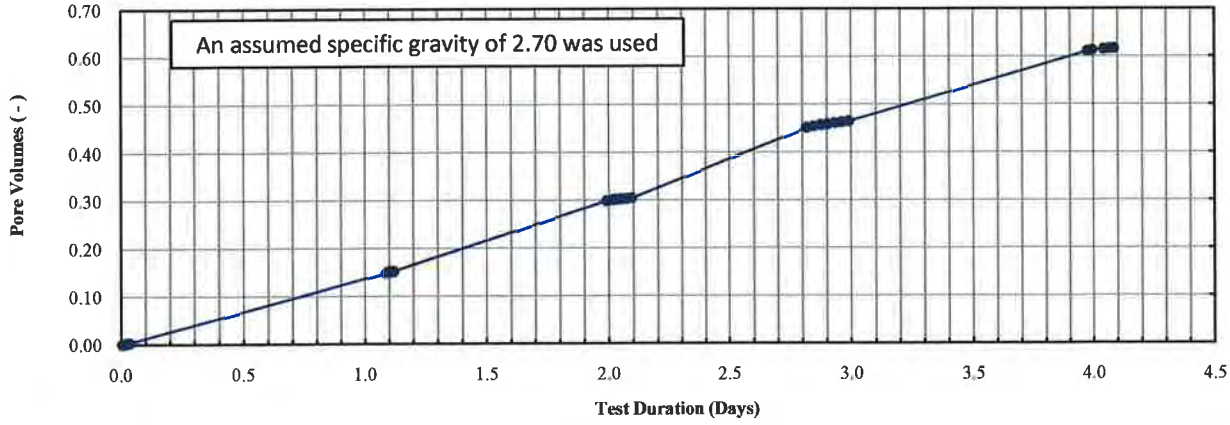
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	SCB-Mix3
Lab Sample No:	14D125

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

7-22-14
TR, NSA

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	SCB-Mix4
Lab Sample Number:	14D111
Material Type:	7% Bentonite Slurry with Hydrant Water, 0% Dry Bentonite, 16% Cement, CS-03 Soil (Note 2)
Permeant Liquid	P-7D
Date Test Started:	5/9/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.59	7.68	72.2	37.3	75.0	70.0	5.0	P-7D	29	4.5E-7

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement. The Bentonite Cement slurry was added to CS-03 to form a sample with a slump of 4 to 6 inches.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Soil Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) thick layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

7-23-14
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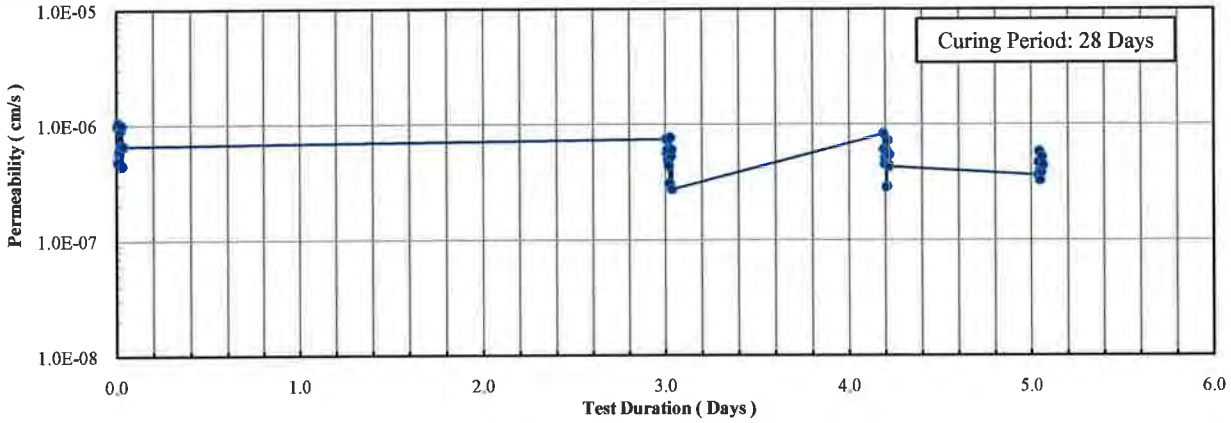
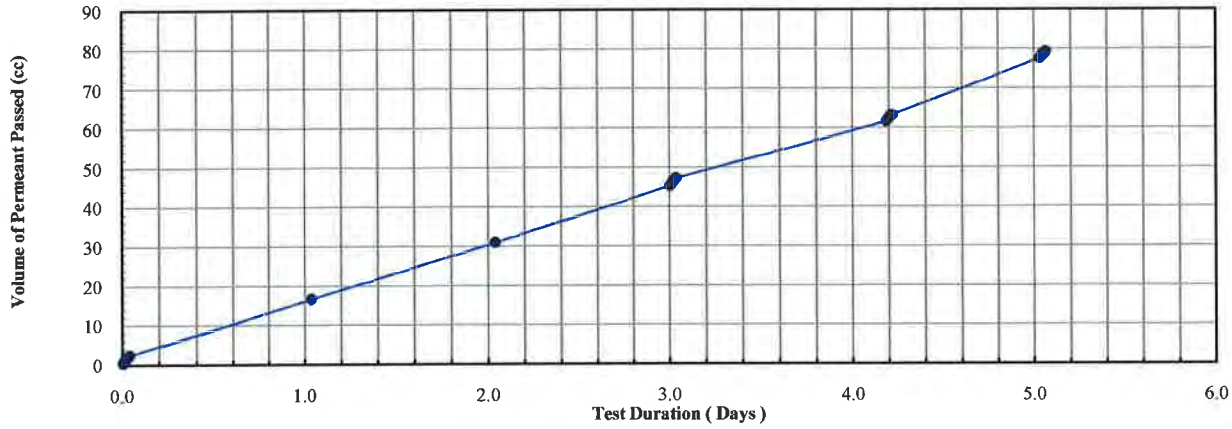
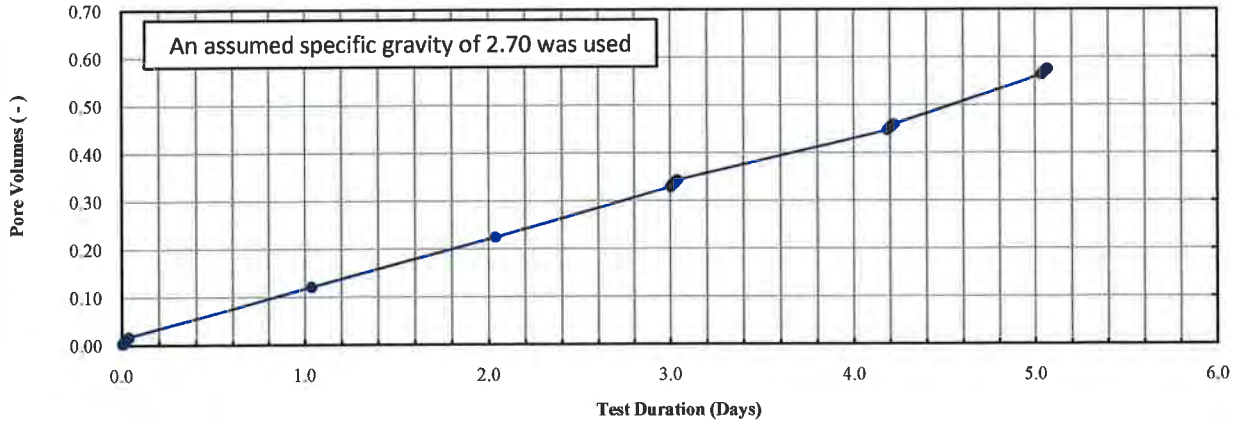
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	SCB-Mix4
Lab Sample No:	14D111

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

7-22-14
TR, NSR

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	SCB-Mix5
Lab Sample Number:	14D119
Material Type:	7% Bentonite Slurry with Hydrant Water, 1% Dry Bentonite, 19% Cement, CS-03 Soil (Note 2)
Permeant Liquid	P-7D
Date Test Started:	5/12/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.61	7.65	63.9	58.5	75.0	70.0	5.0	P-7D	29	1.0E-7

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement. The Bentonite Cement slurry was added to CS-03 to form a sample with a slump of 4 to 6 inches.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Soil Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) thick layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

7-23-14
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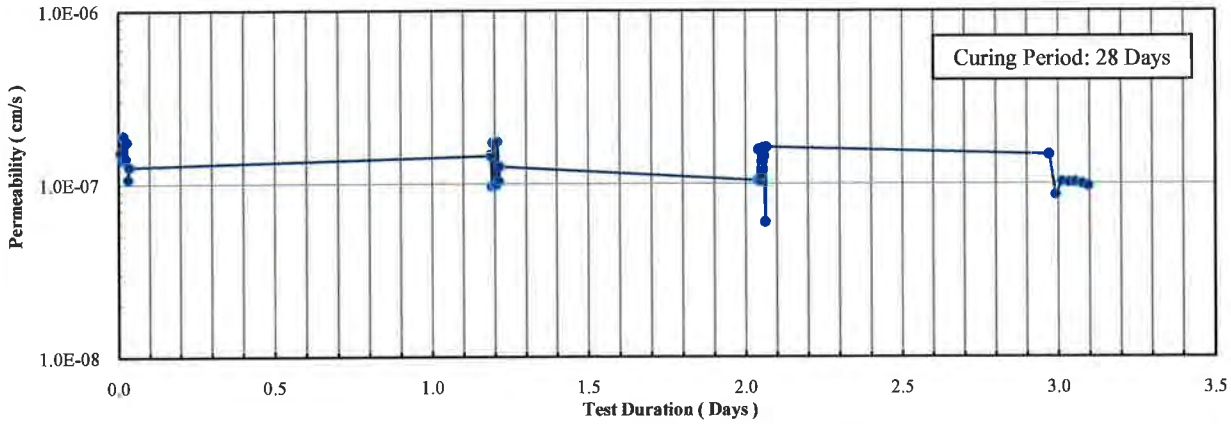
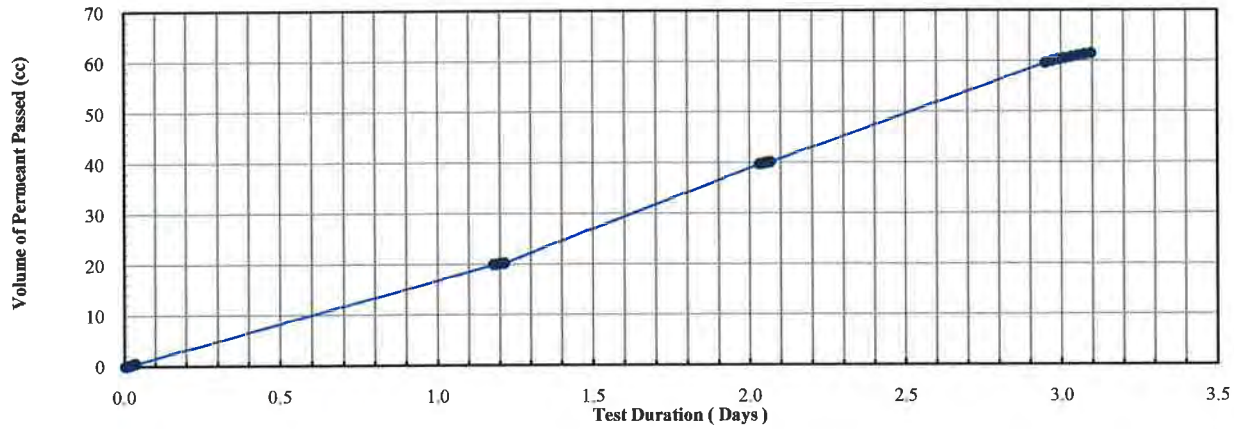
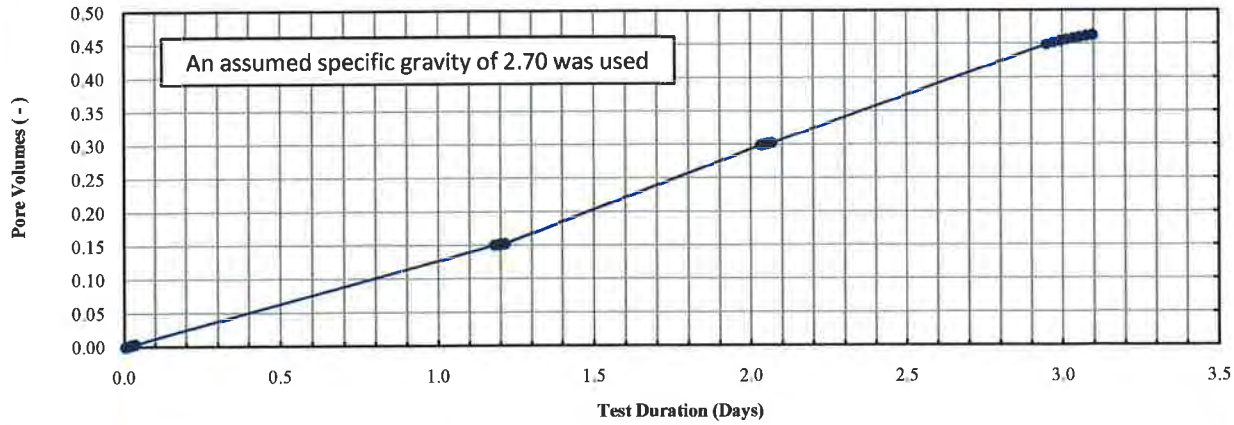
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	SCB-Mix5
Lab Sample No:	14D119

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	SCB-Mix6
Lab Sample Number:	14D127
Material Type:	7% Bentonite Slurry with Hydrant Water, 2% dry Bentonite, 21% Cement, CS-03 Soil (Note 2)
Permeant Liquid	P-7D
Date Test Started:	5/12/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.64	7.65	64.0	56.6	75.0	70.0	5.0	P-7D	26	6.6E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement. The Bentonite Cement slurry was added to CS-03 to form a sample with a slump of 4 to 6 inches.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Soil Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) thick layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

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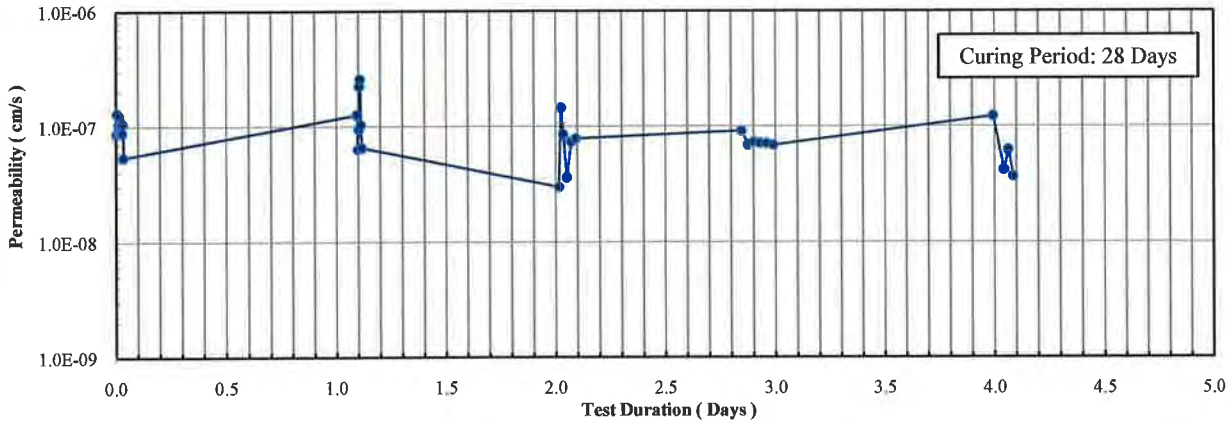
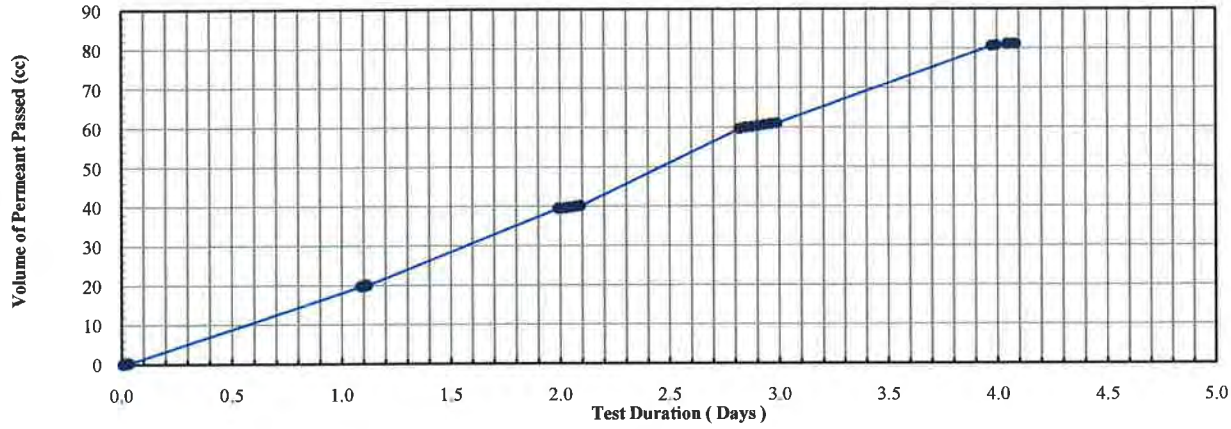
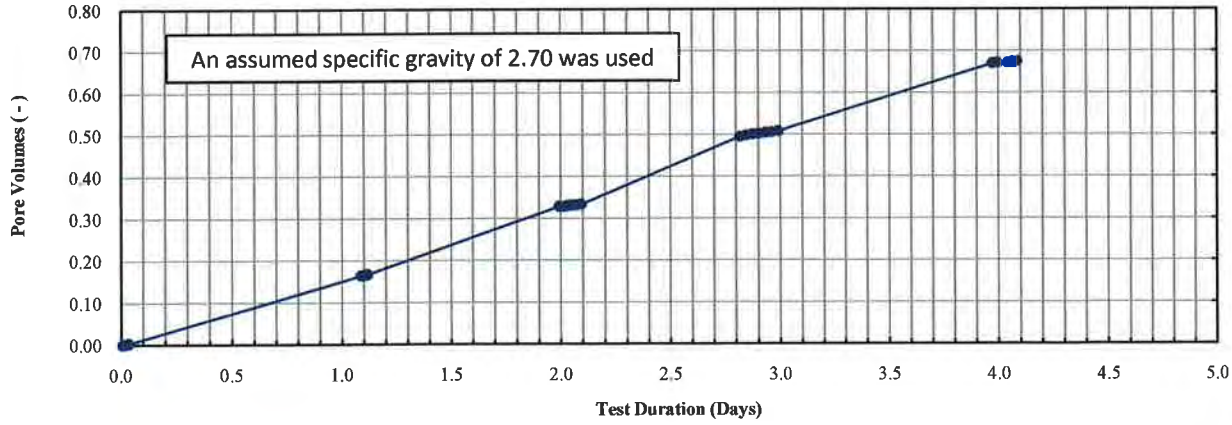
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	SCB-Mix6
Lab Sample No:	14D127

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	SB-Mix1
Lab Sample Number:	14D059
Material Type:	7% Bentonite Slurry with Hydrant Water, 0% Dry Bentonite, CS-03 Soil (Note 2)
Permeant Liquid	P-5D
Date Test Started:	4/72014

Curing Period: N/A

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	5.96	7.27	58.0	71.3	75.0	70.0	5.0	P-5D	14	8.1E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours. The Bentonite slurry was added to CS-03 to form a sample with a slump of 4-6 inches.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Soil Bentonite Slurry mix in 3 approximately I in. (2.5 cm) layers; the test specimen was formed in a mold with the initial dimensions presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

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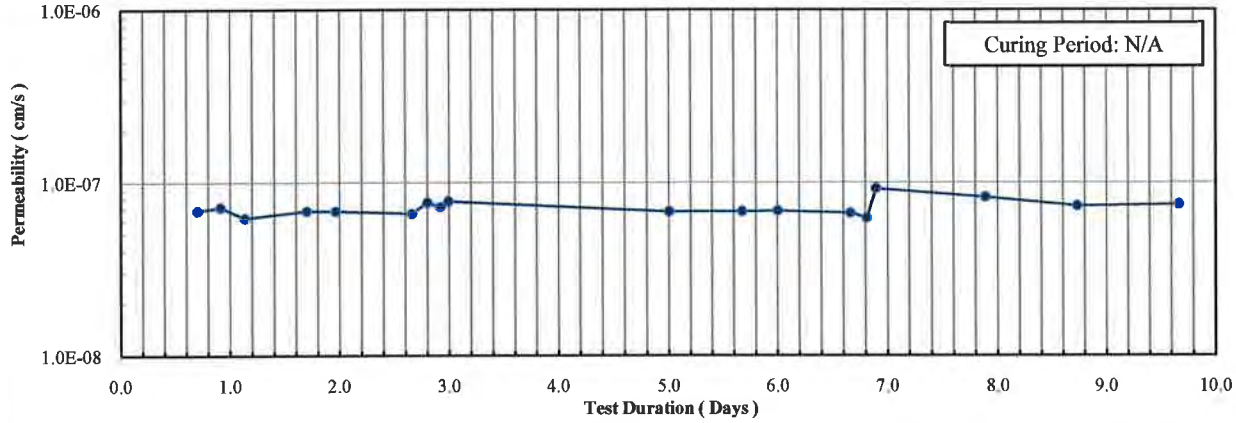
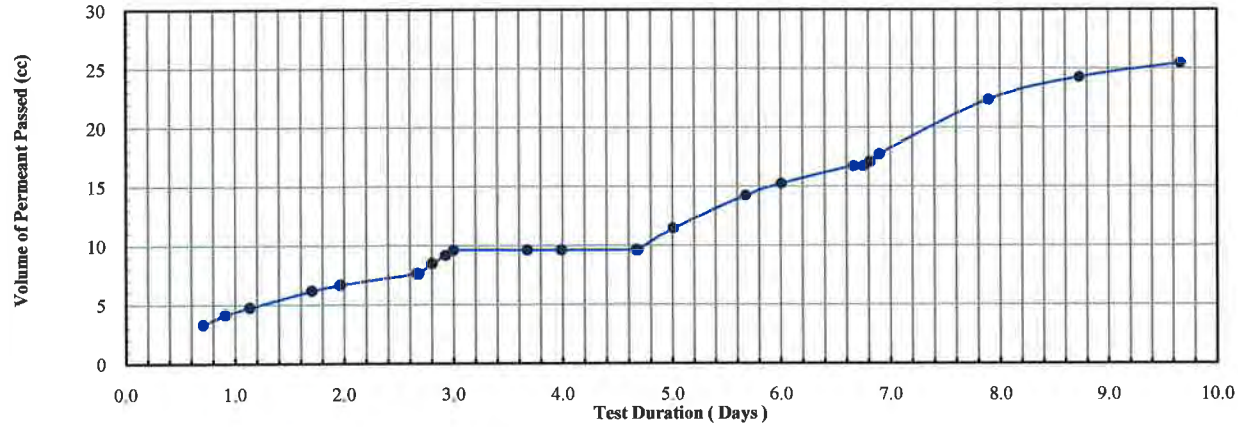
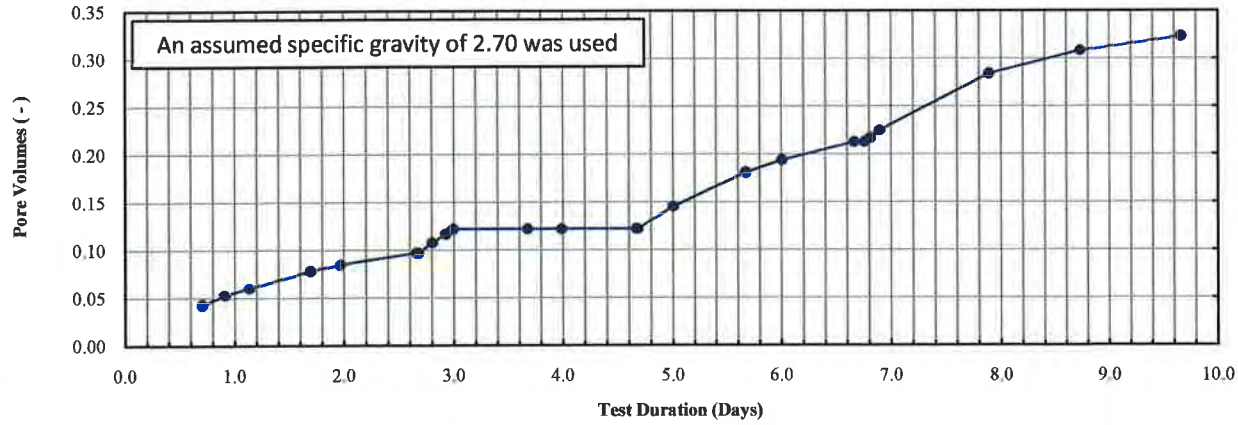
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	SB-Mix1
Lab Sample No:	14D059

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

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Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	SB-Mix2
Lab Sample Number:	14D072
Material Type:	7% Bentonite Slurry with Hydrant Water, 1% Dry Bentonite, CS-03 Soil (Note 2)
Permeant Liquid	P-5D
Date Test Started:	4/9/2014

Curing Period: N/A

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	5.96	7.27	63.8	59.9	75.0	70.0	5.0	P-5D	16	5.9E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours. The Bentonite slurry was added to CS-03 to form a sample with a slump of 4-6 inches.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Soil Bentonite Slurry mix in 3 approximately I in. (2.5 cm) layers; the test specimen was formed in a mold with the initial dimensions presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented

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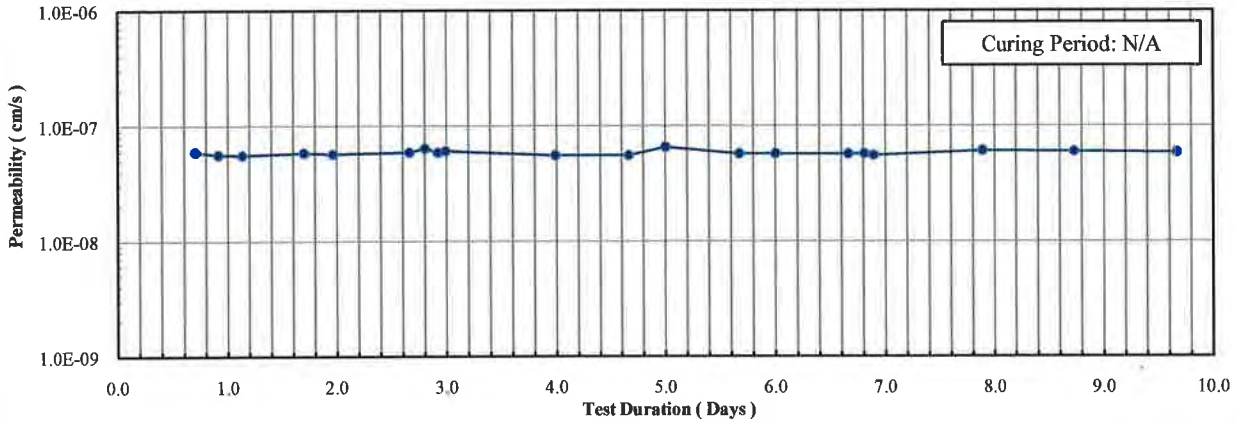
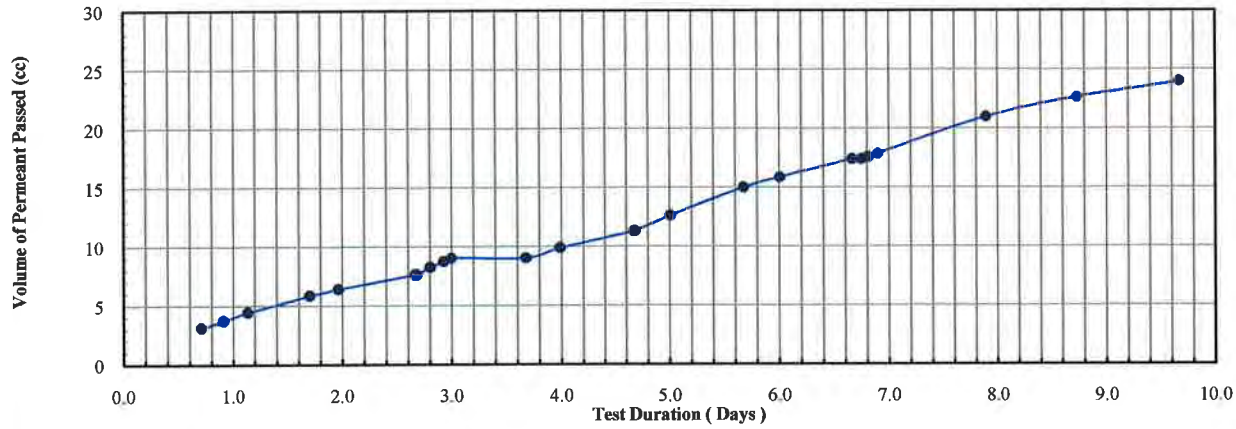
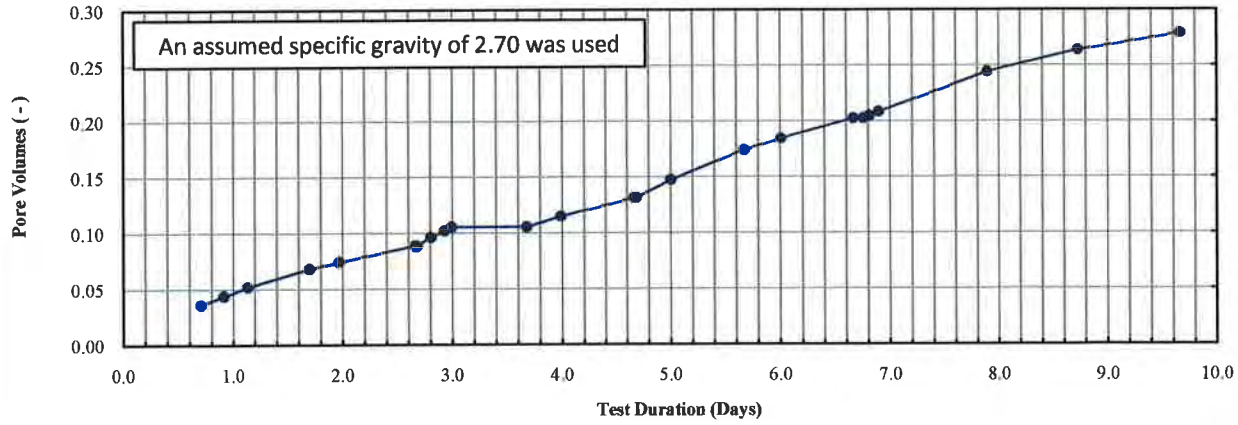
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	SB-Mix2
Lab Sample No:	14D072

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	SB-Mix3
Lab Sample Number:	14D140
Material Type:	7% Bentonite Slurry with Hydrant Water, 2% Dry Bentonite, CS-03 Soil (Note 2)
Permeant Liquid	P-5D
Date Test Started:	4/18/2014

Curing Period: N/A

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	5.96	7.27	64.5	62.1	75.0	70.0	5.0	P-5D	16	3.3E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours. The Bentonite slurry was added to CS-03 to form a sample with a slump of 4-6 inches.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Soil Bentonite Slurry mix in 3 approximately I in. (2.5 cm) layers; the test specimen was formed in a mold with the initial dimensions presented.
6. Average of the last 4 measurements.

* Deviations:
Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

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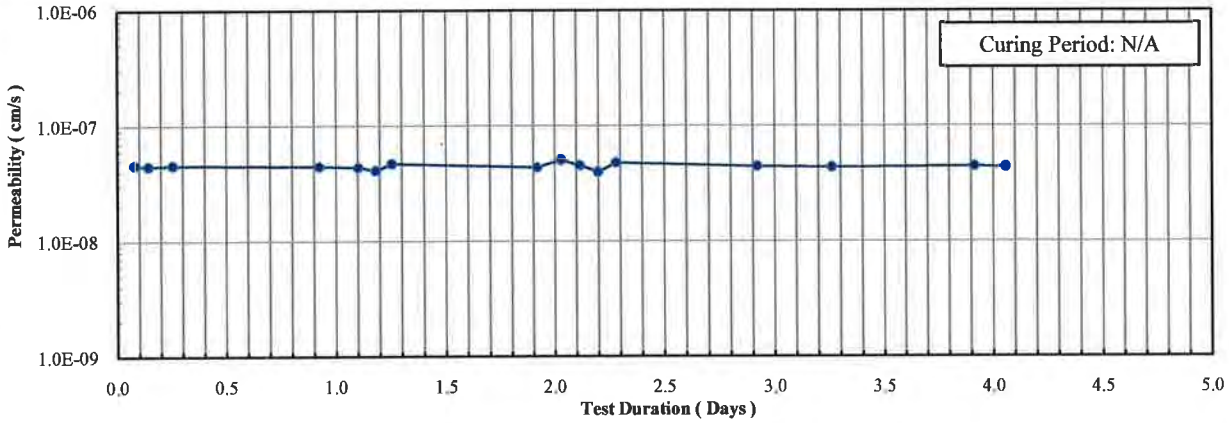
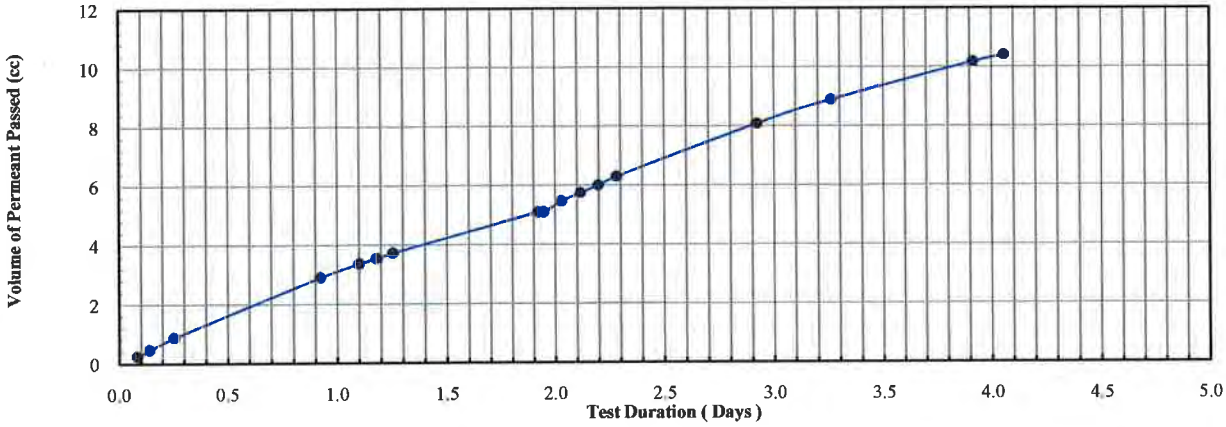
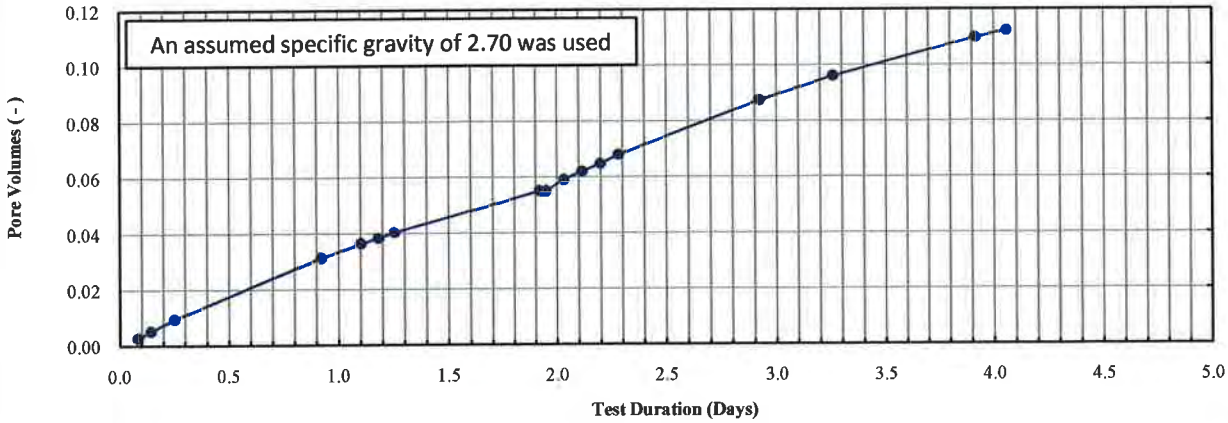
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	SB-Mix3
Lab Sample No:	14D140

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

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Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	SB-Mix4
Lab Sample Number:	14D060
Material Type:	7% Bentonite Slurry with Hydrant Water, 0% Dry Bentonite, CS-03 Soil (Note 2)
Permeant Liquid	P-7D
Date Test Started:	4/7/2014

Curing Period: N/A

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	5.96	7.27	58.2	71.3	75.0	70.0	5.0	P-7D	15	6.9E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours. The Bentonite slurry was added to CS-03 to form a sample with a slump of 4-6 inches.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Soil Bentonite Slurry mix in 3 approximately I in. (2.5 cm) layers; the test specimen was formed in a mold with the initial dimensions presented.
6. Average of the last 4 measurements.

* Deviations:
Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

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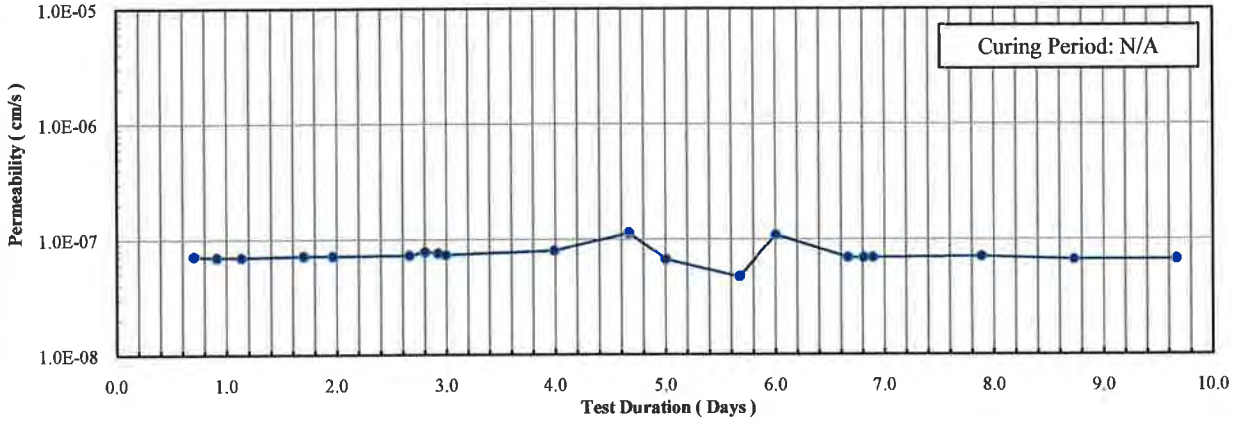
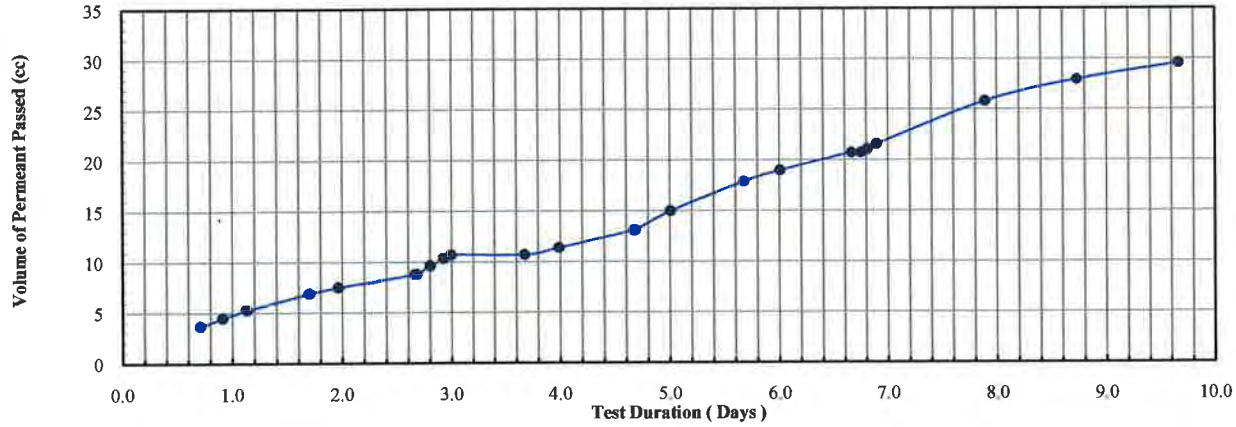
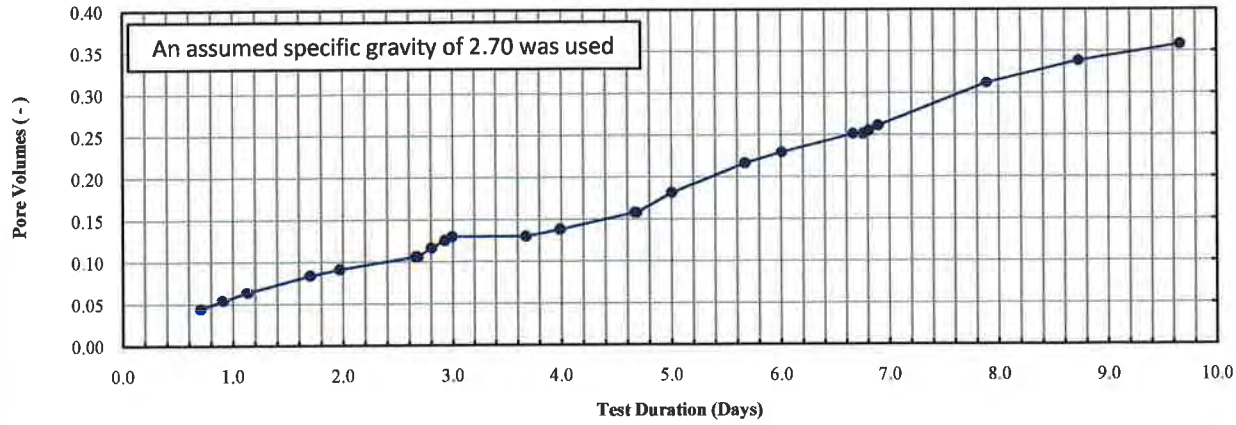
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	SB-Mix4
Lab Sample No:	14D060

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	SB-Mix5
Lab Sample Number:	14D073
Material Type:	7% Bentonite Slurry with Hydrant Water, 1% Dry Bentonite, CS-03 Soil (Note 2)
Permeant Liquid	P-7D
Date Test Started:	4/9/2014

Curing Period: N/A

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	5.96	7.27	62.9	59.9	75.0	70.0	5.0	P-7D	21	3.9E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours. The Bentonite slurry was added to CS-03 to form a sample with a slump of 4-6 inches.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Soil Bentonite Slurry mix in 3 approximately I in. (2.5 cm) layers; the test specimen was formed in a mold with the initial dimensions presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented

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Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	SB-Mix5
Lab Sample No:	14D073

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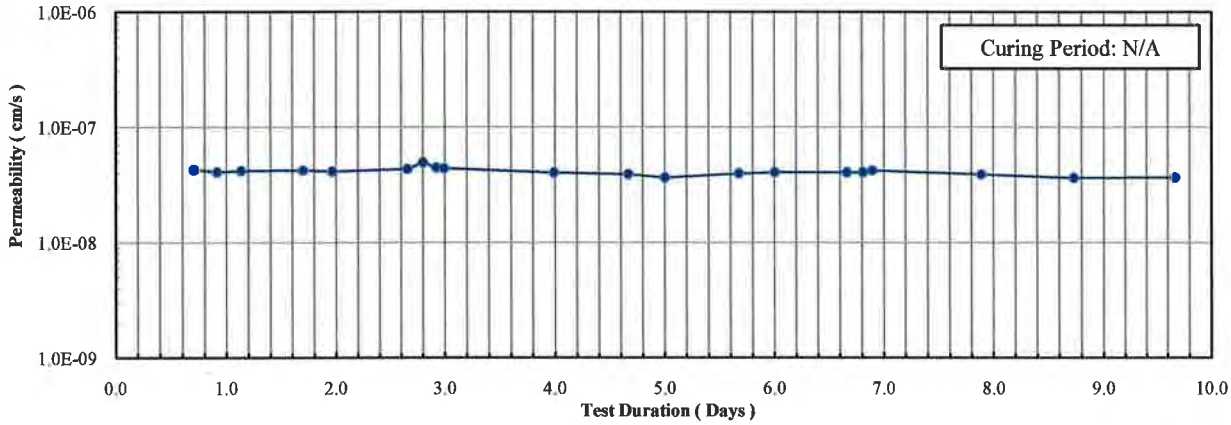
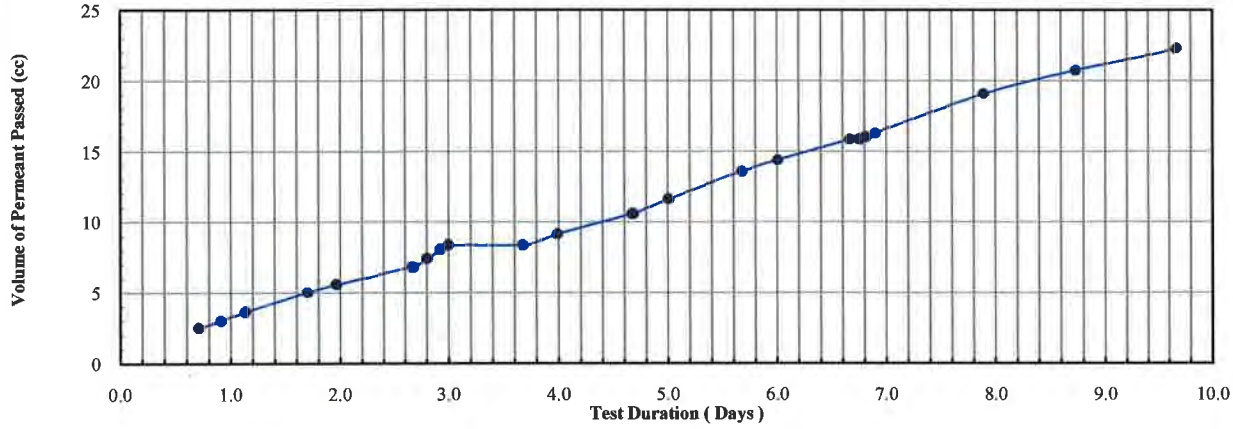
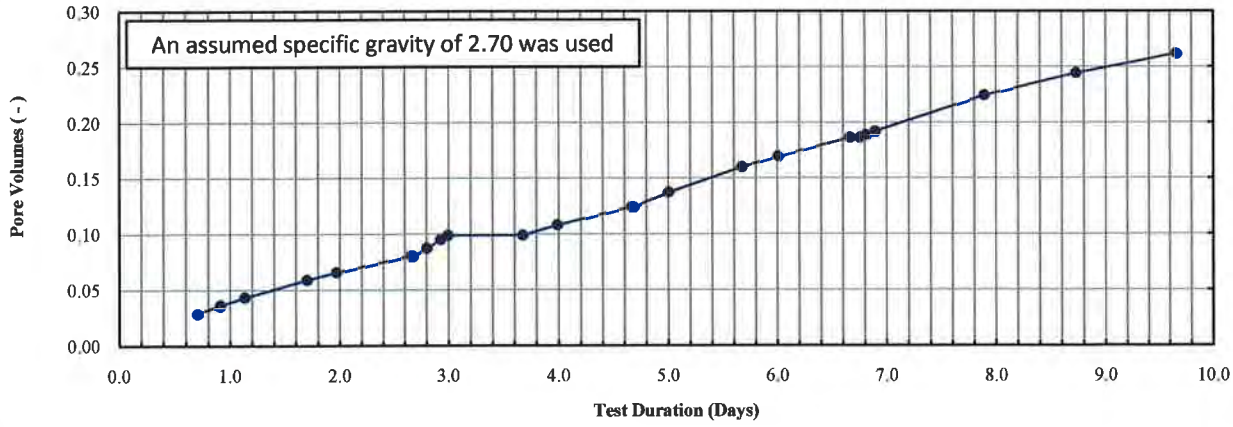
PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

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Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	SB-Mix6
Lab Sample Number:	14D141
Material Type:	7% Bentonite Slurry with Hydrant Water, 2% Dry Bentonite, CS-03 Soil (Note 2)
Permeant Liquid	P-7D
Date Test Started:	4/18/2014

Curing Period: N/A

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	5.96	7.27	64.6	62.1	75.0	70.0	5.0	P-7D	15	4.7E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours. The Bentonite slurry was added to CS-03 to form a sample with a slump of 4-6 inches.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Soil Bentonite Slurry mix in 3 approximately I in. (2.5 cm) layers; the test specimen was formed in a mold with the initial dimensions presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

7-22-14
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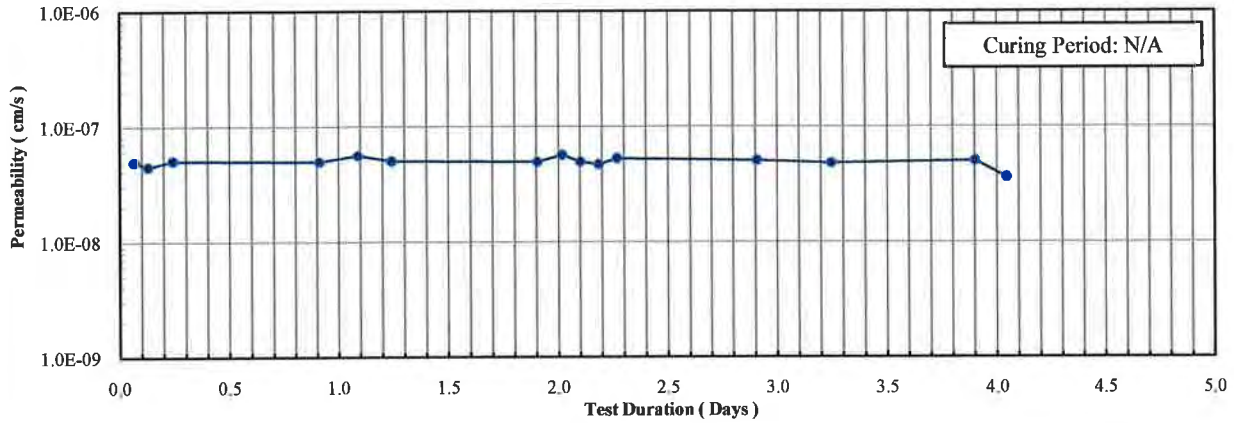
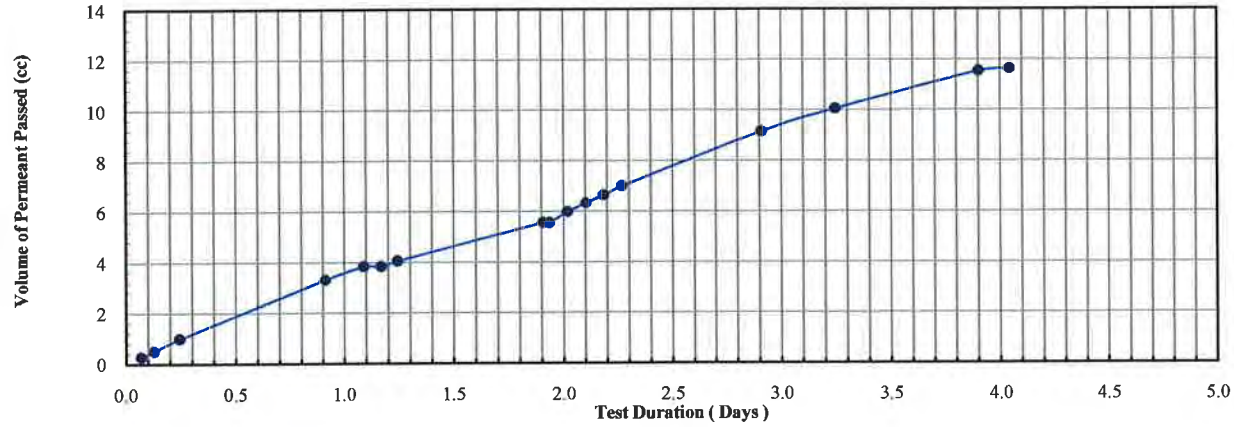
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	SB-Mix6
Lab Sample No:	14D141

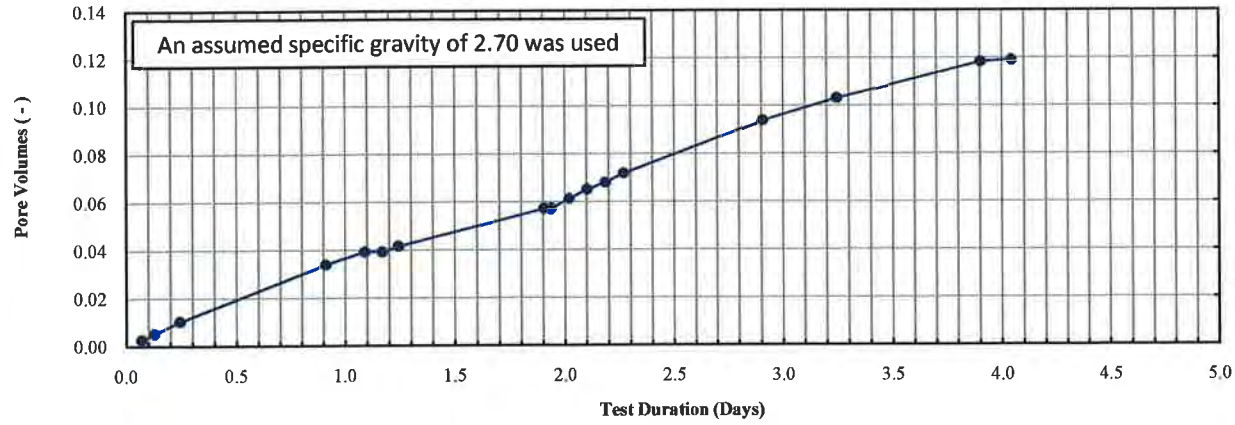
ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING

Figure P4-02







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	CB-Mix1
Lab Sample Number:	14C087
Material Type:	8% Bentonite Slurry with Hydrant Water, 19% Cement (Note 2)
Permeant Liquid	P-5D
Date Test Started:	4/24/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.72	7.64	14.8	368.3	75.0	70.0	5.0	P-5D	13	2.4E-6

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:
Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

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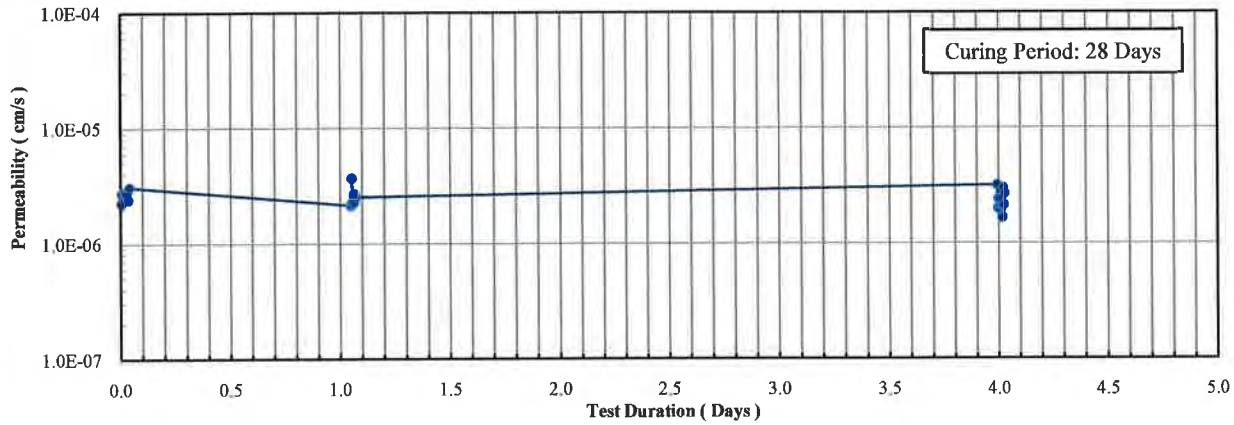
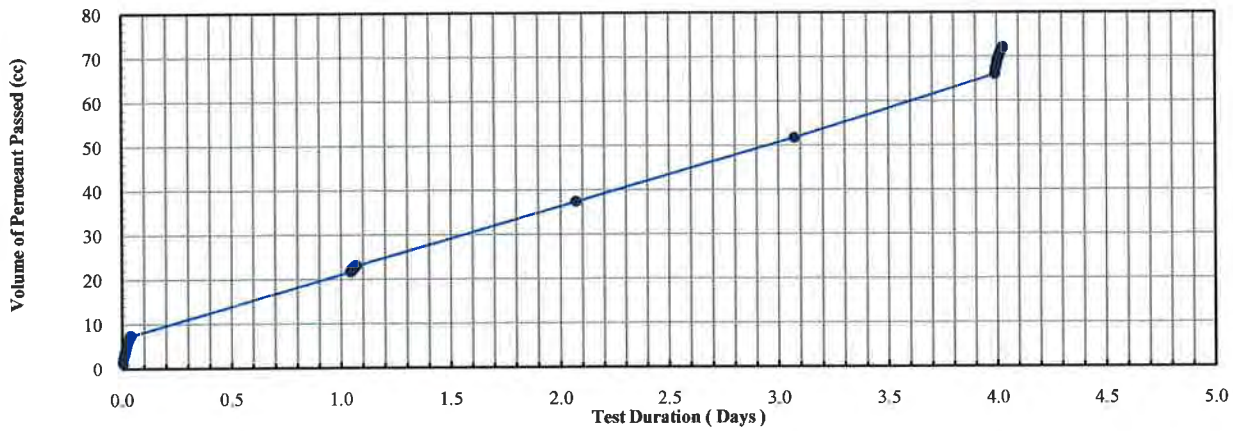
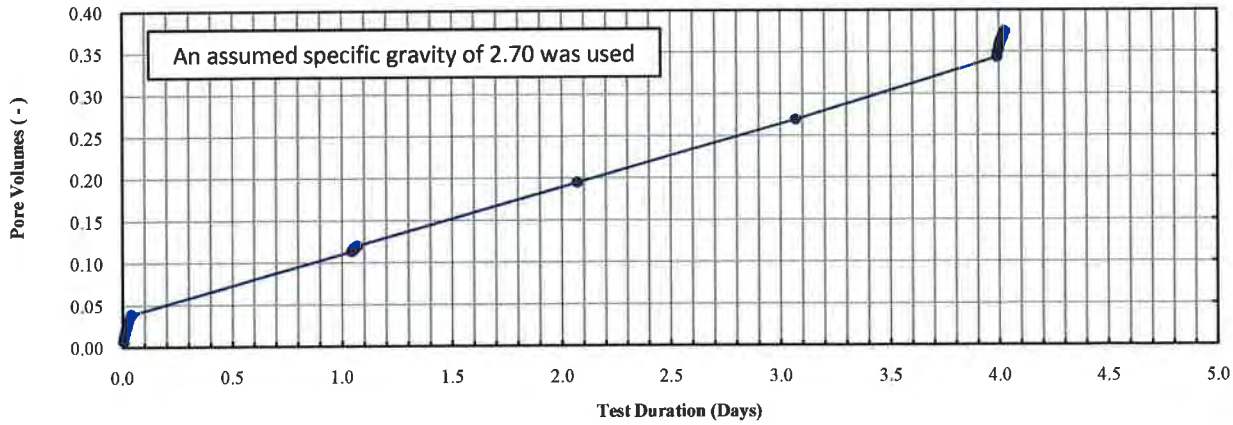
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CB-Mix1
Lab Sample No:	14C087

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	CB-Mix2
Lab Sample Number:	14C099
Material Type:	7% Bentonite Slurry with Hydrant Water, 19% Cement (Note 2)
Permeant Liquid:	P-5D
Date Test Started:	4/25/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.74	7.65	15.9	332.7	75.0	70.0	5.0	P-5D	13	2.4E-6

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

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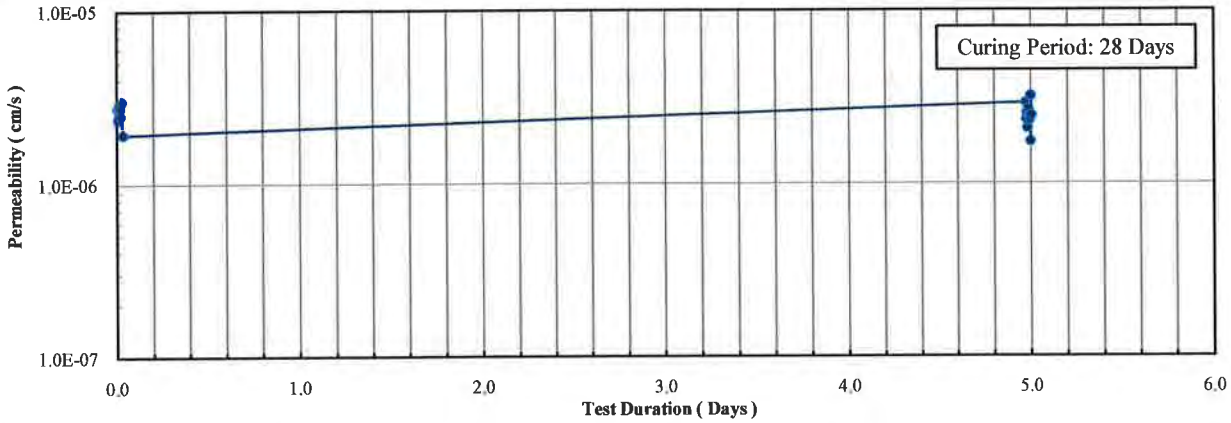
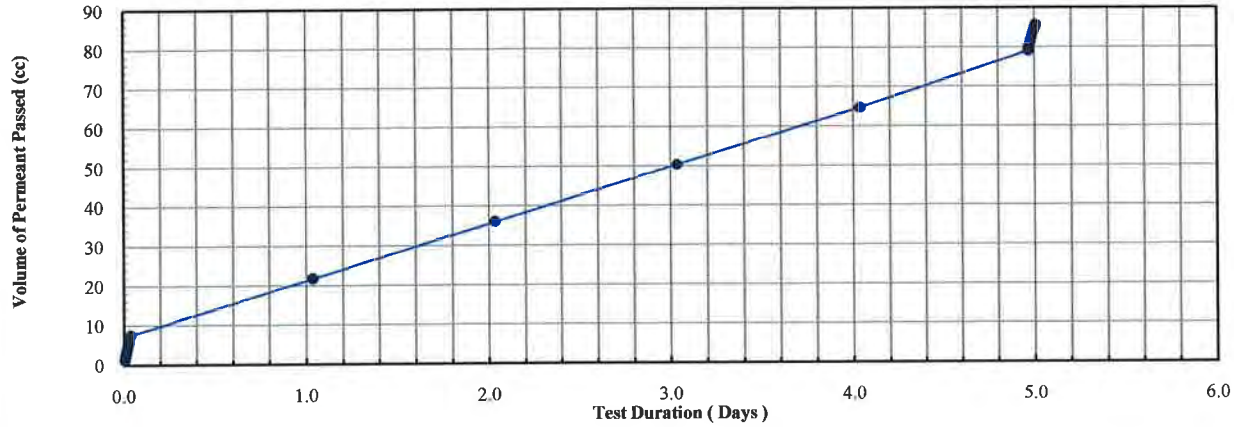
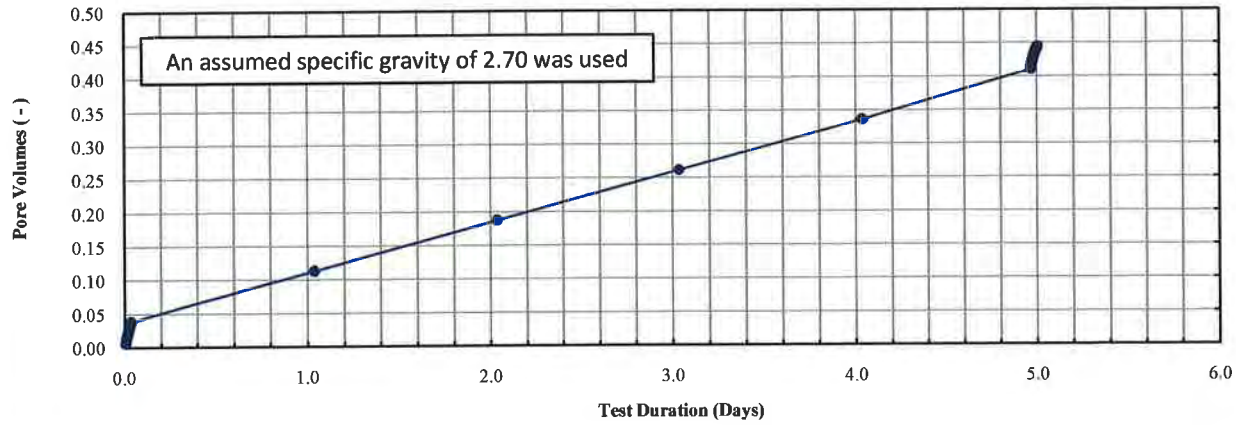
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CB-Mix2
Lab Sample No:	14C099

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	CB-Mix3
Lab Sample Number:	14C124
Material Type:	6% Bentonite Slurry with Hydrant Water, 19% Cement (Note 2)
Permeant Liquid	P-5D
Date Test Started:	4/18/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.61	7.63	17.2	318.6	75.0	70.0	5.0	P-5D	12	2.7E-6

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

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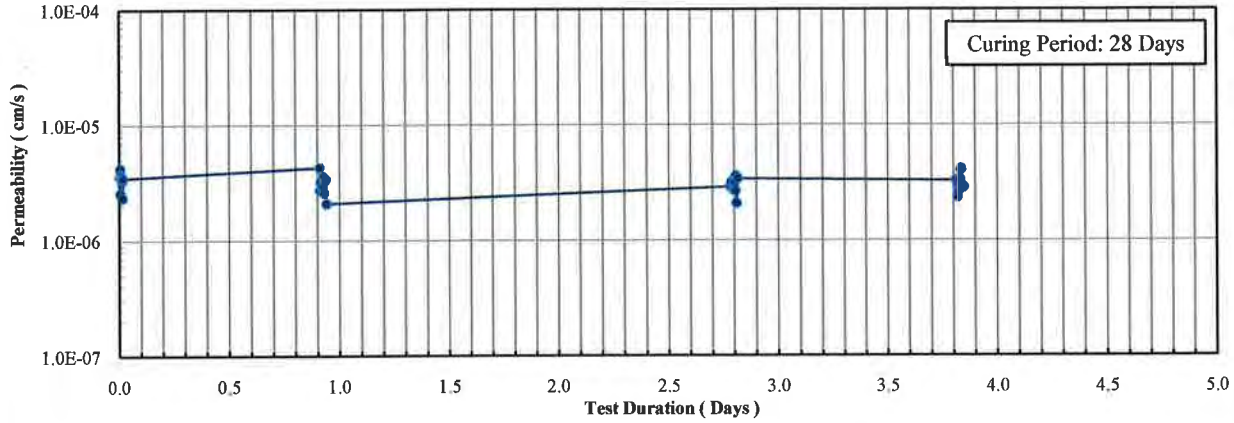
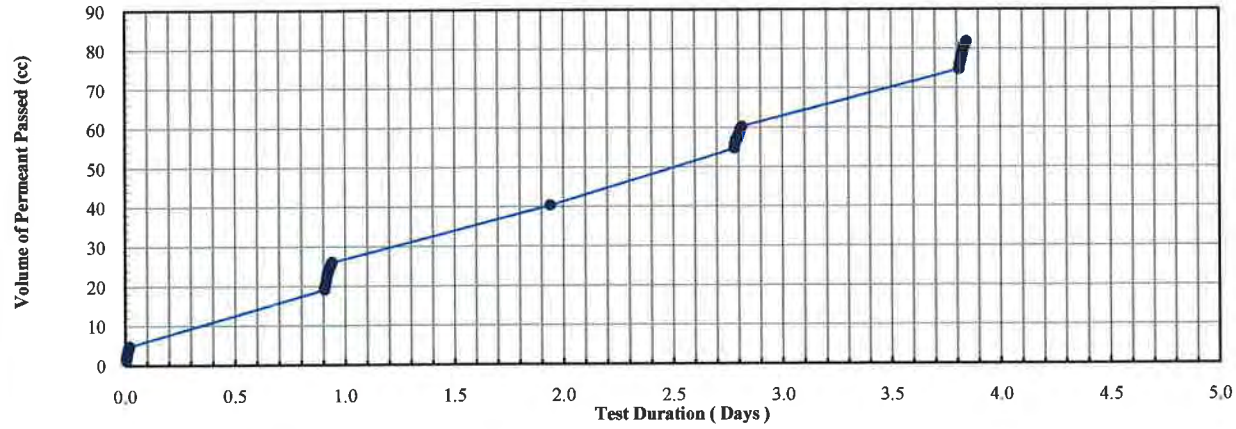
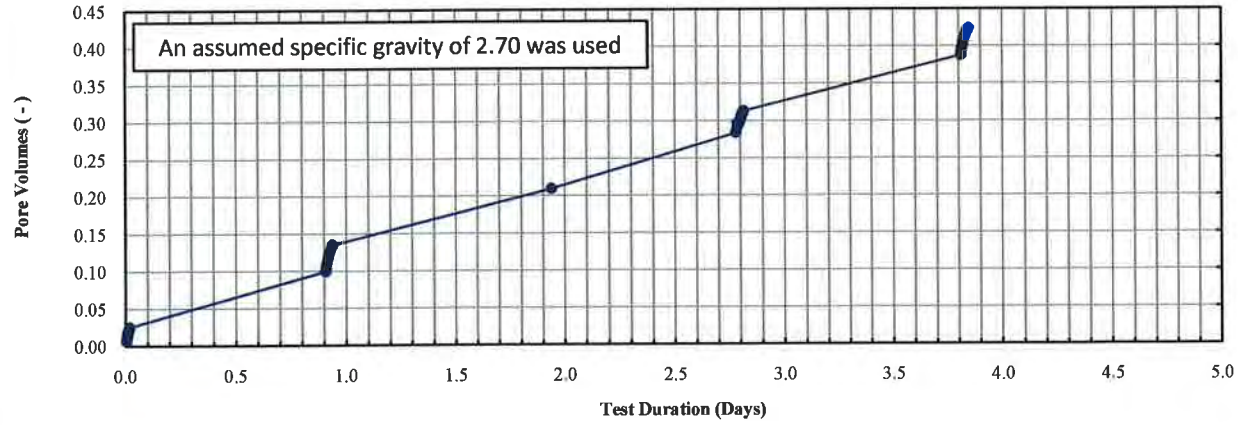
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CB-Mix3
Lab Sample No:	14C124

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	CB-Mix4
Lab Sample Number:	14D010
Material Type:	6% Bentonite Slurry with Hydrant Water, 16% Cement (Note 2)
Permeant Liquid	P-5D
Date Test Started:	5/1/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid [6]	Average Gradient[7]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.65	7.65	14.4	381.0	75.0	70.0	5.0	P-5D	12	2.8E-6

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

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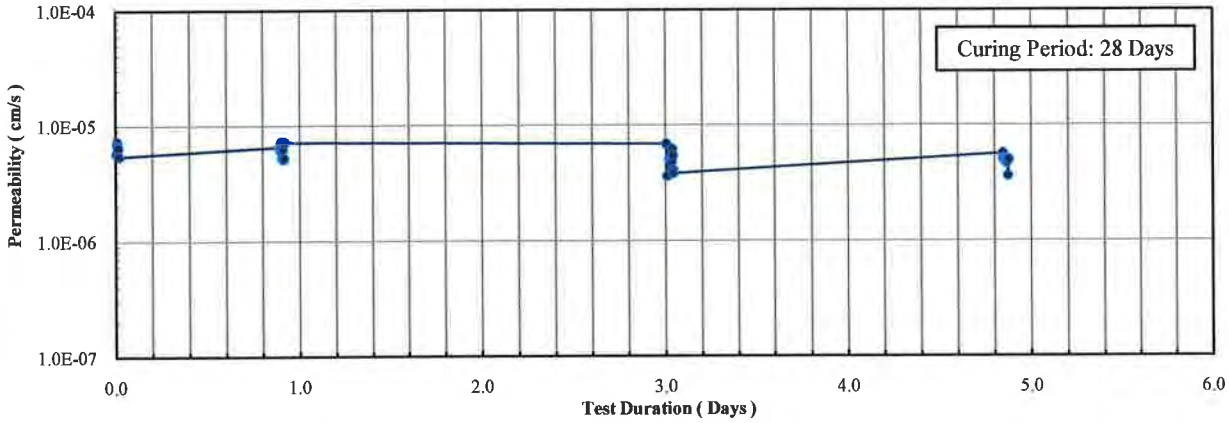
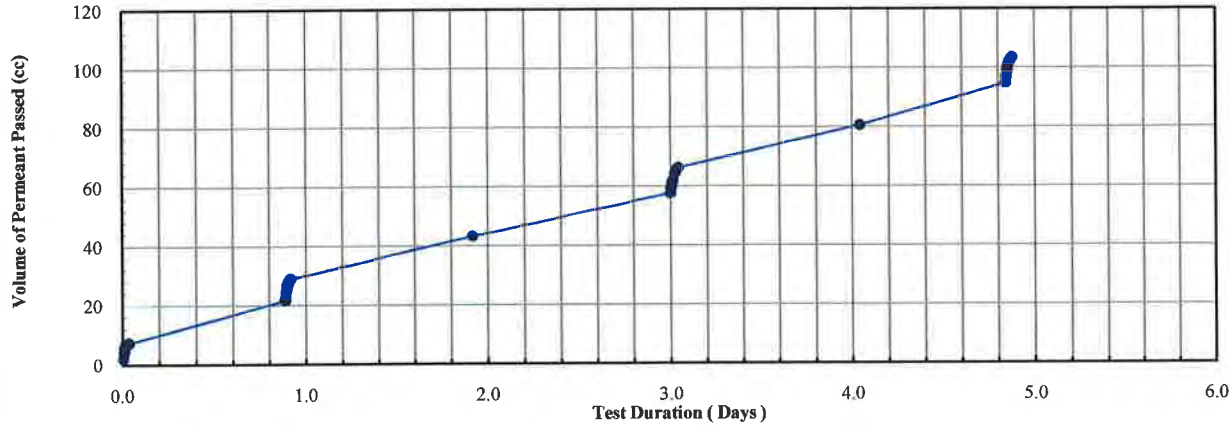
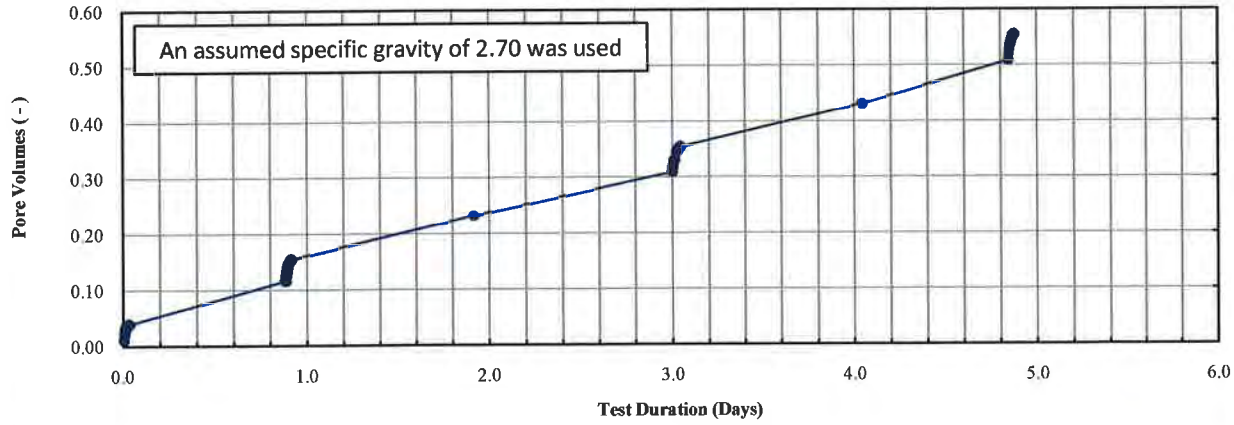
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CB-Mix4
Lab Sample No:	14D010

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	CB-Mix5
Lab Sample Number:	14C092
Material Type:	8% Bentonite Slurry with Hydrant Water, 19% Cement (Note 2)
Permeant Liquid:	P-7D
Date Test Started:	4/24/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.72	7.64	14.9	368.3	75.0	70.0	5.0	P-7D	16	1.9E-6

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

7-22-14
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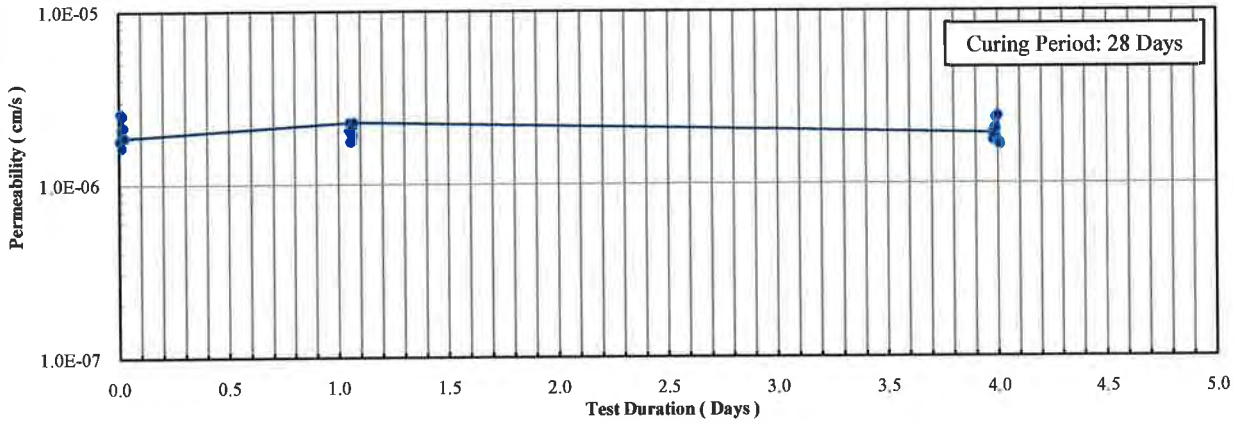
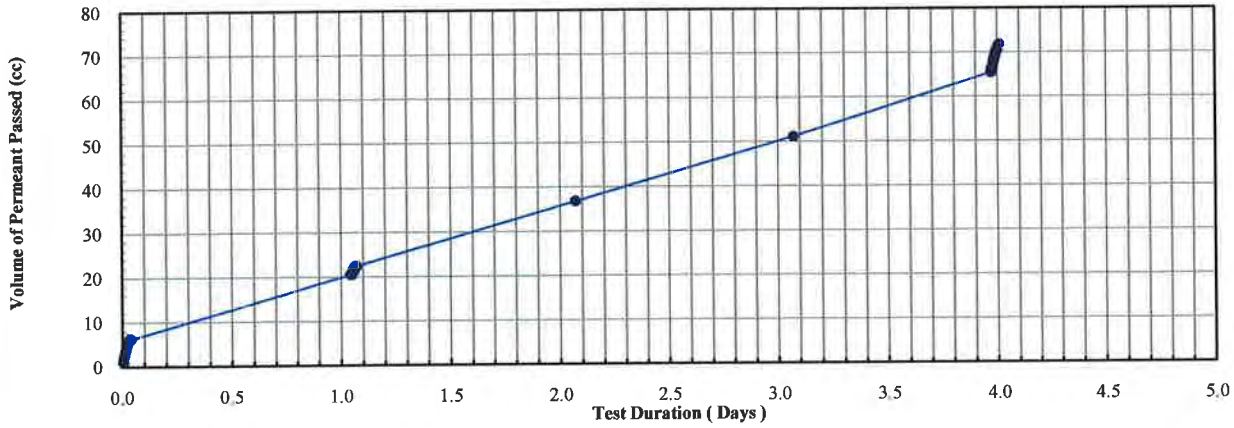
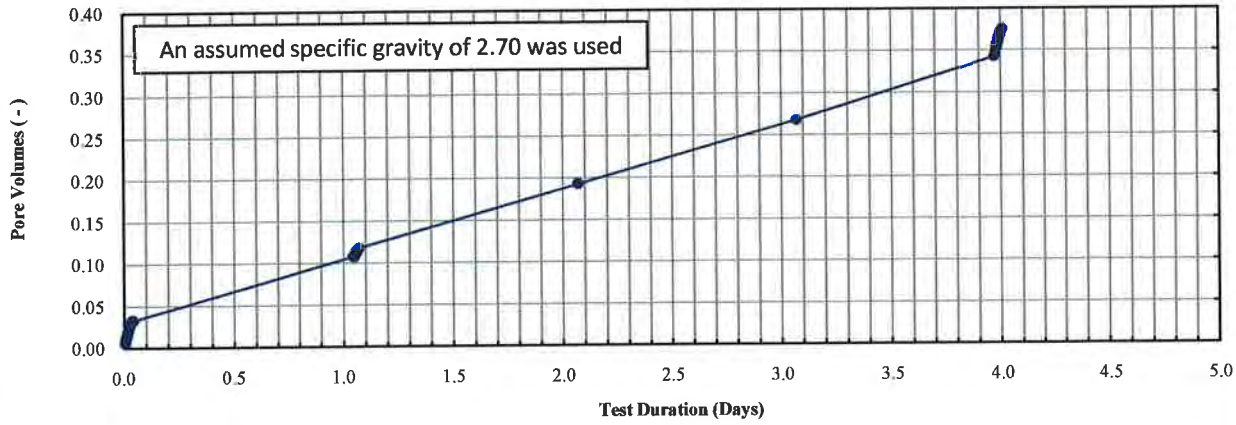
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CB-Mix5
Lab Sample No:	14C092

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	CB-Mix6
Lab Sample Number:	14C104
Material Type:	7% Bentonite Slurry with Hydrant Water, 19% Cement (Note 2)
Permeant Liquid:	P-7D
Date Test Started:	4/25/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.74	7.64	17.3	301.4	75.0	70.0	5.0	P-7D	18	1.3E-6

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

7-22-14
TR, NSR

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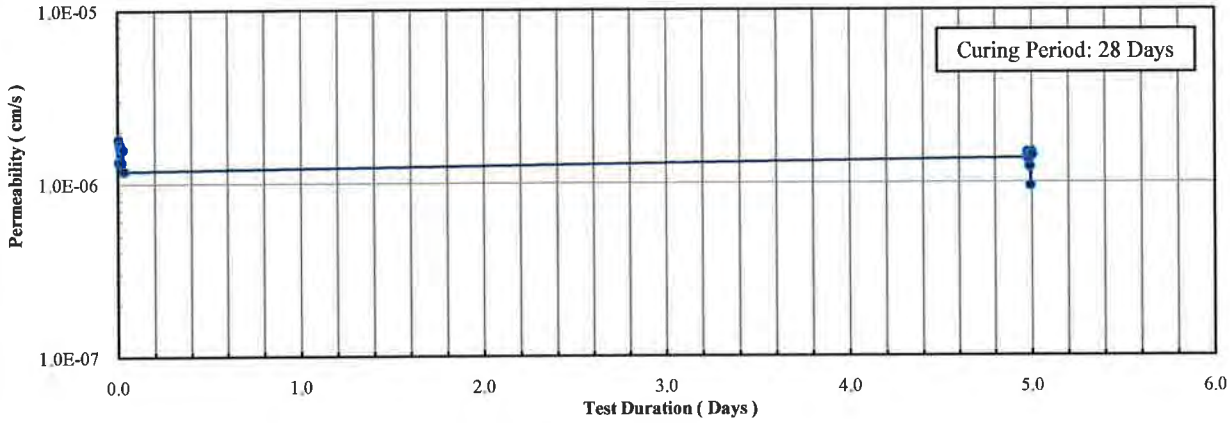
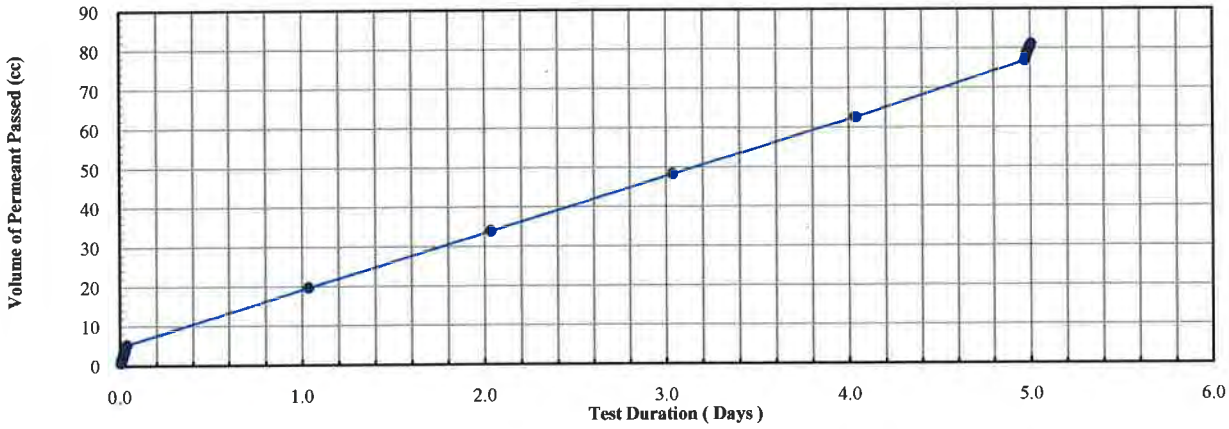
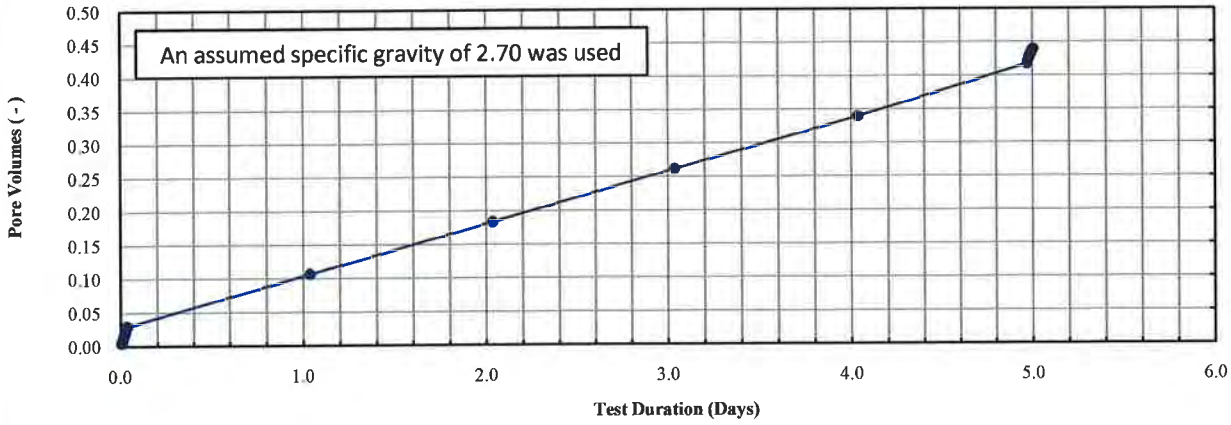
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CB-Mix6
Lab Sample No:	14C104

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

7-28-14
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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	CB-Mix7
Lab Sample Number:	14C125
Material Type:	6% Bentonite Slurry with Hydrant Water, 19% Cement (Note 2)
Permeant Liquid	P-7D
Date Test Started:	4/28/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.65	7.63	17.0	320.2	75.0	70.0	5.0	P-7D	14	2.4E-6

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

7-22-14
TR, NSR

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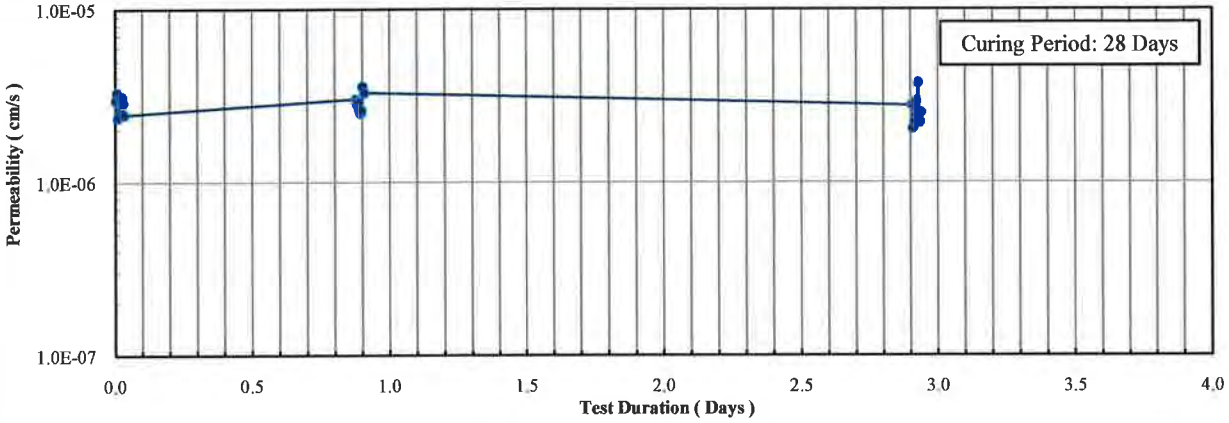
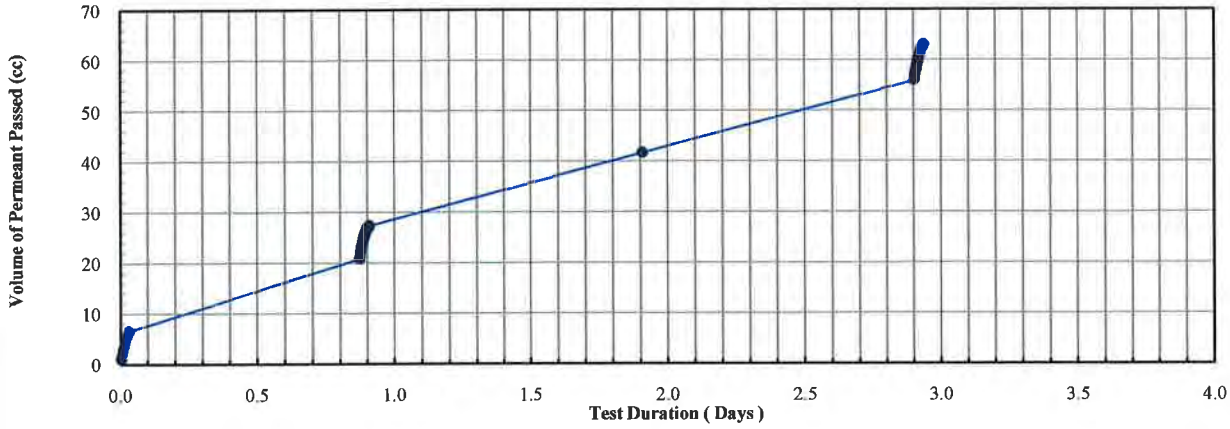
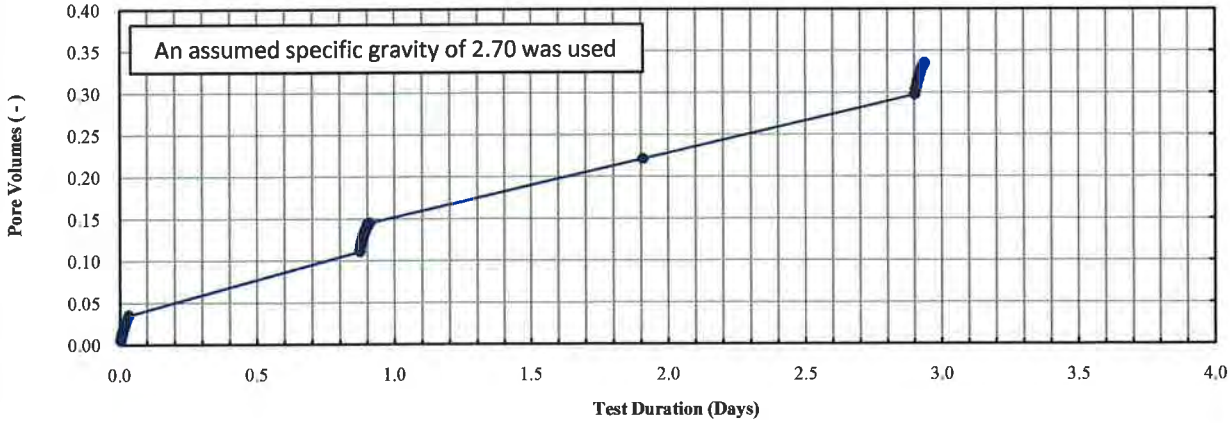
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CB-Mix7
Lab Sample No:	14C125

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

A-22-14
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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	CB-Mix8
Lab Sample Number:	14D012
Material Type:	6% Bentonite Slurry with Hydrant Water, 16% Cement (Note 2)
Permeant Liquid	P-7D
Date Test Started:	5/1/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid [6]	Average Gradient[7]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.63	7.55	16.9	322.1	75.0	70.0	5.0	P-7D	12	2.8E-6

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

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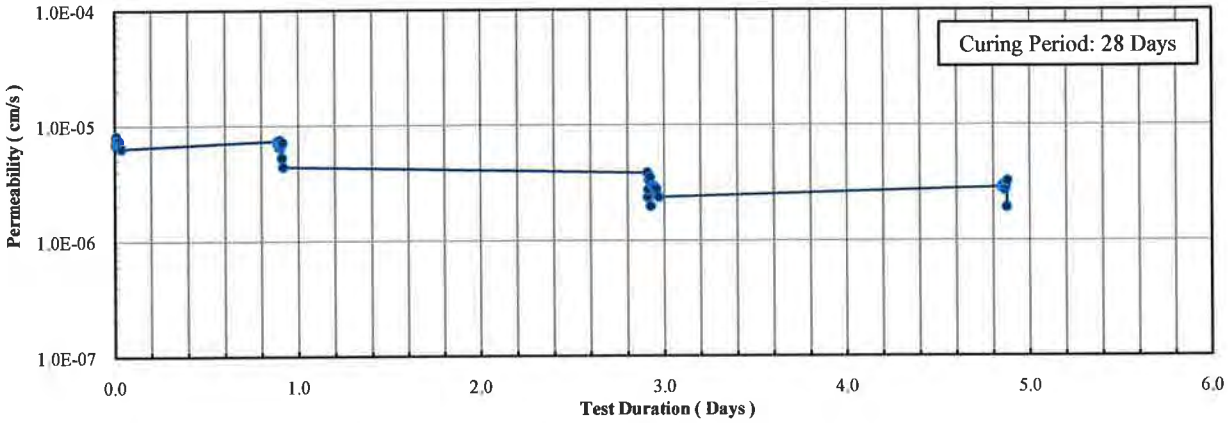
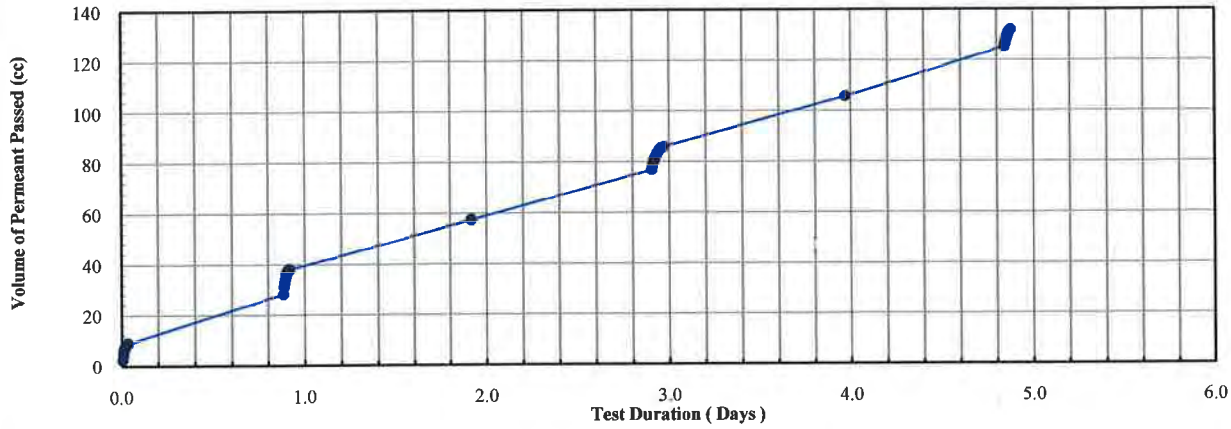
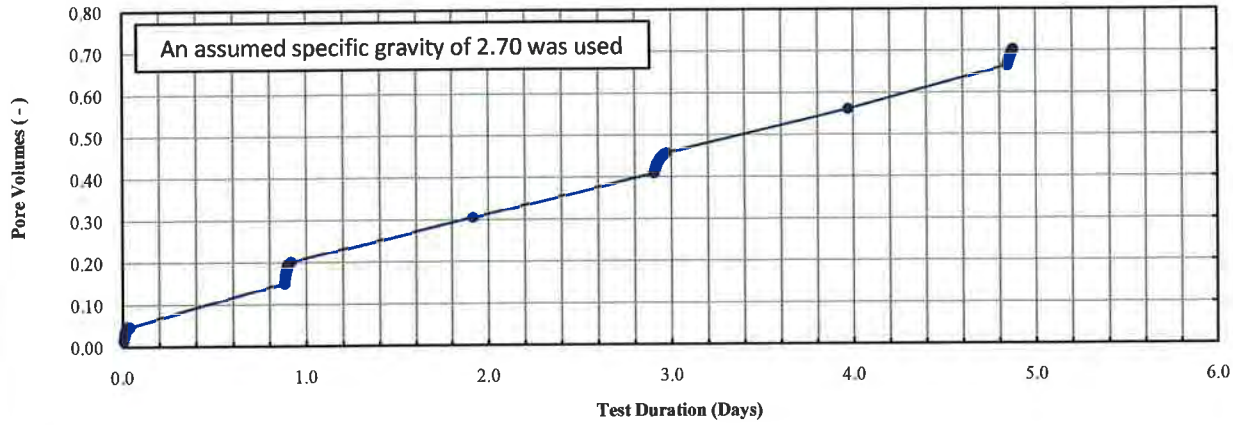
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CB-Mix8
Lab Sample No:	14D012

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	CB-Mix11
Lab Sample Number:	14E147
Material Type:	6% Bentonite Slurry with Hydrant Water, 23% Cement (Note 2)
Permeant Liquid	P-5D
Date Test Started:	6/16/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.62	7.63	18.3	302.3	75.0	70.0	5.0	P-5D	31	2.3E-6

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented

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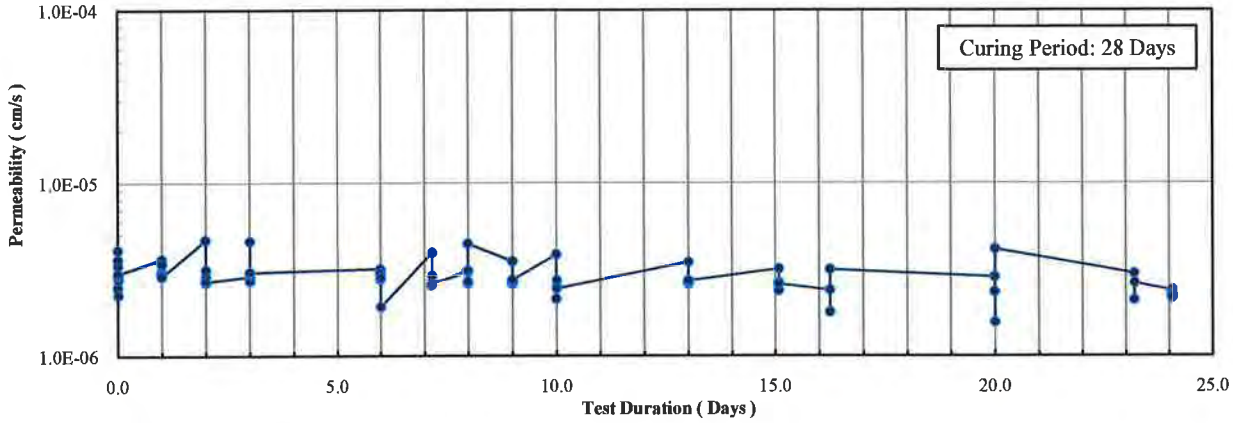
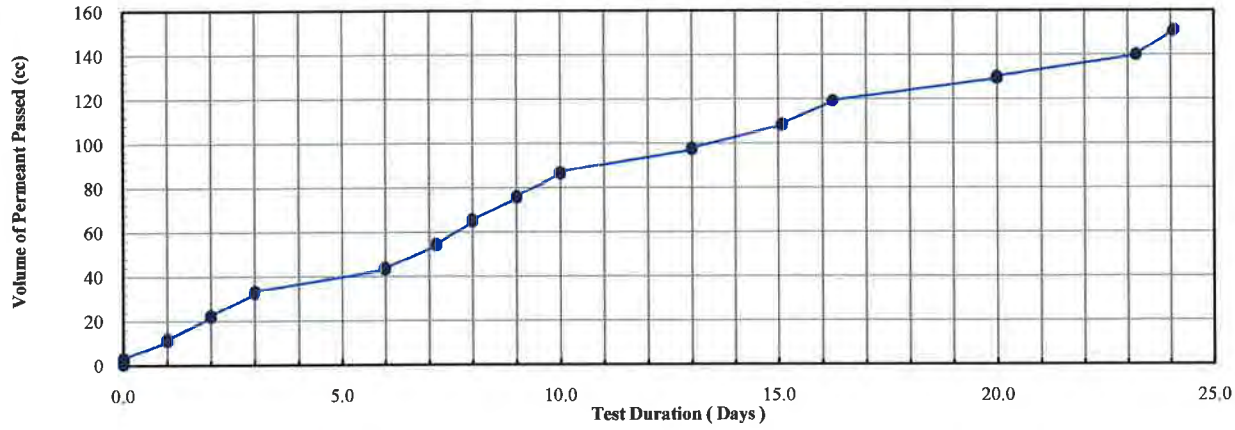
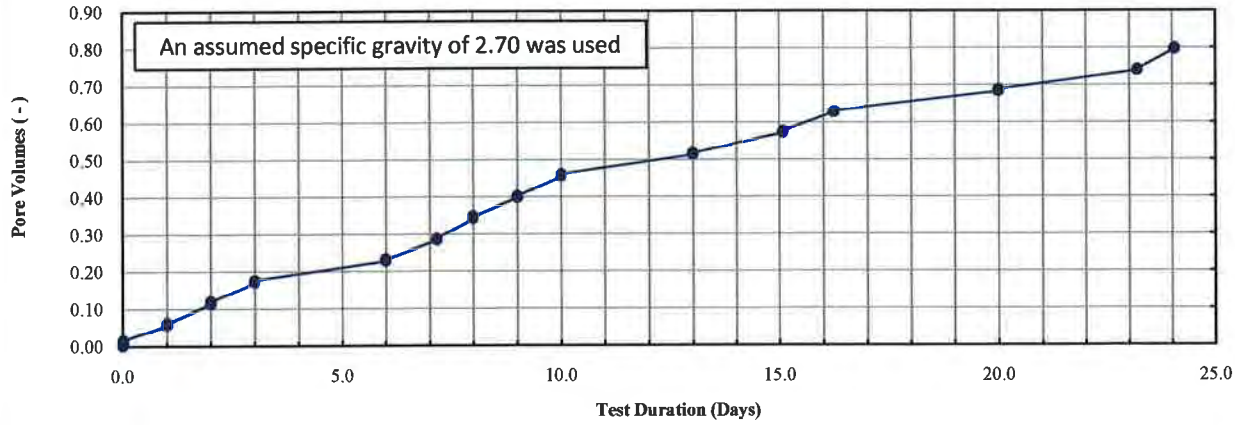
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CB-Mix11
Lab Sample No:	14E147

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	CB-Mix12
Lab Sample Number:	14E148
Material Type:	6% Bentonite Slurry with Hydrant Water, 23% Cement (Note 2)
Permeant Liquid	P-7D
Date Test Started:	6/16/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.63	7.64	19.4	280.0	75.0	70.0	5.0	P-7D	26	1.9E-6

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3. All particles larger than 3/8 in., if any, were discarded.
4. Hydrant Water was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

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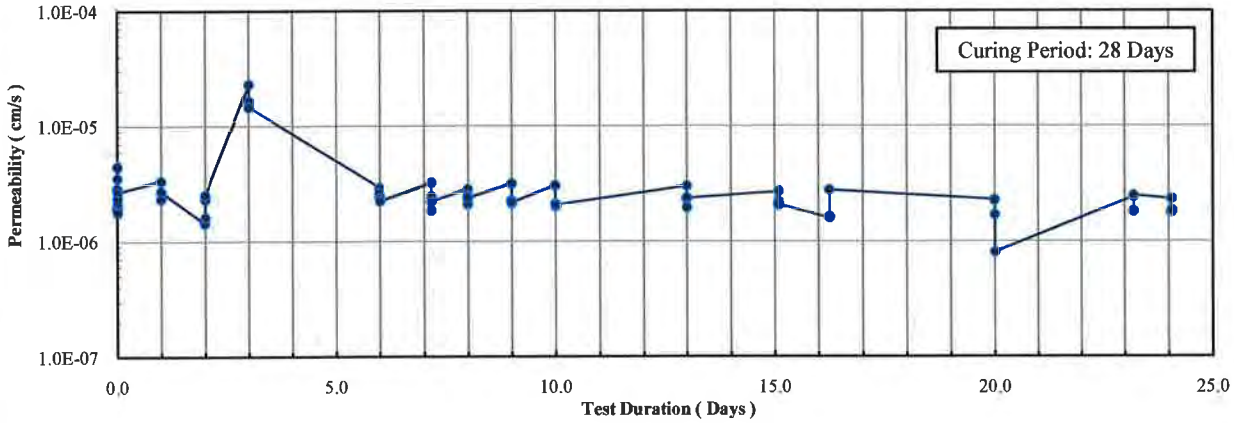
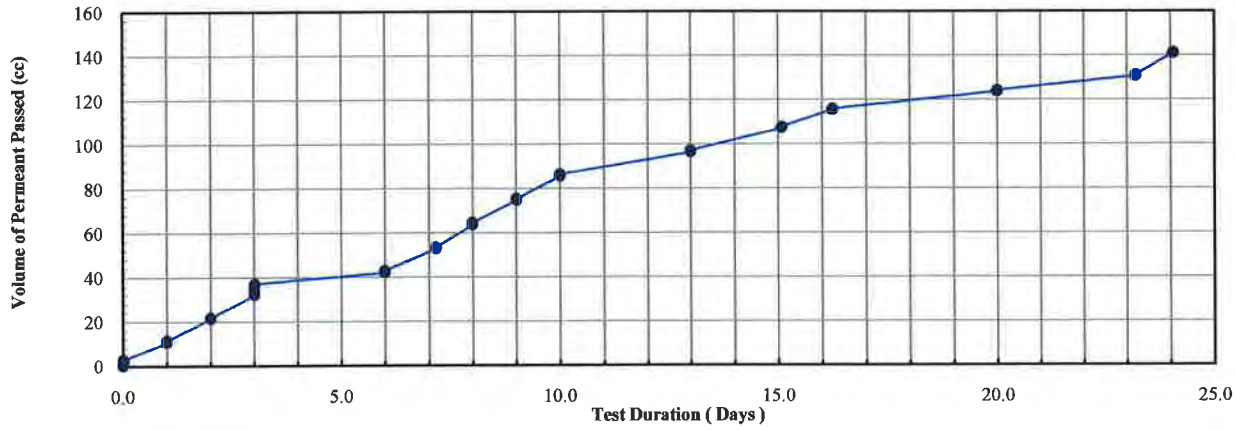
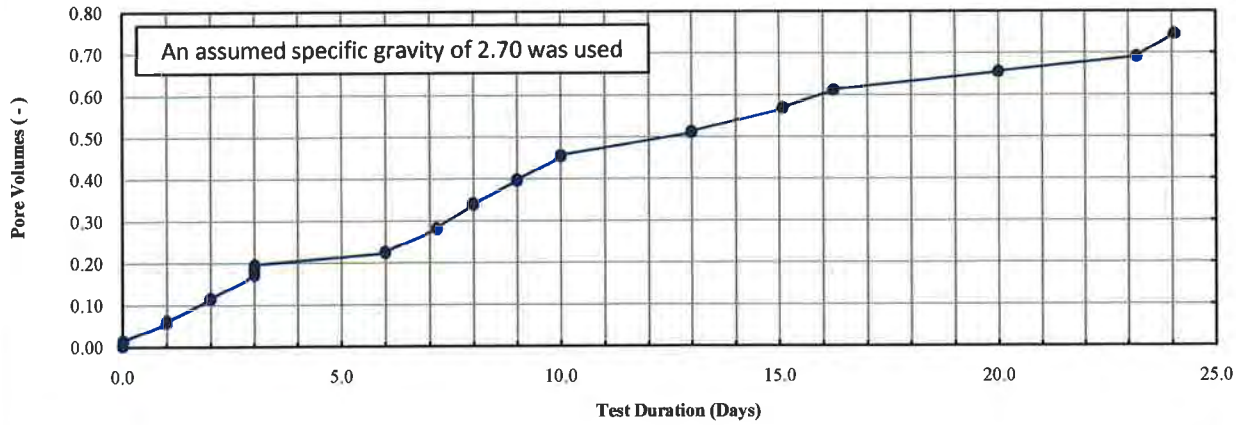
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CB-Mix12
Lab Sample No:	14E148

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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Phase 3

Soil Cement Bentonite, Soil Bentonite, and Cement Bentonite Mix Design and Evaluation

Attachment P3-D

Unconfined Compressive Strength Test Results

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Table P3-D-01

Project Name: Chemtronics Geotechnical Testing
Project No.: 621

Unconfined Compressive Strength

Sample Identification			Sample Mix Percentages				Curing Period						Notes
							7 Days			28 Days			
Site ID	Lab No.		Bentonite	Cement	Dry Bent.	Water Mix	Moisture	Dry Unit	Compressive	Moisture	Dry Unit	Compressive	
	7 Days	28 Days	Slurry	added	to Soil	Type	Content	Weight	Strength	Content	Weight	Strength	
(-)	(-)	(-)	(%)	(%)	(%)	(-)	(%)	(pcf)	(psi)	(%)	(pcf)	(psi)	
SCB-Mix1	14D105	14D107	7	16	0	Hydrant	60.0	64.3	34.5	61.6	63.1	56.4	
SCB-Mix2	14D113	14D115	7	19	1	Hydrant	56.8	65.8	52.3	56.1	65.4	86.0	
SCB-Mix3	14D121	14D123	7	21	2	Hydrant	59.4	64.2	43.3	57.4	64.4	95.3	
SCB-Mix4	-	-	7	16	0	Hydrant	-	-	-	-	-	-	
SCB-Mix5	-	-	7	19	1	Hydrant	-	-	-	-	-	-	
SCB-Mix6	-	-	7	21	2	Hydrant	-	-	-	-	-	-	
CB-Mix1	-	14C083	8	19	0	Hydrant	See CB-Mix5			358.6	15.1	11.3	
CB-Mix2	14C097	-	7	19	0	Hydrant	360.6	15.5	7.5	See CB-Mix6			
CB-Mix3	14C121	14C122	6	19	0	Hydrant	332.4	16.5	8.5	324.3	16.6	12.6	
CB-Mix4	14D007	14D008	6	16	0	Hydrant	415.1	13.6	4.4	376.7	14.7	8.0	
CB-Mix5	14C090	-	8	19	0	Hydrant	367.8	15.2	6.2	-	-	-	
CB-Mix6	-	14C103	7	19	0	Hydrant	-	-	-	298.4	18.4	11.0	
CB-Mix7	-	-	6	19	0	Hydrant	-	-	-	-	-	-	
CB-Mix8	-	-	6	16	0	Hydrant	-	-	-	-	-	-	
CB-Mix11	14E144	14E145	6	23	0	Hydrant	299.6	17.7	4.5	386.1	14.4	5.6	
CB-Mix12	-	-	6	23	0	Hydrant	-	-	-	-	-	-	

Notes:

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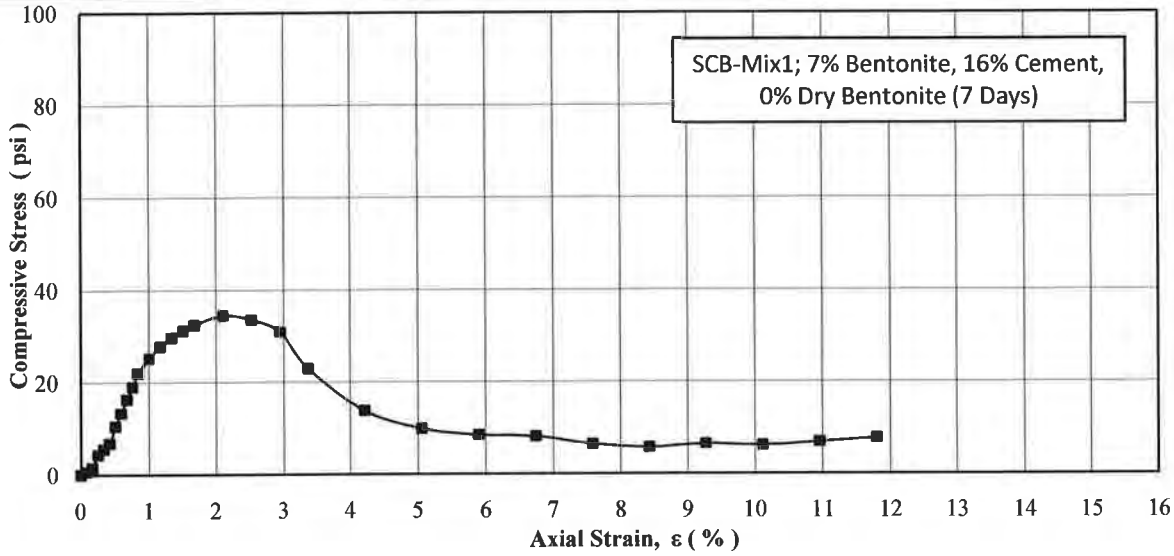
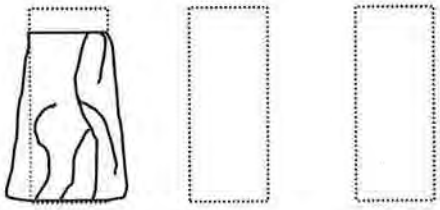
Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: SCB-Mix1
Lab Sample No: 14D105

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
SCB-Mix1	14D105	5.93	2.98	60.0	64.3	0.843	2.1	34.5	8.4	5.8	9	RE



SCB-Mix1

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:

1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement. The Bentonite Cement slurry was added to the CS-03 to form a sample with a slumpof 4-6 inches.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - Hydrant water was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Soil Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) thick layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

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Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: SCB-Mix1
Lab Sample No: 14D107

UNCONFINED COMPRESSIVE STRENGTH TEST

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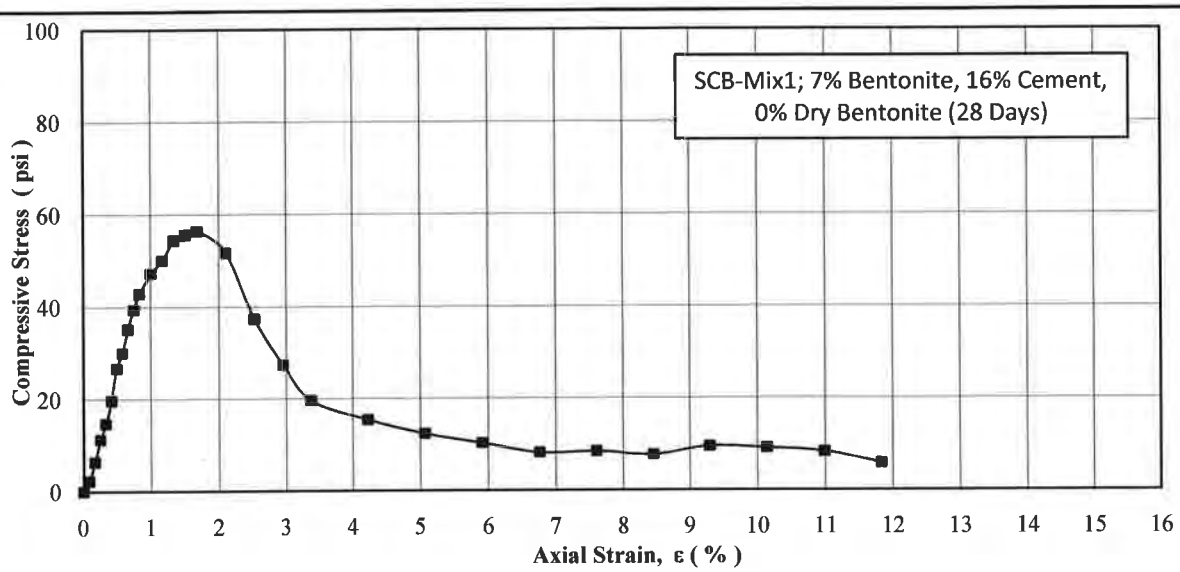
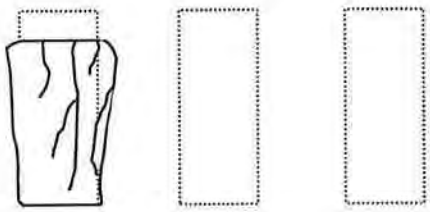


Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
SCB-Mix1	14D107	5.92	3.00	61.6	63.1	0.845	1.7	56.4	11.8	5.8	9	RE



SCB-Mix1

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:

1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement. The Bentonite Cement slurry was added to the CS-03 to form a sample with a slumpof 4-6 inches.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - Hydrant water was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Soil Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) thick layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

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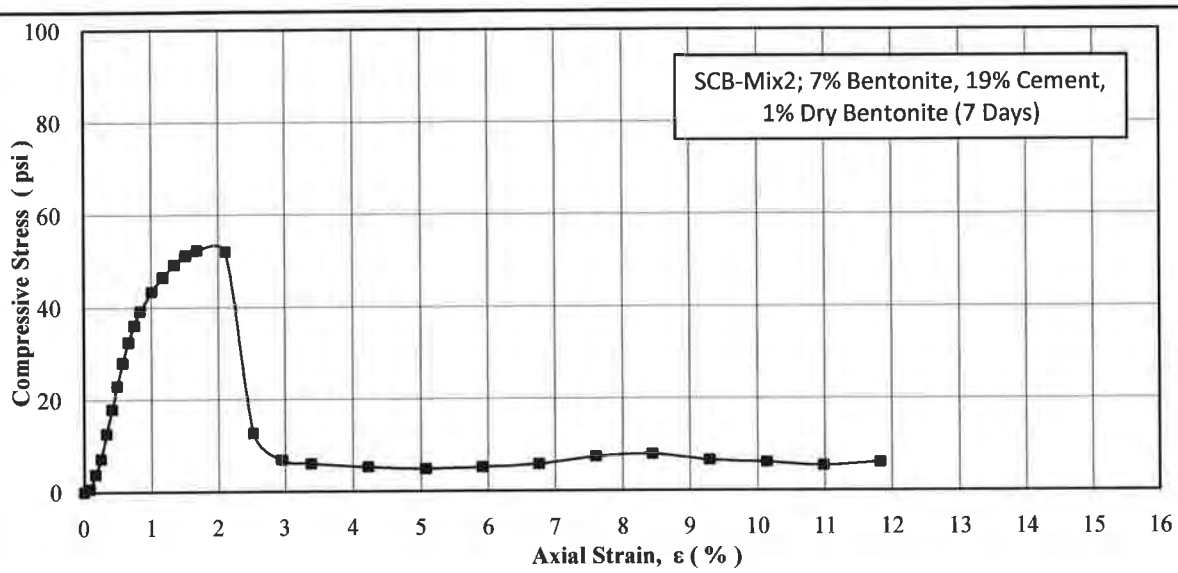
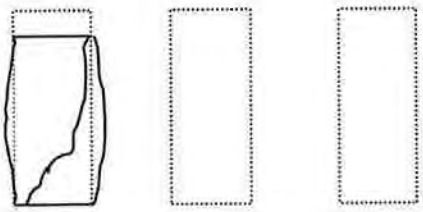
Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: SCB-Mix2
Lab Sample No: 14D113

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
SCB-Mix2	14D113	5.92	3.01	56.8	65.8	0.845	1.7	52.3	5.1	4.9	9	RE



SCB-Mix2

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:

1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement. The Bentonite Cement slurry was added to the CS-03 to form a sample with a slumpof 4-6 inches.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - Hydrant water was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Soil Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) thick layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

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Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: SCB-Mix2
Lab Sample No: 14D115

UNCONFINED COMPRESSIVE STRENGTH TEST

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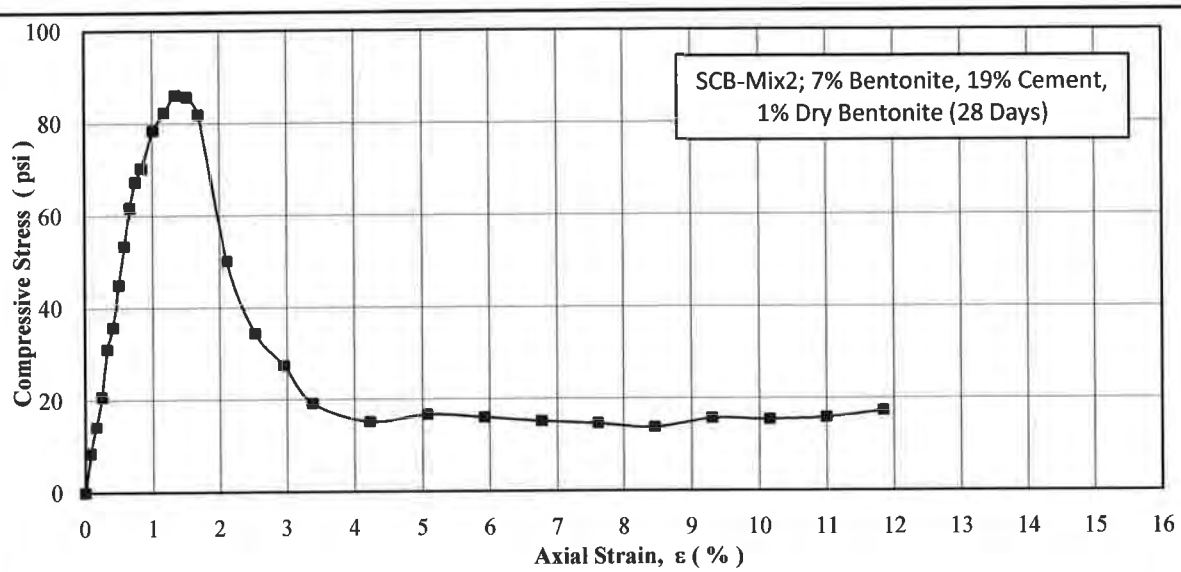

Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
SCB-Mix2	14D115	5.91	3.01	56.1	65.4	0.846	1.4	86.0	8.5	13.8	9	RE

SCB-Mix2

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:
1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement. The Bentonite Cement slurry was added to the CS-03 to form a sample with a slumpof 4-6 inches.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - Hydrant water was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Soil Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) thick layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

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Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: SCB-Mix3
Lab Sample No: 14D121

UNCONFINED COMPRESSIVE STRENGTH TEST

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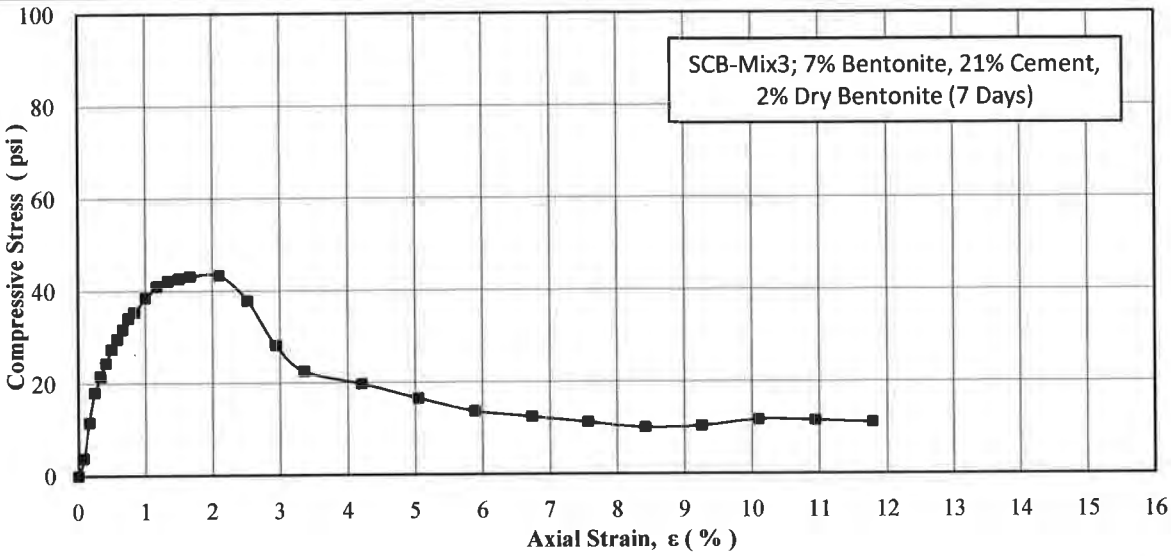
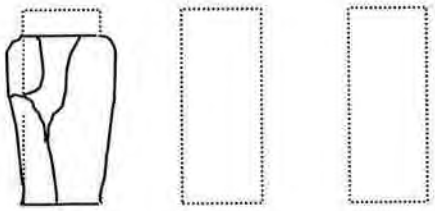


Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
SCB-Mix3	14D121	5.94	2.99	59.4	64.2	0.842	2.1	43.3	8.4	10.0	9	RE



SCB-Mix3

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:
1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement. The Bentonite Cement slurry was added to the CS-03 to form a sample with a slumpof 4-6 inches.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - Hydrant water was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Soil Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) thick layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

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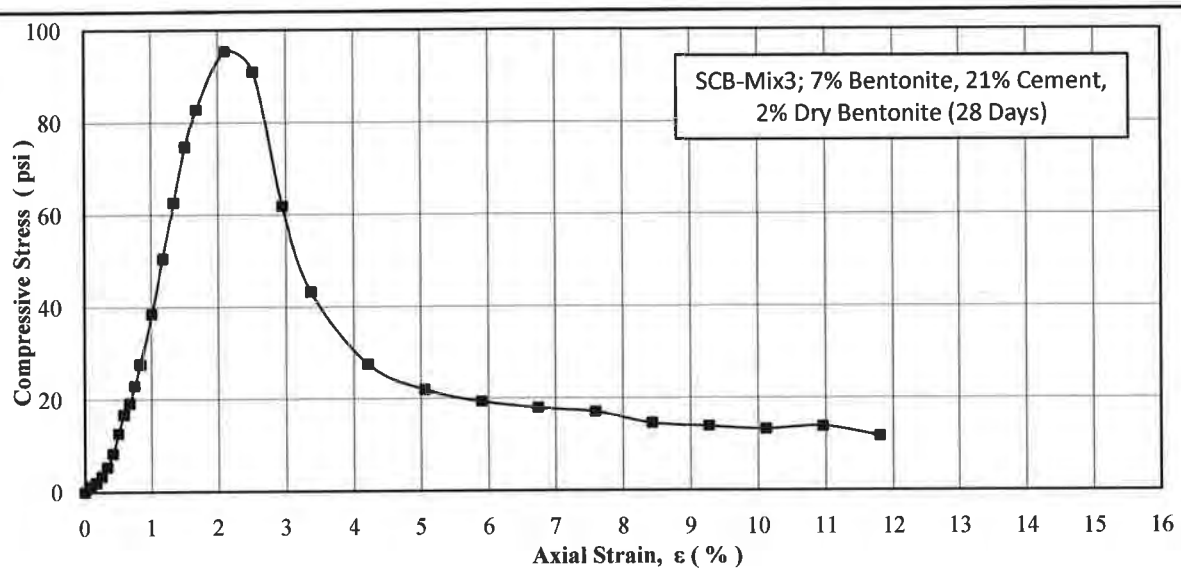
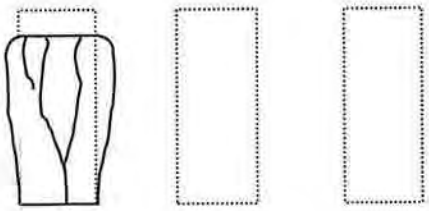
Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: SCB-Mix3
Lab Sample No: 14D123

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
SCB-Mix3	14D123	5.93	3.00	57.4	64.4	0.843	2.1	95.3	11.8	11.7	9	RE



SCB-Mix3

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:
1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement. The Bentonite Cement slurry was added to the CS-03 to form a sample with a slumpof 4-6 inches.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - Hydrant water was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Soil Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) thick layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

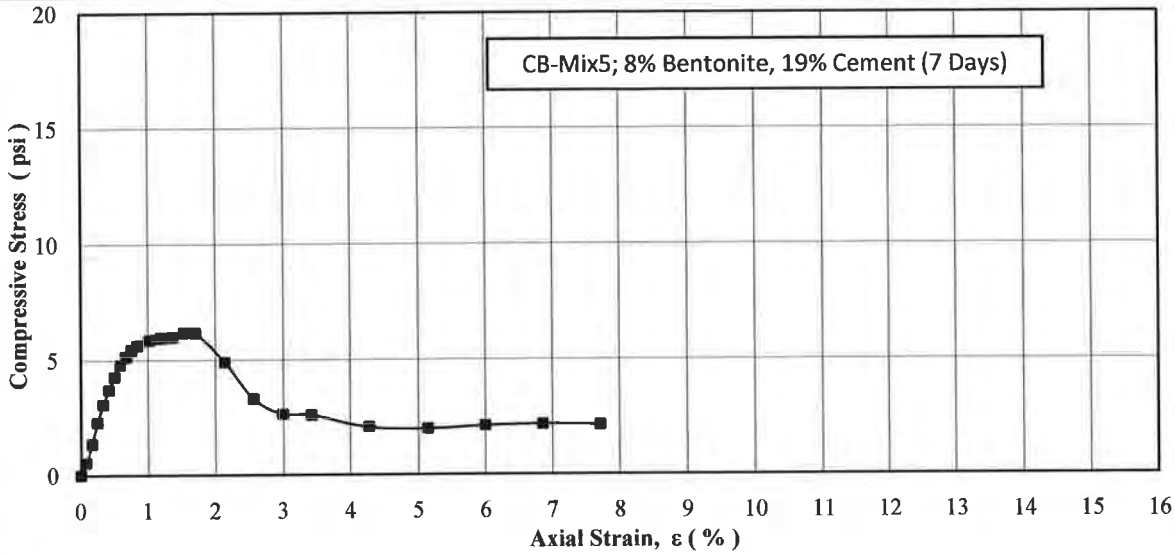
7-22-14
TR, NSR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

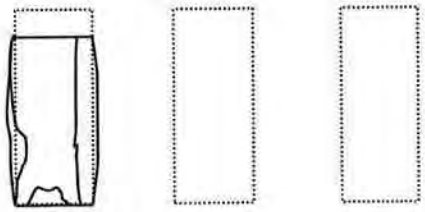
Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: CB-Mix5
Lab Sample No: 14C090

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
CB-Mix5	14C090	5.83	3.01	367.8	15.2	0.857	1.7	6.2	5.1	2.0	9	RE



CB-Mix5

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:

1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - Hydrant water was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 6 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

7-22-14
TR, NSR

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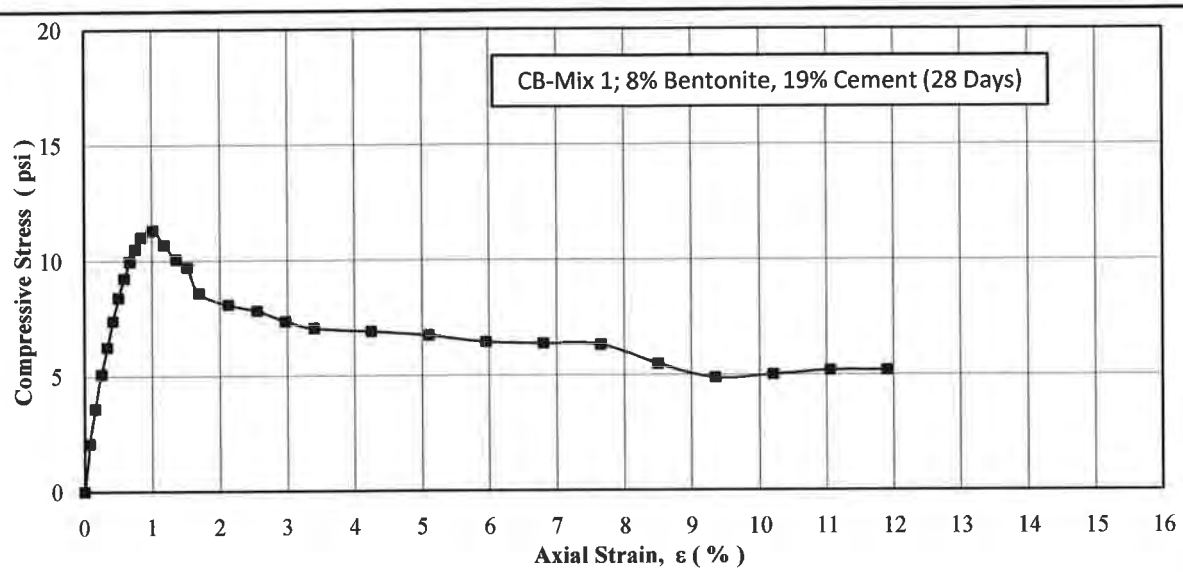
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

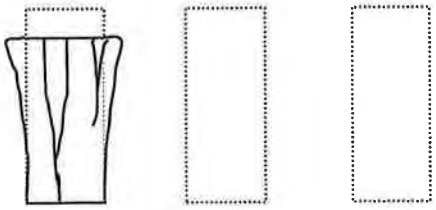
Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: CB-Mix1
Lab Sample No: 14C083

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
CB-Mix1	14C083	5.88	3.02	358.6	15.1	0.850	1.0	11.3	9.4	4.9	9	RE



CB-Mix1

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:

1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - Hydrant water was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 6 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

7-22-14
TR, NSR

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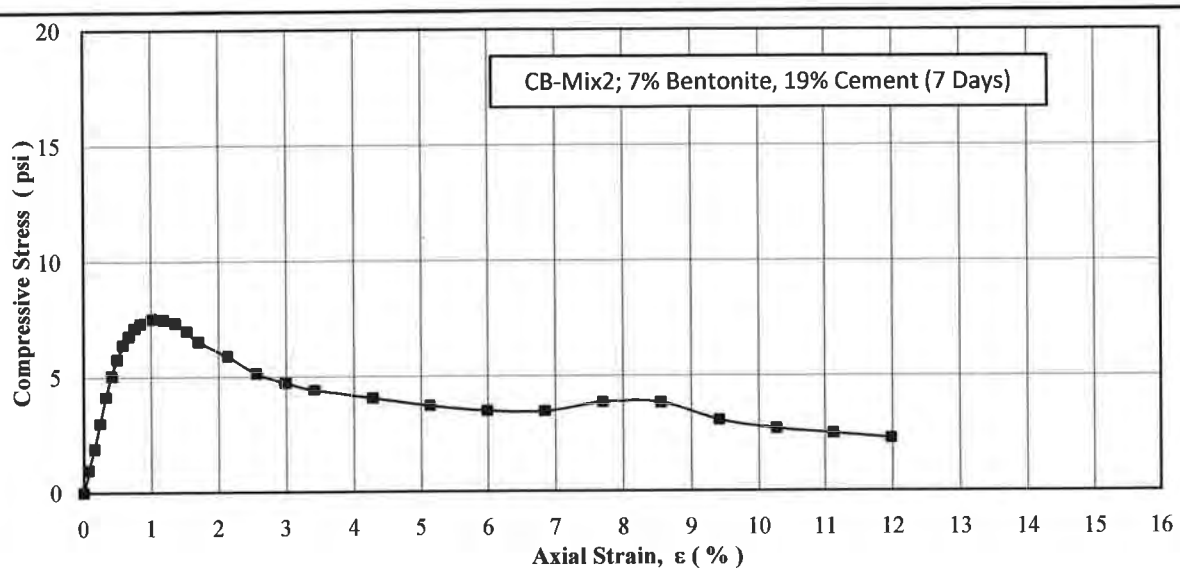
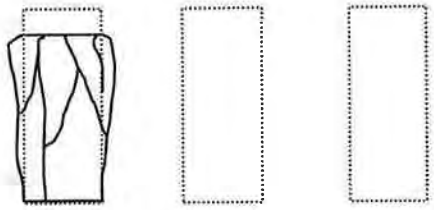
Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: CB-Mix2
Lab Sample No: 14C097

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type(2,3,4,5)
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 (1)	
CB-Mix2	14C097	5.84	2.98	360.6	15.5	0.856	1.0	7.5	12.0	2.3	9	RE



CB-Mix2

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:
1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - Hydrant water was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 6 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

7-22-14
TR, NSR

Excel Geotechnical Testing, Inc.
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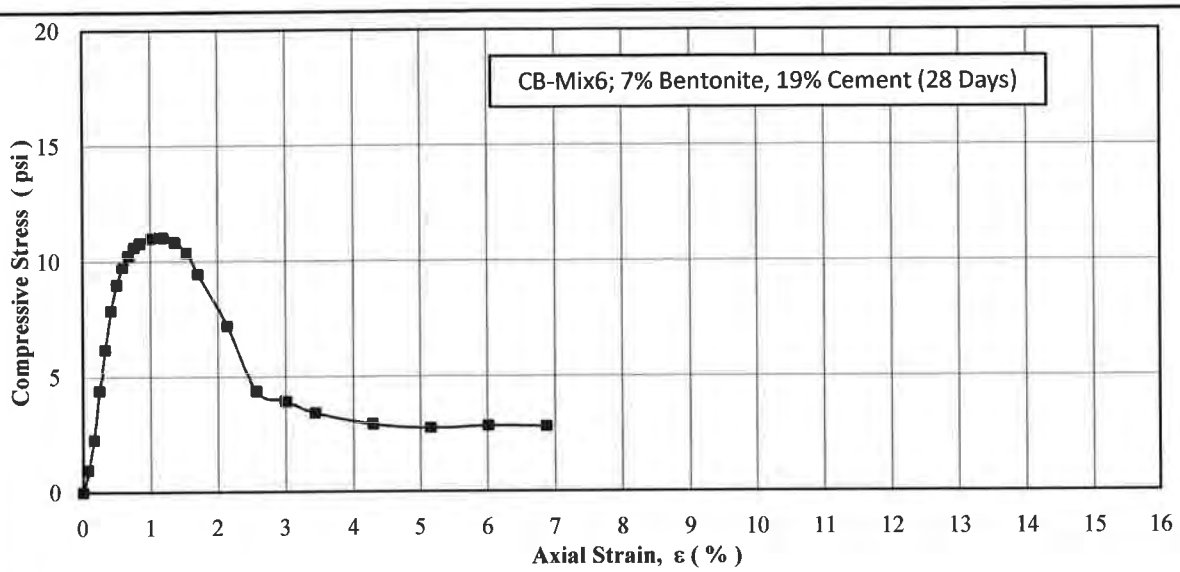
Tel: (770) 910 7537 Fax: (770) 910 7538

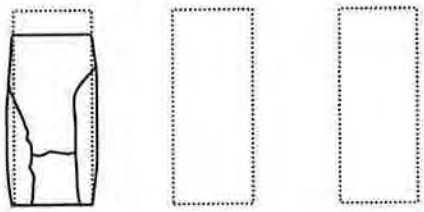
Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: CB-Mix6
Lab Sample No: 14C103

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
CB-Mix6	14C103	5.82	2.99	298.4	18.4	0.859	1.2	11.0	6.9	2.8	9	RE



CB-Mix6

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:

1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - Hydrant water was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 6 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

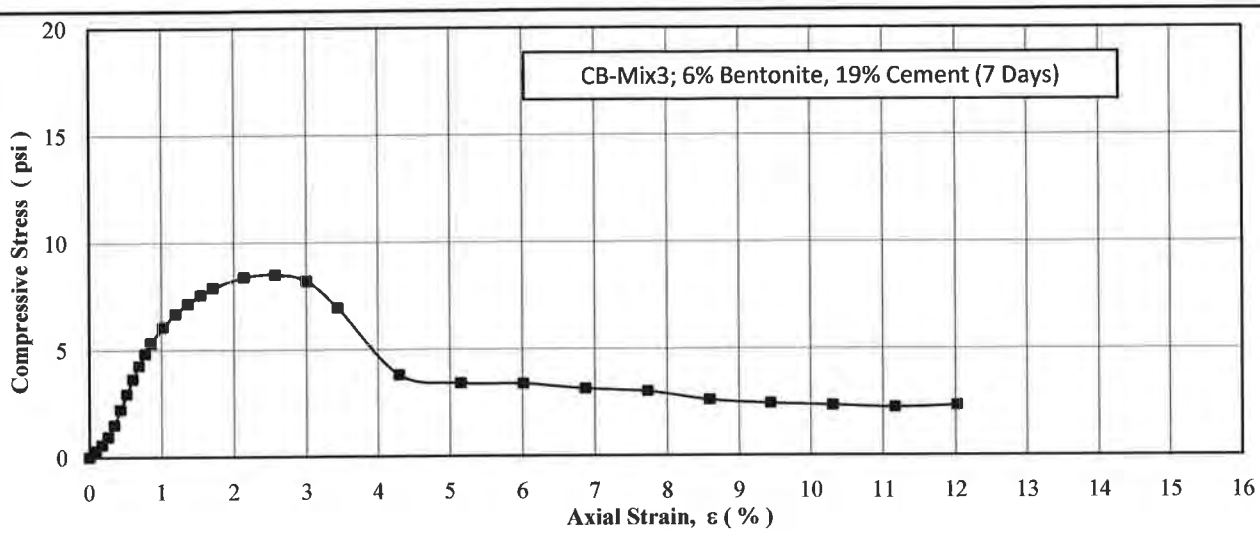
7-22-14
TR, NSR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

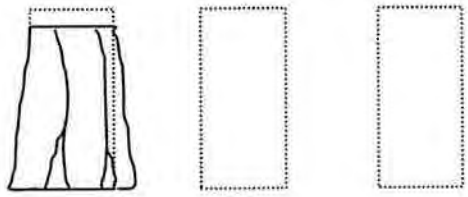
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Sample ID:	CB-Mix3
Lab Sample No:	14C121

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
CB-Mix3	14C121	5.82	3.00	332.4	16.5	0.859	2.6	8.5	11.2	2.2	9	RE



CB-Mix3

Specimen Type

UD - Undisturbed Specimen
ST - Shelby Tube Specimen
RE - Remolded Specimen
C - Three-inch Concrete Mold Specimen

Notes:
1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - Hydrant water was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 6 approximately 1 in (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

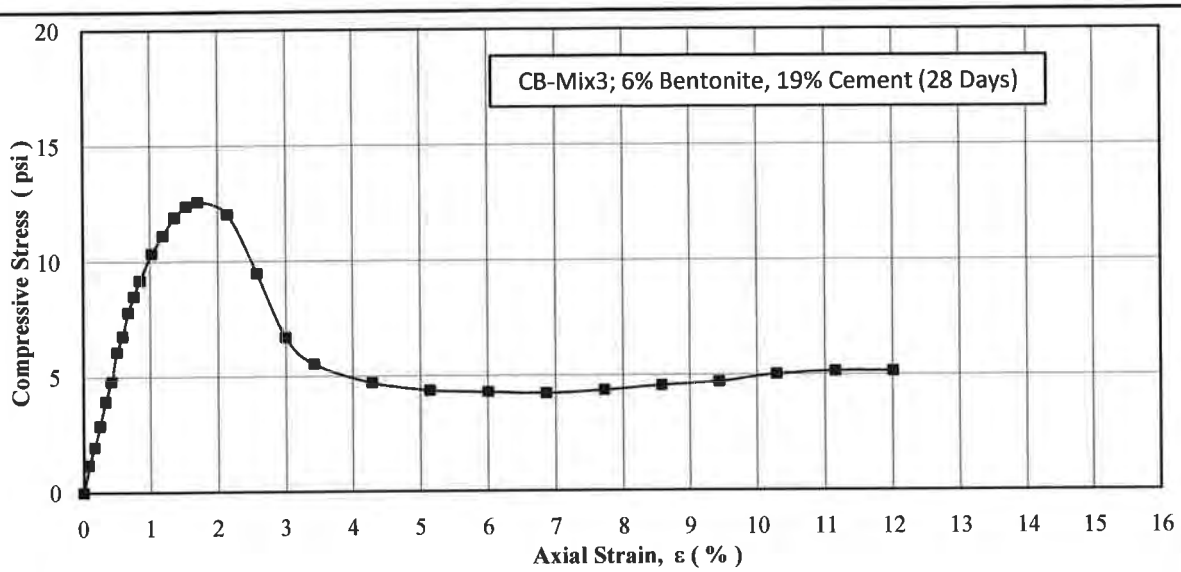
7-22-14
TR, NSR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

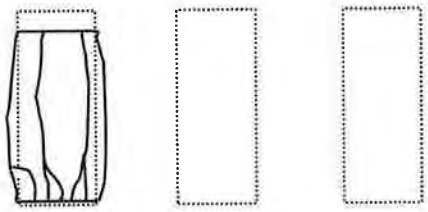
Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: CB-Mix3
Lab Sample No: 14C122

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
CB-Mix3	14C122	5.83	3.02	324.3	16.6	0.858	1.7	12.6	6.9	4.2	9	RE



CB-Mix3

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:
1 - 1 to 10 indicates extremely poor to excellent specimen conditions
2 - Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - Hydrant water was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 6 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

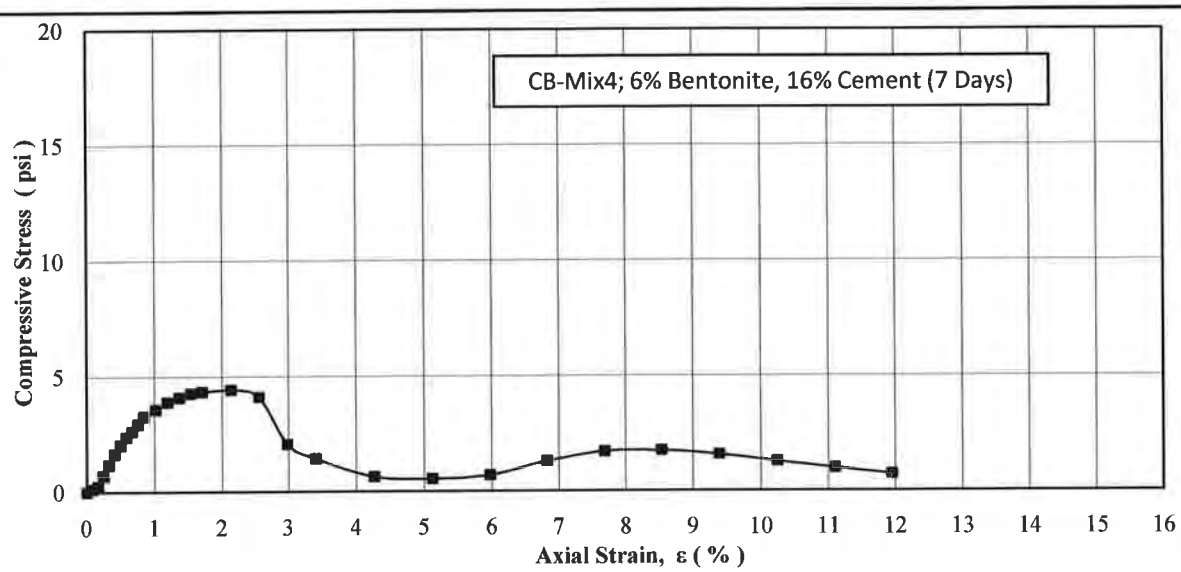
7-22-14
TR, NSR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

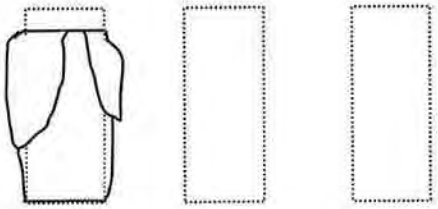
Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: CB-Mix4
Lab Sample No: 14D007

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
CB-Mix4	14D007	5.86	3.00	415.1	13.6	0.854	2.1	4.4	12.0	0.7	9	RE



CB-Mix4

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:

1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - Hydrant water was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 6 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

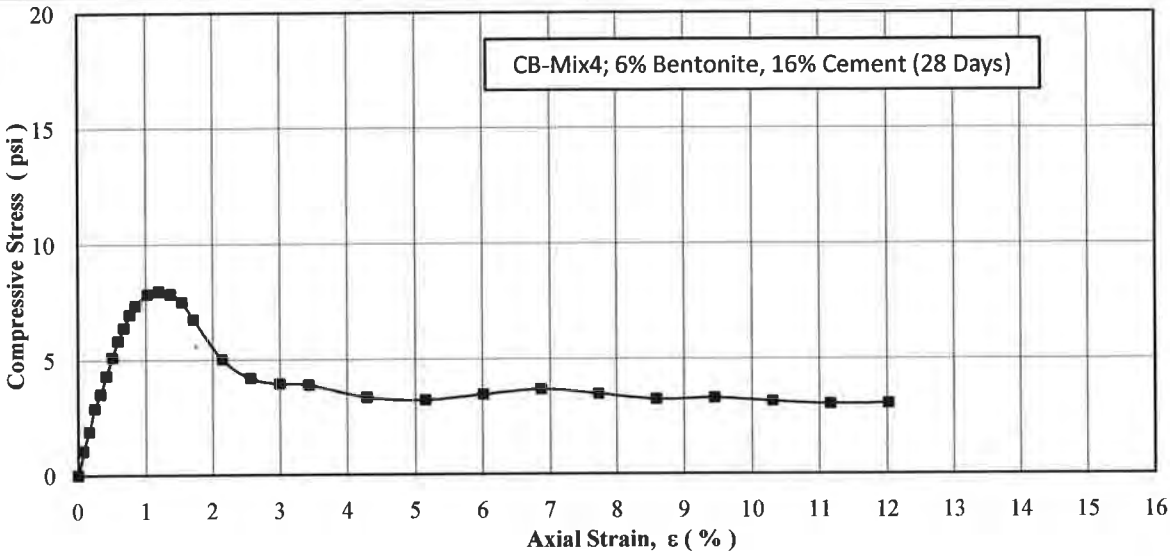
7-22-14
TL, NSR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

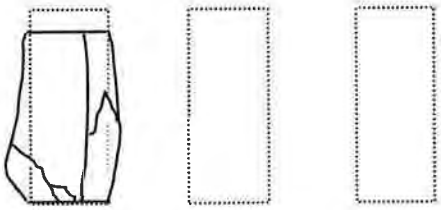
Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: CB-Mix4
Lab Sample No: 14D008

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10[1]	
CB-Mix4	14D008	5.82	3.00	376.7	14.7	0.859	1.2	8.0	11.2	3.0	9	RE



CB-Mix4

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:

1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - Hydrant water was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 6 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

7-22-14
TR, NSR

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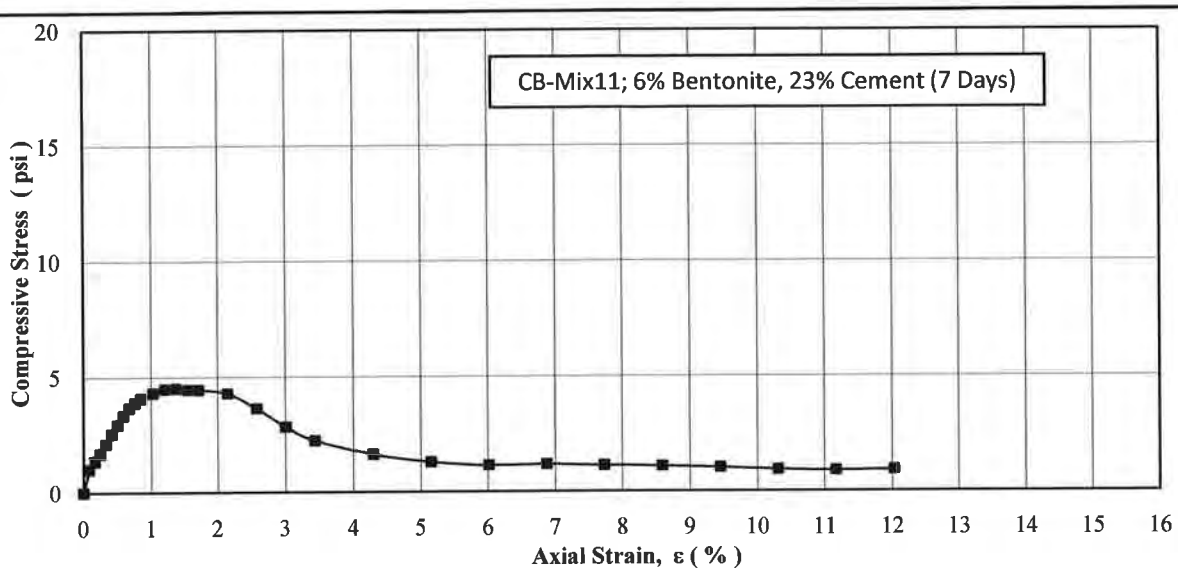
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

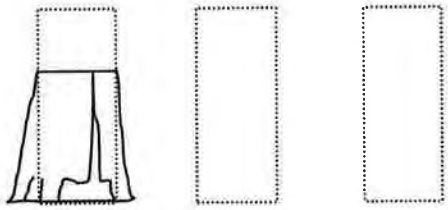
Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: CB-Mix11
Lab Sample No: 14E144

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10[1]	
CB-Mix11	14E144	5.82	2.99	299.6	17.7	0.859	1.4	4.5	11.2	0.9	9	RE



CB-Mix11

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:
1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - Hydrant water was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 6 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen length presented.

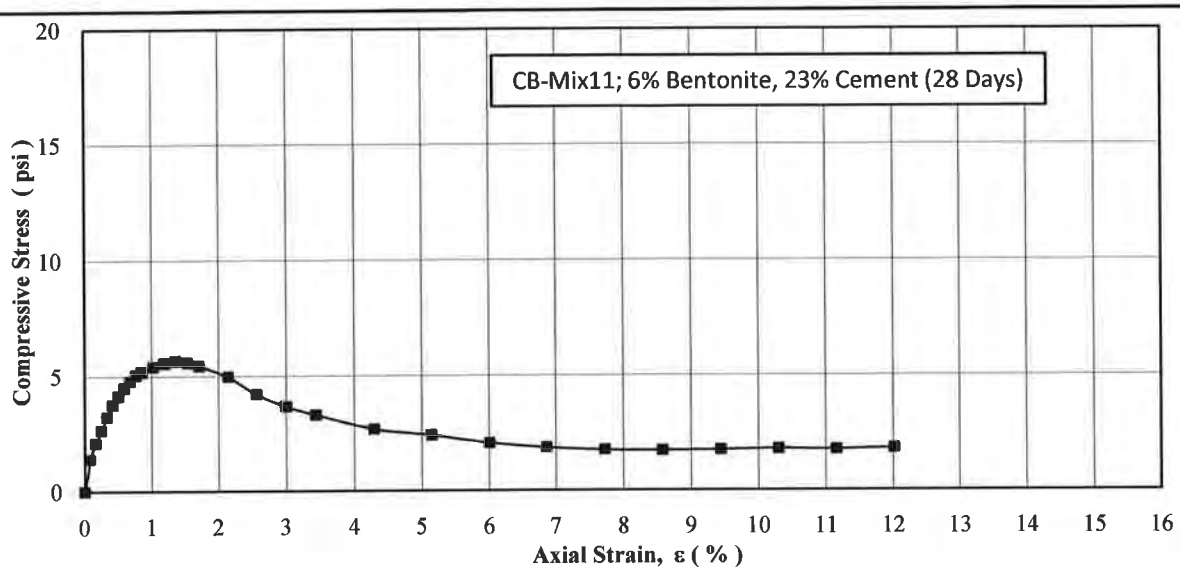
7-22-14
TR, NSR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

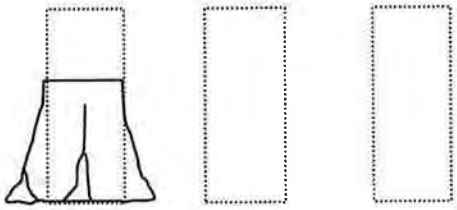
Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: CB-Mix11
Lab Sample No: 14E145

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
CB-Mix11	14E145	5.83	3.00	386.1	14.4	0.858	1.4	5.6	8.6	1.7	9	RE



CB-Mix11

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:

1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to Hydrant Water and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - Hydrant water was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 6 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

7-22-14
TR, NSR

Phase 4

Soil Cement Bentonite, Soil Bentonite, and Cement Bentonite Mix Design and Compatibility

Purpose

Phase 4 of the testing program was performed to evaluate permeability and strength characteristics of various Soil Cement Bentonite, Soil Bentonite, and Cement Bentonite mixes. Bentonite and Cement Bentonite slurries prepared with Site Ground Waters (SGWs), dry Bentonite, and a composite soil sample were used at different ratios when preparing the test specimens (see Table P4-01). Site Ground Waters were used when saturating, consolidating, and permeating the permeability test specimens.

Test Material

The test material consisted of:

- Two Site Ground Waters (P-5D & P-7D);
- WYO-BEN, Inc. HYDROGEL (Bentonite);
- Cement type I / II obtained from a local Home Depot store; and
- Composite soil sample CS-03.

Test Results

The test results are presented in the following attachments.

Permeability and Unconfined Compressive Strength Testing – Test results are shown in Attachments P4-A and P4-B for permeability and unconfined compressive strength, respectively.

The Bentonite slurries used were prepared with SGWs and allowed to hydrate for at least 24 hours. The following procedures were used to form the test mixes:

- Soil Cement Bentonite Mix - Cement was added to the hydrated Bentonite slurry and mixed with a hand-held high speed blender to a uniform and smooth consistency. The resulted Cement Bentonite slurry was added to CS-03 and thoroughly mixed. If required, dry Bentonite was then added to the test material

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(based on the dry weight of the test soil) and thoroughly mixed. A MSC slump test was then performed on the resulted Soil Cement Bentonite mix. If needed, more Cement Bentonite slurry was added and thoroughly mixed and another MSC slump test was performed until a MSC slump equivalent to a SSC slump of 4 to 6 inches was achieved.

- Soil Bentonite Mix - Hydrated Bentonite slurry was added to CS-03 and thoroughly mixed. If required, dry Bentonite was then added to the test material (based on the dry weight of the test soil) and thoroughly mixed. A MSC slump test was then performed on the resulted Soil Bentonite mix. If needed, more Bentonite slurry was added and thoroughly mixed and another MSC slump test was performed until a MSC slump equivalent to a SSC slump of 4 to 6 inches was achieved.
- Cement Bentonite Mix - Cement was added to the Bentonite slurry and mixed with a hand-held high speed blender to a uniform and smooth consistency.

Test specimens for each set of permeability and strength testing were prepared at the same time to ensure uniformity. The following procedures were used to form the test specimens:

- Soil Cement Bentonite – Samples were prepared in 3 inch diameter by 6 inch high plastic cylinder molds in approximately 1 inch thick layers. Each layer was rodded with a half an inch diameter rod to remove air bubbles. The samples were kept in a high humidity cooler for the duration of the curing period. The following specific conditions were used:
    - Permeability test specimens were prepared in 3 approximately 1 inch thick layers and cured for 28 days. Each test specimen was trimmed after curing to a height of approximately 2.25 inches.
    - Unconfined compressive strength test specimens were prepared in 6 approximately 1 inch layers and tested at two different curing periods of 7 and 28 days. Each test specimen was trimmed after curing to a height of approximately 6.0 inches.
- Soil Bentonite – Test specimens were prepared in a stainless steel tube, approximately 2.8 inches in diameter and 2.3 inches in height. Each sample was prepared in 3 approximately 1 inch thick layers. Each layer was rodded with a half an inch diameter rod to remove air bubbles. Each test specimen was tested immediately after specimen preparation. Only permeability testing was performed.
- Cement Bentonite – Samples were prepared in 3 inch diameter by 6 inch high plastic cylinder molds in approximately 1 inch thick layers. Each layer was rodded with a half an inch diameter rod to remove air bubbles. The samples were placed in a high humidity cooler for the duration of the curing period. The following procedures were used when preparing the test specimens:
    - Permeability test specimens were prepared in 3 approximately 1 inch layers and cured for 28 days. Each test specimen was trimmed after curing to a height of approximately 2.25 inches.

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- Unconfined compressive strength test specimens were prepared in 6 approximately 1 inch thick layers and tested at two different curing periods of 7 and 28 days. Each test specimen was trimmed after curing to a height of approximately 6.0 inches.

Permeability Testing – Test results are shown in Attachment P4-A. All test specimens were saturated with the requested test permeant and then consolidated under a consolidation pressure of 5.0 psi for 2 to 3 days before being permeated. The test results are summarized in Table P4-A-01 and presented in the accompanying figures.

Unconfined Compressive Strength – Test results are shown in Attachment P4-B. The tests were run at a displacement rate of 0.050 inches per minute with the load and displacement being monitored. The test results are summarized in Table P4-B-01 and are presented in the accompanying figures.

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Table P4-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Identification		Soil Composite	Dry Bent. to Dry Soil	Slurry Properties			Permeant Liquid	Notes
Design Phase (-)	Site ID (-)		(%)	Bentonite Added[1] (%)	Cement to Mix Liquid Ratio[2] (-)	Mix Liquid Type (-)	(-)	
Compatability Testing	SCB-Mix7	CS-03	0	7	0.21	P-5D	P-5D	
	SCB-Mix8	CS-03	1	7	0.21	P-7D	P-7D	
	SB-Mix7	CS-03	1	7	-	P-5D	P-5D	
	SB-Mix8	CS-03	2	7	-	P-7D	P-7D	
	CB-Mix9	-	-	7	0.19	P-5D	P-5D	
	CB-Mix10	-	-	7	0.21	P-7D	P-7D	
	CB-Mix13	-	-	6	0.23	P-5D	P-5D	
	CB-Mix14	-	-	6	0.23	P-7D	P-7D	

Notes:

1. Weight of Betonite to weight of the Mix Liquid.
2. Weight of Cement to weight of the Mix Liquid.

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Phase 4

Soil Cement Bentonite, Soil Bentonite, and Cement Bentonite Mix Design and Compatibility

Attachment P4-A

Permeability Test Results

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Table P4-A-01

Project Name: Chemtronics Geotechnical Testing
Project No.: 621

Sample Information							Hydraulic Conductivity				Notes
Sample Identification		Sample Mix									
Site ID	Lab No.	Bentonite Slurry	Cement added	Dry Bent. to Soil	Water Mix Type	Permeant Liquid	Dry Unit Weight	Moisture Content	Average Gradient[1]	Hydraulic Conductivity[1]	
(-)	(-)	(%)	(%)	(%)	(-)	(-)	(pcf)	(%)	(-)	(cm/s)	
SCB-Mix7	14E032	7	21	0	P-5D	P-5D	64.0	57.4	20	1.6E-7	
SCB-Mix8	14E034	7	21	1	P-7D	P-7D	69.1	48.6	23	8.9E-8	
SB-Mix7	14D164	7	0	1	P-5D	P-5D	71.3	48.6	3	1.8E-7	
SB-Mix8	14D165	7	0	2	P-7D	P-7D	70.2	51.3	16	7.3E-8	
CB-Mix9	14D036	7	19	0	P-5D	P-5D	18.1	301.2	9	9.1E-6	
CB-Mix10	14E038	7	21	0	P-7D	P-7D	18.8	289.5	21	3.1E-6	
CB-Mix13	14E153	6	23	0	P-5D	P-5D	18.9	273.2	28	7.8E-6	
CB-Mix14	14E158	6	23	0	P-7D	P-7D	18.3	285.3	25	4.1E-6	

Notes: 1. Average of the last 4 measurements.

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	SCB-Mix07
Lab Sample Number:	14E032
Material Type:	7% Bentonite Slurry with P-5D, 0% Dry Bentonite, 21% Cement & CS-03 (Note 2)
Permeant Liquid	P-5D
Date Test Started:	6/2/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	5.64	7.66	52.7	57.4	75.0	70.0	5.0	P-5D	20	1.9E-7

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to P-5D and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement. The Bentonite Cement slurry was added to CS-03 to form a sample with a slump of 4 to 6 inches.
3. All particles larger than 3/8 in., if any, were discarded.
4. P-5D was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Soil Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) thick layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:
Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented

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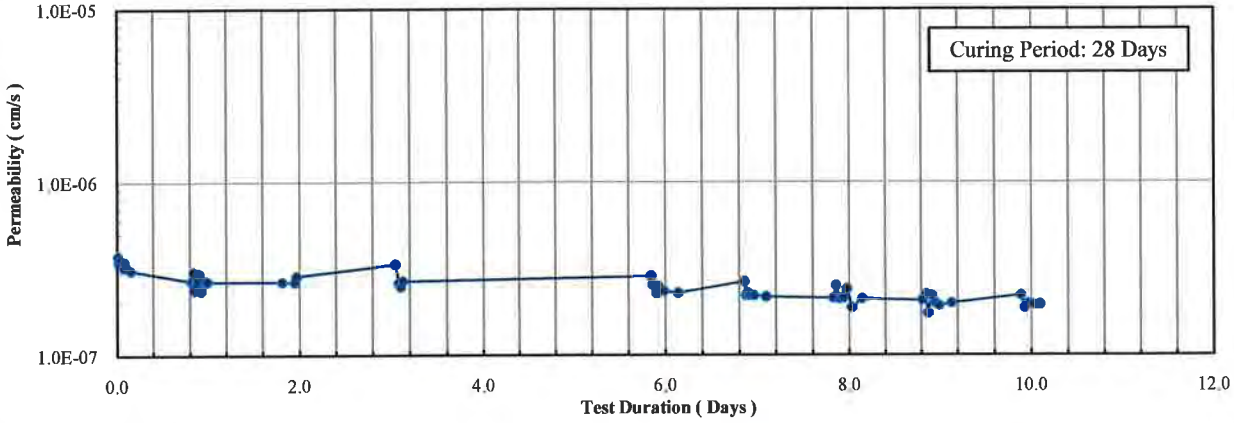
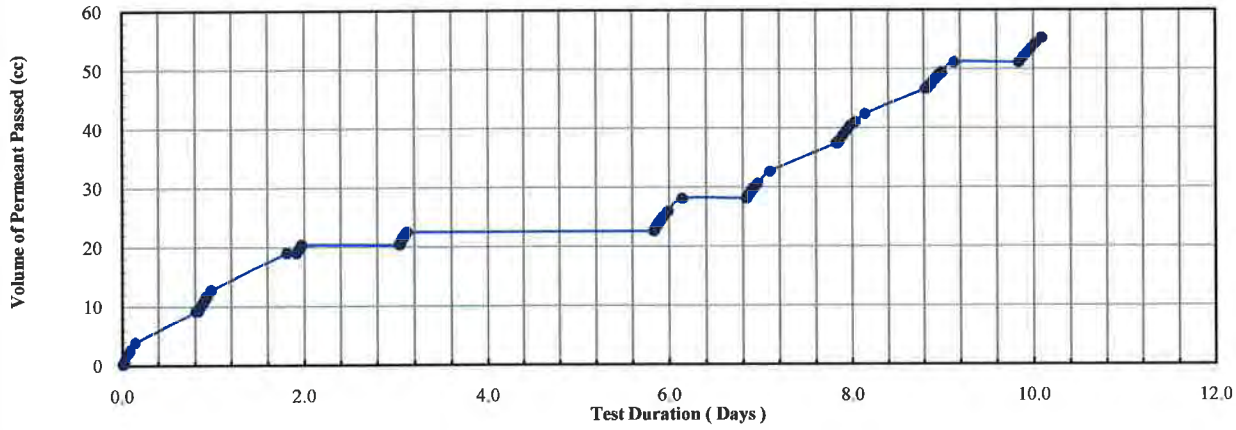
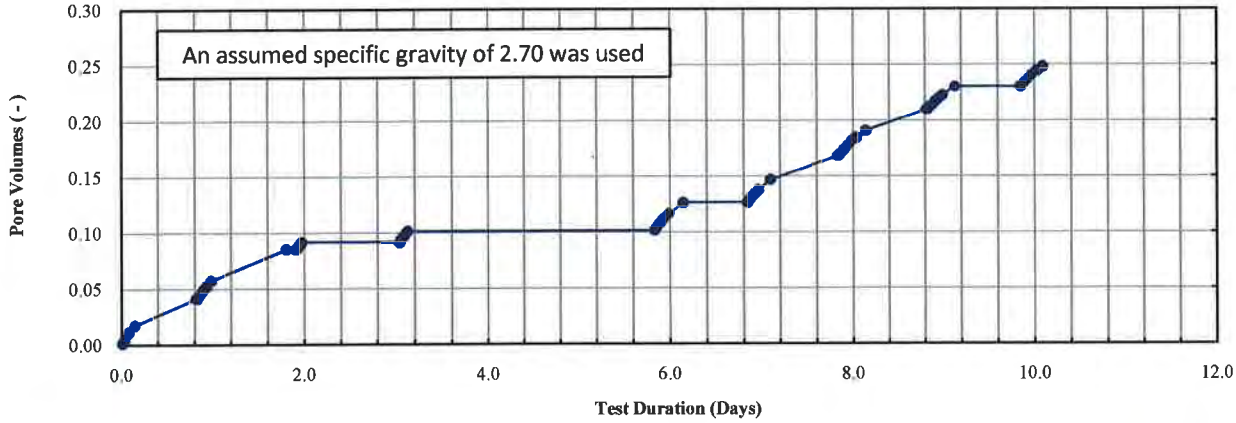
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	SCB-Mix07
Lab Sample No:	14E032

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

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Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	SCB-Mix08
Lab Sample Number:	14E034
Material Type:	7% Bentonite Slurry with P-7D, 1% Dry Bentonite, 21% Cement & CS-03 (Note 2)
Permeant Liquid	P-7D
Date Test Started:	6/2/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	5.65	7.65	56.9	48.6	75.0	70.0	5.0	P-7D	23	1.1E-7

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to P-7D and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement. The Bentonite Cement slurry was added to CS-03 to form a sample with a slump of 4 to 6 inches.
3. All particles larger than 3/8 in., if any, were discarded.
4. P-7D was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Soil Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) thick layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented

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Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	SCB-Mix08
Lab Sample No:	14E034

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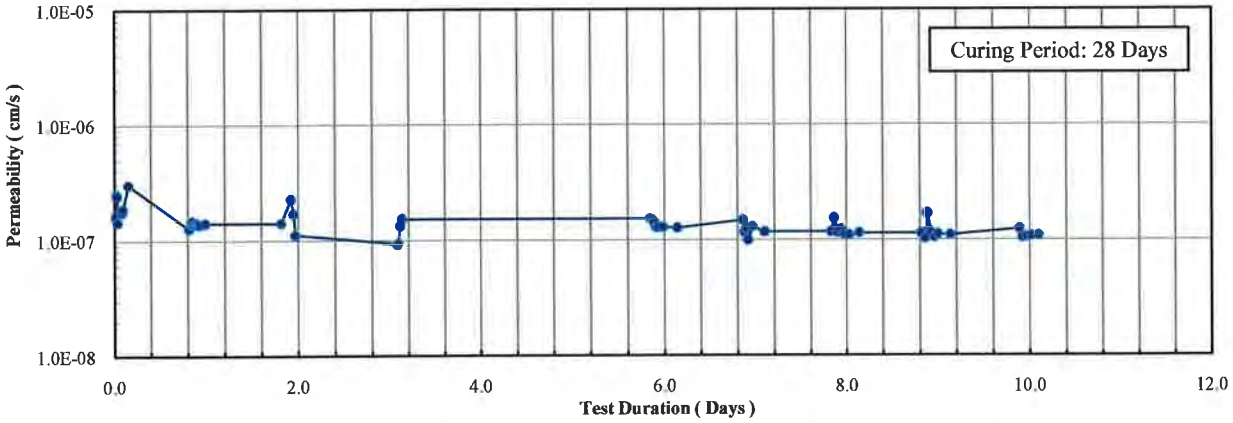
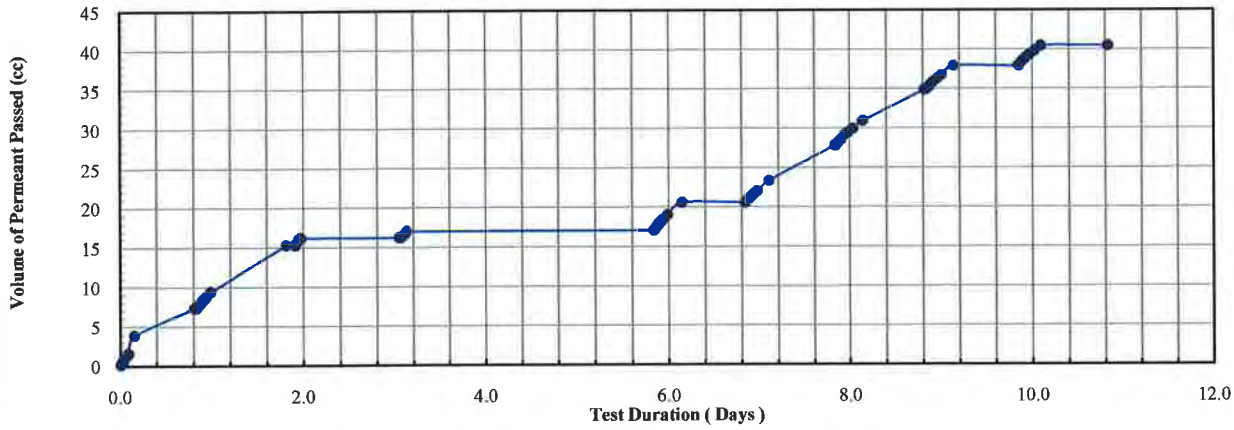
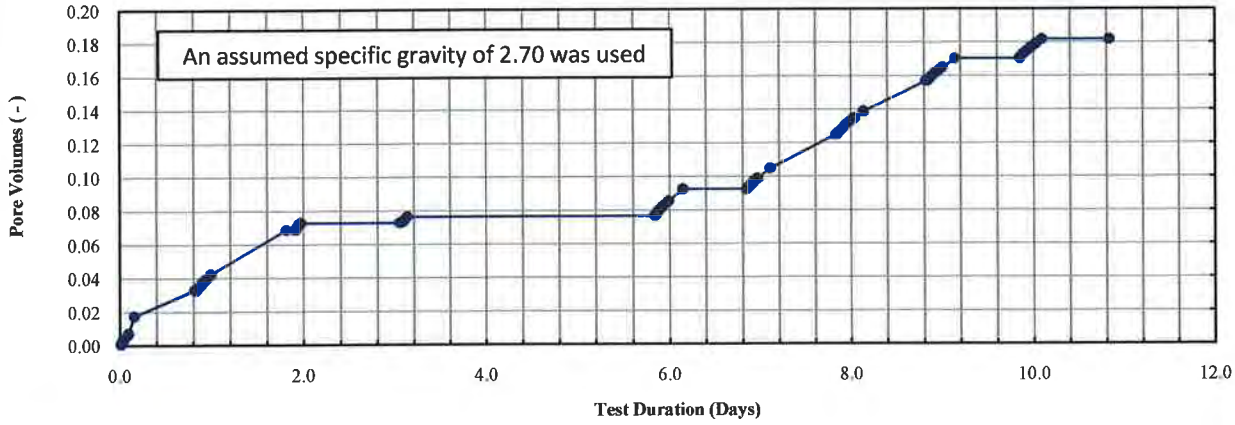
PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

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Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	SB-Mix07
Lab Sample Number:	14E164
Material Type:	7% Bentonite Slurry with P-5D, 1% Dry Bentonite & CS-03 (Note 2)
Permeant Liquid	P-5D
Date Test Started:	5/9/2014

Curing Period: N/A

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	5.97	7.28	71.3	48.6	75.0	70.0	5.0	P-5D	23	3.5E-6

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to P-5D and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours. The Bentonite slurry was added to CS-03 to form a sample with a slump of 4-6 inches.
3. All particles larger than 3/8 in., if any, were discarded.
4. P-5D was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Soil Bentonite Slurry mix in 3 approximately I in. (2.5 cm) layers; the test specimen was formed in a mold with the initial dimensions presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

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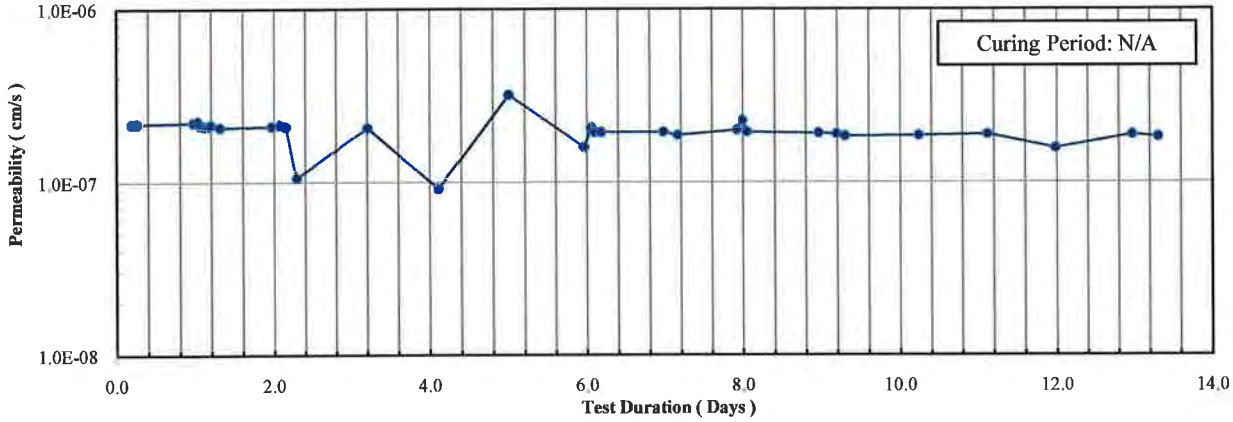
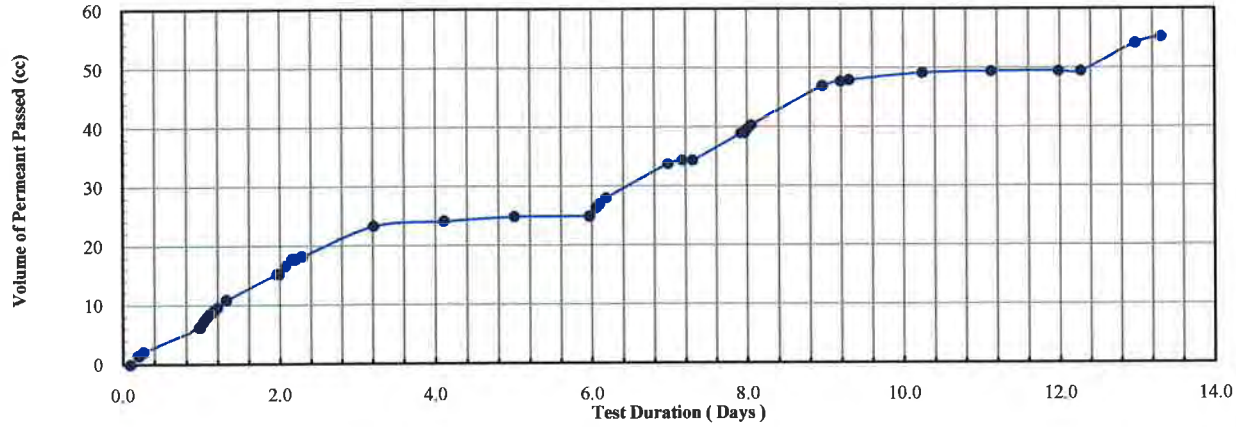
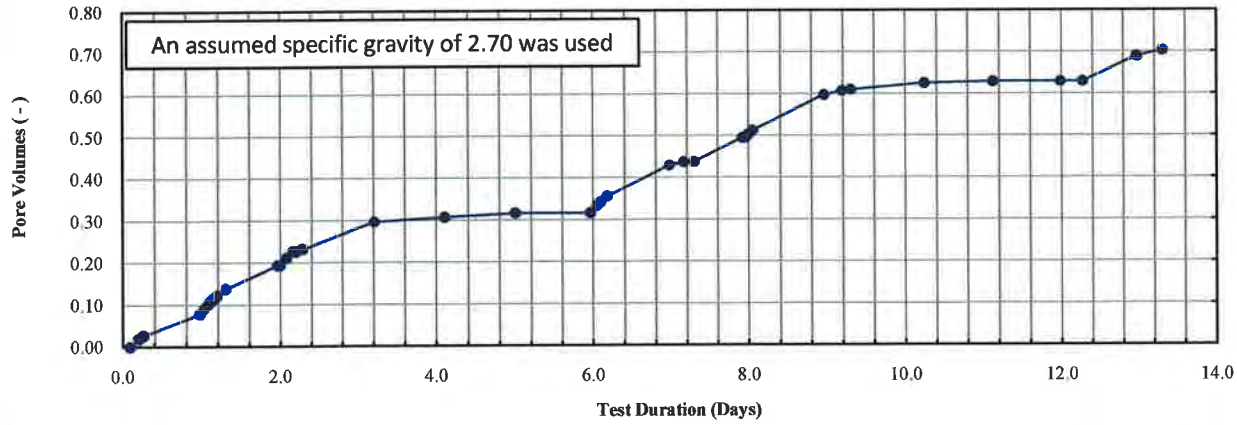
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	SB-Mix07
Lab Sample No:	14E164

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

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Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	SB-Mix08
Lab Sample Number:	14E165
Material Type:	7% Bentonite Slurry with P-7D, 2% Dry Bentonite & CS-03 (Note 2)
Permeant Liquid	P-7D
Date Test Started:	5/9/2014

Curing Period: N/A

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	5.97	7.28	70.2	51.3	75.0	70.0	5.0	P-7D	15	1.4E-7

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to P-7D and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours. The Bentonite slurry was added to CS-03 to form a sample with a slump of 4-6 inches.
3. All particles larger than 3/8 in., if any, were discarded.
4. P-7D was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Soil Bentonite Slurry mix in 3 approximately I in. (2.5 cm) layers; the test specimen was formed in a mold with the initial dimensions presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

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Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	SB-Mix08
Lab Sample No:	14E165

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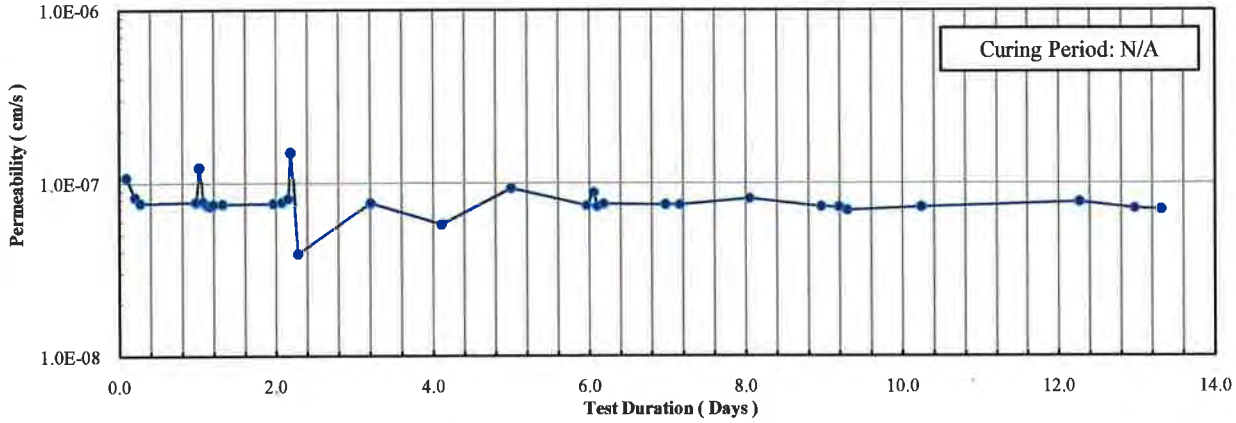
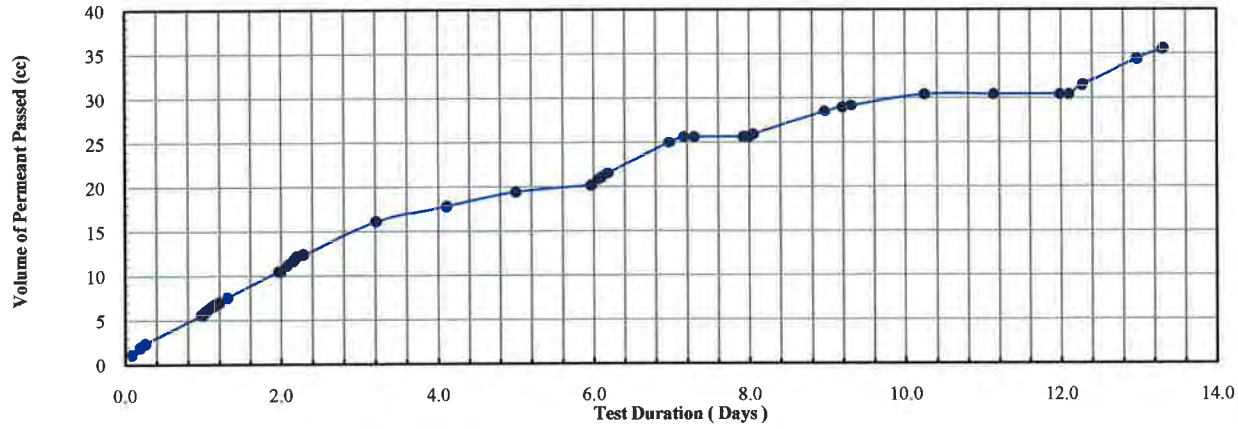
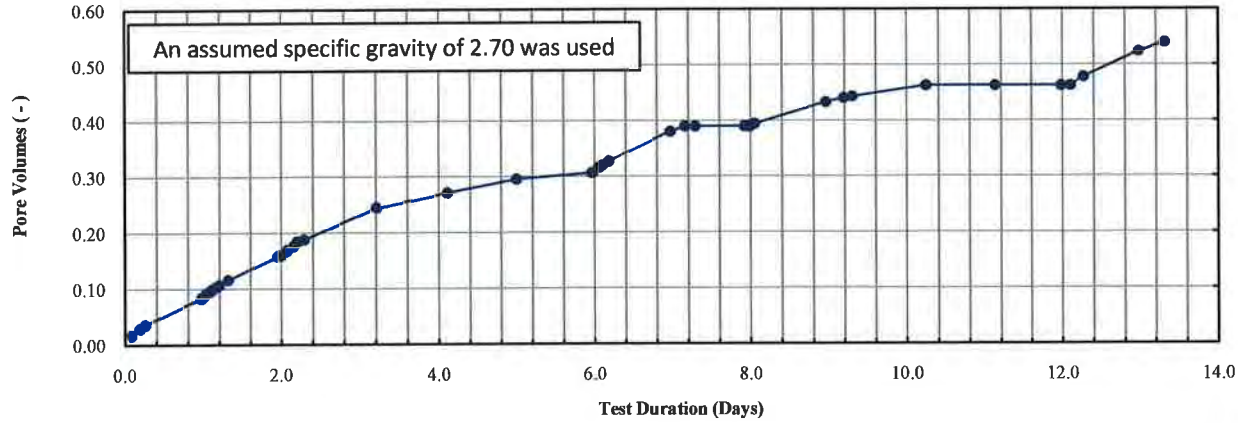
PERMEABILITY/COMPATIBILITY TESTING







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FLEXIBLE WALL PERMEABILITY TEST [1]

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Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	CB-Mix09
Lab Sample Number:	14E036
Material Type:	7% Bentonite Slurry with P-5D, 19% Cement (Note 2)
Permeant Liquid	P-5D
Date Test Started:	5/9/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.61	7.63	18.1	301.2	75.0	70.0	5.0	P-5D	12	1.1E-5

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to P-5D and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3. All particles larger than 3/8 in., if any, were discarded.
4. P-5D was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

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Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CB-Mix09
Lab Sample No:	14E036

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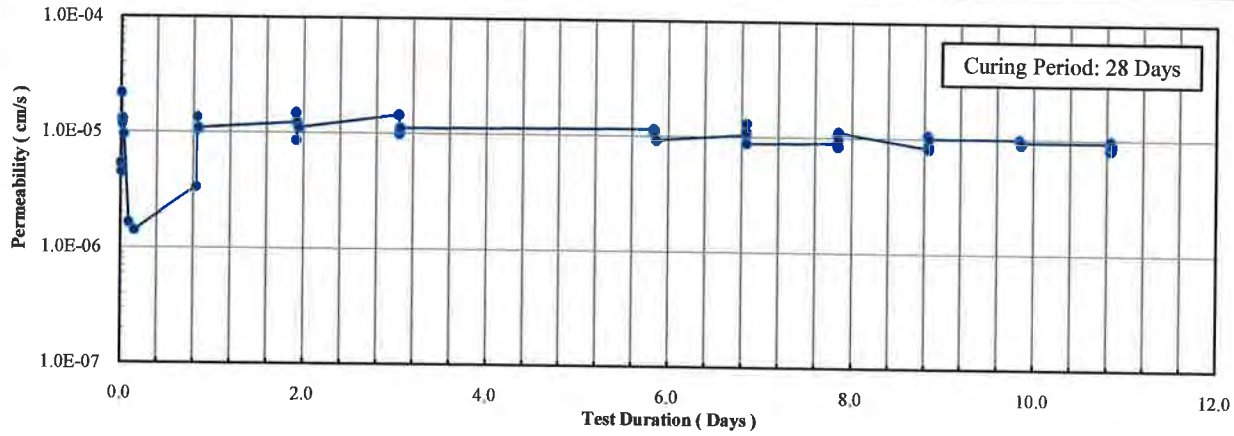
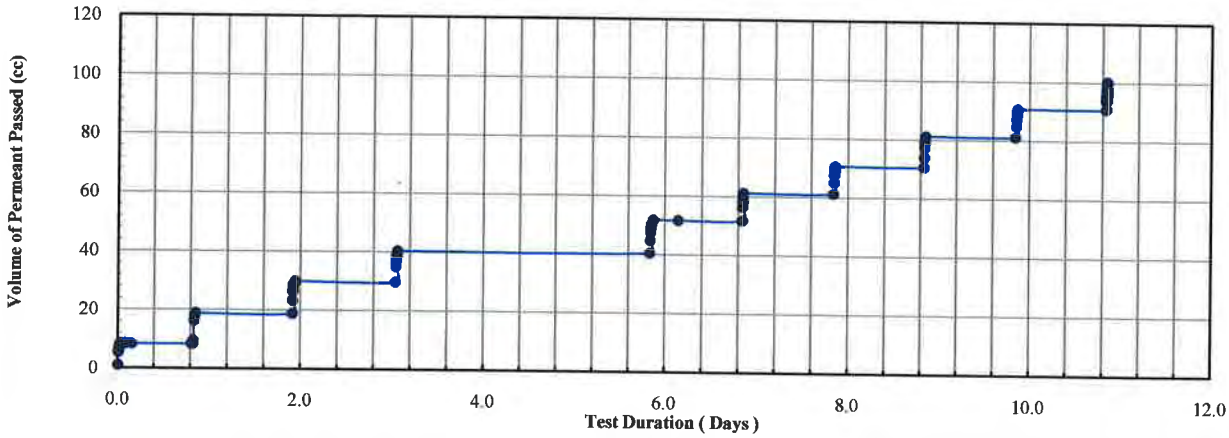
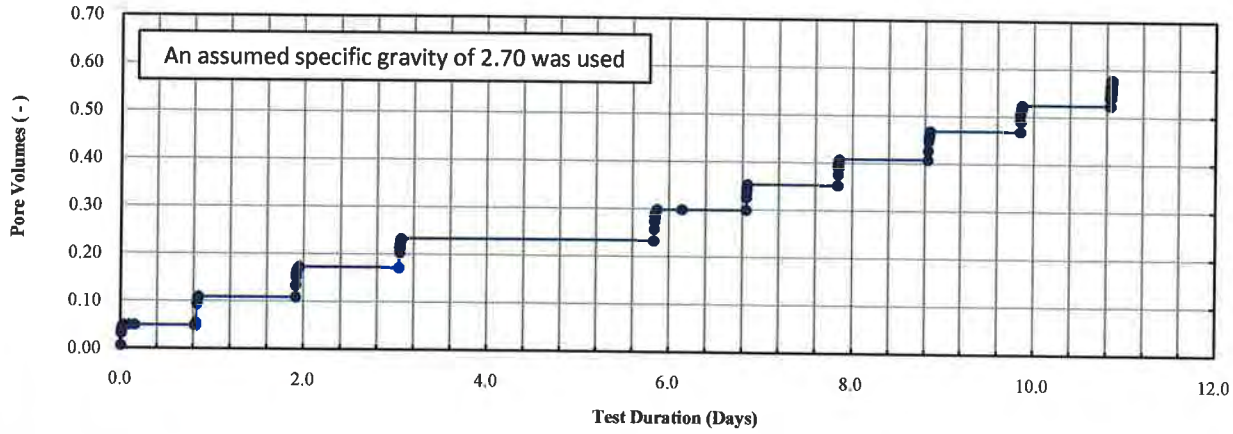
PERMEABILITY/COMPATIBILITY TESTING







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FLEXIBLE WALL PERMEABILITY TEST [1]

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Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	CB-Mix10
Lab Sample Number:	14E038
Material Type:	7% Bentonite Slurry with P-7D, 19% Cement (Note 2)
Permeant Liquid	P-7D
Date Test Started:	5/9/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.60	7.64	18.8	289.5	75.0	70.0	5.0	P-7D	22	2.9E-6

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to P-7D and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3. All particles larger than 3/8 in., if any, were discarded.
4. P-7D was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:
Laboratory temperature at 22±3 °C
Test specimen final conditions are not presented.

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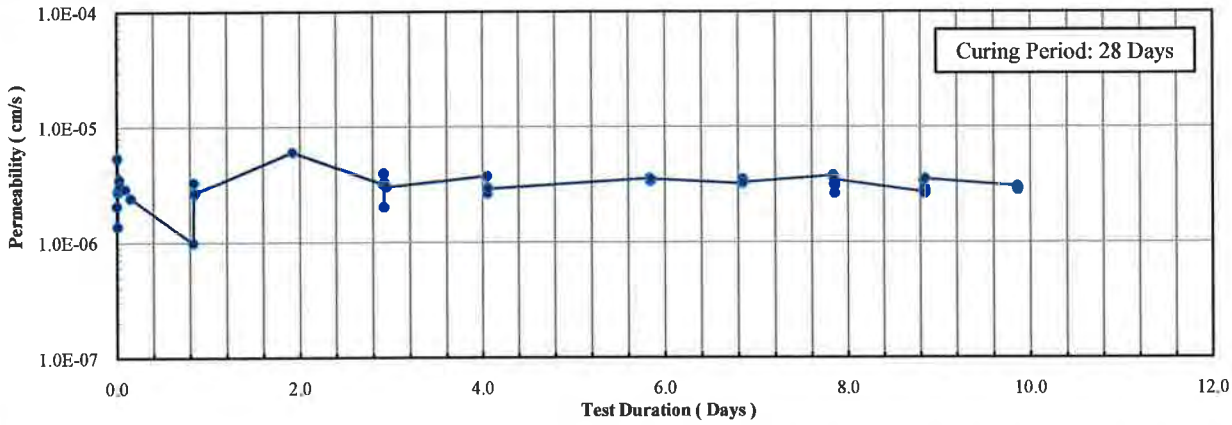
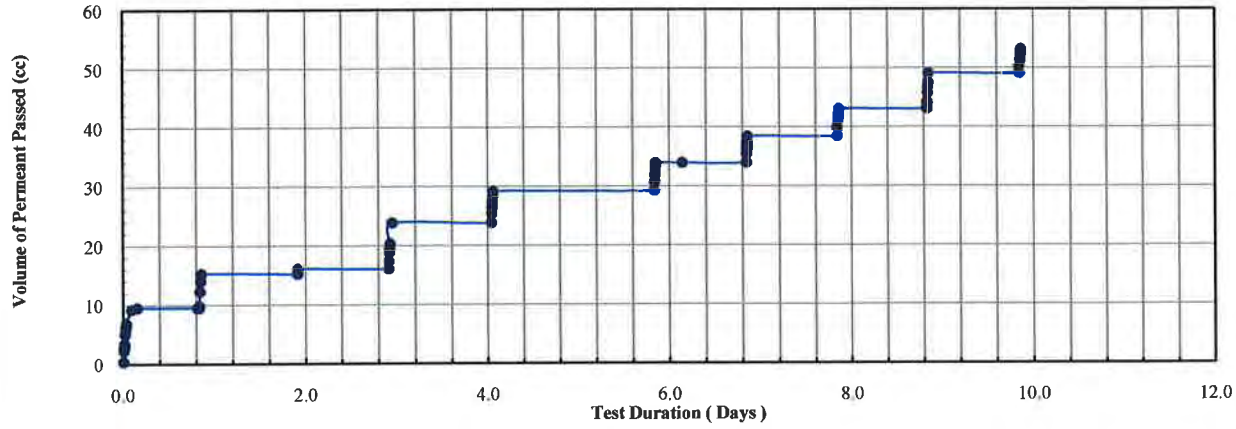
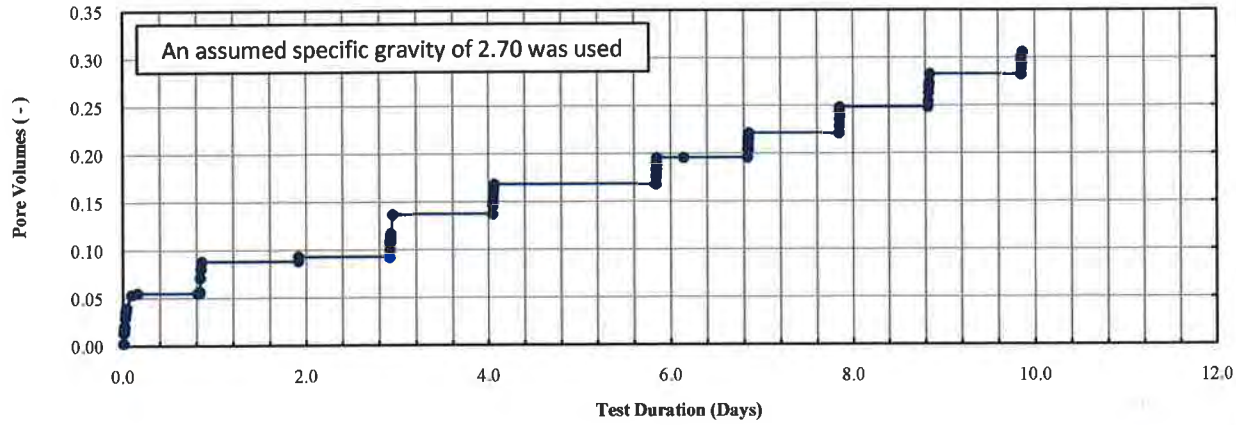
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CB-Mix10
Lab Sample No:	14E038

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	CB-Mix13
Lab Sample Number:	14E153
Material Type:	6% Bentonite Slurry with P-5D, 23% Cement (Note 2)
Permeant Liquid	P-5D
Date Test Started:	6/16/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.62	7.65	18.9	273.2	75.0	70.0	5.0	P-5D	28	7.8E-6

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to P-5D and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3. All particles larger than 3/8 in., if any, were discarded.
4. P-5D was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

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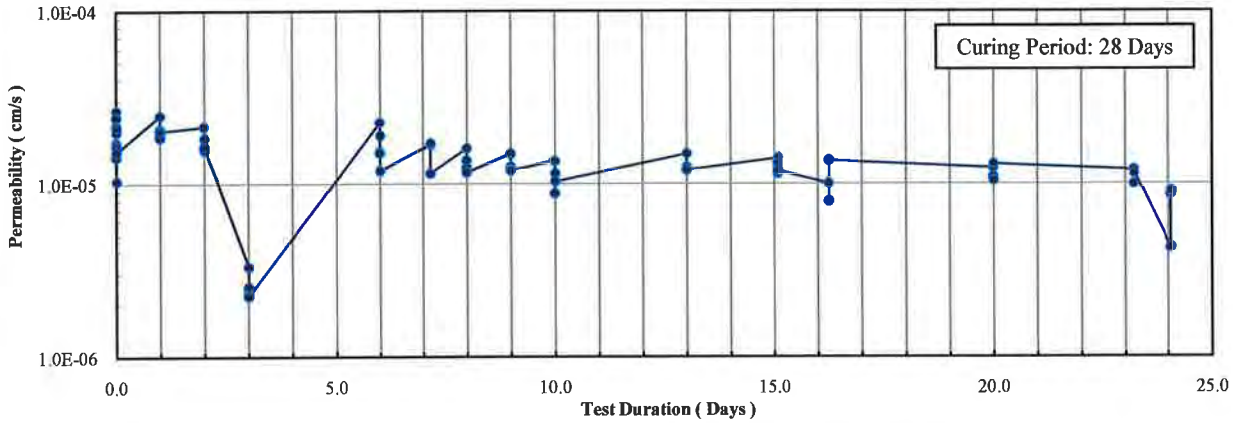
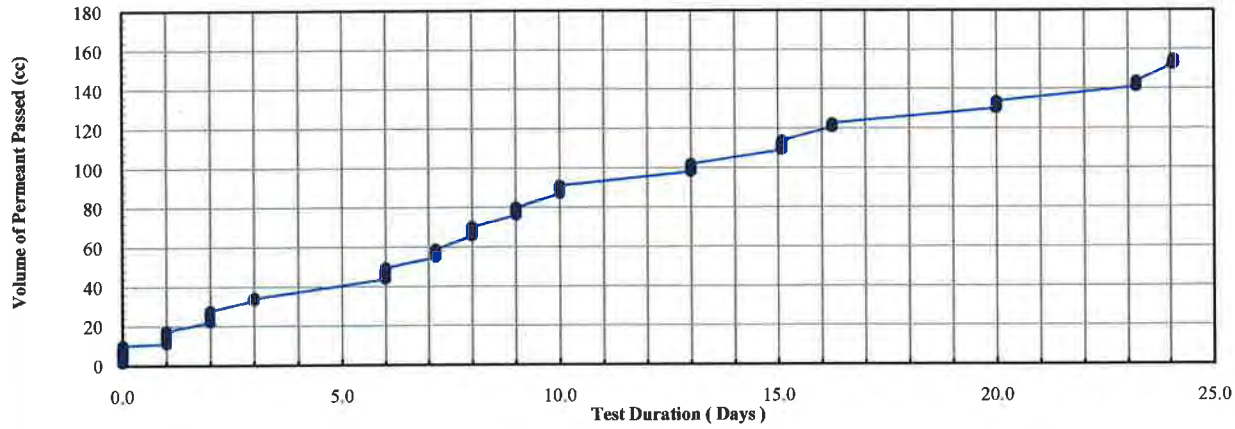
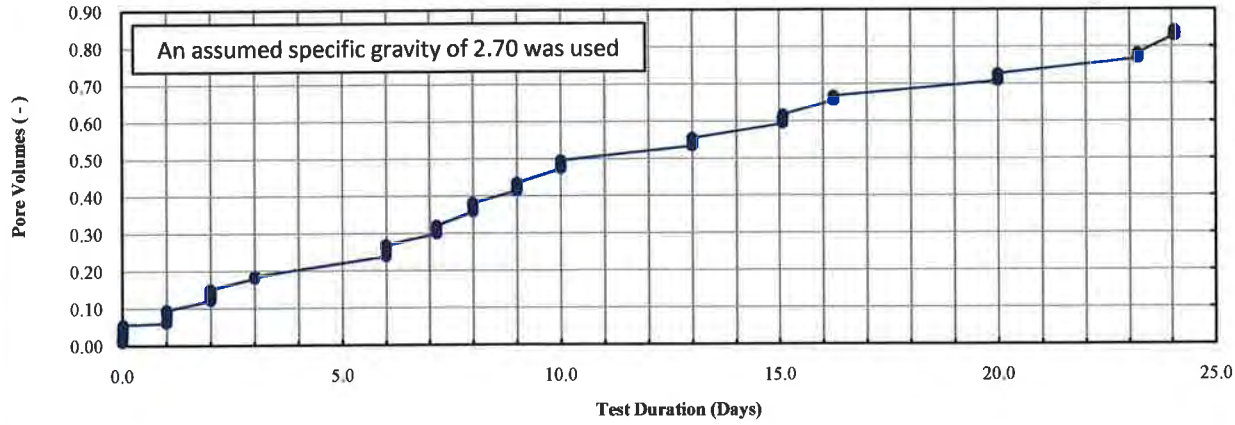
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CB-Mix13
Lab Sample No:	14E153

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	CB-Mix14
Lab Sample Number:	14E158
Material Type:	6% Bentonite Slurry with P-7D, 23% Cement (Note 2)
Permeant Liquid	P-7D
Date Test Started:	6/16/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[6]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.62	7.65	18.3	285.3	75.0	70.0	5.0	P-7D	25	4.1E-6

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to P-7D and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3. All particles larger than 3/8 in., if any, were discarded.
4. P-7D was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

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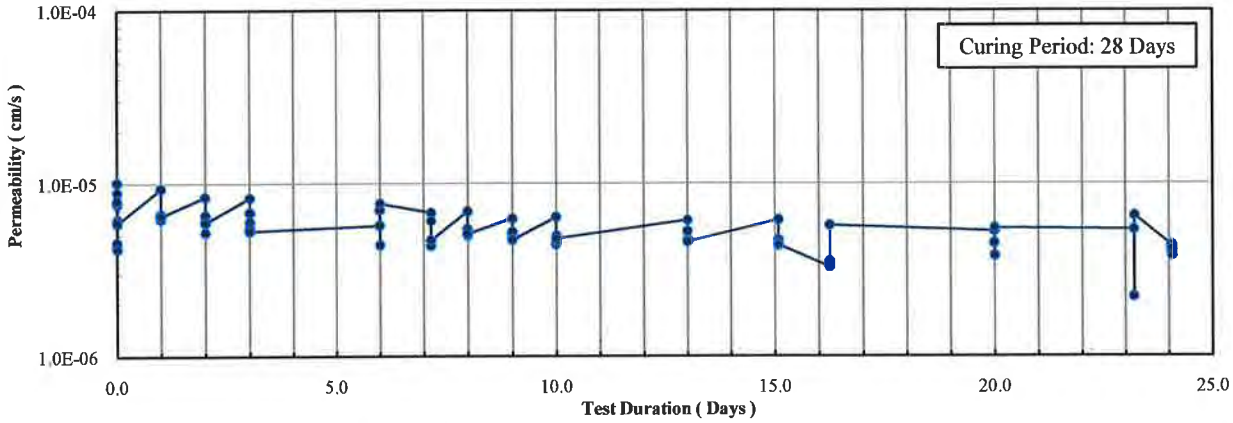
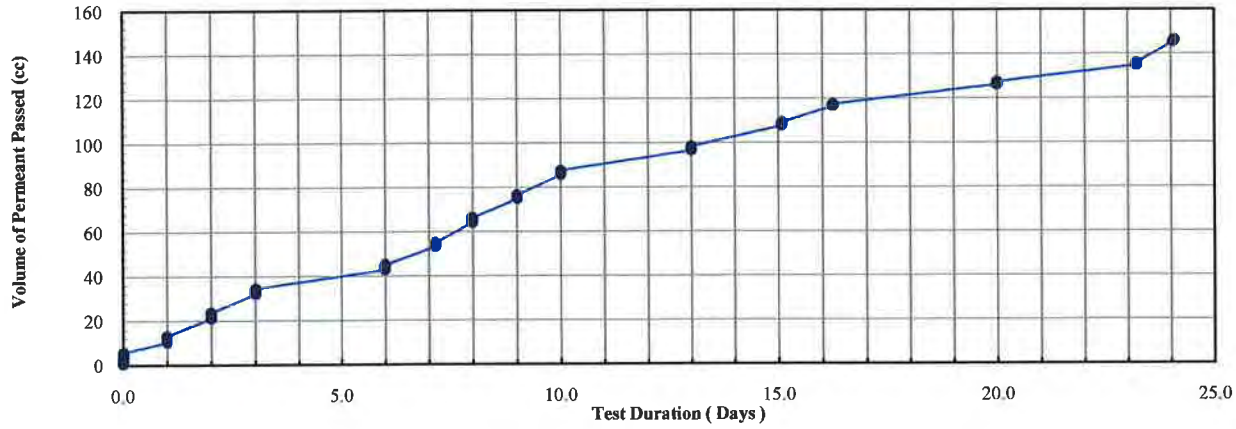
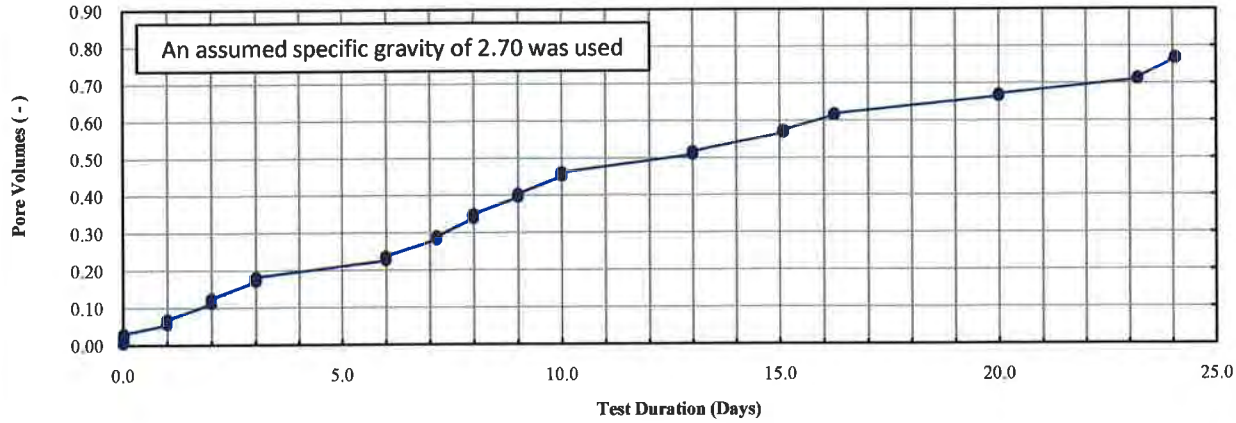
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	CB-Mix14
Lab Sample No:	14E158

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

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Phase 4

Soil Cement Bentonite, Soil Bentonite, and Cement Bentonite Mix Design and Compatibility

Attachment P4-B

Unconfined Compressive Strength Test Results

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Table P4-B-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Unconfined Compressive Strength

Sample Identification			Sample Mix Percentages				Curing Period						Notes
							7 Days			28 Days			
Site ID	Lab No.		Bentonite	Cement	Dry Bent.	Water Mix	Moisture	Dry Unit	Compressive	Moisture	Dry Unit	Compressive	
	7 Days	28 Days	Slurry	added	to Soil	Type	Content	Weight	Strength	Content	Weight	Strength	
(-)	(-)	(-)	(%)	(%)	(%)	(-)	(%)	(pcf)	(psi)	(%)	(pcf)	(psi)	
CB-Mix13	14E150	14E151	6	23	0	P-5D	274.8	18.5	7.6	252.6	20.4	12.8	
CB-Mix14	14E155	14E156	6	23	0	P-7D	276.4	19.3	9.5	279.8	19.3	17.0	

Notes:

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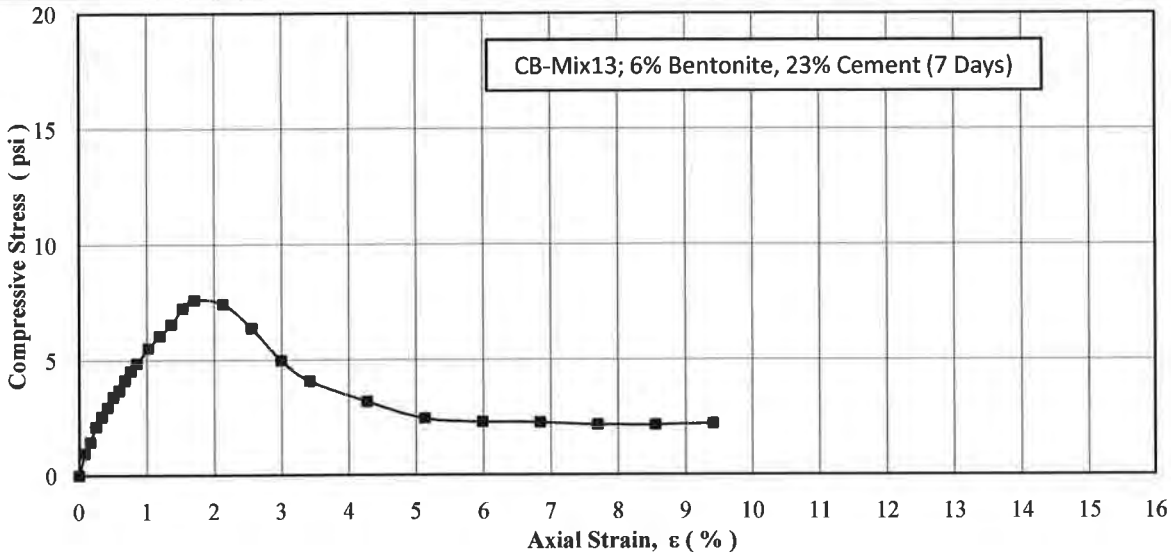
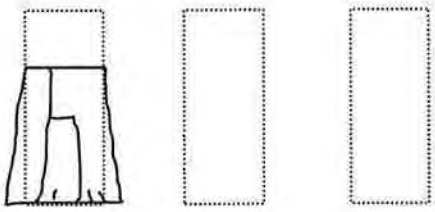
Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: CB-Mix13
Lab Sample No: 14E150

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
CB-Mix13	14E150	5.85	2.99	274.8	18.5	0.855	1.7	7.6	8.6	2.2	9	RE



CB-Mix13

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:

1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to P-5D and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - P-5D was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 6 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

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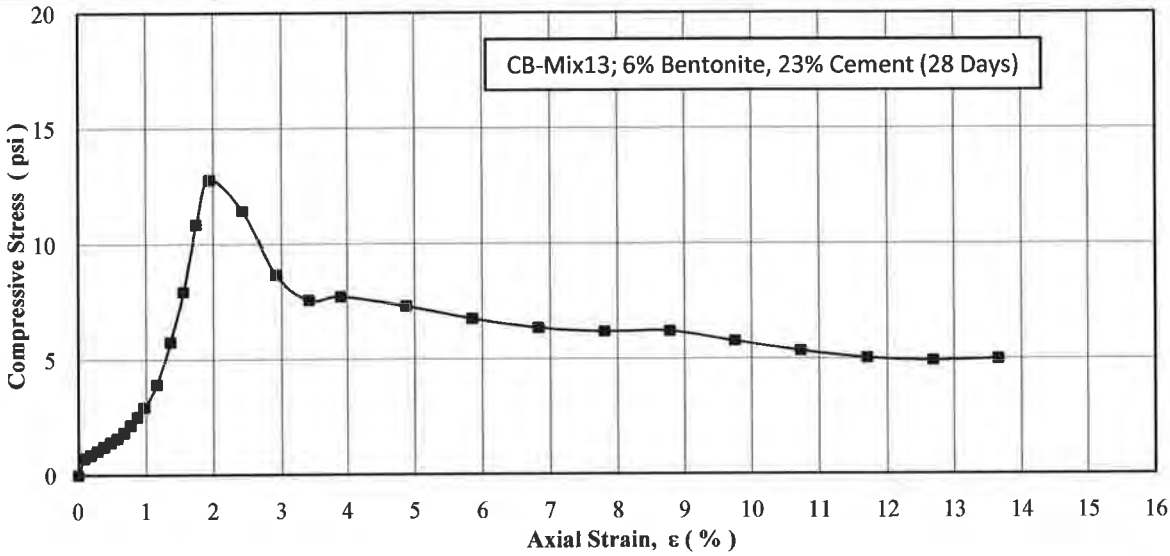
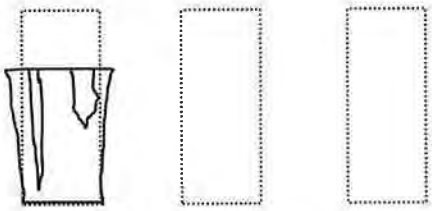
Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: CB-Mix13
Lab Sample No: 14E151

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
CB-Mix13	14E151	5.12	2.97	252.6	20.4	0.976	2.0	12.8	12.7	4.9	9	RE



CB-Mix13

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:
1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to P-5D and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - P-5D was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 6 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

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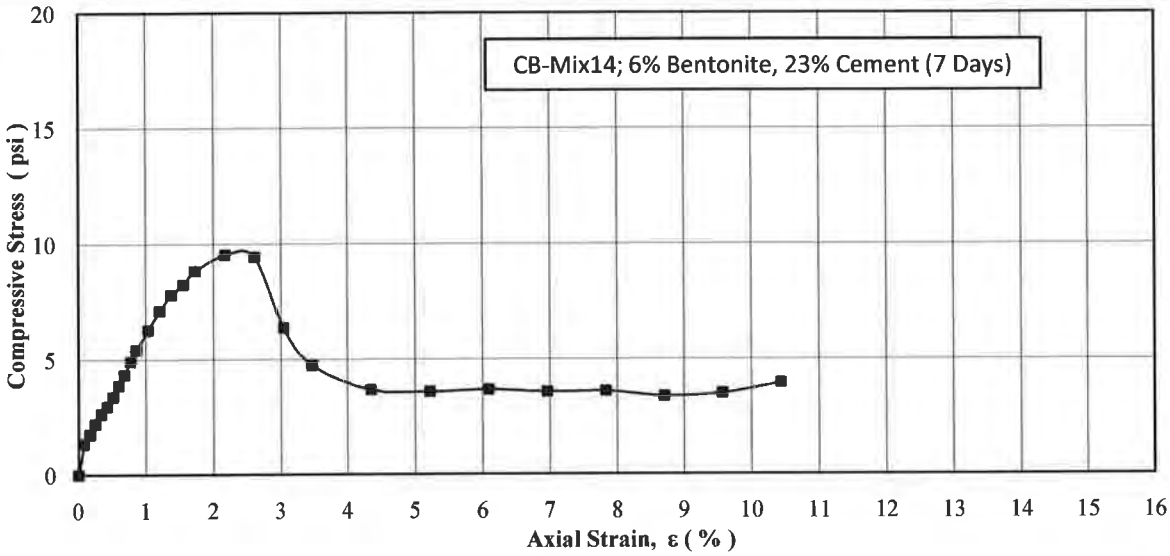
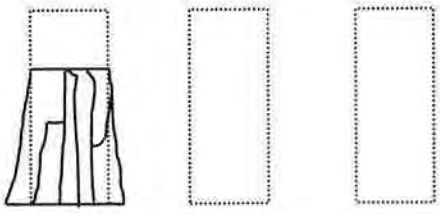
Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: CB-Mix14
Lab Sample No: 14E155

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
CB-Mix14	14E155	5.74	3.00	276.4	19.3	0.870	2.2	9.5	9.6	3.5	9	RE



CB-Mix14

Specimen Type

UD - Undisturbed Specimen

ST - Shelby Tube Specimen

RE - Remolded Specimen

C - Three-inch Concrete Mold Specimen

Notes:
1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to P-7D and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - P-7D was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 6 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

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Project Name: Chemtronics Geotechnical Testing
Project No: 621
Sample ID: CB-Mix14
Lab Sample No: 14E156

UNCONFINED COMPRESSIVE STRENGTH TEST

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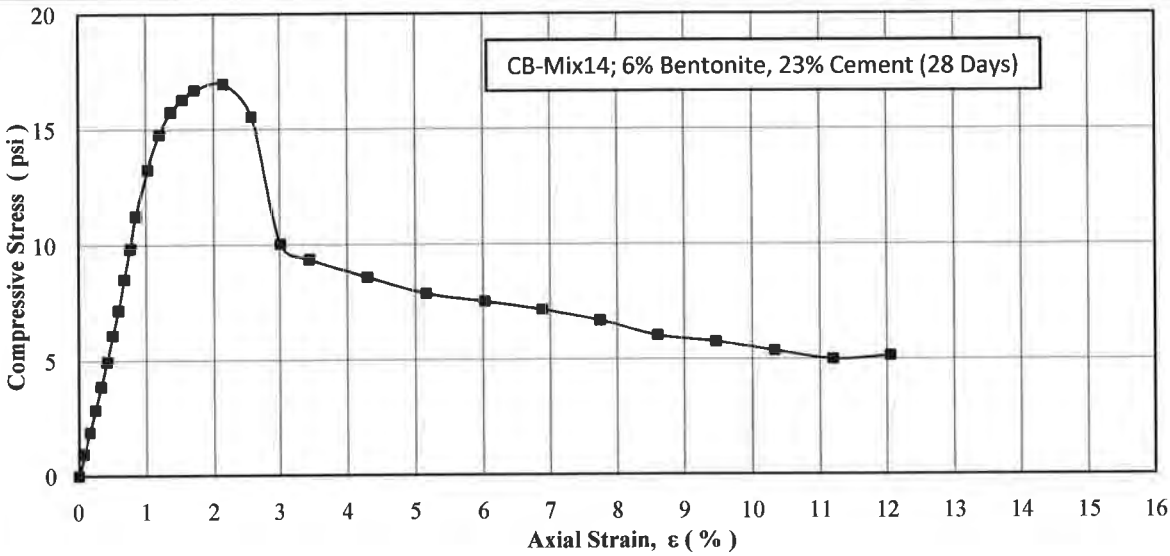
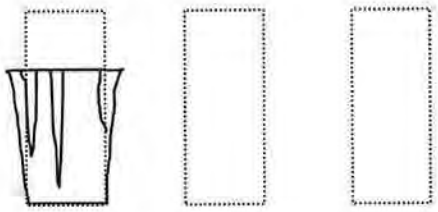


Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10 [1]	
CB-Mix14	14E156	5.81	3.00	279.8	19.3	0.861	2.2	17.0	11.2	5.0	9	RE



CB-Mix14

Specimen Type

UD - Undisturbed Specimen
ST - Shelby Tube Specimen
RE - Remolded Specimen
C - Three-inch Concrete Mold Specimen

Notes:
1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to P-7D and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - P-7D was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 6 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

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Appendix A

Alternate Cement Mix Compatibility

Appendix A

Alternate Cement Mix Compatibility

Purpose

The testing program was performed to evaluate permeability and strength characteristics of one Cement Bentonite mix. One Site Ground Water and an alternate cement was used when preparing the cement bentonite slurry. Site Ground Water was used when saturating, consolidating, and permeating the permeability test specimen.

Test Material

The test material consisted of:

- Site Ground Water (P-7D);
- WYO-BEN, Inc. HYDROGEL (Bentonite); and
- An Alternate Cement from a Geosyntec California project.

Test Results

The test results are presented in the accompanying tables and figures:

Permeability and Unconfined Compressive Strength Testing – The Bentonite slurry used was prepared with P-7D and allowed to hydrate for at least 24 hours. The cement was added to the Bentonite slurry and mixed with a hand-held high speed blender to a uniform and smooth consistency.

Test specimens for permeability and strength testing were prepared at the same time to ensure uniformity. Samples were prepared in 3 inch diameter by 6 inch high plastic cylinder molds in approximately 1 inch thick layers. Each layer was rodded with a half an inch diameter rod to remove air bubbles. The samples were placed in a high humidity cooler for the duration of the curing period. The following procedures were used when preparing the test specimens:

- Permeability test specimens were prepared in 3 approximately 1 inch layers and cured for 28 days. Each test specimen was trimmed after curing to a height of approximately 2.25 inches.
- Unconfined compressive strength test specimens were prepared in 6 approximately 1 inch thick layers and tested at two different curing

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periods of 7 and 28 days. Each test specimen was trimmed after curing to a height of approximately 6.0 inches.

Permeability Testing – All test specimens were saturated with the requested test permeant and then consolidated under a consolidation pressure of 5.0 psi for 2 to 3 days before being permeated. The test results are summarized in Table AppA-01 and presented in the accompanying figures.

Unconfined Compressive Strength – The tests were run at a displacement rate of 0.050 inches per minute with the load and displacement being monitored. The test results are summarized in Table AppA-02 and are presented in the accompanying figures.

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Table AppA-01

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Sample Information							Hydraulic Conductivity				Notes
Sample Identification		Sample Mix									
Site ID	Lab No.	Bentonite Slurry	Cement added	Dry Bent. to Soil	Water Mix Type	Permeant Liquid	Dry Unit Weight	Moisture Content	Average Gradient[1]	Hydraulic Conductivity[1]	
(-)	(-)	(%)	(%)	(%)	(-)	(-)	(pcf)	(%)	(-)	(cm/s)	
ACM[2]	14E162	6	23	-	P-7D	P-7D	18.6	286.3	25	3.8E-6	

Notes:
1. Average of the last 4 measurements.
2. ACM - Alternate Cement Mix

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D 5084 *

Project Name:	Chemtronics Geotechnical Testing
Project Number:	621
Client Name:	Geosyntec Consultants
Site Sample ID:	Alternate Cement Mix
Lab Sample Number:	14E162
Material Type:	6% Bentonite Slurry with P-7D, 23% Alternate Cement (Note 2)
Permeant Liquid	P-7D
Date Test Started:	6/16/2014

Curing Period: 28 Days

Remolded Specimen	Initial Specimen Conditions				Test Conditions					Hydraulic Conductivity[7]
	Spec. Length	Spec. Diameter	Dry Unit Weight	Moisture Content	Cell Press.	Back Press.	Consolid. Press.	Permeant Liquid	Average Gradient[6]	
(-)	(cm)	(cm)	(pcf)	(%)	(psi)	(psi)	(psi)	(-)	(-)	(cm/s)
Notes 3 to 5	4.63	7.64	18.6	286.3	75.0	70.0	5.0	P-7D	25	3.8E-6

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Bentonite was added to P-7D and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending the alternate cement.
3. All particles larger than 3/8 in., if any, were discarded.
4. P-7D was used in the Bentonite Slurry mix.
5. Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 3 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen length presented.
6. Average of the last 4 measurements.

* Deviations:

Laboratory temperature at 22±3 °C.
Test specimen final conditions are not presented.

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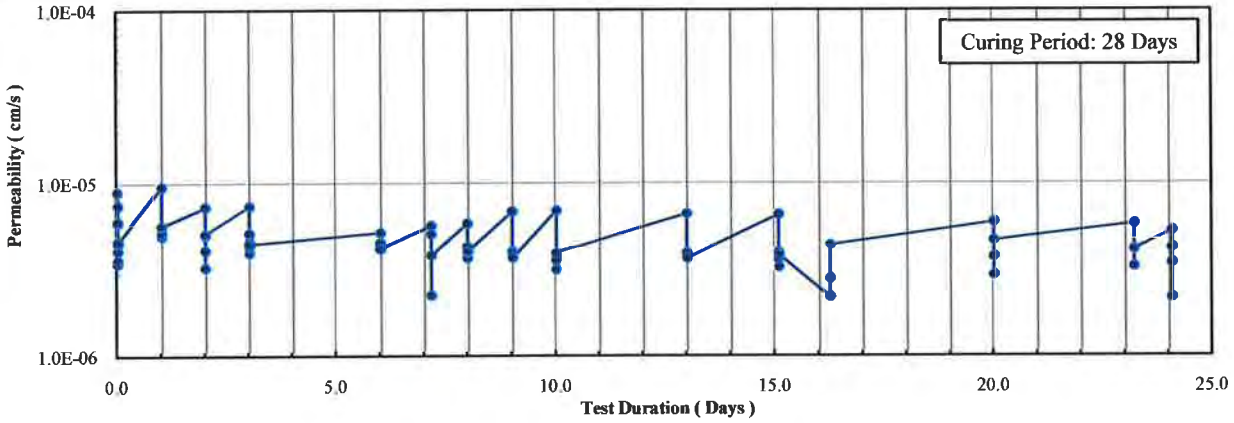
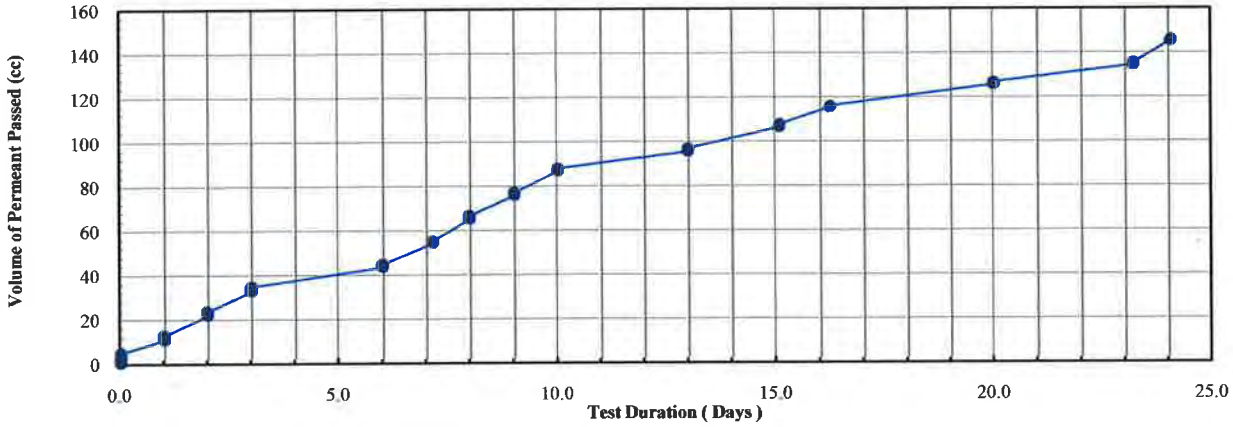
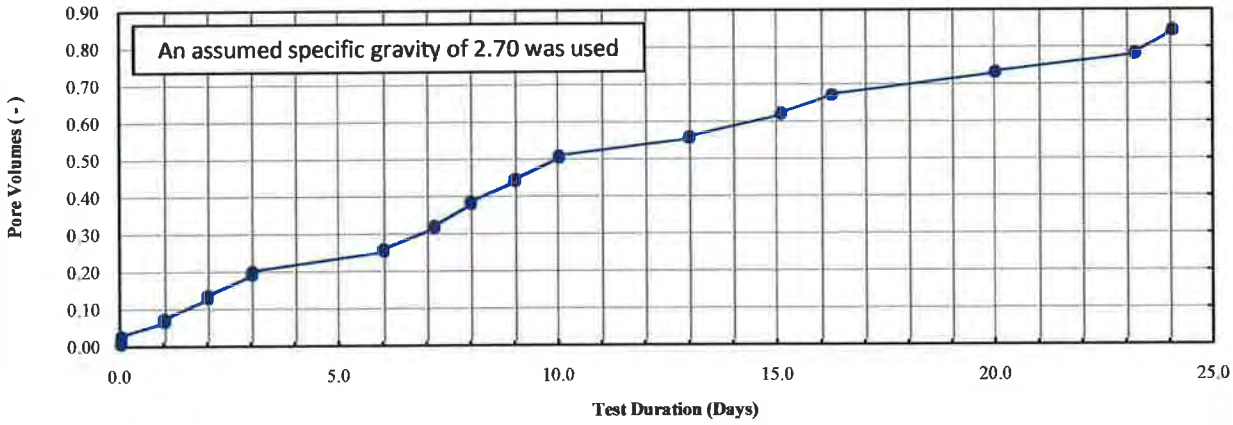
Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Client Sample ID:	Alternate Cement Mix
Lab Sample No:	14E162

ASTM D 5084

PERMEABILITY/COMPATIBILITY TESTING







Note(s):

7-25-14
TR, NSR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Table AppA-02

Project Name: Chemtronics Geotechnical Testing

Project No.: 621

Unconfined Compressive Strength

Sample Identification			Sample Mix Percentages				Curing Period						Notes
							7 Days			28 Days			
Site ID	Lab No.		Bentonite	Cement	Dry Bent.	Water Mix	Moisture	Dry Unit	Compressive	Moisture	Dry Unit	Compressive	
	7 Days	28 Days	Slurry	added	to Soil	Type	Content	Weight	Strength	Content	Weight	Strength	
(-)	(-)	(-)	(%)	(%)	(%)	(-)	(%)	(pcf)	(psi)	(%)	(pcf)	(psi)	
ACM[1]	14E160	14E161	6	23	-	P-7D	311.0	17.7	4.4	262.2	19.9	14.9	

Notes: 1. ACM - Alternate Cement Mix

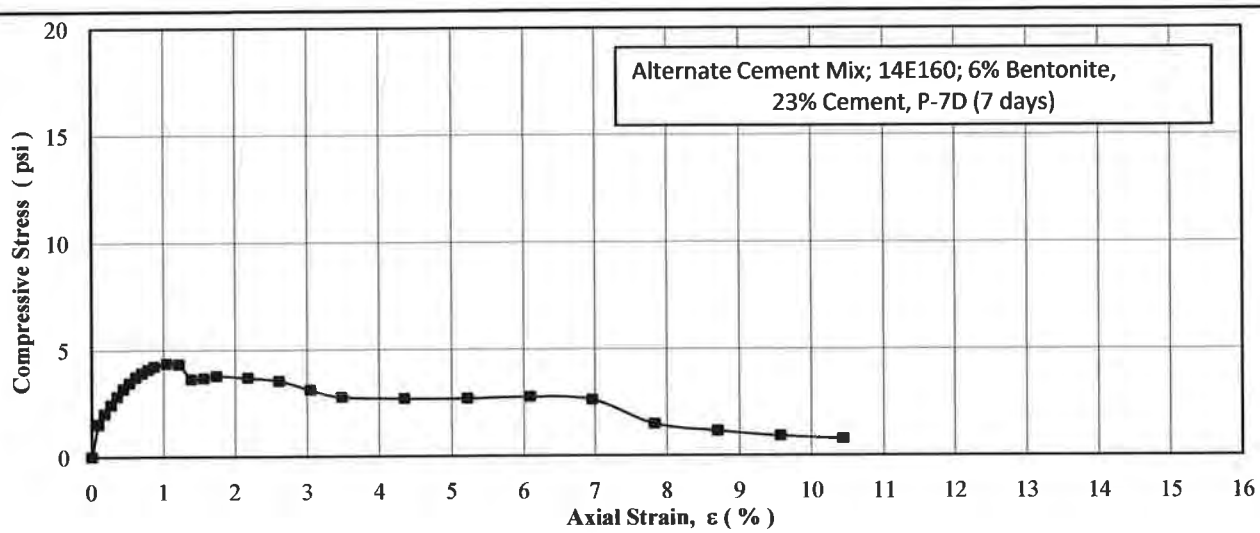
7-25-14
TR, NSR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Sample ID:	Alternate Cement Mix
Lab Sample No:	14E160

UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10[1]	
ACM	14E160	5.75	2.99	311.0	17.7	0.870	1.0	4.4	10.4	0.8	9	RE

ACM - Alternate Cement Mix

Alternate Cement Mix

Specimen Type

UD - Undisturbed Specimen
ST - Shelby Tube Specimen
RE - Remolded Specimen
C - Three-inch Concrete Mold Specimen

Notes:
1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to P-7D and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3 - All particles larger than 3/8 in., if any, were discarded.
4 - P-7D was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 6 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

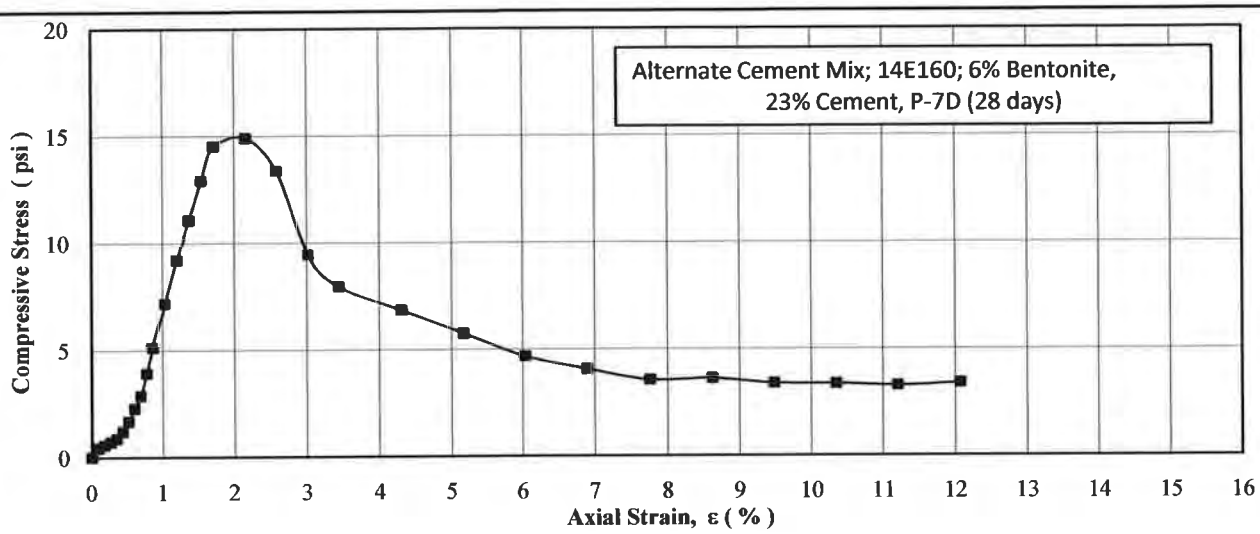
7-25-14
TR, NSR

Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537 Fax: (770) 910 7538

Project Name:	Chemtronics Geotechnical Testing
Project No:	621
Sample ID:	Alternate Cement Mix
Lab Sample No:	14E161

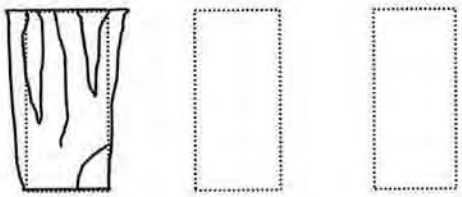
UNCONFINED COMPRESSIVE STRENGTH TEST

ASTM D 2166



Test Specimen		Initial Conditions				Strain Rate	Unconfined Compressive Strength				Specimen Quality	Type[2,3,4,5]
							Peak		Residual			
Client No.	Lab No.	Height (in)	Diameter (in)	Moisture Content (%)	Dry Unit Weight (pcf)	(% / min)	Strain (%)	Strength (psi)	Strain (%)	Strength (psi)	1 to 10[1]	
ACM	14E161	5.80	3.01	262.2	19.9	0.862	2.2	14.9	11.2	3.3	9	RE

ACM - Alternate Cement Mix



Alternate Cement Mix

Specimen Type

UD - Undisturbed Specimen
ST - Shelby Tube Specimen
RE - Remolded Specimen
C - Three-inch Concrete Mold Specimen

Notes:
1 - 1 to 10 indicates extremely poor to excellent specimen conditions.
2 - Bentonite was added to P-7D and mixed with a high speed blender. The slurry was allowed to hydrate for a minimum of 24 hours before adding and blending cement.
3 - All particles larger than 3/8 in , if any, were discarded.
4 - P-7D was used in the Bentonite Slurry mix.
5 - Remolded specimen was formed by rodding the Cement Bentonite Slurry mix in 6 approximately 1 in. (2.5 cm) layers; the test specimen was trimmed after curing to the initial specimen lingth presented.

7-25-14
TR, NSR

APPENDIX C

Analytical Test Results of P-5D and P-7D Groundwater and Hydrant Water Samples (Lancaster Laboratories, Inc., 2014)

P5-D and P7-D
Groundwater Analytical Results

ANALYTICAL RESULTS

Prepared by:	Prepared for:
Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601	Altamont Environmental 231 Haywood Street Asheville NC 28801

January 24, 2014

Project: Chemtronics Site

Submittal Date: 01/11/2014
Group Number: 1445301
PO Number: 2115.231
State of Sample Origin: NC

Client Sample Description	Lancaster Labs (LL) #
P5-D Grab Groundwater	7333520
P5-D Filtered Grab Groundwater	7333521
P7-D Grab Groundwater	7333522
P7-D Filtered Grab Groundwater	7333523
Trip Blank Water	7333524

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Altamont Environmental	Attn: Amy Huffman
ELECTRONIC COPY TO	Altamont Environmental	Attn: Marta VanDussen

Respectfully Submitted,

Nancy Jean Bornholm

Nancy Jean Bornholm
Principal Specialist

(717) 556-7250

Sample Description: P5-D Grab Groundwater
Chemtronics Site

LL Sample # WW 7333520
LL Group # 1445301
Account # 12184

Project Name: Chemtronics Site

Collected: 01/10/2014 10:44 by PB

Submitted: 01/11/2014 09:25
Reported: 01/24/2014 12:38

Altamont Environmental
231 Haywood Street
Asheville NC 28801

P5D--

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	600	U	600	1,000	200
02898	Acetonitrile	75-05-8	1,400	U	1,400	4,000	200
02898	Acrolein	107-02-8	1,000	U	1,000	5,000	200
02898	Acrylonitrile	107-13-1	200	U	200	1,000	200
02898	Allyl Chloride	107-05-1	20	U	20	100	200
02898	t-Amyl methyl ether	994-05-8	20	U	20	100	200
02898	Benzene	71-43-2	380		20	100	200
02898	Benzyl Chloride	100-44-7	20	U	20	100	200
02898	Bromobenzene	108-86-1	20	U	20	100	200
02898	Bromochloromethane	74-97-5	20	U	20	100	200
02898	Bromodichloromethane	75-27-4	20	U	20	100	200
02898	Bromoform	75-25-2	20	U	20	100	200
02898	Bromomethane	74-83-9	20	U	20	100	200
02898	n-Butanol	71-36-3	4,000	U	4,000	10,000	200
02898	2-Butanone	78-93-3	200	U	200	1,000	200
02898	t-Butyl Alcohol	75-65-0	180,000		8,000	20,000	2000
02898	n-Butylbenzene	104-51-8	20	U	20	100	200
02898	sec-Butylbenzene	135-98-8	20	U	20	100	200
02898	tert-Butylbenzene	98-06-6	20	U	20	100	200
02898	Carbon Disulfide	75-15-0	80	U	80	100	200
02898	Carbon Tetrachloride	56-23-5	20	U	20	100	200
02898	2-Chloro-1,3-Butadiene	126-99-8	20	U	20	100	200
02898	Chlorobenzene	108-90-7	20	U	20	100	200
02898	Chloroethane	75-00-3	20	U	20	100	200
02898	Chloroform	67-66-3	20	U	20	100	200
02898	Chloromethane	74-87-3	40	U	40	100	200
02898	2-Chlorotoluene	95-49-8	20	U	20	100	200
02898	4-Chlorotoluene	106-43-4	20	U	20	100	200
02898	Cyclohexane	110-82-7	93	J	20	100	200
02898	Cyclohexanone	108-94-1	1,000	U	1,000	5,000	200
02898	1,2-Dibromo-3-chloropropane	96-12-8	40	U	40	100	200
02898	Dibromochloromethane	124-48-1	20	U	20	100	200
02898	1,2-Dibromoethane	106-93-4	20	U	20	100	200
02898	Dibromomethane	74-95-3	20	U	20	100	200
02898	trans-1,4-Dichloro-2-butene	110-57-6	200	U	200	1,000	200
02898	1,2-Dichlorobenzene	95-50-1	20	U	20	100	200
02898	1,3-Dichlorobenzene	541-73-1	20	U	20	100	200
02898	1,4-Dichlorobenzene	106-46-7	20	U	20	100	200
02898	Dichlorodifluoromethane	75-71-8	20	U	20	100	200
02898	1,1-Dichloroethane	75-34-3	20	U	20	100	200
02898	1,2-Dichloroethane	107-06-2	6,700		200	1,000	2000
02898	1,1-Dichloroethene	75-35-4	20	U	20	100	200
02898	cis-1,2-Dichloroethene	156-59-2	20	U	20	100	200
02898	trans-1,2-Dichloroethene	156-60-5	20	U	20	100	200
02898	1,2-Dichloropropane	78-87-5	20	U	20	100	200
02898	1,3-Dichloropropane	142-28-9	20	U	20	100	200
02898	2,2-Dichloropropane	594-20-7	20	U	20	100	200
02898	1,1-Dichloropropene	563-58-6	20	U	20	100	200
02898	cis-1,3-Dichloropropene	10061-01-5	20	U	20	100	200
02898	trans-1,3-Dichloropropene	10061-02-6	20	U	20	100	200

*=This limit was used in the evaluation of the final result

Sample Description: P5-D Grab Groundwater
Chemtronics Site

LL Sample # WW 7333520
LL Group # 1445301
Account # 12184

Project Name: Chemtronics Site

Collected: 01/10/2014 10:44 by PB

Submitted: 01/11/2014 09:25
Reported: 01/24/2014 12:38

Altamont Environmental
231 Haywood Street
Asheville NC 28801

P5D--

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		**ug/l**		**ug/l**	**ug/l**	
02898	Ethyl Methacrylate	97-63-2	20	U	20	100	200
02898	Ethyl t-butyl ether	637-92-3	20	U	20	100	200
02898	Ethylbenzene	100-41-4	20	U	20	100	200
02898	Freon 113	76-13-1	40	U	40	100	200
02898	n-Heptane	142-82-5	40	U	40	100	200
02898	Hexachlorobutadiene	87-68-3	20	U	20	100	200
02898	n-Hexane	110-54-3	20	U	20	100	200
02898	2-Hexanone	591-78-6	200	U	200	1,000	200
02898	Isobutyl Alcohol	78-83-1	2,000	U	2,000	5,000	200
02898	Isopropylbenzene	98-82-8	20	U	20	100	200
02898	p-Isopropyltoluene	99-87-6	20	U	20	100	200
02898	Methacrylonitrile	126-98-7	200	U	200	1,000	200
02898	Methyl Acetate	79-20-9	60	U	60	200	200
02898	Methyl Methacrylate	80-62-6	20	U	20	100	200
02898	Methyl Tertiary Butyl Ether	1634-04-4	1,300		20	100	200
02898	4-Methyl-2-Pentanone	108-10-1	200	U	200	1,000	200
02898	Methylcyclohexane	108-87-2	20	U	20	100	200
02898	Methylene Chloride	75-09-2	40	U	40	100	200
02898	Naphthalene	91-20-3	20	U	20	100	200
02898	Pentachloroethane	76-01-7	40	U	40	100	200
02898	Propionitrile	107-12-0	400	U	400	2,000	200
02898	n-Propylbenzene	103-65-1	20	U	20	100	200
02898	Styrene	100-42-5	20	U	20	100	200
02898	1,1,1,2-Tetrachloroethane	630-20-6	20	U	20	100	200
02898	1,1,2,2-Tetrachloroethane	79-34-5	20	U	20	100	200
02898	Tetrachloroethene	127-18-4	20	U	20	100	200
02898	Tetrahydrofuran	109-99-9	400	U	400	1,000	200
02898	Toluene	108-88-3	20	U	20	100	200
02898	1,2,3-Trichlorobenzene	87-61-6	20	U	20	100	200
02898	1,2,4-Trichlorobenzene	120-82-1	20	U	20	100	200
02898	1,1,1-Trichloroethane	71-55-6	20	U	20	100	200
02898	1,1,2-Trichloroethane	79-00-5	20	U	20	100	200
02898	Trichloroethene	79-01-6	320		20	100	200
02898	1,2,4-Trimethylbenzene	95-63-6	20	U	20	100	200
02898	1,3,5-Trimethylbenzene	108-67-8	20	U	20	100	200
02898	Vinyl Acetate	108-05-4	40	U	40	100	200
02898	Vinyl Chloride	75-01-4	20	U	20	100	200
02898	m+p-Xylene	1330-20-7	20	U	20	100	200
02898	o-Xylene	95-47-6	20	U	20	100	200
Explosives	**SW-846 8015B**		**ug/l**		**ug/l**	**ug/l**	
02265	Picric Acid	88-89-1	50	U	50	200	1
Explosives	**SW-846 8330**		**ug/l**		**ug/l**	**ug/l**	
06916	4-Amino-2,6-Dinitrotoluene	19406-51-0	14	U	14	14	1
06916	2-Amino-4,6-Dinitrotoluene	35572-78-2	0.20	U	0.20	0.60	1
06916	1,2-Dinitrobenzene	528-29-0	2.7	U	2.7	2.7	1
06916	1,3-Dinitrobenzene	99-65-0	0.33	J	0.20	0.60	1
06916	1,4-Dinitrobenzene	100-25-4	0.82		0.30	0.60	1

*=This limit was used in the evaluation of the final result

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2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Analysis Report

Sample Description: P5-D Grab Groundwater
Chemtronics Site

LL Sample # WW 7333520
LL Group # 1445301
Account # 12184

Project Name: Chemtronics Site

Collected: 01/10/2014 10:44 by PB

Submitted: 01/11/2014 09:25
Reported: 01/24/2014 12:38

Altamont Environmental
231 Haywood Street
Asheville NC 28801

P5D--

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Explosives	**SW-846 8330**		**ug/l**		**ug/l**	**ug/l**	
06916	2,4-Dinitrotoluene	121-14-2	0.72	U	0.72	2.0	1
06916	2,6-Dinitrotoluene	606-20-2	0.80	U	0.80	1.3	1
06916	HMX	2691-41-0	0.65	U	0.65	2.0	1
06916	Nitrobenzene	98-95-3	0.20	U	0.20	0.60	1
06916	Nitroglycerin	55-63-0	21	U	21	21	1
06916	1-Nitronaphthalene	86-57-7	0.20	U	0.20	0.60	1
06916	2-Nitrotoluene	88-72-2	0.25	U	0.25	0.75	1
06916	3-Nitrotoluene	99-08-1	0.70	U	0.70	1.2	1
06916	4-Nitrotoluene	99-99-0	0.70	U	0.70	1.2	1
06916	PETN	78-11-5	6.0	U	6.0	18	1
06916	RDX	121-82-4	2.2	U	2.2	2.2	1
06916	Tetryl	479-45-8	0.40	U	0.40	0.60	1
06916	1,3,5-Trinitrobenzene	99-35-4	1.1		0.20	0.60	1
06916	2,4,6-Trinitrotoluene	118-96-7	1.7		0.20	0.60	1
Reporting limits were raised due to interference from the sample matrix.							
Perchlorate	**SW-846 6850 1/2007**		**ug/l**		**ug/l**	**ug/l**	
06386	Perchlorate	14797-73-0	0.20	U	0.20	1.0	1
GC Miscellaneous	**SW-846 8015B modified**		**ug/l**		**ug/l**	**ug/l**	
07105	Ethane	74-84-0	1.0	U	1.0	5.0	1
07105	Ethene	74-85-1	21		1.0	5.0	1
07105	Methane	74-82-8	16		3.0	5.0	1
Wet Chemistry	**EPA 300.0**		**mg/l**		**mg/l**	**mg/l**	
01505	Bromide	24959-67-9	110		4.0	5.0	10
00224	Chloride	16887-00-6	38.3		2.0	4.0	10
00368	Nitrate Nitrogen	14797-55-8	0.25	U	0.25	0.50	5
01506	Nitrite Nitrogen	14797-65-0	0.40	U	0.40	0.50	5
00228	Sulfate	14808-79-8	782		30.0	100	100
	SM 5310 C-2000		**mg/l**		**mg/l**	**mg/l**	
00273	Total Organic Carbon	n.a.	61.0		1.3	2.5	2.5
	SM 2340 C-1997		**mg/l as CaCO3**		**mg/l as CaCO3**	**mg/l as CaCO3**	
12147	Total Hardness	471-34-1	1,200		75.0	125	25
	SM 2540 C-1997		**mg/l**		**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	1,650		38.8	120	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Lancaster Laboratories Environmental
2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Analysis Report

Sample Description: P5-D Grab Groundwater
Chemtronics Site

LL Sample # WW 7333520
LL Group # 1445301
Account # 12184

Project Name: Chemtronics Site

Collected: 01/10/2014 10:44 by PB

Submitted: 01/11/2014 09:25
Reported: 01/24/2014 12:38

Altamont Environmental
231 Haywood Street
Asheville NC 28801

P5D--

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C140141AA	01/14/2014 14:51	Kerri E Legerlotz	200
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C140141AA	01/14/2014 15:14	Kerri E Legerlotz	2000
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C140141AA	01/14/2014 14:51	Kerri E Legerlotz	200
01163	GC/MS VOA Water Prep	SW-846 5030B	2	C140141AA	01/14/2014 15:14	Kerri E Legerlotz	2000
02265	Picric Acid	SW-846 8015B	1	140140033A	01/14/2014 18:42	James H Place	1
06916	Nitroaromatics/Amines	SW-846 8330	1	140130017A	01/17/2014 05:56	James H Place	1
06386	Perchlorate	SW-846 6850 1/2007	1	140210003A	01/23/2014 15:39	Richard A Shober	1
06915	Nitroaromatics/Amines Wat Ext	SW-846 8330	1	140130017A	01/14/2014 12:30	Edwin Ortiz	1
07105	Dissolved Gases	SW-846 8015B modified	1	140150017A	01/16/2014 03:59	Elizabeth J Marin	1
01505	Bromide	EPA 300.0	1	14011987601A	01/11/2014 15:20	Sandra J Miller	10
00224	Chloride	EPA 300.0	1	14011987601A	01/11/2014 15:20	Sandra J Miller	10
00368	Nitrate Nitrogen	EPA 300.0	1	14011987601A	01/11/2014 13:11	Sandra J Miller	5
01506	Nitrite Nitrogen	EPA 300.0	1	14011987601A	01/11/2014 13:11	Sandra J Miller	5
00228	Sulfate	EPA 300.0	1	14011987601A	01/11/2014 16:09	Sandra J Miller	100
00273	Total Organic Carbon	SM 5310 C-2000	1	14016049501A	01/17/2014 04:50	James S Mathiot	2.5
12147	Total Hardness	SM 2340 C-1997	1	14023001101B	01/23/2014 21:14	Susan A Engle	25
00212	Total Dissolved Solids	SM 2540 C-1997	1	14015021201B	01/15/2014 09:49	Noah M Rainbow	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: P5-D Filtered Grab Groundwater Chemtronics Site

LL Sample # WW 7333521
LL Group # 1445301
Account # 12184

Project Name: Chemtronics Site

Collected: 01/10/2014 10:44 by PB

Submitted: 01/11/2014 09:25
Reported: 01/24/2014 12:38

Altamont Environmental
231 Haywood Street
Asheville NC 28801

P5D-F

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010B**		mg/l	mg/l	mg/l	
01743	Aluminum	7429-90-5	0.0828 U	0.0828	0.200	1
01750	Calcium	7440-70-2	270	0.0334	0.200	1
01754	Iron	7439-89-6	18.7	0.0430	0.200	1
01757	Magnesium	7439-95-4	101	0.0167	0.100	1
07058	Manganese	7439-96-5	20.4	0.0208	0.125	25
01762	Potassium	7440-09-7	5.41	0.0980	0.500	1
01767	Sodium	7440-23-5	16.7	0.167	1.00	1

General Sample Comments

State of North Carolina Lab Certification No. 521
This sample was field filtered for dissolved metals.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01743	Aluminum	SW-846 6010B	1	140141848001	01/16/2014 04:18	Tara L Snyder	1
01750	Calcium	SW-846 6010B	1	140141848001	01/16/2014 04:18	Tara L Snyder	1
01754	Iron	SW-846 6010B	1	140141848001	01/16/2014 04:18	Tara L Snyder	1
01757	Magnesium	SW-846 6010B	1	140141848001	01/16/2014 04:18	Tara L Snyder	1
07058	Manganese	SW-846 6010B	1	140141848001	01/16/2014 08:10	Joanne M Gates	25
01762	Potassium	SW-846 6010B	1	140141848001	01/16/2014 04:18	Tara L Snyder	1
01767	Sodium	SW-846 6010B	1	140141848001	01/16/2014 04:18	Tara L Snyder	1
01848	WW SW846 ICP Digest (tot rec)	SW-846 3005A	1	140141848001	01/15/2014 12:44	James L Mertz	1

*=This limit was used in the evaluation of the final result

Sample Description: P7-D Grab Groundwater
Chemtronics Site

LL Sample # WW 7333522
LL Group # 1445301
Account # 12184

Project Name: Chemtronics Site

Collected: 01/10/2014 13:12 by PB

Submitted: 01/11/2014 09:25
Reported: 01/24/2014 12:38

Altamont Environmental
231 Haywood Street
Asheville NC 28801

P7D--

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		**ug/l**		**ug/l**	**ug/l**	
02898	Acetone	67-64-1	60	U	60	100	20
02898	Acetonitrile	75-05-8	140	U	140	400	20
02898	Acrolein	107-02-8	100	U	100	500	20
02898	Acrylonitrile	107-13-1	20	U	20	100	20
02898	Allyl Chloride	107-05-1	2.0	U	2.0	10	20
02898	t-Amyl methyl ether	994-05-8	2.0	U	2.0	10	20
02898	Benzene	71-43-2	2.0	U	2.0	10	20
02898	Benzyl Chloride	100-44-7	2.0	U	2.0	10	20
02898	Bromobenzene	108-86-1	2.0	U	2.0	10	20
02898	Bromochloromethane	74-97-5	2.0	U	2.0	10	20
02898	Bromodichloromethane	75-27-4	2.0	U	2.0	10	20
02898	Bromoform	75-25-2	2.0	U	2.0	10	20
02898	Bromomethane	74-83-9	2.0	U	2.0	10	20
02898	n-Butanol	71-36-3	400	U	400	1,000	20
02898	2-Butanone	78-93-3	20	U	20	100	20
02898	t-Butyl Alcohol	75-65-0	80	U	80	200	20
02898	n-Butylbenzene	104-51-8	2.0	U	2.0	10	20
02898	sec-Butylbenzene	135-98-8	2.0	U	2.0	10	20
02898	tert-Butylbenzene	98-06-6	2.0	U	2.0	10	20
02898	Carbon Disulfide	75-15-0	8.0	U	8.0	10	20
02898	Carbon Tetrachloride	56-23-5	2.0	U	2.0	10	20
02898	2-Chloro-1,3-Butadiene	126-99-8	2.0	U	2.0	10	20
02898	Chlorobenzene	108-90-7	2.0	U	2.0	10	20
02898	Chloroethane	75-00-3	2.0	U	2.0	10	20
02898	Chloroform	67-66-3	19		2.0	10	20
02898	Chloromethane	74-87-3	4.0	U	4.0	10	20
02898	2-Chlorotoluene	95-49-8	2.0	U	2.0	10	20
02898	4-Chlorotoluene	106-43-4	2.0	U	2.0	10	20
02898	Cyclohexane	110-82-7	2.0	U	2.0	10	20
02898	Cyclohexanone	108-94-1	100	U	100	500	20
02898	1,2-Dibromo-3-chloropropane	96-12-8	4.0	U	4.0	10	20
02898	Dibromochloromethane	124-48-1	2.0	U	2.0	10	20
02898	1,2-Dibromoethane	106-93-4	2.0	U	2.0	10	20
02898	Dibromomethane	74-95-3	2.0	U	2.0	10	20
02898	trans-1,4-Dichloro-2-butene	110-57-6	20	U	20	100	20
02898	1,2-Dichlorobenzene	95-50-1	2.0	U	2.0	10	20
02898	1,3-Dichlorobenzene	541-73-1	2.0	U	2.0	10	20
02898	1,4-Dichlorobenzene	106-46-7	2.0	U	2.0	10	20
02898	Dichlorodifluoromethane	75-71-8	2.0	U	2.0	10	20
02898	1,1-Dichloroethane	75-34-3	2.0	U	2.0	10	20
02898	1,2-Dichloroethane	107-06-2	3,900		20	100	200
02898	1,1-Dichloroethene	75-35-4	2.0	U	2.0	10	20
02898	cis-1,2-Dichloroethene	156-59-2	140		2.0	10	20
02898	trans-1,2-Dichloroethene	156-60-5	2.0	U	2.0	10	20
02898	1,2-Dichloropropane	78-87-5	2.0	U	2.0	10	20
02898	1,3-Dichloropropane	142-28-9	2.0	U	2.0	10	20
02898	2,2-Dichloropropane	594-20-7	2.0	U	2.0	10	20
02898	1,1-Dichloropropene	563-58-6	2.0	U	2.0	10	20
02898	cis-1,3-Dichloropropene	10061-01-5	2.0	U	2.0	10	20
02898	trans-1,3-Dichloropropene	10061-02-6	2.0	U	2.0	10	20

*=This limit was used in the evaluation of the final result

Sample Description: P7-D Grab Groundwater
Chemtronics Site

LL Sample # WW 7333522
LL Group # 1445301
Account # 12184

Project Name: Chemtronics Site

Collected: 01/10/2014 13:12 by PB

Submitted: 01/11/2014 09:25
Reported: 01/24/2014 12:38

Altamont Environmental
231 Haywood Street
Asheville NC 28801

P7D--

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		**ug/l**		**ug/l**	**ug/l**	
02898	Ethyl Methacrylate	97-63-2	2.0	U	2.0	10	20
02898	Ethyl t-butyl ether	637-92-3	2.0	U	2.0	10	20
02898	Ethylbenzene	100-41-4	2.0	U	2.0	10	20
02898	Freon 113	76-13-1	4.0	U	4.0	10	20
02898	n-Heptane	142-82-5	4.0	U	4.0	10	20
02898	Hexachlorobutadiene	87-68-3	2.0	U	2.0	10	20
02898	n-Hexane	110-54-3	2.0	U	2.0	10	20
02898	2-Hexanone	591-78-6	20	U	20	100	20
02898	Isobutyl Alcohol	78-83-1	200	U	200	500	20
02898	Isopropylbenzene	98-82-8	2.0	U	2.0	10	20
02898	p-Isopropyltoluene	99-87-6	2.0	U	2.0	10	20
02898	Methacrylonitrile	126-98-7	20	U	20	100	20
02898	Methyl Acetate	79-20-9	6.0	U	6.0	20	20
02898	Methyl Methacrylate	80-62-6	2.0	U	2.0	10	20
02898	Methyl Tertiary Butyl Ether	1634-04-4	2.0	U	2.0	10	20
02898	4-Methyl-2-Pentanone	108-10-1	20	U	20	100	20
02898	Methylcyclohexane	108-87-2	2.0	U	2.0	10	20
02898	Methylene Chloride	75-09-2	5.3	J	4.0	10	20
02898	Naphthalene	91-20-3	2.0	U	2.0	10	20
02898	Pentachloroethane	76-01-7	4.0	U	4.0	10	20
02898	Propionitrile	107-12-0	40	U	40	200	20
02898	n-Propylbenzene	103-65-1	2.0	U	2.0	10	20
02898	Styrene	100-42-5	2.0	U	2.0	10	20
02898	1,1,1,2-Tetrachloroethane	630-20-6	2.0	U	2.0	10	20
02898	1,1,2,2-Tetrachloroethane	79-34-5	2.0	U	2.0	10	20
02898	Tetrachloroethene	127-18-4	65		2.0	10	20
02898	Tetrahydrofuran	109-99-9	190		40	100	20
02898	Toluene	108-88-3	2.0	U	2.0	10	20
02898	1,2,3-Trichlorobenzene	87-61-6	2.0	U	2.0	10	20
02898	1,2,4-Trichlorobenzene	120-82-1	2.0	U	2.0	10	20
02898	1,1,1-Trichloroethane	71-55-6	2.0	U	2.0	10	20
02898	1,1,2-Trichloroethane	79-00-5	2.0	U	2.0	10	20
02898	Trichloroethene	79-01-6	2,500		20	100	200
02898	1,2,4-Trimethylbenzene	95-63-6	2.0	U	2.0	10	20
02898	1,3,5-Trimethylbenzene	108-67-8	2.0	U	2.0	10	20
02898	Vinyl Acetate	108-05-4	4.0	U	4.0	10	20
02898	Vinyl Chloride	75-01-4	2.0	U	2.0	10	20
02898	m+p-Xylene	1330-20-7	2.0	U	2.0	10	20
02898	o-Xylene	95-47-6	9.2	J	2.0	10	20
Explosives	**SW-846 8015B**		**ug/l**		**ug/l**	**ug/l**	
02265	Picric Acid	88-89-1	50	U	50	200	1
Explosives	**SW-846 8330**		**ug/l**		**ug/l**	**ug/l**	
06916	4-Amino-2,6-Dinitrotoluene	19406-51-0	0.45	U	0.45	0.60	1
06916	2-Amino-4,6-Dinitrotoluene	35572-78-2	0.30	U	0.30	0.60	1
06916	1,2-Dinitrobenzene	528-29-0	0.20	U	0.20	0.60	1
06916	1,3-Dinitrobenzene	99-65-0	0.70	U	0.70	0.70	1
06916	1,4-Dinitrobenzene	100-25-4	0.78		0.30	0.60	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: P7-D Grab Groundwater
Chemtronics Site

LL Sample # WW 7333522
LL Group # 1445301
Account # 12184

Project Name: Chemtronics Site

Collected: 01/10/2014 13:12 by PB

Submitted: 01/11/2014 09:25
Reported: 01/24/2014 12:38

Altamont Environmental
231 Haywood Street
Asheville NC 28801

P7D--

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Explosives	**SW-846 8330**		**ug/l**		**ug/l**	**ug/l**	
06916	2,4-Dinitrotoluene	121-14-2	1.1	U	1.1	2.0	1
06916	2,6-Dinitrotoluene	606-20-2	0.45	U	0.45	1.3	1
06916	HMX	2691-41-0	58	U	58	58	20
06916	Nitrobenzene	98-95-3	1.5	U	1.5	1.5	1
06916	Nitroglycerin	55-63-0	14	J	5.2	15	1
06916	1-Nitronaphthalene	86-57-7	0.40	U	0.40	0.60	1
06916	2-Nitrotoluene	88-72-2	0.25	U	0.25	0.75	1
06916	3-Nitrotoluene	99-08-1	0.40	U	0.40	1.2	1
06916	4-Nitrotoluene	99-99-0	0.60	U	0.60	1.2	1
06916	PETN	78-11-5	6.0	U	6.0	18	1
06916	RDX	121-82-4	180		4.0	10	20
06916	Tetryl	479-45-8	1.5	U	1.5	1.5	1
06916	1,3,5-Trinitrobenzene	99-35-4	0.20	U	0.20	0.60	1
06916	2,4,6-Trinitrotoluene	118-96-7	0.66		0.20	0.60	1
Reporting limits were raised due to interference from the sample matrix.							
Perchlorate	**SW-846 6850 1/2007**		**ug/l**		**ug/l**	**ug/l**	
06386	Perchlorate	14797-73-0	9,900		200	1,000	1000
GC Miscellaneous	**SW-846 8015B modified**		**ug/l**		**ug/l**	**ug/l**	
07105	Ethane	74-84-0	1.0	U	1.0	5.0	1
07105	Ethene	74-85-1	1.0	U	1.0	5.0	1
07105	Methane	74-82-8	23		3.0	5.0	1
Wet Chemistry	**EPA 300.0**		**mg/l**		**mg/l**	**mg/l**	
01505	Bromide	24959-67-9	2.0	U	2.0	2.5	5
00224	Chloride	16887-00-6	6.7		1.0	2.0	5
00368	Nitrate Nitrogen	14797-55-8	28.9		1.0	2.0	20
01506	Nitrite Nitrogen	14797-65-0	0.40	U	0.40	0.50	5
00228	Sulfate	14808-79-8	60.1		1.5	5.0	5
	SM 5310 C-2000		**mg/l**		**mg/l**	**mg/l**	
00273	Total Organic Carbon	n.a.	5.8		0.50	1.0	1
	SM 2340 C-1997		**mg/l as CaCO3**		**mg/l as CaCO3**	**mg/l as CaCO3**	
12147	Total Hardness	471-34-1	316		15.0	25.0	5
	SM 2540 C-1997		**mg/l**		**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	562		19.4	60.0	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

Sample Description: P7-D Grab Groundwater
Chemtronics Site

LL Sample # WW 7333522
LL Group # 1445301
Account # 12184

Project Name: Chemtronics Site

Collected: 01/10/2014 13:12 by PB

Submitted: 01/11/2014 09:25
Reported: 01/24/2014 12:38

Altamont Environmental
231 Haywood Street
Asheville NC 28801

P7D--

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C140141AA	01/14/2014 12:36	Kerri E Legerlotz	20
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C140141AA	01/14/2014 14:29	Kerri E Legerlotz	200
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C140141AA	01/14/2014 12:36	Kerri E Legerlotz	20
01163	GC/MS VOA Water Prep	SW-846 5030B	2	C140141AA	01/14/2014 14:29	Kerri E Legerlotz	200
02265	Picric Acid	SW-846 8015B	1	140140033A	01/14/2014 19:17	James H Place	1
06916	Nitroaromatics/Amines	SW-846 8330	1	140130017A	01/17/2014 06:39	James H Place	1
06916	Nitroaromatics/Amines	SW-846 8330	1	140130017A	01/17/2014 15:54	James H Place	20
06386	Perchlorate	SW-846 6850 1/2007	1	140210003A	01/23/2014 16:17	Richard A Shober	1000
06915	Nitroaromatics/Amines Wat Ext	SW-846 8330	1	140130017A	01/14/2014 12:30	Edwin Ortiz	1
07105	Dissolved Gases	SW-846 8015B modified	1	140150017A	01/16/2014 04:16	Elizabeth J Marin	1
01505	Bromide	EPA 300.0	1	14011987601A	01/11/2014 13:27	Sandra J Miller	5
00224	Chloride	EPA 300.0	1	14011987601A	01/11/2014 13:27	Sandra J Miller	5
00368	Nitrate Nitrogen	EPA 300.0	1	14011987601A	01/11/2014 16:57	Sandra J Miller	20
01506	Nitrite Nitrogen	EPA 300.0	1	14011987601A	01/11/2014 13:27	Sandra J Miller	5
00228	Sulfate	EPA 300.0	1	14011987601A	01/11/2014 13:27	Sandra J Miller	5
00273	Total Organic Carbon	SM 5310 C-2000	1	14016049501A	01/16/2014 04:03	James S Mathiot	1
12147	Total Hardness	SM 2340 C-1997	1	14023001101B	01/23/2014 11:14	Susan A Engle	5
00212	Total Dissolved Solids	SM 2540 C-1997	1	14015021201B	01/15/2014 09:49	Noah M Rainbow	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: P7-D Filtered Grab Groundwater Chemtronics Site

LL Sample # WW 7333523
LL Group # 1445301
Account # 12184

Project Name: Chemtronics Site

Collected: 01/10/2014 13:12 by PB

Submitted: 01/11/2014 09:25
Reported: 01/24/2014 12:38

Altamont Environmental
231 Haywood Street
Asheville NC 28801

P7D-F

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010B**		mg/l	mg/l	mg/l	
01743	Aluminum	7429-90-5	0.0828 U	0.0828	0.200	1
01750	Calcium	7440-70-2	96.2	0.0334	0.200	1
01754	Iron	7439-89-6	0.0430 U	0.0430	0.200	1
01757	Magnesium	7439-95-4	12.9	0.0167	0.100	1
07058	Manganese	7439-96-5	0.632	0.00083	0.0050	1
01762	Potassium	7440-09-7	3.52	0.0980	0.500	1
01767	Sodium	7440-23-5	46.6	0.835	5.00	5

General Sample Comments

State of North Carolina Lab Certification No. 521
This sample was field filtered for dissolved metals.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01743	Aluminum	SW-846 6010B	1	140141848001	01/16/2014 04:22	Tara L Snyder	1
01750	Calcium	SW-846 6010B	1	140141848001	01/16/2014 04:22	Tara L Snyder	1
01754	Iron	SW-846 6010B	1	140141848001	01/16/2014 04:22	Tara L Snyder	1
01757	Magnesium	SW-846 6010B	1	140141848001	01/16/2014 04:22	Tara L Snyder	1
07058	Manganese	SW-846 6010B	1	140141848001	01/16/2014 04:22	Tara L Snyder	1
01762	Potassium	SW-846 6010B	1	140141848001	01/16/2014 04:22	Tara L Snyder	1
01767	Sodium	SW-846 6010B	1	140141848001	01/16/2014 08:14	Joanne M Gates	5
01848	WW SW846 ICP Digest (tot rec)	SW-846 3005A	1	140141848001	01/15/2014 12:44	James L Mertz	1

*=This limit was used in the evaluation of the final result

Sample Description: Trip Blank Water
Chemtronics Site

LL Sample # WW 7333524
LL Group # 1445301
Account # 12184

Project Name: Chemtronics Site

Collected: 01/10/2014

Submitted: 01/11/2014 09:25
Reported: 01/24/2014 12:38

Altamont Environmental
231 Haywood Street
Asheville NC 28801

TBCHM

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		**ug/l**		**ug/l**	**ug/l**	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.1	U	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	0.5	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-Butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	0.1	U	0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	0.1	U	0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.1	U	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

Sample Description: Trip Blank Water
Chemtronics Site

LL Sample # WW 7333524
LL Group # 1445301
Account # 12184

Project Name: Chemtronics Site

Collected: 01/10/2014

Submitted: 01/11/2014 09:25
Reported: 01/24/2014 12:38

Altamont Environmental
231 Haywood Street
Asheville NC 28801

TBCHM

CAT No.	Analysis Name	CAS Number	As Received Result		As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		**ug/l**		**ug/l**	**ug/l**	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-Pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.1	U	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Analysis Report

Sample Description: Trip Blank Water
Chemtronics Site

LL Sample # WW 7333524
LL Group # 1445301
Account # 12184

Project Name: Chemtronics Site

Collected: 01/10/2014

Submitted: 01/11/2014 09:25
Reported: 01/24/2014 12:38

Altamont Environmental
231 Haywood Street
Asheville NC 28801

TBCHM

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C140141AA	01/14/2014 12:14	Kerri E Legerlotz	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C140141AA	01/14/2014 12:14	Kerri E Legerlotz	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1445301
Reported: 01/24/14 at 12:38 PM

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: C140141AA	Sample number(s): 7333520,7333522,7333524									
Acetone	3.0	U	3.0	5.0	ug/l	118		60-139		
Acetonitrile	7.0	U	7.0	20	ug/l	115		41-158		
Acrolein	5.0	U	5.0	25	ug/l	107		36-137		
Acrylonitrile	1.0	U	1.0	5.0	ug/l	113		69-136		
Allyl Chloride	0.1	U	0.1	0.5	ug/l	90		61-130		
t-Amyl methyl ether	0.1	U	0.1	0.5	ug/l	94		80-124		
Benzene	0.1	U	0.1	0.5	ug/l	101		80-120		
Benzyl Chloride	0.1	U	0.1	0.5	ug/l	109		62-120		
Bromobenzene	0.1	U	0.1	0.5	ug/l	108		80-120		
Bromochloromethane	0.1	U	0.1	0.5	ug/l	116		80-125		
Bromodichloromethane	0.1	U	0.1	0.5	ug/l	115		80-120		
Bromoform	0.1	U	0.1	0.5	ug/l	129*		73-128		
Bromomethane	0.1	U	0.1	0.5	ug/l	120		62-126		
n-Butanol	20	U	20.	50	ug/l	115		65-138		
2-Butanone	1.0	U	1.0	5.0	ug/l	112		70-130		
t-Butyl Alcohol	4.0	U	4.0	10	ug/l	119		68-140		
n-Butylbenzene	0.1	U	0.1	0.5	ug/l	102		80-120		
sec-Butylbenzene	0.1	U	0.1	0.5	ug/l	100		80-120		
tert-Butylbenzene	0.1	U	0.1	0.5	ug/l	98		80-120		
Carbon Disulfide	0.4	U	0.4	0.5	ug/l	100		80-128		
Carbon Tetrachloride	0.1	U	0.1	0.5	ug/l	116		80-129		
2-Chloro-1,3-Butadiene	0.1	U	0.1	0.5	ug/l	98		80-127		
Chlorobenzene	0.1	U	0.1	0.5	ug/l	110		80-120		
Chloroethane	0.1	U	0.1	0.5	ug/l	111		68-120		
Chloroform	0.1	U	0.1	0.5	ug/l	113		80-120		
Chloromethane	0.2	U	0.2	0.5	ug/l	115		55-120		
2-Chlorotoluene	0.1	U	0.1	0.5	ug/l	104		80-120		
4-Chlorotoluene	0.1	U	0.1	0.5	ug/l	105		80-120		
Cyclohexane	0.1	U	0.1	0.5	ug/l	89		75-123		
Cyclohexanone	5.0	U	5.0	25	ug/l	67		38-149		
1,2-Dibromo-3-chloropropane	0.2	U	0.2	0.5	ug/l	131		64-141		
Dibromochloromethane	0.1	U	0.1	0.5	ug/l	121		80-126		
1,2-Dibromoethane	0.1	U	0.1	0.5	ug/l	119		80-120		
Dibromomethane	0.1	U	0.1	0.5	ug/l	117		80-120		
trans-1,4-Dichloro-2-butene	1.0	U	1.0	5.0	ug/l	146		14-166		
1,2-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	113		80-120		
1,3-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	109		80-120		
1,4-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	110		80-120		
Dichlorodifluoromethane	0.1	U	0.1	0.5	ug/l	121*		39-120		
1,1-Dichloroethane	0.1	U	0.1	0.5	ug/l	99		80-120		
1,2-Dichloroethane	0.1	U	0.1	0.5	ug/l	120		80-127		
1,1-Dichloroethene	0.1	U	0.1	0.5	ug/l	102		80-123		
cis-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	105		80-120		

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1445301
Reported: 01/24/14 at 12:38 PM

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
trans-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	107		80-120		
1,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	107		80-120		
1,3-Dichloropropane	0.1	U	0.1	0.5	ug/l	109		80-120		
2,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	96		75-122		
1,1-Dichloropropene	0.1	U	0.1	0.5	ug/l	104		80-121		
cis-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	103		80-123		
trans-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	109		80-120		
Ethyl Methacrylate	0.1	U	0.1	0.5	ug/l	99		80-120		
Ethyl t-butyl ether	0.1	U	0.1	0.5	ug/l	90		76-120		
Ethylbenzene	0.1	U	0.1	0.5	ug/l	104		80-120		
Freon 113	0.2	U	0.2	0.5	ug/l	101		78-132		
n-Heptane	0.2	U	0.2	0.5	ug/l	92		75-132		
Hexachlorobutadiene	0.1	U	0.1	0.5	ug/l	104		73-120		
n-Hexane	0.1	U	0.1	0.5	ug/l	87		76-131		
2-Hexanone	1.0	U	1.0	5.0	ug/l	113		69-131		
Isobutyl Alcohol	10	U	10.	25	ug/l	129*		71-128		
Isopropylbenzene	0.1	U	0.1	0.5	ug/l	103		80-120		
p-Isopropyltoluene	0.1	U	0.1	0.5	ug/l	99		80-120		
Methacrylonitrile	1.0	U	1.0	5.0	ug/l	115		68-138		
Methyl Acetate	0.3	U	0.3	1.0	ug/l	108		69-126		
Methyl Methacrylate	0.1	U	0.1	0.5	ug/l	105		64-149		
Methyl Tertiary Butyl Ether	0.1	U	0.1	0.5	ug/l	95		80-120		
4-Methyl-2-Pentanone	1.0	U	1.0	5.0	ug/l	114		69-135		
Methylcyclohexane	0.1	U	0.1	0.5	ug/l	97		80-127		
Methylene Chloride	0.2	U	0.2	0.5	ug/l	109		80-120		
Naphthalene	0.1	U	0.1	0.5	ug/l	106		65-120		
Pentachloroethane	0.2	U	0.2	0.5	ug/l	110		75-126		
Propionitrile	2.0	U	2.0	10	ug/l	127		71-138		
n-Propylbenzene	0.1	U	0.1	0.5	ug/l	101		80-120		
Styrene	0.1	U	0.1	0.5	ug/l	109		80-120		
1,1,1,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	117		80-120		
1,1,2,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	118		80-125		
Tetrachloroethene	0.1	U	0.1	0.5	ug/l	106		80-120		
Tetrahydrofuran	2.0	U	2.0	5.0	ug/l	112		65-131		
Toluene	0.1	U	0.1	0.5	ug/l	101		80-120		
1,2,3-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	106		63-120		
1,2,4-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	103		70-120		
1,1,1-Trichloroethane	0.1	U	0.1	0.5	ug/l	106		80-120		
1,1,2-Trichloroethane	0.1	U	0.1	0.5	ug/l	115		80-120		
Trichloroethene	0.1	U	0.1	0.5	ug/l	110		80-120		
1,2,4-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	102		80-120		
1,3,5-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	100		80-120		
Vinyl Acetate	0.2	U	0.2	0.5	ug/l	96		45-132		
Vinyl Chloride	0.1	U	0.1	0.5	ug/l	116		65-127		
m+p-Xylene	0.1	U	0.1	0.5	ug/l	104		80-120		
o-Xylene	0.1	U	0.1	0.5	ug/l	103		80-120		
Batch number: 140130017A	Sample number(s): 7333520,7333522									
4-Amino-2,6-Dinitrotoluene	0.30	U	0.30	0.60	ug/l	110	111	97-156	0	30
2-Amino-4,6-Dinitrotoluene	0.20	U	0.20	0.60	ug/l	95	95	65-107	0	30
1,2-Dinitrobenzene	0.20	U	0.20	0.60	ug/l	114	114	90-118	0	30
1,3-Dinitrobenzene	0.20	U	0.20	0.60	ug/l	98	98	78-121	0	30
1,4-Dinitrobenzene	0.30	U	0.30	0.60	ug/l	95	95	81-108	0	30
2,4-Dinitrotoluene	0.72	U	0.72	2.0	ug/l	98	98	71-111	0	30
2,6-Dinitrotoluene	0.45	U	0.45	1.3	ug/l	95	95	84-157	0	30
HMX	0.65	U	0.65	2.0	ug/l	86	87	73-112	2	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1445301
Reported: 01/24/14 at 12:38 PM

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Nitrobenzene	0.20	U	0.20	0.60	ug/l	97	97	71-111	0	30
Nitroglycerin	5.2	U	5.2	15	ug/l	96	95	73-116	1	30
1-Nitronaphthalene	0.20	U	0.20	0.60	ug/l	103	104	69-125	0	30
2-Nitrotoluene	0.25	U	0.25	0.75	ug/l	90	91	74-115	1	30
3-Nitrotoluene	0.40	U	0.40	1.2	ug/l	95	96	76-115	1	30
4-Nitrotoluene	0.60	U	0.60	1.2	ug/l	91	92	76-120	1	30
PETN	6.0	U	6.0	18	ug/l	102	102	73-126	0	30
RDX	0.20	U	0.20	0.50	ug/l	94	95	70-117	1	30
Tetryl	0.40	U	0.40	0.60	ug/l	82	84	43-133	2	30
1,3,5-Trinitrobenzene	0.20	U	0.20	0.60	ug/l	95	96	72-119	0	30
2,4,6-Trinitrotoluene	0.20	U	0.20	0.60	ug/l	99	99	75-119	0	30
Batch number: 140140033A	Sample number(s): 7333520,7333522									
Picric Acid	50	U	50.	200	ug/l	98		70-130		
Batch number: 140210003A	Sample number(s): 7333520,7333522									
Perchlorate	0.20	U	0.20	1.0	ug/l	80		80-120		
Batch number: 140150017A	Sample number(s): 7333520,7333522									
Ethane	1.0	U	1.0	5.0	ug/l	97		80-120		
Ethene	1.0	U	1.0	5.0	ug/l	98		80-120		
Methane	3.0	U	3.0	5.0	ug/l	99		80-120		
Batch number: 140141848001	Sample number(s): 7333521,7333523									
Aluminum	0.0828	U	0.0828	0.200	mg/l	103		90-112		
Calcium	0.0797	J	0.0334	0.200	mg/l	103		90-112		
Iron	0.0430	U	0.0430	0.200	mg/l	103		90-112		
Magnesium	0.0251	J	0.0167	0.100	mg/l	102		89-110		
Manganese	0.00083	U	0.00083	0.0050	mg/l	103		90-110		
Potassium	0.0980	U	0.0980	0.500	mg/l	99		90-110		
Sodium	0.167	U	0.167	1.00	mg/l	98		87-114		
Batch number: 14011987601A	Sample number(s): 7333520,7333522									
Bromide	0.40	U	0.40	0.50	mg/l	94		90-110		
Chloride	0.20	U	0.20	0.40	mg/l	97		90-110		
Nitrate Nitrogen	0.050	U	0.050	0.10	mg/l	96		90-110		
Nitrite Nitrogen	0.080	U	0.080	0.10	mg/l	97		90-110		
Sulfate	0.30	U	0.30	1.0	mg/l	100		90-110		
Batch number: 14016049501A	Sample number(s): 7333520,7333522									
Total Organic Carbon	0.50	U	0.50	1.0	mg/l	108		91-113		
Batch number: 14015021201B	Sample number(s): 7333520,7333522									
Total Dissolved Solids	9.7	U	9.7	30.0	mg/l	101		80-120		
Batch number: 14023001101B	Sample number(s): 7333520,7333522									
Total Hardness	3.0	U	3.0	5.0	mg/l as CaCO3	101		96-110		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1445301
Reported: 01/24/14 at 12:38 PM

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: C140141AA	Sample number(s): 7333520,7333522,7333524 UNSPK: 7333522								
Acetone	126	115	57-163	10	30				
Acetonitrile	125	127	77-129	2	30				
Acrolein	110	106	29-149	3	30				
Acrylonitrile	119	117	56-161	2	30				
Allyl Chloride	90	94	56-160	5	30				
t-Amyl methyl ether	95	98	74-127	2	30				
Benzene	107	105	87-126	2	30				
Benzyl Chloride	110	115	62-125	4	30				
Bromobenzene	113	114	80-123	1	30				
Bromochloromethane	112	116	82-125	3	30				
Bromodichloromethane	120	120	82-133	0	30				
Bromoform	131	134	60-138	2	30				
Bromomethane	124	126	66-130	2	30				
n-Butanol	128	131	55-144	2	30				
2-Butanone	124	119	56-160	5	30				
t-Butyl Alcohol	123	116	55-154	6	30				
n-Butylbenzene	112	112	83-131	0	30				
sec-Butylbenzene	111	112	84-128	0	30				
tert-Butylbenzene	109	111	84-135	1	30				
Carbon Disulfide	107	104	84-141	3	30				
Carbon Tetrachloride	126	124	81-148	2	30				
2-Chloro-1,3-Butadiene	106	103	87-145	2	30				
Chlorobenzene	117	118	78-133	1	30				
Chloroethane	115	120	70-139	4	30				
Chloroform	118	116	86-136	2	30				
Chloromethane	120	124	49-135	3	30				
2-Chlorotoluene	111	113	75-134	2	30				
4-Chlorotoluene	112	113	76-134	0	30				
Cyclohexane	97	96	69-149	1	30				
Cyclohexanone	53	59	50-126	12	30				
1,2-Dibromo-3-chloropropane	154*	148*	43-143	4	30				
Dibromochloromethane	124	126*	79-125	2	30				
1,2-Dibromoethane	118	119	84-127	1	30				
Dibromomethane	120	119	83-126	1	30				
trans-1,4-Dichloro-2-butene	158	157	11-172	1	30				
1,2-Dichlorobenzene	118*	120*	83-117	2	30				
1,3-Dichlorobenzene	117	118	79-132	1	30				
1,4-Dichlorobenzene	118	118	79-120	0	30				
Dichlorodifluoromethane	133	136	28-136	2	30				
1,1-Dichloroethane	104	101	88-136	2	30				
1,2-Dichloroethane	-7 (2)	-54 (2)	82-135	1	30				
1,1-Dichloroethene	112	106	83-150	5	30				
cis-1,2-Dichloroethene	117	116	82-129	0	30				
trans-1,2-Dichloroethene	111	109	88-127	2	30				
1,2-Dichloropropane	111	112	91-126	1	30				
1,3-Dichloropropane	112	112	80-127	0	30				
2,2-Dichloropropane	102	102	80-134	1	30				
1,1-Dichloropropene	113	111	86-139	2	30				
cis-1,3-Dichloropropene	108	109	74-132	1	30				
trans-1,3-Dichloropropene	112	114	71-128	2	30				
Ethyl Methacrylate	102	105	73-134	2	30				
Ethyl t-butyl ether	89	90	61-131	1	30				
Ethylbenzene	112	112	80-140	0	30				
Freon 113	113	108	77-147	4	30				

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1445301
Reported: 01/24/14 at 12:38 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
n-Heptane	102	100	86-147	2	30				
Hexachlorobutadiene	113	116	65-128	2	30				
n-Hexane	96	94	82-149	2	30				
2-Hexanone	114	116	59-169	2	30				
Isobutyl Alcohol	138	133	65-146	4	30				
Isopropylbenzene	114	114	81-133	0	30				
p-Isopropyltoluene	108	108	84-124	1	30				
Methacrylonitrile	126	123	58-155	3	30				
Methyl Acetate	103	102	53-142	1	30				
Methyl Methacrylate	115	118	48-152	2	30				
Methyl Tertiary Butyl Ether	93	93	82-132	0	30				
4-Methyl-2-Pentanone	113	113	69-149	0	30				
Methylcyclohexane	103	109	74-140	6	30				
Methylene Chloride	109	105	77-135	4	30				
Naphthalene	109	112	70-131	3	30				
Pentachloroethane	115	118	68-145	2	30				
Propionitrile	142	132	63-147	7	30				
n-Propylbenzene	111	111	79-131	0	30				
Styrene	115	116	63-151	0	30				
1,1,1,2-Tetrachloroethane	125	126	87-126	1	30				
1,1,2,2-Tetrachloroethane	120	122	75-131	2	30				
Tetrachloroethene	118	116	75-129	1	30				
Tetrahydrofuran	138	118	56-154	12	30				
Toluene	110	110	83-127	0	30				
1,2,3-Trichlorobenzene	106	110	73-125	4	30				
1,2,4-Trichlorobenzene	107	109	77-120	2	30				
1,1,1-Trichloroethane	114	112	85-140	2	30				
1,1,2-Trichloroethane	119	121	85-129	1	30				
Trichloroethene	39 (2)	28 (2)	85-131	0	30				
1,2,4-Trimethylbenzene	109	110	87-126	1	30				
1,3,5-Trimethylbenzene	109	108	89-129	0	30				
Vinyl Acetate	96	90	45-136	5	30				
Vinyl Chloride	125	130	62-135	4	30				
m+p-Xylene	112	112	81-137	0	30				
o-Xylene	115	115	81-137	0	30				
Batch number: 140140033A	Sample number(s): 7333520,7333522 UNSPK: 7333520								
Picric Acid	92	90	70-130	2	30				
Batch number: 140210003A	Sample number(s): 7333520,7333522 UNSPK: 7333520								
Perchlorate	90	96	80-120	6	20				
Batch number: 140150017A	Sample number(s): 7333520,7333522 UNSPK: P335127								
Ethane	87	84	32-129	4	20				
Ethene	94	92	35-162	2	20				
Methane	37 (2)	29 (2)	35-157	1	20				
Batch number: 140141848001	Sample number(s): 7333521,7333523 UNSPK: P332198 BKG: P332198								
Aluminum	106	107	75-125	1	20	0.0884 J	0.0993 J	12 (1)	20
Calcium	77 (2)	63 (2)	75-125	1	20	64.6	62.9	3	20
Iron	100	100	75-125	1	20	0.0786 J	0.0707 J	11 (1)	20
Magnesium	72 (2)	61 (2)	75-125	1	20	29.7	28.9	3	20

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1445301
Reported: 01/24/14 at 12:38 PM

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Manganese	103	101	75-125	2	20	0.0037 J	0.0039 J	5 (1)	20
Potassium	100	100	77-128	0	20	2.36	2.31	2 (1)	20
Sodium	98	98	75-125	1	20	5.40	5.24	3	20
Batch number: 14011987601A	Sample number(s): 7333520,7333522 UNSPK: 7333520 BKG: 7333520								
Bromide	79*		90-110			110	110	0	20
Chloride	93		90-110			38.3	40.0	4	20
Nitrate Nitrogen	82*		90-110			0.25 U	0.25 U	0 (1)	20
Nitrite Nitrogen	86*		90-110			0.40 U	0.40 U	0 (1)	20
Sulfate	98		90-110			782	773	1	20
Batch number: 14016049501A	Sample number(s): 7333520,7333522 UNSPK: P334852 BKG: P334852								
Total Organic Carbon	107		63-142			2.8	2.9	4 (1)	4
Batch number: 14015021201B	Sample number(s): 7333520,7333522 UNSPK: P334385 BKG: P334382								
Total Dissolved Solids	96	99	51-144	1	23	868	860	1	5
Batch number: 14023001101B	Sample number(s): 7333520,7333522 UNSPK: P342088 BKG: P334052								
Total Hardness	98		67-120			236	235	0	5

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed
unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: GC/MS Volatiles
Batch number: C140141AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
7333520	105	104	97	96
7333522	106	99	96	98
7333524	109	108	96	97
Blank	108	106	97	97
LCS	106	104	98	100
MS	106	104	98	101
MSD	104	104	98	99
Limits:	77-114	74-113	77-110	78-110

Analysis Name: Nitroaromatics/Amines
Batch number: 140130017A

	2-Nitro-m-xylene
7333520	112
7333522	105
Blank	96
LCS	98
LCSD	98

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1445301
Reported: 01/24/14 at 12:38 PM

Surrogate Quality Control

Limits: 73-122

Analysis Name: Picric Acid
Batch number: 140140033A

	2-NMX
7333520	101
7333522	103
Blank	101
LCS	97
MS	100
MSD	102

Limits: 40-157

Analysis Name: Volatile Headspace Hydrocarbon
Batch number: 140150017A

	Propene
7333520	83
7333522	75
Blank	99
LCS	99
MS	87
MSD	81

Limits: 42-131

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

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Environmental Services Analysis Request/Chain of Custody

Acct. #: 12184 Group #: 1445301 Sample #: 7333520-24

COC#: 7673

Client: **Altamont Environmental**

Project Name/#:

Project Manager: Amy Huffman P.O. #: 2115.231

Sampler: P. Brooks

Phone #: 828 281 3350 Quote #: 207662

State where sample(s) were collected: NC

For Lab Use Only

SF#: 194843

SCR#: 148200

Preservation Codes: H = HCl, T = Thiosulfate, N = HNO_3, B = NaOH, S = H_2SO_4, P = H_3PO_4, O = Other

Sample Identification	Collection Date	Collection Time	Grab	Composite	Soil	Sediment	Potable	Ground Water	NPDES	Surface Water	Other:	Total # of Containers	GC/MS VOAs (8260)	Picric Acid (8015B)	Perchlorate (6850)	Nitroaromatics/Amines (8330)	Cl-, SO4-, NO2, NO3, Br- (300.0)	Dissolved Gases (8015)	Diss. Al, Ca, Fe, Mg, Mn, K, Na (6010)	TOC (SM20 5310 C)	Total Hardness (2340 C)	TDS (2540 C)			Remarks
													H			P		H	N		N				
~~P5-D~~ P5-D	1/10/14	1044	X					X				15	X	X	X	X	X	X	X	X	X	X			Please Filter Metal samples
P7-D	1/10/14	1312	X					X				15	X	X	X	X	X	X	X	X	X	X			
Trip Blank	1/10/14											2	X												

Turnaround Time Requested (TAT) (please check): Standard ☒ RUSH ☐

(RUSH TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: Standard

E-mail address to send RUSH results: ahuffman@altamontenvironmental.com

Data Package Options (please check if required)

Type I (Validation/non-CLP) ☐ MA MCP ☐ TX TRRP - 13 ☐

Type III (Reduced non-CLP) ☐ CT RCP ☐

Type IV (CLP SOW) ☐ ASP Type A ☐

Type VI (Raw Data Only) ☐ ASP Type B ☐

EDD Format:

If site-specific QC (MS/MSD/Dup) required, indicate QC samples and submit triplicate volume.

Relinquished by:	Date	Time	Received by:	Date	Time
S Delme	11/7/13	1350			
[signature]	1/10/14	1715			
			[signature]	1/11/14	0925

Airbill No.:

Relinquished by Commercial Carrier:

UPS ✓ FedEx ____ Other ____

Temperature upon receipt 0.9 °C

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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Data Qualifiers:

C – result confirmed by reanalysis.

J - estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers

A	TIC is a possible aldol-condensation product
B	Analyte was also detected in the blank
C	Pesticide result confirmed by GC/MS
D	Compound quantitated on a diluted sample
E	Concentration exceeds the calibration range of the instrument
N	Presumptive evidence of a compound (TICs only)
P	Concentration difference between primary and confirmation columns >25%
U	Compound was not detected
X,Y,Z	Defined in case narrative

Inorganic Qualifiers

B	Value is <CRDL, but ≥IDL
E	Estimated due to interference
M	Duplicate injection precision not met
N	Spike sample not within control limits
S	Method of standard additions (MSA) used for calculation
U	Compound was not detected
W	Post digestion spike out of control limits
*****	Duplicate analysis not within control limits
+	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

Hydrant Water Analytical Results

ANALYTICAL RESULTS

Prepared by:	Prepared for:
Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601	Altamont Environmental 231 Haywood Street Asheville NC 28801

December 12, 2013

Project: Chemtronics

Submittal Date: 12/04/2013
Group Number: 1438345
PO Number: 2115.231
State of Sample Origin: NC

Client Sample Description	Lancaster Labs (LL) #
Hydrant Water	7300878

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Altamont Environmental	Attn: Amy Huffman
ELECTRONIC COPY TO	Altamont Environmental	Attn: Marta VanDussen

Respectfully Submitted,

Nancy Jean Bornholm

Nancy Jean Bornholm
Principal Specialist

(717) 556-7250

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Analysis Report

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Sample Description: Hydrant Water
Chemtronics

LL Sample # WW 7300878
LL Group # 1438345
Account # 12184

Project Name: Chemtronics

Collected: 12/03/2013 12:30 by AH

Submitted: 12/04/2013 10:05
Reported: 12/12/2013 17:06

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 2340 C-1997**		**mg/l as CaCO3**	**mg/l as CaCO3**	**mg/l as CaCO3**	
12147	Total Hardness	471-34-1	32.3	3.0	5.0	1
	SM 2540 C-1997		**mg/l**	**mg/l**	**mg/l**	
00212	Total Dissolved Solids	n.a.	65.0	9.7	30.0	1
	SM 4500-H+ B-2000		**Std. Units**	**Std. Units**	**Std. Units**	
12152	pH	n.a.	10.2	0.010	0.010	1

The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
12147	Total Hardness	SM 2340 C-1997	1	13339001101A	12/05/2013 11:47	Susan A Engle	1
00212	Total Dissolved Solids	SM 2540 C-1997	1	13340021201A	12/06/2013 14:55	Carolyn M Mastropietro	1
12152	pH	SM 4500-H+ B-2000	1	13339003203A	12/05/2013 19:30	Michele L Graham	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1438345
Reported: 12/12/13 at 05:06 PM

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 13339001101A	Sample number(s): 7300878									
Total Hardness	3.0	U	3.0	5.0	mg/l as CaCO3	102		96-110		
Batch number: 13339003203A	Sample number(s): 7300878									
pH						100		90-110		
Batch number: 13340021201A	Sample number(s): 7300878									
Total Dissolved Solids	9.7	U	9.7	30.0	mg/l	97		80-120		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: 13339001101A	Sample number(s): 7300878 UNSPK: P301162 BKG: P301162								
Total Hardness	96		67-120			50.4	50.5	0	5
Batch number: 13339003203A	Sample number(s): 7300878 BKG: P299987								
pH						5.4	5.4	1	3
Batch number: 13340021201A	Sample number(s): 7300878 UNSPK: P296209 BKG: P292758								
Total Dissolved Solids	100		51-144			25,300	24,800	2	5

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

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Environmental Services Analysis Request/Chain of Custody

COC#: 7673

Acct. #: 12184 Group #: 1438345 Sample #: 7300878

Client:	Altamont Environmental
Project Name/#:	Chemtronics
Project Manager:	Amy Huffman
P.O. #:	2115.231
Sampler:	AHuffman
Phone #:	828-281-3350
Quote #:	207662
State where sample(s) were collected:	NC

For Lab Use Only
SF#: 194843
SCR#: 148200

Preservation Codes: H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; P = H_3PO_4; O = Other

Sample Identification	Collection Date	Collection Time	Grab	Composite	Soil	Sediment	Potable	Ground	Surface	NPDES	Water	Other:	Total # of Containers	GC/MS VOAs (8260)	Picric Acid (8015B)	Perchlorate (6850)	Nitroaromatics/Amines (8330)	Cl-, SO4-, NO2, NO3, Br- (300.0)	Dissolved Gases (8015)	Diss. Al, Ca, Fe, Mg, Mn, K, Na (6010)	TOC (SM20 5310 C)	Total Hardness (2340 C)	TDS (2540 C)	Pit	Remarks
														H			P		H	N		N			
Hydrant	12/3/13	1230									X		3									X	X	X	

Turnaround Time Requested (TAT) (please check): Standard ☑ RUSH ☐
(RUSH TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed: 2 weeks

E-mail address to send RUSH results:

Data Package Options (please check if required)

Type I (Validation/non-CLP) ☐ MA MCP ☐ TX TRRP - 13 ☐
Type III (Reduced non-CLP) ☐ CT RCP ☐
Type IV (CLP SOW) ☐ ASP Type A ☐
Type VI (Raw Data Only) ☐ ASP Type B ☐

EDD Format:

If site-specific QC (MS/MSD/Dup) required, indicate QC samples and submit triplicate volume.

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	12/3/13	1300			
			[signature]	12/4/13	1005

Airbill No.:
Relinquished by Commercial Carrier:
UPS ✓ FedEx _____ Other _____

Temperature upon receipt 3.0 °C

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Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than - The number following the sign is the limit of quantitation, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Data Qualifiers:

C – result confirmed by reanalysis.

J - estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers		Inorganic Qualifiers	
A	TIC is a possible aldol-condensation product	**B**	Value is <CRDL, but ≥IDL
B	Analyte was also detected in the blank	**E**	Estimated due to interference
C	Pesticide result confirmed by GC/MS	**M**	Duplicate injection precision not met
D	Compound quantitated on a diluted sample	**N**	Spike sample not within control limits
E	Concentration exceeds the calibration range of the instrument	**S**	Method of standard additions (MSA) used for calculation
N	Presumptive evidence of a compound (TICs only)	**U**	Compound was not detected
P	Concentration difference between primary and confirmation columns >25%	**W**	Post digestion spike out of control limits
U	Compound was not detected	*****	Duplicate analysis not within control limits
X,Y,Z	Defined in case narrative	**+**	Correlation coefficient for MSA <0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

ATTACHMENT B

SUMMARY OF TASKS PERFORMED DURING MARCH THROUGH MAY 2015, AS DESCRIBED IN THE WORK PLAN FOR ADDITIONAL GEOTECHNICAL BORINGS, MONITORING WELL INSTALLATION AND AQUIFER TESTING IN THE BACK VALLEY, FEBRUARY 2015

ALTAMONT ENVIRONMENTAL, INC.
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MEMORANDUM

To: Chemtronics, Inc.

Date: February 19, 2016

Subject: Summary of Tasks Performed during March through May 2015, as Described in the Work Plan for Additional Geotechnical Borings, Monitoring Well Installation and Aquifer Testing in the Back Valley, February 2015

The February 25, 2015, *Work Plan for Additional Geotechnical Borings, Monitoring Well Installation, and Aquifer Testing in the Back Valley* (Work Plan), approved by the United States Environmental Protection Agency (USEPA), was performed in between March and May 2015. The goal of the work described in the Work Plan was to further characterize the sub-surface geologic conditions in the vicinity of the Acid Pits and DA 9 by collecting additional information on: depth to competent bedrock, fracture distribution in the upper bedrock, potentiometric data for Zone CD; and, collect additional hydraulic and chemical data to assess horizontal and vertical groundwater flow. These goals were accomplished through completion of the following tasks:

1. Drilling four geotechnical borings and completing them as Zone CD monitoring wells.
2. Aquifer testing using pneumatic slug tests, specific capacity tests, step drawdown tests.
3. Stream evaluation involving discharge measurements.
4. Groundwater and surface water sample collection and analysis.

Methods and results are summarized below and discussed in more detail in the *Back Valley Aquifer Testing Report* (Geosyntec, 2015)

Monitoring Well Installation

South Atlantic Environmental Drilling and Construction Company (SAEDACCO) from Charlotte, North Carolina, a North Carolina-licensed well driller, installed four Zone CD monitoring wells between March 23 and April 8, 2015, under contract to Altamont Environmental, Inc. The monitoring wells were constructed in accordance with the North Carolina Administrative Code Title 15A Subchapter 2C Well Construction Standards. The top of the well casing for each monitoring well was surveyed to the Site datum and coordinate system by Ed Holmes and Associates Land Surveyors, PA, a North Carolina-licensed surveyor. The surveyed well locations are shown on Figure 1, and coordinates for each well are provided on the boring logs (Attachment A) and in the well construction diagrams (Attachment B).

Drilling was performed in accordance with the methods described in the Work Plan. No deviations regarding drilling methods, decontamination procedures, management and disposal of

investigation-derived wastes, well installation, or development of the four Zone CD monitoring wells occurred; however, one proposed 4-inch diameter pumping well (MW282-K23CD) was completed as a 2-inch diameter monitoring well, and one proposed 2-inch diameter monitoring well (MW284-K25CD) was completed as a 4-inch well. These deviations from the Work Plan were made based on drilling observations during the advancement of the MW282-K23CD borehole that indicated this location had a very slow recharge rate which would cause the well to be unsuitable for use as a pumping well and well MW284-K25CD was deemed more appropriate as a pumping well.

Boring logs are provided in Attachment A. Well construction diagrams are provided in Attachment B.

Aquifer Testing

The Work Plan indicated that pneumatic slug tests, specific capacity tests, and a step-drawdown test with an associated aquifer pumping and recovery test would be performed. Due to low recharge rates observed in the new monitoring wells, a deviation was made from the aquifer testing program outlined in the Work Plan. The Work Plan called for the slug testing of 12 Zone CD wells and specific capacity testing in monitoring wells MW283-K25CD and MW284-K25CD (Figure 1). Due to the low recharge rates observed while drilling, slug testing was performed in 23 Back Valley Zone CD wells and the step drawdown test and aquifer pumping test specified in the Work Plan were not performed. The results of the various aquifer tests are discussed in the *Back Valley Aquifer Testing Report* (Geosyntec, 2015).

Stream Evaluation

Stream discharge measurements were obtained on April 24, 2015, during base flow conditions (e.g. after five consecutive days of no precipitation). Measurements were obtained at three locations on each branch to the east and west of the Acid Pits (Figure 2). At each location, the stream channel was measured for width and depth. Due to shallow stream conditions, the Price pygmy meter (specified in the Work Plan) could not be used. Instead, an alternative flow meter (FLOWATCH magnetic transmission rotary meter) was used. This meter measures stream flow in meters per second (m/s) with a precision of 0.1 m/s. All flow measurements were converted to feet per second (ft/sec). Discharge (cubic feet per second [cfs]) was calculated using the relationship Q=VA where Q is the discharge, V is the velocity in ft/sec, and A is the cross-sectional area of the stream channel in square feet (sf). Three velocity measurements were obtained for each stream location. The following provides the average measurements of channel area and velocity, and the calculated discharge for each stream location.

- East Branch
  - Upstream
    - Area 2.83ft X 0.18ft = 0.51 sf
    - Velocity = 0.3 ft/sec
    - Q = 0.15 cfs
  - Midstream
    - Area 3.4ft X 0.09ft = 0.31 sf
    - Velocity = 0.35 ft/sec
    - Q = 0.11 cfs
  - Downstream
    - Area 4.0ft X 0.19ft = 0.77 sf
    - Velocity = 0.3 ft/sec
    - Q = 0.23 cfs
- West Branch
  - Upstream
    - Area 2.25ft X 0.08ft = 0.18 sf
    - Velocity = 0.2 ft/sec
    - Q = 0.04 cfs
  - Midstream
    - Area 1.5ft X 0.10ft = 0.15 sf
    - Velocity = 0.3 ft/sec
    - Q = 0.05 cfs
  - Downstream
    - Area 3.25ft X 0.13ft = 0.42 sf
    - Velocity = 0.3 ft/sec
    - Q = 0.13 cfs

Groundwater and Surface Water Analytical Results

The developed groundwater monitoring wells were sampled on May 5 and 6, 2015, and four surface water samples were collected on May 5, 2015 (sampling forms and analytical results are provided in Attachments C and D). In accordance with the Work Plan, the groundwater samples were analyzed for volatile organic compounds, nitroaromatics, perchlorate, dissolved hydrogen gases, anions, cations, dissolved iron and manganese, alkalinity, biological oxygen demand, and total organic carbon. The surface water samples were analyzed for volatile organic compounds, nitroaromatics, perchlorate, anions, and alkalinity. The analytical results and sample collection forms are attached. Field data recorded on the sample collection forms include measurements of pH, conductivity, dissolved oxygen, oxidation reduction potential, turbidity, and temperature for each sample location. Table 1 provides a summary of the reported analytical results that showed detectable concentrations. Figures 1 and 2 show the sample collection locations for groundwater and surface water, respectively.

Attachments

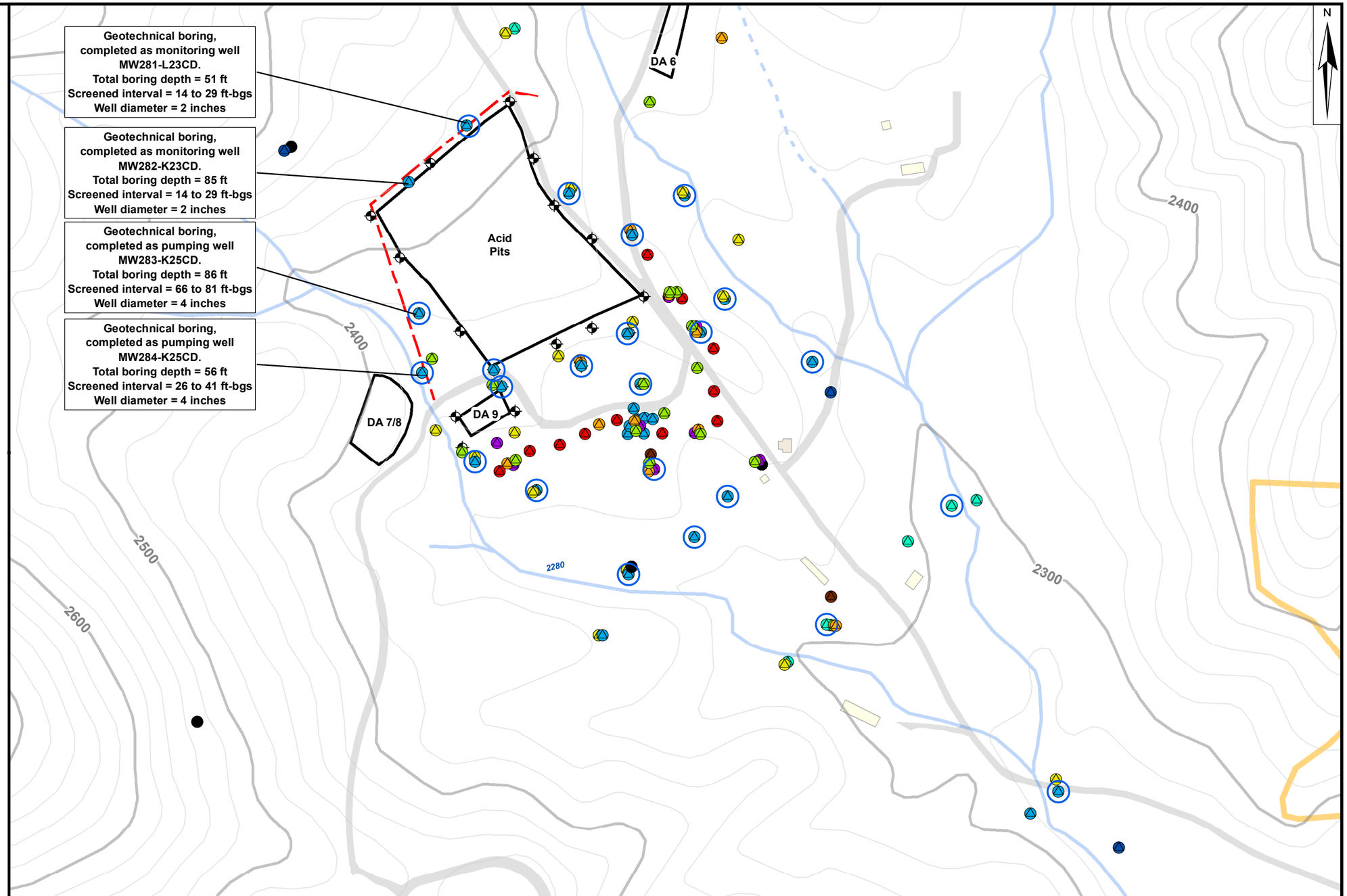
Figure 1–Monitoring Well Locations Spring 2015
Figure 2–Surface Water Discharge Monitoring and Sample Locations
Table 1–Summary of Detected Constituents from Sample Collected in Accordance with the Work Plan for Additional Geotechnical Borings, Monitoring Well Installation and Aquifer Testing in the Back Valley
Attachment A–Boring Logs
Attachment B–Well Construction Logs
Attachment C–Groundwater and Surface Water Sampling Forms
Attachment D–Groundwater and Surface Water Analytical Results.

ATTACHMENTS

FIGURES

Legend

- Pneumatic Slug Test Location
- Zone A Monitoring Well
- Zone AB Monitoring Well
- Zone B Monitoring Well
- Zone C Monitoring Well
- Zone CD Monitoring Well
- Zone D Monitoring Well
- Zone E Monitoring Well
- Zone EF Monitoring Well
- Zone F Monitoring Well
- Extraction Well
- Geotechnical Boring
- Possible Alignment of Groundwater Diversion Barrier
- Disposal Area (DA)
- Chemtronics Property Boundary
- Former Building Location
- Treatment Building
- Road or Parking Area
- Topographic Contour (100-foot Interval)
- Topographic Contour (20-foot Interval)
- Stream (Dashed Where Intermittent)



Notes

1. bgs = below ground surface.
2. Topographic contours from Lidar data from the NC Flood Plain Mapping Project (2007) and distributed by the NCDOT.

References

1. Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet.

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Project Manager: Stu Ryman
Client: Chemtronics, Inc.
Date: 08/21/2015

Scale: 0 100 200 300 Feet

Monitoring Well Locations Spring 2015

Chemtronics Site
Swannanoa, North Carolina

Figure 1

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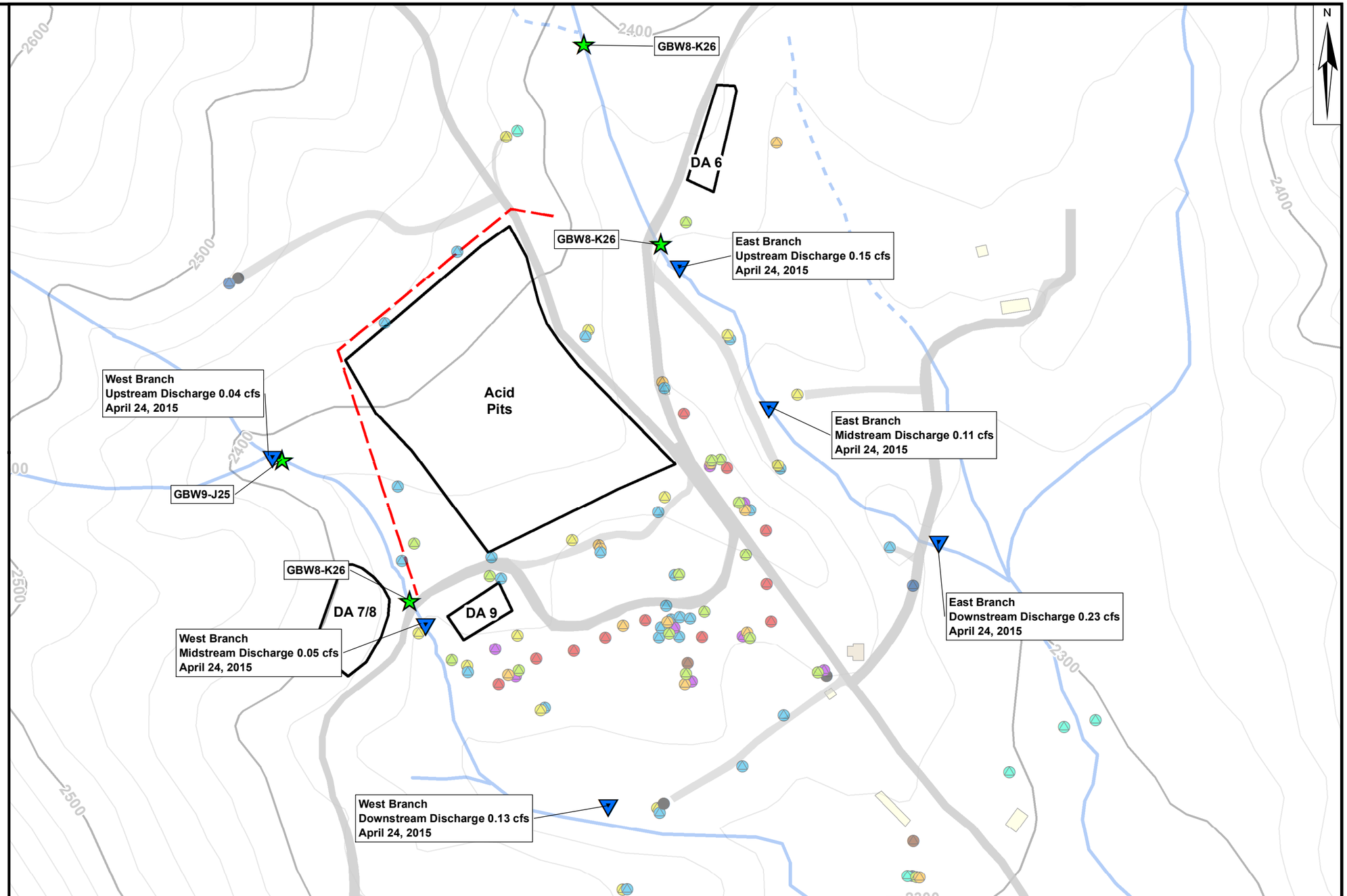
Document Path: P:\Chemtronics - GIS\Projects\Western APA Assessment\MXD\Figure 1 Monitoring Well Locations Spring 2015.mxd

LEGEND

- Stream Sample Location
- Flow Measurement Location
- Zone A Monitoring Well
- Zone AB Monitoring Well
- Zone B Monitoring Well
- Zone C Monitoring Well
- Zone CD Monitoring Well
- Zone D Monitoring Well
- Zone E Monitoring Well
- Zone EF Monitoring Well
- Zone F Monitoring Well
- Extraction Well
- Possible Alignment of Groundwater Diversion Barrier
- Road
- Disposal Area (DA)
- Chemtronics Property Boundary
- Former Building Location
- Treatment Building
- Road or Parking Area
- Stream (Dashed Where Intermittent)
- Topographic Contour (20-Foot Interval)
- Topographic Contour (100-Foot Interval)



NOTES

1. bgs = below ground surface.
2. Topographic contours from Lidar data from the NC Flood Plain Mapping Project (2007) and distributed by the NCDOT.

REFERENCES

1. Coordinate System: NAD 1983 StatePlane North Carolina FIPS 3200 Feet.

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Drawn By: Chuck Pippin
Project Manager: Stu Ryman
Client: Chemtronics, Inc.
Date: 08/21/2015

Scale
0 100 200 300 Feet

SURFACE WATER DISCHARGE MONITORING AND SAMPLE LOCATIONS

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE
2

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DOCUMENT PATH: P:\CHEMTRONICS - GIS\PROJECTS\WESTERN APA ASSESSMENT\MXD\FIG-2 SURFACE WATER DISCHARGE MONITORING AND SAMPLE LOCATIONS.MXD

TABLES

Table 1
Summary of Detected Constituents from Samples Collected in Accordance
with the Work Plan for Additonal Geotechical Borings, Monitoring Well Installation and Aquifer Testing in the Back Valley

Chemtronics Site,
Swannanoa, North Carolina

Fraction	Analyte	Units	Groundwater Standard	Groundwater				Surface Water			
				MW281-L23CD May 6, 2015	**MW282-K23CD** May 6, 2015	**MW283-K25CD** May 5, 2015	**MW284-K25CD** May 5, 2015	**GBW9-J25** May 5, 2015	**GBW8-K26** May 5, 2015	**GBW7-M21** May 5, 2015	**GBW4-N23** May 5, 2015
Conventionals	**Alkalinity, Bicarbonate**	mg/L	NE	**125**	0.7U	**83.7**	**54.3**	**17.9**	**17.4**	**22.3**	**24.2**
	Alkalinity, Total	mg/L	NE	**125**	**807**	**83.7**	**54.3**	**17.9**	**17.4**	**22.3**	**24.2**
	Biochemical Oxygen Demand	mg/L	NE	5.1U	**7.9**	3.9U	3.8U	NA	NA	NA	NA
	Chloride	mg/L	250	**3.1**	**8.1**	**2.6**	**3.2**	**3.0**	**2.6**	**2.5**	**2.1**
	Nitrate	mg/L	10	**0.74**	0.25U	**0.41J**	0.25U	0.25U	0.25U	0.25U	0.25U
	Sulfate	mg/L	250	**7.8**	**3.7J**	**22.6**	**8.8**	**3.0J**	**2.9J**	**4.3J**	**4.2J**
	Total Organic Carbon (TOC)	mg/L	NE	**0.96J**	**5.5**	0.5U	0.5U	NA	NA	NA	NA
Metals	**Calcium**	mg/L	NE	**42.6**	**345**	**7.07**	**13.1**	**2.71**	**2.81**	**3.66**	**3.87**
	Iron	mg/L	0.3	0.0334U	0.0334U	0.0334U	**2.76**	NA	NA	NA	NA
	Magnesium	mg/L	NE	**4.38**	**6.23**	**3.2**	**3.42**	**1.76**	**1.84**	**2.05**	**2.08**
	Manganese	mg/L	0.05	**0.151**	0.00083U	**0.113**	**0.187**	NA	NA	NA	NA
	Potassium	mg/L	NE	**4.18**	**20.8**	**20.6**	**3.99**	**0.992**	**1.11**	**1.08**	**1.13**
	Sodium	mg/L	NE	**3.51**	**26.2**	**28.6**	**7.63**	**3.62**	**3.80**	**4.32**	**4.39**
Pesticides/PCBs	**Perchlorate**	ug/L	2	0.2U	**0.88J**	0.2U	0.2U	0.20U	0.20U	**0.34J**	**0.32J**
Volatiles	**1,2-Dichloroethane**	ug/L	0.4	0.1U	0.5U	**0.4J**	**0.2J**	0.1U	0.1U	0.1U	0.1U
	Acetone	ug/L	6000	3U	**39**	3U	3U	3.0U	3.0U	3.0U	3.0U
	Chloroform	ug/L	70	**1.0**	**3.6**	**0.2J**	0.1U	0.1U	0.1U	0.1U	0.1U
	Cyclohexane	ug/L	NE	**5.6**	0.5U	0.1U	**0.1J**	**0.8**	0.1U	**0.1J**	0.1U
	Ethylbenzene	ug/L	600	0.1U	**0.7J**	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
	m,p-Xylenes	ug/L	500	0.1U	**0.9J**	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U
	Methane	ug/L	NE	**4.7J**	3U	3U	3U	NA	NA	NA	NA

Notes:
1. mg/L - miligrams per liter
2. ug/L - micrograms per liter
3. U is the qualifier that indicates that the analyte was analyzed for, but was not detected at a level greater than or equal to the level of the sample quantitation limit (SQL) for sample and method.
4. J is the qualifier that indicates that the analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain quality control criteria were not met, or the concentration of the analyte being below the SQL).
5. NE means not established.
6. NA means not analyzed.

ATTACHMENT A
Boring Logs

WELL NUMBER MW281-L23CD

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics
PROJECT NAME (NUMBER) Chemtronics - Task 2115 (2115.231)
NORTHING, EASTING 703973.7, 979393.27
PROJECT LOCATION Chemtronics, Swannanoa, North Carolina
DATE STARTED 3/26/2015 **COMPLETED** 4/1/2015
GROUND ELEVATION 2412.5 ft **HOLE SIZE** 4.75"/8"
DRILLING CONTRACTOR SEADACCO
GROUND WATER LEVELS:
DRILLING METHOD HW Casing/Coring then Overream with Air Hammer
AT TIME OF DRILLING NM
LOGGED BY Megan Stamey **CHECKED BY** Chuck Pippin
AT END OF DRILLING 20.1 ft / Elev 2392.4 ft
NOTES Well construction overseen by M. Stamey
AFTER DRILLING 20.9 ft / Elev 2391.6 ft

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	PID (ppm)	TESTS AND REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○
0	CSG			Boring advanced using HW tools to target depth. Boring backfilled to desired well depth with grout. Over-reamed with 6-inch air hammer to desired well depth.	SP			Unconsolidated material. HW casing advanced using mud rotary to top of resistant materials. No lithological description.	Grout 2-inch Diameter PVC Riser	20 40 60 80
5										
10	RC CR1	100 (5)	0.1	At 9 feet hard drilling. Advance first core run through rock lens.	SP			2 to 3 inches of biotite garnet schist followed by unconsolidated fine SAND with silt and minor clay.	Bentonite	
								14.0 2398.5		
15	RC CR2	100 (35)	0.1	Extended HW casing to 18 feet to prevent circulation loss.	PWR			Highly weathered biotite garnet schist with manganese oxide stains throughout returned core, becoming less weathered in the last 3.5 inches of returns.		
								19.0 2393.5		
20	RC CR3	100 (98)	0.0		ROC	▼		24 inches of schistose metagraywacke (biotite garnet schist) followed by 12 inches of weakly foliated metagraywacke, then returns to schistose metagraywacke.	Filter Sand 2-inch Diameter PVC 0.01-inch-Slotted Screen	
25	RC CR4	100 (100)	0.0		ROC			Dark gray, medium grained schistose metagraywacke. Noted Fractures 24.25 - Fracture with orange iron staining 25.25 - Fracture with brown oxide stains		
30	RC CR5	98 (98)	0.0		ROC			-same as above, becoming finer grained at 31 ft Noted Fractures 31 to 31.5 - Two normal to foliation fractures with no aperture.		
35	RC CR6	100 (100)			ROC			- coarser grained		

(Continued Next Page)

WELL NUMBER MW281-L23CD

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics
PROJECT NAME (NUMBER) Chemtronics - Task 2115 (2115.231)
NORTHING, EASTING 703973.7, 979393.27
PROJECT LOCATION Chemtronics, Swannanoa, North Carolina

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	PID (ppm)	TESTS AND REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
35										
					ROC			- coarser grained *(continued)*		
								- same as above		
	RC CR7	97 (97)			ROC					
40									Backfilled w/ Grout	
								-same as above		
	RC CR8	97 (97)	0.0		ROC			Noted Fractures Two normal to foliation fractures with unaltered pyrite on fracture face		
45										
				Rock core advanced to target elevation to assess subsurface for geotechnical purposes. Boring backfilled with grout and completed as a CD Zone monitoring well.				- same as above		
					ROC			Noted Fractures		
	RC CR9	100 (100)					48.0	47.5 - Fracture at 30 degree dip with pyrite and manganese oxide stains	2364.5	
50					ROC			48 to 51 - Fine to coarse grained, non-foliated, felsic rock (leucosome).		
							51.0	Noted Fractures 48 - Subvertical fracture with pyrite and manganese oxide stains. 49 - Fracture with 45 degree dip with green staining on surface (chlorite?)	2361.5	

Boring terminated at 51.0 feet.

WELL NUMBER MW282-K23CD

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics
PROJECT NAME (NUMBER) Chemtronics - Task 2115 (2115.231)
NORTHING, EASTING 703842.06, 979243.32
PROJECT LOCATION Chemtronics, Swannanoa, North Carolina
DATE STARTED 3/23/2015 **COMPLETED** 4/1/2015
GROUND ELEVATION 2416.3 ft **HOLE SIZE** 4.75"/8"
DRILLING CONTRACTOR SEADACCO
GROUND WATER LEVELS:
DRILLING METHOD HW Casing/Coring then Overream with Air Hammer
AT TIME OF DRILLING 23.7 ft / Elev 2392.6 ft
LOGGED BY Chuck Pippin **CHECKED BY** Stu Ryman
AT END OF DRILLING 31.0 ft / Elev 2385.3 ft
NOTES Well construction overseen by M. Stamey
AFTER DRILLING 23.2 ft / Elev 2393.1 ft

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	PID (ppm)	TESTS AND REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○
0								Unconsolidated material. HW casing advanced using mud rotary to top of resistant materials. No lithological description.		20 40 60 80
5	CSG			Boring advanced using HW tools to target depth. Boring backfilled to desired well depth with grout. Overreamed with 6-inch air hammer to desired well depth.	PWR				Grout 2-inch Diameter PVC Riser	
10	RC CR1	50 (31)	0.0	At 8 feet hard drilling. Advance first core run.	PWR			4 inches of fine grained biotite garnet schist, then 2 inches of white felsic rock (feldspar and quartz) followed by coarser grained felsic rock interlayered with biotite garnet schist with much larger garnets then grading into fine grained biotite garnet schist for 6 inches then followed by 3 inches of more biotite rich garnet schist 11.0 / 2405.3	Bentonite	
15	RC CR2	40 (20)	0.0		ROC			Noted Fractures 1 subvertical 2 foliation parallel with ~45 degree dip Medium grained biotite garnet schist		
20	RC CR3	75 (67)		Circulation loss, added bentonite to mud mix.	ROC			16 to 17 inches of weathered biotite garnet schist 17 to 18 - Becoming less weathered and banded, felsic banding at <0.4 inches to 1.1 inches thick, angle of foliation steepens 18 to 20 - Biotite garnet gneiss (schistose metagraywacke) 20.0 / 2396.3		
25	RC CR4	92 (88)	0.0		ROC			Noted Fractures 16 to 16.5 - Four sub-horizontal fractures that cut foliation. Spacing is 1/2 inch. 17 - Sub-vertical fracture, tight 17.5 - Foliation parallel fracture with iron staining 24.0 / 2392.3	Filter Sand 2-inch Diameter PVC 0.01-inch-Slotted Screen	
30	RC CR5	100 (100)	0.0		ROC			20 to 22.5 - Weekly foliated, equigranular, garnet bearing metagraywacke then becomes more foliated with felsic banding transitioning to coarse grained felsic luecosome 22.5 to 24 - Schistose metagraywacke (biotite garnet schist) then transitions to metagraywacke for last 9 inches of core return. 27.0 / 2389.3		
35	RC CR6	100 (100)	0.0		ROC			24-25 - Fine grained metagraywacke 25-27 - Schistose metagraywacke (very garnet and biotite rich) 27-29 - Fine grained weakly foliated metagraywacke with lesser garnet and biotite. Foliation about 30 to 45 degree dip. 29 to 32 - Medium grained, foliated biotite garnet schist with greater abundance of garnet.		
	RC CR7	100 (100)	0.0		ROC					

(Continued Next Page)

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics
PROJECT NAME (NUMBER) Chemtronics - Task 2115 (2115.231)
NORTHING, EASTING 703842.06, 979243.32
PROJECT LOCATION Chemtronics, Swannanoa, North Carolina

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	PID (ppm)	TESTS AND REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○ 20 40 60 80
35					ROC			32 to 33 - Transition to fine grained, weakly foliated metagraywacke, with foliations dipping 60 to 70 degrees 37.0 33 to 37 - Fine grained, weakly foliated metagraywacke *(continued)* 2379.3		
40	RC CR8	100 (100)	0.0	Minor loss of circulation.	ROC			37 to 38.7 - same as above but with increasing mafic minerals with depth 38.7 to 40 - Well foliated mafic zone with foliations dipping 60 to 70 degrees 40 to 42 - Light gray, fine grained, biotite garnet schist with greenish gray banding		
45	RC CR9	100 (100)	0.0		ROC			42 to 46 - Medium grained gray to dark gray biotite garnet schist with felsic banding		
50	RC CR10	95 (95)	0.0	Loss of circulation.	ROC			46 to 48.5 - Dark gray, medium grained, schistose metagraywacke, with greater biotite and garnet 48.5 to 51 - Greenish gray to dark gray, finer grained schistose metagraywacke		
55	RC CR11	100 (100)	0.0	Loss of circulation (~300 gallons).	ROC			- same as above		
	RC CR12	100 (100)	0.0		ROC			Dark gray fine grained, weakly foliated schistose metagraywacke		
60	RC CR13	100 (100)			ROC			- same as above Noted Fracture 59.5 - Fracture normal to foliation with pyrite on fracture plane.	Backfilled w/ Grout	
65	RC CR14	100 (100)	0.0		ROC			- same as above, coarse grained		
70	RC CR15	100 (100)	0.0		ROC			66 to 68 - Schistose metagraywacke with minor quartz banding. 68 to 69 - Partial melt zone 69 to 71 - Schistose metagraywacke with minor quartz banding		
75	RC CR16	100 (100)	0.0		ROC			- same as above		

(Continued Next Page)

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics
PROJECT NAME (NUMBER) Chemtronics - Task 2115 (2115.231)
NORTHING, EASTING 703842.06, 979243.32
PROJECT LOCATION Chemtronics, Swannanoa, North Carolina

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	PID (ppm)	TESTS AND REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○ 20 40 60 80
75										
	RC CR17	100 (100)	0.0	Rock core advanced to target elevation to assess subsurface for geotechnical purposes. Boring backfilled with grout and completed as a CD Zone monitoring well.	ROC			- same as above *(continued)* 76 to 77 - Same as above but coarser grained 77 to 80 - Coarse grained luecosome (felsic rock composed of quartz and feldspar) interlayered with biotite garnet schist		
80										
	RC CR18	100 (100)			ROC			- same as above		
								84.5 2331.8		

Boring terminated at 84.5 feet.

WELL NUMBER MW283-K25CD

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics
PROJECT NAME (NUMBER) Chemtronics - Task 2115 (2115.231)
NORTHING, EASTING 703517.26, 979272.63
PROJECT LOCATION Chemtronics, Swannanoa, North Carolina
DATE STARTED 4/1/2015 **COMPLETED** 4/7/2015
GROUND ELEVATION 2379.7 ft **HOLE SIZE** 4.75"/8"
DRILLING CONTRACTOR SEADACCO
GROUND WATER LEVELS:
DRILLING METHOD HW Casing/Coring then Overream with Air Hammer
AT TIME OF DRILLING 24.4 ft / Elev 2355.3 ft
LOGGED BY R. Hastings / M. Stamey **CHECKED BY** Chuck Pippin
AT END OF DRILLING 19.1 ft / Elev 2360.6 ft
NOTES Well construction overseen by S. Ryman
AFTER DRILLING 17.0 ft / Elev 2362.7 ft

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	PID (ppm)	TESTS AND REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○ 20 40 60 80
0										
				Boring advanced using HW tools to target depth. Boring backfilled to desired well depth with grout. Overreamed with 8-inch air hammer to desired well depth.	SP			Fine grained, reddish brown SILT and fine SAND with minor clay		
5	AU									
					SP			- same as above		
10								Unconsolidated material. HW casing advanced using mud rotary to top of resistant materials. No lithological description.		
15										
			0.02							
20										
					SP					
			0.0							
25										
30				Due to mud rotary fluid daylighting, HW casing withdrawn from boring to advance 8 1/4-inch HSA to 10 feet.					Grout	
									4-inch Diameter PVC Riser	
35	CSG									

1KH 2015-APA DRILLING.GPJ 15/11/11

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ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics
PROJECT NAME (NUMBER) Chemtronics - Task 2115 (2115.231)
NORTHING, EASTING 703517.26, 979272.63
PROJECT LOCATION Chemtronics, Swannanoa, North Carolina

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	PID (ppm)	TESTS AND REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
35			0.0	HSA used to stop drilling fluid from daylighting. Continued HW casing to 59 feet.				Unconsolidated material. HW casing advanced using mud rotary to top of resistant materials. No lithological description. *(continued)*		
40										
45					SP					
50										
55			0.0							
								58.0 — 2321.7		
					PWR			Advancing HW casing becomes harder likely due to transition from unconsolidated soil to partially weathered rock		
60	RC CR1	0 (0)			PWR			Very weathered rock. Coarse grained with garnets, feldspar and mica present	Bentonite	
65	RC CR2	0 (0)			PWR			No recovery		
70	RC CR3	0 (0)			PWR			No recovery		
								72.0 — 2307.7	Filter Sand	
75	RC CR4	48 (20)			ROC					

1KH 2015-APA DRILLING.GPJ 15/11/11

(Continued Next Page)

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics
PROJECT NAME (NUMBER) Chemtronics - Task 2115 (2115.231)
NORTHING, EASTING 703517.26, 979272.63
PROJECT LOCATION Chemtronics, Swannanoa, North Carolina

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	PID (ppm)	TESTS AND REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○
75										20 40 60 80
					ROC			72 - Highly weathered rock 75 to 77 - Unweathered rock with no fractures Noted Fractures 72 - 4 to 5 fractures 74 - Low angle fracture intersected by sub-vertical fracture *(continued)*	4-inch Diameter PVC 0.02-inch Slotted Vee-wlre Screen	
80	RC CR5	88 (88)			ROC			Competent rock Noted Fracture 80.5 - Foliation parallel fracture	Sand	
	RC CR6	100 (100)		Rock core advanced to target elevation to assess subsurface for geotechnical purposes. Boring backfilled with grout and completed as a CD Zone monitoring well.	ROC			Unfractured competent rock	Backfilled w/ Bentonite	
85								86.0 2293.7		

Boring terminated at 86.0 feet.

WELL NUMBER MW284-K25CD

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics
PROJECT NAME (NUMBER) Chemtronics - Task 2115 (2115.231)
NORTHING, EASTING 703371.83, 979280.32
PROJECT LOCATION Chemtronics, Swannanoa, North Carolina
DATE STARTED 4/8/2015 **COMPLETED** 4/10/2015
GROUND ELEVATION 2364.6 ft **HOLE SIZE** 4.75"/8"
DRILLING CONTRACTOR SEADACCO
GROUND WATER LEVELS:
DRILLING METHOD HW Casing/Coring then Overream with Air Hammer
AT TIME OF DRILLING NM
LOGGED BY Chuck Pippin **CHECKED BY** Stu Ryman
AT END OF DRILLING NM
NOTES Well construction overseen by C. Pippin
AFTER DRILLING 7.8 ft / Elev 2356.8 ft

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	PID (ppm)	TESTS AND REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○
0	AU			Boring advanced using HW tools and roller cone bit to target depth. Boring backfilled to desired well depth with grout. Overreamed with 8-inch air hammer to desired well depth. Loss circulation, added bentonite to mud mix. HW casing could not be advanced past rock lens. Switch to roller cone bit. Avanced roller cone bit to top of rock.	SP			Orange brown SAND with silt.		
5	CSG									
9.0										
10	RC CR1	10 (0)			ROCK			HW casing refusal at 9 feet. Core returns included 6 inches of broken rock fragments then 6 inch section of quartz (2 inches) and biotite garnet schist (4 inches)	Grout; 4-inch Diameter Riser	○
14.0										
15					SP			Gray fine SAND		
17.0										
20								Gray fine SAND, harder drilling with roller cone bit, likely partially weathered rock.	Bentonite	
25	CSG				PWR					
30										
32.0										
35					PWR			Same as above, but browner in color, drilling becoming harder.	Filter Sand	

(Continued Next Page)

WELL NUMBER MW284-K25CD

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY

CLIENT Chemtronics
PROJECT NAME (NUMBER) Chemtronics - Task 2115 (2115.231)
NORTHING, EASTING 703371.83, 979280.32
PROJECT LOCATION Chemtronics, Swannanoa, North Carolina

DEPTH (ft)	SAMPLE TYPE	RECOVERY % (RQD)	PID (ppm)	TESTS AND REMARKS	U.S.C.S.	Groundwater Level	GRAPHIC LOG	MATERIAL DESCRIPTION Note: Material descriptions, including USCS classification, based on field observation. Laboratory tests provide further clarification.	WELL DIAGRAM	SPT N VALUE ● RQD (%) ○ (20 40 60 80)
35					PWR			Same as above, but browner in color, drilling becoming harder. *(continued)*	4-inch Diameter PVC 0.02-inch Slotted Vee-Wire Screen	
								37.5 — 2327.1		
40	RC CR2	98 (92)	0.0		ROC			37.5 to 39 - Biotite garnet schist for 5 inches followed by 18 inches of weakly foliated felsic rock. 39 to 42.5 - Biotite garnet schist Noted Fractures 37.5 - Foliation parallel fracture and normal to foliation fracture 38.5 - Horizontal fracture with iron staining 39 - Sub-horizontal fracture with brown oxide staining		
								42.5 — 2322.1		
45	RC CR3	100 (100)			ROC			42 to 45 - Medium grained biotite garnet schist with foliations dipping about 50 degrees 45 to 46 - Weakly foliated felsic rock		
								46.5 — 2318.1		
50	RC CR4	100 (100)			ROC			46.5 to 47 - same as above 47 to 51 - Biotite garnet schist 51 to 51.5 - Weakly foliated, fine to medium grained felsic rock Pyrite present as assessory mineral observed on mechanical breaks	Backfilled w/ Grout	
								51.5 — 2313.1		
55	RC CR5	100 (100)		Rock core advanced to target elevation to assess subsurface for geotechnical purposes. Boring backfilled with grout and completed as a CD Zone monitoring well.	ROC			Noted Fracture 47 - Fracture with iron oxide stains 51.5 to 54 - same as above 54 to 56 - Biotite garnet schist with medium grained bands of felsic rocks		
								56.0 — 2308.6		
								Noted Fracture 53.5 - Cross cutting fracture normal to foliation dipping about 65 to 75 degrees. Boring terminated at 56.0 feet.		

ATTACHMENT B
Well Construction Logs

MONITORING WELL CONSTRUCTION DATA

DATE INSTALLED: 4/1/2015	CLIENT: Chemtronics, Inc.	PROJECT NO: 2115.231

WELL/BORING NO: MW281-L23CD

PLANE COORDINATES:
NORTH 703973.70
EAST 979393.27

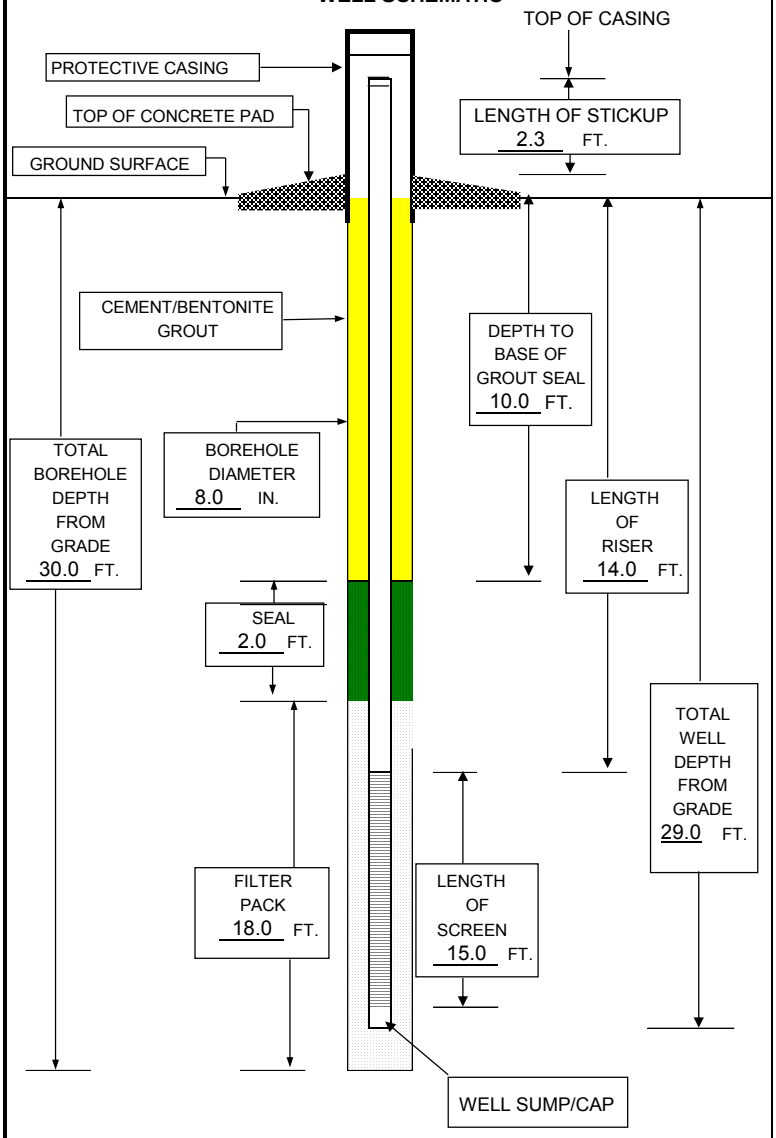
PROJECT NAME: Chemtronics, Inc.
ADDRESS: Swannanoa, NC

TOP OF SLAB ELEVATION: 2412.50

WELL CONTRACTOR: SAEDACCO

TOP OF CASING ELEVATION: 2414.77

WELL SCHEMATIC



ALL ELEVATIONS ARE IN FEET NGVD

CONSTRUCTION DATA

CASING INFORMATION

MATERIAL: [X] PVC [ ] STAINLESS [ ] CARBON
[ ] OTHER _____
DIAMETER: [X] 2" [ ] 4" [ ] 6"
[ ] OTHER _____ IN.
JOINTS: [X] THREADED [ ] WELDED
[ ] SCREWED [ ] COUPLED
[ ] OTHER _____
SCHEDULE: 40

SCREEN INFORMATION

MATERIAL: [X] PVC
[ ] STAINLESS
[ ] TEFLON
[ ] OTHER _____
DIAMETER: [X] 2"
[ ] 4"
[ ] 6"
[ ] OTHER _____ IN
SLOT: [X] 0.010
[ ] 0.020
[ ] OTHER _____ IN

CENTRALIZER: [ ] YES [X] NO
SHOW LOCATION OF CENTRALIZER(S) ON SCHEMATIC

FILTER PACK MATERIAL
20/40 SAND
OTHER [X] GP #1

SECONDARY FILTER PACK MATERIAL
SUGAR SAND [ ]
OTHER [ ] _____

BENTONITE WELL SEAL
[ ] 1/2-INCH PELLETS
[ ] 1/4-INCH PELLETS
[X] CHIPS
[ ] OTHER _____

SURFACE PROTECTION
CONCRETE PAD: [X] 3'X3'
[ ] 4'X4'
[ ] OTHER _____ FT

WELL SUMP/CAP
[X] YES
[ ] NO
LENGTH 0.40 FT.

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY
231 HAYWOOD STREET, ASHEVILLE, NC 28801
TEL.828.281.3350 FAC.828.281.3351
WWW.ALTAMONTENVIRONMENTAL.COM

MONITORING WELL CONSTRUCTION DATA

DATE INSTALLED: 4/1/2015	CLIENT: Chemtronics, Inc.	PROJECT NO: 2115.231

WELL/BORING NO: MW282-K23CD

PLANE COORDINATES:
NORTH 703842.06
EAST 979243.32

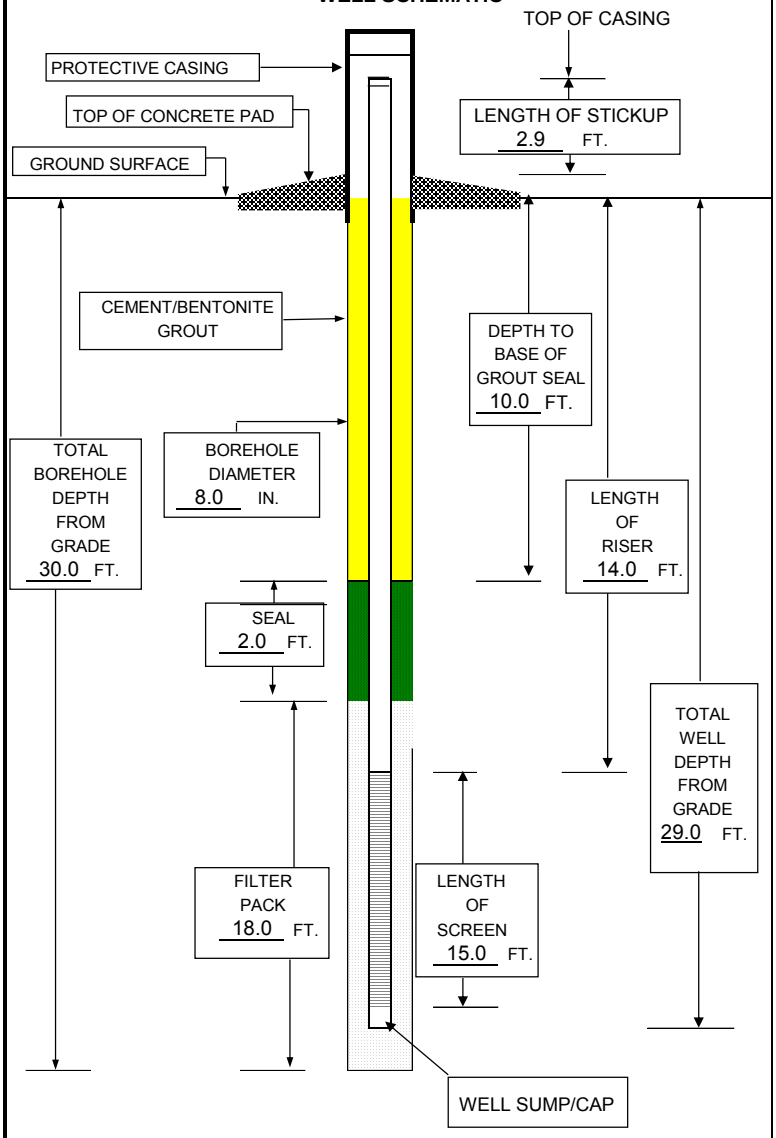
PROJECT NAME: Chemtronics, Inc.
ADDRESS: Swannanoa, NC

TOP OF SLAB ELEVATION: 2416.30

WELL CONTRACTOR: SAEDACCO

TOP OF CASING ELEVATION: 2419.18

WELL SCHEMATIC



ALL ELEVATIONS ARE IN FEET NGVD

CONSTRUCTION DATA

CASING INFORMATION

MATERIAL: [X] PVC [ ] STAINLESS [ ] CARBON
[ ] OTHER _____
DIAMETER: [X] 2" [ ] 4" [ ] 6"
[ ] OTHER _____ IN.
JOINTS: [X] THREADED [ ] WELDED
[ ] SCREWED [ ] COUPLED
[ ] OTHER _____
SCHEDULE: 40

SCREEN INFORMATION

MATERIAL: [X] PVC
[ ] STAINLESS
[ ] TEFLON
[ ] OTHER _____
DIAMETER: [X] 2"
[ ] 4"
[ ] 6"
[ ] OTHER _____ IN
SLOT: [X] 0.010
[ ] 0.020
[ ] OTHER _____ IN

CENTRALIZER: [ ] YES [X] NO
SHOW LOCATION OF CENTRALIZER(S) ON SCHEMATIC

FILTER PACK MATERIAL
20/40 SAND
OTHER [X] GP #1

SECONDARY FILTER PACK MATERIAL
SUGAR SAND [ ]
OTHER [ ] _____

BENTONITE WELL SEAL
[ ] 1/2-INCH PELLETS
[ ] 1/4-INCH PELLETS
[X] CHIPS
[ ] OTHER _____

SURFACE PROTECTION
CONCRETE PAD: [X] 3'X3'
[ ] 4'X4'
[ ] OTHER _____ FT

WELL SUMP/CAP
[X] YES
[ ] NO
LENGTH 0.40 FT.

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MONITORING WELL CONSTRUCTION DATA

DATE INSTALLED: 4/7/2015	CLIENT: Chemtronics, Inc.	PROJECT NO: 2115.231

WELL/BORING NO: MW283-K25CD

PLANE COORDINATES:
NORTH 703517.26
EAST 979272.63

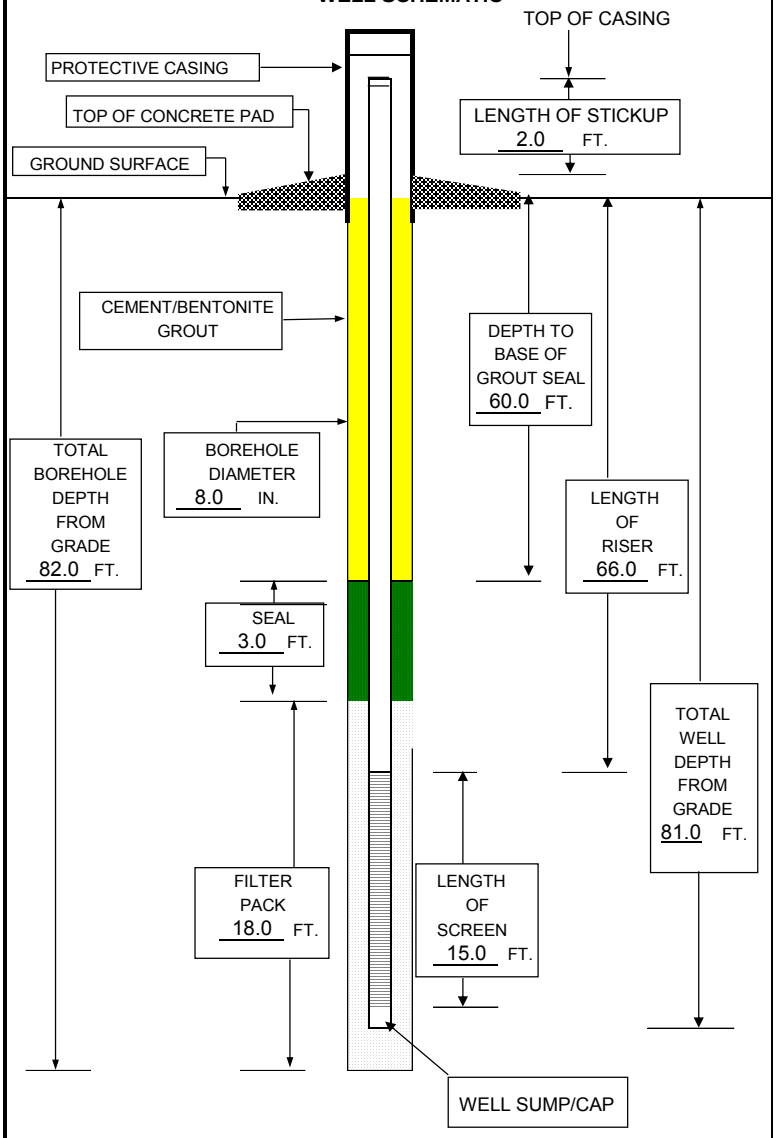
PROJECT NAME: Chemtronics, Inc.
ADDRESS: Swannanoa, NC

TOP OF SLAB ELEVATION: 2379.70

WELL CONTRACTOR: SAEDACCO

TOP OF CASING ELEVATION: 2381.70

WELL SCHEMATIC



ALL ELEVATIONS ARE IN FEET NGVD

CONSTRUCTION DATA

CASING INFORMATION

MATERIAL: [X] PVC [ ] STAINLESS [ ] CARBON
[ ] OTHER _____
DIAMETER: [ ] 2" [X] 4" [ ] 6"
[ ] OTHER _____ IN.
JOINTS: [X] THREADED [ ] WELDED
[ ] SCREWED [ ] COUPLED
[ ] OTHER _____
SCHEDULE: 40

SCREEN INFORMATION

MATERIAL: [ ] PVC
[ ] STAINLESS
[ ] TEFLON
[X] OTHER PVC Vee-Wire Screen
DIAMETER: [ ] 2"
[X] 4"
[ ] 6"
[ ] OTHER _____ IN
SLOT: [ ] 0.010
[X] 0.020
[ ] OTHER _____ IN

CENTRALIZER: [ ] YES [X] NO
SHOW LOCATION OF CENTRALIZER(S) ON SCHEMATIC

FILTER PACK MATERIAL
20/40 SAND
OTHER [X] GP #2

SECONDARY FILTER PACK MATERIAL
SUGAR SAND [ ]
OTHER [ ] _____

BENTONITE WELL SEAL
[ ] 1/2-INCH PELLETS
[ ] 1/4-INCH PELLETS
[X] CHIPS
[ ] OTHER _____

SURFACE PROTECTION
CONCRETE PAD: [X] 3'X3'
[ ] 4'X4'
[ ] OTHER _____ FT

WELL SUMP/CAP
[X] YES
[ ] NO
LENGTH 0.40 FT.

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MONITORING WELL CONSTRUCTION DATA

DATE INSTALLED: 4/10/2015	CLIENT: Chemtronics, Inc.	PROJECT NO: 2115.231

WELL/BORING NO: MW284-K25CD

PROJECT NAME: Chemtronics, Inc.

ADDRESS: Swannanoa, NC

WELL CONTRACTOR: SAEDACCO

PLANE COORDINATES:

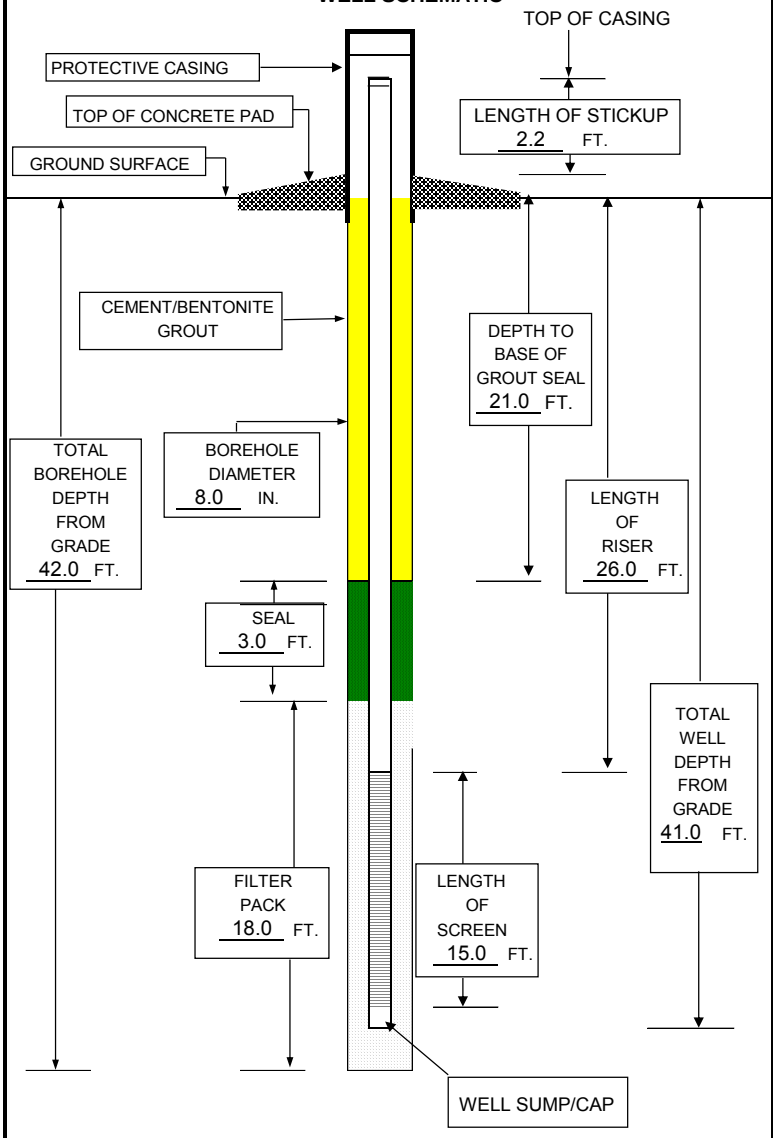
NORTH 703371.83

EAST 979280.32

TOP OF SLAB ELEVATION: 2364.60

TOP OF CASING ELEVATION: 2366.81

WELL SCHEMATIC



ALL ELEVATIONS ARE IN FEET NGVD

CONSTRUCTION DATA

CASING INFORMATION

MATERIAL: [X] PVC [ ] STAINLESS [ ] CARBON [ ] OTHER _____

DIAMETER: [ ] 2" [X] 4" [ ] 6" [ ] OTHER _____ IN.

JOINTS: [X] THREADED [ ] WELDED [ ] SCREWED [ ] COUPLED [ ] OTHER _____

SCHEDULE: 40

SCREEN INFORMATION

MATERIAL: [ ] PVC [ ] STAINLESS [ ] TEFLON [X] OTHER PVC Vee-Wire Screen

DIAMETER: [ ] 2" [X] 4" [ ] 6" [ ] OTHER _____ IN

SLOT: [ ] 0.010 [X] 0.020 [ ] OTHER _____ IN

CENTRALIZER: [ ] YES [X] NO

SHOW LOCATION OF CENTRALIZER(S) ON SCHEMATIC

FILTER PACK MATERIAL

20/40 SAND

OTHER [X] GP #2

SECONDARY FILTER PACK MATERIAL

SUGAR SAND [ ]

OTHER [ ] _____

BENTONITE WELL SEAL

[ ] 1/2-INCH PELLETS

[ ] 1/4-INCH PELLETS

[X] CHIPS

[ ] OTHER _____

SURFACE PROTECTION

CONCRETE PAD: [X] 3'X3' [ ] 4'X4' [ ] OTHER _____ FT

WELL SUMP/CAP

[X] YES

[ ] NO

LENGTH 0.40 FT.

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ATTACHMENT C
Groundwater and Surface Water Sampling Forms

ALTAMONT ENVIRONMENTAL, INC.
ENGINEERING & HYDROGEOLOGY
231 HAYWOOD STREET, ASHEVILLE, NC 28801
TEL.828.281.3350 FAC.828.281.3351
WWW.ALTAMONTENVIRONMENTAL.COM

Well Sampling Log

PROJECT NAME: Chemtronics
PROJECT NUMBER: 215.231
SAMPLING PERSONNEL: AH/MS

DATE: 5/5/15 / 5/6/15
WEATHER: 60's sunny
SAMPLE TIME: 1030

WELL NUMBER: MW281-L23CD
WELL DIAMETER: 2"
TYPE OF CASING: PVC
MEASURING POINT: TOC
FLUSH MOUNT / STICK-UP
COMMENTS: Bailed dry on 5/5/15 takes time to recharge

WELL DEPTH IN FEET (WD): 29.00 5/6/15
WATER LEVEL IN FEET (WL): 20.55 20.67
LENGTH OF WATER COLUMN: 8.45 FEET
(WD) - (WL) = (LWC)
ONE CASING VOLUME: 1.44 GALLONS
(LWC) x (WCV)
THREE CASING VOLUMES: 4.32 GALLONS
ACTUAL VOLUME PURGED: ~~5~~ 4 GALLONS

WELL CASING VOLUMES (WCV)
1" = 0.041 Gal/Ft 2" = 0.17 Gal/Ft 3" = 0.38 Gal/Ft 4" = 0.66 Gal/Ft 6" = 1.5 Gal/Ft 8" = 2.6 Gal/Ft 12" = 5.8 Gal/Ft

PURGE METHOD: BAILER-DISP. BAILER-TEFLON DEDICATED PUMP WHALE PUMP GRUNDFOS OTHER:
SAMPLE METHOD: BAILER-DISP. BAILER-TEFLON DEDICATED PUMP WHALE PUMP GRUNDFOS OTHER:

READING	TIME	GALLONS PURGED	TEMP (°C)	SPECIFIC COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	pH (S.U.) *report to 0.1 S.U.*	OXIDATION REDUCTION POTENTIAL (mV)	TURBIDITY (NTU)	COMMENTS
1	10:01	~~0~~	15.7	2944	3.96	11.95	-63.1	28.66	
2	10:07	2	15.3	3289	5.77	11.12	-25.0	318.77	
3	10:10	4	14.9	2240	8.95	12.09	-72.3	515.0	
4									
5	10:30	~~0~~	23.9	237.1	4.90	6.78	143.2	10.50	
6									
7									
8									
9									
10									

SAMPLING CONTAINER	NUMBER OF CONTAINERS	REQUESTED ANALYSIS
500 mL PLASTIC		
250 mL PLASTIC	3	cations, filtered Fe+Mn, alkalinity
125 mL PLASTIC	1	BOD
40 mL GLASS	11	VOCs, DHGs, TOCs, Anions, Perch. Fluor
1 L GLASS	1	Nitrogs
OTHER	1	Sulfide

PROTECTIVE CASING: ✓ PAD: ✓ LOCK: ✓ VEGETATION: ✓ ACCESS: ✓

Sampling Personnel Signature: [signature] Date: 5/6/15

Notes: °C = degrees Celsius
µS/cm = micro-Siemen per centimeter
mg/L = milligrams per liter
S.U. = Standard Units
mV = millivolt
NTU = nephelometric turbidity units
Samples are analyzed immediately upon collection.

ALTAMONT ENVIRONMENTAL, INC.
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Well Sampling Log

PROJECT NAME: ChemtronicS
PROJECT NUMBER: 2115.231
SAMPLING PERSONNEL: AH/MS

DATE: 5/5/15 / 5/6/15
WEATHER: 70's sunny
SAMPLE TIME: 1045

WELL NUMBER: MW282-K23CD
WELL DIAMETER: 2"
TYPE OF CASING: PVC
MEASURING POINT: TOC
FLUSH MOUNT / STICK-UP
COMMENTS:

WELL DEPTH IN FEET (WD): 29.00
WATER LEVEL IN FEET (WL): 21.12 [5/6/15] 23.12
LENGTH OF WATER COLUMN: 7.88 FEET 5.88
(WD) - (WL) = (LWC)
ONE CASING VOLUME: 1.34 GALLONS 1
(LWC) x (WCV)
THREE CASING VOLUMES: 4.02 GALLONS 3
ACTUAL VOLUME PURGED: 4.00 GALLONS 3

WELL CASING VOLUMES (WCV)
1" = 0.041 Gal/Ft 2" = 0.17 Gal/Ft 3" = 0.38 Gal/Ft 4" = 0.66 Gal/Ft 6" = 1.5 Gal/Ft 8" = 2.6 Gal/Ft 12" = 5.8 Gal/Ft

PURGE METHOD: BAILER-DISP. BAILER-TEFLON DEDICATED PUMP WHALE PUMP GRUNDFOS OTHER:
SAMPLE METHOD: BAILER-DISP. BAILER-TEFLON DEDICATED PUMP WHALE PUMP GRUNDFOS OTHER:

READING	TIME	GALLONS PURGED	TEMP (°C)	SPECIFIC COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	pH (S.U.) *report to 0.1 S.U.*	OXIDATION REDUCTION POTENTIAL (mV)	TURBIDITY (NTU)	COMMENTS
1	1036	Ø	17.5	2460	5.89	12.09	-72.0	15.23	
2	1040	1	14.7	2450	8.99	11.14	-25.1	2150	
3	1042	2	14.2	2669	8.77	11.39	-38.0	5168.3	
4	1044	3	16.0	2289	6.55	12.11	-59.9	320.7	
5									
6									
7									
8									
9									
10									

SAMPLING CONTAINER	NUMBER OF CONTAINERS	REQUESTED ANALYSIS
500 mL PLASTIC		
250 mL PLASTIC	3	cations, filtered FE + Mn, alkalinity
125 mL PLASTIC	1	BOD
40 mL GLASS	11	VOCs, DRGs, TOCs, Anions, Perch. Fix
1 L GLASS	1	Nitros
OTHER	1	Sulfide

PROTECTIVE CASING: ✓ PAD: ✓ LOCK: ✓ VEGETATION: ✓ ACCESS: ✓

Sampling Personnel Signature: [signature] Date: 5/6/15

Notes: °C = degrees Celsius
µS/cm = micro-Siemen per centimeter
mg/L = milligrams per liter
S.U. = Standard Units
mV = millivolt
NTU = nephelometric turbidity units
Samples are analyzed immediately upon collection.

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Low-Flow Sampling Log

PROJECT NAME:	CHEMTRONICS	PROJECT NUMBER:	2115.231
LOCATION:	BV	DATE:	5/5/15
SAMPLING PERSONNEL:	AH / MS	WEATHER:	sunny 70's

Well ID:	MW283-K25CD	Arrive at Well:	1410
Screen Interval:	66-81 bgs	Start Time:	1450
Depth to Water:	17.08 toc	Sample Time:	1511
Stickup:	2.0	Finish Sample Time:	
Depth of Pump Intake:	74.0 toc	Leave Well:	
Drawdown Set:	18.1 toc		

COMMENTS: Field filter iron & manganese

Well does not recharge well.

Time	DTW (feet)	Temp (°C)	Specific Cond. (µS)	DO (mg/L)	pH (S.U.) report to 0.1 S.U.	ORP (mV)	Turbidity (NTU)
1450	17.4	14.4	209.2	5.26	7.03	155.8	27.00
1453	17.4	14.2	209.3	2.71	6.65	167.8	27.10
1456	19.1	15.1	211.9	2.72	6.55	160.0	34.96
1459	18.1	14.6	209.5	2.44	6.19	179.3	35.21
1502	18.1	14.6	209.4	2.47	6.23	176.6	34.53
1505	18.1	16.6	210.9	2.50	6.59	155.4	33.99
1508	18.1	16.7	211.4	2.44	6.64	144.9	37.46
1511	18.1	16.5	210.5	2.50	6.65	143.4	37.27

Time between recharge during sample collection: 3min @ 2gpm

Sampling Personnel Signature: M Stamey Date: 5/5/15

NOTES:

STABILIZATION
3 successive readings, 3 minutes apart:
within +/- 10% DO and turbidity; +/- 3% Conductivity; +/- 0.1 pH unit; +/- 10 mV for ORP
from *EPA - Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures*, April 1996

bgs = below ground surface
toc = top of casing
°C = degrees Celsius
µS = micro-Siemen
DO = dissolved oxygen
mg/L = milligrams per liter
Samples are analyzed immediately upon collection.

S.U. = standard units
ORP = oxidation reduction potential
mV = millivolt
NTU = nephelometric turbidity units

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Low-Flow Sampling Log

PROJECT NAME: CHEMTRONICS
PROJECT NUMBER: 2115.231
LOCATION: BV
DATE: 5/5/15
SAMPLING PERSONNEL: AH/MS
WEATHER: sunny 70's

Well ID: MW284-K15CD
Screen Interval: 26-41 bgs
Depth to Water: 8.28 toc
Stickup: 2.0
Depth of Pump Intake: 34.5 toc
Drawdown Set: 9.28 toc

Arrive at Well: 1159
Start Time: 1229
Sample Time: 1248
Finish Sample Time:
Leave Well:

COMMENTS:
field filter iron & manganese

Time	DTW (feet)	Temp (°C)	Specific Cond. (µS)	DO (mg/L)	pH (S.U.) *report to 0.1 S.U.*	ORP (mV)	Turbidity (NTU)
1230	8.40	13.9	130.1	2.35	7.23	41.7	11.84
1233	9.28	14.8	130.1	0.55	6.84	24.7	4.57
1236	9.28	13.4	128.4	0.32	6.70	20.6	61.27
1239	9.28	13.4	128.2	0.38	6.61	18.7	3.44
1242	9.28	13.3	127.8	0.29	6.55	16.9	4.00
1245	9.28	13.3	128.5	0.22	6.54	16.3	3.48
1248	9.28	13.3	128.3	0.19	6.51	15.8	3.62

Time between recharge during sample collection: 1 gal @ 2gpm

Sampling Personnel Signature: [signature] Date: 5/5/15

NOTES:

STABILIZATION
3 successive readings, 3 minutes apart:
within +/- 10% DO and turbidity; +/- 3% Conductivity; +/- 0.1 pH unit; +/- 10 mV for ORP
from *EPA - Low-Flow (Minimal Drawdown) Groundwater Sampling Procedures*, April 1996

bgs = below ground surface
toc = top of casing
°C = degrees Celsius
µS = micro-Siemen
DO = dissolved oxygen
mg/L = milligrams per liter
Samples are analyzed immediately upon collection.

S.U. = standard units
ORP = oxidation reduction potential
mV = millivolt
NTU = nephelometric turbidity units

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Surface Water Sampling Log

PROJECT NAME: CHEMTRONICS
PROJECT NUMBER: 0115.231
SAMPLING PERSONNEL: AH/MS
DATE: 5/5/15
WEATHER: sunny + 70's

SAMPLE NAME: GBW9-125

COMMENTS: Access up creek from mw28d-KZSCD

SAMPLE METHOD: GRAB SYRINGE PUMP BAILER-DISP. OTHER:

TIME	TEMP (°C)	SPECIFIC COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	pH (S.U.) *report to 0.1 S.U.*	OXIDATION REDUCTION POTENTIAL (mV)	TURBIDITY (NTU)	COMMENTS
1350	13.6	40.7	9.64	6.87	192.7	20.09	

SAMPLING CONTAINER	NUMBER OF CONTAINERS	REQUESTED ANALYSIS
500 mL PLASTIC		
250 mL PLASTIC	2	cations, alkalinity
125 mL PLASTIC		
40 mL GLASS	7	VOCs, anions, perch, picric
1 L GLASS	1	Nitros sulfide
OTHER		

VEGETATION: OK ACCESS: OK

Sampling Personnel Signature: [signature] Date: 5/5/15

Notes: °C = degrees Celsius
µS/cm = micro-Siemen per cubic centimeter
mg/L = milligrams per liter
S.U. = standard units
mV = millivolt
NTU = nephelometric turbidity units
Samples are analyzed immediately upon collection.

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Surface Water Sampling Log

PROJECT NAME: Chemfronties
PROJECT NUMBER: 2115.231
SAMPLING PERSONNEL: AH/MS
DATE: 5/5/2015
WEATHER: sunny 70's

SAMPLE NAME: GBW 8-K26

COMMENTS: Access above culvert near well MW284-K25CD

SAMPLE METHOD: GRAB SYRINGE PUMP BAILER-DISP. OTHER:

TIME	TEMP (°C)	SPECIFIC COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	pH (S.U.) *report to 0.1 S.U.*	OXIDATION REDUCTION POTENTIAL (mV)	TURBIDITY (NTU)	COMMENTS
1310	14.0	41.1	9.29	7.06	107.0	11.29	

SAMPLING CONTAINER	NUMBER OF CONTAINERS	REQUESTED ANALYSIS
500 mL PLASTIC		
250 mL PLASTIC	2	Cations, Alkalinity
125 mL PLASTIC		
40 mL GLASS	7	Vocs, anions, perch, picric acid
1 L GLASS	1	nitros
OTHER	1	sulfide

VEGETATION: ✓ ACCESS: ✓

Sampling Personnel Signature: [signature] Date: 5/5/15

Notes: °C = degrees Celsius
µS/cm = micro-Siemen per cubic centimeter
mg/L = milligrams per liter
S.U. = standard units
mV = millivolt
NTU = nephelometric turbidity units
Samples are analyzed immediately upon collection.

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Surface Water Sampling Log

PROJECT NAME: Chemtronics
PROJECT NUMBER: 245.231
SAMPLING PERSONNEL: AH/MS
DATE: 5/5/15
WEATHER: sunny 70's

SAMPLE NAME: GBW 7-M21

COMMENTS: New sampling location

SAMPLE METHOD: (GRAB) SYRINGE PUMP BAILER-DISP. OTHER:

TIME	TEMP (°C)	SPECIFIC COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	pH (S.U.) *report to 0.1 S.U.*	OXIDATION REDUCTION POTENTIAL (mV)	TURBIDITY (NTU)	COMMENTS
1135	13.1	50.3	10.29	7.83	174.4	33.20	

SAMPLING CONTAINER	NUMBER OF CONTAINERS	REQUESTED ANALYSIS
500 mL PLASTIC		
250 mL PLASTIC	2	Cations Alkalinity
125 mL PLASTIC		
40 mL GLASS	7	VOCs, Anions, Perch, Picr
1 L GLASS	1	Nitros
OTHER	1	sulfide

VEGETATION: ✓ ACCESS: ✓

Sampling Personnel Signature: [signature] Date: 5/5/15

Notes: °C = degrees Celsius
µS/cm = micro-Siemen per cubic centimeter
mg/L = milligrams per liter
S.U. = standard units
mV = millivolt
NTU = nephelometric turbidity units
Samples are analyzed immediately upon collection.

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Surface Water Sampling Log

PROJECT NAME: CHEMTRONICS
DATE: 5/5/15
PROJECT NUMBER: 215.231
WEATHER: sunny
SAMPLING PERSONNEL: AH/MS

SAMPLE NAME: GBW 4-N23

COMMENTS: Collected upgradient of culvert due to access issues.

SAMPLE METHOD: (GRAB) SYRINGE PUMP BAILER-DISP. OTHER:

TIME	TEMP (°C)	SPECIFIC COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	pH (S.U.) *report to 0.1 S.U.*	OXIDATION REDUCTION POTENTIAL (mV)	TURBIDITY (NTU)	COMMENTS
1100	13.0	50.8	10.04	7.62	159.7	57.84	

SAMPLING CONTAINER	NUMBER OF CONTAINERS	REQUESTED ANALYSIS
500 mL PLASTIC		
250 mL PLASTIC	2	CATIONS, Alkalinity
125 mL PLASTIC		
40 mL GLASS	3, 2, 2	VOCs, Anions, Perchlorate, picric
1 L GLASS	1	Nitros
OTHER 250 ml glass	1	sulfide

VEGETATION: ✓ ACCESS: ✓

Sampling Personnel Signature: [signature] Date: 5/5/15

Notes: °C = degrees Celsius
µS/cm = micro-Siemen per cubic centimeter
mg/L = milligrams per liter
S.U. = standard units
mV = millivolt
NTU = nephelometric turbidity units
Samples are analyzed immediately upon collection.

ATTACHMENT D
Groundwater and Surface Water Analytical Results

ANALYTICAL RESULTS

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

Altamont Environmental
231 Haywood Street
Asheville NC 28801

May 19, 2015

Project: Chemtronics Site

Submittal Date: 05/06/2015
Group Number: 1558863
PO Number: 2115.231
State of Sample Origin: NC

Client Sample Description	Lancaster Labs (LL) #
MW284-K25CD Grab Groundwater	7875539
MW284-K25CD Filtered Grab Groundwater	7875540
MW283-K25CD Grab Groundwater	7875541
MW283-K25CD Filtered Grab Groundwater	7875542
GBW9-J25 Grab Groundwater	7875543
GBW8-K26 Grab Groundwater	7875544
GBW7-M21 Grab Groundwater	7875545
GBW4-N23 Grab Groundwater	7875546
Trip Blank Water	7875547

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Regulatory agencies do not accredit laboratories for all methods, analytes, and matrices. Our scopes of accreditation can be viewed at http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ .

ELECTRONIC COPY TO Altamont Environmental Attn: Amy Huffman

Respectfully Submitted,

Nancy Jean Bornholm
Principal Specialist

(717) 556-7250

eurofins
Lancaster Laboratories Environmental
2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Analysis Report

Sample Description: MW284-K25CD Grab Groundwater Chemtronics Site

LL Sample # WW 7875539
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 12:48 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

284KT

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.1	U	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	1.0	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	0.1	U	0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	0.1	J	0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.2	J	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.1	U	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW284-K25CD Grab Groundwater
Chemtronics Site

LL Sample # WW 7875539
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 12:48 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

284KT

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.1	U	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1
Explosives	**SW-846 8015B**		ug/l		ug/l	ug/l	
02265	Picric Acid	88-89-1	50	U	50	200	1
Explosives	**SW-846 8330**		ug/l		ug/l	ug/l	
06916	4-Amino-2,6-Dinitrotoluene	19406-51-0	0.30	U	0.30	0.60	1
06916	2-Amino-4,6-Dinitrotoluene	35572-78-2	0.20	U	0.20	0.60	1
06916	1,2-Dinitrobenzene	528-29-0	0.20	U	0.20	0.60	1
06916	1,3-Dinitrobenzene	99-65-0	0.20	U	0.20	0.60	1
06916	1,4-Dinitrobenzene	100-25-4	0.20	U	0.20	0.60	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW284-K25CD Grab Groundwater Chemtronics Site

LL Sample # WW 7875539
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 12:48 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

284KT

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
Explosives	**SW-846 8330**		**ug/l**		**ug/l**	**ug/l**	
06916	2,4-Dinitrotoluene	121-14-2	0.72	U	0.72	2.0	1
06916	2,6-Dinitrotoluene	606-20-2	0.45	U	0.45	1.3	1
06916	HMX	2691-41-0	0.65	U	0.65	2.0	1
06916	Nitrobenzene	98-95-3	0.20	U	0.20	0.60	1
06916	Nitroglycerin	55-63-0	5.2	U	5.2	15	1
06916	1-Nitronaphthalene	86-57-7	0.20	U	0.20	0.60	1
06916	2-Nitrotoluene	88-72-2	0.25	U	0.25	0.75	1
06916	3-Nitrotoluene	99-08-1	0.40	U	0.40	1.2	1
06916	4-Nitrotoluene	99-99-0	0.60	U	0.60	1.2	1
06916	PETN	78-11-5	6.0	U	6.0	18	1
06916	RDX	121-82-4	0.20	U	0.20	0.50	1
06916	Tetryl	479-45-8	0.40	U	0.40	0.80	1
06916	1,3,5-Trinitrobenzene	99-35-4	0.20	U	0.20	0.60	1
06916	2,4,6-Trinitrotoluene	118-96-7	0.20	U	0.20	0.60	1
Perchlorate	**SW-846 6850 1/2007**		**ug/l**		**ug/l**	**ug/l**	
06386	Perchlorate	14797-73-0	0.20	U	0.20	1.0	1
GC Miscellaneous	**SW-846 8015B modified**		**ug/l**		**ug/l**	**ug/l**	
07105	Ethane	74-84-0	1.0	U	1.0	5.0	1
07105	Ethene	74-85-1	1.0	U	1.0	5.0	1
07105	Methane	74-82-8	3.0	U	3.0	5.0	1
Metals	**SW-846 6010B**		**mg/l**		**mg/l**	**mg/l**	
01750	Calcium	7440-70-2	13.1		0.0334	0.200	1
01757	Magnesium	7439-95-4	3.42		0.0167	0.100	1
01762	Potassium	7440-09-7	3.99		0.133	0.500	1
01767	Sodium	7440-23-5	7.63		0.167	1.00	1
Wet Chemistry	**EPA 300.0**		**mg/l**		**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	3.2		1.0	2.0	5
00368	Nitrate Nitrogen	14797-55-8	0.25	U	0.25	0.50	5
01506	Nitrite Nitrogen	14797-65-0	0.25	U	0.25	0.50	5
00228	Sulfate	14808-79-8	8.8		1.5	5.0	5
	SM 5310 C-2000		**mg/l**		**mg/l**	**mg/l**	
00273	Total Organic Carbon	n.a.	0.50	U	0.50	1.0	1
	SM 2320 B-1997		**mg/l as CaCO3**		**mg/l as CaCO3**	**mg/l as CaCO3**	
12150	Total Alkalinity to pH 4.5	n.a.	54.3		0.70	2.0	1
12149	Bicarbonate Alkalinity	n.a.	54.3		0.70	2.0	1
	SM 4500-S2 D-2000		**mg/l**		**mg/l**	**mg/l**	
00230	Sulfide	18496-25-8	0.054	U	0.054	0.16	1
	SM 5210 B-2001		**mg/l**		**mg/l**	**mg/l**	
00235	Biochemical Oxygen Demand	n.a.	3.8	U	3.8	3.8	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW284-K25CD Grab Groundwater Chemtronics Site

LL Sample # WW 7875539
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 12:48 by AH

Altamont Environmental
231 Haywood Street
Asheville NC 28801

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

284KT

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C151323AA	05/12/2015 22:55	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C151323AA	05/12/2015 22:55	Kevin A Sposito	1
02265	Picric Acid	SW-846 8015B	1	151270016A	05/07/2015 16:48	James H Place	1
06916	Nitroaromatics/Amines	SW-846 8330	1	151290019A	05/16/2015 10:22	James H Place	1
06386	Perchlorate	SW-846 6850 1/2007	1	151270041A	05/07/2015 18:35	Richard A Shober	1
06915	Nitroaromatics/Amines Wat Ext	SW-846 8330	1	151290019A	05/11/2015 17:00	Kelli M Barto	1
07105	Dissolved Gases	SW-846 8015B modified	1	151260012A	05/06/2015 15:17	Tracy A Cole	1
01750	Calcium	SW-846 6010B	1	151281848002	05/11/2015 15:49	Eric L Eby	1
01757	Magnesium	SW-846 6010B	1	151281848002	05/11/2015 15:49	Eric L Eby	1
01762	Potassium	SW-846 6010B	1	151281848002	05/11/2015 15:49	Eric L Eby	1
01767	Sodium	SW-846 6010B	2	151281848002	05/13/2015 16:50	Katlin N Cataldi	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	1	151281848002	05/10/2015 23:00	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	15126667151B	05/06/2015 16:17	Drew M Gerhart	5
00368	Nitrate Nitrogen	EPA 300.0	1	15126667151B	05/06/2015 16:17	Drew M Gerhart	5
01506	Nitrite Nitrogen	EPA 300.0	1	15126667151B	05/06/2015 16:17	Drew M Gerhart	5
00228	Sulfate	EPA 300.0	1	15126667151B	05/06/2015 16:17	Drew M Gerhart	5
00273	Total Organic Carbon	SM 5310 C-2000	1	15127049505B	05/07/2015 09:49	James S Mathiot	1
12150	Total Alkalinity to pH 4.5	SM 2320 B-1997	1	15127002103A	05/08/2015 01:04	Michele L Graham	1
12149	Bicarbonate Alkalinity	SM 2320 B-1997	1	15127002103A	05/08/2015 01:04	Michele L Graham	1
00230	Sulfide	SM 4500-S2 D-2000	1	15127023001A	05/07/2015 08:30	Susan E Hibner	1
00235	Biochemical Oxygen Demand	SM 5210 B-2001	1	15126023502A	05/06/2015 11:30	Susan A Engle	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW284-K25CD Filtered Grab Groundwater Chemtronics Site

LL Sample # WW 7875540
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 12:48 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

284KF

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010B**		**mg/l**	**mg/l**	**mg/l**	
01754	Iron	7439-89-6	2.76	0.0334	0.200	1
07058	Manganese	7439-96-5	0.187	0.00083	0.0050	1

General Sample Comments

State of North Carolina Lab Certification No. 521
This sample was field filtered for dissolved metals.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01754	Iron	SW-846 6010B	1	151281848002	05/11/2015 15:52	Eric L Eby	1
07058	Manganese	SW-846 6010B	1	151281848002	05/11/2015 15:52	Eric L Eby	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	1	151281848002	05/10/2015 23:00	Annamaria Kuhns	1

*=This limit was used in the evaluation of the final result

Sample Description: MW283-K25CD Grab Groundwater Chemtronics Site

LL Sample # WW 7875541
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 15:11 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

283KT

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.1	U	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	1.0	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	0.2	J	0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	0.1	U	0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.4	J	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.1	U	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW283-K25CD Grab Groundwater Chemtronics Site

LL Sample # WW 7875541
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 15:11 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

283KT

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.1	U	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1
Explosives	**SW-846 8015B**		ug/l		ug/l	ug/l	
02265	Picric Acid	88-89-1	50	U	50	200	1
Explosives	**SW-846 8330**		ug/l		ug/l	ug/l	
06916	4-Amino-2,6-Dinitrotoluene	19406-51-0	0.30	U	0.30	0.60	1
06916	2-Amino-4,6-Dinitrotoluene	35572-78-2	0.20	U	0.20	0.60	1
06916	1,2-Dinitrobenzene	528-29-0	0.20	U	0.20	0.60	1
06916	1,3-Dinitrobenzene	99-65-0	0.20	U	0.20	0.60	1
06916	1,4-Dinitrobenzene	100-25-4	0.20	U	0.20	0.60	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW283-K25CD Grab Groundwater Chemtronics Site

LL Sample # WW 7875541
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 15:11 by AH

Altamont Environmental
231 Haywood Street
Asheville NC 28801

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

283KT

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
Explosives	**SW-846 8330**		**ug/l**		**ug/l**	**ug/l**	
06916	2,4-Dinitrotoluene	121-14-2	0.72	U	0.72	2.0	1
06916	2,6-Dinitrotoluene	606-20-2	0.45	U	0.45	1.3	1
06916	HMX	2691-41-0	0.65	U	0.65	2.0	1
06916	Nitrobenzene	98-95-3	0.20	U	0.20	0.60	1
06916	Nitroglycerin	55-63-0	5.2	U	5.2	15	1
06916	1-Nitronaphthalene	86-57-7	0.20	U	0.20	0.60	1
06916	2-Nitrotoluene	88-72-2	0.25	U	0.25	0.75	1
06916	3-Nitrotoluene	99-08-1	0.40	U	0.40	1.2	1
06916	4-Nitrotoluene	99-99-0	0.60	U	0.60	1.2	1
06916	PETN	78-11-5	6.0	U	6.0	18	1
06916	RDX	121-82-4	0.20	U	0.20	0.50	1
06916	Tetryl	479-45-8	0.40	U	0.40	0.80	1
06916	1,3,5-Trinitrobenzene	99-35-4	0.20	U	0.20	0.60	1
06916	2,4,6-Trinitrotoluene	118-96-7	0.20	U	0.20	0.60	1
Perchlorate	**SW-846 6850 1/2007**		**ug/l**		**ug/l**	**ug/l**	
06386	Perchlorate	14797-73-0	0.20	U	0.20	1.0	1
GC Miscellaneous	**SW-846 8015B modified**		**ug/l**		**ug/l**	**ug/l**	
07105	Ethane	74-84-0	1.0	U	1.0	5.0	1
07105	Ethene	74-85-1	1.0	U	1.0	5.0	1
07105	Methane	74-82-8	3.0	U	3.0	5.0	1
Metals	**SW-846 6010B**		**mg/l**		**mg/l**	**mg/l**	
01750	Calcium	7440-70-2	7.07		0.0334	0.200	1
01757	Magnesium	7439-95-4	3.20		0.0167	0.100	1
01762	Potassium	7440-09-7	20.6		0.133	0.500	1
01767	Sodium	7440-23-5	28.6		0.167	1.00	1
Wet Chemistry	**EPA 300.0**		**mg/l**		**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	2.6		1.0	2.0	5
00368	Nitrate Nitrogen	14797-55-8	0.41	J	0.25	0.50	5
01506	Nitrite Nitrogen	14797-65-0	0.25	U	0.25	0.50	5
00228	Sulfate	14808-79-8	22.6		1.5	5.0	5
	SM 5310 C-2000		**mg/l**		**mg/l**	**mg/l**	
00273	Total Organic Carbon	n.a.	0.50	U	0.50	1.0	1
	SM 2320 B-1997		**mg/l as CaCO3**		**mg/l as CaCO3**	**mg/l as CaCO3**	
12150	Total Alkalinity to pH 4.5	n.a.	83.7		0.70	2.0	1
12149	Bicarbonate Alkalinity	n.a.	83.7		0.70	2.0	1
	SM 4500-S2 D-2000		**mg/l**		**mg/l**	**mg/l**	
00230	Sulfide	18496-25-8	0.054	U	0.054	0.16	1
	SM 5210 B-2001		**mg/l**		**mg/l**	**mg/l**	

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW283-K25CD Grab Groundwater Chemtronics Site

LL Sample # WW 7875541
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 15:11 by AH

Altamont Environmental
231 Haywood Street
Asheville NC 28801

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

283KT

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 5210 B-2001**		**mg/l**		**mg/l**	**mg/l**	
00235	Biochemical Oxygen Demand	n.a.	3.9	U	3.9	3.9	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C151323AA	05/13/2015 00:02	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C151323AA	05/13/2015 00:02	Kevin A Sposito	1
02265	Picric Acid	SW-846 8015B	1	151270016A	05/07/2015 17:24	James H Place	1
06916	Nitroaromatics/Amines	SW-846 8330	1	151290019A	05/16/2015 11:04	James H Place	1
06386	Perchlorate	SW-846 6850 1/2007	1	151270041A	05/07/2015 18:48	Richard A Shober	1
06915	Nitroaromatics/Amines Wat Ext	SW-846 8330	1	151290019A	05/11/2015 17:00	Kelli M Barto	1
07105	Dissolved Gases	SW-846 8015B modified	1	151260012A	05/06/2015 15:35	Tracy A Cole	1
01750	Calcium	SW-846 6010B	1	151281848002	05/11/2015 15:55	Eric L Eby	1
01757	Magnesium	SW-846 6010B	1	151281848002	05/11/2015 15:55	Eric L Eby	1
01762	Potassium	SW-846 6010B	1	151281848002	05/11/2015 15:55	Eric L Eby	1
01767	Sodium	SW-846 6010B	1	151281848002	05/11/2015 15:55	Eric L Eby	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	1	151281848002	05/10/2015 23:00	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	15126667151B	05/06/2015 16:32	Drew M Gerhart	5
00368	Nitrate Nitrogen	EPA 300.0	1	15126667151B	05/06/2015 16:32	Drew M Gerhart	5
01506	Nitrite Nitrogen	EPA 300.0	1	15126667151B	05/06/2015 16:32	Drew M Gerhart	5
00228	Sulfate	EPA 300.0	1	15126667151B	05/06/2015 16:32	Drew M Gerhart	5
00273	Total Organic Carbon	SM 5310 C-2000	1	15127049505B	05/07/2015 10:03	James S Mathiot	1
12150	Total Alkalinity to pH 4.5	SM 2320 B-1997	1	15127002103A	05/08/2015 00:03	Michele L Graham	1
12149	Bicarbonate Alkalinity	SM 2320 B-1997	1	15127002103A	05/08/2015 00:03	Michele L Graham	1
00230	Sulfide	SM 4500-S2 D-2000	1	15127023001A	05/07/2015 08:30	Susan E Hibner	1
00235	Biochemical Oxygen Demand	SM 5210 B-2001	1	15126023502A	05/06/2015 11:30	Susan A Engle	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW283-K25CD Filtered Grab Groundwater Chemtronics Site

LL Sample # WW 7875542
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 15:11 by AH

Altamont Environmental
231 Haywood Street
Asheville NC 28801

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

283KF

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010B**		**mg/l**	**mg/l**	**mg/l**	
01754	Iron	7439-89-6	0.0334 U	0.0334	0.200	1
07058	Manganese	7439-96-5	0.113	0.00083	0.0050	1

General Sample Comments

State of North Carolina Lab Certification No. 521
This sample was field filtered for dissolved metals.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01754	Iron	SW-846 6010B	1	151281848002	05/11/2015 15:58	Eric L Eby	1
07058	Manganese	SW-846 6010B	1	151281848002	05/11/2015 15:58	Eric L Eby	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	1	151281848002	05/10/2015 23:00	Annamaria Kuhns	1

*=This limit was used in the evaluation of the final result

Sample Description: GBW9-J25 Grab Groundwater
Chemtronics Site

LL Sample # WW 7875543
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 13:50 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

9J25-

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.1	U	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	1.0	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	0.1	U	0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	0.8		0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.1	U	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

Sample Description: GBW9-J25 Grab Groundwater
Chemtronics Site

LL Sample # WW 7875543
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 13:50 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

9J25-

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.1	U	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1
Explosives	**SW-846 8015B**		ug/l		ug/l	ug/l	
02265	Picric Acid	88-89-1	50	U	50	200	1
Explosives	**SW-846 8330**		ug/l		ug/l	ug/l	
06916	4-Amino-2,6-Dinitrotoluene	19406-51-0	0.30	U	0.30	0.60	1
06916	2-Amino-4,6-Dinitrotoluene	35572-78-2	0.20	U	0.20	0.60	1
06916	1,2-Dinitrobenzene	528-29-0	0.20	U	0.20	0.60	1
06916	1,3-Dinitrobenzene	99-65-0	0.20	U	0.20	0.60	1
06916	1,4-Dinitrobenzene	100-25-4	0.20	U	0.20	0.60	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: GBW9-J25 Grab Groundwater
Chemtronics Site

LL Sample # WW 7875543
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 13:50 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

9J25-

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
Explosives	**SW-846 8330**		**ug/l**		**ug/l**	**ug/l**	
06916	2,4-Dinitrotoluene	121-14-2	0.72	U	0.72	2.0	1
06916	2,6-Dinitrotoluene	606-20-2	0.45	U	0.45	1.3	1
06916	HMX	2691-41-0	0.65	U	0.65	2.0	1
06916	Nitrobenzene	98-95-3	0.20	U	0.20	0.60	1
06916	Nitroglycerin	55-63-0	5.2	U	5.2	15	1
06916	1-Nitronaphthalene	86-57-7	0.20	U	0.20	0.60	1
06916	2-Nitrotoluene	88-72-2	0.25	U	0.25	0.75	1
06916	3-Nitrotoluene	99-08-1	0.40	U	0.40	1.2	1
06916	4-Nitrotoluene	99-99-0	0.60	U	0.60	1.2	1
06916	PETN	78-11-5	6.0	U	6.0	18	1
06916	RDX	121-82-4	0.20	U	0.20	0.50	1
06916	Tetryl	479-45-8	0.40	U	0.40	0.80	1
06916	1,3,5-Trinitrobenzene	99-35-4	0.20	U	0.20	0.60	1
06916	2,4,6-Trinitrotoluene	118-96-7	0.20	U	0.20	0.60	1
Perchlorate	**SW-846 6850 1/2007**		**ug/l**		**ug/l**	**ug/l**	
06386	Perchlorate	14797-73-0	0.20	U	0.20	1.0	1
Metals	**SW-846 6010B**		**mg/l**		**mg/l**	**mg/l**	
01750	Calcium	7440-70-2	2.71		0.0334	0.200	1
01757	Magnesium	7439-95-4	1.76		0.0167	0.100	1
01762	Potassium	7440-09-7	0.992		0.133	0.500	1
01767	Sodium	7440-23-5	3.62		0.167	1.00	1
Wet Chemistry	**EPA 300.0**		**mg/l**		**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	3.0		1.0	2.0	5
00368	Nitrate Nitrogen	14797-55-8	0.25	U	0.25	0.50	5
01506	Nitrite Nitrogen	14797-65-0	0.25	U	0.25	0.50	5
00228	Sulfate	14808-79-8	3.0	J	1.5	5.0	5
	SM 2320 B-1997		**mg/l as CaCO3**		**mg/l as CaCO3**	**mg/l as CaCO3**	
12150	Total Alkalinity to pH 4.5	n.a.	17.9		0.70	2.0	1
12149	Bicarbonate Alkalinity	n.a.	17.9		0.70	2.0	1
	SM 4500-S2 D-2000		**mg/l**		**mg/l**	**mg/l**	
00230	Sulfide	18496-25-8	0.054	U	0.054	0.16	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: GBW9-J25 Grab Groundwater Chemtronics Site

LL Sample # WW 7875543
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 13:50 by AH

Altamont Environmental
231 Haywood Street
Asheville NC 28801

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

9J25-

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C151323AA	05/13/2015 00:24	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C151323AA	05/13/2015 00:24	Kevin A Sposito	1
02265	Picric Acid	SW-846 8015B	1	151270016A	05/07/2015 17:36	James H Place	1
06916	Nitroaromatics/Amines	SW-846 8330	1	151290019A	05/16/2015 11:47	James H Place	1
06386	Perchlorate	SW-846 6850 1/2007	1	151270041A	05/07/2015 19:01	Richard A Shober	1
06915	Nitroaromatics/Amines Wat Ext	SW-846 8330	1	151290019A	05/11/2015 17:00	Kelli M Barto	1
01750	Calcium	SW-846 6010B	1	151281848002	05/11/2015 14:33	Eric L Eby	1
01757	Magnesium	SW-846 6010B	1	151281848002	05/11/2015 14:33	Eric L Eby	1
01762	Potassium	SW-846 6010B	1	151281848002	05/11/2015 14:33	Eric L Eby	1
01767	Sodium	SW-846 6010B	2	151281848002	05/13/2015 16:36	Katlin N Cataldi	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	1	151281848002	05/10/2015 23:00	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	15126667151B	05/06/2015 15:01	Drew M Gerhart	5
00368	Nitrate Nitrogen	EPA 300.0	1	15126667151B	05/06/2015 15:01	Drew M Gerhart	5
01506	Nitrite Nitrogen	EPA 300.0	1	15126667151B	05/06/2015 15:01	Drew M Gerhart	5
00228	Sulfate	EPA 300.0	1	15126667151B	05/08/2015 04:47	Drew M Gerhart	5
12150	Total Alkalinity to pH 4.5	SM 2320 B-1997	1	15127002103A	05/08/2015 00:18	Michele L Graham	1
12149	Bicarbonate Alkalinity	SM 2320 B-1997	1	15127002103A	05/08/2015 00:18	Michele L Graham	1
00230	Sulfide	SM 4500-S2 D-2000	1	15127023001A	05/07/2015 08:30	Susan E Hibner	1

*=This limit was used in the evaluation of the final result

Sample Description: GBW8-K26 Grab Groundwater Chemtronics Site

LL Sample # WW 7875544
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 13:10 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

8K26-

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.1	U	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	1.0	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	0.1	U	0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	0.1	U	0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.1	U	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

Sample Description: GBW8-K26 Grab Groundwater
Chemtronics Site

LL Sample # WW 7875544
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 13:10 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

8K26-

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.1	U	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1
Explosives	**SW-846 8015B**		ug/l		ug/l	ug/l	
02265	Picric Acid	88-89-1	50	U	50	200	1
Explosives	**SW-846 8330**		ug/l		ug/l	ug/l	
06916	4-Amino-2,6-Dinitrotoluene	19406-51-0	0.30	U	0.30	0.60	1
06916	2-Amino-4,6-Dinitrotoluene	35572-78-2	0.20	U	0.20	0.60	1
06916	1,2-Dinitrobenzene	528-29-0	0.20	U	0.20	0.60	1
06916	1,3-Dinitrobenzene	99-65-0	0.20	U	0.20	0.60	1
06916	1,4-Dinitrobenzene	100-25-4	0.20	U	0.20	0.60	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: GBW8-K26 Grab Groundwater
Chemtronics Site

LL Sample # WW 7875544
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 13:10 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

8K26-

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
Explosives	**SW-846 8330**		**ug/l**		**ug/l**	**ug/l**	
06916	2,4-Dinitrotoluene	121-14-2	0.72	U	0.72	2.0	1
06916	2,6-Dinitrotoluene	606-20-2	0.45	U	0.45	1.3	1
06916	HMX	2691-41-0	0.65	U	0.65	2.0	1
06916	Nitrobenzene	98-95-3	0.20	U	0.20	0.60	1
06916	Nitroglycerin	55-63-0	5.2	U	5.2	15	1
06916	1-Nitronaphthalene	86-57-7	0.20	U	0.20	0.60	1
06916	2-Nitrotoluene	88-72-2	0.25	U	0.25	0.75	1
06916	3-Nitrotoluene	99-08-1	0.40	U	0.40	1.2	1
06916	4-Nitrotoluene	99-99-0	0.60	U	0.60	1.2	1
06916	PETN	78-11-5	6.0	U	6.0	18	1
06916	RDX	121-82-4	0.20	U	0.20	0.50	1
06916	Tetryl	479-45-8	0.40	U	0.40	0.80	1
06916	1,3,5-Trinitrobenzene	99-35-4	0.20	U	0.20	0.60	1
06916	2,4,6-Trinitrotoluene	118-96-7	0.20	U	0.20	0.60	1
Perchlorate	**SW-846 6850 1/2007**		**ug/l**		**ug/l**	**ug/l**	
06386	Perchlorate	14797-73-0	0.20	U	0.20	1.0	1
Metals	**SW-846 6010B**		**mg/l**		**mg/l**	**mg/l**	
01750	Calcium	7440-70-2	2.81		0.0334	0.200	1
01757	Magnesium	7439-95-4	1.84		0.0167	0.100	1
01762	Potassium	7440-09-7	1.11		0.133	0.500	1
01767	Sodium	7440-23-5	3.80		0.167	1.00	1
Wet Chemistry	**EPA 300.0**		**mg/l**		**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	2.6		1.0	2.0	5
00368	Nitrate Nitrogen	14797-55-8	0.25	U	0.25	0.50	5
01506	Nitrite Nitrogen	14797-65-0	0.25	U	0.25	0.50	5
00228	Sulfate	14808-79-8	2.9	J	1.5	5.0	5
	SM 2320 B-1997		**mg/l as CaCO3**		**mg/l as CaCO3**	**mg/l as CaCO3**	
12150	Total Alkalinity to pH 4.5	n.a.	17.4		0.70	2.0	1
12149	Bicarbonate Alkalinity	n.a.	17.4		0.70	2.0	1
	SM 4500-S2 D-2000		**mg/l**		**mg/l**	**mg/l**	
00230	Sulfide	18496-25-8	0.054	U	0.054	0.16	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: GBW8-K26 Grab Groundwater Chemtronics Site

LL Sample # WW 7875544
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 13:10 by AH

Altamont Environmental
231 Haywood Street
Asheville NC 28801

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

8K26-

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C151323AA	05/13/2015 00:47	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C151323AA	05/13/2015 00:47	Kevin A Sposito	1
02265	Picric Acid	SW-846 8015B	1	151270016A	05/07/2015 17:48	James H Place	1
06916	Nitroaromatics/Amines	SW-846 8330	1	151290019A	05/16/2015 12:29	James H Place	1
06386	Perchlorate	SW-846 6850 1/2007	1	151270041A	05/07/2015 19:26	Richard A Shober	1
06915	Nitroaromatics/Amines Wat Ext	SW-846 8330	1	151290019A	05/11/2015 17:00	Kelli M Barto	1
01750	Calcium	SW-846 6010B	1	151281848002	05/11/2015 16:02	Eric L Eby	1
01757	Magnesium	SW-846 6010B	1	151281848002	05/11/2015 16:02	Eric L Eby	1
01762	Potassium	SW-846 6010B	2	151281848002	05/13/2015 16:53	Katlin N Cataldi	1
01767	Sodium	SW-846 6010B	2	151281848002	05/13/2015 16:53	Katlin N Cataldi	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	1	151281848002	05/10/2015 23:00	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	15126667151B	05/06/2015 16:48	Drew M Gerhart	5
00368	Nitrate Nitrogen	EPA 300.0	1	15126667151B	05/06/2015 16:48	Drew M Gerhart	5
01506	Nitrite Nitrogen	EPA 300.0	1	15126667151B	05/06/2015 16:48	Drew M Gerhart	5
00228	Sulfate	EPA 300.0	1	15126667151B	05/06/2015 16:48	Drew M Gerhart	5
12150	Total Alkalinity to pH 4.5	SM 2320 B-1997	1	15127002103A	05/08/2015 00:11	Michele L Graham	1
12149	Bicarbonate Alkalinity	SM 2320 B-1997	1	15127002103A	05/08/2015 00:11	Michele L Graham	1
00230	Sulfide	SM 4500-S2 D-2000	1	15127023001A	05/07/2015 08:30	Susan E Hibner	1

*=This limit was used in the evaluation of the final result

Sample Description: GBW7-M21 Grab Groundwater
Chemtronics Site

LL Sample # WW 7875545
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 11:35 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

7M21-

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.1	U	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	1.0	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	0.1	U	0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	0.1	J	0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.1	U	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

Sample Description: GBW7-M21 Grab Groundwater
Chemtronics Site

LL Sample # WW 7875545
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 11:35 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

7M21-

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.1	U	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1
Explosives	**SW-846 8015B**		ug/l		ug/l	ug/l	
02265	Picric Acid	88-89-1	50	U	50	200	1
Explosives	**SW-846 8330**		ug/l		ug/l	ug/l	
06916	4-Amino-2,6-Dinitrotoluene	19406-51-0	0.30	U	0.30	0.60	1
06916	2-Amino-4,6-Dinitrotoluene	35572-78-2	0.20	U	0.20	0.60	1
06916	1,2-Dinitrobenzene	528-29-0	0.20	U	0.20	0.60	1
06916	1,3-Dinitrobenzene	99-65-0	0.20	U	0.20	0.60	1
06916	1,4-Dinitrobenzene	100-25-4	0.20	U	0.20	0.60	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: GBW7-M21 Grab Groundwater
Chemtronics Site

LL Sample # WW 7875545
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 11:35 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

7M21-

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
Explosives	**SW-846 8330**		**ug/l**		**ug/l**	**ug/l**	
06916	2,4-Dinitrotoluene	121-14-2	0.72	U	0.72	2.0	1
06916	2,6-Dinitrotoluene	606-20-2	0.45	U	0.45	1.3	1
06916	HMX	2691-41-0	0.65	U	0.65	2.0	1
06916	Nitrobenzene	98-95-3	0.20	U	0.20	0.60	1
06916	Nitroglycerin	55-63-0	5.2	U	5.2	15	1
06916	1-Nitronaphthalene	86-57-7	0.20	U	0.20	0.60	1
06916	2-Nitrotoluene	88-72-2	0.25	U	0.25	0.75	1
06916	3-Nitrotoluene	99-08-1	0.40	U	0.40	1.2	1
06916	4-Nitrotoluene	99-99-0	0.60	U	0.60	1.2	1
06916	PETN	78-11-5	6.0	U	6.0	18	1
06916	RDX	121-82-4	0.20	U	0.20	0.50	1
06916	Tetryl	479-45-8	0.40	U	0.40	0.80	1
06916	1,3,5-Trinitrobenzene	99-35-4	0.20	U	0.20	0.60	1
06916	2,4,6-Trinitrotoluene	118-96-7	0.20	U	0.20	0.60	1
Perchlorate	**SW-846 6850 1/2007**		**ug/l**		**ug/l**	**ug/l**	
06386	Perchlorate	14797-73-0	0.34	J	0.20	1.0	1
Metals	**SW-846 6010B**		**mg/l**		**mg/l**	**mg/l**	
01750	Calcium	7440-70-2	3.66		0.0334	0.200	1
01757	Magnesium	7439-95-4	2.05		0.0167	0.100	1
01762	Potassium	7440-09-7	1.08		0.133	0.500	1
01767	Sodium	7440-23-5	4.32		0.167	1.00	1
Wet Chemistry	**EPA 300.0**		**mg/l**		**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	2.5		1.0	2.0	5
00368	Nitrate Nitrogen	14797-55-8	0.25	U	0.25	0.50	5
01506	Nitrite Nitrogen	14797-65-0	0.25	U	0.25	0.50	5
00228	Sulfate	14808-79-8	4.3	J	1.5	5.0	5
	SM 2320 B-1997		**mg/l as CaCO3**		**mg/l as CaCO3**	**mg/l as CaCO3**	
12150	Total Alkalinity to pH 4.5	n.a.	22.3		0.70	2.0	1
12149	Bicarbonate Alkalinity	n.a.	22.3		0.70	2.0	1
	SM 4500-S2 D-2000		**mg/l**		**mg/l**	**mg/l**	
00230	Sulfide	18496-25-8	0.054	U	0.054	0.16	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: GBW7-M21 Grab Groundwater Chemtronics Site

LL Sample # WW 7875545
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 11:35 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

7M21-

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C151323AA	05/13/2015 01:11	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C151323AA	05/13/2015 01:11	Kevin A Sposito	1
02265	Picric Acid	SW-846 8015B	1	151270016A	05/07/2015 18:00	James H Place	1
06916	Nitroaromatics/Amines	SW-846 8330	1	151290019A	05/16/2015 13:54	James H Place	1
06386	Perchlorate	SW-846 6850 1/2007	1	151270041A	05/07/2015 19:39	Richard A Shober	1
06915	Nitroaromatics/Amines Wat Ext	SW-846 8330	1	151290019A	05/11/2015 17:00	Kelli M Barto	1
01750	Calcium	SW-846 6010B	1	151281848002	05/11/2015 16:05	Eric L Eby	1
01757	Magnesium	SW-846 6010B	1	151281848002	05/11/2015 16:05	Eric L Eby	1
01762	Potassium	SW-846 6010B	2	151281848002	05/13/2015 16:56	Katlin N Cataldi	1
01767	Sodium	SW-846 6010B	2	151281848002	05/13/2015 16:56	Katlin N Cataldi	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	1	151281848002	05/10/2015 23:00	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	15126667151B	05/06/2015 17:03	Drew M Gerhart	5
00368	Nitrate Nitrogen	EPA 300.0	1	15126667151B	05/06/2015 17:03	Drew M Gerhart	5
01506	Nitrite Nitrogen	EPA 300.0	1	15126667151B	05/06/2015 17:03	Drew M Gerhart	5
00228	Sulfate	EPA 300.0	1	15126667151B	05/06/2015 17:03	Drew M Gerhart	5
12150	Total Alkalinity to pH 4.5	SM 2320 B-1997	1	15127002103A	05/08/2015 01:11	Michele L Graham	1
12149	Bicarbonate Alkalinity	SM 2320 B-1997	1	15127002103A	05/08/2015 01:11	Michele L Graham	1
00230	Sulfide	SM 4500-S2 D-2000	1	15127023001A	05/07/2015 08:30	Susan E Hibner	1

*=This limit was used in the evaluation of the final result

Sample Description: GBW4-N23 Grab Groundwater
Chemtronics Site

LL Sample # WW 7875546
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 11:00 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

4N23-

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.1	U	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	1.0	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	0.1	U	0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	0.1	U	0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.1	U	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: GBW4-N23 Grab Groundwater
Chemtronics Site

LL Sample # WW 7875546
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 11:00 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

4N23-

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.1	U	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1
Explosives	**SW-846 8015B**		ug/l		ug/l	ug/l	
02265	Picric Acid	88-89-1	50	U	50	200	1
Explosives	**SW-846 8330**		ug/l		ug/l	ug/l	
06916	4-Amino-2,6-Dinitrotoluene	19406-51-0	0.30	U	0.30	0.60	1
06916	2-Amino-4,6-Dinitrotoluene	35572-78-2	0.20	U	0.20	0.60	1
06916	1,2-Dinitrobenzene	528-29-0	0.20	U	0.20	0.60	1
06916	1,3-Dinitrobenzene	99-65-0	0.20	U	0.20	0.60	1
06916	1,4-Dinitrobenzene	100-25-4	0.20	U	0.20	0.60	1

*=This limit was used in the evaluation of the final result

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2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Analysis Report

Sample Description: GBW4-N23 Grab Groundwater
Chemtronics Site

LL Sample # WW 7875546
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 11:00 by AH

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

4N23-

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
Explosives	**SW-846 8330**		**ug/l**		**ug/l**	**ug/l**	
06916	2,4-Dinitrotoluene	121-14-2	0.72	U	0.72	2.0	1
06916	2,6-Dinitrotoluene	606-20-2	0.45	U	0.45	1.3	1
06916	HMX	2691-41-0	0.65	U	0.65	2.0	1
06916	Nitrobenzene	98-95-3	0.20	U	0.20	0.60	1
06916	Nitroglycerin	55-63-0	5.2	U	5.2	15	1
06916	1-Nitronaphthalene	86-57-7	0.20	U	0.20	0.60	1
06916	2-Nitrotoluene	88-72-2	0.25	U	0.25	0.75	1
06916	3-Nitrotoluene	99-08-1	0.40	U	0.40	1.2	1
06916	4-Nitrotoluene	99-99-0	0.60	U	0.60	1.2	1
06916	PETN	78-11-5	6.0	U	6.0	18	1
06916	RDX	121-82-4	0.20	U	0.20	0.50	1
06916	Tetryl	479-45-8	0.40	U	0.40	0.80	1
06916	1,3,5-Trinitrobenzene	99-35-4	0.20	U	0.20	0.60	1
06916	2,4,6-Trinitrotoluene	118-96-7	0.20	U	0.20	0.60	1
Perchlorate	**SW-846 6850 1/2007**		**ug/l**		**ug/l**	**ug/l**	
06386	Perchlorate	14797-73-0	0.32	J	0.20	1.0	1
Metals	**SW-846 6010B**		**mg/l**		**mg/l**	**mg/l**	
01750	Calcium	7440-70-2	3.87		0.0334	0.200	1
01757	Magnesium	7439-95-4	2.08		0.0167	0.100	1
01762	Potassium	7440-09-7	1.13		0.133	0.500	1
01767	Sodium	7440-23-5	4.39		0.167	1.00	1
Wet Chemistry	**EPA 300.0**		**mg/l**		**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	2.1		1.0	2.0	5
00368	Nitrate Nitrogen	14797-55-8	0.25	U	0.25	0.50	5
01506	Nitrite Nitrogen	14797-65-0	0.25	U	0.25	0.50	5
00228	Sulfate	14808-79-8	4.2	J	1.5	5.0	5
	SM 2320 B-1997		**mg/l as CaCO3**		**mg/l as CaCO3**	**mg/l as CaCO3**	
12150	Total Alkalinity to pH 4.5	n.a.	24.2		0.70	2.0	1
12149	Bicarbonate Alkalinity	n.a.	24.2		0.70	2.0	1
	SM 4500-S2 D-2000		**mg/l**		**mg/l**	**mg/l**	
00230	Sulfide	18496-25-8	0.054	U	0.054	0.16	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: GBW4-N23 Grab Groundwater Chemtronics Site

LL Sample # WW 7875546
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015 11:00 by AH

Altamont Environmental
231 Haywood Street
Asheville NC 28801

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

4N23-

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C151323AA	05/13/2015 01:33	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C151323AA	05/13/2015 01:33	Kevin A Sposito	1
02265	Picric Acid	SW-846 8015B	1	151270016A	05/07/2015 18:12	James H Place	1
06916	Nitroaromatics/Amines	SW-846 8330	1	151290019A	05/16/2015 14:37	James H Place	1
06386	Perchlorate	SW-846 6850 1/2007	1	151270041A	05/07/2015 19:52	Richard A Shober	1
06915	Nitroaromatics/Amines Wat Ext	SW-846 8330	1	151290019A	05/11/2015 17:00	Kelli M Barto	1
01750	Calcium	SW-846 6010B	1	151321848002	05/14/2015 05:28	Tara L Snyder	1
01757	Magnesium	SW-846 6010B	1	151321848002	05/14/2015 05:28	Tara L Snyder	1
01762	Potassium	SW-846 6010B	1	151281848004	05/11/2015 17:32	Suzanne M Will	1
01767	Sodium	SW-846 6010B	1	151281848004	05/11/2015 17:32	Suzanne M Will	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	1	151281848004	05/10/2015 23:00	Annamaria Kuhns	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	2	151321848002	05/13/2015 22:00	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	15126667151B	05/06/2015 17:18	Drew M Gerhart	5
00368	Nitrate Nitrogen	EPA 300.0	1	15126667151B	05/06/2015 17:18	Drew M Gerhart	5
01506	Nitrite Nitrogen	EPA 300.0	1	15126667151B	05/06/2015 17:18	Drew M Gerhart	5
00228	Sulfate	EPA 300.0	1	15126667151B	05/06/2015 17:18	Drew M Gerhart	5
12150	Total Alkalinity to pH 4.5	SM 2320 B-1997	1	15127002103A	05/08/2015 01:26	Michele L Graham	1
12149	Bicarbonate Alkalinity	SM 2320 B-1997	1	15127002103A	05/08/2015 01:26	Michele L Graham	1
00230	Sulfide	SM 4500-S2 D-2000	1	15127023002A	05/07/2015 11:45	Susan E Hibner	1

*=This limit was used in the evaluation of the final result

Sample Description: Trip Blank Water
Chemtronics Site

LL Sample # WW 7875547
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

TBCHM

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.1	U	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	1.0	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	0.1	U	0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	0.1	U	0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.1	U	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

Sample Description: Trip Blank Water
Chemtronics Site

LL Sample # WW 7875547
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

TBCHM

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.1	U	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Lancaster Laboratories Environmental
2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Analysis Report

Sample Description: Trip Blank Water
Chemtronics Site

LL Sample # WW 7875547
LL Group # 1558863
Account # 12184

Project Name: Chemtronics Site

Collected: 05/05/2015

Submitted: 05/06/2015 09:40
Reported: 05/19/2015 16:18

Altamont Environmental
231 Haywood Street
Asheville NC 28801

TBCHM

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C151323AA	05/13/2015 01:55	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C151323AA	05/13/2015 01:55	Kevin A Sposito	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1558863
Reported: 05/19/2015 16:18

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: C151323AA	Sample number(s): 7875539,7875541,7875543-7875547									
Acetone	3.0	U	3.0	5.0	ug/l	100	106	66-132	6	30
Acetonitrile	7.0	U	7.0	20	ug/l	106	109	50-145	3	30
Acrolein	5.0	U	5.0	25	ug/l	82	86	44-122	4	30
Acrylonitrile	1.0	U	1.0	5.0	ug/l	111	116	75-133	4	30
Allyl Chloride	0.1	U	0.1	0.5	ug/l	95	96	73-124	0	30
t-Amyl methyl ether	0.1	U	0.1	0.5	ug/l	104	104	80-120	1	30
Benzene	0.1	U	0.1	0.5	ug/l	97	96	80-120	1	30
Benzyl Chloride	0.1	U	0.1	0.5	ug/l	106	108	47-141	1	30
Bromobenzene	0.1	U	0.1	0.5	ug/l	98	97	80-120	1	30
Bromochloromethane	0.1	U	0.1	0.5	ug/l	112	110	80-125	2	30
Bromodichloromethane	0.1	U	0.1	0.5	ug/l	104	104	80-120	1	30
Bromoform	0.1	U	0.1	0.5	ug/l	108	108	64-134	0	30
Bromomethane	0.1	U	0.1	0.5	ug/l	93	91	62-126	2	30
n-Butanol	20	U	20.	50	ug/l	97	102	75-122	5	30
2-Butanone	1.0	U	1.0	5.0	ug/l	106	110	75-128	4	30
t-Butyl Alcohol	4.0	U	4.0	10	ug/l	104	112	77-130	7	30
n-Butylbenzene	0.1	U	0.1	0.5	ug/l	94	93	80-120	1	30
sec-Butylbenzene	0.1	U	0.1	0.5	ug/l	94	94	80-120	0	30
tert-Butylbenzene	0.1	U	0.1	0.5	ug/l	94	93	80-120	1	30
Carbon Disulfide	0.4	U	0.4	1.0	ug/l	110	106	70-128	4	30
Carbon Tetrachloride	0.1	U	0.1	0.5	ug/l	105	104	80-135	1	30
2-Chloro-1,3-butadiene	0.1	U	0.1	0.5	ug/l	84	84	78-120	1	30
Chlorobenzene	0.1	U	0.1	0.5	ug/l	98	99	80-120	1	30
Chloroethane	0.1	U	0.1	0.5	ug/l	94	93	68-120	1	30
Chloroform	0.1	U	0.1	0.5	ug/l	101	100	80-120	1	30
Chloromethane	0.2	U	0.2	0.5	ug/l	81	82	55-125	0	30
2-Chlorotoluene	0.1	U	0.1	0.5	ug/l	95	97	80-120	2	30
4-Chlorotoluene	0.1	U	0.1	0.5	ug/l	97	96	80-120	1	30
Cyclohexane	0.1	U	0.1	0.5	ug/l	99	99	69-120	1	30
Cyclohexanone	5.0	U	5.0	25	ug/l	44	59	35-120	28	30
1,2-Dibromo-3-chloropropane	0.2	U	0.2	0.5	ug/l	96	102	72-136	6	30
Dibromochloromethane	0.1	U	0.1	0.5	ug/l	109	110	80-126	2	30
1,2-Dibromoethane	0.1	U	0.1	0.5	ug/l	112	113	80-120	2	30
Dibromomethane	0.1	U	0.1	0.5	ug/l	110	111	80-120	1	30
trans-1,4-Dichloro-2-butene	1.0	U	1.0	5.0	ug/l	65	68	14-166	4	30
1,2-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	97	96	80-120	1	30
1,3-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	94	94	80-120	1	30
1,4-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	94	95	80-120	1	30
Dichlorodifluoromethane	0.1	U	0.1	0.5	ug/l	75	72	35-142	4	30
1,1-Dichloroethane	0.1	U	0.1	0.5	ug/l	97	96	80-120	0	30
1,2-Dichloroethane	0.1	U	0.1	0.5	ug/l	109	110	80-125	0	30
1,1-Dichloroethene	0.1	U	0.1	0.5	ug/l	103	100	80-120	3	30
cis-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	102	101	80-120	0	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1558863
Reported: 05/19/2015 16:18

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
trans-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	100	101	80-120	0	30
1,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	105	104	80-120	0	30
1,3-Dichloropropane	0.1	U	0.1	0.5	ug/l	105	107	80-120	2	30
2,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	98	97	75-122	2	30
1,1-Dichloropropene	0.1	U	0.1	0.5	ug/l	102	101	80-120	1	30
cis-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	104	102	80-120	2	30
trans-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	108	109	77-126	1	30
Ethyl Methacrylate	0.1	U	0.1	0.5	ug/l	107	110	70-120	3	30
Ethyl t-butyl ether	0.1	U	0.1	0.5	ug/l	99	98	76-120	1	30
Ethylbenzene	0.1	U	0.1	0.5	ug/l	95	96	80-120	0	30
Freon 113	0.2	U	0.2	0.5	ug/l	104	100	75-120	4	30
n-Heptane	0.2	U	0.2	0.5	ug/l	98	97	65-120	1	30
Hexachlorobutadiene	0.1	U	0.1	0.5	ug/l	95	95	74-123	0	30
n-Hexane	0.1	U	0.1	0.5	ug/l	101	101	60-126	0	30
2-Hexanone	1.0	U	1.0	5.0	ug/l	111	113	72-124	2	30
Isobutyl Alcohol	10	U	10.	25	ug/l	107	112	79-127	5	30
Isopropylbenzene	0.1	U	0.1	0.5	ug/l	96	95	80-120	0	30
p-Isopropyltoluene	0.1	U	0.1	0.5	ug/l	93	92	80-120	0	30
Methacrylonitrile	1.0	U	1.0	5.0	ug/l	106	113	77-132	6	30
Methyl Acetate	0.3	U	0.3	1.0	ug/l	113	114	59-130	1	30
Methyl Methacrylate	0.1	U	0.1	0.5	ug/l	98	105	74-125	7	30
Methyl Tertiary Butyl Ether	0.1	U	0.1	0.5	ug/l	107	108	80-120	1	30
4-Methyl-2-pentanone	1.0	U	1.0	5.0	ug/l	113	113	71-123	0	30
Methylcyclohexane	0.1	U	0.1	0.5	ug/l	102	100	80-120	1	30
Methylene Chloride	0.2	U	0.2	0.5	ug/l	102	103	80-120	1	30
Naphthalene	0.1	U	0.1	0.5	ug/l	96	97	72-120	1	30
Pentachloroethane	0.2	U	0.2	0.5	ug/l	105	105	80-123	0	30
Propionitrile	2.0	U	2.0	10	ug/l	107	113	76-135	5	30
n-Propylbenzene	0.1	U	0.1	0.5	ug/l	94	94	80-120	0	30
Styrene	0.1	U	0.1	0.5	ug/l	101	102	80-120	2	30
1,1,1,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	102	102	80-120	0	30
1,1,2,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	103	103	80-120	0	30
Tetrachloroethene	0.1	U	0.1	0.5	ug/l	99	98	80-120	0	30
Tetrahydrofuran	2.0	U	2.0	5.0	ug/l	98	107	73-127	8	30
Toluene	0.1	U	0.1	0.5	ug/l	97	98	80-120	1	30
1,2,3-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	88	87	75-120	1	30
1,2,4-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	91	91	80-120	1	30
1,1,1-Trichloroethane	0.1	U	0.1	0.5	ug/l	98	97	80-120	1	30
1,1,2-Trichloroethane	0.1	U	0.1	0.5	ug/l	108	108	80-120	1	30
Trichloroethene	0.1	U	0.1	0.5	ug/l	100	100	80-120	0	30
1,2,4-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	95	95	80-120	0	30
1,3,5-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	93	94	80-120	1	30
Vinyl Acetate	0.2	U	0.2	0.5	ug/l	94	94	18-200	0	30
Vinyl Chloride	0.1	U	0.1	0.5	ug/l	92	89	59-124	3	30
m+p-Xylene	0.1	U	0.1	0.5	ug/l	97	98	80-120	1	30
o-Xylene	0.1	U	0.1	0.5	ug/l	97	97	80-120	1	30
Batch number: 151270016A	Sample number(s): 7875539,7875541,7875543-7875546									
Picric Acid	50	U	50.	200	ug/l	104		70-130		
Batch number: 151290019A	Sample number(s): 7875539,7875541,7875543-7875546									
4-Amino-2,6-Dinitrotoluene	0.30	U	0.30	0.60	ug/l	96	92	83-129	5	30
2-Amino-4,6-Dinitrotoluene	0.20	U	0.20	0.60	ug/l	97	93	74-115	4	30
1,2-Dinitrobenzene	0.20	U	0.20	0.60	ug/l	103	99	76-145	4	30
1,3-Dinitrobenzene	0.20	U	0.20	0.60	ug/l	113	110	85-115	3	30
1,4-Dinitrobenzene	0.20	U	0.20	0.60	ug/l	100	96	85-115	5	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1558863
Reported: 05/19/2015 16:18

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
2,4-Dinitrotoluene	0.72	U	0.72	2.0	ug/l	102	98	84-115	3	30
2,6-Dinitrotoluene	0.45	U	0.45	1.3	ug/l	101	98	83-115	3	30
HMX	0.65	U	0.65	2.0	ug/l	107	96	67-123	10	30
Nitrobenzene	0.20	U	0.20	0.60	ug/l	103	98	80-115	5	30
Nitroglycerin	5.2	U	5.2	15	ug/l	98	93	78-115	5	30
1-Nitronaphthalene	0.20	U	0.20	0.60	ug/l	106	101	85-121	5	30
2-Nitrotoluene	0.25	U	0.25	0.75	ug/l	99	96	77-115	3	30
3-Nitrotoluene	0.40	U	0.40	1.2	ug/l	102	98	83-118	4	30
4-Nitrotoluene	0.60	U	0.60	1.2	ug/l	103	98	84-115	5	30
PETN	6.0	U	6.0	18	ug/l	103	98	86-115	5	30
RDX	0.20	U	0.20	0.50	ug/l	102	111	77-115	9	30
Tetryl	0.40	U	0.40	0.80	ug/l	106	103	53-116	3	30
1,3,5-Trinitrobenzene	0.20	U	0.20	0.60	ug/l	102	98	83-115	4	30
2,4,6-Trinitrotoluene	0.20	U	0.20	0.60	ug/l	101	99	83-115	2	30
Batch number: 151270041A	Sample number(s): 7875539,7875541,7875543-7875546									
Perchlorate	0.20	U	0.20	1.0	ug/l	92		80-120		
Batch number: 151260012A	Sample number(s): 7875539,7875541									
Ethane	1.0	U	1.0	5.0	ug/l	103		85-115		
Ethene	1.0	U	1.0	5.0	ug/l	102		83-115		
Methane	3.0	U	3.0	5.0	ug/l	109		85-115		
Batch number: 151281848002	Sample number(s): 7875539-7875545									
Calcium	0.0770	J	0.0334	0.200	mg/l	101		80-120		
Iron	0.0334	U	0.0334	0.200	mg/l	99		80-120		
Magnesium	0.0218	J	0.0167	0.100	mg/l	100		80-120		
Manganese	0.00083	U	0.00083	0.0050	mg/l	99		80-120		
Potassium	0.133	U	0.133	0.500	mg/l	100		80-120		
Sodium	0.167	U	0.167	1.00	mg/l	100		80-120		
Batch number: 151281848004	Sample number(s): 7875546									
Potassium	0.133	U	0.133	0.500	mg/l	98		80-120		
Sodium	0.167	U	0.167	1.00	mg/l	99		80-120		
Batch number: 151321848002	Sample number(s): 7875546									
Calcium	0.0557	J	0.0334	0.200	mg/l	104		80-120		
Magnesium	0.0167	U	0.0167	0.100	mg/l	102		80-120		
Batch number: 15126667151B	Sample number(s): 7875539,7875541,7875543-7875546									
Chloride	0.20	U	0.20	0.40	mg/l	104		90-110		
Nitrate Nitrogen	0.050	U	0.050	0.10	mg/l	103		90-110		
Nitrite Nitrogen	0.050	U	0.050	0.10	mg/l	100		90-110		
Sulfate	0.30	U	0.30	1.0	mg/l	102		90-110		
Batch number: 15127049505B	Sample number(s): 7875539,7875541									
Total Organic Carbon	0.50	U	0.50	1.0	mg/l	108		91-113		
Batch number: 15126023502A	Sample number(s): 7875539,7875541									
Biochemical Oxygen Demand						104		85-115		
Batch number: 15127002103A	Sample number(s): 7875539,7875541,7875543-7875546									
Total Alkalinity to pH 4.5	0.70	U	0.70	2.0	mg/l as CaCO3	98		90-110		
Batch number: 15127023001A	Sample number(s): 7875539,7875541,7875543-7875545									

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(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1558863
Reported: 05/19/2015 16:18

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Sulfide	0.054	U	0.054	0.16	mg/l	106		90-110		
Batch number: 15127023002A	Sample number(s): 7875546									
Sulfide	0.054	U	0.054	0.16	mg/l	107		90-110		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc		DUP Conc		DUP RPD	Dup RPD Max
Batch number: C151323AA	Sample number(s): 7875539,7875541,7875543-7875547 BKG: 7875539										
Acetone						3.0	U	3.0	U	0 (1)	30
Acetonitrile						7.0	U	7.0	U	0 (1)	30
Acrolein						5.0	U	5.0	U	0 (1)	30
Acrylonitrile						1.0	U	1.0	U	0 (1)	30
Allyl Chloride						0.1	U	0.1	U	0 (1)	30
t-Amyl methyl ether						0.1	U	0.1	U	0 (1)	30
Benzene						0.1	U	0.1	U	0 (1)	30
Benzyl Chloride						0.1	U	0.1	U	0 (1)	30
Bromobenzene						0.1	U	0.1	U	0 (1)	30
Bromochloromethane						0.1	U	0.1	U	0 (1)	30
Bromodichloromethane						0.1	U	0.1	U	0 (1)	30
Bromoform						0.1	U	0.1	U	0 (1)	30
Bromomethane						0.1	U	0.1	U	0 (1)	30
n-Butanol						20	U	20	U	0 (1)	30
2-Butanone						1.0	U	1.0	U	0 (1)	30
t-Butyl Alcohol						4.0	U	4.0	U	0 (1)	30
n-Butylbenzene						0.1	U	0.1	U	0 (1)	30
sec-Butylbenzene						0.1	U	0.1	U	0 (1)	30
tert-Butylbenzene						0.1	U	0.1	U	0 (1)	30
Carbon Disulfide						0.4	U	0.4	U	0 (1)	30
Carbon Tetrachloride						0.1	U	0.1	U	0 (1)	30
2-Chloro-1,3-butadiene						0.1	U	0.1	U	0 (1)	30
Chlorobenzene						0.1	U	0.1	U	0 (1)	30
Chloroethane						0.1	U	0.1	U	0 (1)	30
Chloroform						0.1	U	0.1	U	0 (1)	30
Chloromethane						0.2	U	0.2	U	0 (1)	30
2-Chlorotoluene						0.1	U	0.1	U	0 (1)	30
4-Chlorotoluene						0.1	U	0.1	U	0 (1)	30
Cyclohexane						0.1	J	0.1	U	200* (1)	30
Cyclohexanone						5.0	U	5.0	U	0 (1)	30
1,2-Dibromo-3-chloropropane						0.2	U	0.2	U	0 (1)	30
Dibromochloromethane						0.1	U	0.1	U	0 (1)	30
1,2-Dibromoethane						0.1	U	0.1	U	0 (1)	30
Dibromomethane						0.1	U	0.1	U	0 (1)	30
trans-1,4-Dichloro-2-butene						1.0	U	1.0	U	0 (1)	30
1,2-Dichlorobenzene						0.1	U	0.1	U	0 (1)	30
1,3-Dichlorobenzene						0.1	U	0.1	U	0 (1)	30
1,4-Dichlorobenzene						0.1	U	0.1	U	0 (1)	30
Dichlorodifluoromethane						0.1	U	0.1	U	0 (1)	30
1,1-Dichloroethane						0.1	U	0.1	U	0 (1)	30

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Quality Control Summary

Client Name: Altamont Environmental Group Number: 1558863
Reported: 05/19/2015 16:18

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc		DUP Conc		DUP RPD	Dup RPD Max
1,2-Dichloroethane						0.2	J	0.2	J	3 (1)	30
1,1-Dichloroethene						0.1	U	0.1	U	0 (1)	30
cis-1,2-Dichloroethene						0.1	U	0.1	U	0 (1)	30
trans-1,2-Dichloroethene						0.1	U	0.1	U	0 (1)	30
1,2-Dichloropropane						0.1	U	0.1	U	0 (1)	30
1,3-Dichloropropane						0.1	U	0.1	U	0 (1)	30
2,2-Dichloropropane						0.1	U	0.1	U	0 (1)	30
1,1-Dichloropropene						0.1	U	0.1	U	0 (1)	30
cis-1,3-Dichloropropene						0.1	U	0.1	U	0 (1)	30
trans-1,3-Dichloropropene						0.1	U	0.1	U	0 (1)	30
Ethyl Methacrylate						0.1	U	0.1	U	0 (1)	30
Ethyl t-butyl ether						0.1	U	0.1	U	0 (1)	30
Ethylbenzene						0.1	U	0.1	U	0 (1)	30
Freon 113						0.2	U	0.2	U	0 (1)	30
n-Heptane						0.2	U	0.2	U	0 (1)	30
Hexachlorobutadiene						0.1	U	0.1	U	0 (1)	30
n-Hexane						0.1	U	0.1	U	0 (1)	30
2-Hexanone						1.0	U	1.0	U	0 (1)	30
Isobutyl Alcohol						10	U	10	U	0 (1)	30
Isopropylbenzene						0.1	U	0.1	U	0 (1)	30
p-Isopropyltoluene						0.1	U	0.1	U	0 (1)	30
Methacrylonitrile						1.0	U	1.0	U	0 (1)	30
Methyl Acetate						0.3	U	0.3	U	0 (1)	30
Methyl Methacrylate						0.1	U	0.1	U	0 (1)	30
Methyl Tertiary Butyl Ether						0.1	U	0.1	U	0 (1)	30
4-Methyl-2-pentanone						1.0	U	1.0	U	0 (1)	30
Methylcyclohexane						0.1	U	0.1	U	0 (1)	30
Methylene Chloride						0.2	U	0.2	U	0 (1)	30
Naphthalene						0.1	U	0.1	U	0 (1)	30
Pentachloroethane						0.2	U	0.2	U	0 (1)	30
Propionitrile						2.0	U	2.0	U	0 (1)	30
n-Propylbenzene						0.1	U	0.1	U	0 (1)	30
Styrene						0.1	U	0.1	U	0 (1)	30
1,1,1,2-Tetrachloroethane						0.1	U	0.1	U	0 (1)	30
1,1,2,2-Tetrachloroethane						0.1	U	0.1	U	0 (1)	30
Tetrachloroethene						0.1	U	0.1	U	0 (1)	30
Tetrahydrofuran						2.0	U	2.0	U	0 (1)	30
Toluene						0.1	U	0.1	U	0 (1)	30
1,2,3-Trichlorobenzene						0.1	U	0.1	U	0 (1)	30
1,2,4-Trichlorobenzene						0.1	U	0.1	U	0 (1)	30
1,1,1-Trichloroethane						0.1	U	0.1	U	0 (1)	30
1,1,2-Trichloroethane						0.1	U	0.1	U	0 (1)	30
Trichloroethene						0.1	U	0.1	U	0 (1)	30
1,2,4-Trimethylbenzene						0.1	U	0.1	U	0 (1)	30
1,3,5-Trimethylbenzene						0.1	U	0.1	U	0 (1)	30
Vinyl Acetate						0.2	U	0.2	U	0 (1)	30
Vinyl Chloride						0.1	U	0.1	U	0 (1)	30
m+p-Xylene						0.1	U	0.1	U	0 (1)	30
o-Xylene						0.1	U	0.1	U	0 (1)	30

Batch number: 151270016A Sample number(s): 7875539,7875541,7875543-7875546 UNSPK: 7875539

Picric Acid	104	104	70-130	0	30

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Quality Control Summary

Client Name: Altamont Environmental Group Number: 1558863
Reported: 05/19/2015 16:18

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: 151270041A	Sample number(s): 7875539,7875541,7875543-7875546 UNSPK: P875533								
Perchlorate	95	92	80-120	3	15				
Batch number: 151260012A	Sample number(s): 7875539,7875541 UNSPK: P875533								
Ethane	102	101	53-122	1	20				
Ethene	106	108	35-162	1	20				
Methane	104	104	46-129	0	20				
Batch number: 151281848002	Sample number(s): 7875539-7875545 UNSPK: 7875543 BKG: 7875543								
Calcium	101	101	75-125	0	20	2.71	2.75	2	20
Iron	108	107	75-125	1	20	0.600	0.610	2 (1)	20
Magnesium	101	101	75-125	0	20	1.76	1.79	2	20
Manganese	100	98	75-125	1	20	0.0212	0.0220	3 (1)	20
Potassium	101	101	75-125	0	20	0.992	0.991	0 (1)	20
Sodium	98	97	75-125	1	20	3.62	3.62	0 (1)	20
Batch number: 151281848004	Sample number(s): 7875546 UNSPK: P876734 BKG: P876734								
Potassium	97	100	75-125	2	20	6.78	6.87	1	20
Sodium	96	100	75-125	2	20	17.2	17.3	1	20
Batch number: 151321848002	Sample number(s): 7875546 UNSPK: P873798 BKG: P873798								
Calcium	42 (2)	-54 (2)	75-125	1	20	289	272	6	20
Magnesium	12 (2)	-87 (2)	75-125	1	20	204	193	6	20
Batch number: 15126667151B	Sample number(s): 7875539,7875541,7875543-7875546 UNSPK: 7875543 BKG: 7875543								
Chloride	83*		90-110			3.0	3.0	2 (1)	20
Nitrate Nitrogen	96		90-110			0.25 U	0.25 U	0 (1)	20
Nitrite Nitrogen	92		90-110			0.25 U	0.25 U	0 (1)	20
Sulfate	91		90-110			3.0 J	3.1 J	3 (1)	20
Batch number: 15127049505B	Sample number(s): 7875539,7875541 UNSPK: 7875541 BKG: 7875541								
Total Organic Carbon	119		63-142			0.50 U	0.50 U	0 (1)	4
Batch number: 15126023502A	Sample number(s): 7875539,7875541 UNSPK: P874939 BKG: P874933								
Biochemical Oxygen Demand	111	113	85-115	1	8	22.8	23.6	3 (1)	15
Batch number: 15127002103A	Sample number(s): 7875539,7875541,7875543-7875546 UNSPK: P876721 BKG: P876721								
Total Alkalinity to pH 4.5	94	93	90-110	1	5	22.1	21.2	4	5
Batch number: 15127023001A	Sample number(s): 7875539,7875541,7875543-7875545 UNSPK: P874565 BKG: P874565								
Sulfide	70*	81*	90-110	15	16	0.054 U	0.054 U	0 (1)	5
Batch number: 15127023002A	Sample number(s): 7875546 UNSPK: 7875546 BKG: 7875546								
Sulfide	88*	99	90-110	12	16	0.054 U	0.054 U	0 (1)	5

Surrogate Quality Control

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1558863
Reported: 05/19/2015 16:18

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed
unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: GC/MS Volatiles 25-ml purge
Batch number: C151323AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
7875539	107	111	99	97
7875541	107	111	98	97
7875543	108	110	99	96
7875544	110	113	98	98
7875545	108	111	98	97
7875546	109	111	98	96
7875547	108	111	98	96
Blank	107	112	99	98
DUP	109	112	99	97
LCS	106	110	100	100
LCSD	105	108	100	102
Limits:	77-114	74-113	77-110	78-110

Analysis Name: Picric Acid
Batch number: 151270016A

	2-NMX
7875539	100
7875541	101
7875543	101
7875544	101
7875545	102
7875546	102
Blank	100
LCS	99
MS	101
MSD	100
Limits:	40-157

Analysis Name: Nitroaromatics/Amines
Batch number: 151290019A

	2-Nitro-m-xylene
7875539	100
7875541	102
7875543	101
7875544	101
7875545	95
7875546	96
Blank	100
LCS	102
LCSD	99
Limits:	60-137

Analysis Name: Dissolved Gases
Batch number: 151260012A

	Propene
7875539	95
7875541	98
Blank	103
LCS	102

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1558863
Reported: 05/19/2015 16:18

Surrogate Quality Control

MS	92
MSD	95
Limits:	47-116

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

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Environmental Services Analysis Request/Chain of Custody

Acct. #: 12184 Group #: 1558863 Sample #: 787539-47

COC#: 11872

Client: **Altamont Environmental**

Project Name/#: Chemtronics

Project Manager: Amy Huffman P.O. #: 2115.231

Sampler: AH/MS

Phone #: 828 281 3550 Quote #: 207662

State where sample(s) were collected: NC

For Lab Use Only

SF#: 234303

SCR#: 170768

Preservation Codes: H = HCl, T = Thiosulfate, N = HNO_3, B = NaOH, S = H_2SO_4, P = H_3PO_4, O = Other

Sample Identification	Collection Date	Collection Time	Grab	Composite	Sediment	Ground	Surface	Potable	NPDES	Soil	Water	Other:	Total # of Containers	GC/MS VOAs (8260)	Ca, Mg, K, Na (6010)	Diss. Fe, Mn (6010)	Nitroaromatics/Amines (8330)	Picric Acid (8015B)	Perchlorate (6850)	S2- (4500 S2 D)	BOD (SM 5210 B)	Bicarbonate Alk (SM 2320B)	Cl-, SO4-, NO2, NO3 (300.0)	TOC (SM20 5310 C)	Dissolved Gases (8015)	Remarks
														H	N	N				B				P	H	
MW284-K25CD	5/5/15	1248	X								X		17	X	X	X	X	X	X	X	X	X	X	X	X	
MW283-K25CD	5/5/15	1511	X								X		17	X	X	X	X	X	X	X	X	X	X	X	X	
GBW 9-J25	5/5/15	1350	X								X		11	X	X		X	X	X	X		X	X		X	Please change
GBW 8-K26	5/5/15	1310	X								X		11	X	X		X	X	X	X		X	X			~~rush analysis~~
GBW 7-M21	5/5/15	1135	X								X		11	X	X		X	X	X	X		X	X			for DRGs
GBW 4-N23	5/5/15	1100	X								X		11	X	X		X	X	X	X		X	X			hold time
Trip Blank	5/5/15										X		2	X												to 48 hrs

Turnaround Time Requested (TAT) (please check): Standard ☑ RUSH ☐

(RUSH TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed:

E-mail address to send RUSH results:

Data Package Options (please check if required)

Type I (Validation/non-CLP) ☐ MA MCP ☐ TX TRRP - 13 ☐

Type III (Reduced non-CLP) ☐ CT RCP ☐

Type IV (CLP SOW) ☐ ASP Type A ☐

Type VI (Raw Data Only) ☐ ASP Type B ☐

EDD Format:

If site-specific QC (MS/MSD/Dup) required, indicate QC samples and submit triplicate volume.

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	4/23/15	1312			
[signature]	5/5/15	1700			
			[signature]	5.6.15	940

Airbill No.:

Relinquished by Commercial Carrier:

UPS _____ FedEx X Other _____

Temperature upon receipt 0.5 - 0.9 °C

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Laboratory Data Qualifiers:

B - Analyte detected in the blank
C - Result confirmed by reanalysis
E - Concentration exceeds the calibration range
J (or G, I, X) - estimated value ≥ the Method Detection Limit (MDL or DL) and the < Limit of Quantitation (LOQ or RL)
P - Concentration difference between the primary and confirmation column >40%. The lower result is reported.
U - Analyte was not detected at the value indicated
V - Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference…

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, ISO17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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ANALYTICAL RESULTS

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

Altamont Environmental
231 Haywood Street
Asheville NC 28801

May 23, 2015

Project: Chemtronics Site

Submittal Date: 05/07/2015
Group Number: 1559295
PO Number: 2115.231
State of Sample Origin: NC

Client Sample Description	Lancaster Labs (LL) #
MW281-L23CD Grab Groundwater	7877351
MW281-L23CD Filtered Grab Groundwater	7877352
MW282-K23CD Grab Groundwater	7877353
MW282-K23CD Filtered Grab Groundwater	7877354
Trip Blank Water	7877355

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Regulatory agencies do not accredit laboratories for all methods, analytes, and matrices. Our scopes of accreditation can be viewed at http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/ .

ELECTRONIC COPY TO Altamont Environmental Attn: Amy Huffman

Respectfully Submitted,

Nancy Jean Bornholm
Principal Specialist

(717) 556-7250

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Analysis Report

Sample Description: MW281-L23CD Grab Groundwater Chemtronics Site

LL Sample # WW 7877351
LL Group # 1559295
Account # 12184

Project Name: Chemtronics Site

Collected: 05/06/2015 10:30 by PB

Altamont Environmental
231 Haywood Street
Asheville NC 28801

Submitted: 05/07/2015 09:20
Reported: 05/23/2015 15:37

CSL23

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.1	U	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	1.0	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	1.0		0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	5.6		0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.1	U	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW281-L23CD Grab Groundwater Chemtronics Site

LL Sample # WW 7877351
LL Group # 1559295
Account # 12184

Project Name: Chemtronics Site

Collected: 05/06/2015 10:30 by PB

Submitted: 05/07/2015 09:20
Reported: 05/23/2015 15:37

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CSL23

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.1	U	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1
Explosives	**SW-846 8015B**		ug/l		ug/l	ug/l	
02265	Picric Acid	88-89-1	50	U	50	200	1
Explosives	**SW-846 8330**		ug/l		ug/l	ug/l	
06916	4-Amino-2,6-Dinitrotoluene	19406-51-0	0.30	U	0.30	0.60	1
06916	2-Amino-4,6-Dinitrotoluene	35572-78-2	0.20	U	0.20	0.60	1
06916	1,2-Dinitrobenzene	528-29-0	0.20	U	0.20	0.60	1
06916	1,3-Dinitrobenzene	99-65-0	0.20	U	0.20	0.60	1
06916	1,4-Dinitrobenzene	100-25-4	0.20	U	0.20	0.60	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW281-L23CD Grab Groundwater Chemtronics Site

LL Sample # WW 7877351
LL Group # 1559295
Account # 12184

Project Name: Chemtronics Site

Collected: 05/06/2015 10:30 by PB

Altamont Environmental
231 Haywood Street
Asheville NC 28801

Submitted: 05/07/2015 09:20
Reported: 05/23/2015 15:37

CSL23

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
Explosives	**SW-846 8330**		**ug/l**		**ug/l**	**ug/l**	
06916	2,4-Dinitrotoluene	121-14-2	0.72	U	0.72	2.0	1
06916	2,6-Dinitrotoluene	606-20-2	0.45	U	0.45	1.3	1
06916	HMX	2691-41-0	0.65	U	0.65	2.0	1
06916	Nitrobenzene	98-95-3	0.20	U	0.20	0.60	1
06916	Nitroglycerin	55-63-0	5.2	U	5.2	15	1
06916	1-Nitronaphthalene	86-57-7	0.20	U	0.20	0.60	1
06916	2-Nitrotoluene	88-72-2	0.25	U	0.25	0.75	1
06916	3-Nitrotoluene	99-08-1	0.40	U	0.40	1.2	1
06916	4-Nitrotoluene	99-99-0	0.60	U	0.60	1.2	1
06916	PETN	78-11-5	6.0	U	6.0	18	1
06916	RDX	121-82-4	0.20	U	0.20	0.50	1
06916	Tetryl	479-45-8	0.40	U	0.40	0.80	1
06916	1,3,5-Trinitrobenzene	99-35-4	0.20	U	0.20	0.60	1
06916	2,4,6-Trinitrotoluene	118-96-7	0.20	U	0.20	0.60	1
Perchlorate	**SW-846 6850 1/2007**		**ug/l**		**ug/l**	**ug/l**	
06386	Perchlorate	14797-73-0	0.20	U	0.20	1.0	1
GC Miscellaneous	**SW-846 8015B modified**		**ug/l**		**ug/l**	**ug/l**	
07105	Ethane	74-84-0	1.0	U	1.0	5.0	1
07105	Ethene	74-85-1	1.0	U	1.0	5.0	1
07105	Methane	74-82-8	4.7	J	3.0	5.0	1
Metals	**SW-846 6010B**		**mg/l**		**mg/l**	**mg/l**	
01750	Calcium	7440-70-2	42.6		0.0334	0.200	1
01757	Magnesium	7439-95-4	4.38		0.0167	0.100	1
01762	Potassium	7440-09-7	4.18		0.133	0.500	1
01767	Sodium	7440-23-5	3.51		0.167	1.00	1
Wet Chemistry	**EPA 300.0**		**mg/l**		**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	3.1		1.0	2.0	5
00368	Nitrate Nitrogen	14797-55-8	0.74		0.25	0.50	5
01506	Nitrite Nitrogen	14797-65-0	0.25	U	0.25	0.50	5
00228	Sulfate	14808-79-8	7.8		1.5	5.0	5
	SM 5310 C-2000		**mg/l**		**mg/l**	**mg/l**	
00273	Total Organic Carbon	n.a.	0.96	J	0.50	1.0	1
	SM 2320 B-1997		**mg/l as CaCO3**		**mg/l as CaCO3**	**mg/l as CaCO3**	
12150	Total Alkalinity to pH 4.5	n.a.	125		0.70	2.0	1
12149	Bicarbonate Alkalinity	n.a.	125		0.70	2.0	1
	SM 4500-S2 D-2000		**mg/l**		**mg/l**	**mg/l**	
00230	Sulfide	18496-25-8	0.054	U	0.054	0.16	1
	SM 5210 B-2001		**mg/l**		**mg/l**	**mg/l**	
00235	Biochemical Oxygen Demand	n.a.	5.1	U	5.1	5.1	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW281-L23CD Grab Groundwater Chemtronics Site

LL Sample # WW 7877351
LL Group # 1559295
Account # 12184

Project Name: Chemtronics Site

Collected: 05/06/2015 10:30 by PB

Submitted: 05/07/2015 09:20
Reported: 05/23/2015 15:37

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CSL23

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C151323AA	05/13/2015 02:42	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C151323AA	05/13/2015 02:42	Kevin A Sposito	1
02265	Picric Acid	SW-846 8015B	1	151270040A	05/07/2015 15:25	James H Place	1
06916	Nitroaromatics/Amines	SW-846 8330	1	151290019A	05/16/2015 15:19	James H Place	1
06386	Perchlorate	SW-846 6850 1/2007	1	151320016A	05/12/2015 16:02	Richard A Shober	1
06915	Nitroaromatics/Amines Wat Ext	SW-846 8330	1	151290019A	05/11/2015 17:00	Kelli M Barto	1
07105	Dissolved Gases	SW-846 8015B modified	1	151270039A	05/07/2015 15:56	Kristen N Brandt	1
01750	Calcium	SW-846 6010B	2	151321848002	05/14/2015 05:31	Tara L Snyder	1
01757	Magnesium	SW-846 6010B	1	151321848002	05/14/2015 05:31	Tara L Snyder	1
01762	Potassium	SW-846 6010B	1	151281848004	05/11/2015 17:01	Suzanne M Will	1
01767	Sodium	SW-846 6010B	1	151281848004	05/11/2015 17:01	Suzanne M Will	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	1	151281848004	05/10/2015 23:00	Annamaria Kuhns	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	2	151321848002	05/13/2015 22:00	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	15127987132A	05/07/2015 17:40	Clinton M Wilson	5
00368	Nitrate Nitrogen	EPA 300.0	1	15127987132A	05/07/2015 17:40	Clinton M Wilson	5
01506	Nitrite Nitrogen	EPA 300.0	1	15127987132A	05/07/2015 17:40	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	15127987132A	05/07/2015 17:40	Clinton M Wilson	5
00273	Total Organic Carbon	SM 5310 C-2000	1	15132049501B	05/12/2015 09:12	James S Mathiot	1
12150	Total Alkalinity to pH 4.5	SM 2320 B-1997	1	15132005102A	05/12/2015 19:05	Michele L Graham	1
12149	Bicarbonate Alkalinity	SM 2320 B-1997	1	15132005102A	05/12/2015 19:05	Michele L Graham	1
00230	Sulfide	SM 4500-S2 D-2000	1	15131023001A	05/11/2015 12:00	Michele L Graham	1
00235	Biochemical Oxygen Demand	SM 5210 B-2001	1	15128023501A	05/08/2015 07:45	Susan E Hibner	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW281-L23CD Filtered Grab Groundwater Chemtronics Site

LL Sample # WW 7877352
LL Group # 1559295
Account # 12184

Project Name: Chemtronics Site

Collected: 05/06/2015 10:30 by PB

Submitted: 05/07/2015 09:20
Reported: 05/23/2015 15:37

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010B**		**mg/l**	**mg/l**	**mg/l**	
01754	Iron	7439-89-6	0.0334 U	0.0334	0.200	1
07058	Manganese	7439-96-5	0.151	0.00083	0.0050	1

General Sample Comments

State of North Carolina Lab Certification No. 521
This sample was field filtered for dissolved metals.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01754	Iron	SW-846 6010B	2	151321848002	05/14/2015 05:34	Tara L Snyder	1
07058	Manganese	SW-846 6010B	1	151281848004	05/11/2015 17:04	Suzanne M Will	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	1	151281848004	05/10/2015 23:00	Annamaria Kuhns	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	2	151321848002	05/13/2015 22:00	Annamaria Kuhns	1

*=This limit was used in the evaluation of the final result

Sample Description: MW282-K23CD Grab Groundwater Chemtronics Site

LL Sample # WW 7877353
LL Group # 1559295
Account # 12184

Project Name: Chemtronics Site

Collected: 05/06/2015 10:45 by PB

Submitted: 05/07/2015 09:20
Reported: 05/23/2015 15:37

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CSK23

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		**ug/l**		**ug/l**	**ug/l**	
02898	Acetone	67-64-1	39		15	25	5
02898	Acetonitrile	75-05-8	35	U	35	100	5
02898	Acrolein	107-02-8	25	U	25	130	5
02898	Acrylonitrile	107-13-1	5.0	U	5.0	25	5
02898	Allyl Chloride	107-05-1	0.5	U	0.5	2.5	5
02898	t-Amyl methyl ether	994-05-8	0.5	U	0.5	2.5	5
02898	Benzene	71-43-2	0.5	U	0.5	2.5	5
02898	Benzyl Chloride	100-44-7	0.5	U	0.5	2.5	5
02898	Bromobenzene	108-86-1	0.5	U	0.5	2.5	5
02898	Bromochloromethane	74-97-5	0.5	U	0.5	2.5	5
02898	Bromodichloromethane	75-27-4	0.5	U	0.5	2.5	5
02898	Bromoform	75-25-2	0.5	U	0.5	2.5	5
02898	Bromomethane	74-83-9	0.5	U	0.5	2.5	5
02898	n-Butanol	71-36-3	100	U	100	250	5
02898	2-Butanone	78-93-3	5.0	U	5.0	25	5
02898	t-Butyl Alcohol	75-65-0	20	U	20	50	5
02898	n-Butylbenzene	104-51-8	0.5	U	0.5	2.5	5
02898	sec-Butylbenzene	135-98-8	0.5	U	0.5	2.5	5
02898	tert-Butylbenzene	98-06-6	0.5	U	0.5	2.5	5
02898	Carbon Disulfide	75-15-0	2.0	U	2.0	5.0	5
02898	Carbon Tetrachloride	56-23-5	0.5	U	0.5	2.5	5
02898	2-Chloro-1,3-butadiene	126-99-8	0.5	U	0.5	2.5	5
02898	Chlorobenzene	108-90-7	0.5	U	0.5	2.5	5
02898	Chloroethane	75-00-3	0.5	U	0.5	2.5	5
02898	Chloroform	67-66-3	3.6		0.5	2.5	5
02898	Chloromethane	74-87-3	1.0	U	1.0	2.5	5
02898	2-Chlorotoluene	95-49-8	0.5	U	0.5	2.5	5
02898	4-Chlorotoluene	106-43-4	0.5	U	0.5	2.5	5
02898	Cyclohexane	110-82-7	0.5	U	0.5	2.5	5
02898	Cyclohexanone	108-94-1	25	U	25	130	5
02898	1,2-Dibromo-3-chloropropane	96-12-8	1.0	U	1.0	2.5	5
02898	Dibromochloromethane	124-48-1	0.5	U	0.5	2.5	5
02898	1,2-Dibromoethane	106-93-4	0.5	U	0.5	2.5	5
02898	Dibromomethane	74-95-3	0.5	U	0.5	2.5	5
02898	trans-1,4-Dichloro-2-butene	110-57-6	5.0	U	5.0	25	5
02898	1,2-Dichlorobenzene	95-50-1	0.5	U	0.5	2.5	5
02898	1,3-Dichlorobenzene	541-73-1	0.5	U	0.5	2.5	5
02898	1,4-Dichlorobenzene	106-46-7	0.5	U	0.5	2.5	5
02898	Dichlorodifluoromethane	75-71-8	0.5	U	0.5	2.5	5
02898	1,1-Dichloroethane	75-34-3	0.5	U	0.5	2.5	5
02898	1,2-Dichloroethane	107-06-2	0.5	U	0.5	2.5	5
02898	1,1-Dichloroethene	75-35-4	0.5	U	0.5	2.5	5
02898	cis-1,2-Dichloroethene	156-59-2	0.5	U	0.5	2.5	5
02898	trans-1,2-Dichloroethene	156-60-5	0.5	U	0.5	2.5	5
02898	1,2-Dichloropropane	78-87-5	0.5	U	0.5	2.5	5
02898	1,3-Dichloropropane	142-28-9	0.5	U	0.5	2.5	5
02898	2,2-Dichloropropane	594-20-7	0.5	U	0.5	2.5	5
02898	1,1-Dichloropropene	563-58-6	0.5	U	0.5	2.5	5
02898	cis-1,3-Dichloropropene	10061-01-5	0.5	U	0.5	2.5	5
02898	trans-1,3-Dichloropropene	10061-02-6	0.5	U	0.5	2.5	5

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW282-K23CD Grab Groundwater Chemtronics Site

LL Sample # WW 7877353
LL Group # 1559295
Account # 12184

Project Name: Chemtronics Site

Collected: 05/06/2015 10:45 by PB

Altamont Environmental
231 Haywood Street
Asheville NC 28801

Submitted: 05/07/2015 09:20
Reported: 05/23/2015 15:37

CSK23

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	0.5	U	0.5	2.5	5
02898	Ethyl t-butyl ether	637-92-3	0.5	U	0.5	2.5	5
02898	Ethylbenzene	100-41-4	0.7	J	0.5	2.5	5
02898	Freon 113	76-13-1	1.0	U	1.0	2.5	5
02898	n-Heptane	142-82-5	1.0	U	1.0	2.5	5
02898	Hexachlorobutadiene	87-68-3	0.5	U	0.5	2.5	5
02898	n-Hexane	110-54-3	0.5	U	0.5	2.5	5
02898	2-Hexanone	591-78-6	5.0	U	5.0	25	5
02898	Isobutyl Alcohol	78-83-1	50	U	50	130	5
02898	Isopropylbenzene	98-82-8	0.5	U	0.5	2.5	5
02898	p-Isopropyltoluene	99-87-6	0.5	U	0.5	2.5	5
02898	Methacrylonitrile	126-98-7	5.0	U	5.0	25	5
02898	Methyl Acetate	79-20-9	1.5	U	1.5	5.0	5
02898	Methyl Methacrylate	80-62-6	0.5	U	0.5	2.5	5
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.5	U	0.5	2.5	5
02898	4-Methyl-2-pentanone	108-10-1	5.0	U	5.0	25	5
02898	Methylcyclohexane	108-87-2	0.5	U	0.5	2.5	5
02898	Methylene Chloride	75-09-2	1.0	U	1.0	2.5	5
02898	Naphthalene	91-20-3	0.5	U	0.5	2.5	5
02898	Pentachloroethane	76-01-7	1.0	U	1.0	2.5	5
02898	Propionitrile	107-12-0	10	U	10	50	5
02898	n-Propylbenzene	103-65-1	0.5	U	0.5	2.5	5
02898	Styrene	100-42-5	0.5	U	0.5	2.5	5
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.5	U	0.5	2.5	5
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.5	U	0.5	2.5	5
02898	Tetrachloroethene	127-18-4	0.5	U	0.5	2.5	5
02898	Tetrahydrofuran	109-99-9	10	U	10	25	5
02898	Toluene	108-88-3	0.5	U	0.5	2.5	5
02898	1,2,3-Trichlorobenzene	87-61-6	0.5	U	0.5	2.5	5
02898	1,2,4-Trichlorobenzene	120-82-1	0.5	U	0.5	2.5	5
02898	1,1,1-Trichloroethane	71-55-6	0.5	U	0.5	2.5	5
02898	1,1,2-Trichloroethane	79-00-5	0.5	U	0.5	2.5	5
02898	Trichloroethene	79-01-6	0.5	U	0.5	2.5	5
02898	1,2,4-Trimethylbenzene	95-63-6	0.5	U	0.5	2.5	5
02898	1,3,5-Trimethylbenzene	108-67-8	0.5	U	0.5	2.5	5
02898	Vinyl Acetate	108-05-4	1.0	U	1.0	2.5	5
02898	Vinyl Chloride	75-01-4	0.5	U	0.5	2.5	5
02898	m+p-Xylene	1330-20-7	0.9	J	0.5	2.5	5
02898	o-Xylene	95-47-6	0.5	U	0.5	2.5	5
Reporting limits were raised due to sample foaming.							
Explosives	**SW-846 8015B**		ug/l		ug/l	ug/l	
02265	Picric Acid	88-89-1	50	U	50	200	1
Explosives	**SW-846 8330**		ug/l		ug/l	ug/l	
06916	4-Amino-2,6-Dinitrotoluene	19406-51-0	0.30	U	0.30	0.60	1
06916	2-Amino-4,6-Dinitrotoluene	35572-78-2	0.20	U	0.20	0.60	1
06916	1,2-Dinitrobenzene	528-29-0	0.20	U	0.20	0.60	1
06916	1,3-Dinitrobenzene	99-65-0	0.20	U	0.20	0.60	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW282-K23CD Grab Groundwater Chemtronics Site

LL Sample # WW 7877353
LL Group # 1559295
Account # 12184

Project Name: Chemtronics Site

Collected: 05/06/2015 10:45 by PB

Submitted: 05/07/2015 09:20
Reported: 05/23/2015 15:37

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CSK23

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
Explosives	**SW-846 8330**		**ug/l**		**ug/l**	**ug/l**	
06916	1,4-Dinitrobenzene	100-25-4	0.20	U	0.20	0.60	1
06916	2,4-Dinitrotoluene	121-14-2	0.72	U	0.72	2.0	1
06916	2,6-Dinitrotoluene	606-20-2	0.45	U	0.45	1.3	1
06916	HMX	2691-41-0	0.65	U	0.65	2.0	1
06916	Nitrobenzene	98-95-3	0.20	U	0.20	0.60	1
06916	Nitroglycerin	55-63-0	5.2	U	5.2	15	1
06916	1-Nitronaphthalene	86-57-7	0.20	U	0.20	0.60	1
06916	2-Nitrotoluene	88-72-2	0.25	U	0.25	0.75	1
06916	3-Nitrotoluene	99-08-1	0.40	U	0.40	1.2	1
06916	4-Nitrotoluene	99-99-0	0.60	U	0.60	1.2	1
06916	PETN	78-11-5	6.0	U	6.0	18	1
06916	RDX	121-82-4	0.20	U	0.20	0.50	1
06916	Tetryl	479-45-8	0.40	U	0.40	0.80	1
06916	1,3,5-Trinitrobenzene	99-35-4	0.20	U	0.20	0.60	1
06916	2,4,6-Trinitrotoluene	118-96-7	0.20	U	0.20	0.60	1
Perchlorate	**SW-846 6850 1/2007**		**ug/l**		**ug/l**	**ug/l**	
06386	Perchlorate	14797-73-0	0.88	J	0.20	1.0	1
GC Miscellaneous	**SW-846 8015B modified**		**ug/l**		**ug/l**	**ug/l**	
07105	Ethane	74-84-0	1.0	U	1.0	5.0	1
07105	Ethene	74-85-1	1.0	U	1.0	5.0	1
07105	Methane	74-82-8	3.0	U	3.0	5.0	1
Metals	**SW-846 6010B**		**mg/l**		**mg/l**	**mg/l**	
01750	Calcium	7440-70-2	345		0.0334	0.200	1
01757	Magnesium	7439-95-4	6.23		0.0167	0.100	1
01762	Potassium	7440-09-7	20.8		0.133	0.500	1
01767	Sodium	7440-23-5	26.2		0.167	1.00	1
Wet Chemistry	**EPA 300.0**		**mg/l**		**mg/l**	**mg/l**	
00224	Chloride	16887-00-6	8.1		1.0	2.0	5
00368	Nitrate Nitrogen	14797-55-8	0.25	U	0.25	0.50	5
01506	Nitrite Nitrogen	14797-65-0	0.25	U	0.25	0.50	5
00228	Sulfate	14808-79-8	3.7	J	1.5	5.0	5
	SM 5310 C-2000		**mg/l**		**mg/l**	**mg/l**	
00273	Total Organic Carbon	n.a.	5.5		0.50	1.0	1
	SM 2320 B-1997		**mg/l as CaCO3**		**mg/l as CaCO3**	**mg/l as CaCO3**	
12150	Total Alkalinity to pH 4.5	n.a.	807		0.70	2.0	1
12149	Bicarbonate Alkalinity	n.a.	0.70	U	0.70	2.0	1
	SM 4500-S2 D-2000		**mg/l**		**mg/l**	**mg/l**	
00230	Sulfide	18496-25-8	0.054	U	0.054	0.16	1
	SM 5210 B-2001		**mg/l**		**mg/l**	**mg/l**	

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW282-K23CD Grab Groundwater Chemtronics Site

LL Sample # WW 7877353
LL Group # 1559295
Account # 12184

Project Name: Chemtronics Site

Collected: 05/06/2015 10:45 by PB

Submitted: 05/07/2015 09:20
Reported: 05/23/2015 15:37

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CSK23

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry	**SM 5210 B-2001**		**mg/l**	**mg/l**	**mg/l**	
00235	Biochemical Oxygen Demand	n.a.	7.9	6.0	6.0	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C151393AB	05/20/2015 18:08	Kerri E Legerlotz	5
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C151393AB	05/20/2015 18:08	Kerri E Legerlotz	5
02265	Picric Acid	SW-846 8015B	1	151270040A	05/07/2015 16:00	James H Place	1
06916	Nitroaromatics/Amines	SW-846 8330	1	151290019A	05/16/2015 16:01	James H Place	1
06386	Perchlorate	SW-846 6850 1/2007	1	151320016A	05/12/2015 16:40	Richard A Shober	1
06915	Nitroaromatics/Amines Wat Ext	SW-846 8330	1	151290019A	05/11/2015 17:00	Kelli M Barto	1
07105	Dissolved Gases	SW-846 8015B modified	1	151270039A	05/07/2015 16:50	Kristen N Brandt	1
01750	Calcium	SW-846 6010B	2	151321848002	05/14/2015 05:38	Tara L Snyder	1
01757	Magnesium	SW-846 6010B	1	151321848002	05/14/2015 05:38	Tara L Snyder	1
01762	Potassium	SW-846 6010B	1	151281848004	05/11/2015 17:07	Suzanne M Will	1
01767	Sodium	SW-846 6010B	1	151281848004	05/11/2015 17:07	Suzanne M Will	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	1	151281848004	05/10/2015 23:00	Annamaria Kuhns	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	2	151321848002	05/13/2015 22:00	Annamaria Kuhns	1
00224	Chloride	EPA 300.0	1	15127987132A	05/07/2015 18:20	Clinton M Wilson	5
00368	Nitrate Nitrogen	EPA 300.0	1	15127987132A	05/07/2015 18:20	Clinton M Wilson	5
01506	Nitrite Nitrogen	EPA 300.0	1	15127987132A	05/07/2015 18:20	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	15127987132A	05/07/2015 18:20	Clinton M Wilson	5
00273	Total Organic Carbon	SM 5310 C-2000	1	15132049501B	05/12/2015 09:28	James S Mathiot	1
12150	Total Alkalinity to pH 4.5	SM 2320 B-1997	1	15132005103A	05/12/2015 21:19	Michele L Graham	1
12149	Bicarbonate Alkalinity	SM 2320 B-1997	1	15132005103A	05/12/2015 21:19	Michele L Graham	1
00230	Sulfide	SM 4500-S2 D-2000	1	15131023001A	05/11/2015 12:00	Michele L Graham	1
00235	Biochemical Oxygen Demand	SM 5210 B-2001	1	15128023501A	05/08/2015 07:45	Susan E Hibner	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: MW282-K23CD Filtered Grab Groundwater Chemtronics Site

LL Sample # WW 7877354
LL Group # 1559295
Account # 12184

Project Name: Chemtronics Site

Collected: 05/06/2015 10:45 by PB

Submitted: 05/07/2015 09:20
Reported: 05/23/2015 15:37

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals Dissolved	**SW-846 6010B**		**mg/l**	**mg/l**	**mg/l**	
01754	Iron	7439-89-6	0.0334 U	0.0334	0.200	1
07058	Manganese	7439-96-5	0.00083 U	0.00083	0.0050	1

General Sample Comments

State of North Carolina Lab Certification No. 521
This sample was field filtered for dissolved metals.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01754	Iron	SW-846 6010B	2	151321848002	05/14/2015 05:41	Tara L Snyder	1
07058	Manganese	SW-846 6010B	1	151281848004	05/11/2015 17:10	Suzanne M Will	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	1	151281848004	05/10/2015 23:00	Annamaria Kuhns	1
01848	ICP-WW, 3005A (tot rec) - U3	SW-846 3005A	2	151321848002	05/13/2015 22:00	Annamaria Kuhns	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: Trip Blank Water
Chemtronics Site

LL Sample # WW 7877355
LL Group # 1559295
Account # 12184

Project Name: Chemtronics Site

Collected: 05/06/2015

Submitted: 05/07/2015 09:20
Reported: 05/23/2015 15:37

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CSTB-

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Acetone	67-64-1	3.0	U	3.0	5.0	1
02898	Acetonitrile	75-05-8	7.0	U	7.0	20	1
02898	Acrolein	107-02-8	5.0	U	5.0	25	1
02898	Acrylonitrile	107-13-1	1.0	U	1.0	5.0	1
02898	Allyl Chloride	107-05-1	0.1	U	0.1	0.5	1
02898	t-Amyl methyl ether	994-05-8	0.1	U	0.1	0.5	1
02898	Benzene	71-43-2	0.1	U	0.1	0.5	1
02898	Benzyl Chloride	100-44-7	0.1	U	0.1	0.5	1
02898	Bromobenzene	108-86-1	0.1	U	0.1	0.5	1
02898	Bromochloromethane	74-97-5	0.1	U	0.1	0.5	1
02898	Bromodichloromethane	75-27-4	0.1	U	0.1	0.5	1
02898	Bromoform	75-25-2	0.1	U	0.1	0.5	1
02898	Bromomethane	74-83-9	0.1	U	0.1	0.5	1
02898	n-Butanol	71-36-3	20	U	20	50	1
02898	2-Butanone	78-93-3	1.0	U	1.0	5.0	1
02898	t-Butyl Alcohol	75-65-0	4.0	U	4.0	10	1
02898	n-Butylbenzene	104-51-8	0.1	U	0.1	0.5	1
02898	sec-Butylbenzene	135-98-8	0.1	U	0.1	0.5	1
02898	tert-Butylbenzene	98-06-6	0.1	U	0.1	0.5	1
02898	Carbon Disulfide	75-15-0	0.4	U	0.4	1.0	1
02898	Carbon Tetrachloride	56-23-5	0.1	U	0.1	0.5	1
02898	2-Chloro-1,3-butadiene	126-99-8	0.1	U	0.1	0.5	1
02898	Chlorobenzene	108-90-7	0.1	U	0.1	0.5	1
02898	Chloroethane	75-00-3	0.1	U	0.1	0.5	1
02898	Chloroform	67-66-3	0.1	U	0.1	0.5	1
02898	Chloromethane	74-87-3	0.2	U	0.2	0.5	1
02898	2-Chlorotoluene	95-49-8	0.1	U	0.1	0.5	1
02898	4-Chlorotoluene	106-43-4	0.1	U	0.1	0.5	1
02898	Cyclohexane	110-82-7	0.1	U	0.1	0.5	1
02898	Cyclohexanone	108-94-1	5.0	U	5.0	25	1
02898	1,2-Dibromo-3-chloropropane	96-12-8	0.2	U	0.2	0.5	1
02898	Dibromochloromethane	124-48-1	0.1	U	0.1	0.5	1
02898	1,2-Dibromoethane	106-93-4	0.1	U	0.1	0.5	1
02898	Dibromomethane	74-95-3	0.1	U	0.1	0.5	1
02898	trans-1,4-Dichloro-2-butene	110-57-6	1.0	U	1.0	5.0	1
02898	1,2-Dichlorobenzene	95-50-1	0.1	U	0.1	0.5	1
02898	1,3-Dichlorobenzene	541-73-1	0.1	U	0.1	0.5	1
02898	1,4-Dichlorobenzene	106-46-7	0.1	U	0.1	0.5	1
02898	Dichlorodifluoromethane	75-71-8	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethane	75-34-3	0.1	U	0.1	0.5	1
02898	1,2-Dichloroethane	107-06-2	0.1	U	0.1	0.5	1
02898	1,1-Dichloroethene	75-35-4	0.1	U	0.1	0.5	1
02898	cis-1,2-Dichloroethene	156-59-2	0.1	U	0.1	0.5	1
02898	trans-1,2-Dichloroethene	156-60-5	0.1	U	0.1	0.5	1
02898	1,2-Dichloropropane	78-87-5	0.1	U	0.1	0.5	1
02898	1,3-Dichloropropane	142-28-9	0.1	U	0.1	0.5	1
02898	2,2-Dichloropropane	594-20-7	0.1	U	0.1	0.5	1
02898	1,1-Dichloropropene	563-58-6	0.1	U	0.1	0.5	1
02898	cis-1,3-Dichloropropene	10061-01-5	0.1	U	0.1	0.5	1
02898	trans-1,3-Dichloropropene	10061-02-6	0.1	U	0.1	0.5	1

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: Trip Blank Water
Chemtronics Site

LL Sample # WW 7877355
LL Group # 1559295
Account # 12184

Project Name: Chemtronics Site

Collected: 05/06/2015

Submitted: 05/07/2015 09:20
Reported: 05/23/2015 15:37

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CSTB-

CAT No.	Analysis Name	CAS Number	Result		Method Detection Limit*	Limit of Quantitation	Dilution Factor
GC/MS Volatiles	**SW-846 8260B 25mL purge**		ug/l		ug/l	ug/l	
02898	Ethyl Methacrylate	97-63-2	0.1	U	0.1	0.5	1
02898	Ethyl t-butyl ether	637-92-3	0.1	U	0.1	0.5	1
02898	Ethylbenzene	100-41-4	0.1	U	0.1	0.5	1
02898	Freon 113	76-13-1	0.2	U	0.2	0.5	1
02898	n-Heptane	142-82-5	0.2	U	0.2	0.5	1
02898	Hexachlorobutadiene	87-68-3	0.1	U	0.1	0.5	1
02898	n-Hexane	110-54-3	0.1	U	0.1	0.5	1
02898	2-Hexanone	591-78-6	1.0	U	1.0	5.0	1
02898	Isobutyl Alcohol	78-83-1	10	U	10	25	1
02898	Isopropylbenzene	98-82-8	0.1	U	0.1	0.5	1
02898	p-Isopropyltoluene	99-87-6	0.1	U	0.1	0.5	1
02898	Methacrylonitrile	126-98-7	1.0	U	1.0	5.0	1
02898	Methyl Acetate	79-20-9	0.3	U	0.3	1.0	1
02898	Methyl Methacrylate	80-62-6	0.1	U	0.1	0.5	1
02898	Methyl Tertiary Butyl Ether	1634-04-4	0.1	U	0.1	0.5	1
02898	4-Methyl-2-pentanone	108-10-1	1.0	U	1.0	5.0	1
02898	Methylcyclohexane	108-87-2	0.1	U	0.1	0.5	1
02898	Methylene Chloride	75-09-2	0.2	U	0.2	0.5	1
02898	Naphthalene	91-20-3	0.1	U	0.1	0.5	1
02898	Pentachloroethane	76-01-7	0.2	U	0.2	0.5	1
02898	Propionitrile	107-12-0	2.0	U	2.0	10	1
02898	n-Propylbenzene	103-65-1	0.1	U	0.1	0.5	1
02898	Styrene	100-42-5	0.1	U	0.1	0.5	1
02898	1,1,1,2-Tetrachloroethane	630-20-6	0.1	U	0.1	0.5	1
02898	1,1,2,2-Tetrachloroethane	79-34-5	0.1	U	0.1	0.5	1
02898	Tetrachloroethene	127-18-4	0.1	U	0.1	0.5	1
02898	Tetrahydrofuran	109-99-9	2.0	U	2.0	5.0	1
02898	Toluene	108-88-3	0.1	U	0.1	0.5	1
02898	1,2,3-Trichlorobenzene	87-61-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trichlorobenzene	120-82-1	0.1	U	0.1	0.5	1
02898	1,1,1-Trichloroethane	71-55-6	0.1	U	0.1	0.5	1
02898	1,1,2-Trichloroethane	79-00-5	0.1	U	0.1	0.5	1
02898	Trichloroethene	79-01-6	0.1	U	0.1	0.5	1
02898	1,2,4-Trimethylbenzene	95-63-6	0.1	U	0.1	0.5	1
02898	1,3,5-Trimethylbenzene	108-67-8	0.1	U	0.1	0.5	1
02898	Vinyl Acetate	108-05-4	0.2	U	0.2	0.5	1
02898	Vinyl Chloride	75-01-4	0.1	U	0.1	0.5	1
02898	m+p-Xylene	1330-20-7	0.1	U	0.1	0.5	1
02898	o-Xylene	95-47-6	0.1	U	0.1	0.5	1

General Sample Comments

State of North Carolina Lab Certification No. 521

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: Trip Blank Water
Chemtronics Site

LL Sample # WW 7877355
LL Group # 1559295
Account # 12184

Project Name: Chemtronics Site

Collected: 05/06/2015

Submitted: 05/07/2015 09:20
Reported: 05/23/2015 15:37

Altamont Environmental
231 Haywood Street
Asheville NC 28801

CSTB-

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
02898	GC/MS Volatiles 25-ml purge	SW-846 8260B 25mL purge	1	C151323AA	05/13/2015 02:19	Kevin A Sposito	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	C151323AA	05/13/2015 02:19	Kevin A Sposito	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1559295
Reported: 05/23/2015 15:37

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: C151323AA	Sample number(s): 7877351,7877355									
Acetone	3.0	U	3.0	5.0	ug/l	100	106	66-132	6	30
Acetonitrile	7.0	U	7.0	20	ug/l	106	109	50-145	3	30
Acrolein	5.0	U	5.0	25	ug/l	82	86	44-122	4	30
Acrylonitrile	1.0	U	1.0	5.0	ug/l	111	116	75-133	4	30
Allyl Chloride	0.1	U	0.1	0.5	ug/l	95	96	73-124	0	30
t-Amyl methyl ether	0.1	U	0.1	0.5	ug/l	104	104	80-120	1	30
Benzene	0.1	U	0.1	0.5	ug/l	97	96	80-120	1	30
Benzyl Chloride	0.1	U	0.1	0.5	ug/l	106	108	47-141	1	30
Bromobenzene	0.1	U	0.1	0.5	ug/l	98	97	80-120	1	30
Bromochloromethane	0.1	U	0.1	0.5	ug/l	112	110	80-125	2	30
Bromodichloromethane	0.1	U	0.1	0.5	ug/l	104	104	80-120	1	30
Bromoform	0.1	U	0.1	0.5	ug/l	108	108	64-134	0	30
Bromomethane	0.1	U	0.1	0.5	ug/l	93	91	62-126	2	30
n-Butanol	20	U	20.	50	ug/l	97	102	75-122	5	30
2-Butanone	1.0	U	1.0	5.0	ug/l	106	110	75-128	4	30
t-Butyl Alcohol	4.0	U	4.0	10	ug/l	104	112	77-130	7	30
n-Butylbenzene	0.1	U	0.1	0.5	ug/l	94	93	80-120	1	30
sec-Butylbenzene	0.1	U	0.1	0.5	ug/l	94	94	80-120	0	30
tert-Butylbenzene	0.1	U	0.1	0.5	ug/l	94	93	80-120	1	30
Carbon Disulfide	0.4	U	0.4	1.0	ug/l	110	106	70-128	4	30
Carbon Tetrachloride	0.1	U	0.1	0.5	ug/l	105	104	80-135	1	30
2-Chloro-1,3-butadiene	0.1	U	0.1	0.5	ug/l	84	84	78-120	1	30
Chlorobenzene	0.1	U	0.1	0.5	ug/l	98	99	80-120	1	30
Chloroethane	0.1	U	0.1	0.5	ug/l	94	93	68-120	1	30
Chloroform	0.1	U	0.1	0.5	ug/l	101	100	80-120	1	30
Chloromethane	0.2	U	0.2	0.5	ug/l	81	82	55-125	0	30
2-Chlorotoluene	0.1	U	0.1	0.5	ug/l	95	97	80-120	2	30
4-Chlorotoluene	0.1	U	0.1	0.5	ug/l	97	96	80-120	1	30
Cyclohexane	0.1	U	0.1	0.5	ug/l	99	99	69-120	1	30
Cyclohexanone	5.0	U	5.0	25	ug/l	44	59	35-120	28	30
1,2-Dibromo-3-chloropropane	0.2	U	0.2	0.5	ug/l	96	102	72-136	6	30
Dibromochloromethane	0.1	U	0.1	0.5	ug/l	109	110	80-126	2	30
1,2-Dibromoethane	0.1	U	0.1	0.5	ug/l	112	113	80-120	2	30
Dibromomethane	0.1	U	0.1	0.5	ug/l	110	111	80-120	1	30
trans-1,4-Dichloro-2-butene	1.0	U	1.0	5.0	ug/l	65	68	14-166	4	30
1,2-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	97	96	80-120	1	30
1,3-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	94	94	80-120	1	30
1,4-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	94	95	80-120	1	30
Dichlorodifluoromethane	0.1	U	0.1	0.5	ug/l	75	72	35-142	4	30
1,1-Dichloroethane	0.1	U	0.1	0.5	ug/l	97	96	80-120	0	30
1,2-Dichloroethane	0.1	U	0.1	0.5	ug/l	109	110	80-125	0	30
1,1-Dichloroethene	0.1	U	0.1	0.5	ug/l	103	100	80-120	3	30
cis-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	102	101	80-120	0	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1559295
Reported: 05/23/2015 15:37

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
trans-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	100	101	80-120	0	30
1,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	105	104	80-120	0	30
1,3-Dichloropropane	0.1	U	0.1	0.5	ug/l	105	107	80-120	2	30
2,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	98	97	75-122	2	30
1,1-Dichloropropene	0.1	U	0.1	0.5	ug/l	102	101	80-120	1	30
cis-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	104	102	80-120	2	30
trans-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	108	109	77-126	1	30
Ethyl Methacrylate	0.1	U	0.1	0.5	ug/l	107	110	70-120	3	30
Ethyl t-butyl ether	0.1	U	0.1	0.5	ug/l	99	98	76-120	1	30
Ethylbenzene	0.1	U	0.1	0.5	ug/l	95	96	80-120	0	30
Freon 113	0.2	U	0.2	0.5	ug/l	104	100	75-120	4	30
n-Heptane	0.2	U	0.2	0.5	ug/l	98	97	65-120	1	30
Hexachlorobutadiene	0.1	U	0.1	0.5	ug/l	95	95	74-123	0	30
n-Hexane	0.1	U	0.1	0.5	ug/l	101	101	60-126	0	30
2-Hexanone	1.0	U	1.0	5.0	ug/l	111	113	72-124	2	30
Isobutyl Alcohol	10	U	10.	25	ug/l	107	112	79-127	5	30
Isopropylbenzene	0.1	U	0.1	0.5	ug/l	96	95	80-120	0	30
p-Isopropyltoluene	0.1	U	0.1	0.5	ug/l	93	92	80-120	0	30
Methacrylonitrile	1.0	U	1.0	5.0	ug/l	106	113	77-132	6	30
Methyl Acetate	0.3	U	0.3	1.0	ug/l	113	114	59-130	1	30
Methyl Methacrylate	0.1	U	0.1	0.5	ug/l	98	105	74-125	7	30
Methyl Tertiary Butyl Ether	0.1	U	0.1	0.5	ug/l	107	108	80-120	1	30
4-Methyl-2-pentanone	1.0	U	1.0	5.0	ug/l	113	113	71-123	0	30
Methylcyclohexane	0.1	U	0.1	0.5	ug/l	102	100	80-120	1	30
Methylene Chloride	0.2	U	0.2	0.5	ug/l	102	103	80-120	1	30
Naphthalene	0.1	U	0.1	0.5	ug/l	96	97	72-120	1	30
Pentachloroethane	0.2	U	0.2	0.5	ug/l	105	105	80-123	0	30
Propionitrile	2.0	U	2.0	10	ug/l	107	113	76-135	5	30
n-Propylbenzene	0.1	U	0.1	0.5	ug/l	94	94	80-120	0	30
Styrene	0.1	U	0.1	0.5	ug/l	101	102	80-120	2	30
1,1,1,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	102	102	80-120	0	30
1,1,2,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	103	103	80-120	0	30
Tetrachloroethene	0.1	U	0.1	0.5	ug/l	99	98	80-120	0	30
Tetrahydrofuran	2.0	U	2.0	5.0	ug/l	98	107	73-127	8	30
Toluene	0.1	U	0.1	0.5	ug/l	97	98	80-120	1	30
1,2,3-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	88	87	75-120	1	30
1,2,4-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	91	91	80-120	1	30
1,1,1-Trichloroethane	0.1	U	0.1	0.5	ug/l	98	97	80-120	1	30
1,1,2-Trichloroethane	0.1	U	0.1	0.5	ug/l	108	108	80-120	1	30
Trichloroethene	0.1	U	0.1	0.5	ug/l	100	100	80-120	0	30
1,2,4-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	95	95	80-120	0	30
1,3,5-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	93	94	80-120	1	30
Vinyl Acetate	0.2	U	0.2	0.5	ug/l	94	94	18-200	0	30
Vinyl Chloride	0.1	U	0.1	0.5	ug/l	92	89	59-124	3	30
m+p-Xylene	0.1	U	0.1	0.5	ug/l	97	98	80-120	1	30
o-Xylene	0.1	U	0.1	0.5	ug/l	97	97	80-120	1	30
Batch number: C151393AB	Sample number(s): 7877353									
Acetone	3.0	U	3.0	5.0	ug/l	89	87	66-132	2	30
Acetonitrile	7.0	U	7.0	20	ug/l	130	116	50-145	11	30
Acrolein	5.0	U	5.0	25	ug/l	85	84	44-122	1	30
Acrylonitrile	1.0	U	1.0	5.0	ug/l	98	102	75-133	3	30
Allyl Chloride	0.1	U	0.1	0.5	ug/l	101	97	73-124	4	30
t-Amyl methyl ether	0.1	U	0.1	0.5	ug/l	102	103	80-120	0	30
Benzene	0.1	U	0.1	0.5	ug/l	102	100	80-120	2	30
Benzyl Chloride	0.1	U	0.1	0.5	ug/l	102	101	47-141	1	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1559295
Reported: 05/23/2015 15:37

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Bromobenzene	0.1	U	0.1	0.5	ug/l	102	100	80-120	2	30
Bromochloromethane	0.1	U	0.1	0.5	ug/l	102	99	80-125	3	30
Bromodichloromethane	0.1	U	0.1	0.5	ug/l	106	105	80-120	1	30
Bromoform	0.1	U	0.1	0.5	ug/l	100	91	64-134	9	30
Bromomethane	0.1	U	0.1	0.5	ug/l	98	96	62-126	2	30
n-Butanol	20	U	20.	50	ug/l	100	100	75-122	0	30
2-Butanone	1.0	U	1.0	5.0	ug/l	101	101	75-128	0	30
t-Butyl Alcohol	4.0	U	4.0	10	ug/l	96	97	77-130	1	30
n-Butylbenzene	0.1	U	0.1	0.5	ug/l	108	104	80-120	3	30
sec-Butylbenzene	0.1	U	0.1	0.5	ug/l	109	106	80-120	3	30
tert-Butylbenzene	0.1	U	0.1	0.5	ug/l	109	105	80-120	3	30
Carbon Disulfide	0.4	U	0.4	1.0	ug/l	106	101	70-128	5	30
Carbon Tetrachloride	0.1	U	0.1	0.5	ug/l	114	108	80-135	5	30
2-Chloro-1,3-butadiene	0.1	U	0.1	0.5	ug/l	97	95	78-120	3	30
Chlorobenzene	0.1	U	0.1	0.5	ug/l	104	101	80-120	3	30
Chloroethane	0.1	U	0.1	0.5	ug/l	92	91	68-120	1	30
Chloroform	0.1	U	0.1	0.5	ug/l	105	105	80-120	1	30
Chloromethane	0.2	U	0.2	0.5	ug/l	88	87	55-125	1	30
2-Chlorotoluene	0.1	U	0.1	0.5	ug/l	105	102	80-120	3	30
4-Chlorotoluene	0.1	U	0.1	0.5	ug/l	104	102	80-120	2	30
Cyclohexane	0.1	U	0.1	0.5	ug/l	105	102	69-120	3	30
Cyclohexanone	5.0	U	5.0	25	ug/l	99	109	35-120	9	30
1,2-Dibromo-3-chloropropane	0.2	U	0.2	0.5	ug/l	113	105	72-136	7	30
Dibromochloromethane	0.1	U	0.1	0.5	ug/l	102	99	80-126	3	30
1,2-Dibromoethane	0.1	U	0.1	0.5	ug/l	103	102	80-120	1	30
Dibromomethane	0.1	U	0.1	0.5	ug/l	103	102	80-120	1	30
trans-1,4-Dichloro-2-butene	1.0	U	1.0	5.0	ug/l	74	75	14-166	1	30
1,2-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	104	102	80-120	2	30
1,3-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	103	102	80-120	1	30
1,4-Dichlorobenzene	0.1	U	0.1	0.5	ug/l	103	101	80-120	2	30
Dichlorodifluoromethane	0.1	U	0.1	0.5	ug/l	88	84	35-142	4	30
1,1-Dichloroethane	0.1	U	0.1	0.5	ug/l	103	101	80-120	2	30
1,2-Dichloroethane	0.1	U	0.1	0.5	ug/l	102	103	80-125	0	30
1,1-Dichloroethene	0.1	U	0.1	0.5	ug/l	103	99	80-120	4	30
cis-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	105	102	80-120	3	30
trans-1,2-Dichloroethene	0.1	U	0.1	0.5	ug/l	106	105	80-120	1	30
1,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	105	104	80-120	1	30
1,3-Dichloropropane	0.1	U	0.1	0.5	ug/l	99	98	80-120	1	30
2,2-Dichloropropane	0.1	U	0.1	0.5	ug/l	107	104	75-122	3	30
1,1-Dichloropropene	0.1	U	0.1	0.5	ug/l	101	97	80-120	3	30
cis-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	99	98	80-120	1	30
trans-1,3-Dichloropropene	0.1	U	0.1	0.5	ug/l	102	99	77-126	3	30
Ethyl Methacrylate	0.1	U	0.1	0.5	ug/l	103	103	70-120	0	30
Ethyl t-butyl ether	0.1	U	0.1	0.5	ug/l	101	101	76-120	0	30
Ethylbenzene	0.1	U	0.1	0.5	ug/l	107	104	80-120	3	30
Freon 113	0.2	U	0.2	0.5	ug/l	108	103	75-120	4	30
n-Heptane	0.2	U	0.2	0.5	ug/l	108	103	65-120	5	30
Hexachlorobutadiene	0.1	U	0.1	0.5	ug/l	107	99	74-123	8	30
n-Hexane	0.1	U	0.1	0.5	ug/l	114	108	60-126	5	30
2-Hexanone	1.0	U	1.0	5.0	ug/l	101	102	72-124	0	30
Isobutyl Alcohol	10	U	10.	25	ug/l	101	101	79-127	1	30
Isopropylbenzene	0.1	U	0.1	0.5	ug/l	113	110	80-120	3	30
p-Isopropyltoluene	0.1	U	0.1	0.5	ug/l	110	106	80-120	4	30
Methacrylonitrile	1.0	U	1.0	5.0	ug/l	103	104	77-132	1	30
Methyl Acetate	0.3	U	0.3	1.0	ug/l	97	97	59-130	0	30
Methyl Methacrylate	0.1	U	0.1	0.5	ug/l	100	101	74-125	1	30

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(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1559295
Reported: 05/23/2015 15:37

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Methyl Tertiary Butyl Ether	0.1	U	0.1	0.5	ug/l	99	101	80-120	2	30
4-Methyl-2-pentanone	1.0	U	1.0	5.0	ug/l	101	100	71-123	1	30
Methylcyclohexane	0.1	U	0.1	0.5	ug/l	113	106	80-120	6	30
Methylene Chloride	0.2	U	0.2	0.5	ug/l	103	100	80-120	3	30
Naphthalene	0.1	U	0.1	0.5	ug/l	104	103	72-120	1	30
Pentachloroethane	0.2	U	0.2	0.5	ug/l	107	102	80-123	5	30
Propionitrile	2.0	U	2.0	10	ug/l	105	108	76-135	2	30
n-Propylbenzene	0.1	U	0.1	0.5	ug/l	106	103	80-120	3	30
Styrene	0.1	U	0.1	0.5	ug/l	112	109	80-120	3	30
1,1,1,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	105	106	80-120	1	30
1,1,2,2-Tetrachloroethane	0.1	U	0.1	0.5	ug/l	97	96	80-120	1	30
Tetrachloroethene	0.1	U	0.1	0.5	ug/l	107	103	80-120	4	30
Tetrahydrofuran	2.0	U	2.0	5.0	ug/l	93	93	73-127	0	30
Toluene	0.1	U	0.1	0.5	ug/l	103	100	80-120	3	30
1,2,3-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	100	99	75-120	1	30
1,2,4-Trichlorobenzene	0.1	U	0.1	0.5	ug/l	101	101	80-120	0	30
1,1,1-Trichloroethane	0.1	U	0.1	0.5	ug/l	109	106	80-120	3	30
1,1,2-Trichloroethane	0.1	U	0.1	0.5	ug/l	98	98	80-120	0	30
Trichloroethene	0.1	U	0.1	0.5	ug/l	109	105	80-120	4	30
1,2,4-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	110	107	80-120	3	30
1,3,5-Trimethylbenzene	0.1	U	0.1	0.5	ug/l	109	106	80-120	4	30
Vinyl Acetate	0.2	U	0.2	0.5	ug/l	85	83	18-200	3	30
Vinyl Chloride	0.1	U	0.1	0.5	ug/l	95	92	59-124	2	30
m+p-Xylene	0.1	U	0.1	0.5	ug/l	107	105	80-120	3	30
o-Xylene	0.1	U	0.1	0.5	ug/l	107	104	80-120	3	30
Batch number: 151270040A	Sample number(s): 7877351,7877353									
Picric Acid	50	U	50.	200	ug/l	106		70-130		
Batch number: 151290019A	Sample number(s): 7877351,7877353									
4-Amino-2,6-Dinitrotoluene	0.30	U	0.30	0.60	ug/l	96	92	83-129	5	30
2-Amino-4,6-Dinitrotoluene	0.20	U	0.20	0.60	ug/l	97	93	74-115	4	30
1,2-Dinitrobenzene	0.20	U	0.20	0.60	ug/l	103	99	76-145	4	30
1,3-Dinitrobenzene	0.20	U	0.20	0.60	ug/l	113	110	85-115	3	30
1,4-Dinitrobenzene	0.20	U	0.20	0.60	ug/l	100	96	85-115	5	30
2,4-Dinitrotoluene	0.72	U	0.72	2.0	ug/l	102	98	84-115	3	30
2,6-Dinitrotoluene	0.45	U	0.45	1.3	ug/l	101	98	83-115	3	30
HMX	0.65	U	0.65	2.0	ug/l	107	96	67-123	10	30
Nitrobenzene	0.20	U	0.20	0.60	ug/l	103	98	80-115	5	30
Nitroglycerin	5.2	U	5.2	15	ug/l	98	93	78-115	5	30
1-Nitronaphthalene	0.20	U	0.20	0.60	ug/l	106	101	85-121	5	30
2-Nitrotoluene	0.25	U	0.25	0.75	ug/l	99	96	77-115	3	30
3-Nitrotoluene	0.40	U	0.40	1.2	ug/l	102	98	83-118	4	30
4-Nitrotoluene	0.60	U	0.60	1.2	ug/l	103	98	84-115	5	30
PETN	6.0	U	6.0	18	ug/l	103	98	86-115	5	30
RDX	0.20	U	0.20	0.50	ug/l	102	111	77-115	9	30
Tetryl	0.40	U	0.40	0.80	ug/l	106	103	53-116	3	30
1,3,5-Trinitrobenzene	0.20	U	0.20	0.60	ug/l	102	98	83-115	4	30
2,4,6-Trinitrotoluene	0.20	U	0.20	0.60	ug/l	101	99	83-115	2	30
Batch number: 151320016A	Sample number(s): 7877351,7877353									
Perchlorate	0.20	U	0.20	1.0	ug/l	94		80-120		
Batch number: 151270039A	Sample number(s): 7877351,7877353									
Ethane	1.0	U	1.0	5.0	ug/l	105		85-115		
Ethene	1.0	U	1.0	5.0	ug/l	104		83-115		

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Quality Control Summary

Client Name: Altamont Environmental Group Number: 1559295
Reported: 05/23/2015 15:37

Analysis Name	Blank Result		Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Methane	3.0	U	3.0	5.0	ug/l	110		85-115		
Batch number: 151281848004	Sample number(s): 7877351-7877354									
Manganese	0.00087	J	0.00083	0.0050	mg/l	98		80-120		
Potassium	0.133	U	0.133	0.500	mg/l	98		80-120		
Sodium	0.167	U	0.167	1.00	mg/l	99		80-120		
Batch number: 151321848002	Sample number(s): 7877351-7877354									
Calcium	0.0557	J	0.0334	0.200	mg/l	104		80-120		
Iron	0.0334	U	0.0334	0.200	mg/l	100		80-120		
Magnesium	0.0167	U	0.0167	0.100	mg/l	102		80-120		
Batch number: 15127987132A	Sample number(s): 7877351,7877353									
Chloride	0.20	U	0.20	0.40	mg/l	100		90-110		
Nitrate Nitrogen	0.050	U	0.050	0.10	mg/l	103		90-110		
Nitrite Nitrogen	0.050	U	0.050	0.10	mg/l	96		90-110		
Sulfate	0.30	U	0.30	1.0	mg/l	97		90-110		
Batch number: 15132049501B	Sample number(s): 7877351,7877353									
Total Organic Carbon	0.50	U	0.50	1.0	mg/l	94		91-113		
Batch number: 15128023501A	Sample number(s): 7877351,7877353									
Biochemical Oxygen Demand						96		85-115		
Batch number: 15131023001A	Sample number(s): 7877351,7877353									
Sulfide	0.054	U	0.054	0.16	mg/l	104		90-110		
Batch number: 15132005102A	Sample number(s): 7877351									
Total Alkalinity to pH 4.5	0.70	U	0.70	2.0	mg/l as CaCO3	97		90-110		
Batch number: 15132005103A	Sample number(s): 7877353									
Total Alkalinity to pH 4.5	0.70	U	0.70	2.0	mg/l as CaCO3	97		90-110		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc		DUP Conc		DUP RPD	Dup RPD Max
Batch number: C151323AA	Sample number(s): 7877351,7877355 BKG: P875539										
Acetone						3.0	U	3.0	U	0 (1)	30
Acetonitrile						7.0	U	7.0	U	0 (1)	30
Acrolein						5.0	U	5.0	U	0 (1)	30
Acrylonitrile						1.0	U	1.0	U	0 (1)	30
Allyl Chloride						0.1	U	0.1	U	0 (1)	30
t-Amyl methyl ether						0.1	U	0.1	U	0 (1)	30
Benzene						0.1	U	0.1	U	0 (1)	30
Benzyl Chloride						0.1	U	0.1	U	0 (1)	30
Bromobenzene						0.1	U	0.1	U	0 (1)	30
Bromochloromethane						0.1	U	0.1	U	0 (1)	30

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Quality Control Summary

Client Name: Altamont Environmental Group Number: 1559295
Reported: 05/23/2015 15:37

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc		DUP Conc		DUP RPD	Dup RPD Max
Bromodichloromethane						0.1	U	0.1	U	0 (1)	30
Bromoform						0.1	U	0.1	U	0 (1)	30
Bromomethane						0.1	U	0.1	U	0 (1)	30
n-Butanol						20	U	20	U	0 (1)	30
2-Butanone						1.0	U	1.0	U	0 (1)	30
t-Butyl Alcohol						4.0	U	4.0	U	0 (1)	30
n-Butylbenzene						0.1	U	0.1	U	0 (1)	30
sec-Butylbenzene						0.1	U	0.1	U	0 (1)	30
tert-Butylbenzene						0.1	U	0.1	U	0 (1)	30
Carbon Disulfide						0.4	U	0.4	U	0 (1)	30
Carbon Tetrachloride						0.1	U	0.1	U	0 (1)	30
2-Chloro-1,3-butadiene						0.1	U	0.1	U	0 (1)	30
Chlorobenzene						0.1	U	0.1	U	0 (1)	30
Chloroethane						0.1	U	0.1	U	0 (1)	30
Chloroform						0.1	U	0.1	U	0 (1)	30
Chloromethane						0.2	U	0.2	U	0 (1)	30
2-Chlorotoluene						0.1	U	0.1	U	0 (1)	30
4-Chlorotoluene						0.1	U	0.1	U	0 (1)	30
Cyclohexane						0.1	J	0.1	U	200* (1)	30
Cyclohexanone						5.0	U	5.0	U	0 (1)	30
1,2-Dibromo-3-chloropropane						0.2	U	0.2	U	0 (1)	30
Dibromochloromethane						0.1	U	0.1	U	0 (1)	30
1,2-Dibromoethane						0.1	U	0.1	U	0 (1)	30
Dibromomethane						0.1	U	0.1	U	0 (1)	30
trans-1,4-Dichloro-2-butene						1.0	U	1.0	U	0 (1)	30
1,2-Dichlorobenzene						0.1	U	0.1	U	0 (1)	30
1,3-Dichlorobenzene						0.1	U	0.1	U	0 (1)	30
1,4-Dichlorobenzene						0.1	U	0.1	U	0 (1)	30
Dichlorodifluoromethane						0.1	U	0.1	U	0 (1)	30
1,1-Dichloroethane						0.1	U	0.1	U	0 (1)	30
1,2-Dichloroethane						0.2	J	0.2	J	3 (1)	30
1,1-Dichloroethene						0.1	U	0.1	U	0 (1)	30
cis-1,2-Dichloroethene						0.1	U	0.1	U	0 (1)	30
trans-1,2-Dichloroethene						0.1	U	0.1	U	0 (1)	30
1,2-Dichloropropane						0.1	U	0.1	U	0 (1)	30
1,3-Dichloropropane						0.1	U	0.1	U	0 (1)	30
2,2-Dichloropropane						0.1	U	0.1	U	0 (1)	30
1,1-Dichloropropene						0.1	U	0.1	U	0 (1)	30
cis-1,3-Dichloropropene						0.1	U	0.1	U	0 (1)	30
trans-1,3-Dichloropropene						0.1	U	0.1	U	0 (1)	30
Ethyl Methacrylate						0.1	U	0.1	U	0 (1)	30
Ethyl t-butyl ether						0.1	U	0.1	U	0 (1)	30
Ethylbenzene						0.1	U	0.1	U	0 (1)	30
Freon 113						0.2	U	0.2	U	0 (1)	30
n-Heptane						0.2	U	0.2	U	0 (1)	30
Hexachlorobutadiene						0.1	U	0.1	U	0 (1)	30
n-Hexane						0.1	U	0.1	U	0 (1)	30
2-Hexanone						1.0	U	1.0	U	0 (1)	30
Isobutyl Alcohol						10	U	10	U	0 (1)	30
Isopropylbenzene						0.1	U	0.1	U	0 (1)	30
p-Isopropyltoluene						0.1	U	0.1	U	0 (1)	30
Methacrylonitrile						1.0	U	1.0	U	0 (1)	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1559295
Reported: 05/23/2015 15:37

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc		DUP Conc		DUP RPD	Dup RPD Max
Methyl Acetate						0.3	U	0.3	U	0 (1)	30
Methyl Methacrylate						0.1	U	0.1	U	0 (1)	30
Methyl Tertiary Butyl Ether						0.1	U	0.1	U	0 (1)	30
4-Methyl-2-pentanone						1.0	U	1.0	U	0 (1)	30
Methylcyclohexane						0.1	U	0.1	U	0 (1)	30
Methylene Chloride						0.2	U	0.2	U	0 (1)	30
Naphthalene						0.1	U	0.1	U	0 (1)	30
Pentachloroethane						0.2	U	0.2	U	0 (1)	30
Propionitrile						2.0	U	2.0	U	0 (1)	30
n-Propylbenzene						0.1	U	0.1	U	0 (1)	30
Styrene						0.1	U	0.1	U	0 (1)	30
1,1,1,2-Tetrachloroethane						0.1	U	0.1	U	0 (1)	30
1,1,2,2-Tetrachloroethane						0.1	U	0.1	U	0 (1)	30
Tetrachloroethene						0.1	U	0.1	U	0 (1)	30
Tetrahydrofuran						2.0	U	2.0	U	0 (1)	30
Toluene						0.1	U	0.1	U	0 (1)	30
1,2,3-Trichlorobenzene						0.1	U	0.1	U	0 (1)	30
1,2,4-Trichlorobenzene						0.1	U	0.1	U	0 (1)	30
1,1,1-Trichloroethane						0.1	U	0.1	U	0 (1)	30
1,1,2-Trichloroethane						0.1	U	0.1	U	0 (1)	30
Trichloroethene						0.1	U	0.1	U	0 (1)	30
1,2,4-Trimethylbenzene						0.1	U	0.1	U	0 (1)	30
1,3,5-Trimethylbenzene						0.1	U	0.1	U	0 (1)	30
Vinyl Acetate						0.2	U	0.2	U	0 (1)	30
Vinyl Chloride						0.1	U	0.1	U	0 (1)	30
m+p-Xylene						0.1	U	0.1	U	0 (1)	30
o-Xylene						0.1	U	0.1	U	0 (1)	30
Batch number: C151393AB	Sample number(s): 7877353		BKG: P877380								
Acetone						3.0	U	3.0	U	0 (1)	30
Acetonitrile						7.0	U	7.0	U	0 (1)	30
Acrolein						5.0	U	5.0	U	0 (1)	30
Acrylonitrile						1.0	U	1.0	U	0 (1)	30
Allyl Chloride						0.1	U	0.1	U	0 (1)	30
t-Amyl methyl ether						0.1	U	0.1	U	0 (1)	30
Benzene						0.1	U	0.1	U	0 (1)	30
Benzyl Chloride						0.1	U	0.1	U	0 (1)	30
Bromobenzene						0.1	U	0.1	U	0 (1)	30
Bromochloromethane						0.1	U	0.1	U	0 (1)	30
Bromodichloromethane						0.1	U	0.1	U	0 (1)	30
Bromoform						0.1	U	0.1	U	0 (1)	30
Bromomethane						0.1	U	0.1	U	0 (1)	30
n-Butanol						20	U	20	U	0 (1)	30
2-Butanone						1.0	U	1.0	U	0 (1)	30
t-Butyl Alcohol						4.0	U	4.0	U	0 (1)	30
n-Butylbenzene						0.1	U	0.1	U	0 (1)	30
sec-Butylbenzene						0.1	U	0.1	U	0 (1)	30
tert-Butylbenzene						0.1	U	0.1	U	0 (1)	30
Carbon Disulfide						0.4	U	0.4	U	0 (1)	30
Carbon Tetrachloride						0.1	U	0.1	U	0 (1)	30
2-Chloro-1,3-butadiene						0.1	U	0.1	U	0 (1)	30
Chlorobenzene						0.1	U	0.1	U	0 (1)	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1559295
Reported: 05/23/2015 15:37

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc		DUP Conc		DUP RPD	Dup RPD Max
Chloroethane						0.1	U	0.1	U	0 (1)	30
Chloroform						0.2	J	0.2	J	5 (1)	30
Chloromethane						0.2	U	0.2	U	0 (1)	30
2-Chlorotoluene						0.1	U	0.1	U	0 (1)	30
4-Chlorotoluene						0.1	U	0.1	U	0 (1)	30
Cyclohexane						0.1	U	0.1	U	0 (1)	30
Cyclohexanone						5.0	U	5.0	U	0 (1)	30
1,2-Dibromo-3-chloropropane						0.2	U	0.2	U	0 (1)	30
Dibromochloromethane						0.1	U	0.1	U	0 (1)	30
1,2-Dibromoethane						0.1	U	0.1	U	0 (1)	30
Dibromomethane						0.1	U	0.1	U	0 (1)	30
trans-1,4-Dichloro-2-butene						1.0	U	1.0	U	0 (1)	30
1,2-Dichlorobenzene						0.1	U	0.1	U	0 (1)	30
1,3-Dichlorobenzene						0.1	U	0.1	U	0 (1)	30
1,4-Dichlorobenzene						0.1	U	0.1	U	0 (1)	30
Dichlorodifluoromethane						0.1	U	0.1	U	0 (1)	30
1,1-Dichloroethane						0.1	U	0.1	U	0 (1)	30
1,2-Dichloroethane						0.1	U	0.1	U	0 (1)	30
1,1-Dichloroethene						0.1	U	0.1	U	0 (1)	30
cis-1,2-Dichloroethene						2.1		1.8		14 (1)	30
trans-1,2-Dichloroethene						0.1	U	0.1	U	0 (1)	30
1,2-Dichloropropane						0.1	U	0.1	U	0 (1)	30
1,3-Dichloropropane						0.1	U	0.1	U	0 (1)	30
2,2-Dichloropropane						0.1	U	0.1	U	0 (1)	30
1,1-Dichloropropene						0.1	U	0.1	U	0 (1)	30
cis-1,3-Dichloropropene						0.1	U	0.1	U	0 (1)	30
trans-1,3-Dichloropropene						0.1	U	0.1	U	0 (1)	30
Ethyl Methacrylate						0.1	U	0.1	U	0 (1)	30
Ethyl t-butyl ether						0.1	U	0.1	U	0 (1)	30
Ethylbenzene						0.1	U	0.1	U	0 (1)	30
Freon 113						0.2	U	0.2	U	0 (1)	30
n-Heptane						0.2	U	0.2	U	0 (1)	30
Hexachlorobutadiene						0.1	U	0.1	U	0 (1)	30
n-Hexane						0.1	U	0.1	U	0 (1)	30
2-Hexanone						1.0	U	1.0	U	0 (1)	30
Isobutyl Alcohol						10	U	10	U	0 (1)	30
Isopropylbenzene						0.1	U	0.1	U	0 (1)	30
p-Isopropyltoluene						0.1	U	0.1	U	0 (1)	30
Methacrylonitrile						1.0	U	1.0	U	0 (1)	30
Methyl Acetate						0.3	U	0.3	U	0 (1)	30
Methyl Methacrylate						0.1	U	0.1	U	0 (1)	30
Methyl Tertiary Butyl Ether						0.1	U	0.1	U	0 (1)	30
4-Methyl-2-pentanone						1.0	U	1.0	U	0 (1)	30
Methylcyclohexane						0.1	U	0.1	U	0 (1)	30
Methylene Chloride						0.2	U	0.2	U	0 (1)	30
Naphthalene						0.1	U	0.1	U	0 (1)	30
Pentachloroethane						0.2	U	0.2	U	0 (1)	30
Propionitrile						2.0	U	2.0	U	0 (1)	30
n-Propylbenzene						0.1	U	0.1	U	0 (1)	30
Styrene						0.1	U	0.1	U	0 (1)	30
1,1,1,2-Tetrachloroethane						0.1	U	0.1	U	0 (1)	30
1,1,2,2-Tetrachloroethane						0.1	U	0.1	U	0 (1)	30

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1559295
Reported: 05/23/2015 15:37

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc		DUP Conc		DUP RPD	Dup RPD Max
Tetrachloroethene						0.1	U	0.1	U	0 (1)	30
Tetrahydrofuran						2.0	U	2.0	U	0 (1)	30
Toluene						0.1	U	0.1	U	0 (1)	30
1,2,3-Trichlorobenzene						0.1	U	0.1	U	0 (1)	30
1,2,4-Trichlorobenzene						0.2	J	0.2	J	0 (1)	30
1,1,1-Trichloroethane						0.1	U	0.1	U	0 (1)	30
1,1,2-Trichloroethane						0.1	U	0.1	U	0 (1)	30
Trichloroethene						51		44		16	30
1,2,4-Trimethylbenzene						0.1	U	0.1	U	0 (1)	30
1,3,5-Trimethylbenzene						0.1	U	0.1	U	0 (1)	30
Vinyl Acetate						0.2	U	0.2	U	0 (1)	30
Vinyl Chloride						0.1	U	0.1	U	0 (1)	30
m+p-Xylene						0.1	U	0.1	U	0 (1)	30
o-Xylene						0.1	U	0.1	U	0 (1)	30
Batch number: 151270040A	Sample number(s): 7877351,7877353 UNSPK: 7877351										
Picric Acid	102	108	70-130	5	30						
Batch number: 151320016A	Sample number(s): 7877351,7877353 UNSPK: 7877351										
Perchlorate	97	98	80-120	1	15						
Batch number: 151270039A	Sample number(s): 7877351,7877353 UNSPK: 7877351										
Ethane	100	97	53-122	3	20						
Ethene	111	105	35-162	5	20						
Methane	101	98	46-129	2	20						
Batch number: 151281848004	Sample number(s): 7877351-7877354 UNSPK: P876734 BKG: P876734										
Manganese	96	98	75-125	2	20	0.0532		0.0540		1	20
Potassium	97	100	75-125	2	20	6.78		6.87		1	20
Sodium	96	100	75-125	2	20	17.2		17.3		1	20
Batch number: 151321848002	Sample number(s): 7877351-7877354 UNSPK: P873798 BKG: P873798										
Calcium	42 (2)	-54 (2)	75-125	1	20	289		272		6	20
Iron	97	98	75-125	0	20	0.329		0.309		6 (1)	20
Magnesium	12 (2)	-87 (2)	75-125	1	20	204		193		6	20
Batch number: 15127987132A	Sample number(s): 7877351,7877353 UNSPK: 7877351 BKG: 7877351										
Chloride	96		90-110			3.1		3.2		2 (1)	20
Nitrate Nitrogen	101		90-110			0.74		0.84		13 (1)	20
Nitrite Nitrogen	96		90-110			0.25	U	0.25	U	0 (1)	20
Sulfate	99		90-110			7.8		9.0		14 (1)	20
Batch number: 15132049501B	Sample number(s): 7877351,7877353 UNSPK: P877380 BKG: P877380										
Total Organic Carbon	97		63-142			0.54	J	0.50	U	200* (1)	4
Batch number: 15128023501A	Sample number(s): 7877351,7877353 UNSPK: P877216 BKG: P877913										
Biochemical Oxygen Demand	99	94	85-115	6	8	180		205		13	15
Batch number: 15131023001A	Sample number(s): 7877351,7877353 UNSPK: P880523 BKG: P880523										
Sulfide	67*	88*	90-110	26*	16	0.054	U	0.054	U	0 (1)	5
Batch number: 15132005102A	Sample number(s): 7877351 UNSPK: P879550 BKG: P879550										

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Altamont Environmental Group Number: 1559295
Reported: 05/23/2015 15:37

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Total Alkalinity to pH 4.5	4*		90-110			358	304	16*	5
Batch number: 15132005103A	Sample number(s): 7877353 UNSPK: P880165 BKG: P880165								
Total Alkalinity to pH 4.5	86*		90-110			109	105	4	5

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: GC/MS Volatiles 25-ml purge
Batch number: C151323AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
7877351	109	112	98	98
7877355	110	112	99	97
Blank	107	112	99	98
DUP	109	112	99	97
LCS	106	110	100	100
LCSD	105	108	100	102
Limits:	77-114	74-113	77-110	78-110

Analysis Name: GC/MS Volatiles 25-ml purge
Batch number: C151393AB

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
7877353	109	101	98	98
Blank	105	100	99	99
DUP	107	102	98	98
LCS	103	101	100	102
LCSD	102	101	99	100
Limits:	77-114	74-113	77-110	78-110

Analysis Name: Picric Acid
Batch number: 151270040A

	2-NMX
7877351	93
7877353	95
Blank	99
LCS	94
MS	95
MSD	96
Limits:	40-157

Analysis Name: Nitroaromatics/Amines
Batch number: 151290019A

	2-Nitro-m-xylene
7877351	94
7877353	95
Blank	100

*- Outside of specification
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(1) The result for one or both determinations was less than five times the LOQ.
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Quality Control Summary

Client Name: Altamont Environmental Group Number: 1559295
Reported: 05/23/2015 15:37

Surrogate Quality Control

LCS	102
LCSD	99
Limits:	60-137

Analysis Name: Dissolved Gases
Batch number: 151270039A

	Propene
7877351	95
7877353	104
Blank	112
LCS	109
MS	96
MSD	92
Limits:	47-116

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

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Environmental Services Analysis Request/Chain of Custody

Acct. #: 12184 Group #: 1559295 Sample #: 7877351-55

COC#: 11872

Client:	Altamont Environmental
Project Name/#:	Chemtronics
Project Manager:	Amy Huffman
P.O. #:	2115.231
Sampler:	A. Huffman
Phone #:	828.281.3350
Quote #:	207662
State where sample(s) were collected:	NC

For Lab Use Only
SF#: 234303
SCR#: 170768

Preservation Codes: H = HCl; N = HNO_3; S = H_2SO_4; O = Other; T = Thiosulfate; B = NaOH; P = H_3PO_4

Sample Identification	Collection Date	Collection Time	Grab	Composite	Soil	Sediment	Water: Potable	Water: Ground	Water: NPDES	Water: Surface	Other:	Total # of Containers	GC/MS VOAs (8260)	Ca, Mg, K, Na (6010)	Diss. Fe, Mn (6010)	Nitroaromatics/Amines (8330)	Picric Acid (8015B)	Perchlorate (6850)	S2- (4500 S2 D)	BOD (SM 5210 B)	Bicarbonate Alk (SM 2320B)	Cl-, SO4-, NO2, NO3 (300.0)	TOC (SM20 5310 C)	Dissolved Gases (8015)	Remarks
													H	N	N				B				P	H	
MW281-L23CD	5/6/15	1030	X									17	X	X	X	X	X	X	X	X	X	X	X	X	
MW282-L23CD	5/6/15	1045	X									17	X	X	X	X	X	X	X	X	X	X	X	X	Change hold time
Trip Blank	5/6/15											2	X												For DHg's
																									to 48hrs

Turnaround Time Requested (TAT) (please check): Standard [X] RUSH [ ]
(RUSH TAT is subject to Lancaster Laboratories approval and surcharges.)

Date results are needed:

E-mail address to send RUSH results:

Data Package Options (please check if required)

Type I (Validation/non-CLP)	[ ]	MA MCP	[ ]	TX TRRP - 13	[ ]
Type III (Reduced non-CLP)	[ ]	CT RCP	[ ]		
Type IV (CLP SOW)	[ ]	ASP Type A	[ ]		
Type VI (Raw Data Only)	[ ]	ASP Type B	[ ]		

EDD Format:

If site-specific QC (MS/MSD/Dup) required, indicate QC samples and submit triplicate volume.

Relinquished by:	Date	Time	Received by:	Date	Time
[signature]	4/23/15	1312			
[signature]	5/6/15	1300			
			[signature]	5-9-15	920

Airbill No.:
Relinquished by Commercial Carrier:
UPS _____ FedEx ___X___ Other _____

Temperature upon receipt ___[illegible]___ °C

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Laboratory Data Qualifiers:

B - Analyte detected in the blank
C - Result confirmed by reanalysis
E - Concentration exceeds the calibration range
J (or G, I, X) - estimated value ≥ the Method Detection Limit (MDL or DL) and the < Limit of Quantitation (LOQ or RL)
P - Concentration difference between the primary and confirmation column >40%. The lower result is reported.
U - Analyte was not detected at the value indicated
V - Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference…

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, ISO17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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ATTACHMENT C

BACK VALLEY AQUIFER TESTING REPORT

Prepared for

Chemtronics, Inc.,
Northrop Grumman Systems Corporation,
and CNA Holdings LLC

BACK VALLEY AQUIFER TESTING REPORT

CHEMTRONICS SITE,
SWANNANOA, BUNCOMBE COUNTY,
NORTH CAROLINA
EPA CERCLIS ID: NCD095459392

Prepared by

Geosyntec consultants

engineers | scientists | innovators

1255 Roberts Blvd. NW, Suite 200
Kennesaw, Georgia 30144

Project Number GR4943

February 2016

Geosyntec consultants

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Geosyntec consultants

ATTACHMENT

Attachment A AQTESOLV Output Files

LIST OF ACRONYMS

3D	three dimensional
APA	Acid Pits Area
BV	Back Valley
DA	Disposal area
FS	Feasibility Study
ft/d	feet per day
gpm	gallons per minute
HCSM	Hydrogeologic Conceptual Site Model
K	hydraulic conductivity
PVC	polyvinyl chloride
PWR	partially weathered rock
RI	Remedial Investigation
USEPA	U.S. Environmental Protection Agency

1.0 INTRODUCTION

Geosyntec Consultants of NC, P.C. (Geosyntec) has prepared this *Back Valley Aquifer Testing Report* (Report) on behalf of Chemtronics, Inc., Northrop Grumman Systems Corporation, and CNA Holdings LLC (together the Companies) to support the Feasibility Study (FS) for the Back Valley (BV) portion of the Chemtronics Site in Swannanoa, Buncombe County, North Carolina (the Site; **Figure 1**).

As part of the FS process, a *Work Plan for Additional Geotechnical Borings, Monitoring Well Installation, and Aquifer Testing in the Back Valley* (Work Plan) was submitted to the United States Environmental Protection Agency (USEPA) on February 25, 2015 by Altamont Environmental, Inc. (Altamont, 2015a). The Work Plan described the installation of four additional wells in the Zone CD (partially weathered rock to upper bedrock zone) and aquifer hydraulic testing planned for the BV. Aquifer hydraulic testing described in the Work Plan included pneumatic slug testing of select wells, specific capacity testing of up to four of the additional wells, and a constant rate aquifer pumping test. The data from these tests would be used to refine a three-dimensional (3D), numerical groundwater flow model developed to evaluate potential remedial alternatives in the BV.

The purpose of this Report is to describe the results from aquifer testing performed in the BV pursuant to the Work Plan. The Site geology, data collection, methodology, and data analysis/interpretation related to these tests are presented. As discussed below, field observations and findings from the specific capacity testing indicated that a constant rate pumping test was not viable due to low well yields at the new well locations and therefore was not implemented at the Site.

2.0 SITE GEOLOGY AND HYDROGEOLOGY

The Site lies within the Blue Ridge Physiographic Province (Horton and Zullo, 1991), which is predominately composed of igneous and metamorphic rocks that have been complexly folded and faulted in a northeasterly direction, parallel to the regional trend of the mountains. These structural imprints are reflected in the topographic and drainage patterns within the region. The predominant rock type underlying the area is high-grade metamorphic rock of the Ashe Metamorphic Suite.

The geology of the Site is typical of that found in the Blue Ridge Province, and consists of regolith (primarily soil, alluvium, and saprolite) overlying a partially weathered rock (PWR) and fractured bedrock transition zone, which grades into competent bedrock with depth (Altamont, 2015b, 2016). A generalized depiction of the primary components of the hydrogeologic system common in the region (from Harned and Daniel, 1992) was modified by Altamont (2016) based on the review of the geologic logs from borings drilled at the Site (**Figure 2)**.

Soil at the Site typically contains high percentages of clay, silt, and fine sized particles and thus is anticipated to have relatively low permeability. The saprolite is unconsolidated and soil-like but still retains the relic structure present in the parent rock. Saprolite was observed in nearly all of the borings at the Site with a thickness generally ranging from 2 to 65 feet. However, saprolite approaching 100 feet in thickness was documented at several locations at the Site. The grain size in saprolite is a function of the parent rock composition and proximity to the underlying parent rock. In general, saprolite becomes coarser-grained and less clay-rich with depth. Furthermore, the grain size is coarser in felsic (i.e. predominantly quartz and feldspar) bands and finer in micaceous bands. Locally, lenses of coarse grained saprolite are present in the subsurface at depths above the top of rock. The high percentage of clay, silt, and fine sand-sized particles, along with the relict structure, results in variable horizontal and vertical permeability within the saprolite.

The transition zone underlies the regolith at the Site and comprises the PWR. The transition zone (generally 10 to 30 ft thick but locally may be less than an inch and as thick as 75 ft) overlies the bedrock and is anticipated to have moderate permeability. PWR overlies the highly fractured uppermost-bedrock and varies in thickness depending on the parent rock type and the degree of localized fracturing in the parent rock. The PWR at the Site resembles the parent rock (e.g., metagraywacke, schistose

metagraywacke or amphibolite) in grain size and color, but is generally more friable. Clay mineral development is minimal, and the unit is thought to be moderately permeable. Locally, thin layers of more resistant bedrock are occasionally found within the saprolite and transition zone.

Groundwater at the Site exists in a multi-zone aquifer consisting of a Surficial Aquifer System, a Transition Zone Aquifer System and a Bedrock Aquifer System (Altamont, 2015b) (see **Figure 2)**. These three aquifer systems are interconnected and have a predominantly downward vertical gradient between the units, but each has different characteristics that influence groundwater flow and transport mechanisms within them. The Surficial Aquifer System (referred to as Zone AB) exists in regolith and extends from the capillary fringe above the water table to the top of the transition zone. The Transition Zone Aquifer System (referred to as Zone CD) represents the gradational shift from the bottom of the regolith, through the PWR, and into the top of the underlying fractured competent bedrock. The permeability of the PWR can be locally variable depending on mineralogy and structure. The Bedrock Aquifer System (referred to as Zone EF) extends below the Transition Zone Aquifer System and exists within a system of fractures in the underlying bedrock.

Additional details on the Site geology and hydrogeology may be found in the *Refined Hydrogeological Conceptual Site Model Focused on the Back Valley* (Altamont, 2016), provided in Attachment A of the *Back Valley Source Mass Flux Reduction Evaluation Report* (Geosyntec, 2016), and the *Final Remedial Investigation Report* (RI) (Altamont, 2015b).

3.0 AQUIFER TESTING METHODS

As described in the Work Plan, four monitoring wells (MW281-L23CD, MW282-K23CD, MW283-K25CD, and MW284-K25CD) were installed along the north and western limits of the APA and were screened in the Zone CD aquifer. Two of the monitoring wells (MW283-K25CD and MW284-K25CD) were constructed with 4-inch diameter polyvinyl chloride (PVC) well riser and screen for performing a constant rate pumping test (e.g., primary and backup well locations) whereas the remaining two wells were constructed of 2-inch diameter PVC. Additional information on the design and construction of these four monitoring wells is documented in the fieldwork summary memorandum prepared by Altamont (Altamont, 2015c).

Aquifer testing described in the Work Plan incorporated a combination of methods including pneumatic slug tests at eight existing monitoring wells and the four newly installed monitoring wells, specific capacity tests at up to four monitoring well locations, and a constant rate pumping test. The objective of the testing was to collect aquifer data to refine the understanding of Zone CD aquifer parameters (e.g., hydraulic conductivity, storativity, well yield, etc.) in the vicinity of the Acid Pit Area (APA) and degree of interconnectivity in support of the evaluation of potential remedies. However, drilling observations at the new wells suggested that low yields were probable due to a limited number of significant water bearing fractures encountered. Specific capacity testing at the two 4-inch wells (MW283-K25CD and MW284-K25CD) indicated well yields were low, leading to the decision to terminate plans for a constant rate pumping test. As an alternative, the Companies decided to expand the network of monitoring wells to be slug tested as this effort would provide the necessary hydrogeologic data needed for refining the numerical groundwater flow model.

3.1 Slug Testing

A total of 38 slug tests were performed in two phases at select monitoring wells in the BV. The wells slug tested are listed in **Table 1** and the locations are illustrated on **Figure 3** (highlighted in yellow). Initially, eight existing monitoring wells were tested to assess the hydraulic conductivity of the Zone CD aquifer around Disposal Area 9 (DA-9) and the APA in March 2015, as outlined in the Work Plan. The following month, slug tests were performed in three of the newly installed CD zone wells (MW281-L23CD, MW283-K25CD, and MW284-K25CD) – MW282-K23CD was dry

at the time of testing – and 27 additional monitoring wells, composed of a combination of Zone AB, Zone CD, and Zone EF wells.

3.2 Slug Testing Procedures

Pneumatic slug testing uses gas (typically nitrogen due to its inert characteristics) to displace the groundwater inside a monitoring well instead of the physical slug used in the traditional slug test method. The advantages of the pneumatic slug testing method over traditional methods are that it reduces the amount of downhole equipment needed for slug testing, thereby minimizing interference or "noise" in the data from testing equipment; reduces the chance for cross contamination between wells; and allows for quick adjustments of water displacement by modifying the input pressure applied to the water column. The formation response to the displacement induced by the gas pressure is measured to estimate the permeability of the formation using analytical solutions. Pressure transducers (InSitu Level Troll®) were used to monitor the water level changes over time inside each well tested.

For each test, the pressure transducer was lowered into the well screen and then connected to a laptop computer to measure the water level within the well. A pressure-tight "tree" assembly consisting of a pipe "Tee" was used to conduct the test. One leg of the Tee was connected to the nitrogen source (compressed gas tank), one leg was connected to a pressure relief ball valve, and the third leg was connected to the 2-inch wellhead. The use of the "tree" assembly enables the following:

- Forms a pressure seal between the well and the atmosphere;
- Allows the injection of compressed gas into the well via an air hose connected to a compressed gas tank;
- Provides a pressure-tight passage for a pressure transducer cable and a water level meter; and
- Allows for rapid well depressurization.

A water level decline of approximately 5 ft in the monitoring well was targeted in the field, depending upon the height of water above the screen. The compressed gas was applied to displace the water level inside the monitoring well. The displacement was observed in real-time using the pressure transducers. Once the displacement was

judged to be stable, the ball valve was opened to release the gas pressure, causing the water level to rise. The recovery of the water level inside the monitoring well to static conditions due to the pressure change is a rising head test and was recorded on the pressure transducer. The water level change was recorded until at least 80 percent recovery had been attained.

Several wells (e.g. MW205-M27AB, MW270-N27CD, MW275-Q29AB, and MW281-L23CD) had static (pre-testing) water levels positioned below the top of the screen, which prevented pneumatic slug testing since the gas would escape out the well screen. For these wells, the traditional method was used whereby a physical slug was used to displace the water level within the well. The physical slug consisted of a 3-ft long solid piece of polyvinylchloride (PVC). The PVC slug was lowered into the well with rope, and the water level was allowed to equilibrate. Care was taken to avoid contacting the pressure transducer with the slug. Once equilibration was achieved, the slug was rapidly removed to initiate a rising head test. Water level change was recorded using a pressure transducer, in the same manner as described above.

Upon completion of slug testing at each well (for both pneumatic and traditional slug tests), all downhole equipment was removed from the well and decontaminated in accordance with the procedures outlined in the Work Plan. The pneumatic and traditional slug test data were examined after collection as part of data quality control. Wells with circumspect data were re-tested for verification.

3.3 Specific Capacity Testing

As part of the aquifer testing outlined in the Work Plan, specific capacity testing was performed between 17 and 20 April 2015 on two monitoring wells (MW283-K25CD and MW284-K25CD) of the four proposed in the Work Plan. The purpose of the specific capacity testing was to evaluate well yield and to gauge the potential for constant rate pumping at each location. Specific capacity tests were not performed on MW281-L23CD because of a partially saturated well screen and low hydraulic conductivity (based on slug testing observations) and due an inadequate height (e.g., approximately 2 inches) of groundwater in MW282-K23CD at the time of testing.

3.4 Specific Capacity Testing Procedures

A specific capacity test was performed by pumping a well at a constant rate of discharge for a short period of time (e.g., approximately two hours or less) until

drawdown stabilized within a prescribed and reasonable range (e.g., +/- 0.2 foot of drawdown over a 10-minute period). The static water level was recorded prior to testing, and a data logging pressure transducer (InSitu Level Troll®) was deployed near the bottom of the well for monitoring water levels. A submersible pump was then deployed in the well and set at a prescribed depth above the top of the screened interval. Once pumping was initiated, the flow rate was estimated by measuring the amount of time it took to fill a graduated container. Real-time data readings from the data logger were collected during each test for post processing and calculation of specific capacity. The discharge water from each well was collected at the wellhead and stored in 250 gallon cage tanks and processed through the existing groundwater treatment system, as described in the Work Plan.

4.0 RESULTS

4.1 Slug Testing Data Analysis

Water level data collected from the monitoring wells was initially screened to remove erroneous noise from the data which commonly occurs in the early-time data due to starting of the test. The data was then analyzed using the software AQTESOLV (HydroSOLVE, Inc., version 4.50.002) which uses analytical models to estimate aquifer parameters such as hydraulic conductivity, transmissivity, and storativity. A summary of the input parameters used within AQTESOLV are provided in **Table 2**.

The response curves presenting observed water level over time was generated by AQTESOLV for each test and curve matching was performed using applicable analytical solutions to generate an estimate of the hydraulic conductivity measured in each well. The analytical models used were Bouwer-Rice (1976), Hyder et al. (1994; also known as the KGS model), and Springer-Gelhar (1991). The Bouwer-Rice method is a semi-analytical method used for slug tests in an unconfined aquifer that exhibit a smooth exponential (overdamped) recovery to static water levels during the test. This method assumes quasi-steady state conditions and ignores elastic storage in the aquifer. The KGS method was also developed for overdamped slug tests in unconfined aquifers but is a fully transient model that incorporates well skin (e.g., drilling "rind") effects. The Springer-Gelhar method is used for underdamped (e.g., oscillatory water level fluctuations) slug tests in unconfined aquifers.

The estimated hydraulic conductivities for each well tested are summarized in **Table 3**. Multiple tests were collected and analyzed for several wells to verify the observed test response; in these cases, a geometric mean of the individual hydraulic conductivity (K) values was computed to provide a single K value for the location. The values that represent an geometric mean K value are highlighted in yellow in **Table 3**. Statistics and box plots of the estimated Ks are provided on **Figure 4**. The corresponding curve matching diagrams from the AQTESOLV software output have been compiled in **Appendix A.**

Hydraulic conductivity in Zone AB ranged from 0.060 to 2.2 feet per day (ft/d) with a geometric mean of 0.50 ft/d. The hydraulic conductivity in Zone CD was generally higher, ranging from 0.11 to 1.9 x 10^2 ft/d, with a geometric mean of 1.0 ft/d. The estimated value of 1.9 x 10^2 ft/d corresponds to MW197-O25CD, which exhibited an oscillatory (underdamped) response in observed water levels during testing and was

likely related to the large fracture within the screen interval noted in the boring log. The higher hydraulic conductivity range for Zone CD wells is consistent with the site conceptual model of a more transmissive zone occurring within the PWR to upper fractured bedrock. Hydraulic conductivity in Zone EF ranged from 0.11 – 26 ft/d, with a geometric mean of 2.4 ft/d. The generally higher K values in Zone EF compared to Zone AB and Zone CD is believed to be biased high because Zone EF monitoring wells targeted fracture zones in the bedrock. Thus, the Zone EF K values are likely representative of fracture-flow dynamics and are not representative of the non-fractured bedrock matrix in Zone EF.

4.2 Specific Capacity Testing

During specific capacity testing at MW283-K25CD and MW284-K25CD, the pump discharge could not be sustained above 0.5 to 1.0 gallon per minute (gpm) without causing substantial drawdown. A summary of the discharge rates, drawdown, and resulting specific capacity is provided below:

Well ID	Average pumping rate (gpm)	Observed drawdown (ft)	Specific capacity (gpm/ft)
MW283-K25CD	0.5	43.67	0.01
MW284-K25CD	0.5	6.456	0.08

It was noted that the available drawdown observed at MW284-K25CD was greater than that at MW283-K25CD and thus potentially capable of a low yield constant rate test. To evaluate the potential effectiveness of a constant rate pumping test, Geosyntec estimated a drawdown of 0.02 ft at a distance of 200 ft (the nearest monitoring well to MW284-K25CD) using the Theis Method (1935) for confined aquifers. The estimate assumed a K value of 1.5 ft/day (conservatively taken as twice the value observed at MW284-K25CD from slug testing), a saturated thickness of 40 ft (Zone CD thickness at the location), storage of 0.01, and an average pumping rate of 1 gallon per minute (gpm). This finding further supported the decision to terminate plans for a constant rate test due to the difficulties in resolving such a low magnitude drawdown from natural, ambient groundwater level fluctuations and the recognition that well losses would further reduce drawdown in the aquifer. As a result, the slug testing program was expanded to collect additional data by aquifer zone and area in the Back Valley.

5.0 DATA EVALUATION

The K values derived from slug testing are plotted on **Figure 5** to evaluate the presence of geographic patterns in spatial distribution. Zone AB and Zone EF did not exhibit any clear spatial patterns in K. However, it was apparent that a zone of lower Ks (between 0.11 and 0.51 ft/d) was present within the vicinity of the APA in Zone CD. This zone of low K corresponds to the general geologic strike observed in the area and the presence of relatively higher bedrock elevations encountered beneath the APA (**Figure 5)**.

The slug testing results also enable a vertical comparison of hydraulic conductivity. The K of Zone CD is generally higher than Zone AB, which is consistent with the presence of more permeable PWR in Zone CD compared to the predominance of clay and silty saprolite in Zone AB. A two-order of magnitude range in K values was observed in Zone EF wells, however the geometric mean value of 2.4 ft/d is interpreted to be a result of interconnected fractures within the bedrock as stated previously.

The slug test results were also compared to K values from past testing at the Site (Altamont, 2015b) and to literature values for a geologically similar area (Campbell, 2011) (**Table 4).** The highest K value (1.9×10^2 ft/d at MW197-O25CD) observed is a consequence of an underdamped slug test response caused by a 1.5-ft fracture within the well screen interval and thus not representative of the bulk Zone CD permeability. Otherwise, the geomean K values for each of the three hydrostratigraphic zones fall within the ranges of hydraulic conductivity reported at the Site in the Final RI and in the vicinity of the Site (e.g., Bent Creek watershed also in Buncombe County) reported by Campbell (2011).

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TABLES

Table 1 - Monitoring Well Locations Used for Slug Testing
Chemtronics Site
Swannanoa, North Carolina

Well ID	Screened Zone	Date Tested
MW254-L25CD	CD	3/16/2015
MW255-L25CD	CD	3/16/2015
MW256-M25CD	CD	3/16/2015
MW257-M25CD	CD	3/16/2015
MW258-M23CD	CD	3/17/2015
MW259-M24CD	CD	3/17/2015
MW265-N25CD	CD	3/17/2015
MW266-L26CD	CD	3/17/2015
MW170-J23E	E	4/16/2015
MW281-L23CD	CD	4/16/2015
MW283-K25CD	CD	4/16/2015
MW284-K25CD	CD	4/17/2015
MW149-O28C	C	4/29/2014
MW152-Q27C	C	4/28/2015
MW168-O28B	B	4/29/2015
MW196-N27CD	CD	4/28/2015
MW197-N25CD	CD	4/27/2015
MW199-R29CD	CD	4/29/2015
MW205-M27AB	AB	4/28/2015
MW206-M27CD	CD	4/28/2015
MW223-L26AB	AB	4/27/2015
MW228-O27EF	EF	4/28/2015
MW260-N24CD	CD	4/27/2015
MW261-N24AB	AB	4/27/2015
MW262-N25CD	CD	4/27/2015
MW263-N25AB	AB	4/27/2015
MW264-N25CD	CD	4/29/2015
MW267-L26CD	CD	4/27/2015
MW268-L26AB	AB	4/27/2015
MW269-M26EF	EF	4/29/2015
MW270-N27CD	CD	4/28/2015
MW272-M27EF	EF	4/28/2015
MW273-O26EF	EF	4/28/2015
MW275-Q29AB	AB	4/29/2015
MW-3B	D	4/28/2015
MW-3D	B	4/28/2015
P-2D	B	4/29/2015
P-4D	B	4/28/2015

Notes:

1. Zone AB represents the Saprolite.
2. Zone CD represents the Partially Weathered Rock to Upper Bedrock.
3. Zone EF represents competent Bedrock.

Table 2 - AQTESOLV Input Parameters for Slug Tested Wells
Chemtronics Site
Swannanoa, North Carolina

Well ID	Unit Screened	Stickup length [ft]	Static DTW [ft btoc]	DTW at start of test [ft btoc]	Top of Screen [ft bgs]	Bottom of Screen [ft bgs]	Total Depth [ft bgs]	Ho [ft]	H [ft]	b [ft]	Kv/Kh (--)	d [ft]	L [ft]	T [ft]	r(c) [ft]	r(eq) [ft]	r(w) [ft]	r(sk) [ft]
MW149-O28C	C	2.14	10.29	18.14	74.00	79.00	79.00	7.85	70.90	70.90	1.00	65.86	5.00	0.00	0.08	0.00	0.08	0.25
MW152-Q27C	C	2.02	4.04	12.37	24.00	29.00	29.00	8.34	27.00	27.00	1.00	21.98	5.00	0.00	0.08	0.00	0.08	0.25
MW168-O28B	B	2.86	12.14	19.28	35.00	40.00	40.00	7.13	30.70	30.70	1.00	25.72	5.00	0.00	0.08	0.00	0.08	0.25
MW170-J23E	E	2.92	53.71	64.15	95.00	115.00	116.00	10.44	65.22	65.20	1.00	44.22	20.00	0.00	0.17	0.00	0.17	0.17
MW196-N27CD	CD	2.33	8.22	10.30	8.00	17.60	18.00	2.08	12.10	12.10	1.00	2.11	9.60	0.00	0.08	0.00	0.08	0.21
MW197-N25CD	CD	2.61	4.19	9.20	41.30	56.10	83.50	5.01	81.90	81.90	1.00	39.72	14.80	0.00	0.08	0.00	0.08	0.25
MW199-R29CD	CD	2.78	8.97	17.38	41.30	56.10	56.50	8.42	50.30	50.30	1.00	35.11	14.80	0.00	0.08	0.00	0.08	0.21
MW205-M27AB	AB	2.64	8.23	10.39	4.40	19.20	19.50	2.17	13.90	13.90	1.00	-1.19	14.80	0.00	0.08	0.00	0.08	0.25
MW206-M27CD	CD	2.60	7.37	14.10	17.80	32.20	32.50	6.74	27.70	27.70	1.00	13.03	14.40	0.00	0.08	0.00	0.08	0.21
MW223-L26AB	AB	2.67	9.42	15.05	13.00	28.00	28.00	5.63	21.20	21.20	1.00	6.25	15.00	0.00	0.08	0.00	0.08	0.25
MW228-O27EF	EF	2.40	33.90	40.20	274.00	294.00	294.00	6.30	262.50	262.50	1.00	242.50	20.00	0.00	0.17	0.00	0.17	0.67
MW254-L25CD	CD	2.72	18.22	26.88	84.00	99.00	99.00	8.66	83.50	83.50	1.00	68.50	15.00	0.00	0.08	0.00	0.08	0.08
MW255-L25CD	CD	2.95	19.84	29.30	50.00	65.00	65.00	9.46	48.11	48.10	1.00	33.11	15.00	0.00	0.08	0.00	0.08	0.08
MW256-M25CD	CD	2.86	21.73	28.39	72.50	87.50	87.50	6.66	68.63	68.60	1.00	53.63	15.00	0.00	0.08	0.00	0.08	0.08
MW257-M25CD	CD	3.16	25.39	31.02	83.00	98.00	98.00	5.63	75.77	75.80	1.00	60.77	15.00	0.00	0.08	0.00	0.08	0.08
MW258-M23CD	CD	2.37	30.64	37.03	75.40	90.40	91.40	6.39	63.13	63.10	1.00	47.13	15.00	0.00	0.08	0.00	0.08	0.08
MW259-M24CD	CD	2.57	25.75	30.02	95.00	115.00	118.50	4.27	95.32	95.30	1.00	71.82	20.00	0.00	0.08	0.00	0.08	0.08
MW260-N24CD	CD	3.06	8.64	16.44	88.50	103.50	104.10	7.80	98.50	98.50	1.00	82.92	15.00	0.00	0.08	0.00	0.08	0.42
MW261-N24AB	AB	2.73	6.28	8.44	5.00	15.00	15.00	2.16	11.40	11.40	1.00	1.45	10.00	0.00	0.08	0.00	0.08	0.25
MW262-N25CD	CD	2.62	11.72	18.31	71.60	86.60	89.60	6.58	80.50	80.50	1.00	62.50	15.00	0.00	0.08	0.00	0.08	0.42
MW263-N25AB	AB	2.93	7.90	10.27	5.50	15.50	16.00	2.37	11.00	11.00	1.00	0.53	10.00	0.00	0.08	0.00	0.08	0.25
MW264-N25CD	CD	2.51	41.15	46.45	131.00	146.00	148.00	5.30	109.40	109.40	1.00	92.36	15.00	0.00	0.08	0.00	0.08	0.42
MW265-N25CD	CD	2.87	21.31	25.90	98.50	113.50	113.50	4.59	95.06	95.10	1.00	80.06	15.00	0.00	0.08	0.00	0.08	0.08
MW266-L26CD	CD	2.68	9.62	16.35	66.00	81.00	83.90	6.73	76.96	77.00	1.00	59.06	15.00	0.00	0.08	0.00	0.08	0.08
MW267-L26CD	CD	2.83	12.26	19.92	58.50	73.50	74.50	7.66	65.10	65.10	1.00	49.07	15.00	0.00	0.08	0.00	0.08	0.42
MW268-L26AB	AB	3.11	11.09	17.14	13.00	28.00	33.00	6.05	25.00	25.00	1.00	5.02	15.00	0.00	0.08	0.00	0.08	0.25
MW269-M26EF	EF	3.09	29.84	32.41	195.00	210.00	257.00	2.57	230.30	230.30	1.00	168.25	15.00	0.00	0.17	0.00	0.17	0.67
MW270-N27CD	CD	2.50	13.55	15.12	8.50	23.50	24.50	1.56	13.40	13.40	1.00	-2.55	15.00	0.00	0.08	0.00	0.08	0.42
MW272-M27EF	EF	2.67	12.39	22.69	67.00	77.00	79.00	10.30	69.30	69.30	1.00	57.28	10.00	0.00	0.08	0.00	0.08	0.67
MW273-O26EF	EF	2.39	26.54	33.85	145.00	165.00	168.50	7.31	144.40	144.40	1.00	120.85	20.00	0.00	0.08	0.00	0.08	0.67
MW275-Q29AB	AB	2.58	6.95	8.99	3.00	13.00	14.00	2.04	9.60	9.60	1.00	-1.37	10.00	0.00	0.08	0.00	0.08	0.25
MW281-L23CD	CD	2.50	20.88	22.20	14.00	29.00	29.00	1.32	10.62	10.60	1.00	-4.38	15.00	0.00	0.08	0.00	0.08	0.08
MW283-K25CD	CD	2.13	17.65	27.37	66.00	81.00	81.00	9.72	65.48	65.50	1.00	50.48	15.00	0.00	0.17	0.00	0.17	0.17
MW284-K25CD	CD	2.08	8.19	17.56	26.00	41.00	41.00	9.37	34.89	34.90	1.00	19.89	15.00	0.00	0.17	0.00	0.17	0.17
MW-3B	D	2.18	19.19	22.85	54.90	78.00	78.00	3.66	61.00	61.00	1.00	37.91	23.10	0.00	0.08	0.00	0.17	0.25
MW-3D	B	2.49	19.21	25.50	36.80	51.70	51.90	6.29	35.20	35.20	1.00	20.09	14.90	0.00	0.08	0.00	0.08	0.25
P-2D	B	2.45	39.98	46.17	63.90	68.90	69.50	6.19	32.00	32.00	1.00	26.37	5.00	0.00	0.08	0.00	0.08	0.25
P-4D	B	2.72	17.50	20.77	30.00	35.00	35.50	3.28	20.70	20.70	1.00	15.23	5.00	0.00	0.08	0.00	0.08	0.25

Notes:

1. DTW = Depth to Water.
2. btoc = below top of casing; indicates that top of casing was the measurement point.
3. bgs = below ground surface; indicates that the ground surface was the measurement point.
4. Ho = Observed initial displacement (change in water level from static).
5. H = Static water column height.
6. b = Saturated thickness of aquifer; assumed to be bottom of the well.
7. Kv/Kh = Ratio of vertical to horizontal hydraulic conductivity.
8. d = Depth to top of well screen - this is the length from the water level (or top confining unit) to the top of the screen.
9. L = Length of well screen.
10. T = Transducer Depth - Note: only used by the Butler-Zahn (2004) & McElwee-Zenner solution. If using Bower-Rice or other solution methods, set to zero.
11. r(c) = Inside radius of well casing
12. r(eq) = Radius of downhole equipment; set to zero as transducer diameter is very small.
13. r(w) = Radius of well open or perforated interval
14. r(sk) = Outside radius of well skin distrubed zone enveloping filter pack; used for the KGS solution.
15. Parameters shown above are initial values, and may have been modified to assist with curve fitting.

Table 3 - Estimated Hydraulic Conductivity from Slug Testing
Chemtronics Site
Swannanoa, North Carolina

Well ID	Unit Screened	Analytical Solution	K [ft/day]
MW205-M27AB	AB	Bouwer-Rice	1.32
MW223-L26AB	AB	KGS	0.79
MW261-N24AB	AB	Bouwer-Rice	0.14
MW263-N25AB	AB	Bouwer-Rice	0.09
MW268-L26AB	AB	KGS	0.81
MW275-Q29AB	AB	Bouwer-Rice	0.56
MW168-O28B	B	KGS	0.06
MW-3D	B	KGS	1.53
P-2D	B	KGS	2.15
P-4D	B	KGS	0.46
MW149-O28C	C	Bouwer-Rice	0.20
MW152-Q27C	C	KGS	2.33
MW196-N27CD	CD	KGS	2.80
MW197-N25CD	CD	Springer-Gelhar	194.80
MW199-R29CD	CD	KGS	2.70
MW206-M27CD	CD	KGS	4.45
MW254-L25CD	CD	KGS	0.45
MW255-L25CD	CD	KGS	1.89
MW256-M25CD	CD	KGS	0.75
MW257-M25CD	CD	KGS	0.82
MW258-M23CD	CD	KGS	0.51
MW259-M24CD	CD	KGS	0.33
MW260-N24CD	CD	KGS	0.31
MW262-N25CD	CD	KGS	1.92
MW264-N25CD	CD	Bouwer-Rice	0.37
MW265-N25CD	CD	KGS	1.62
MW266-L26CD	CD	KGS	0.21
MW267-L26CD	CD	KGS	1.61
MW270-N27CD	CD	Bouwer-Rice	4.25
MW281-L23CD	CD	Bouwer-Rice	0.20
MW283-K25CD	CD	KGS	0.11
MW284-K25CD	CD	KGS	0.78
MW-3B	D	Bouwer-Rice	0.28
MW170-J23E	E	Springer-Gelhar	25.66
MW228-O27EF	EF	KGS	2.73
MW269-M26EF	EF	Bouwer-Rice	0.11
MW272-M27EF	EF	KGS	1.26
MW273-O26EF	EF	KGS	7.53

Notes:

1. K = Hydraulic Conductivity in units of ft/day.
2. Bouwer-Rice (1976).
3. KGS: Hyder et al. (1994).
4. Springer-Gelhar: (1991).
5. See references section of Memo for citation of model papers.
6. Yellow highlighting indicates that K value is a geometric average of several slug test results.

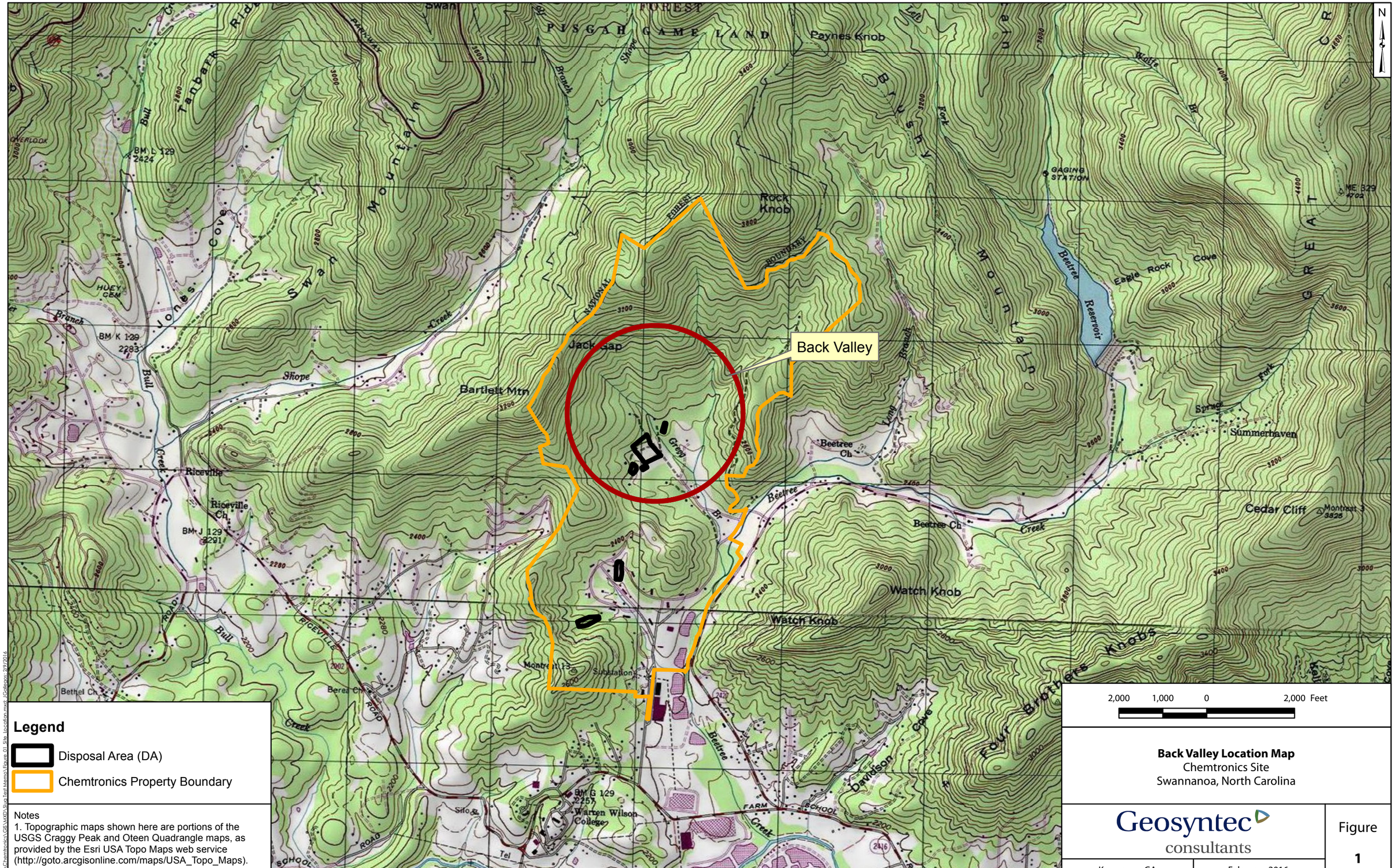
Table 4 - Observed Aquifer Parameters
Chemtronics Site
Swannanoa, North Carolina

		Hydraulic Conductivity (ft/day)					
Data Source	**Zone (Testing Method)**	**Minimum**	**Maximum**	**Geomean**	**Median**	**Representative[4]**	**Porosity**
RI Report[1]	Surficial (Slug Test)	0.16	1.5	0.50	NA	NA	0.21
	Surficial (Step Drawdown and constant rate)	1.1	2.5	NA	NA	NA	0.21
	Bedrock (Packer Testing)	1.0E-03	4.0	NA	NA	NA	NA
	Bedrock (Pumping Test - Bedrock Matrix)	9.4E-07	2.8E-04	1.6E-04	NA	NA	NA
	Bedrock (Pumping Test - Fractures)	0.14	1.4	0.88	NA	NA	NA
NCDENR Report[2]	Saprolite	0.20	3.0	NA	2.0	1.0	0.5
	Partially Weathered Rock	5.0	30	NA	8.0	10	0.3
	Bedrock	0.040	4.0	NA	0.2	0.20	low
Geosyntec[3]	Saprolite -Zone AB (Slug Test)	0.060	2.2	0.50	0.68	NA	NA
	Partially Weathered Rock - Zone CD (Slug Test)	0.11	1.9E+02	1.0	0.78	NA	NA
	Bedrock - Zone EF (Slug Test)	0.11	26	2.4	2.7	NA	NA

Notes:

1. Altamont, 2015 - Final Remedial Investigation (RI) Report.
2. Campbell, T.R., 2011, Hydrogeology and Water Quality at Bent Creek Research Station, Buncombe County, North Carolina, 2002 - 2009: North Carolina Department of Environmental and Natural Resource (NCDENR) Division of Water Quality Groundwater Bulletin 2011-01.
3. Geosyntec Aquifer Testing, March - April 2015.
4. The term “representative” defined by DENR as typically the median value.
5. NA - Not available.
6. ft/day - feet per day.

FIGURES



Notes
1. Topographic maps shown here are portions of the USGS Craggy Peak and Oteen Quadrangle maps, as provided by the Esri USA Topo Maps web service (http://goto.arcgisonline.com/maps/USA_Topo_Maps).

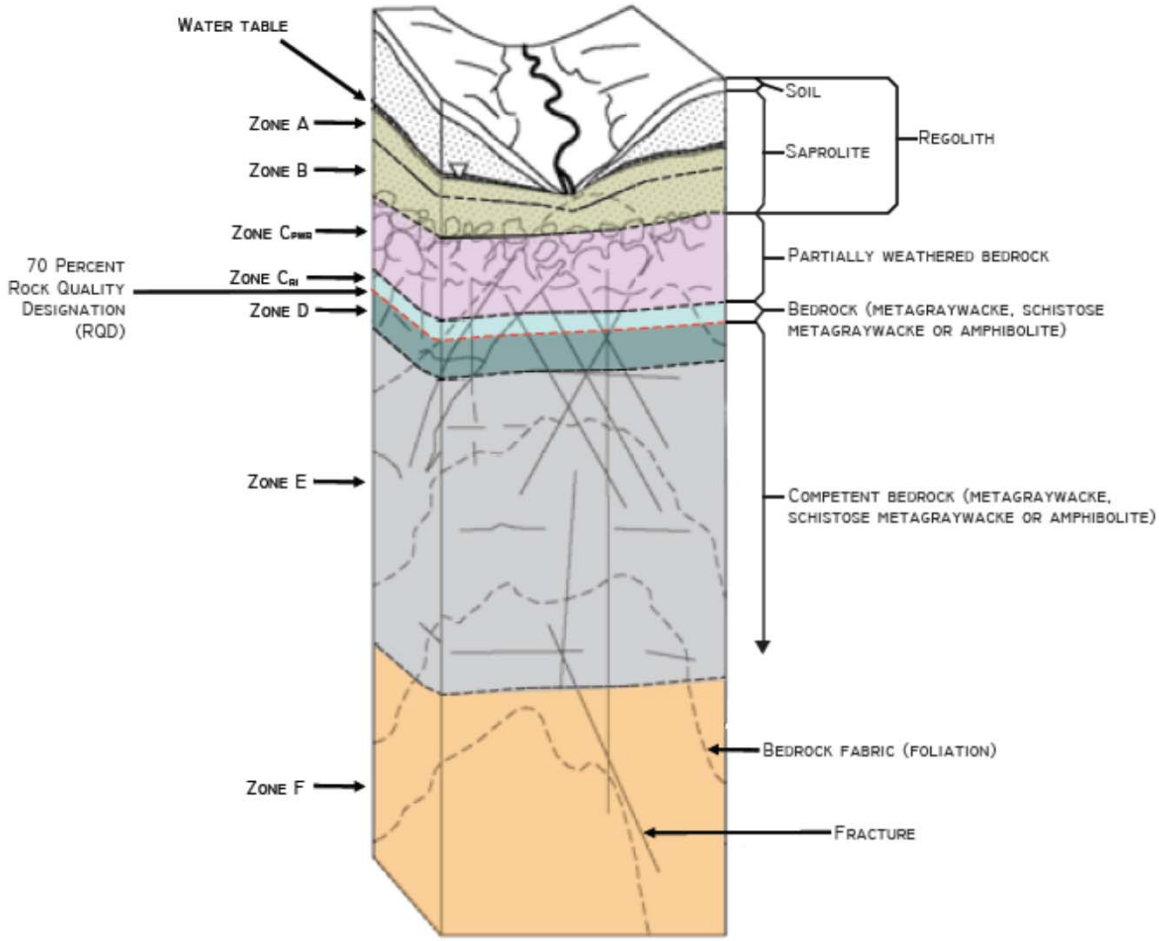
Back Valley Location Map
Chemtronics Site
Swannanoa, North Carolina

Geosyntec consultants

Kennesaw, GA | February, 2016

Figure 1

N:\C\Chemtronics\GIS\MXD\Slug Test Memo\Figure 01_Site Location.mxd; JGallegos; 2/9/2016



Surficial Aquifer System (Zone AB)

Zone A: Water table

Zone B: Only present if > 40 ft from water table

Transition Zone Aquifer System (Zone CD)

Zone Cpwr: Predominance of partially weathered rock and/or blow counts of 50/6 inches

Zone Cri: Auger refusal to RQD ≥ 70 percent

Zone D: First 10-15 feet where RQD ≥ 70 percent

Bedrock Aquifer System (Zone EF)

Zone E: RQD ≥ 70 percent, 100 ft thick

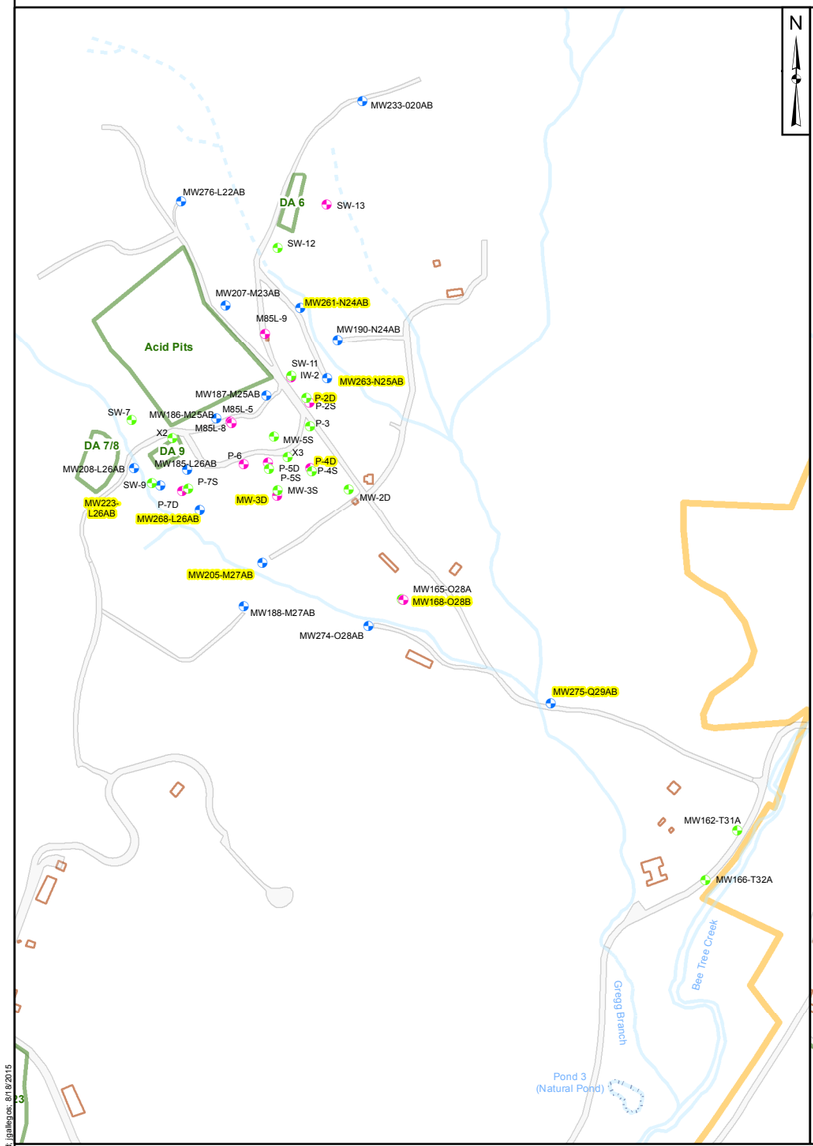
Zone F: RQD ≥ 70 percent, below Zone E

Source: Modified from Harned and Daniel (1992) and presented in the Hydrogeological Conceptual Site Model (Altamont, 2016).

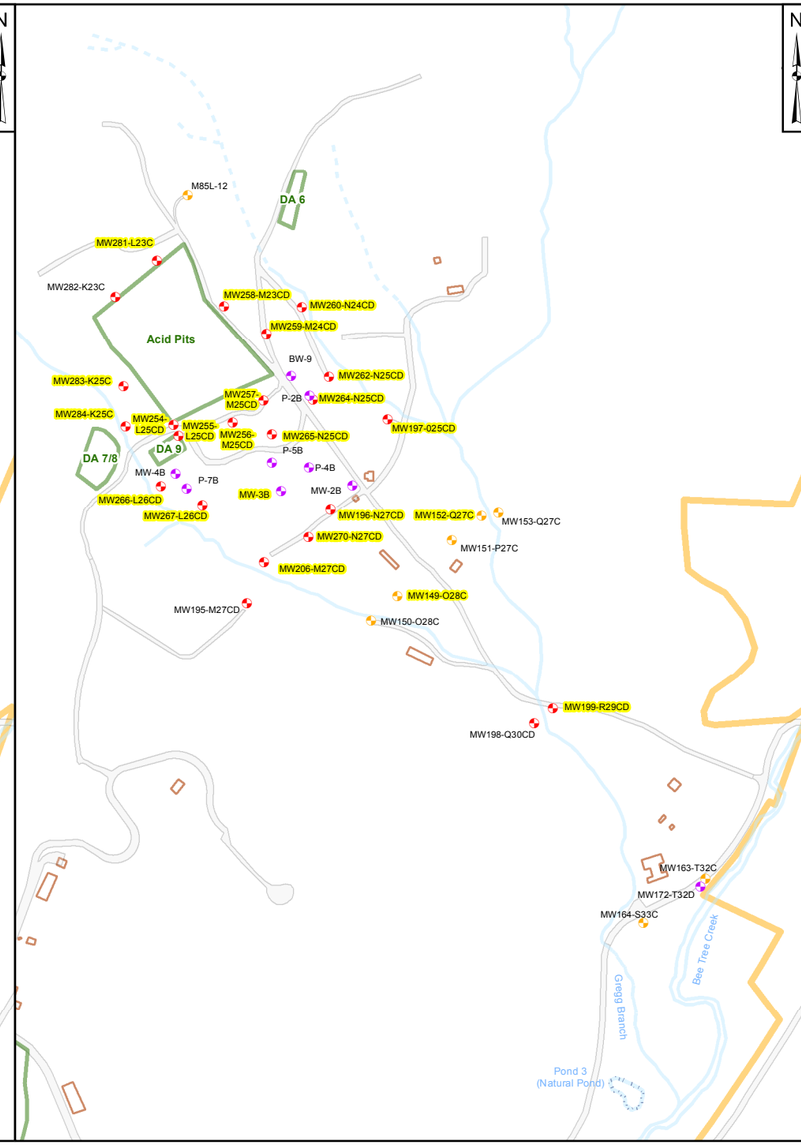
Hydrostratigraphy at the Site	Geosyntec consultants	Figure
Kennesaw, Georgia	February 2016	2

N:\C\Chemtronics\Bedrock Characterization Data\2015 BV hydro testing\2015 Slug Testing Report\Figures\build\feb 2016 rev

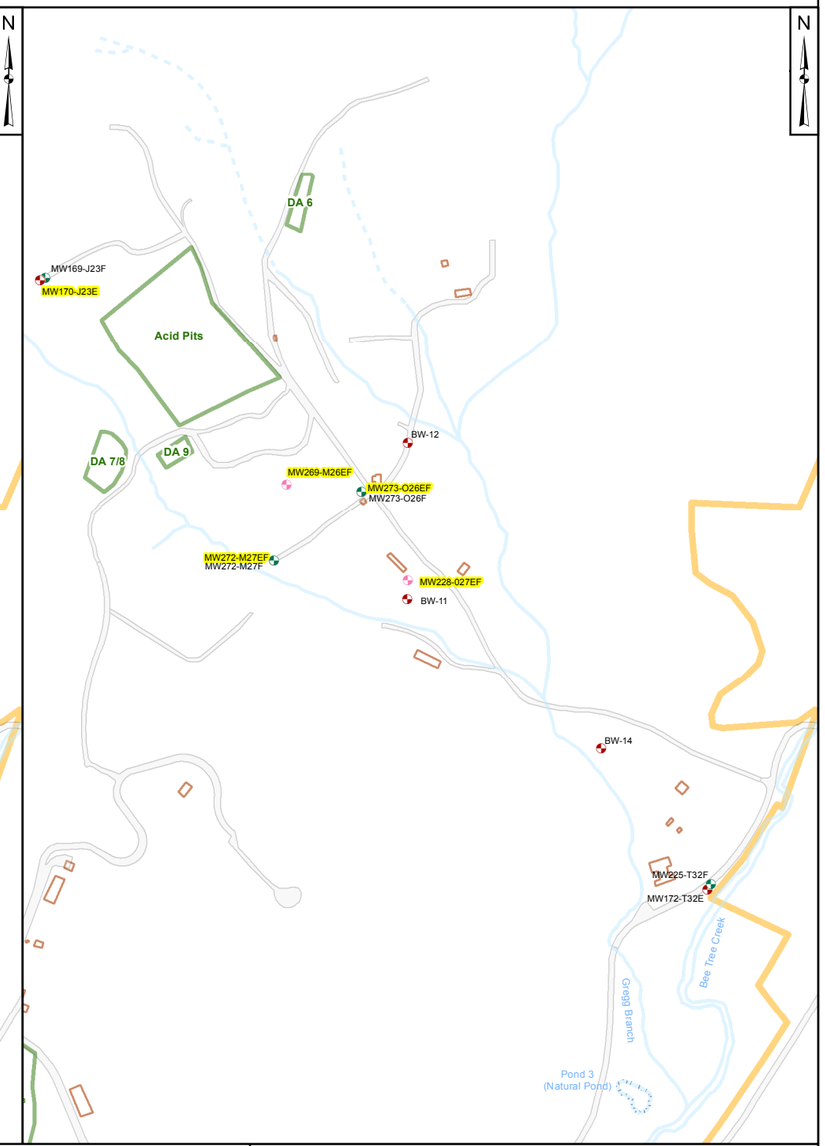
Zone AB



Zone CD



Zone EF



- Zone A Monitoring Well
- Zone B Monitoring Well
- Zone AB Monitoring Well
- Zone C Monitoring Well
- Zone D Monitoring Well
- Zone CD Monitoring Well
- Zone E Monitoring Well
- Zone F Monitoring Well
- Zone EF Monitoring Well
- Disposal Area (DA)
- Pond
- Stream (Dashed Where Intermittent)
- Road
- Existing or Former Building Area
- Chemtronics Property Boundary

Notes:
1. Wells are divided into groups based on which geologic zone the wells are screened in.
2. Yellow highlighted wells indicates wells that were slug tested.

0 275 550 1,100 Feet

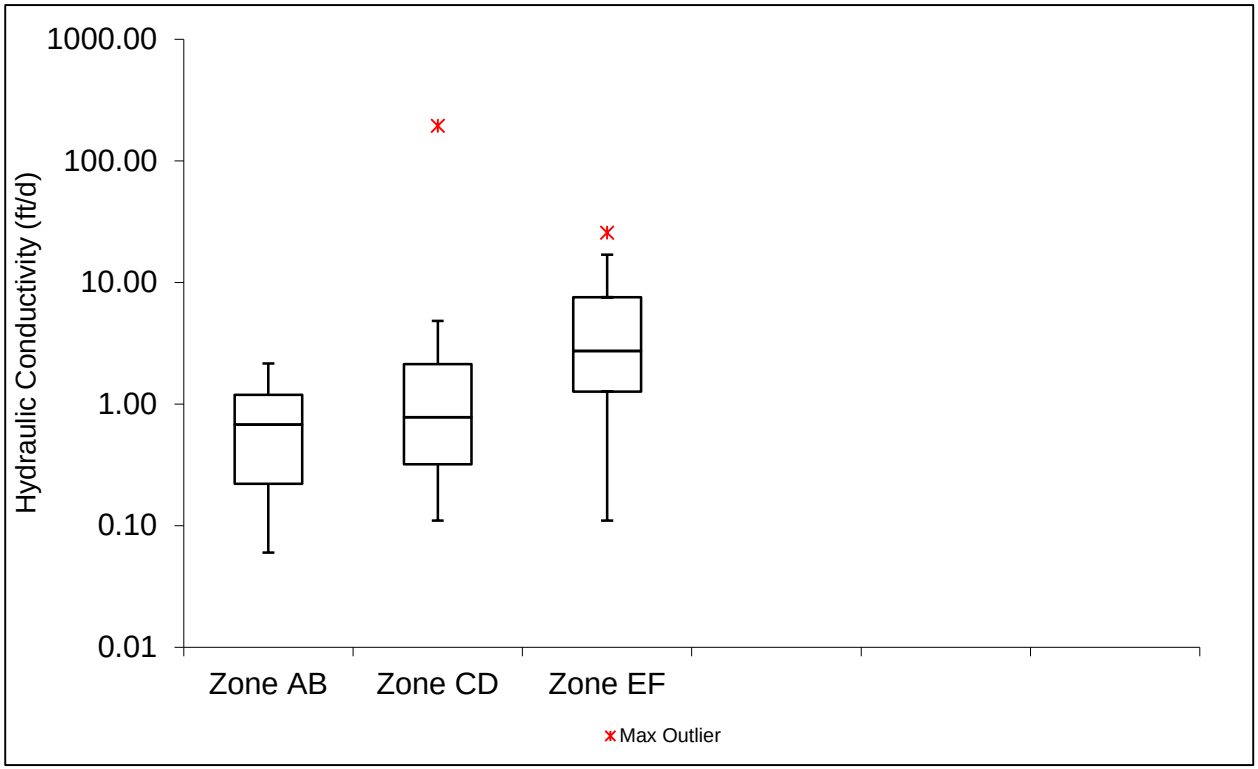
Back Valley Well Location Map
Chemtronics Site
Swannanoa, North Carolina

Geosyntec consultants

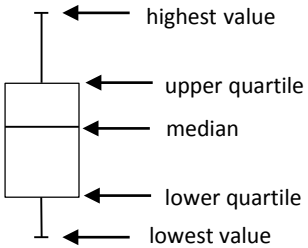
Kennesaw, GA | February 2016

Figure 3

N:\C\Chemtronics\GIS\MXD\Slug Test Memo\Figure_03_Well Map.mxd; jgallegos; 8/18/2015



	Zone AB	Zone CD	Zone EF
Min	0.06	0.11	0.11
Q1	0.22	0.32	1.26
Median	0.68	0.78	2.73
Q3	1.19	2.13	7.53
Max	2.15	194.80	25.66
IQR	0.97	1.81	6.27
Mean	0.79	9.73	7.46
Geometric mean	0.47	0.98	2.36
Number of samples	10	23	5



Note: Zone EF values are believed biased high since the Zone EF monitoring wells were screened across water-bearing fracture zones.

Slug Testing Hydraulic Conductivity Box Plot

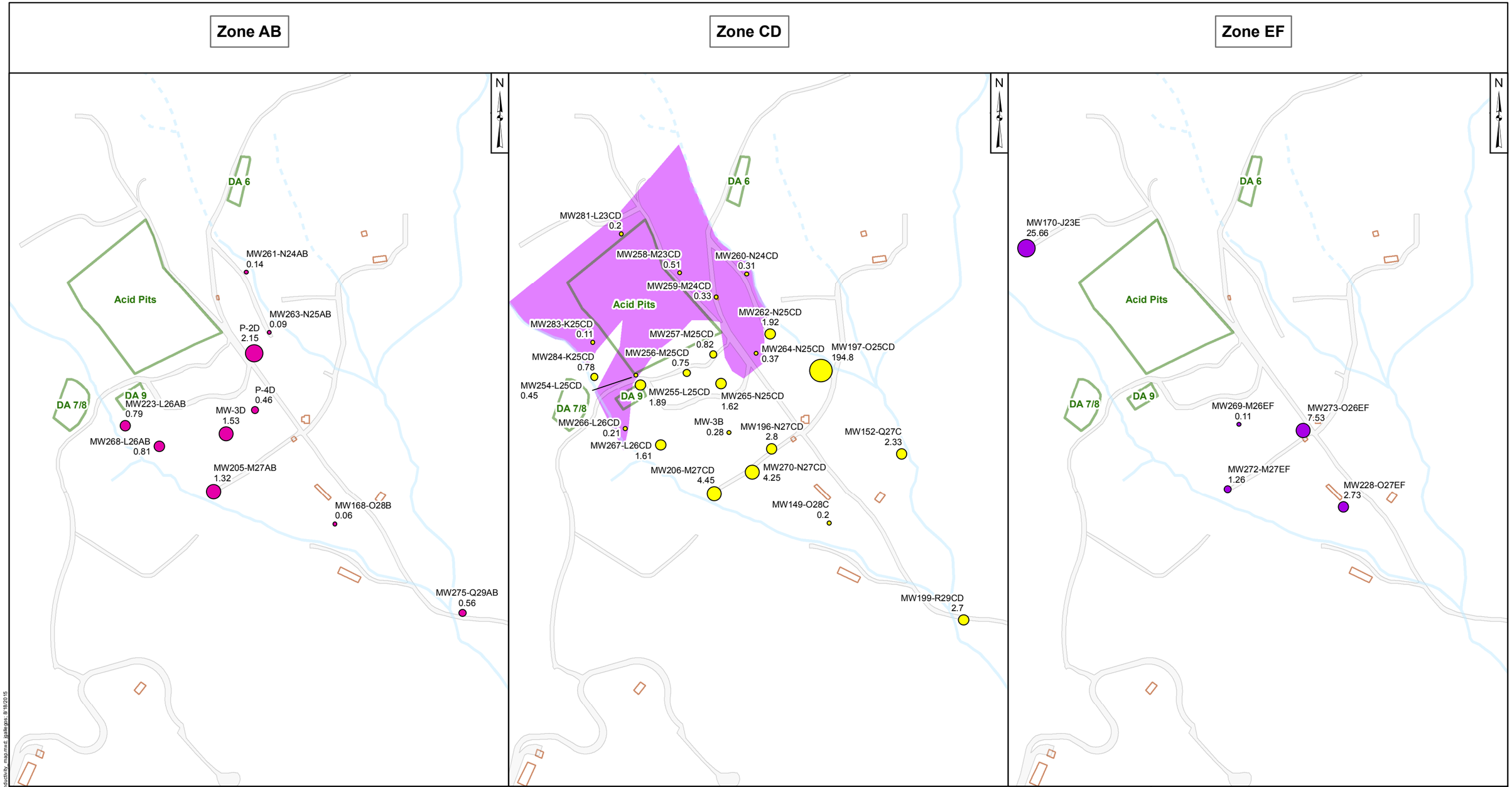
Geosyntec consultants

Kennesaw, GA

February 2016

Figure 4

N:\C\Chemtronics\Bedrock Characterization Data\2015 BV hydro testing\2015 Slug Testing Memo\Figures\build



K (ft/d) - Zone AB	K (ft/d) - Zone CD	K (ft/d) - Zone EF
0.06 - 0.14	0.11 - 0.51	0.11
0.31 - 0.56	0.52 - 0.82	0.12 - 1.26
0.79 - 0.81	0.83 - 2.80	1.27 - 2.73
1.32 - 1.53	2.81 - 4.45	2.74 - 7.53
2.15	4.46 - 194.80	7.54 - 25.66

Disposal Area (DA)
Pond
Intermittent Stream
Perennial Stream
Road
Existing or Former Building Area
Chemtronics Property Boundary
Low K Zone

Notes:
1. K = hydraulic conductivity in units of feet per day.
2. Low K zone based on slug test data and local geologic strike and foliation orientation.

0 250 500 1,000 Feet

Back Valley Hydraulic Conductivity Map
Chemtronics Site
Swannanoa, North Carolina

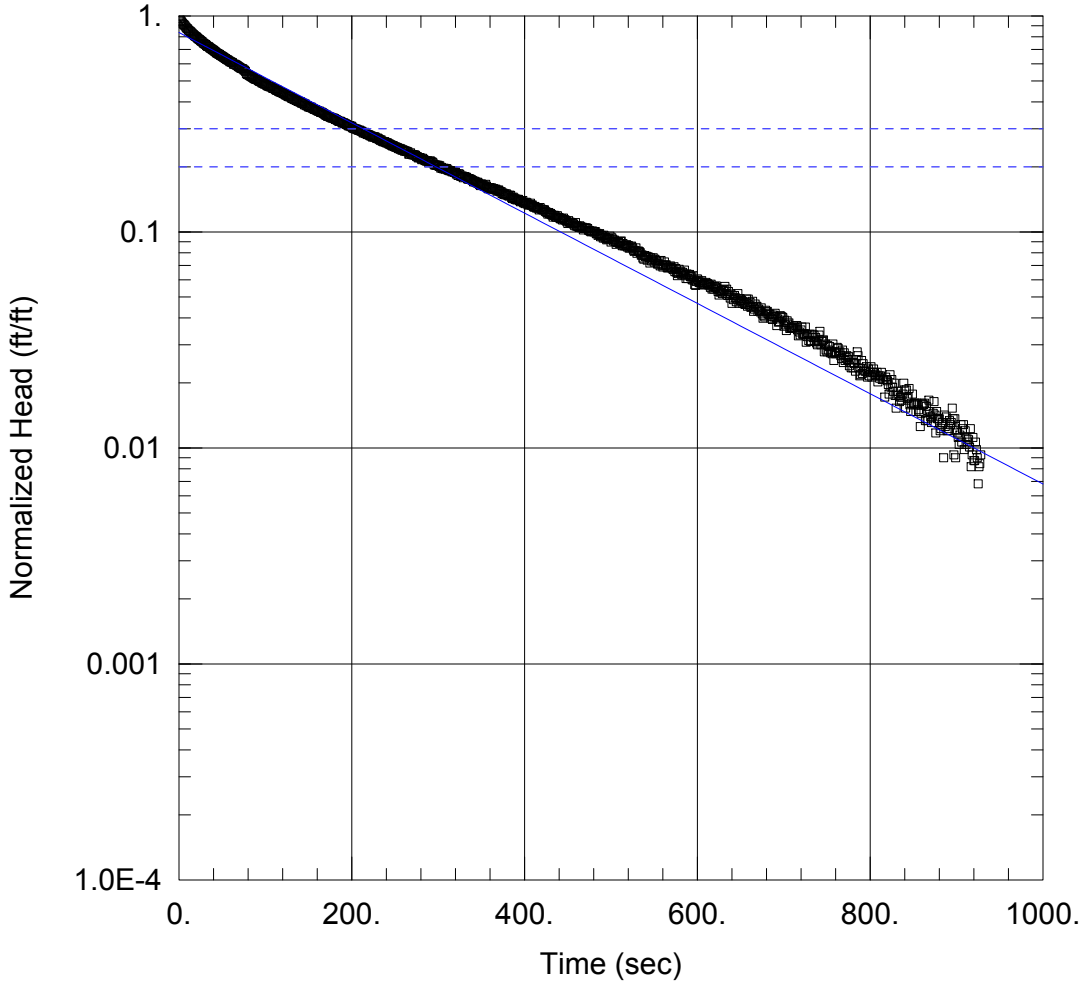
Geosyntec consultants

Kennesaw, GA | February 2016

Figure 5

N:\Chemtronics\GIS\MXD\Slug Test Memo\Figure_05_Hydraulic_Conductivity_map.mxd, gallegos; 8/18/2015

ATTACHMENT A
AQTESOLV OUTPUT FILES



MW-3B

Data Set: N:\...\MW-3B.aqt
Date: 05/08/15 Time: 10:41:01

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-3B
Test Date: 4/28/2015

AQUIFER DATA

Saturated Thickness: 61. ft Anisotropy Ratio (Kz/Kr): 1.

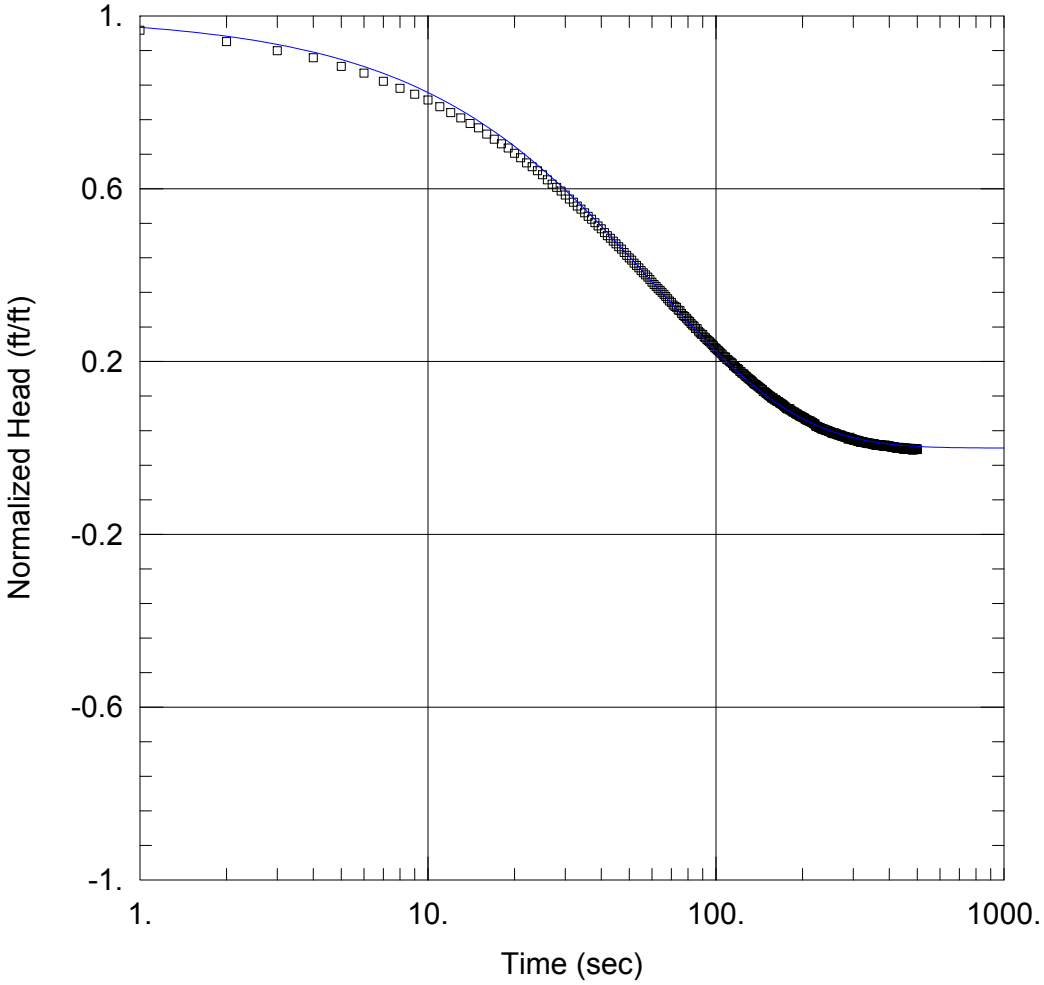
WELL DATA (MW-3B)

Initial Displacement: 3.664 ft Static Water Column Height: 10. ft
Total Well Penetration Depth: 61.01 ft Screen Length: 23.1 ft
Casing Radius: 0.08333 ft Well Radius: 0.1667 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.2769 ft/day y0 = 3.069 ft



MW-3D TEST-2

Data Set: N:\...\MW-3D Test-2-KGS.aqt
Date: 05/12/15 Time: 17:49:42

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-3D Test-2
Test Date: 4/28/2015

AQUIFER DATA

Saturated Thickness: 35.2 ft

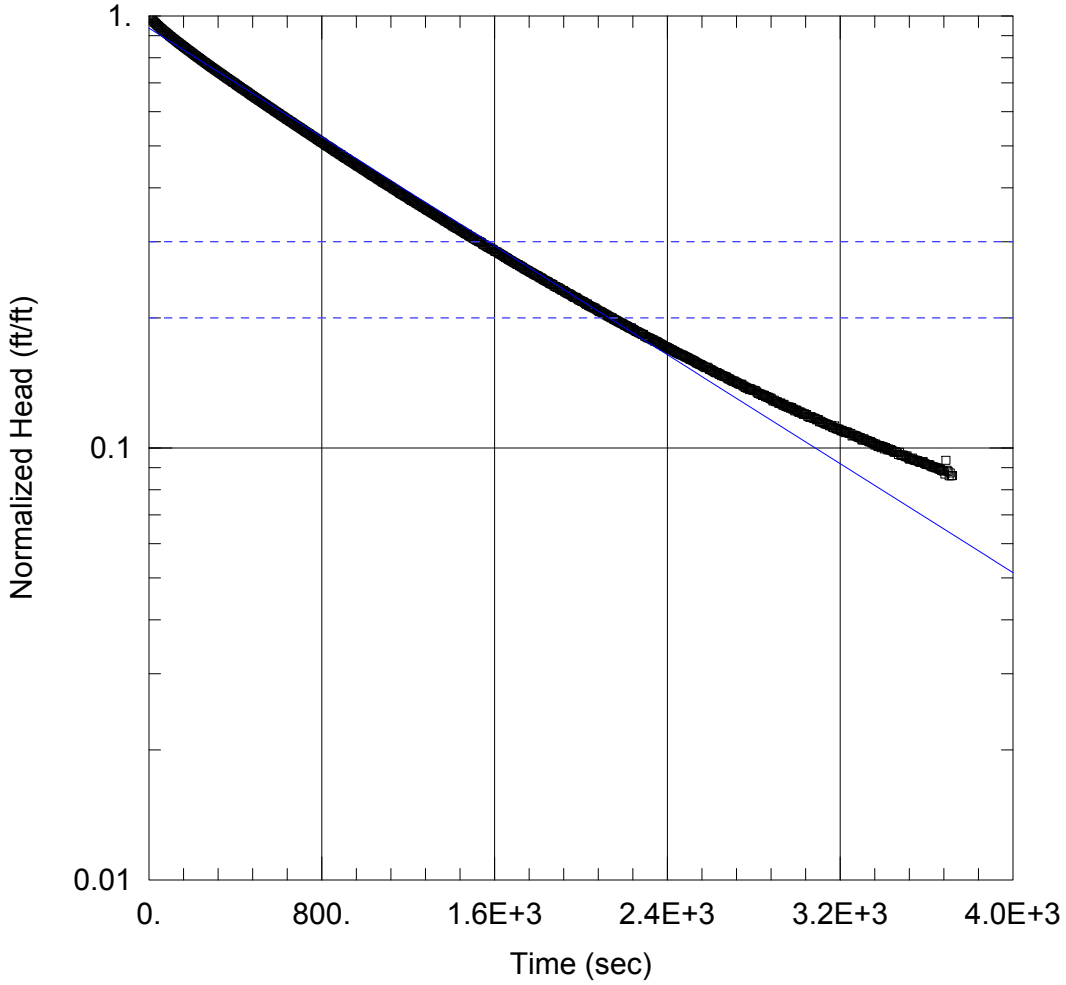
WELL DATA (MW-3D Test-2)

Initial Displacement: 6.293 ft
Total Well Penetration Depth: 34.99 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 35.2 ft
Screen Length: 14.9 ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.525 ft/day
Kz/Kr = 1.
Ss = 7.729E-6 ft^{-1}



MW-149

Data Set: N:\...\MW-149.aqt
Date: 05/08/15 Time: 14:14:20

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-149
Test Date: 4/29/2015

AQUIFER DATA

Saturated Thickness: 65.86 ft Anisotropy Ratio (Kz/Kr): 1.

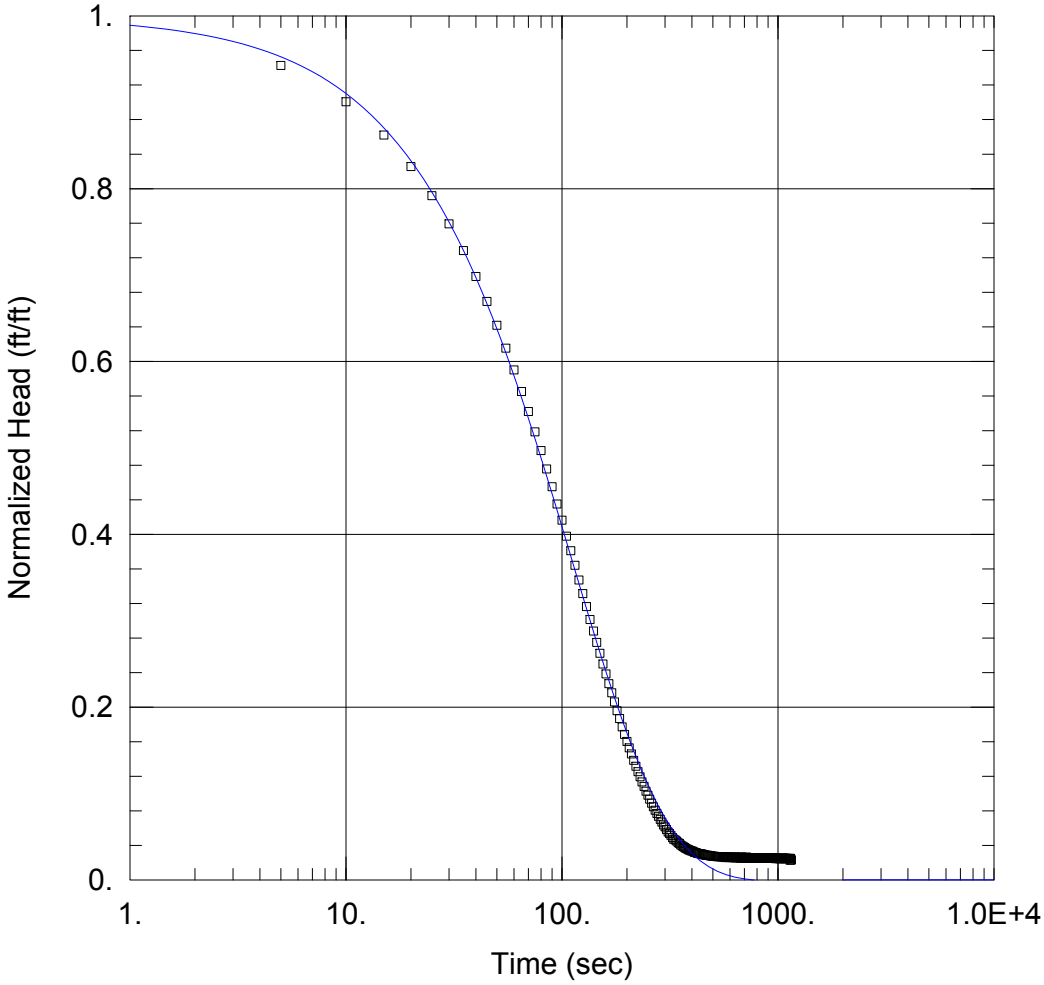
WELL DATA (MW-149)

Initial Displacement: 7.853 ft Static Water Column Height: 70.9 ft
Total Well Penetration Depth: 70.86 ft Screen Length: 5. ft
Casing Radius: 0.0833 ft Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.2043 ft/day y0 = 7.359 ft



MW-152

Data Set: N:\...\MW-152.aqt
Date: 05/12/15 Time: 17:52:29

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-152
Test Date: 4/28/2015

AQUIFER DATA

Saturated Thickness: 27. ft

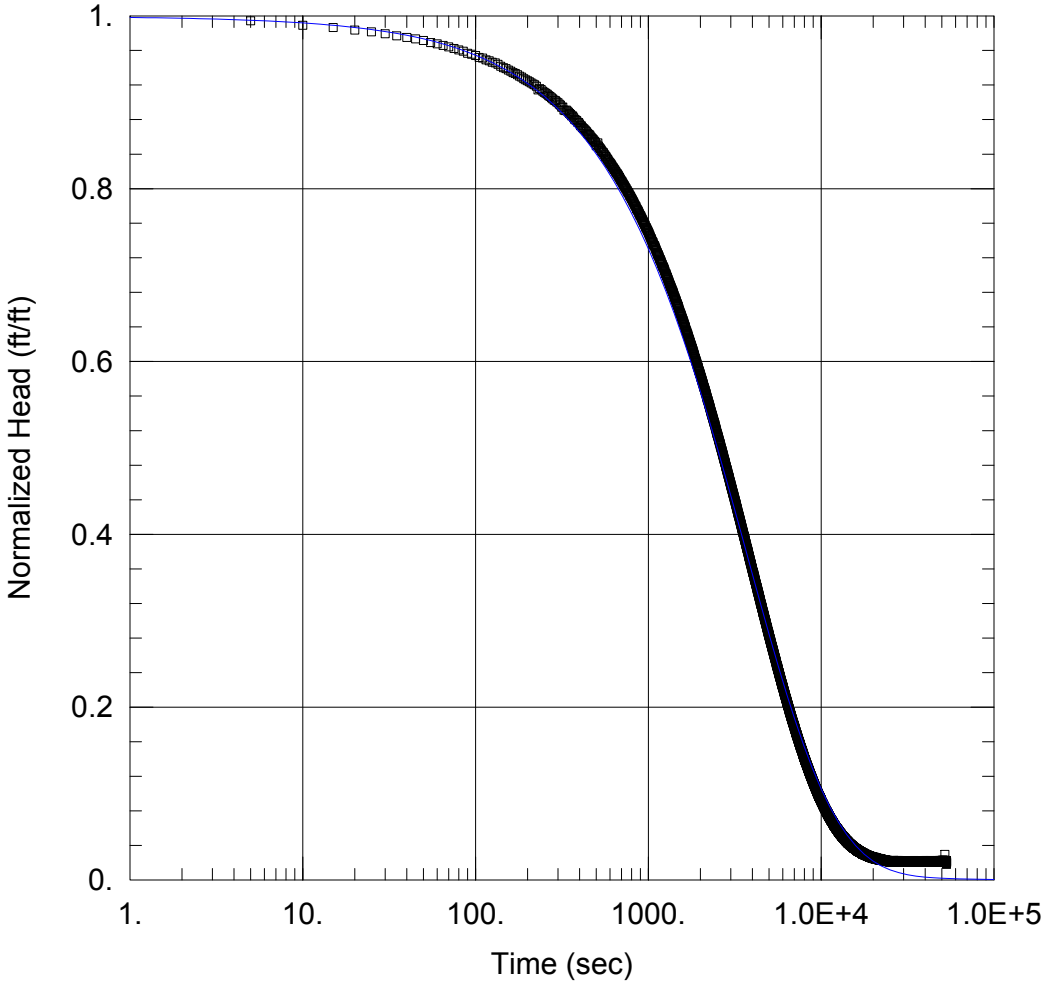
WELL DATA (MW-152)

Initial Displacement: 8.336 ft
Total Well Penetration Depth: 26.98 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 27. ft
Screen Length: 5. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.325 ft/day
Kz/Kr = 1.
Ss = 1.382E-6 ft^{-1}



MW-168

Data Set: N:\...\MW-168.aqt
Date: 05/08/15 Time: 14:42:18

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-168
Test Date: 4/29/2015

AQUIFER DATA

Saturated Thickness: 30.7 ft

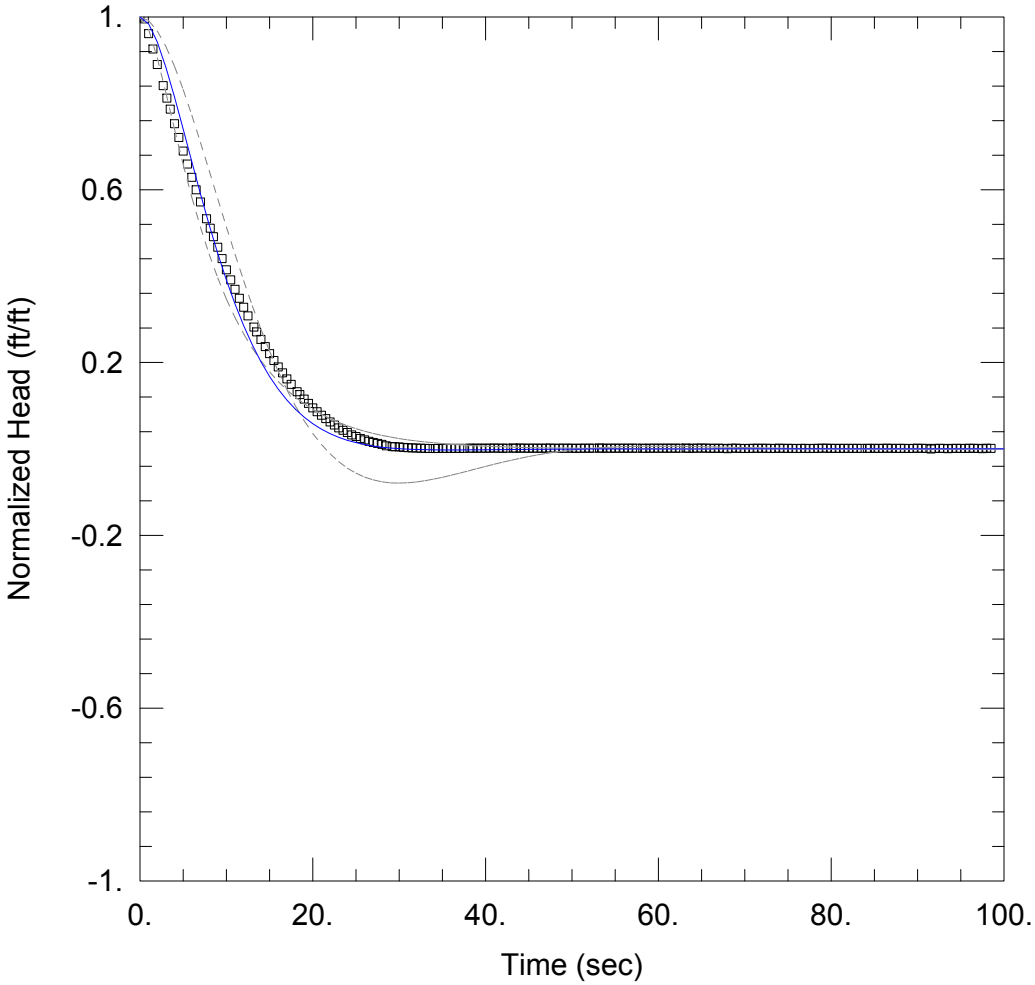
WELL DATA (MW-168)

Initial Displacement: 7.134 ft
Total Well Penetration Depth: 30.72 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 30.7 ft
Screen Length: 5. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.06002 ft/day
Kz/Kr = 1.
Ss = 0.0001342 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW170-J23E_test2_springer-gelhar.aqt
Date: 05/12/15 Time: 17:25:06

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW170-J23E
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 65.2 ft Anisotropy Ratio (Kz/Kr): 1.

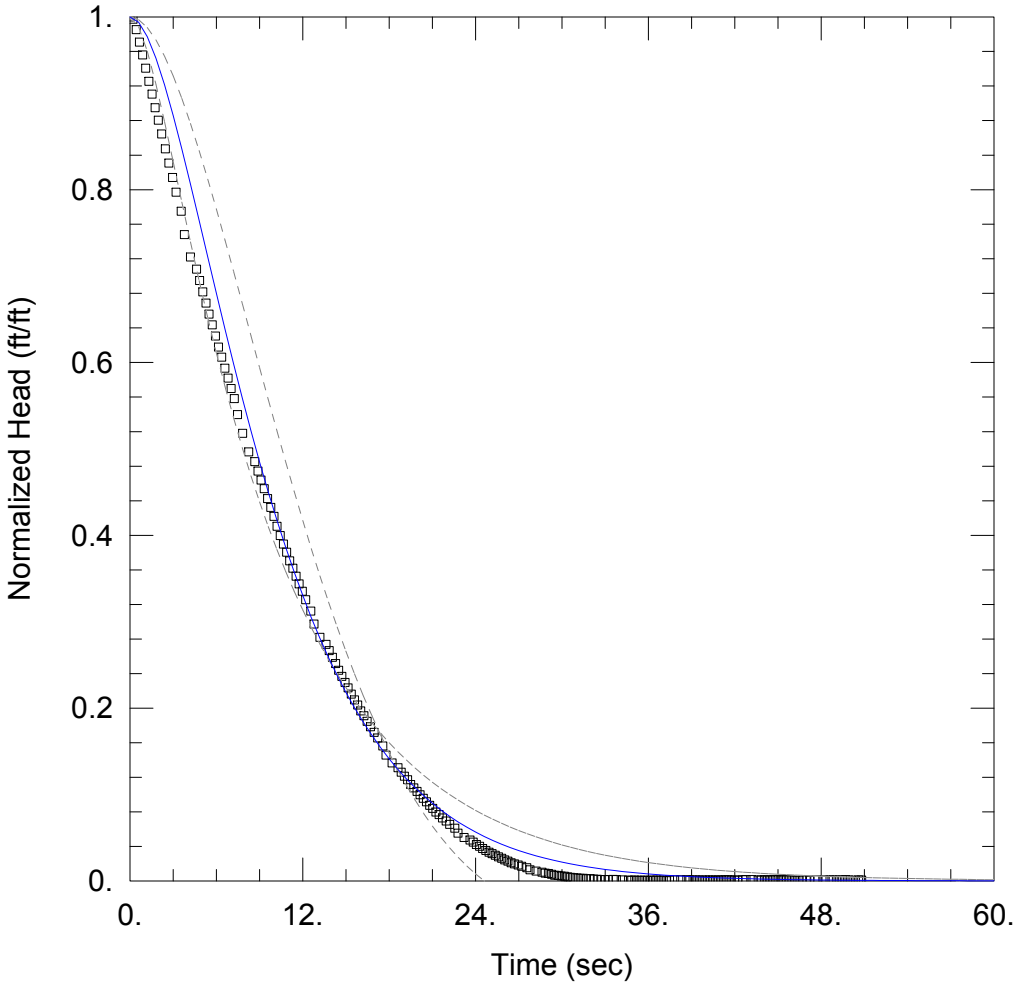
WELL DATA (MW170-J23E)

Initial Displacement: 9.743 ft Static Water Column Height: 65.21 ft
Total Well Penetration Depth: 64.21 ft Screen Length: 20. ft
Casing Radius: 0.1667 ft Well Radius: 0.1667 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Springer-Gelhar

K = 27.14 ft/day Le = 885.8 ft



WELL TEST ANALYSIS

Data Set: N:\...\MW170-J23E_test3_springer-gelhar.aqt
Date: 08/13/15 Time: 11:24:07

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW170-J23E
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 65.2 ft
Anisotropy Ratio (Kz/Kr): 1.

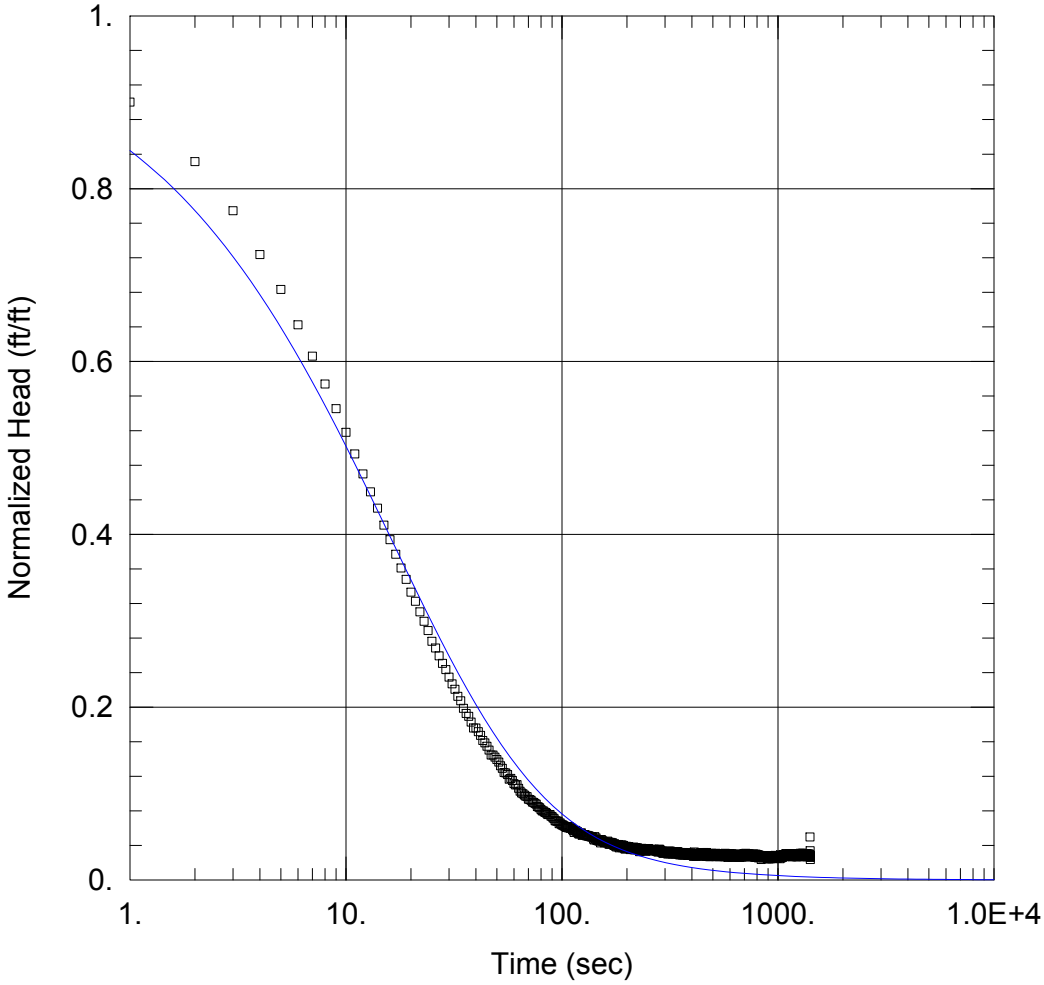
WELL DATA (MW170-J23E)

Initial Displacement: 10.44 ft
Total Well Penetration Depth: 64.22 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 65.22 ft
Screen Length: 20. ft
Well Radius: 0.1667 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 24.26 ft/day
Le = 871. ft



MW-196

Data Set: N:\...\MW-196.aqt
Date: 05/12/15 Time: 17:53:40

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-196
Test Date: 4/28/2015

AQUIFER DATA

Saturated Thickness: 12.1 ft

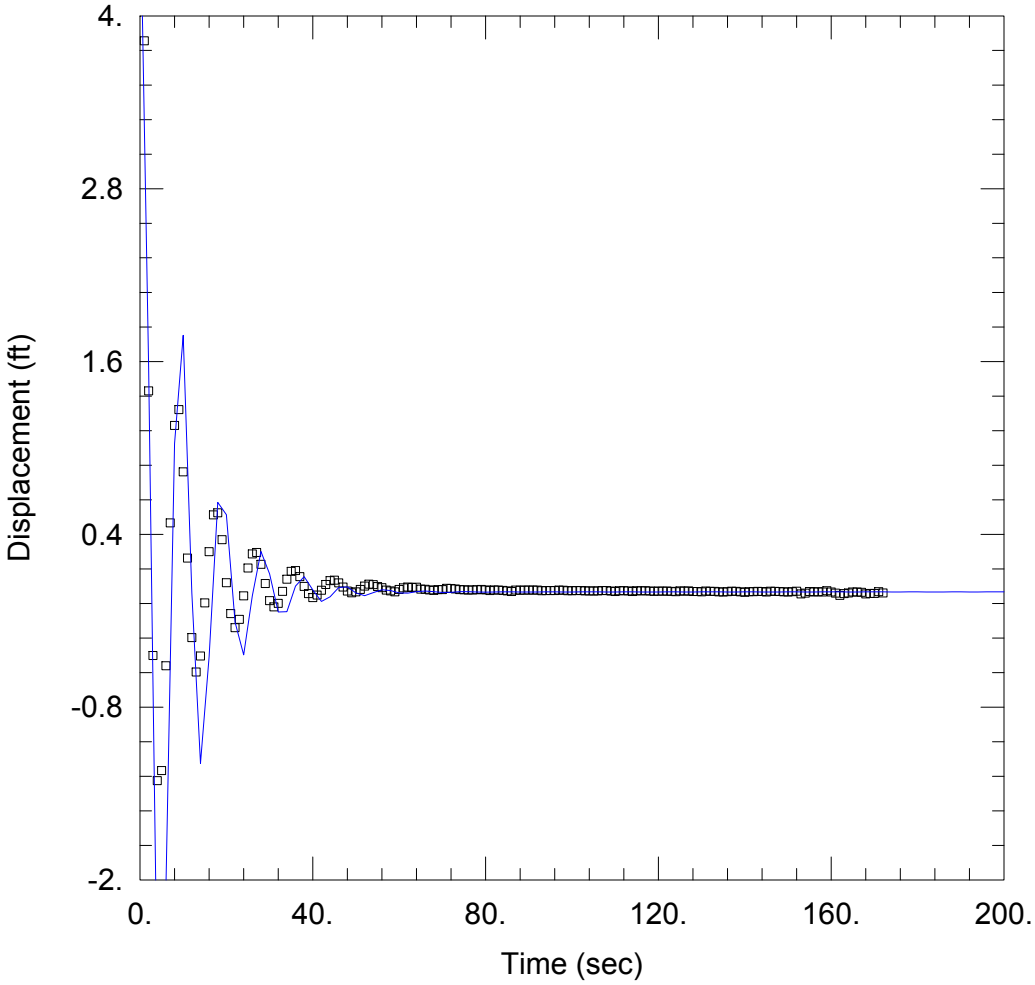
WELL DATA (MW-196)

Initial Displacement: 2.075 ft
Total Well Penetration Depth: 11.71 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 12.1 ft
Screen Length: 9.6 ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.803 ft/day
Kz/Kr = 1.
Ss = 0.008264 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW-197.aqt
Date: 05/13/15 Time: 10:29:59

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW197-O25CD
Test Date: 4/27/2015

AQUIFER DATA

Saturated Thickness: 81.9 ft
Anisotropy Ratio (Kz/Kr): 1.

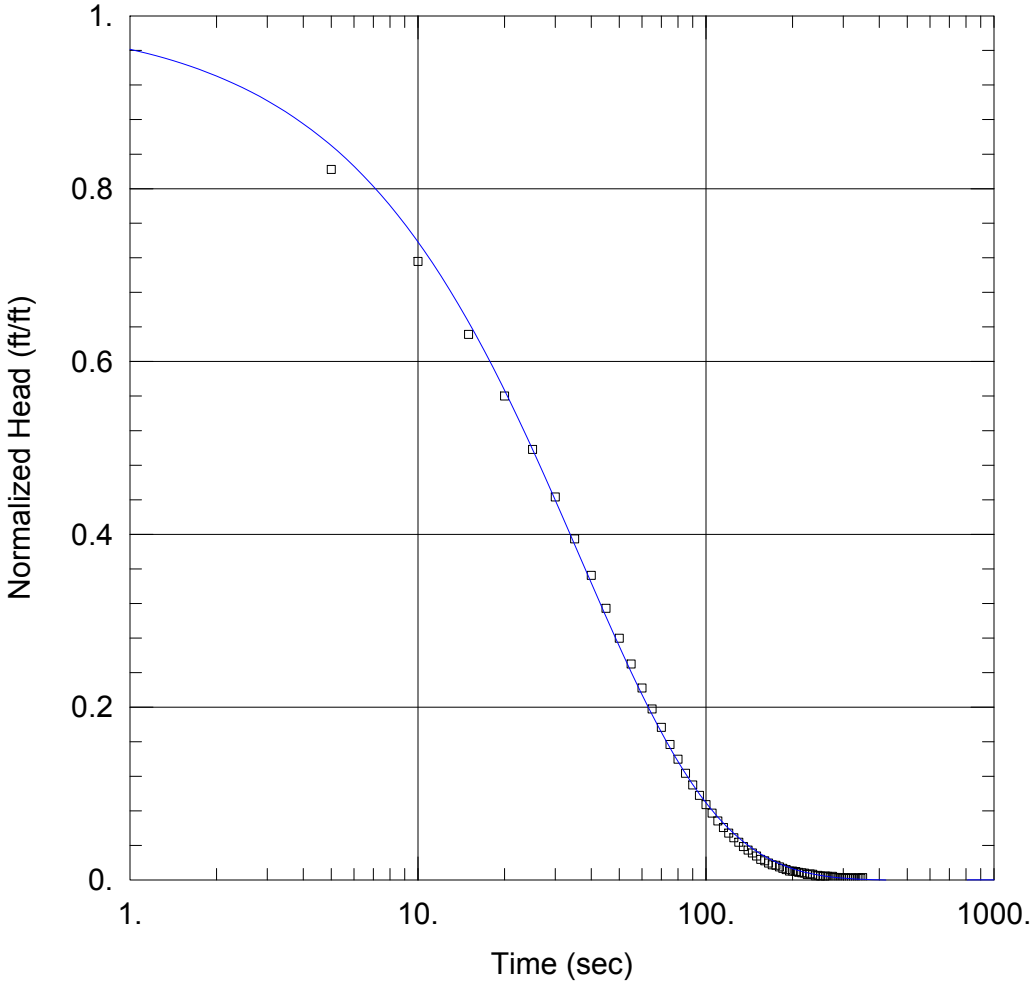
WELL DATA (MW197-O25CD)

Initial Displacement: 5.005 ft
Total Well Penetration Depth: 54.52 ft
Casing Radius: 0.08 ft
Static Water Column Height: 81.9 ft
Screen Length: 14.8 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 194.8 ft/day
Le = 70.59 ft



MW-199

Data Set: N:\...\MW-199 Test 1.aqt
Date: 05/08/15 Time: 14:40:28

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-199
Test Date: 4/29/2015

AQUIFER DATA

Saturated Thickness: 50.3 ft

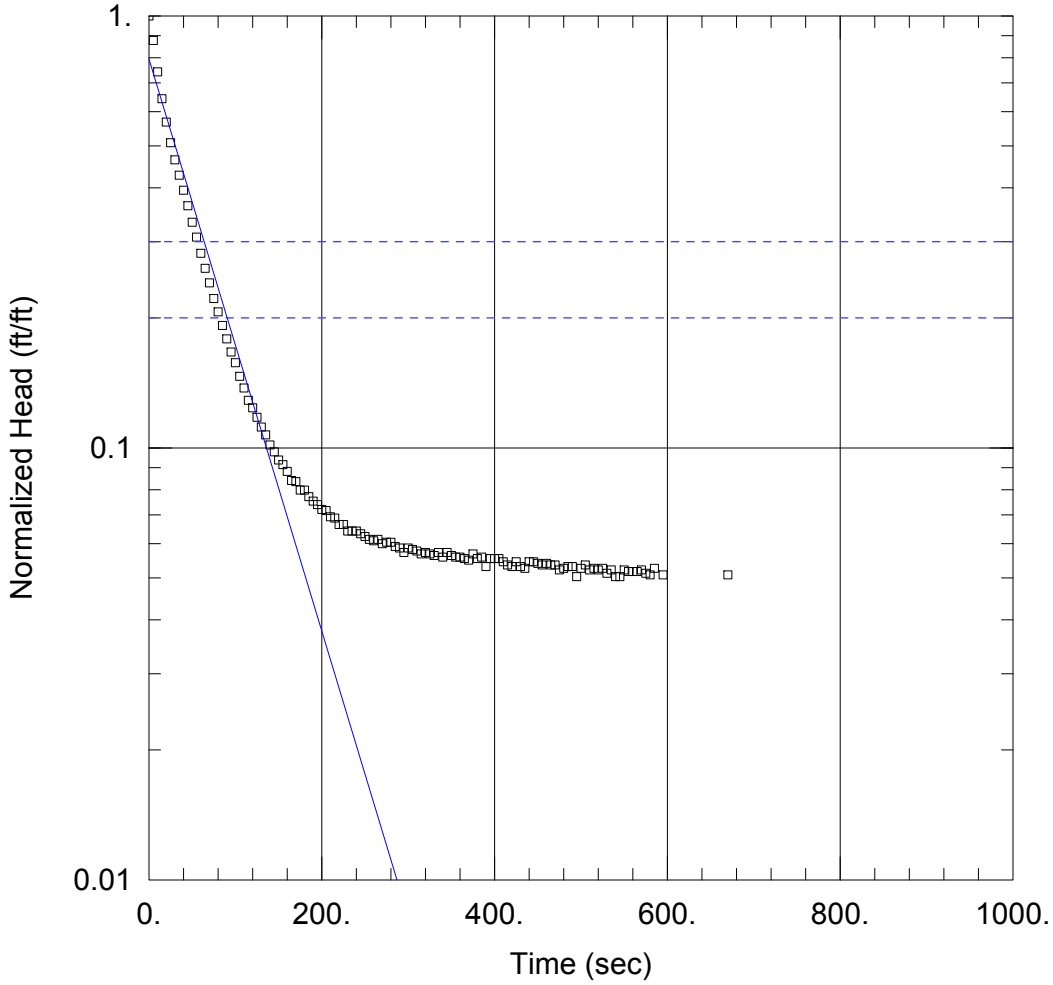
WELL DATA (MW-199)

Initial Displacement: 7.831 ft
Total Well Penetration Depth: 49.91 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 50.3 ft
Screen Length: 14.8 ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.695 ft/day
Kz/Kr = 1.
Ss = 3.799E-6 ft^{-1}



MW-205

Data Set: N:\...\MW-205.aqt
Date: 05/08/15 Time: 10:50:11

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-205
Test Date: 4/28/2015

AQUIFER DATA

Saturated Thickness: 13.9 ft Anisotropy Ratio (Kz/Kr): 1.

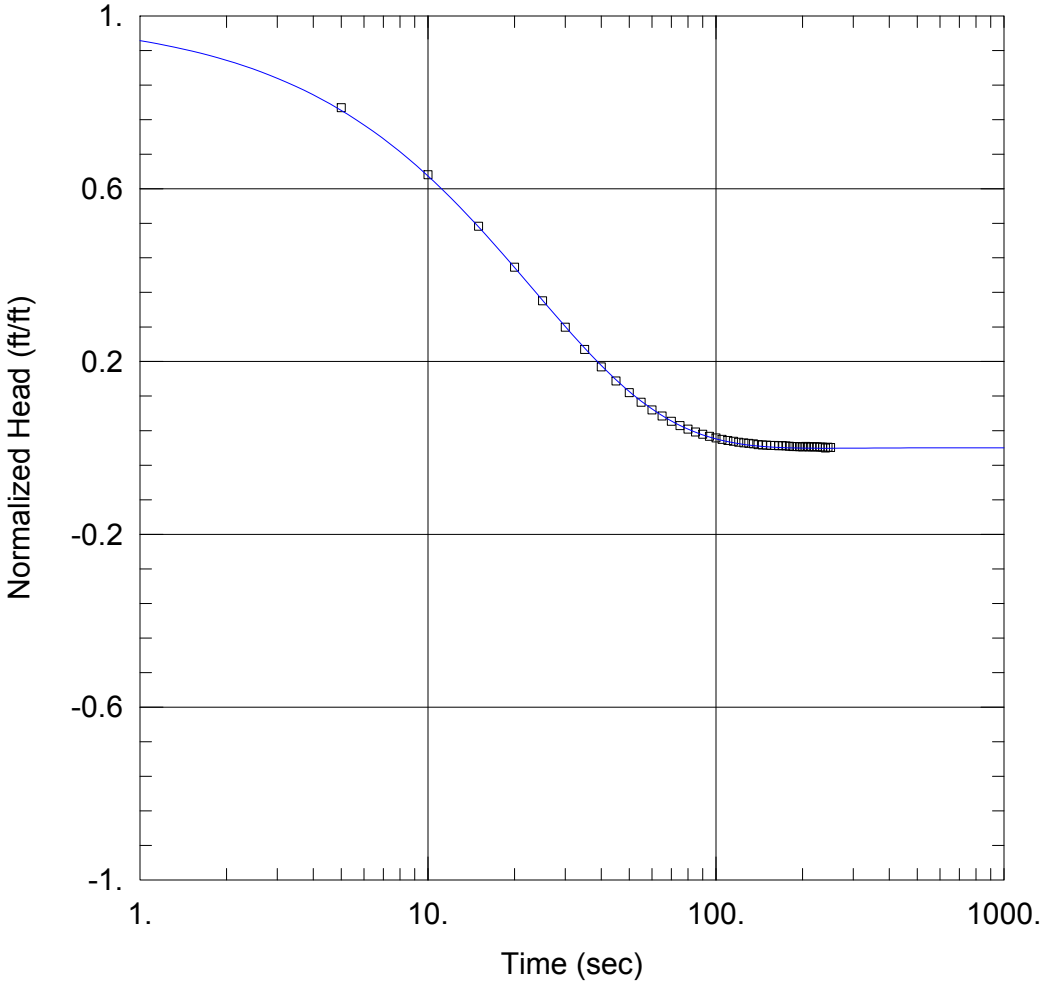
WELL DATA (MW-205)

Initial Displacement: 2.165 ft Static Water Column Height: 13.9 ft
Total Well Penetration Depth: 14.9 ft Screen Length: 14.8 ft
Casing Radius: 0.0833 ft Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.32 ft/day y0 = 1.72 ft



MW-206

Data Set: N:\...\MW-206.aqt
Date: 05/12/15 Time: 17:54:44

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-206
Test Date: 4/28/2015

AQUIFER DATA

Saturated Thickness: 27.7 ft

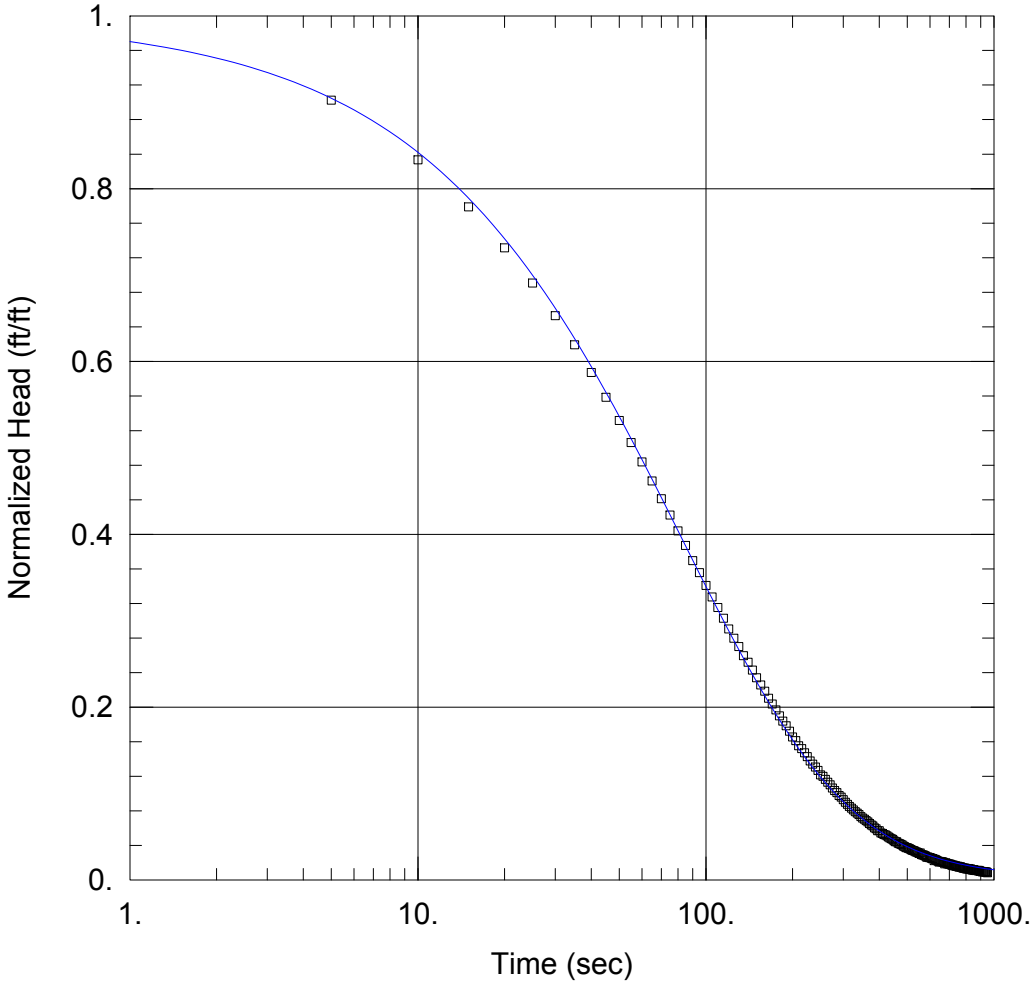
WELL DATA (MW-206)

Initial Displacement: 6.735 ft
Total Well Penetration Depth: 27.43 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 27.7 ft
Screen Length: 14.4 ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 4.445 ft/day
Kz/Kr = 1.
Ss = 3.704E-6 ft^{-1}



MW-223 TEST 1

Data Set: N:\...\MW-223 Test 1.aqt
Date: 05/08/15 Time: 11:41:58

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-223
Test Date: 4/27/2015

AQUIFER DATA

Saturated Thickness: 21.2 ft

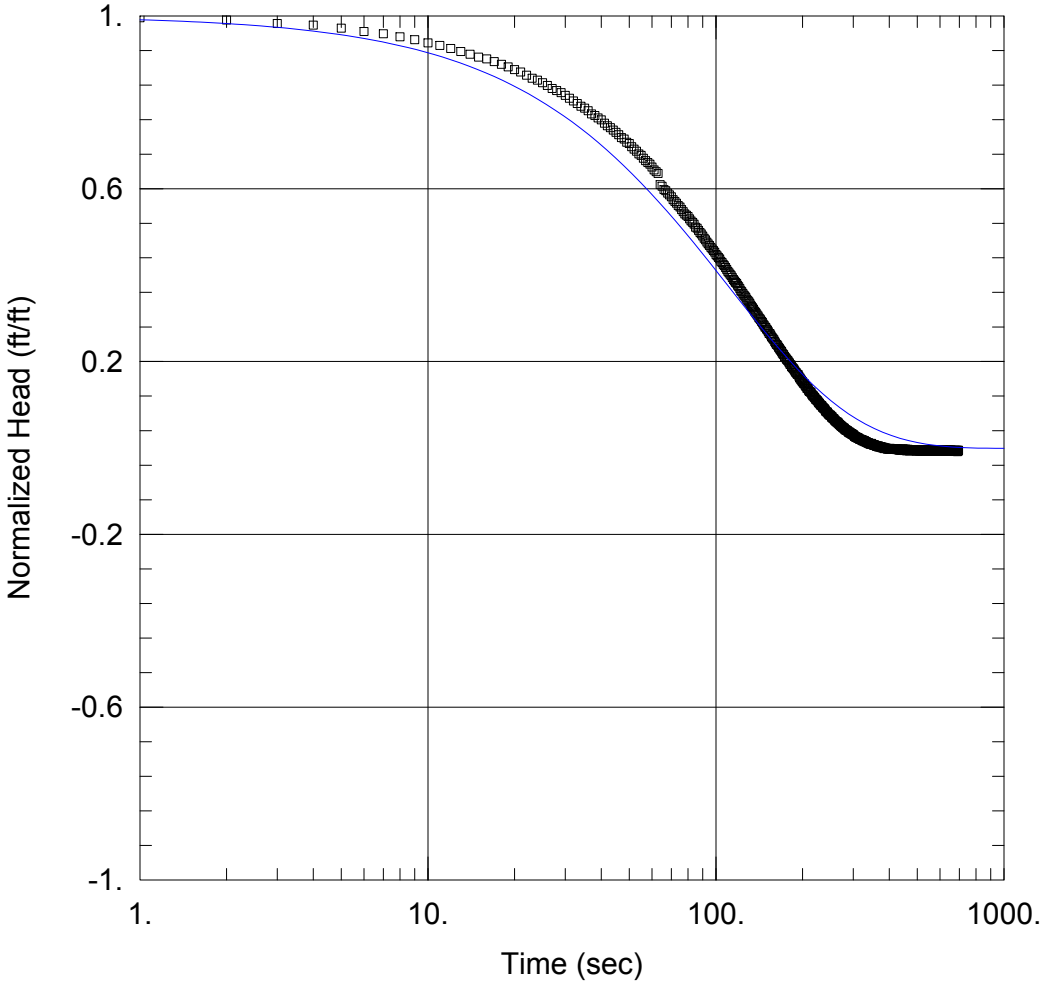
WELL DATA (MW-223)

Initial Displacement: 5.633 ft
Total Well Penetration Depth: 21.25 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 21.2 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.7903 ft/day
Kz/Kr = 1.
Ss = 0.0001501 ft^{-1}



MW-228

Data Set: N:\...\MW-228.aqt
Date: 05/12/15 Time: 17:55:48

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-228
Test Date: 4/28/2015

AQUIFER DATA

Saturated Thickness: 262.5 ft

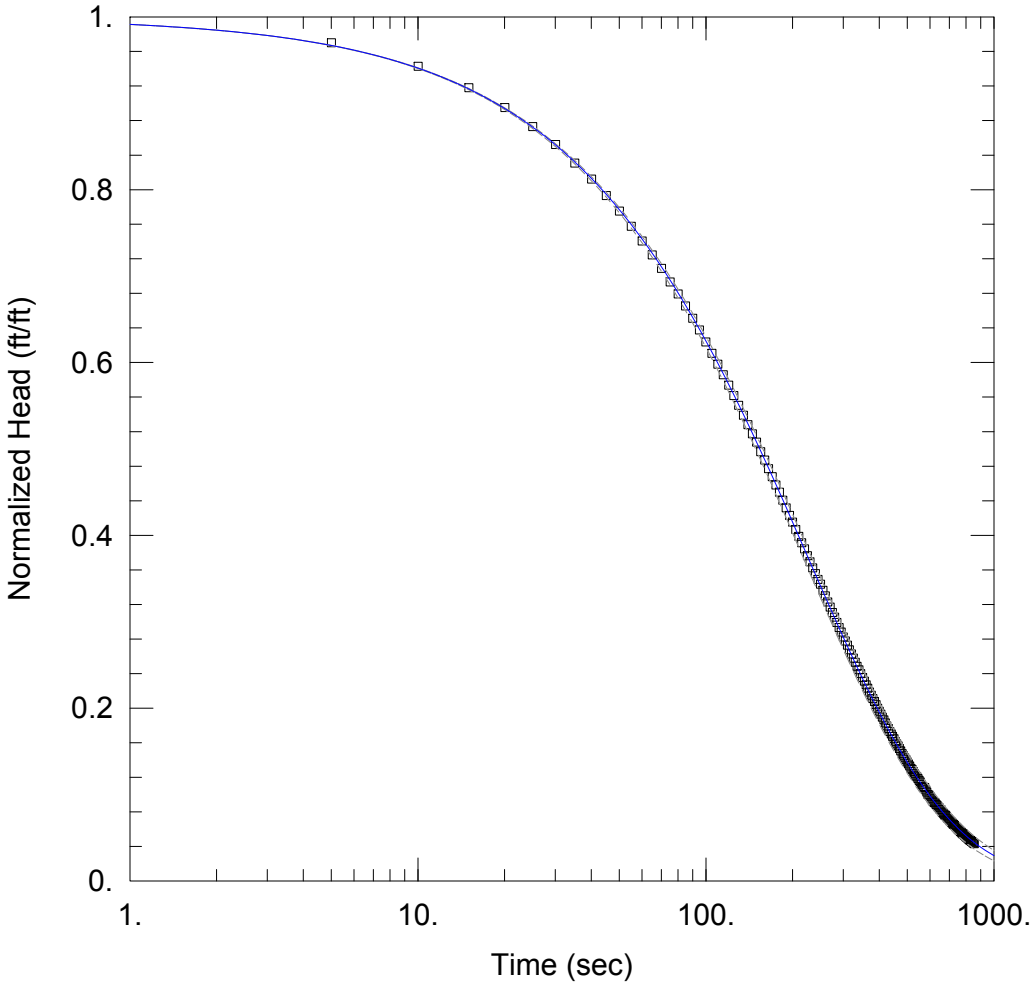
WELL DATA (MW-228)

Initial Displacement: 6.298 ft
Total Well Penetration Depth: 262.5 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 262.5 ft
Screen Length: 20. ft
Well Radius: 0.1667 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.729 ft/day
Kz/Kr = 1.
Ss = 3.81E-13 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW254_L25CD_test3_KGS.aqt
Date: 05/12/15 Time: 14:55:10

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW254-L25CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 83.6 ft

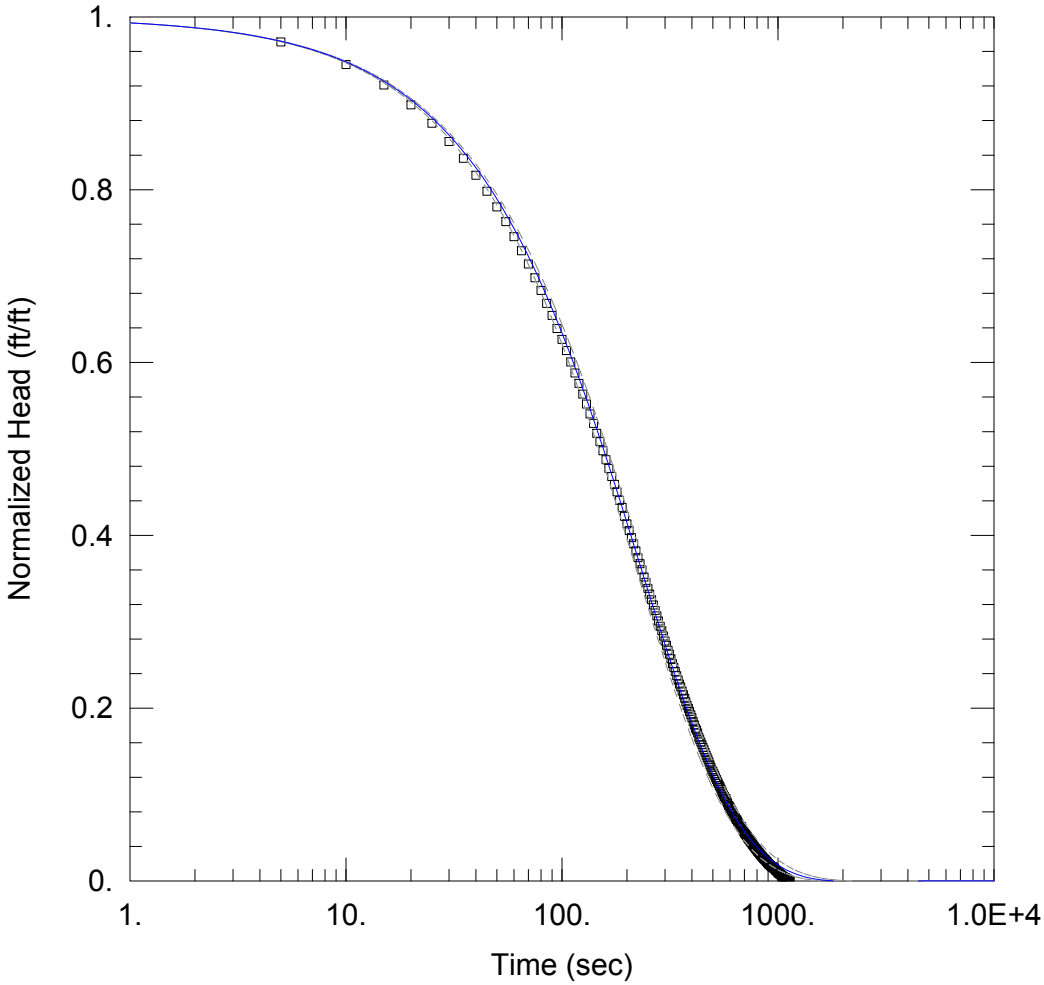
WELL DATA (MW254-L25CD)

Initial Displacement: 8.67 ft
Total Well Penetration Depth: 83.62 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 83.62 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.4309 ft/day
Kz/Kr = 1.
Ss = 4.919E-6 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW254_L25CD_test4_KGS.aqt
Date: 05/12/15 Time: 15:01:21

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW254-L25CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 83.5 ft

WELL DATA (MW254-L25CD)

Initial Displacement: 8.66 ft
Total Well Penetration Depth: 83.5 ft
Casing Radius: 0.08333 ft

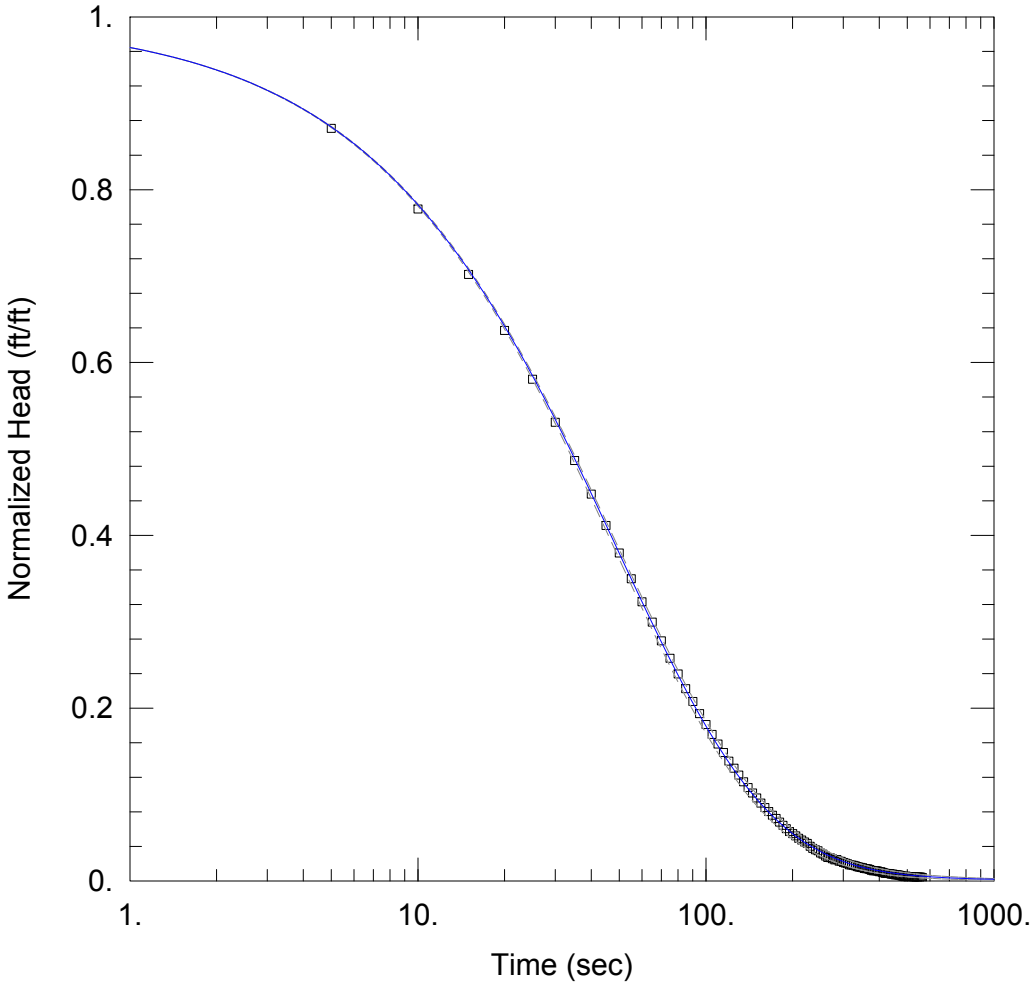
Static Water Column Height: 83.5 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.4663 ft/day
Kz/Kr = 1.

Ss = 7.23E-7 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW255_L25CD_test1_KGS.aqt
Date: 05/12/15 Time: 15:05:46

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW255-L25CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 48.1 ft

WELL DATA (MW255-L25CD)

Initial Displacement: 9.461 ft
Total Well Penetration Depth: 48.11 ft
Casing Radius: 0.08333 ft

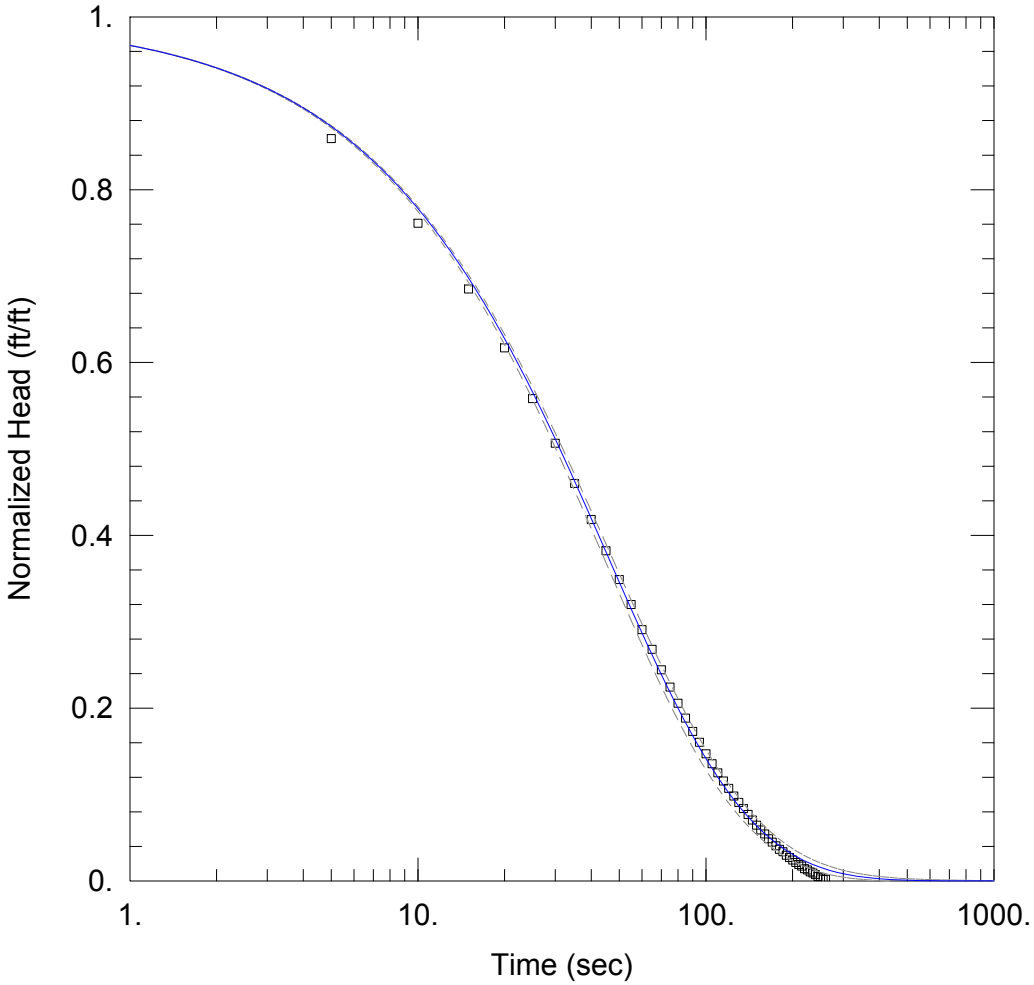
Static Water Column Height: 48.11 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.694 ft/day
Kz/Kr = 1.

Ss = 2.583E-5 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW255_L25CD_test6_KGS.aqt
Date: 05/12/15 Time: 15:53:10

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW255-L25CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 48. ft

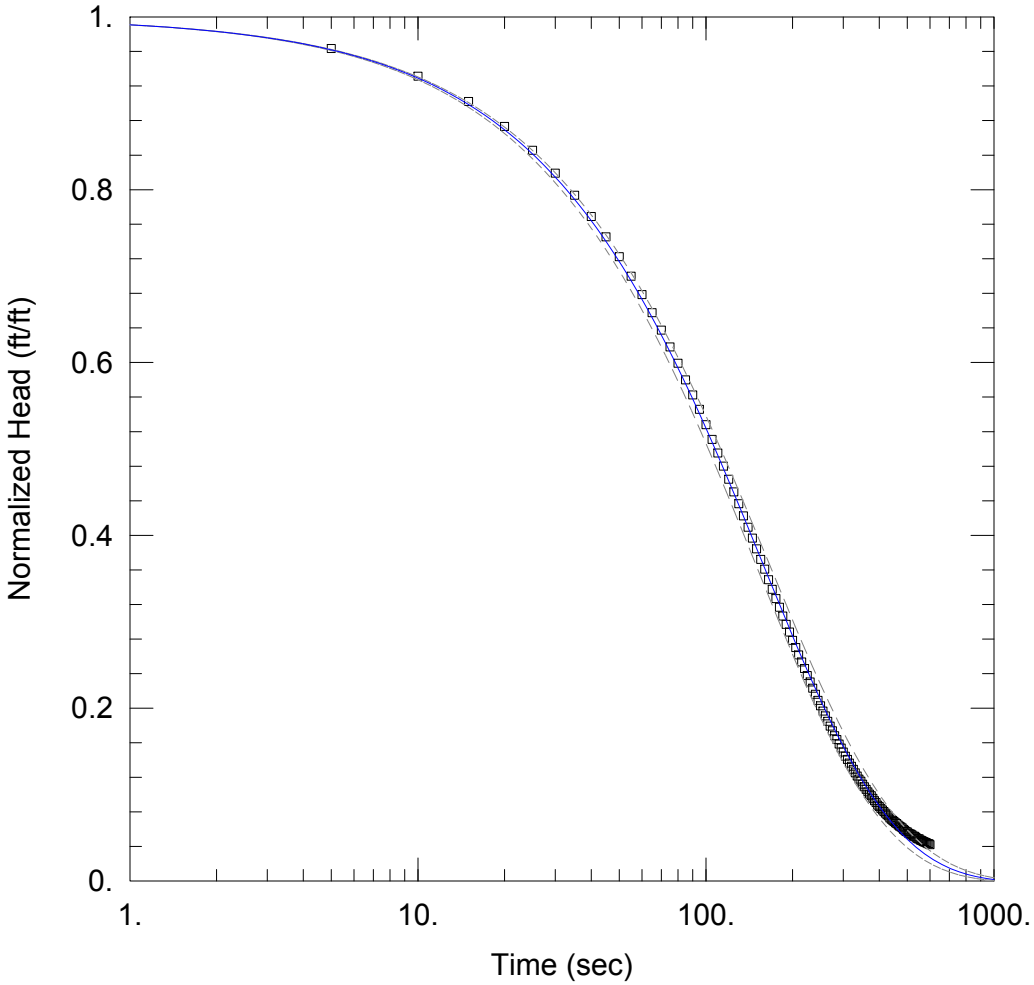
WELL DATA (MW255-L25CD)

Initial Displacement: 5.143 ft
Total Well Penetration Depth: 47.96 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 47.96 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.105 ft/day
Kz/Kr = 1.
Ss = 5.551E-6 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW256_M25CD_test1_KGS.aqt
Date: 05/12/15 Time: 15:55:50

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW256-M25CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 68.6 ft

WELL DATA (MW256-M25CD)

Initial Displacement: 6.655 ft
Total Well Penetration Depth: 68.63 ft
Casing Radius: 0.08333 ft

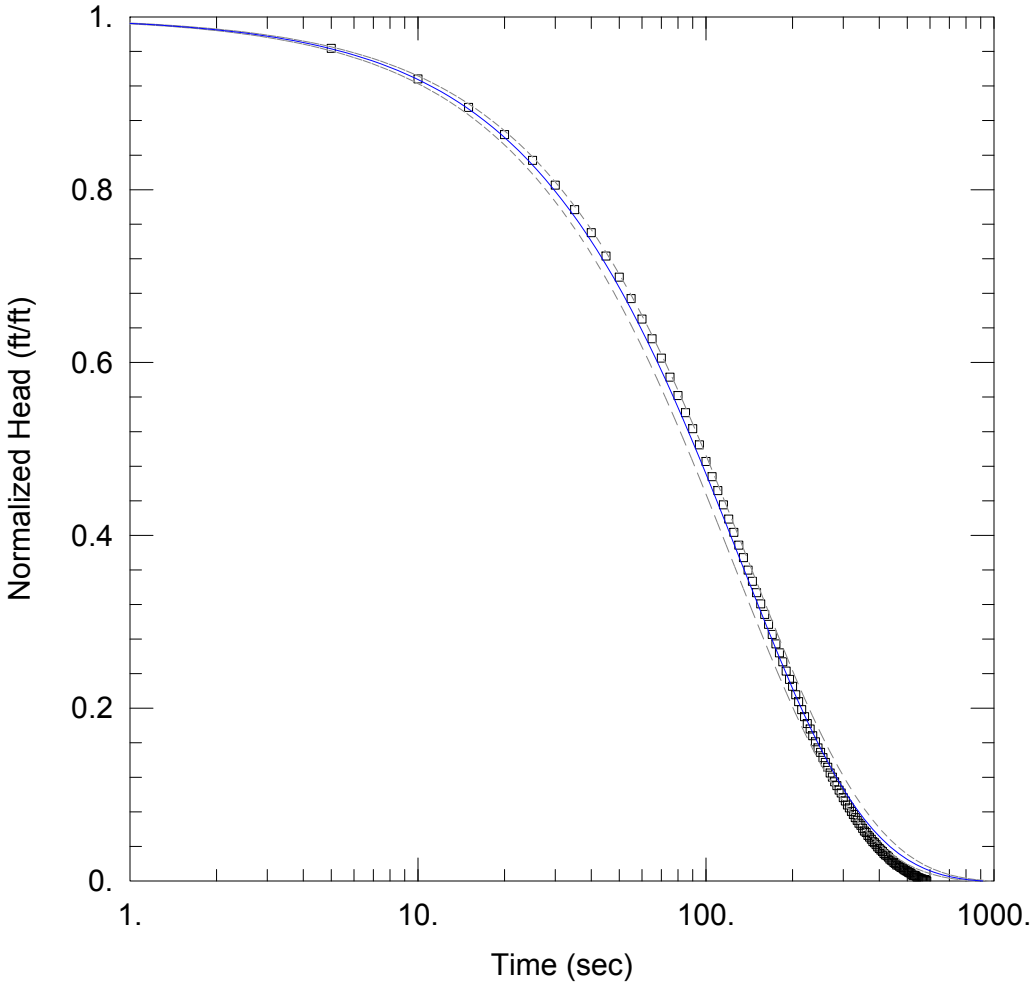
Static Water Column Height: 68.63 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.6829 ft/day
Kz/Kr = 1.

Ss = 4.973E-7 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW256_M25CD_test3_KGS.aqt
Date: 05/15/15 Time: 13:38:32

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW256-M25CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 68.3 ft

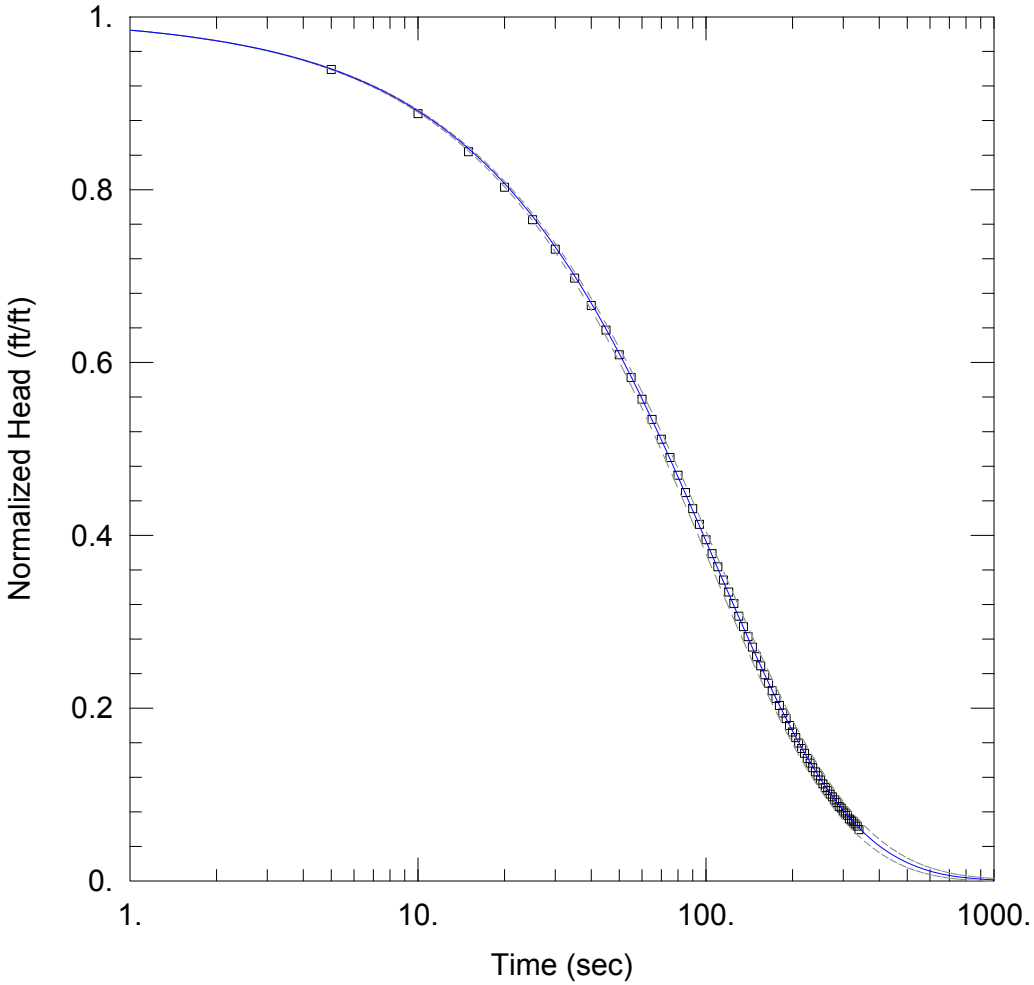
WELL DATA (MW256-M25CD)

Initial Displacement: 5.565 ft
Total Well Penetration Depth: 68.35 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 68.35 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.8183 ft/day
Kz/Kr = 1.
Ss = 1.464E-12 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW257_M25CD_test1_KGS.aqt
Date: 05/12/15 Time: 16:01:22

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW257-M25CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 75.8 ft

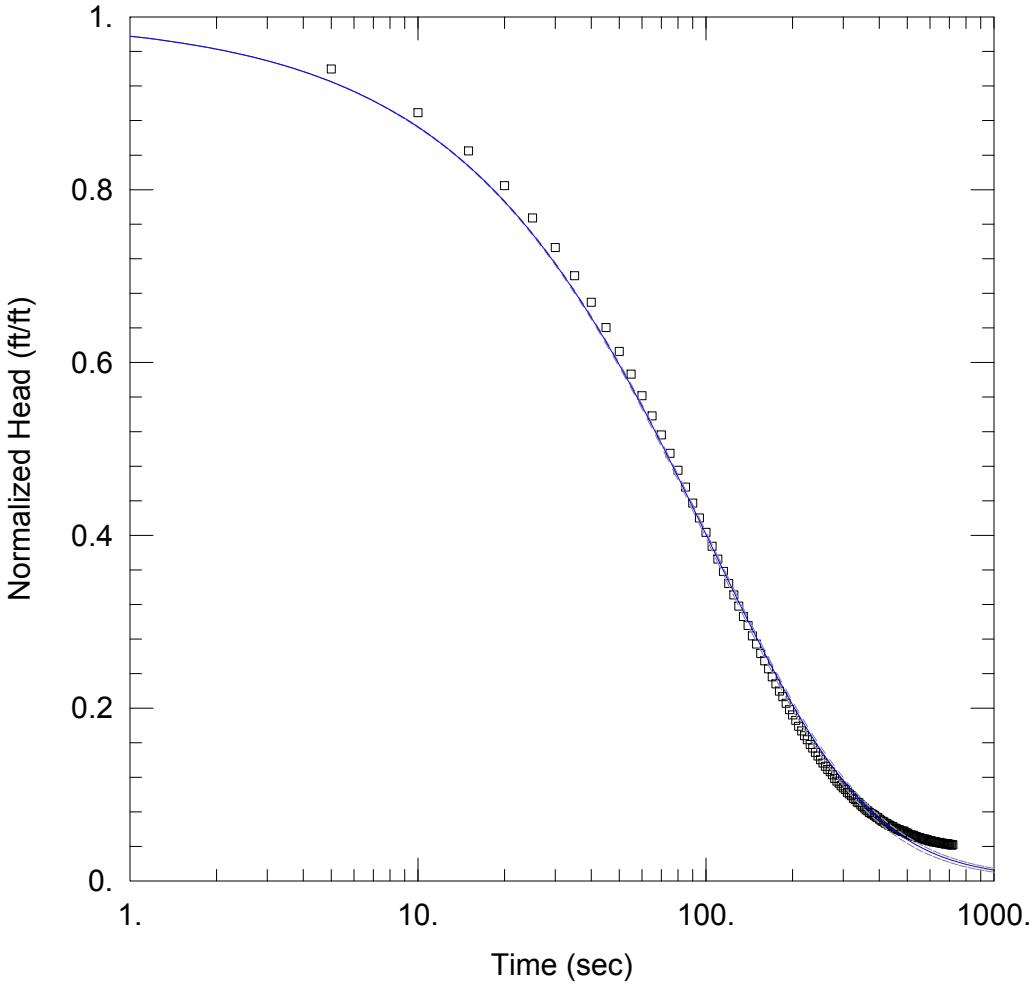
WELL DATA (MW257-M25CD)

Initial Displacement: 5.633 ft
Total Well Penetration Depth: 75.77 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 75.77 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.9427 ft/day
Kz/Kr = 1.
Ss = 2.92E-6 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW257_M25CD_test3_KGS.aqt
Date: 05/12/15 Time: 16:06:30

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW257-M25CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 75.9 ft

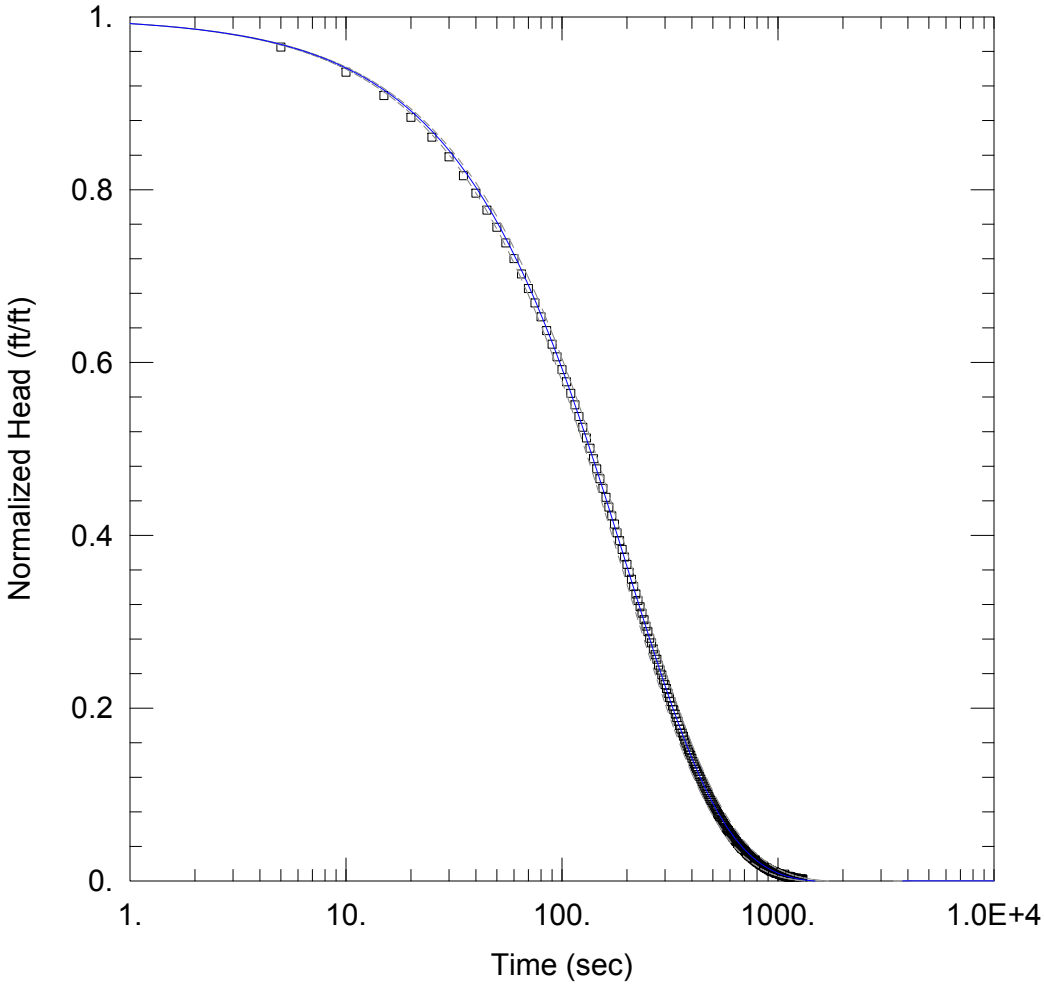
WELL DATA (MW257-M25CD)

Initial Displacement: 5.685 ft
Total Well Penetration Depth: 75.95 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 75.94 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.7174 ft/day
Kz/Kr = 1.
Ss = 6.298E-5 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW258_M23CD_test3_KGS.aqt
Date: 05/12/15 Time: 16:11:57

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW258-M23CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 63.1 ft

WELL DATA (MW258-M23CD)

Initial Displacement: 6.394 ft
Total Well Penetration Depth: 62.13 ft
Casing Radius: 0.08333 ft

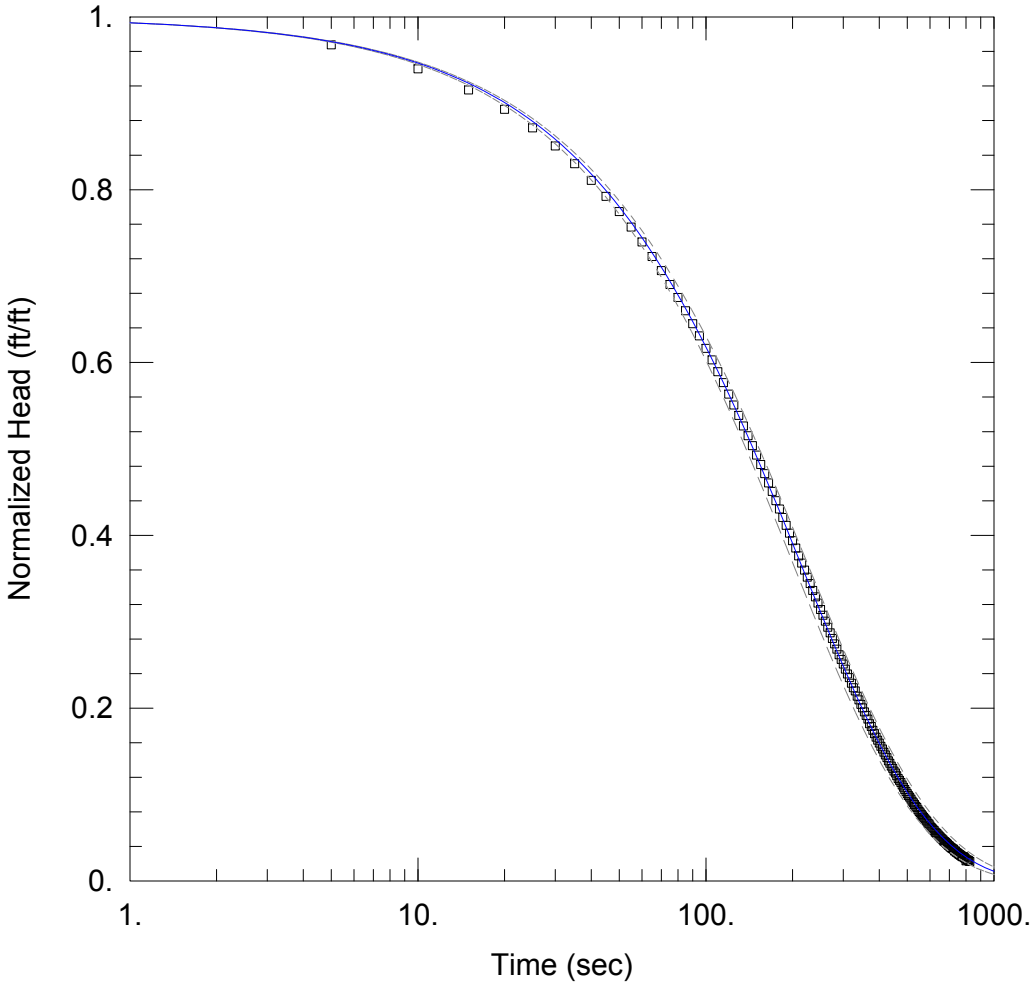
Static Water Column Height: 63.13 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.5225 ft/day
Kz/Kr = 1.

Ss = 7.147E-7 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW258_M23CD_test4_KGS.aqt
Date: 05/12/15 Time: 16:15:48

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW258-M23CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 63.1 ft

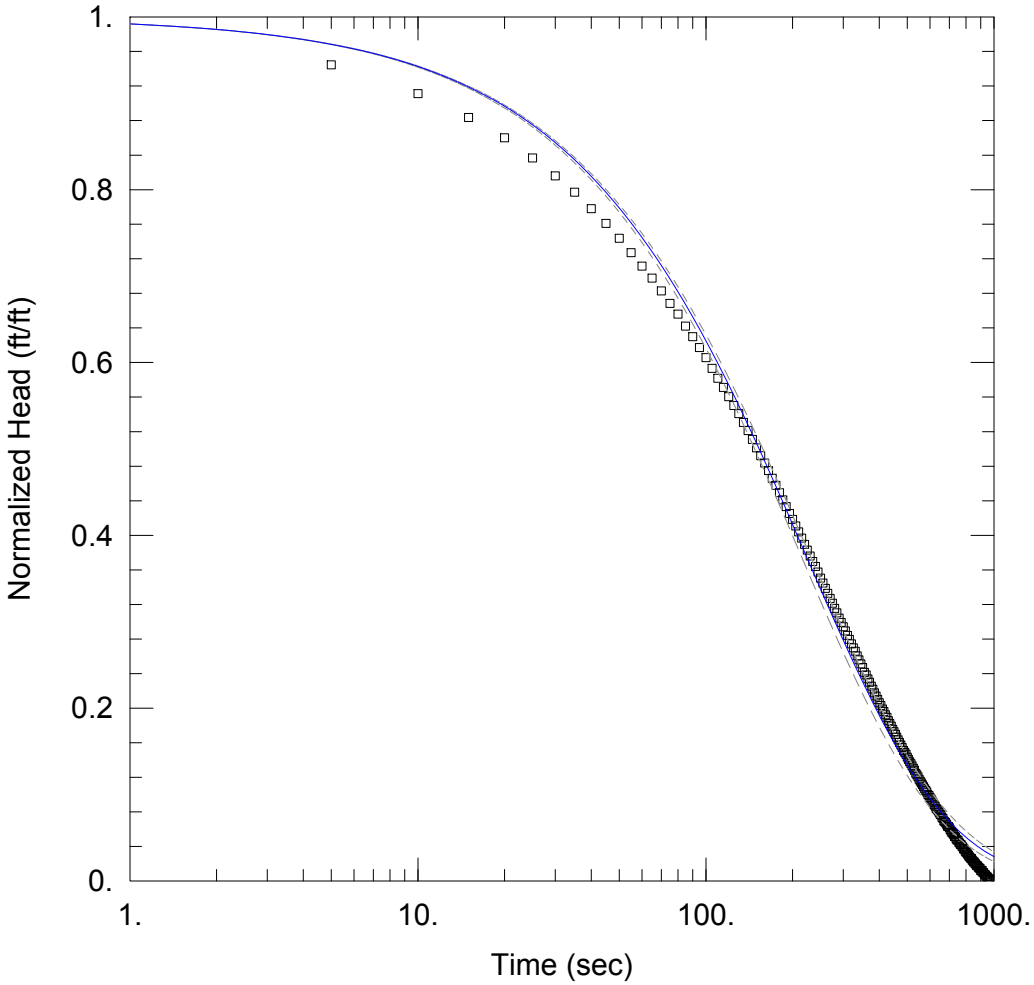
WELL DATA (MW258-M23CD)

Initial Displacement: 8.366 ft
Total Well Penetration Depth: 62.12 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 63.12 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.4887 ft/day
Kz/Kr = 1.
Ss = 4.104E-7 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW259_M24CD_test2_KGS.aqt
Date: 05/12/15 Time: 16:22:13

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW259-M24CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 97.3 ft

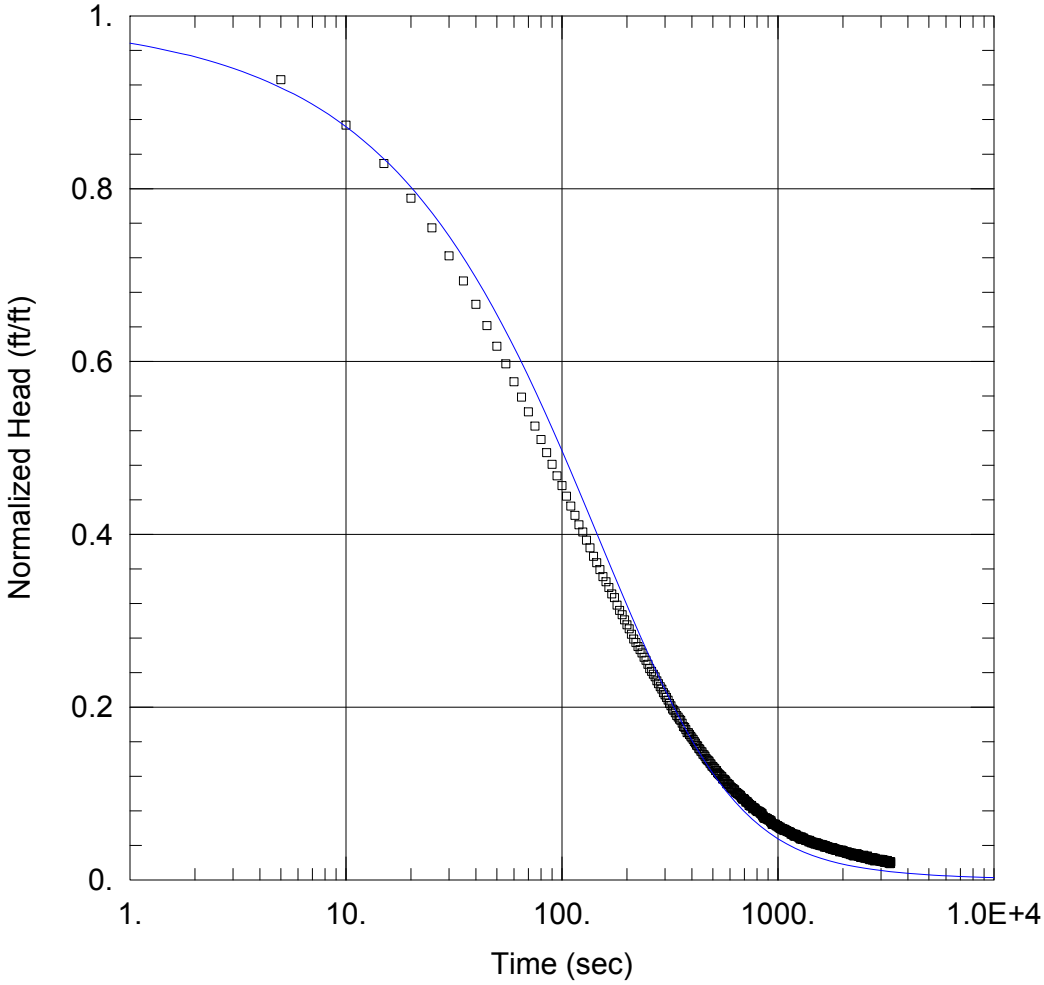
WELL DATA (MW259-M24CD)

Initial Displacement: 6.54 ft
Total Well Penetration Depth: 93.77 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 97.27 ft
Screen Length: 20. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.3261 ft/day
Kz/Kr = 1.
Ss = 2.266E-6 ft^{-1}



MW-260

Data Set: N:\...\MW-260.aqt
Date: 05/12/15 Time: 11:25:33

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-260
Test Date: 4/27/2015

AQUIFER DATA

Saturated Thickness: 98.5 ft

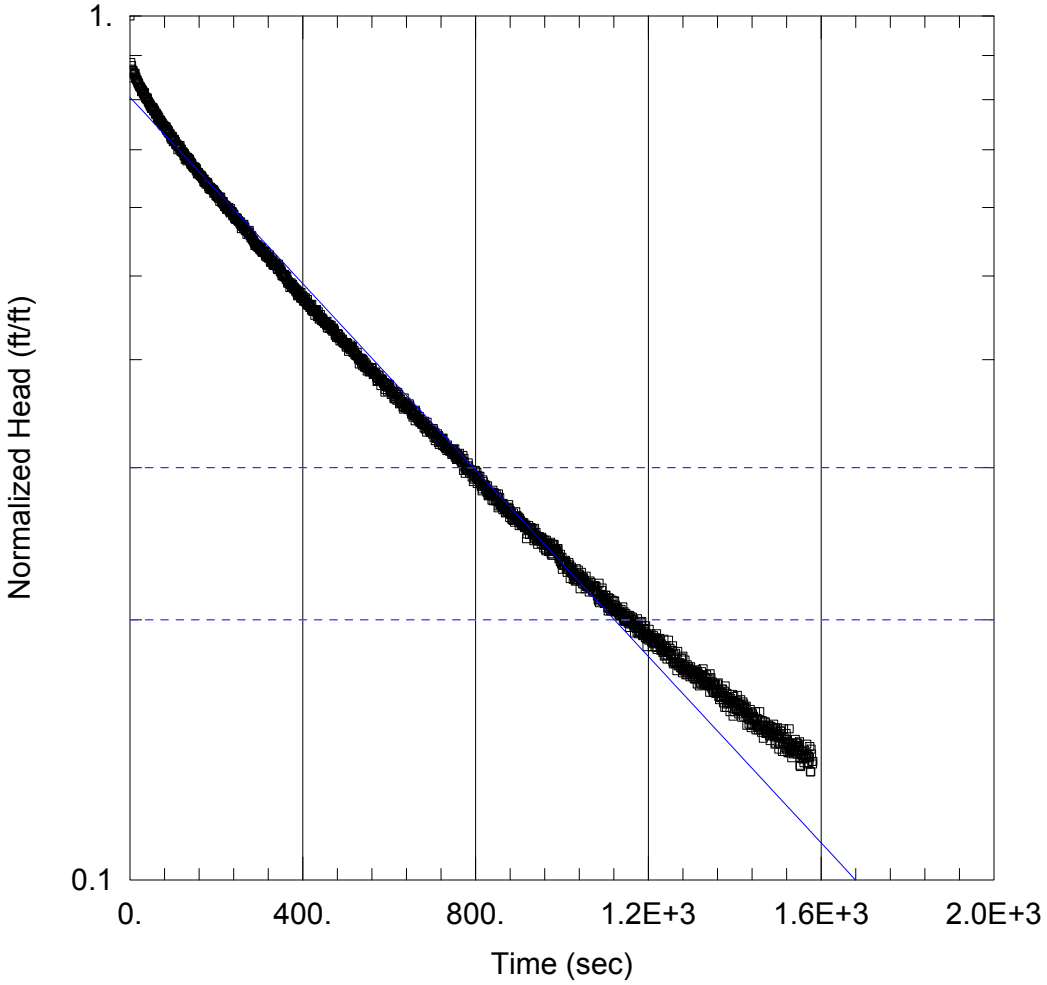
WELL DATA (MW-260)

Initial Displacement: 7.799 ft
Total Well Penetration Depth: 97.92 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 98.52 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.3069 ft/day
Kz/Kr = 1.
Ss = 0.001015 ft^{-1}



MW-261

Data Set: N:\...\MW-261.aqt
Date: 05/08/15 Time: 14:10:50

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-261
Test Date: 4/27/2015

AQUIFER DATA

Saturated Thickness: 11.4 ft Anisotropy Ratio (Kz/Kr): 1.

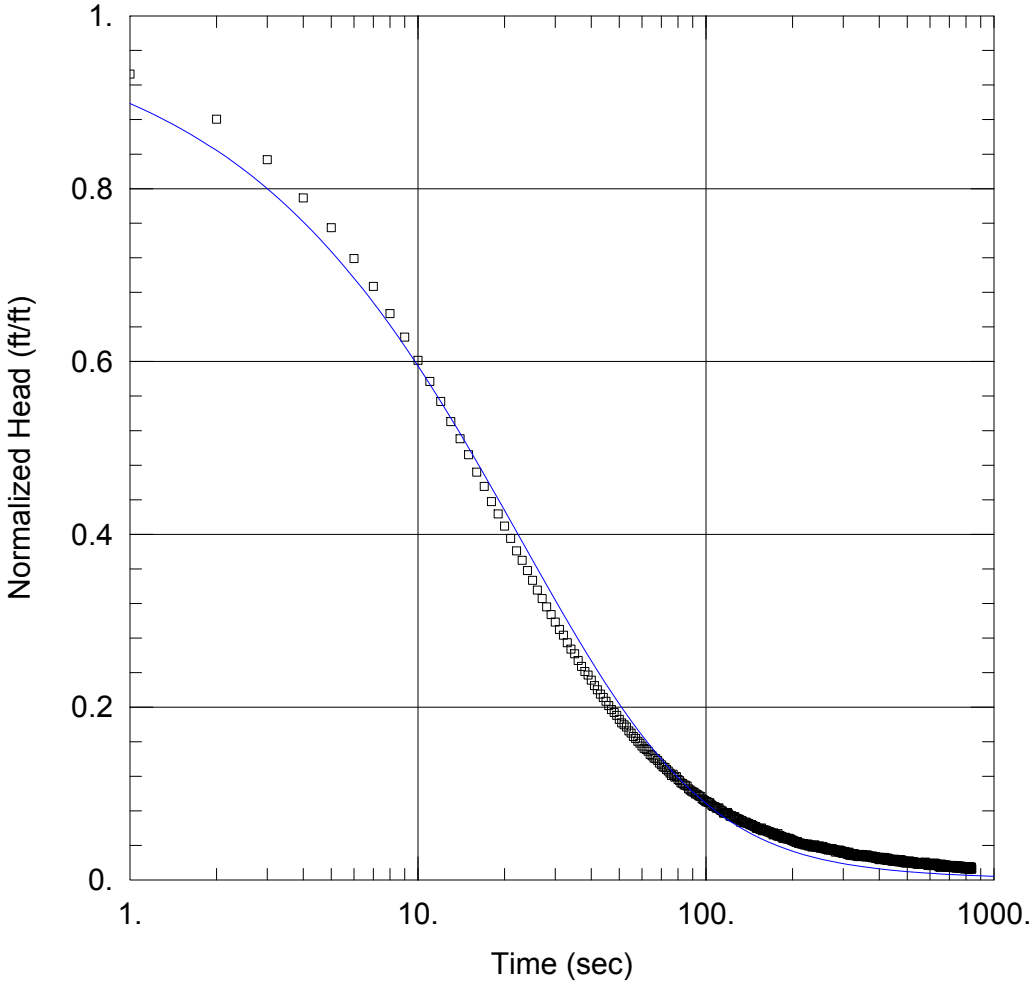
WELL DATA (MW-261)

Initial Displacement: 2.159 ft Static Water Column Height: 11.4 ft
Total Well Penetration Depth: 11.45 ft Screen Length: 10. ft
Casing Radius: 0.08333 ft Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.1408 ft/day y0 = 1.738 ft



MW-262 TEST 1

Data Set: N:\...\MW-262 Test 1.aqt
Date: 05/08/15 Time: 13:44:31

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-262
Test Date: 4/27/2015

AQUIFER DATA

Saturated Thickness: 80.5 ft

WELL DATA (MW-262)

Initial Displacement: 6.897 ft
Total Well Penetration Depth: 77.5 ft
Casing Radius: 0.08333 ft

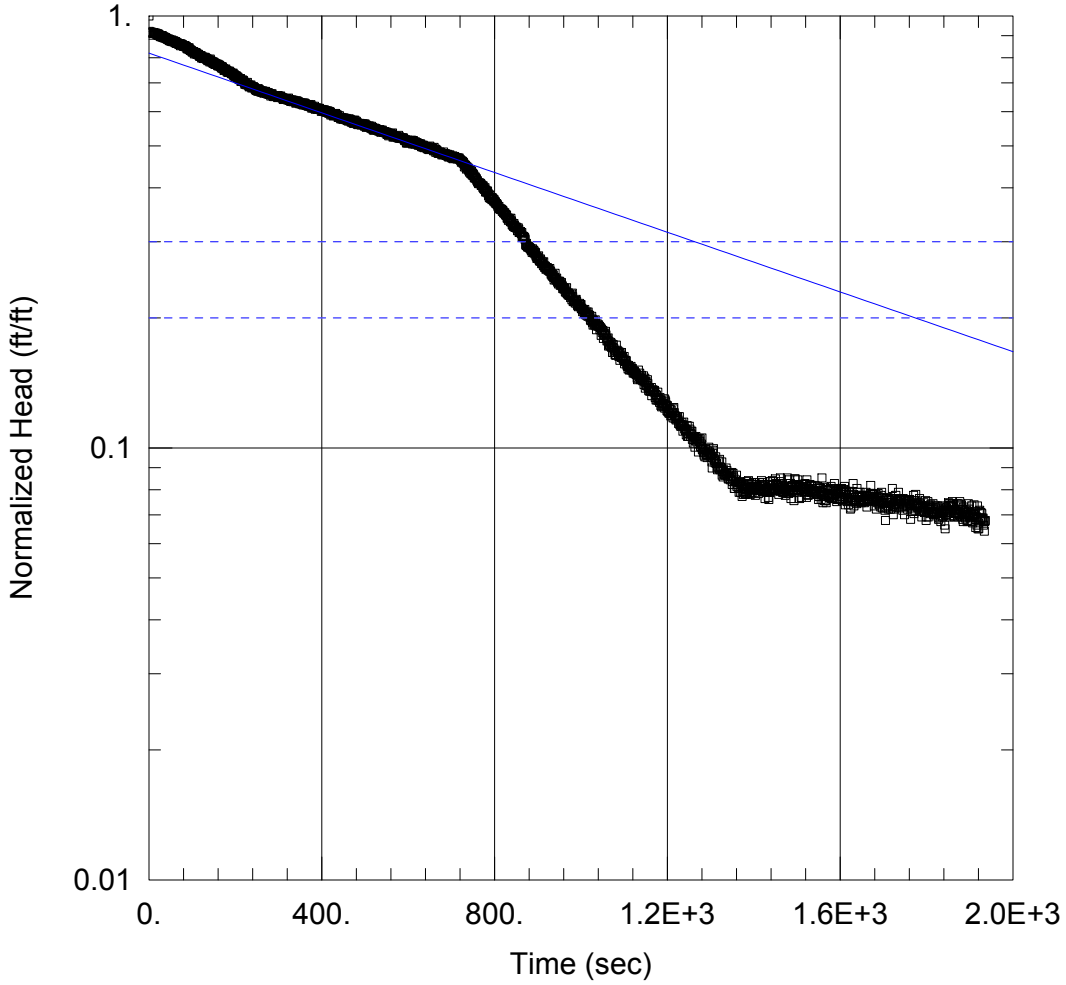
Static Water Column Height: 80.5 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.919 ft/day
Kz/Kr = 1.

Ss = 0.001242 ft^{-1}



MW-263

Data Set: N:\...\MW-263_shallowslope.aqt
Date: 05/15/15 Time: 13:22:19

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-263
Test Date: 4/27/2015

AQUIFER DATA

Saturated Thickness: 11. ft Anisotropy Ratio (Kz/Kr): 1.

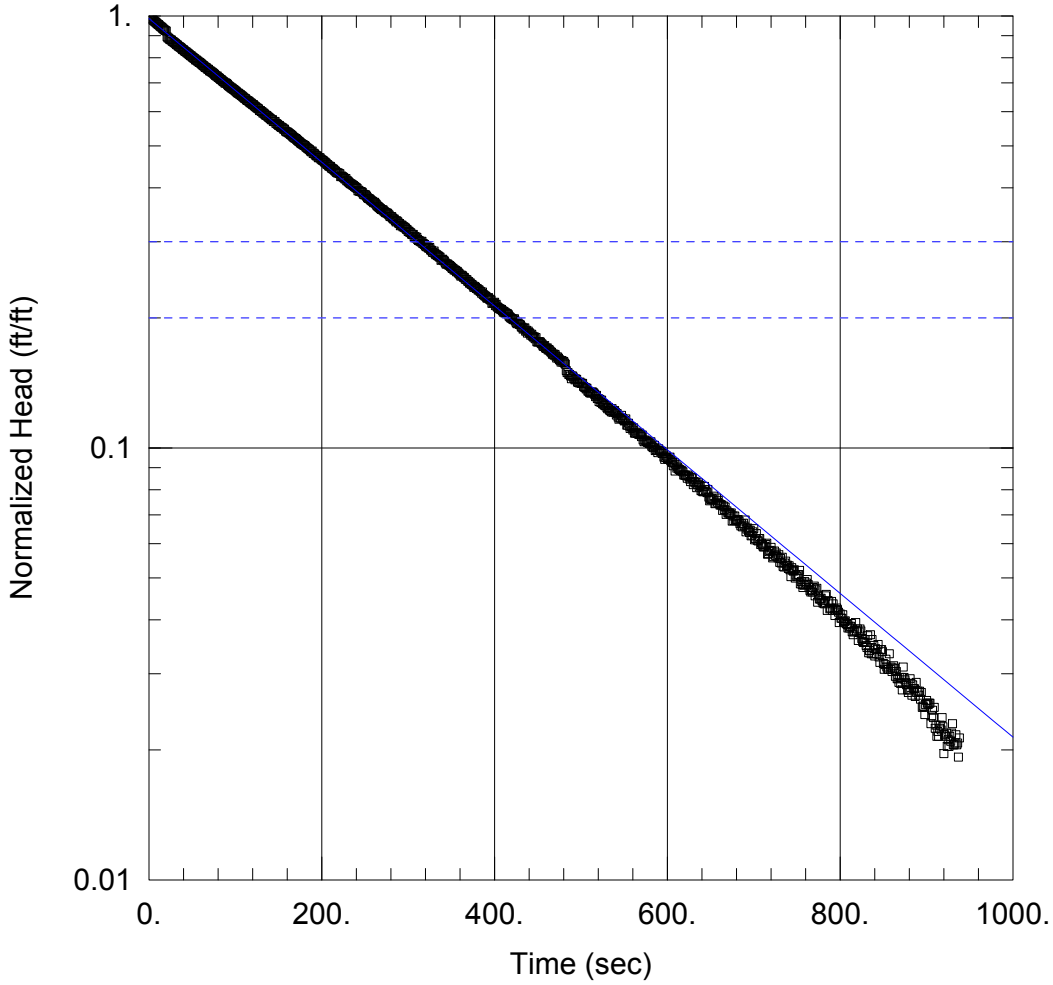
WELL DATA (MW-263)

Initial Displacement: 2.37 ft Static Water Column Height: 11. ft
Total Well Penetration Depth: 10.53 ft Screen Length: 10. ft
Casing Radius: 0.08333 ft Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.08542 ft/day y0 = 1.943 ft



MW-264 TEST 2

Data Set: N:\...\MW-264 Test 2.aqt
Date: 05/08/15 Time: 14:21:11

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-264
Test Date: 4/29/2015

AQUIFER DATA

Saturated Thickness: 109.4 ft Anisotropy Ratio (Kz/Kr): 1.

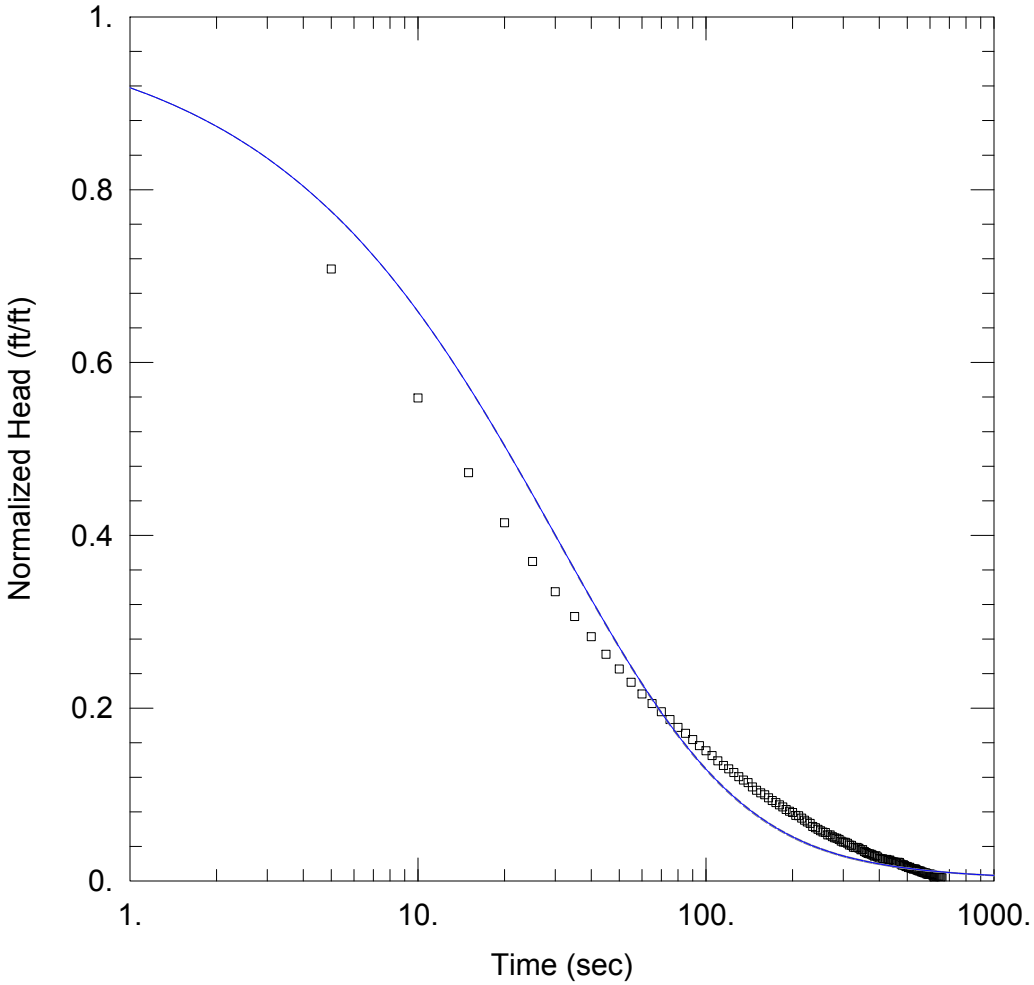
WELL DATA (MW-264)

Initial Displacement: 5.303 ft Static Water Column Height: 109.4 ft
Total Well Penetration Depth: 107.4 ft Screen Length: 15. ft
Casing Radius: 0.0833 ft Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.3732 ft/day y0 = 5.229 ft



WELL TEST ANALYSIS

Data Set: N:\...\MW265_N25CD_test2_KGS.aqt
Date: 05/12/15 Time: 16:42:28

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW265-N25CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 95.1 ft

WELL DATA (MW265-N25CD)

Initial Displacement: 4.585 ft
Total Well Penetration Depth: 95.06 ft
Casing Radius: 0.08333 ft

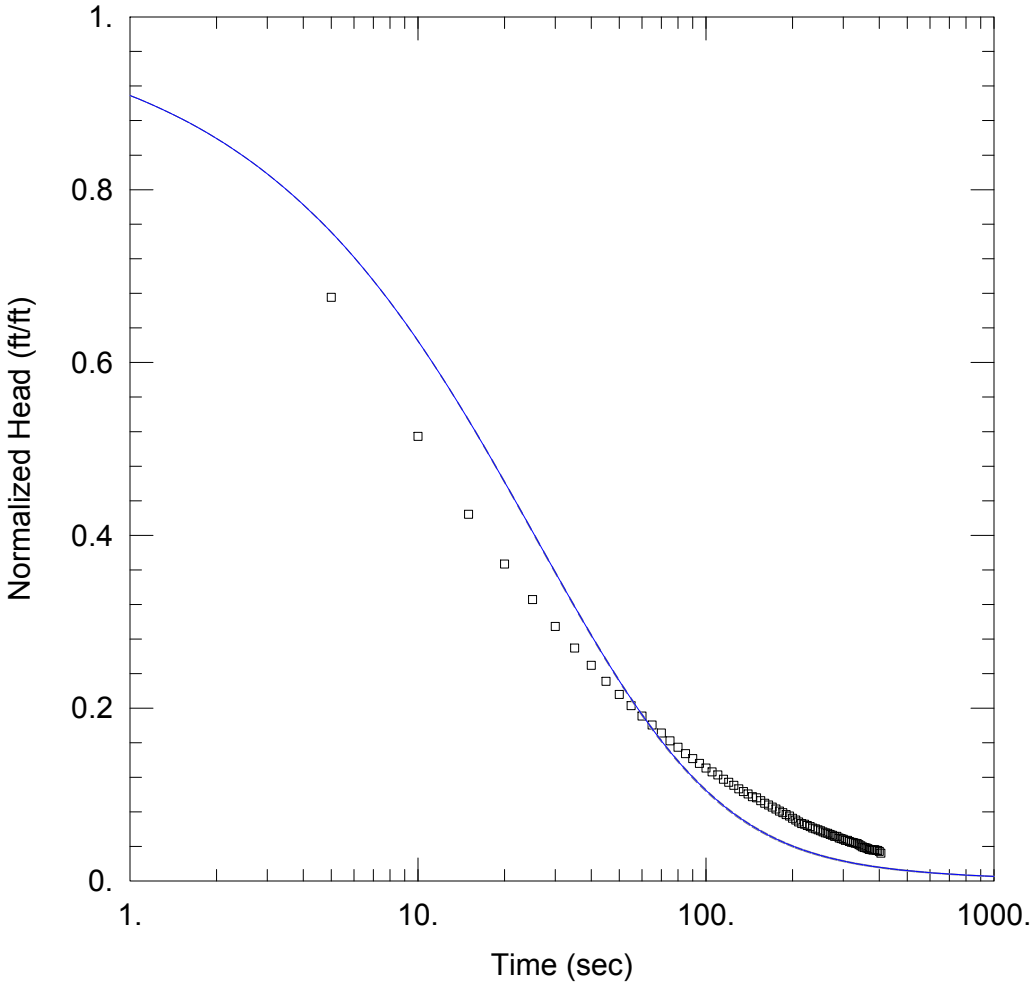
Static Water Column Height: 95.06 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.489 ft/day
Kz/Kr = 1.

Ss = 0.001052 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW265_N25CD_test3_KGS.aqt
Date: 05/12/15 Time: 16:44:56

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW265-N25CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 95.1 ft

WELL DATA (MW265-N25CD)

Initial Displacement: 7.144 ft
Total Well Penetration Depth: 95.08 ft
Casing Radius: 0.08333 ft

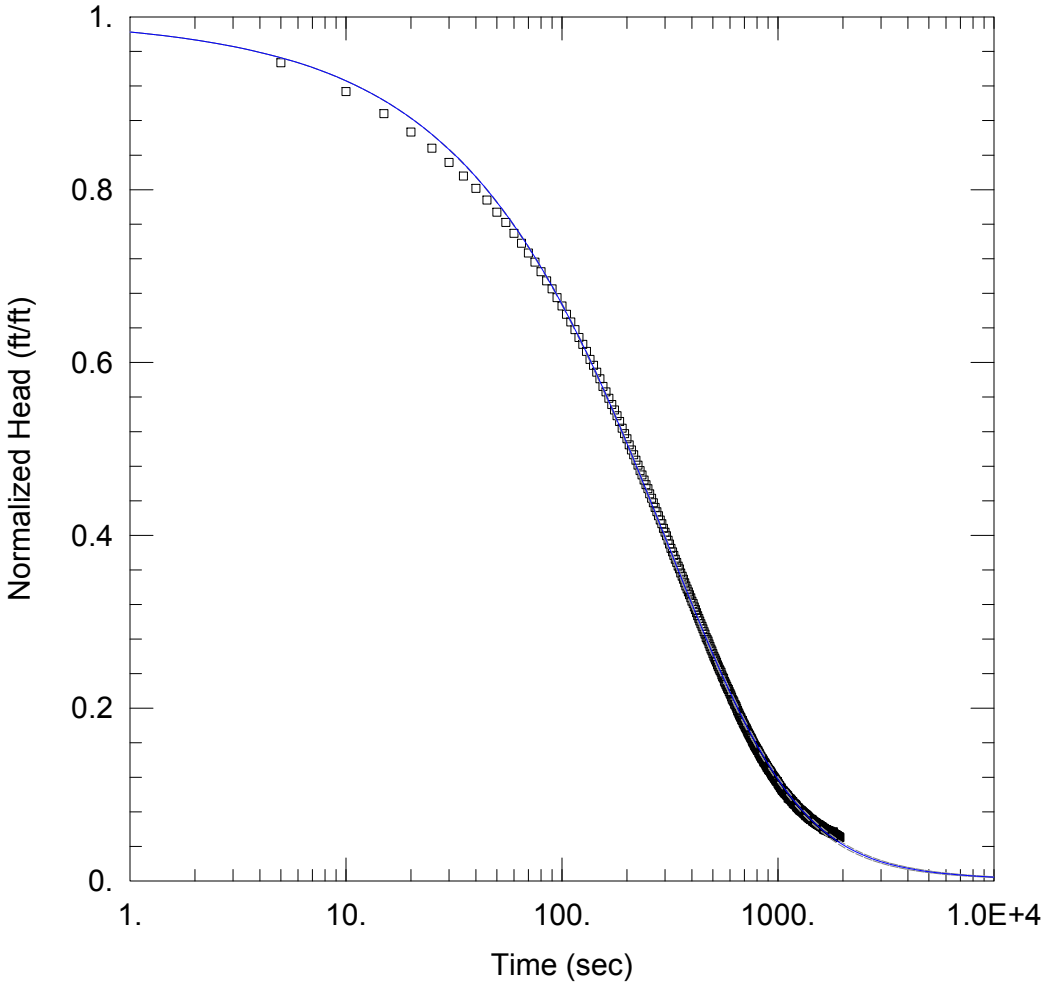
Static Water Column Height: 95.08 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.762 ft/day
Kz/Kr = 1.

Ss = 0.001052 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW266_L26CD_test1_KGS.aqt
Date: 05/12/15 Time: 16:49:47

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW266-L26CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 77. ft

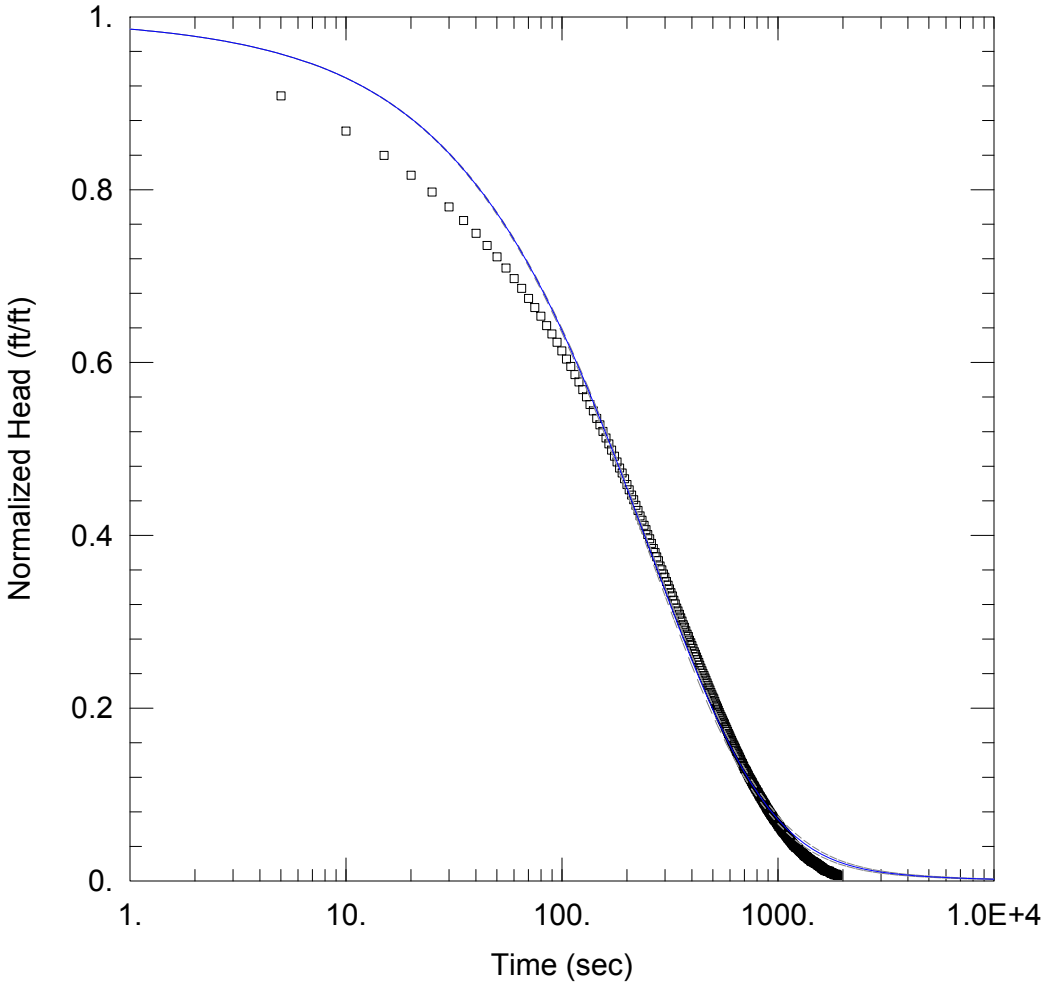
WELL DATA (MW266-L26CD)

Initial Displacement: 6.73 ft
Total Well Penetration Depth: 74.06 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 76.96 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.1687 ft/day
Kz/Kr = 1.
Ss = 0.0005695 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW266_L26CD_test2_KGS.aqt
Date: 05/12/15 Time: 16:52:10

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW266-L26CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 76.6 ft

WELL DATA (MW266-L26CD)

Initial Displacement: 8.236 ft
Total Well Penetration Depth: 73.72 ft
Casing Radius: 0.08333 ft

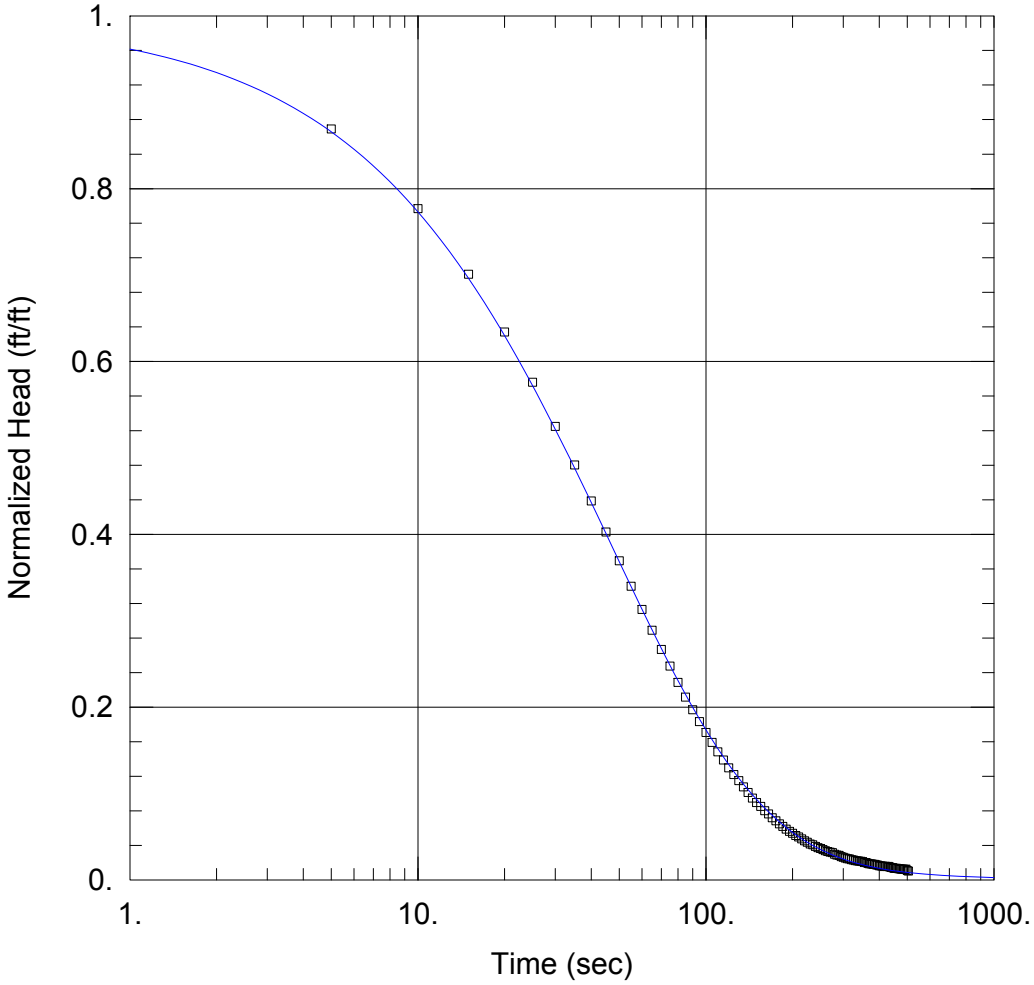
Static Water Column Height: 76.62 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.259 ft/day
Kz/Kr = 1.

Ss = 0.000148 ft^{-1}



MW-267

Data Set: N:\...\MW-267.aqt
Date: 05/08/15 Time: 13:56:05

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-267
Test Date: 4/27/2015

AQUIFER DATA

Saturated Thickness: 65.1 ft

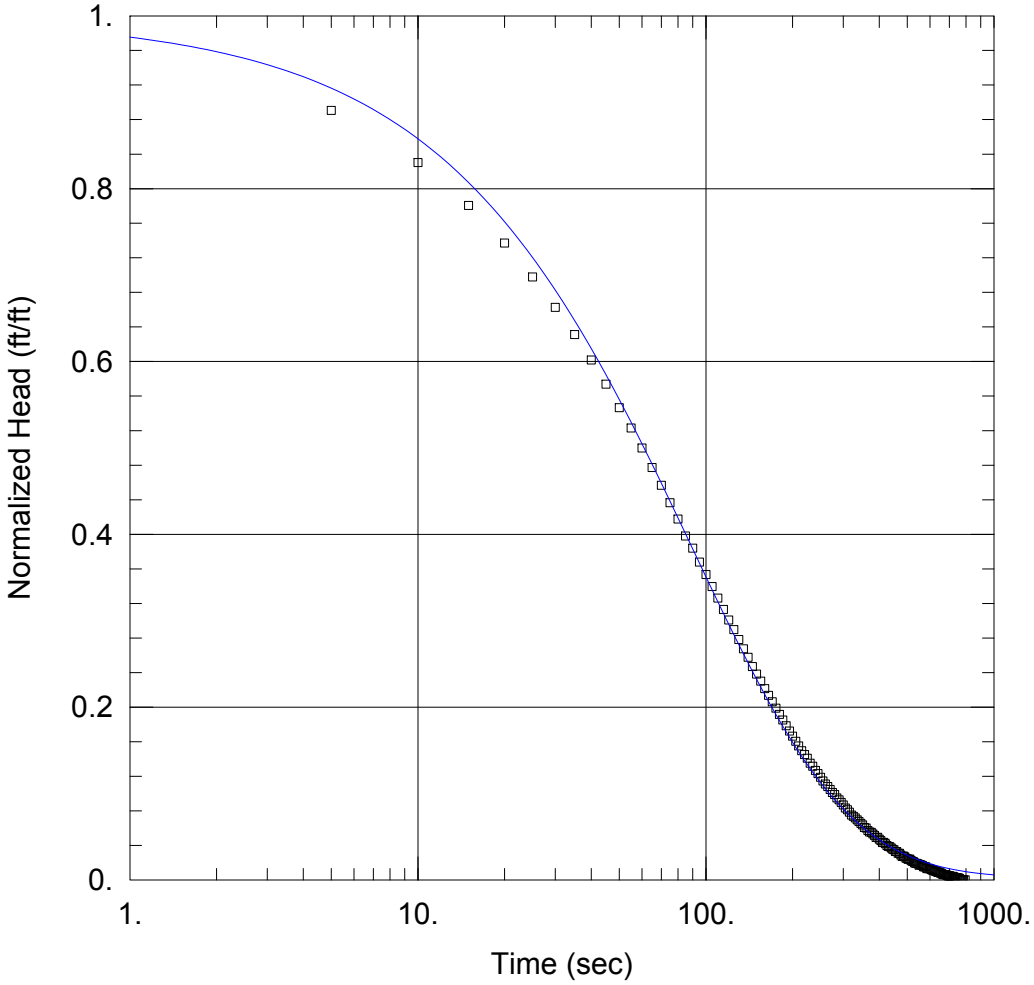
WELL DATA (MW-267)

Initial Displacement: 7.655 ft
Total Well Penetration Depth: 64.07 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 65.1 ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.611 ft/day
Kz/Kr = 1.
Ss = 4.48E-5 ft^{-1}



MW-268

Data Set: N:\...\MW-268.aqt
Date: 05/08/15 Time: 14:00:02

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-268
Test Date: 4/27/2015

AQUIFER DATA

Saturated Thickness: 25. ft

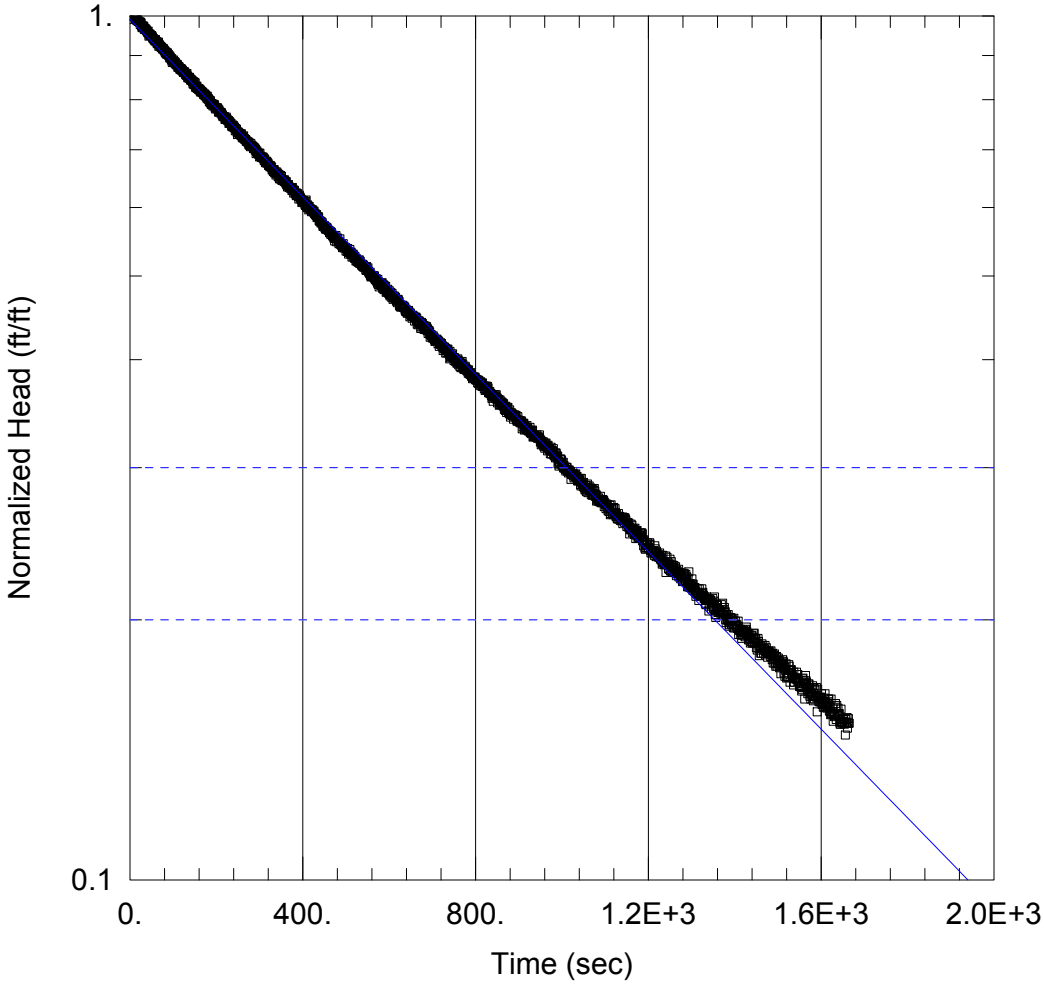
WELL DATA (MW-268)

Initial Displacement: 6.048 ft
Total Well Penetration Depth: 20.02 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 25. ft
Screen Length: 15. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.813 ft/day
Kz/Kr = 1.
Ss = 6.422E-5 ft^{-1}



MW-269

Data Set: N:\...\MW-269.aqt
Date: 05/08/15 Time: 14:21:57

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-269
Test Date: 4/29/2015

AQUIFER DATA

Saturated Thickness: 230.3 ft Anisotropy Ratio (Kz/Kr): 1.

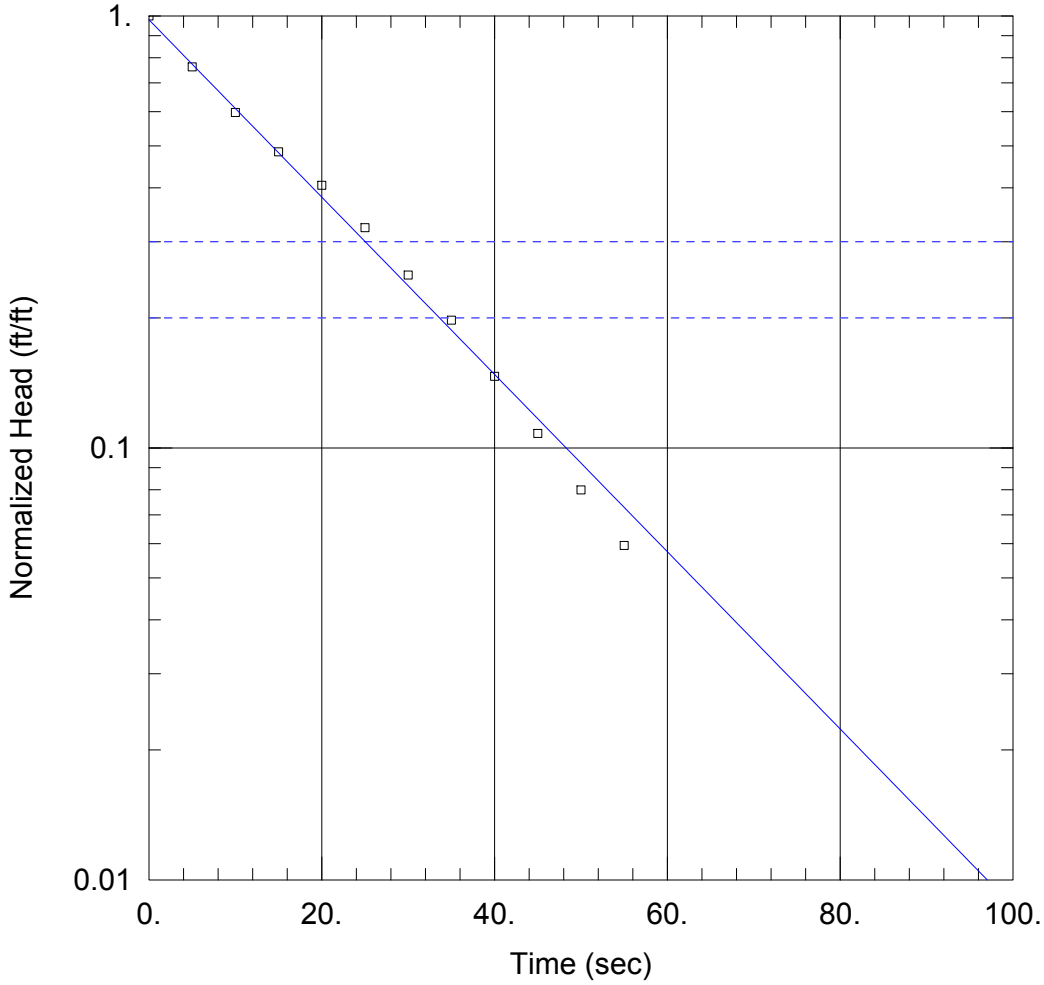
WELL DATA (MW-269)

Initial Displacement: 2.569 ft Static Water Column Height: 230.3 ft
Total Well Penetration Depth: 183.3 ft Screen Length: 15. ft
Casing Radius: 0.0833 ft Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.1119 ft/day y0 = 2.545 ft



MW-270

Data Set: N:\...\MW-270.aqt
Date: 05/08/15 Time: 10:56:23

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-270
Test Date: 4/28/2015

AQUIFER DATA

Saturated Thickness: 13.4 ft Anisotropy Ratio (Kz/Kr): 1.

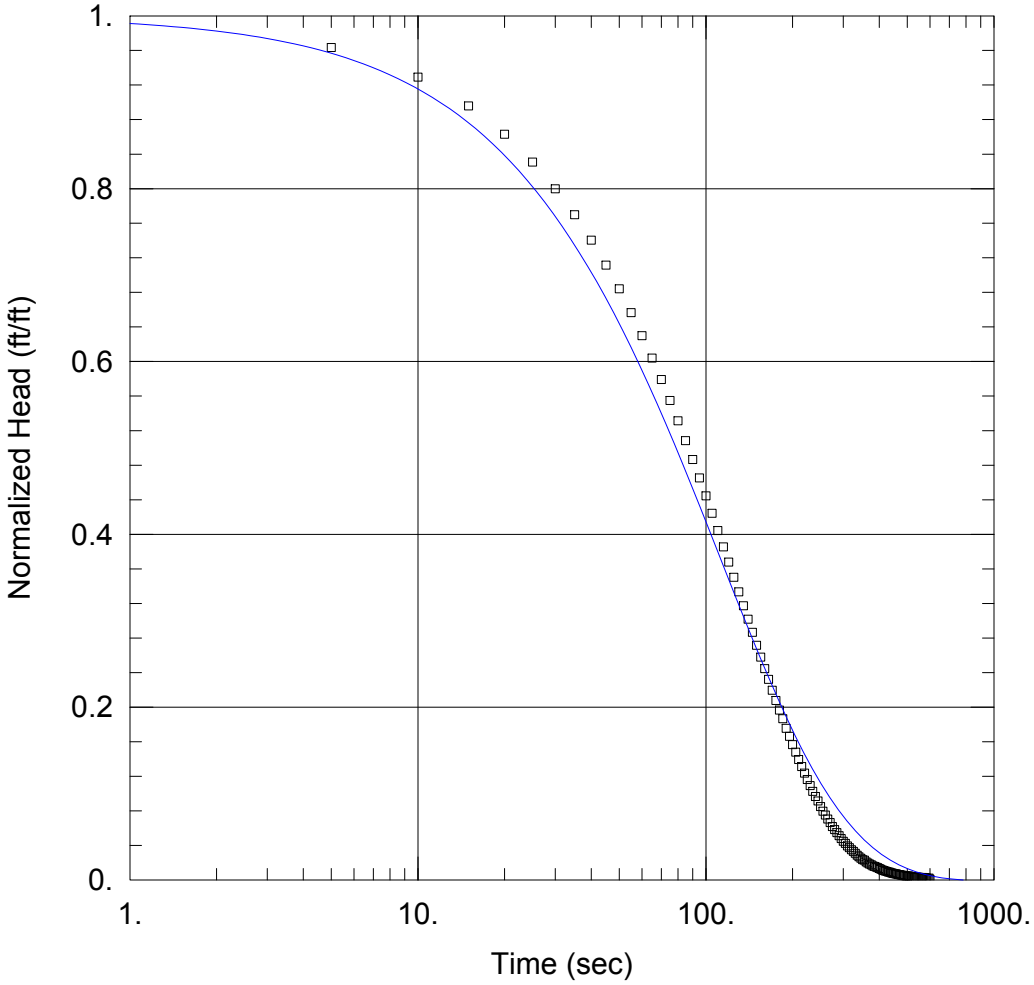
WELL DATA (MW-270)

Initial Displacement: 1.564 ft Static Water Column Height: 13.4 ft
Total Well Penetration Depth: 15.1 ft Screen Length: 15. ft
Casing Radius: 0.0833 ft Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 4.245 ft/day y0 = 1.532 ft



MW-272

Data Set: N:\...\MW-272.aqt
Date: 05/12/15 Time: 17:57:48

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-272
Test Date: 4/28/2015

AQUIFER DATA

Saturated Thickness: 69.3 ft

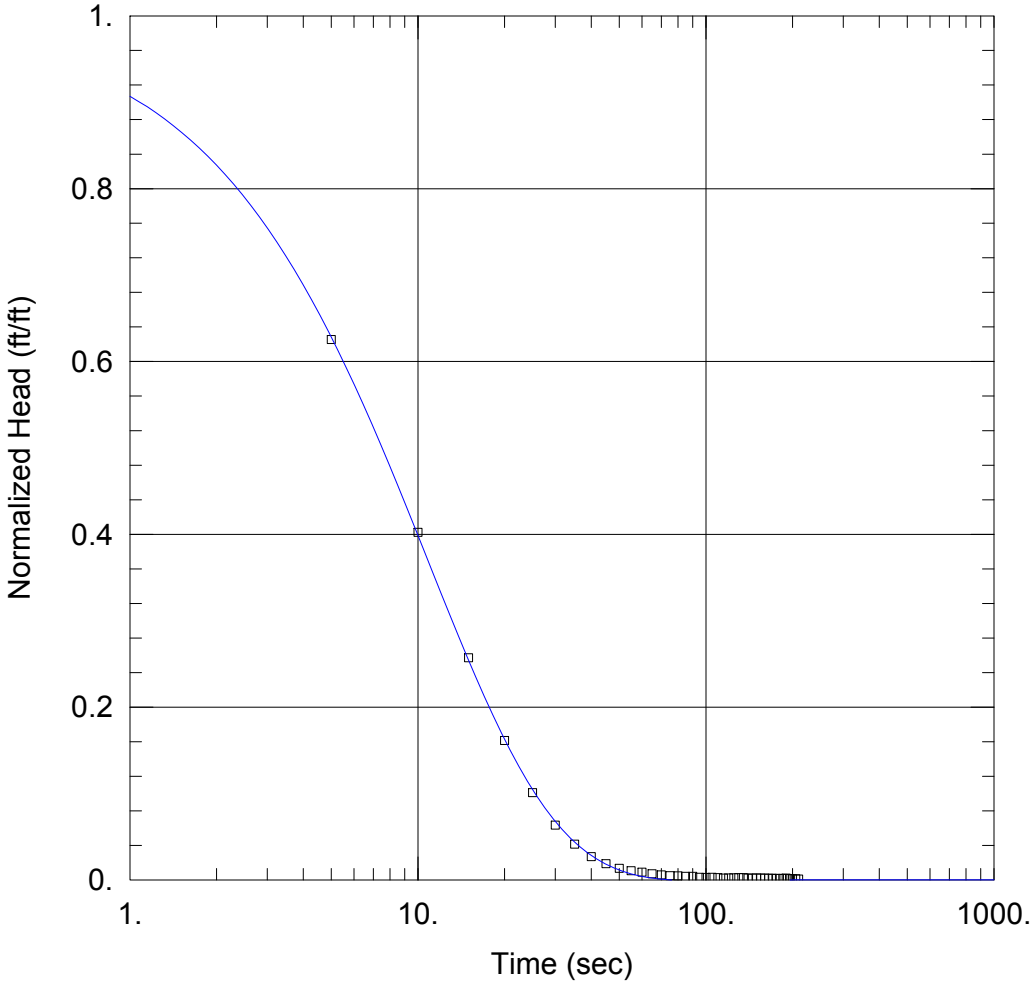
WELL DATA (MW-272)

Initial Displacement: 10.3 ft
Total Well Penetration Depth: 67.28 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 69.3 ft
Screen Length: 10. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 1.261 ft/day
Kz/Kr = 1.
Ss = 1.443E-12 ft^{-1}



MW-273

Data Set: N:\...\MW-273 Test 2_KGS.aqt
Date: 05/12/15 Time: 18:00:53

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-273
Test Date: 4/28/2015

AQUIFER DATA

Saturated Thickness: 144.4 ft

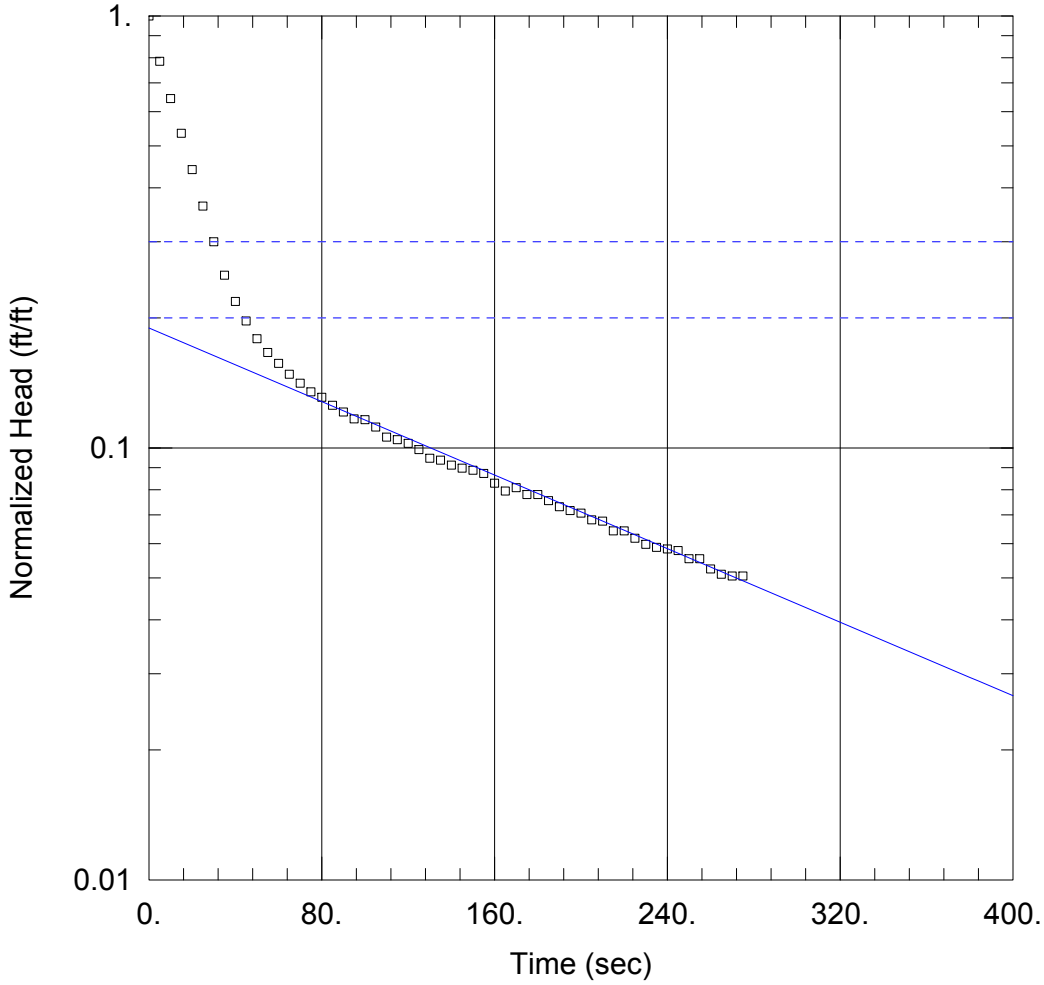
WELL DATA (MW-273 Test-2)

Initial Displacement: 7.31 ft
Total Well Penetration Depth: 140.8 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 144.4 ft
Screen Length: 20. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 7.525 ft/day
Kz/Kr = 1.
Ss = 4.053E-8 ft^{-1}



MW-275

Data Set: N:\...\MW-275.aqt
Date: 05/08/15 Time: 14:24:07

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: MW-275
Test Date: 4/29/2015

AQUIFER DATA

Saturated Thickness: 9.6 ft Anisotropy Ratio (Kz/Kr): 1.

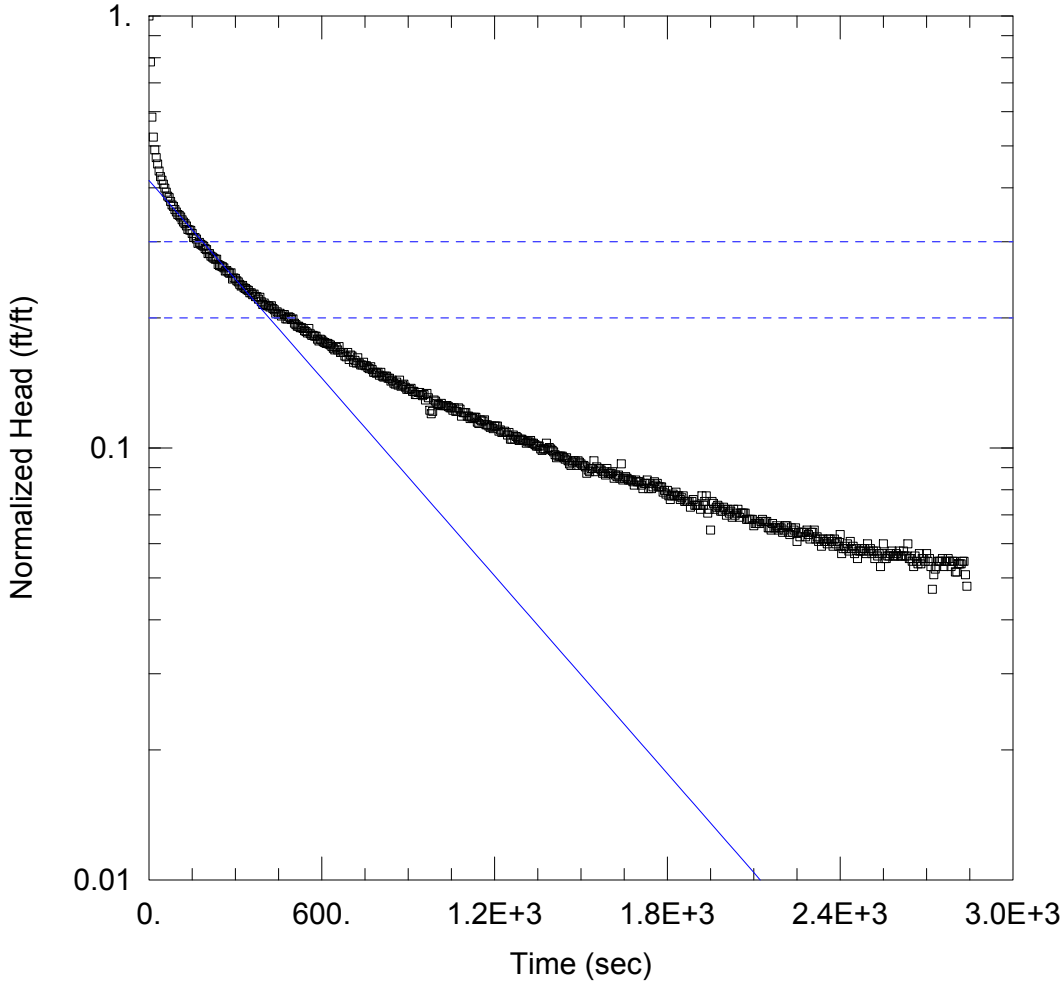
WELL DATA (MW-275)

Initial Displacement: 2.039 ft Static Water Column Height: 9.6 ft
Total Well Penetration Depth: 10.1 ft Screen Length: 10. ft
Casing Radius: 0.0833 ft Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.5649 ft/day y0 = 0.3863 ft



WELL TEST ANALYSIS

Data Set: N:\...\MW281_L23CD_test1.aqt
Date: 05/12/15 Time: 16:46:03

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW281
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 10.6 ft
Anisotropy Ratio (Kz/Kr): 1.

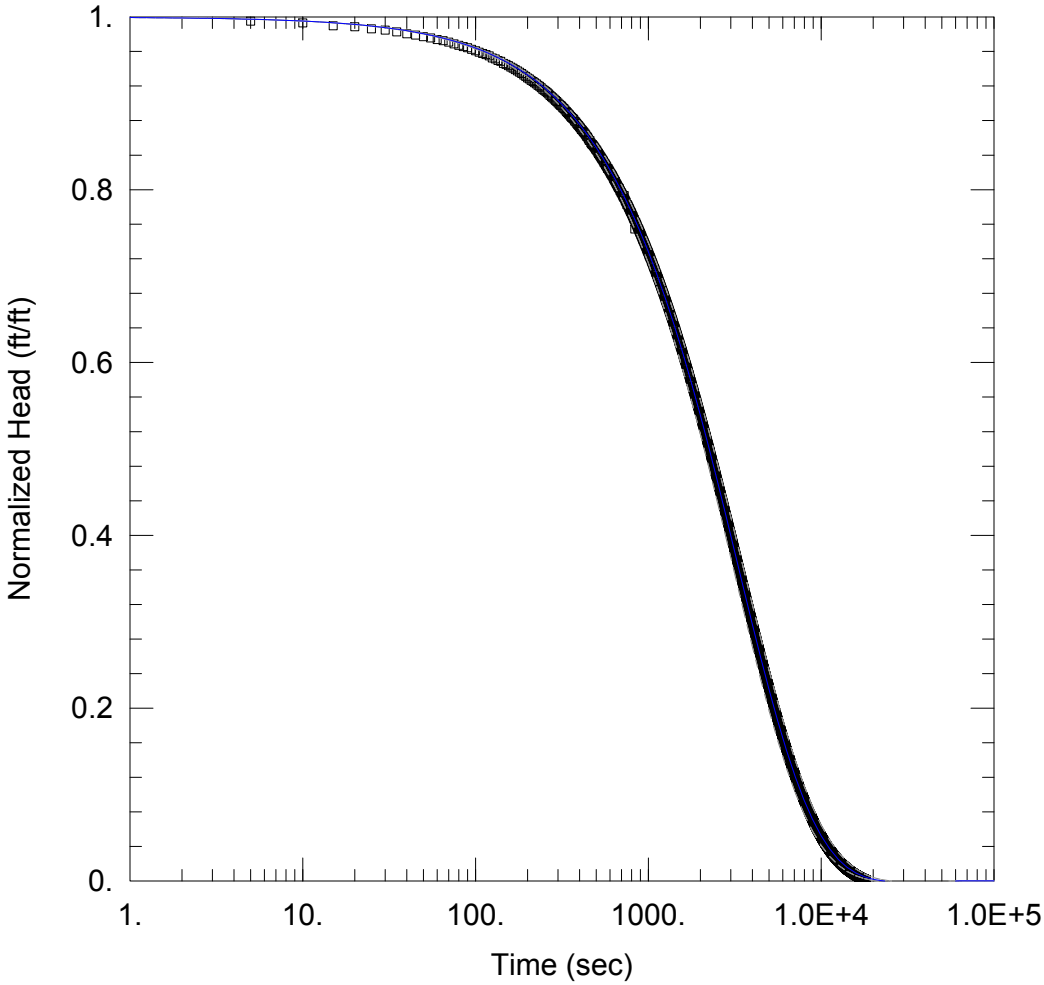
WELL DATA (MW281-L23CD)

Initial Displacement: 1.317 ft
Static Water Column Height: 10.62 ft
Total Well Penetration Depth: 15. ft
Screen Length: 15. ft
Casing Radius: 0.08333 ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.1971 ft/day
y0 = 0.5481 ft



WELL TEST ANALYSIS

Data Set: N:\...\MW283_K25CD_test1_KGS.aqt
Date: 05/12/15 Time: 17:00:47

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW283-K25CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 65.5 ft

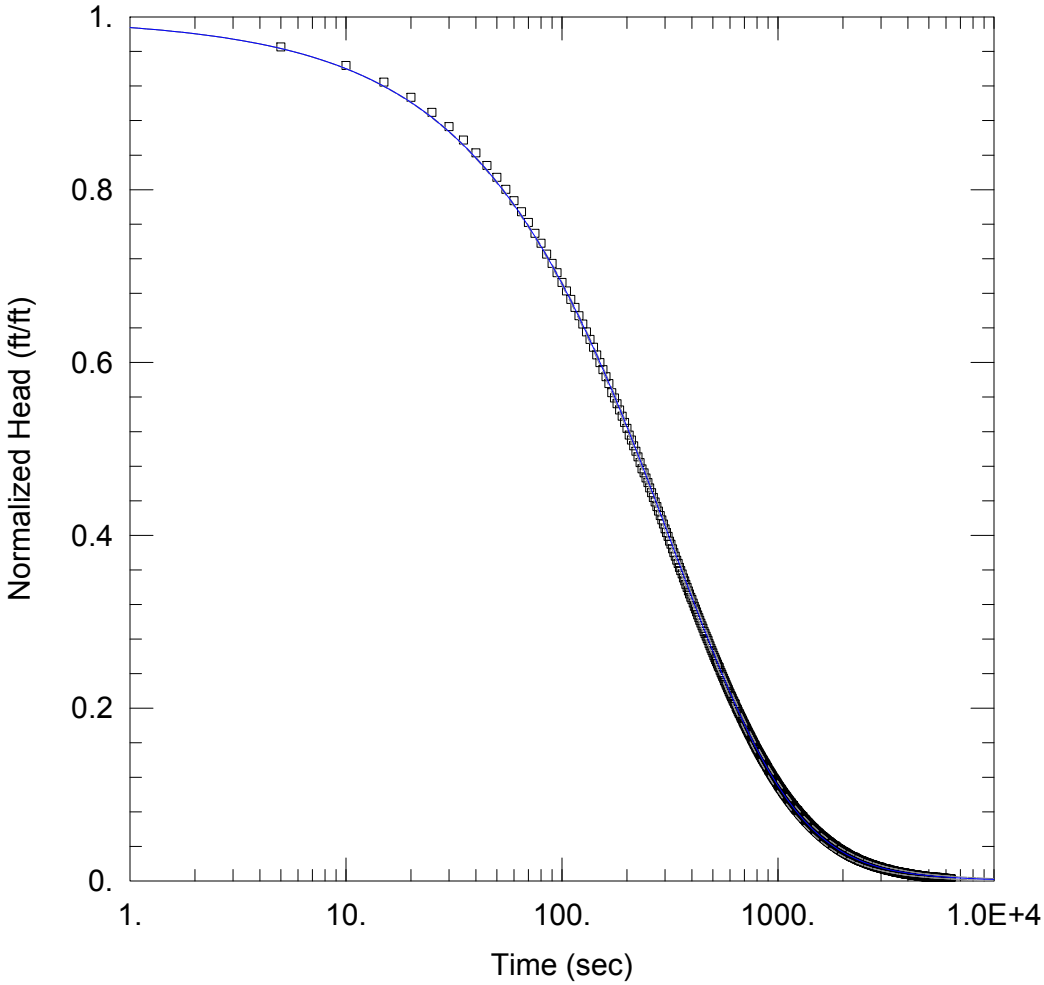
WELL DATA (MW283-K25CD)

Initial Displacement: 9.72 ft
Total Well Penetration Depth: 65.48 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 65.48 ft
Screen Length: 15. ft
Well Radius: 0.1667 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.1145 ft/day
Kz/Kr = 1.
Ss = 9.671E-7 ft^{-1}



WELL TEST ANALYSIS

Data Set: N:\...\MW284_K25CD_test1_KGS.aqt
Date: 05/12/15 Time: 17:05:36

PROJECT INFORMATION

Company: Geosyntec
Client: Chemtronics
Project: GR4943
Location: Swannanoa, NC
Test Well: MW284-K25CD
Test Date: 3/17/2015

AQUIFER DATA

Saturated Thickness: 34.9 ft

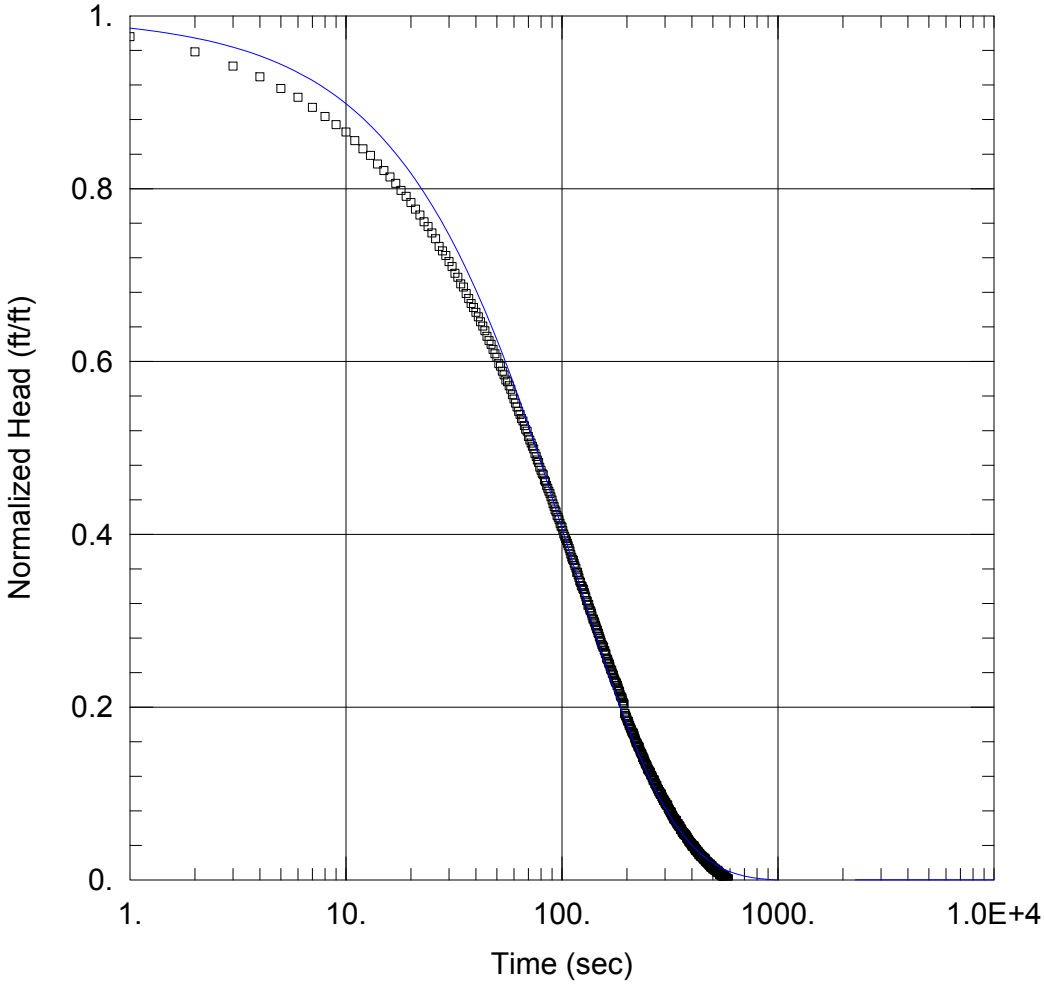
WELL DATA (MW284-K25CD)

Initial Displacement: 9.365 ft
Total Well Penetration Depth: 34.89 ft
Casing Radius: 0.1667 ft
Static Water Column Height: 34.89 ft
Screen Length: 15. ft
Well Radius: 0.1667 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.7795 ft/day
Kz/Kr = 1.
Ss = 0.0001814 ft^{-1}



P-2D TEST 2

Data Set: N:\...\P-2D Test 2.aqt
Date: 05/08/15 Time: 14:29:56

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: P-2D
Test Date: 4/29/2015

AQUIFER DATA

Saturated Thickness: 32. ft

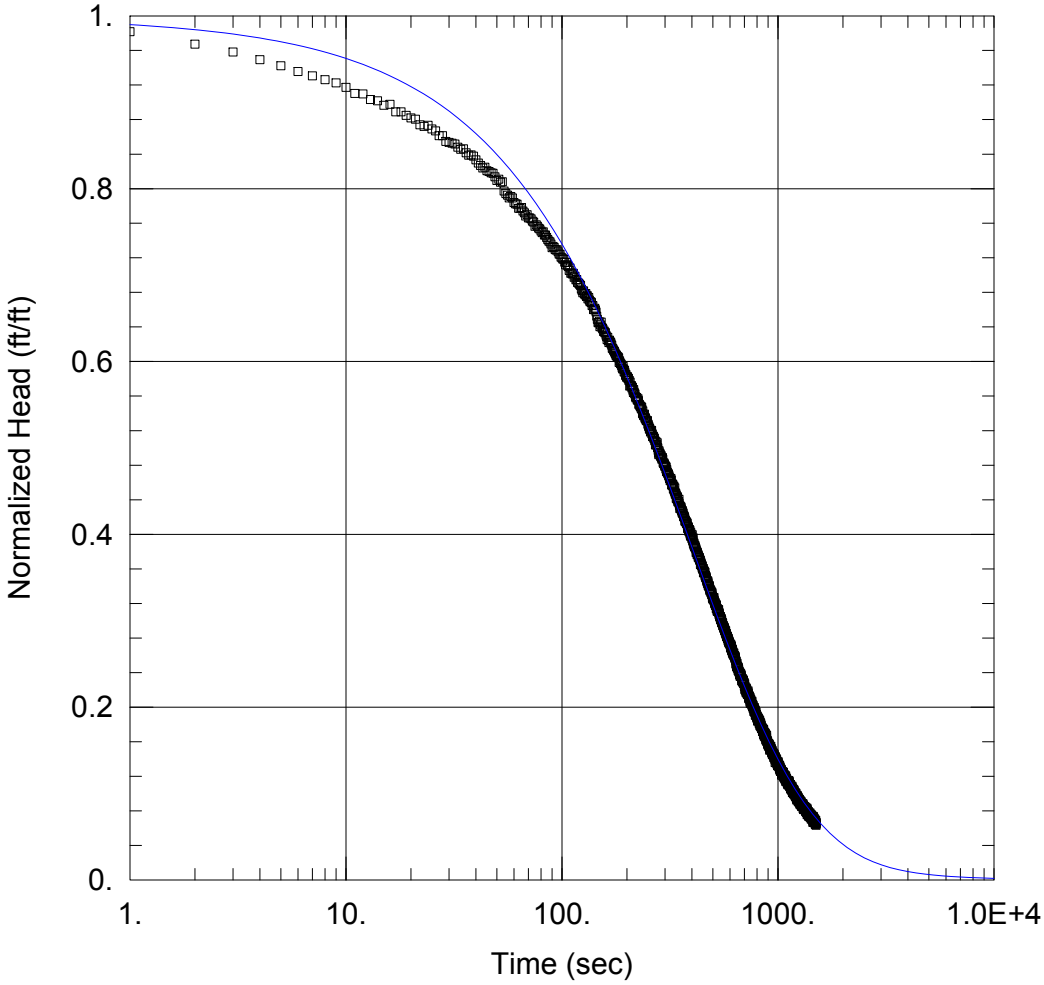
WELL DATA (P-2D)

Initial Displacement: 6.187 ft
Total Well Penetration Depth: 31.37 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 32. ft
Screen Length: 5. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.149 ft/day
Kz/Kr = 1.
Ss = 1.646E-5 ft^{-1}



P-4D

Data Set: N:\...\P-4D.aqt
Date: 05/12/15 Time: 18:01:56

PROJECT INFORMATION

Company: Geosyntec Consultants
Client: Chemtronics
Test Well: P-4D
Test Date: 4/28/2015

AQUIFER DATA

Saturated Thickness: 20.7 ft

WELL DATA (P-4D)

Initial Displacement: 3.277 ft
Total Well Penetration Depth: 20.23 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 20.7 ft
Screen Length: 5. ft
Well Radius: 0.0833 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.4573 ft/day
Kz/Kr = 1.
Ss = 0.0004617 ft^{-1}

ATTACHMENT D

BACK VALLEY GROUNDWATER
MODEL REPORT

Prepared for

Chemtronics, Inc.,
Northrop Grumman Systems Corporation,
and CNA Holdings LLC

BACK VALLEY GROUNDWATER MODEL REPORT

CHEMTRONICS SITE, SWANNANOA, BUNCOMBE COUNTY, NORTH CAROLINA

EPA CERCLIS ID: NCD095459392

Prepared by

Geosyntec consultants

engineers | scientists | innovators

1255 Roberts Blvd. NW, Suite 200
Kennesaw, Georgia 30144

Project Number GR4943

February 2016

Geosyntec consultants

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LIST OF ACRONYMS

3D	Three dimensional
APA	Acid Pit Area
BV	Back Valley
cm/sec	centimeter per second
CF	chloroform
DA	Disposal area
1,2-DCA	1,2-dichloroethane
DCM	dichloromethane
EISB	Enhanced in situ bioremediation
EVS	Environmental Visualization System
FS	Feasibility Study
ft/d	feet per day
GDR	Groundwater Diversion Remedy
HFB	horizontal flow barrier
K	hydraulic conductivity
kg	kilogram
ME	mean error
NCDENR	North Carolina Department of the Environment and Natural Resources
PEST	Parameter estimation software
PWR	partially weathered rock
RQD	Rock Quality Designation
SRMSE	scaled root mean square error
TCE	trichloroethene
VBW	vertical barrier wall
USEPA	U.S. Environmental Protection Agency

1.0 INTRODUCTION

Geosyntec Consultants of NC, P.C. (Geosyntec) has prepared this *Back Valley Groundwater Modeling Report* (Report) on behalf of Chemtronics, Inc., Northrop Grumman Systems Corporation, and CNA Holdings LLC (together the Companies) to support the Feasibility Study (FS) for the Back Valley (BV) portion of the Chemtronics Site in Swannanoa, Buncombe County, North Carolina (the Site; **Figure 1**).

A three-dimensional (3D), steady-state, groundwater numerical model of the Back Valley was developed by Geosyntec to simulate groundwater flow under current Site conditions (e.g., impervious cap over the Acid Pit Area [APA] and disposal area 9 [DA 9] and no active groundwater extraction down gradient of the APA and DA 9). A preliminary version of the Back Valley groundwater flow model was previously presented to the U.S. Environmental Protection Agency (USEPA) and the North Carolina Department of the Environment and Natural Resources (NCDENR) via webinar on 11 December 2014. The purpose of this Report is to document the construction and calibration of the finalized groundwater model that incorporated additional geological and hydrogeological data collected in the BV in 2015. This Report also documents the findings and conclusions of the calibrated groundwater flow model which was used to simulate a potential remedial scenario consisting of a groundwater diversion remedy (GDR). The groundwater flow model output provides data to evaluate the effectiveness of the GDR and results are presented in terms of flow reduction achieved.

1.1 Model Objectives

The objectives of the BV numerical groundwater flow modeling were three-fold:

- Construct a steady-state groundwater model of the BV that is calibrated to representative groundwater conditions;
- Using the calibrated model, simulate groundwater conditions in the BV for a GDR scenario where a Vertical Barrier Wall (VBW) is constructed around the perimeter of the APA and DA 9; and

- Quantify the predicted reduction of groundwater flow within the footprints of the APA and DA 9 achieved with GDR implementation compared to groundwater flow under base case conditions.

1.2 Background

Using observed groundwater concentrations[1], 2015 hydraulic gradients, and aquifer properties, it is estimated that the combined mass of contaminant flux of the seven primary COCs in groundwater (trichloroethene [TCE], 1,2-dichloroethane [1,2-DCA], chloroform [CF], dichloromethane [DCM], tert-butyl alcohol [TBA], benzene, and perchlorate) from the APA and DA 9 is approximately 8 kilograms (kg) per day. It is also estimated that the groundwater extraction system that has been in operation for over 15 years has removed contaminant mass at a rate between 1.75 kg/day in 2000 and 1.0 kg/day in 2014. As part of the current FS process, alternative remedies to the current extraction system have been evaluated, with the goal of selecting a remedy which is more effective at removing mass or reducing mass flux, than the current extraction system. Several alternative remedies that have been considered include a redesigned extraction system, enhanced *in situ* bioremediation (EISB) and a physical barrier.

The groundwater flow modeling presented in this report is focused on evaluating the physical barrier approach to mass flux reduction, and more specifically, on a GDR along the upgradient portions of the BV that would divert groundwater around the APA and DA 9. The GDR could consist of one or more components including a VBW from land surface to top of bedrock (to the extent feasible), a low permeability bedrock grout curtain, and a groundwater drain upgradient of the VBW to redirect groundwater around the VBW and reduce groundwater mounding upgradient of the GDR. A preliminary perimeter design of the VBW is evaluated in this report.

[1] Concentrations used were most recent data available per well, at the time of model construction; dates of data collection ranged from 2007 to 2012. For further details, please see the *Back Valley Source Mass Flux Reduction Evaluation Report* (Geosyntec, 2016a)

2.0 HYDROGEOLOGIC SETTING AND CONCEPTUAL MODEL

The Site lies within the Blue Ridge Physiographic Province (Horton and Zullo, 1991), which is predominately composed of igneous and metamorphic rocks that have been complexly folded and faulted in a northeasterly direction, parallel to the regional trend of the mountains. These structural imprints are reflected in the topographic and drainage patterns within the region. The predominant rock type underlying the area is high-grade metamorphic rock of the Ashe Metamorphic Suite.

The geology of the Site is typical of that found in the Blue Ridge Province, and consists of regolith (primarily soil, alluvium, and saprolite) overlying a partially weathered rock (PWR) and fractured bedrock transition zone, which grades into competent bedrock with depth (Altamont, 2010, 2015a). A generalized depiction of the primary components of the hydrogeologic system is presented on **Figure 2** (modified by Altamont [2015a, 2016] after Harned and Daniel, 1992). In western North Carolina and other parts of the southern Appalachians, most of the regolith is composed of saprolite, derived from in-place weathering of bedrock, with some localized deposition of sediment by streams and rivers (alluvium) or deposition by gravity-induced downslope movement (colluvium). As shown on **Figure 2**, the Site is underlain by regolith consisting of soil and saprolite, and weathered rock overlying bedrock. Soil at the Site typically contains silt and fine sized sand, with some locations also having high percentages of clay; based on this information, soil at the Site is anticipated to have relatively low permeability. The saprolite, which generally ranges from 2 to 65 feet (ft) thick, but with thickness approaching 100 ft at several locations, is highly weathered with variable permeability. The transition zone (generally 5 to 30 ft thick but locally as thick as 65 ft) is a gradational zone between the lower saprolite and competent bedrock, and is typically composed of PWR and highly fractured upper bedrock. The transition zone typically has moderate permeability due to the transmissive nature of the PWR and highly fractured rock. The predominant bedrock type underlying the Site is metagraywacke and schistose metagraywacke, with lesser amounts of amphibolite present locally (Altamont, 2015a).

The Site consists of a three-part flow system: a Surficial Aquifer System, a Transition Zone Aquifer System, and a Bedrock Aquifer System (**Figure 2)** (Altamont, 2015a)**.** These three aquifer systems are interconnected but have different characteristics that influence groundwater flow and transport mechanisms within them. The Surficial Aquifer System (referred to as Zone AB at the Site) exists in regolith and extends from

the capillary fringe to the top of the transition zone. As illustrated in **Table 1**, the hydraulic conductivity of Zone AB has been estimated to range between 0.060 and 2.2 feet per day (ft/d) at the Site. The Transition Zone Aquifer System (referred to as Zone CD at the Site) represents the gradational shift from the bottom of the regolith, through the PWR and the highly fractured upper bedrock, and into the top 10 to 15 ft of the underlying competent bedrock where Rock Quality Designation (RQD) is greater than or equal to 70%. The hydraulic conductivity of Zone CD has been estimated to be approximately one to two orders of magnitude higher than the surficial and bedrock aquifer at the Site and ranges between 0.11 and 1.9 x 10^2 ft/d. The permeability of the PWR can be locally variable depending on mineralogy, structure, and weathering profile. The bedrock aquifer system (referred to as Zone EF at the Site) extends below the transition zone aquifer system and is composed of both fractured and un-fractured competent crystalline bedrock. The average hydraulic conductivities estimated from a constant rate pumping test of the bedrock aquifer system were 1.6×10^{-4} ft/d for the bedrock matrix (e.g., unfractured) and 0.88 ft/d for fractured intervals. However, slug test results showed that fracture zones in the bedrock aquifer can have hydraulic conductivities as high as 26 ft/d.

Potentiometric surface maps for Zone AB, Zone CD, and Zone EF prepared from the April 2015 Site-wide monitoring data are shown on **Figure 3**. The potentiometric surface maps indicate that the predominant groundwater flow direction is generally down-valley towards the southeast. Based on the hydrogeology of the Site and potentiometric contours, it is inferred that groundwater discharge is likely occurring along certain sections of the streams. However, stream flows measured in April 2015 were low and near or below the precision of the stream flow measurement instrument (Altamont, 2015b). Thus, made it was difficult to distinguish the variability in stream flow data from background “noise” or drift, which created uncertainty as to which stream reaches were gaining or losing groundwater. This uncertainty limited the use of the stream flow data as calibration targets for model.

3.0 MODEL CONSTRUCTION

3.1 Model Design

Based on the information described in Section 2, the numerical groundwater flow model is conceptualized as being a three-part flow system similar to **Figure 2** and described in the Final RI (Altamont, 2015a). The model represents three distinct but interconnected hydrogeological units:

i. an overlying regolith unit (Zone AB) representing the Surficial Aquifer;

ii. a middle, transitional unit (Zone CD) representing the Transition Zone Aquifer; and

iii. a lower bedrock unit (Zone EF) which represents the Bedrock Aquifer.

For the purposes of the groundwater flow model, all three aquifers are assumed to act as an equivalent porous medium, given the large scale of the Site and BV.

The numerical model domain (the areal extent of the Site that is represented in the model) encompasses a majority of the BV (**Figure 1**). Most high elevation portions of groundwater flow in the BV located north of the model domain (**Figure 1**) were represented indirectly through the assignment of specified groundwater flux boundary conditions at the model extent due to the absence of hydrogeological data for control points and the large distance from the area considered for remedial actions.

The modular, three-dimensional (3D), finite difference groundwater flow model (MODFLOW), created by the United States Geological Survey, was used as the modeling program to simulate groundwater flow. Specifically, a Newton formulation of MODFLOW, MODFLOW-NWT (Niswonger, et al., 2011) was utilized because of its capabilities in solving non-linear equations associated with unconfined aquifers and non-linear boundary conditions, conditions relevant to the BV. The Horizontal Flow Barrier (HFB) package was used to simulate barriers to flow (such as a slurry wall) by reducing the conductance of model cells that surround/bound the barrier (Hseih & Freckleton, 1993). The HFB Package was used with MODFLOW-NWT to simulate the GDR options for the predictive scenarios. Parameter estimation software (PEST) is a model independent parameter estimation program (Watermark Numerical Computing) that was used during the calibration process to assist in estimating model parameters

such as hydraulic conductivity. Groundwater Vistas, developed by Environmental Simulations Inc., is a graphical user interface used for building groundwater models with MODFLOW and PEST, and for performing groundwater simulations. Groundwater Vistas version 6.69, build 1, 64 bit, was used as a pre-processor and post-processor of the numerical model.

3.1.1 Model Grid and Layering

Within the model extent, the model consists of 235 rows, 235 columns, and 7 vertical layers, with a model cell size of 20 ft by 20 ft. As illustrated on **Figure 1**, the model extent or grid orientation is rotated 40 degrees to the northwest in order to align with the general groundwater flow direction and layout of the GDR. Layer 1 of the model represents Zone AB, layer 2 represents Zone Cpwr, layer 3 represents Zone Cri (where present) and Zone D, layer 4 represents Zone D, and layers 5 to 7 represent Zones E and F (**Table 2**).

Model layer elevations were based on a combination of actual ground surface topography (from publicly-available regional LIDAR data) and subsurface lithologic/geologic borelog descriptions from Site-specific field investigation data. Data from these sources were imported into the 3D visualization software Environmental Visualization System (EVS) and interpolated to create surfaces for the top and bottom of each model layer. The top of layer 1 is land surface and the elevation is based on LIDAR elevation data provided by NCDOT[2]. Elevations for the bottoms of layer 1 to 3 were based on geological boring log data from the BV. For layers 4 to 7, bottom surfaces were created by subtracting constant values from the overlying surfaces based on assumed thicknesses for these layers. For example, the bottom of layer 4 is 15 feet below the bottom of layer 3 while the bottom of layer 5 is 15 feet below the bottom of layer 4.

The thickness for each model layer is shown in **Table 2** and varied across the model domain based on observations of the Site geology. In general, a minimum model layer thickness of 1 ft was applied to areas where interpolation of artificial pinch-outs were created due to a lack of geological data control points, or where physical pinch-outs of geologic units were observed (e.g. Zone Cri at VBW-02, VBW-03, VBW-06, VBW-

[2] (https://connect.ncdot.gov/resources/gis/pages/cont-elev_v2.aspx)

011, VBW-15, VBW-16, and VBW-17). This minimum thickness was enforced because MODFLOW-NWT does not allow for a zero layer thickness in the model grid.

3.1.2 External Boundaries

The model domain represents the BV watershed boundary conditions shown on **Figure 4**. The local groundwater divides observed in the BV watershed are simulated in the numerical model by creating what is referred to as "No–flow" boundary conditions at the western and eastern boundaries of the model domain. The groundwater divides are based on topography and were applied vertically in all seven layers of the model as appropriate. Bee Tree Creek is represented with constant head cells in layer 1 of the model. The groundwater level elevation of the creek was estimated based on topographic contours and applied to the boundary.

The northern boundary of the model is a specified flux boundary, based on the amount of net groundwater recharge estimated to occur in the upgradient portion of the watershed and is subdivided into two specified flux boundaries (**Figure 4**). It was assumed that the boundaries would represent aquifer base flow from upgradient groundwater recharge occurring in the two sub-watersheds located upgradient of the Site. The specified flux for the two boundaries was estimated by first calculating the area for each sub-watershed shown on **Figure 4,** north of the specified flux line. The sub-watershed area was then multiplied by the estimated regional groundwater recharge of 8.4 inches/year (NCDENR[3]), yielding the estimated groundwater recharge occurring within the sub-watershed. This value was then divided by the area of the model cells along the specified flux boundary, producing a calculated specified flux for each boundary. Specified flux boundary 1 was assigned a value of 0.29 ft/d, while specified flux boundary 2 was assigned a value of 0.17 ft/d. These specified flux values were applied to the uppermost active cells along the boundary to represent recharge entering the model domain. The boundaries were simulated within the model by using the MODFLOW Recharge package. Values used to calculate the specified fluxes are shown in **Table 3**.

Net groundwater recharge was applied to the highest active cells within the model. Areal groundwater recharge within the model was divided into two zones. For Zone 1

[3] Regional groundwater recharge data is from NCDENR Groundwater Data Map Server (http://www.ncwater.org/GWMS/openlayers/ol.php?menulist=bl);

(**Figure 5**) a groundwater recharge value of 8.4 inches/year (0.0019 ft/d) was applied to the uppermost active cells. This groundwater recharge value is based on GIS maps of regional recharge, found on the NCDENR Groundwater Data Map Server[2]. The GIS maps were published in 1998 and are themselves based on work done by Heath (1994) for the NCDENR. Recharge Zone 2 was assigned a value of 0 inch/year, and represents the lack of recharge occurring at the APA and DA 9 due to the presence of impervious engineered caps covering each location.

3.1.3 Internal Boundaries

Stream reaches within the model domain were simulated using the MODFLOW Drain Package. As shown on **Figure 5** they are subdivided into 12 drain segments. Initial drain input parameters were based on field data collected by Altamont on 24 April 2015, and field observations by Geosyntec. Streams at the Site are generally narrow upgradient of the APA and gradually increase in width as the streams approach Bee Tree Creek. Therefore, the initial drain widths ranged from 1 to 4 ft. Stream sediment thickness was also assumed to be very thin upgradient of the APA, and gradually thickens as the streams flow downgradient; initial drain sediment thicknesses ranged from 0.3 to 1 ft. Hydraulic conductivity for the drains was assumed to be 1 ft/day, which is similar to the conductivity of fine clean sand. Drain elevations were estimated using field data collected by Altamont on 27 April 2015 (Altamont, 2015b) and topographic contour lines.

3.1.4 Hydraulic Conductivity Zones

Initial hydraulic conductivity (K) values for the model layers were based on observed field data shown in **Table 1**. The K values assigned to each model layer encompassed the entire layer.

During calibration, several additional K zones (APA K zones 9 through 13) were assigned to the model. These additional zones were based on slug testing data, as discussed in Geosyntec's *Back Valley Aquifer Testing Report*, which indicated that an area of lower K exists at the APA (Geosyntec, 2016b). **Figure 6** shows the extent of one of the low K zones (K Zone 9) within model layer 1, along with K Zone 1 which encompasses the remainder of the model layer. Note that the APA K zones (Zones 9 through 13) all have the same extent, and were assigned to model layers 1 to 5 (e.g., K

zone 9 is in model layer 1, K zone 10 is in model layer 3, etc.). Further details regarding K zones 9 through 13 are discussed in the model calibration section below.

3.2 Model Calibration

The groundwater flow model was calibrated to the actual on-site groundwater table conditions by modifying recharge, specific flux along the northern boundaries, hydraulic conductivity, and drain parameters (K, width, etc.). The model was considered calibrated once simulated output closely approximated observed field conditions (e.g. inferred groundwater flow directions, groundwater gradients, groundwater elevations at monitoring wells observed on-site), and when calibration statistics indicated a residual mean error close to zero and a scaled root mean square error less than 10 percent (%).

The model was calibrated to groundwater elevations based on measurements at 96 monitoring wells made by Altamont on 24 April 2015 (**Figure 7**). Four of these wells (MW281-L23CD to MW284-K25CD) were installed in March and April 2015 as part of the bedrock characterization study performed by Altamont and Geosyntec. During calibration it was observed that simulated groundwater levels at MW281-L23CD and MW282-K23CD were substantially lower than what was observed in the field. This led to a re-examination of the Geosyntec slug test results and the identification of an area of lower K values around the APA. Based on the distribution of the slug test data observed, five K zones with identical extents (zones 9 through 13) were assigned in the model to represent this area of low K. **Figure 6** shows an example of the extent of one of the low K zones assigned in the model (K zone 9). K values were then modified until the simulated groundwater elevations in MW281-L23CD and MW282-K23CD were raised to an acceptable level.

During calibration, constant head cells were assigned along the southern edge of the active model domain within layers 2 through 7 to allow groundwater to flow in a more southerly direction near Bee Tree Creek. Constant head values were interpolated along the boundary based on potentiometric surface contours generated by Altamont from 2012 and 2013 for geologic zones CD and EF. An attempt was made to also use stream flow data collected by Altamont to assist with calibrating the model. However, due to the uncertainty of the data (described above in Section 2) it was decided that it would not be appropriate to use the data for calibration.

Simulated groundwater elevation contours of the calibrated model are shown on **Figure 8**. Dry cells depicted on **Figure 8** are model cells where the simulated groundwater level is below the bottom of the cell. The areas of dry cells in layers representing Zone AB and Zone C along the northern edge of the APA correspond favorably with field observations where the groundwater levels are below the saprolite and PWR.

The simulated and the observed groundwater elevations were compared at the 96 monitoring well targets incorporated into the model by calculating the residual (observed groundwater elevation minus simulated groundwater elevation) for each well target (**Table 4**). The minimum residual head value was -6.61 ft and the maximum residual head value was 6.58 ft, over a range in observed head values of 167.41 ft. Comparison statistics for the well targets in **Table 4** show a residual mean error (ME) of -0.21 ft and a scaled root mean square error (SRMSE) of 0.0156 (or 1.56%); the close proximity of these statistics to zero indicates a good match between observed and simulated heads and that the model is reasonably calibrated. The computed mass water balance error for the model was also negligible (-4.7 E-05%). **Figure 9** plots observed versus simulated head values for the 96 targets, and shows a good match between observed and simulated heads based on proximity of the results to the 1:1 correlation line. **Figure 10** shows observed head versus model residuals and shows that most residuals are within 4 to 6 ft of the observed head value and that there is no strong bias to the residuals. Combined with the comparison statistics and negligible mass balance error, **Figure 9** and **Figure 10** support the conclusion that the flow model is a reasonable representation of actual Site conditions.

Simulated hydraulic gradients for model layers representing different geologic zones also reasonably approximate observed horizontal hydraulic gradients. For example, the simulated hydraulic gradient for model layer 1 was 0.073 ft/ft which is similar to the observed hydraulic gradient of 0.077 ft/ft for Zone AB. The simulated hydraulic gradient for model layer 2 was 0.084 ft/ft; similar to the observed hydraulic gradient of 0.089 for Zone CD; and, simulated hydraulic gradient for model layer 6 was 0.089 ft/ft, similar to the observed hydraulic gradient of 0.087 for Zone EF.

As another verification of the model calibration, the observed and simulated vertical hydraulic gradients and vertical flow directions were compared at clustered or adjacent well pairs. **Table 5** shows observed and simulated vertical gradients and vertical flow directions while **Figure 11** shows the locations of the well clusters and simulated vertical flow directions. Overall, the simulated vertical gradients were generally within

one to two orders of magnitude of the observed vertical gradients. A more precise matching of gradients was considered to be inappropriate given the limited vertical resolution of the model and the small magnitude of many of the observed gradients (e.g., the minimum observed vertical gradient is 0.002 ft/ft). For simulated vertical flow direction, the model reproduces the observed flow directions for 14 out of 22 (or 64%) of the well pairs; these well pairs are scattered throughout the model extent, indicating a lack of bias within the model, and show that the model is reasonably calibrated. Well clusters where simulated vertical flow directions do not match observed conditions are highlighted in yellow on **Figure 11**, and tend to occur near a stream or southeast of the APA.

As a final step during model calibration, pumping wells representing the BV extraction system were assigned in the model to simulate drawdown within the BV aquifer system. Extraction rates in the model were based on average flow rates for September 2014 (**Table 6**) and represent pumping conditions just prior to the extraction system shutdown at the end of September. Observed drawdown data was not available for September 2014, therefore simulated drawdown was compared to contours generated to represent aquifer rebound, or groundwater recovery, approximately 6 hours following shutdown of the extraction system. Comparison of simulated drawdown against aquifer rebound is illustrated on **Figure 12**. It is important to recognize that the rebound contours are a temporal data set (i.e. snapshot in time) collected during aquifer recovery and therefore do not represent full recovery of the aquifer. As a result, the comparison focused on the shape and extent of the simulated drawdown to observed rebound and not the magnitude of the rebound contours to the simulated drawdown values. This comparison illustrates the overall agreement between the two datasets, adding confidence in the model as a tool for comparing remedial alternatives.

Overall, calibration statistics along with comparison of simulated heads, simulated vertical flow directions, and simulated drawdown to observed data indicates that the model is reasonably calibrated. See **Table 7** to **Table 9** for a list of calibrated model parameter values.

4.0 PREDICTIVE SIMULATIONS

The groundwater model was used to evaluate the effect a GDR would have on groundwater flow reduction at the Site. As part of the evaluation process, a preliminary GDR design, consisting of a perimeter VBW that surrounds the APA and DA 9, was simulated by the model (see **Figure 13**). The VBW was extended from the surface to the top of rock (bottom of model layer 2). A hydraulic conductivity value of 1.0E-7 centimeter per second (cm/s) (2.8E-4 ft/d) and thickness of 3 ft was applied to the model cells which represented the perimeter VBW. This value is based on professional experience and is consistent with the results of the laboratory testing conducted on-site samples (Geosyntec, 2015c).

To evaluate the impact of the simulated perimeter VBW, flow occurring within the footprint of the APA and DA 9 was summed within each model layer (see **Table 10**). Flow from the perimeter VBW scenario was compared to the calibrated model without the perimeter VBW (e.g., "Base Case") to assess the percentage of flow change (if any) in each layer. For the APA, the perimeter VBW primarily reduced flow within the saprolite and PWR (model layers 1 and 2), with a maximum flow reduction of 31% occurring in model layer 1. Small increases in flow were observed in some of the lower model layers, which is interpreted to be a result of the groundwater being diverted under the perimeter VBW into these lower layers. For DA 9, the perimeter VBW substantially reduced groundwater flow within the DA 9 footprint, for model layers 1 through 5. Based on simulated results, it appears that while the perimeter VBW reduced groundwater flow beneath DA 9, it was not very effective at reducing flow beneath the APA.

To further evaluate the simulation results, groundwater particles flow paths were plotted (**Figure 14**) and a simulated head difference map of the Base Case results and perimeter VBW results was created for the APA and DA 9 (**Figure 15**). Groundwater particle flow paths show that groundwater upgradient of the perimeter VBW is diverted under the VBW and then flows back into the APA footprint. Once the particle flow path enters the footprint of the APA, simulation results indicate that groundwater particles take approximately 5 to 20 years to flow southeast beneath the APA, before flowing under the southeastern boundary of the perimeter VBW. DA 9 shows similar behavior, with particles taking 5 to 10 years to exit the downgradient extent of the perimeter VBW. The simulated head difference map demonstrates that groundwater mounding of up to 5 ft occurs within the perimeter VBW and inside the footprint of the APA. This

simulation identified the possibility that construction of the VBW could cause groundwater to mound within the APA footprint which would be undesirable.

5.0 CONCLUSIONS

A three dimensional steady state groundwater flow model was constructed to simulate conditions in the BV at the Chemtronics Superfund Site. The purpose of the groundwater flow model was to simulate a preliminary GDR design that consisted of a perimeter VBW that encompassed both the APA and DA 9. The model was calibrated to inferred groundwater flow directions, groundwater gradients, and observed groundwater elevations measured in 96 monitoring wells on-site. Once calibrated, the model was used to simulate the groundwater flow conditions that would result from construction of a perimeter VBW. Results from the modeling simulations indicated that the perimeter VBW was not effective at reducing flow from beneath the APA, but did substantially reduce flow from beneath DA 9. However, the simulation also indicated that the perimeter VBW would cause groundwater mounding beneath the APA which would be unfavorable.

Based on these findings, the perimeter VBW was interpreted to not be the most effective GDR design for flow reduction (and thus mass flux reduction) at the Site. Two subsequent GDR designs were later simulated using the same groundwater flow model (with refinements based on additional field data collected in 2015). The simulation results for these two subsequent GDR designs are discussed in detail within the report entitled *Groundwater Diversion Remedy Evaluation For the Back Valley* (Appendix E to the Draft FS).

6.0 REFERENCES

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TABLES

FIGURES

TABLES

Table 1 - Site Aquifer Parameters
Chemtronics Site
Swannanoa, North Carolina

		Hydraulic Conductivity (ft/day)					
Data Source	**Zone (Testing Method)**	**Minimum**	**Maximum**	**Geometric Mean**	**Median**	**Representative[4]**	**Porosity**
RI Report[1]	Surficial (Slug Test)	0.16	1.5	0.50	NA	NA	0.21
	Surficial (Step Drawdown and constant rate)	1.1	2.5	NA	NA	NA	0.21
	Bedrock (Packer Testing)	1.0E-03	4.0	NA	NA	NA	NA
	Bedrock (Pumping Test - Bedrock Matrix)	9.4E-07	2.8E-04	1.6E-04	NA	NA	NA
	Bedrock (Pumping Test - Fractures)	0.14	1.4	0.88	NA	NA	NA
NCDENR Report[2]	Saprolite	0.20	3.0	NA	2.0	1.0	0.5
	Partially Weathered Rock	5.0	30	NA	8.0	10	0.3
	Bedrock	0.040	4.0	NA	0.2	0.20	low
Geosyntec[3]	Saprolite -Zone AB (Slug Test)	0.060	2.2	0.50	0.68	NA	NA
	Partially Weathered Rock - Zone CD (Slug Test)	0.11	1.9E+02	1.0	0.78	NA	NA
	Bedrock - Zone EF (Slug Test)	0.11	26	2.4	2.7	NA	NA

Notes:

1. Altamont, 2015 - Final Remedial Investigation (RI) Report.
2. Campbell, T.R., 2011, Hydrogeology and Water Quality at Bent Creek Research Station, Buncombe County, North Carolina, 2002 - 2009: North Carolina Department of Environmental and Natural Resource (NCDENR) Division of Water Quality Groundwater Bulletin 2011-01.
3. Geosyntec Aquifer Testing, March - April 2015.
4. The term “representative” defined by DENR as typically the median value.
5. NA - Not available.
6. ft/day - feet per day.

Table 2 - Model Layers
Chemtronics Site
Swannanoa, North Carolina

Model Layer	Geologic Unit	Geologic Zone	Model Layer Thickness (feet)
1	Regolith/Saprolite	AB	2 - 82
2	Partially Weathered Rock	Cpwr	1 - 44
3	Highly Fractured Bedrock	Cri & D	1 - 38
4	Competent Bedrock	D	15
5	Competent Bedrock	E	15
6	Competent Bedrock	E	85
7	Competent Bedrock	F	200

Table 3 - Calculated Specified Flux
Chemtronics Site
Swannanoa, North Carolina

Specified Flux Boundary	Sub-Watershed	Sub-Watershed Area (ft^2)	Regional groundwater recharge (in/yr)	Regional Groundwater Recharge (ft/d)	Sub-Watershed Recharge (ft^3/d)	Cell Cross Sectional Area (ft^2)	Number Of Cells Along Boundary	Total Cell Area Along Boundary (ft^2)	Calculated Specified Flux (ft/d)
1	1	10,715,149	8.4	0.0019	20,550	400	175	70,000	0.29
2	2	9,568,855	8.4	0.0019	18,351	400	266	106,400	0.17

Notes:

in/yr = inches per year

ft/d = feet per day

ft^3/d = cubic feet per day

ft^2 = square feet

1. Regional groundwater recharge information was obtained from the NCDENR Groundwater Data Map Server:
(http://www.ncwater.org/GWMS/openlayers/ol.php?menulist=bl);

2. Cell Cross sectional area represents plan view area of an individual cell; plan view area was used because the final specified flux was applied as recharge along the boundary within the MODFLOW model;in plan view, a single cell is 20 ft x 20 ft.

3. Calculated Specified Flux has units of ft/d because calculated values were applied to the boundary using the MODFLOW Recharge Package.

Table 4 - Observed vs. Simulated Heads
Chemtronics Site
Swannanoa, North Carolina

Model Targets (Monitoring Wells)	Simulated Water Level (ft)	Observed Water Level (ft)	Residual (ft)
BW-11	2,297.26	2,295.22	-2.04
BW-12	2,311.83	2,305.89	-5.94
BW-14	2,267.12	2,273.38	6.26
BW-9	2,335.41	2,334.60	-0.81
IW-2	2,334.97	2,335.99	1.02
M85L-12	2,394.74	2,388.69	-6.05
M85L-5	2,342.26	2,343.06	0.80
M85L-8	2,341.95	2,343.44	1.49
M85L-9	2,345.53	2,348.07	2.54
MW149-O28C	2,297.39	2,296.25	-1.14
MW150-O28C	2,298.85	2,298.11	-0.74
MW151-P27C	2,295.84	2,295.28	-0.56
MW152-Q27C	2,292.59	2,292.31	-0.28
MW153-Q27C	2,293.90	2,291.13	-2.77
MW162-T31A	2,257.92	2,256.03	-1.89
MW163-T32C	2,256.21	2,254.77	-1.44
MW165-O28A	2,296.58	2,296.36	-0.22
MW166-T32A	2,256.37	2,254.82	-1.55
MW168-O28B	2,296.40	2,295.58	-0.82
MW170-J23E	2,428.65	2,422.04	-6.61
MW172-T32D	2,255.83	2,254.63	-1.20
MW172-T32E	2,255.86	2,255.74	-0.12
MW185-L26AB	2,342.50	2,346.45	3.95
MW186-M25AB	2,344.60	2,347.70	3.10
MW187-M25AB	2,339.26	2,340.16	0.90
MW188-M27AB	2,325.38	2,323.78	-1.59
MW190-N24AB	2,330.45	2,330.25	-0.20
MW195-M27CD	2,325.11	2,322.91	-2.20
MW196-N27CD	2,318.46	2,325.05	6.58
MW197-O25CD	2,314.52	2,315.02	0.50
MW198-Q30CD	2,271.17	2,268.40	-2.78
MW199-R29CD	2,270.28	2,268.02	-2.26
MW205-M27AB	2,321.42	2,320.68	-0.74
MW206-M27CD	2,320.94	2,320.19	-0.76
MW207-M23AB	2,356.41	2,359.24	2.83
MW208-L26AB	2,350.48	2,351.66	1.19
MW223-L26AB	2,342.79	2,342.55	-0.24
MW225-T32F	2,256.02	2,259.21	3.20
MW233-O20AB	2,384.52	2,381.10	-3.42
MW254-L25CD	2,349.11	2,352.14	3.03
MW255-L25CD	2,346.91	2,351.35	4.44
MW256-M25CD	2,341.63	2,337.66	-3.97
MW257-M25CD	2,339.16	2,338.84	-0.32
MW258-M23CD	2,355.92	2,358.66	2.75
MW259-M24CD	2,344.93	2,343.22	-1.71
MW260-N24CD	2,341.83	2,341.59	-0.24
MW261-N24AB	2,341.70	2,344.26	2.57
MW262-N25CD	2,326.09	2,324.59	-1.51
MW263-N25AB	2,326.42	2,328.56	2.14
MW264-N25CD	2,326.83	2,325.11	-1.72
MW265-N25CD	2,334.68	2,331.33	-3.34
MW266-L26CD	2,342.87	2,341.94	-0.93

Table 4 - Observed vs. Simulated Heads
Chemtronics Site
Swannanoa, North Carolina

Model Targets (Monitoring Wells)	Simulated Water Level (ft)	Observed Water Level (ft)	Residual (ft)
MW267-L26CD	2,336.28	2,335.36	-0.92
MW268-L26AB	2,335.94	2,336.25	0.30
MW269-M26EF	2,319.41	2,317.11	-2.30
MW270-N27CD	2,319.65	2,322.96	3.31
MW272-M27EF	2,323.02	2,316.62	-6.40
MW272-M27F	2,315.02	2,316.66	1.64
MW273-O26EF	2,315.69	2,316.75	1.06
MW274-O28AB	2,298.28	2,296.36	-1.92
MW275-Q29AB	2,270.37	2,270.59	0.22
MW276-L22AB	2,394.49	2,389.66	-4.83
MW279-M25CD	2,334.03	2,334.67	0.64
MW280-M26CD	2,331.34	2,329.70	-1.64
MW281-L23CD	2,389.93	2,394.20	4.27
MW282-K23CD	2,396.50	2,397.36	0.86
MW283-K25CD	2,365.83	2,364.93	-0.90
MW284-K25CD	2,361.88	2,358.90	-2.98
MW-2B	2,316.34	2,316.84	0.50
MW-2D	2,316.74	2,320.20	3.46
MW-3B	2,328.38	2,326.70	-1.68
MW-3D	2,328.95	2,327.22	-1.73
MW-3S	2,329.71	2,327.12	-2.59
MW-4B	2,342.86	2,341.46	-1.40
MW-5S	2,334.49	2,336.03	1.54
P-2B	2,327.96	2,328.50	0.54
P-2D	2,328.61	2,328.55	-0.06
P-2S	2,329.71	2,332.41	2.70
P-3	2,326.46	2,327.71	1.25
P-4B	2,325.35	2,321.81	-3.54
P-4D	2,326.02	2,326.39	0.37
P-4S	2,325.76	2,326.43	0.67
P-5B	2,332.14	2,331.42	-0.72
P-5D	2,333.34	2,335.07	1.73
P-5S	2,332.70	2,337.06	4.36
P-6	2,336.25	2,337.69	1.44
P-7B	2,340.47	2,338.62	-1.85
P-7D	2,340.12	2,339.49	-0.63
P-7S	2,339.93	2,340.95	1.02
SW-11	2,335.37	2,336.51	1.14
SW-12	2,360.88	2,357.98	-2.90
SW-13	2,360.21	2,354.15	-6.06
SW-7	2,361.05	2,360.93	-0.12
SW-9	2,344.13	2,343.11	-1.02
X-2	2,349.20	2,352.17	2.98
X-3	2,330.90	2,333.36	2.46

Notes:

1. Observed water levels were measured on April 24, 2015

Calibration Statistics:

1. Residual Mean = -0.21 ft
2. Root Mean Square Error (RMSE) = 2.62 ft
3. Scaled RMSE = 0.0156
4. Mass Balance = -4.7 E-05%
5. Minimum Residual = -6.61 ft
6. Maximum Residual = 6.58 ft
7. Observed Water Level Range = 167.41 ft

Table 5 - Observed and Simulated Vertical Gradients and Flow Directions
Chemtronics Site
Swannanoa, North Carolina

Well ID	Zone	Screen Midpoint Elevation (ft)	2015 Observed Water Elevation (ft)	Simulated Water Elevation (ft)	2015 Observed Vertical Gradient (ft/ft)	Simulated Vertical Gradient (ft/ft)
P-2S	A	2,323.26	2,332.41	2,329.71	0.17	0.05
P-2D	B	2,300.40	2,328.55	2,328.61	0.002	0.023
P-2B	D	2,272.63	2,328.50	2,327.96		
P-4S	A	2,325.11	2,326.43	2,325.76	0.002	-0.02
P-4D	B	2,308.74	2,326.39	2,326.02	0.11	0.02
P-4B	D	2,268.40	2,321.81	2,325.35		
P-5S	A	2,329.37	2,337.06	2,332.70	0.045	-0.01
P-5D	B	2,285.38	2,335.07	2,333.34	0.12	0.04
P-5B	D	2,254.64	2,331.42	2,332.14		
P-7S	A	2,331.61	2,340.95	2,339.93	0.04	-0.005
P-7D	B	2,294.00	2,339.49	2,340.12	0.02	-0.010
P-7B	D	2,257.64	2,338.62	2,340.47		
MW207-M23AB	AB	2,352.68	2,359.24	2,356.41	0.01	0.01
MW258-MW23CD	CD	2,303.84	2,358.66	2,355.92		
MW165-O28A	A	2,294.09	2,296.36	2,296.58	0.03	0.01
MW168-O28B	B	2,267.32	2,295.58	2,296.40	-0.02	-0.03
MW149-O28C	C	2,227.81	2,296.25	2,297.39	0.04	0.004
BW-11	E	2,198.39	2,295.22	2,297.26		
MW205-M27AB	AB	2,314.38	2,320.68	2,321.42	0.03	0.03
MW206-M27CD	CD	2,299.94	2,320.19	2,320.94		
SW-11	A	2,320.26	2,336.51	2,335.37	0.02	0.02
IW-2	B	2,296.73	2,335.99	2,334.97	0.05	-0.016
BW-9	D	2,270.00	2,334.60	2,335.41		
MW276-L22AB	AB	2,390.53	2,389.66	2,394.49	0.03	-0.007
M85L12	C	2,353.59	2,388.69	2,394.74		
M85L-9	B	2,321.21	2,348.07	2,345.53	0.08	0.010
MW259-M24CD	CD	2,258.49	2,343.22	2,344.93		
MW261-N24AB	AB	2,337.73	2,344.26	2,341.70	0.03	-0.002
MW260-N24CD	CD	2,251.14	2,341.59	2,341.83		
M85L-5	B	2,295.18	2,343.06	2,342.26	0.29	0.033
MW256-M25CD	CD	2,276.23	2,337.66	2,341.63		
M85L-8	B	2,326.05	2,343.44	2,341.95	0.12	0.006
MW256-M25CD	CD	2,276.23	2,337.66	2,341.63		
X2	A	2,347.16	2,352.17	2,349.20	0.02	0.061
MW255-L25CD	CD	2,309.96	2,351.35	2,346.91		
SW7	A	2,341.16	2,360.93	2,361.05	0.20	-0.083
MW284-K25CD	CD	2,331.10	2,358.90	2,361.88		

Notes:

1. For each well pair/cluster, vertical gradients were calculated by subtracting the head in the lower screened well from the head in the upper screened well; head difference was then divided by the distance between the midpoints of the two well screens.
2. Negative vertical gradients indicate upward flow; positive gradients indicate downward flow.
3. Red colored cells indicate upward flow; blue colored cells indicate downward flow.
4. Observed water elevations were collected on April 24, 2015.

Table 6 - Extraction Well Flow Rates
Chemtronics Site
Swannanoa, North Carolina

Extraction Well	Screen Zone	Elevation of Screen Top (ft)	Elevation of Screen Bottom (ft)	Flow Rate (gpm)	Flow Rate (ft^3/d)
EW-2	B-C-D	2,339.04	2,299.36	0.69	132.83
EW-3	B-C-D	2,324.22	2,269.69	0.39	75.08
EW-4	B-C-D	2,321.25	2,291.56	0.29	55.83
EW-5	B-C-D	2,322.07	2,312.14	0.01	1.93
EW-6	B-C-D	2,321.34	2,281.63	0.19	36.58
EW-7	B-C-D	2,327.44	2,272.98	0.19	36.58
EW-9	B-C-D	2,332.76	2,283.21	0.31	59.68
EW-10	B-C-D	2,333.32	2,273.86	0.75	144.38
EW-11	B-C-D	2,334.55	2,270.12	1.00	192.50
EW-15-N26	B-C-D	2,316.35	2,286.35	0.00	0.00
DTW-2	B-C-D	2,302.65	2,277.08	0.35	67.38
STW-2	A	2,328.69	2,303.94	0.00	0.00

Notes:

gpm = gallons per minute
ft^3/d = cubic feet per day

1. Flow rate for each well is a monthly average for September 2014;
2. Flow rate data was provided to Geosyntec by Altamont.
3. Extraction wells are comprised of an upper screen interval and a bottom open borehole interval. Based on field observations by Altamont, the bottom open borehole has been silted in; therefore for the purposes of the model, only the upper screen interval was used during simulation of the extraction wells. Top and bottom elevations of the screen intervals are shown in the table above.

Table 7- Calibrated Hydraulic Conductivity Values
Chemtronics Site
Swannanoa, North Carolina

Model Layer	Model Zone Number	Geologic Unit	Geologic Zone	Horizontal Hydraulic Conductivity (ft/d)	Vertical Hydraulic Conductivity (ft/d)
Non-APA Zone Hydraulic Conductivity					
1	1	Regolith/Saprolite	AB	0.63	0.39
2	2	Partially Weathered Rock	Cpwr	2.65	0.94
3	3	Highly Fractured Bedrock	Cri	0.47	0.43
4	4	Competent Bedrock	D	0.36	0.33
5	5	Competent Bedrock	E	0.27	0.440
6	6	Competent Bedrock	E	0.34	0.170
7	7	Competent Bedrock	F	0.31	0.001
APA Zone Hydraulic Conductivity					
1	9	Regolith/Saprolite	AB	0.87	0.38
2	10	Partially Weathered Rock	Cpwr	0.58	0.36
3	11	Highly Fractured Bedrock	Cri	0.25	0.26
4	12	Competent Bedrock	D	0.0006	0.008
5	13	Competent Bedrock	E	0.042	0.006

Notes:

ft/d = feet per day

1. APA Hydraulic Conductivity Zone was not extended to model layers 6 and 7.
2. Zone number 8 was not used in the final version of the calibrated model.

Table 8- Calibrated Drain Parameters
Chemtronics Site
Swannanoa, North Carolina

Model Layer	Drain Segment	Upgradient Drain Width (ft)	Downgradient Drain Width (ft)	Upgradient Sediment Thickness (ft)	Downgradient Drain Sediment Thickness (ft)	Drain Hydraulic Conductivity (ft/d)
1	1	1	2.25	0.3	0.3	1
1	2	2.25	1.5	0.3	0.3	1
1	3	1.5	3.25	0.3	0.3	1
1	4	3.25	4	0.3	0.3	1
1	5	4	5	0.3	0.5	1
1	6	5	5.5	0.5	1	1
1	7	1	2.83	0.3	0.3	1
1	8	2.83	3.4	0.3	0.3	1
1	9	3.4	4	0.3	0.3	1
1	10	4	4	0.3	0.5	1
1	11	3	3	0.3	0.3	1
1	12	1	1	0.3	0.3	1

Notes:

ft/d = feet per day

1. Upgradient and downgradient widths represent drain width at beginning and end of drain segment; width in between the beginning and end of certain segments was interpolated.
2. Upgradient and downgradient sediment thicknesses represent thickness at beginning and end of drain segment; thickness in between the beginning and end of certain segments was interpolated.

Table 9 - Calibrated Recharge and Specified Flux
Chemtronics Site
Swannanoa, North Carolina

Parameter	Value (ft/d)
Recharge Zone 1	0.0019
Recharge Zone 2	0.00
Specified Flux Boundary 1	0.29
Specified Flux Boundary 2	0.17

Notes:

1. Recharge and Flux parameters are in units of feet per day (ft/d).
2. Specified Flux and recharge were applied to the uppermost active cells.

Table 10 -Simulated Flow within the Footprint of the APA and DA 9
Chemtronics Site
Swannanoa, North Carolina

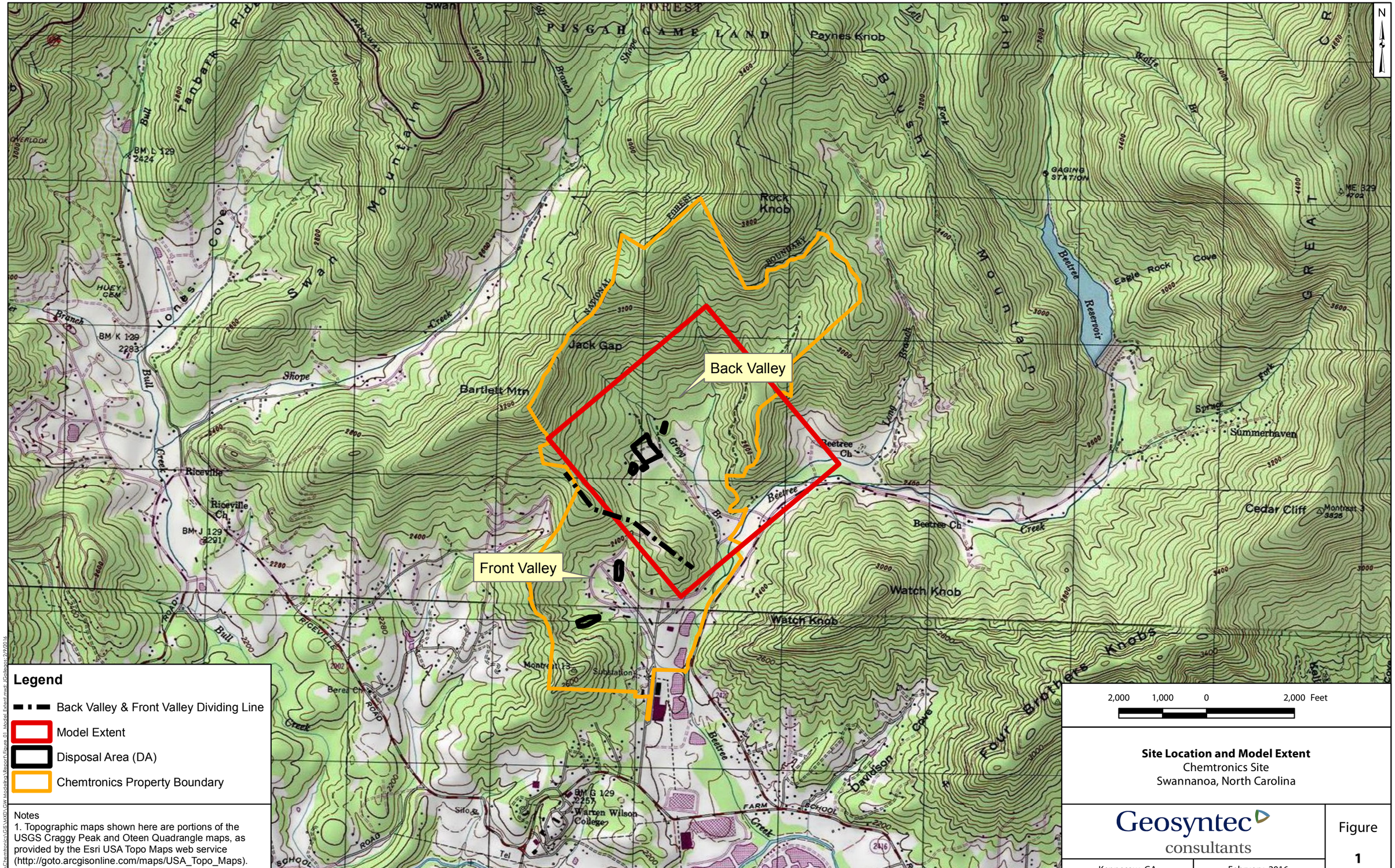
			Simulated Scenarios		
			Base Case	GDR: Perimeter VBW	
Location	**Geologic Unit**	**Model Layer**	**Total Flow (gpm)**	**Total Flow (gpm)**	**Difference (%)**
APA	Zone AB	1	5.40	3.70	-31%
	Zone Cpwr	2	5.49	4.76	-13%
	Zone Cri	3	3.04	3.08	1%
	Zone D	4	2.85	2.92	2%
	Zone E	5	3.15	3.09	-2%
	Zone E	6	9.48	9.69	2%
	Zone F	7	3.51	3.51	0%
DA 9	Zone AB	1	0.87	0.25	-71%
	Zone Cpwr	2	1.11	0.52	-53%
	Zone Cri	3	0.18	0.14	-21%
	Zone D	4	0.14	0.09	-34%
	Zone E	5	0.20	0.14	-27%
	Zone EF	6+7	1.95	1.98	2%

Notes:

gpm = gallons per minute

1. Flow within the APA and DA-9 footprints is shown for the base case scenario and for the GDR Perimeter VBW scenario.
2. For the GDR Perimeter VBW scenario, the VBW extends from the surface to the top of rock (bottom of model layer 2).
3. Percent Difference is relative to the base case model (i.e. the calibrated model); a negative percentage indicates a simulated reduction in flow due to the GDR .

FIGURES


Back Valley
Front Valley
Legend
Back Valley & Front Valley Dividing Line
Model Extent
Disposal Area (DA)
Chemtronics Property Boundary
Notes
1. Topographic maps shown here are portions of the USGS Craggy Peak and Oteen Quadrangle maps, as provided by the Esri USA Topo Maps web service (http://goto.arcgisonline.com/maps/USA_Topo_Maps).
2,000 1,000 0 2,000 Feet
Site Location and Model Extent
Chemtronics Site
Swannanoa, North Carolina
Geosyntec consultants
Figure 1
Kennesaw, GA
February, 2016
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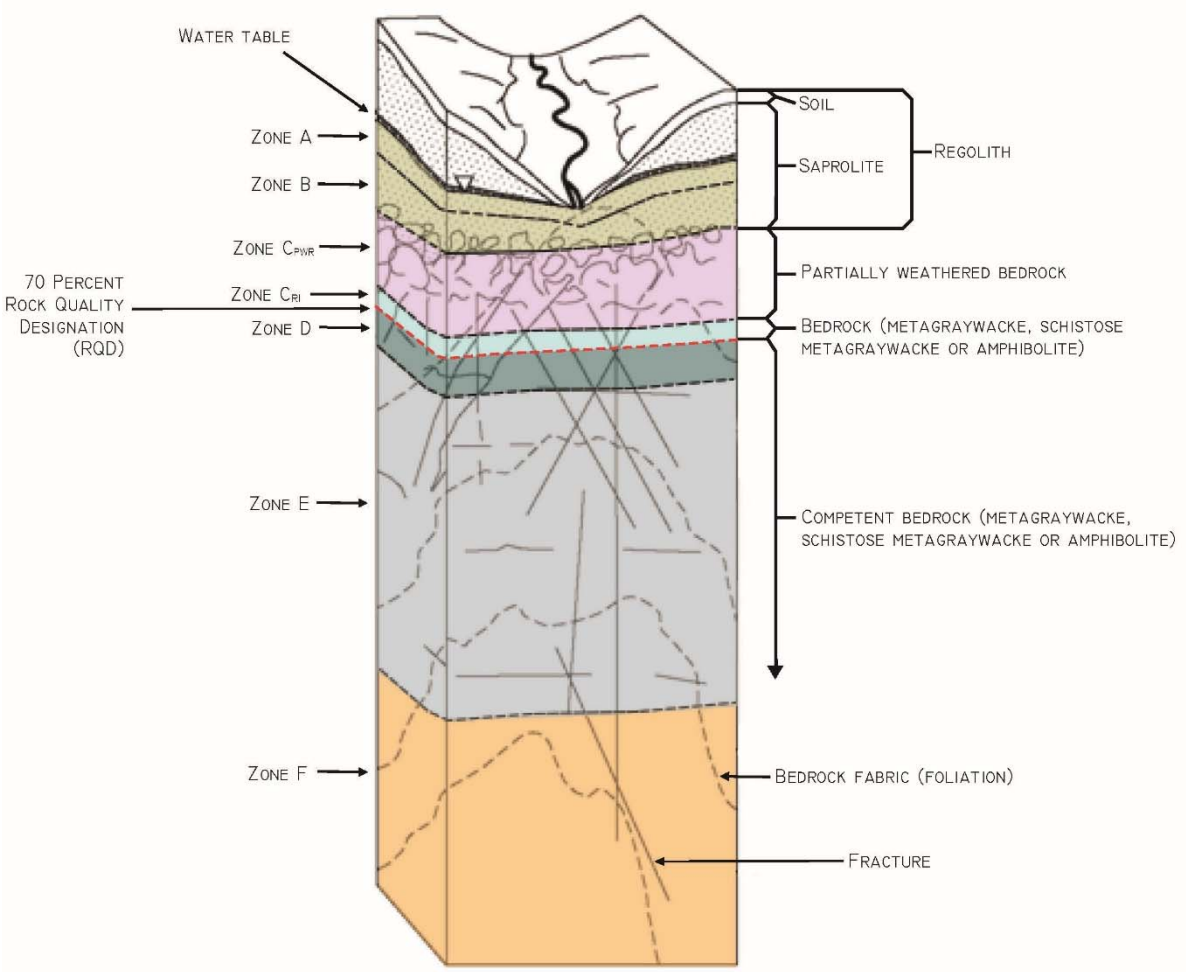


Surficial Aquifer System (Zone AB)

Zone A: Water table

Zone B: Only present if > 40 ft from water table

Transition Zone Aquifer System (Zone CD)

Zone Cpwr: Predominance of partially weathered rock and/or blow counts of 50/6 inches

Zone Cri: Auger Refusal to RQD ≥ 70 percent

Zone D: First 10-15 feet where RQD ≥ 70 percent

Bedrock Aquifer System (Zone EF)

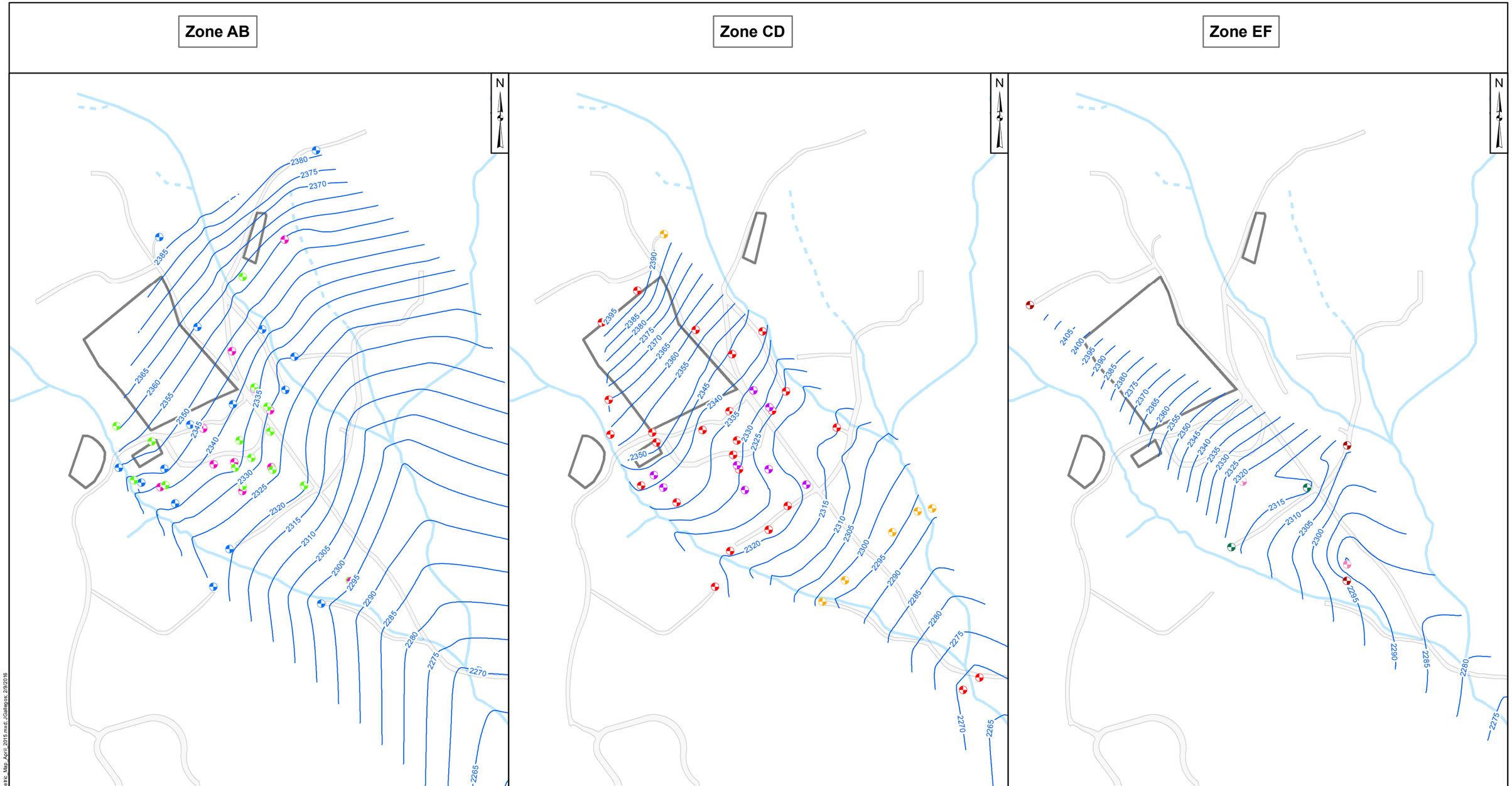
Zone E: RQD ≥ 70 percent, 100 ft thick

Zone F: RQD ≥ 70 percent, below Zone E

Source: Modified from Harned and Daniel (1992) and presented in the Hydrogeological Conceptual Site Model (Altamont, 2015).

Primary Components of the Hydrogeologic System	Geosyntec consultants	Figure
Kennesaw, Georgia	February 2016	2

N:\C\Chemtronics\Groundwater Model\Report\Figures\Build\Figure 2 Hydrostrat Column.pptx



Legend

- Zone A Monitoring Well
- Zone B Monitoring Well
- Zone AB Monitoring Well
- Zone C Monitoring Well
- Zone D Monitoring Well
- Zone CD Monitoring Well
- Zone E Monitoring Well
- Zone F Monitoring Well
- Zone EF Monitoring Well
- Disposal Area (DA)
- Road
- Interpreted Potentiometric Elevation Contour (ft)
- Intermittent Stream
- Perennial Stream

Notes:
1.) Potentiometric elevation contours are interpreted contours of the potentiometric surface. Contours provided to Geosyntec by Altamont.
2.) Water levels used to create contours were collected on April 24, 2015; water levels are not shown on this map.

0 400 800 Feet

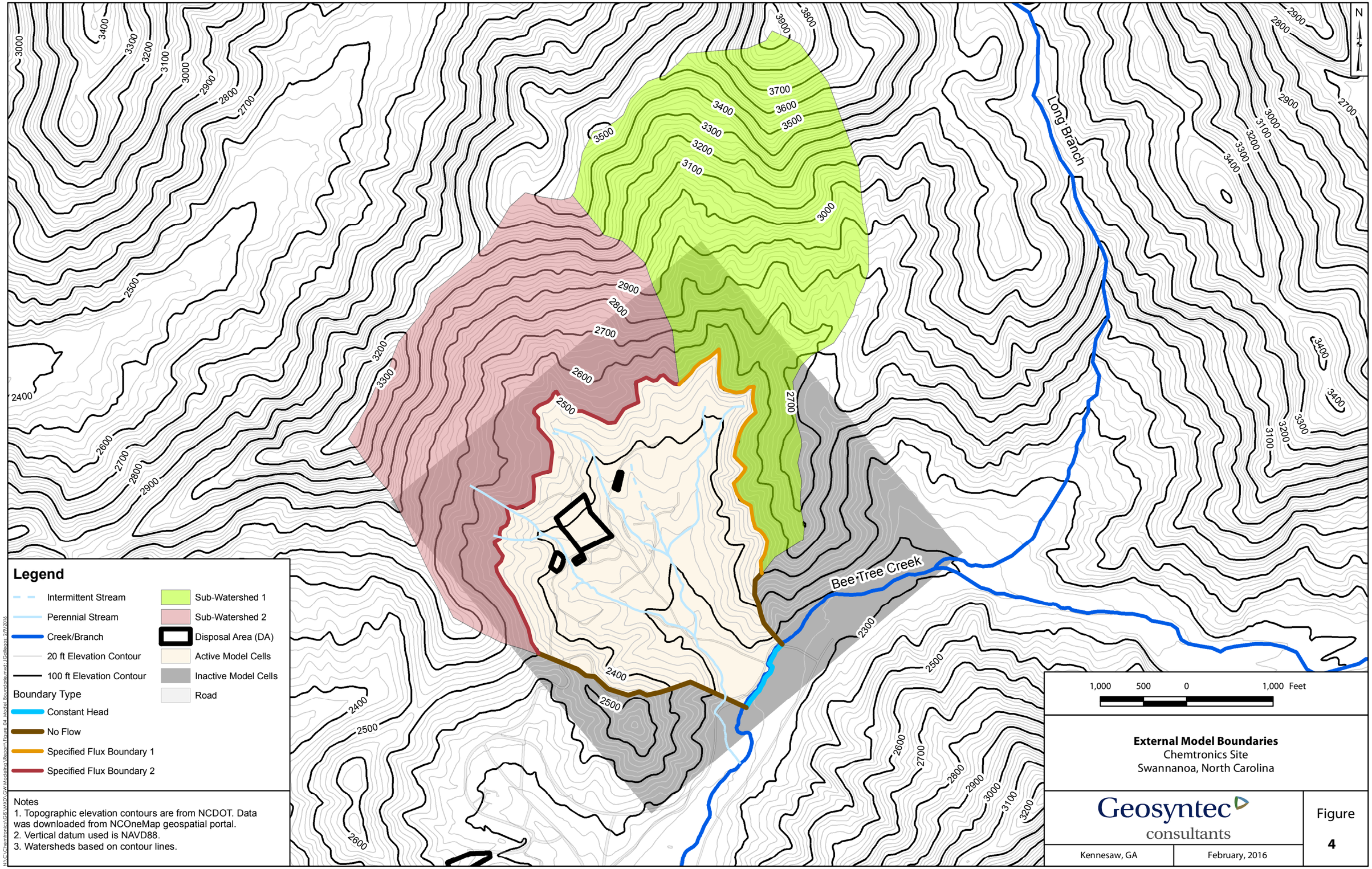
April 2015 Potentiometric Surface Map
Chemtronics Site
Swannanoa, North Carolina

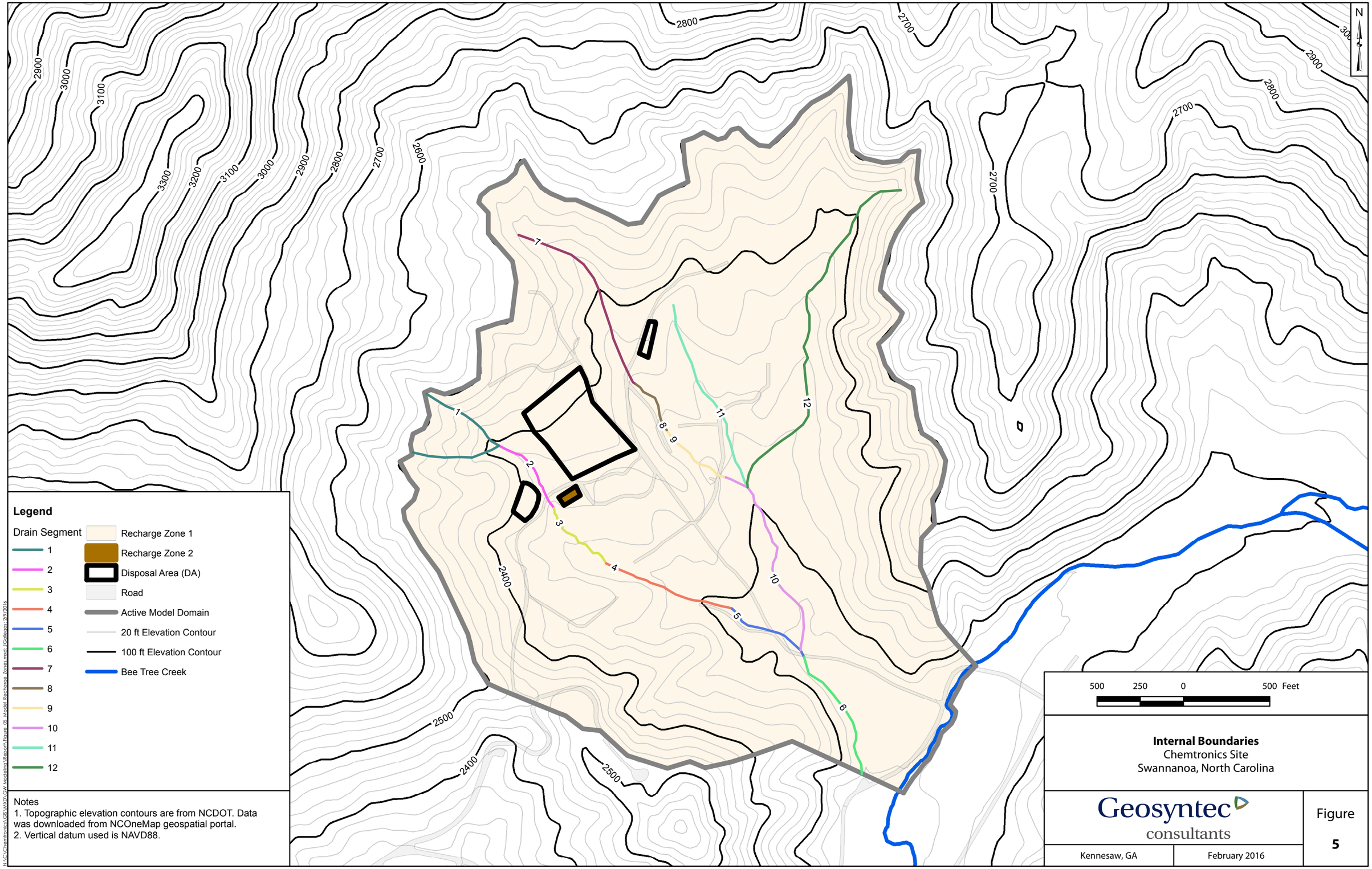
Geosyntec consultants

Kennesaw, GA | February 2016

Figure 3

N:\Chemtronics\GIS\MXD\GW Modeling\Report\Figure_03_Potentiometric_Map_April_2015.mxd; JGallegos; 2/9/2016


Long Branch
Bee Tree Creek
N
1,000 500 0 1,000 Feet
Legend
Intermittent Stream
Perennial Stream
Creek/Branch
20 ft Elevation Contour
100 ft Elevation Contour
Boundary Type
Constant Head
No Flow
Specified Flux Boundary 1
Specified Flux Boundary 2
Sub-Watershed 1
Sub-Watershed 2
Disposal Area (DA)
Active Model Cells
Inactive Model Cells
Road
Notes
1. Topographic elevation contours are from NCDOT. Data was downloaded from NCOneMap geospatial portal.
2. Vertical datum used is NAVD88.
3. Watersheds based on contour lines.
External Model Boundaries
Chemtronics Site
Swannanoa, North Carolina
Geosyntec consultants
Figure
4
Kennesaw, GA
February, 2016



Notes
1. Topographic elevation contours are from NCDOT. Data was downloaded from NCOneMap geospatial portal.
2. Vertical datum used is NAVD88.

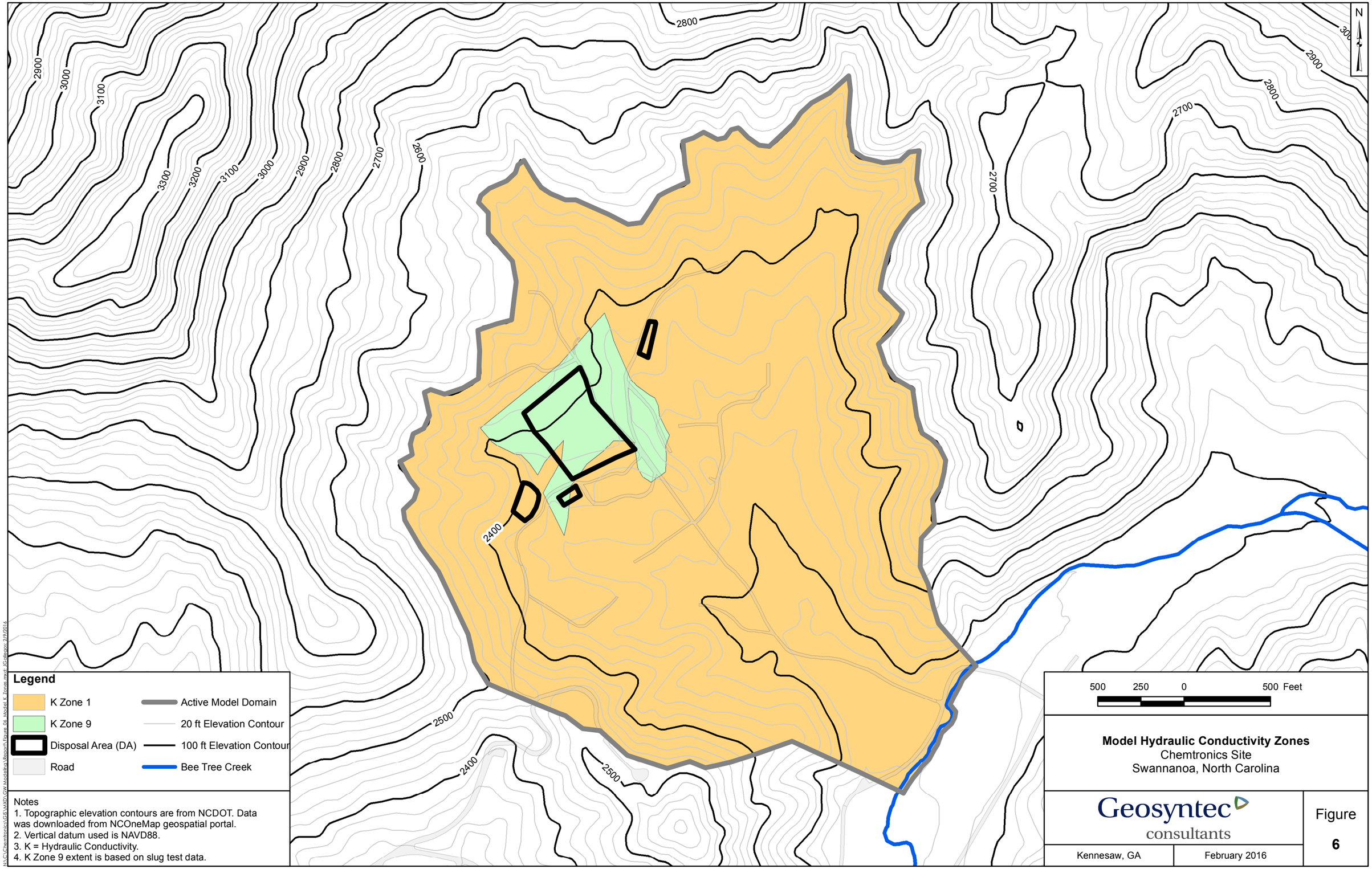
Internal Boundaries
Chemtronics Site
Swannanoa, North Carolina

Geosyntec consultants

Kennesaw, GA | February 2016

Figure 5

N:\C\Chemtronics\GIS\MXD\GW Modeling\Report\Figure_05_Model Recharge Zones.mxd; JCollings; 2/9/2016



Notes
1. Topographic elevation contours are from NCDOT. Data was downloaded from NCOneMap geospatial portal.
2. Vertical datum used is NAVD88.
3. K = Hydraulic Conductivity.
4. K Zone 9 extent is based on slug test data.

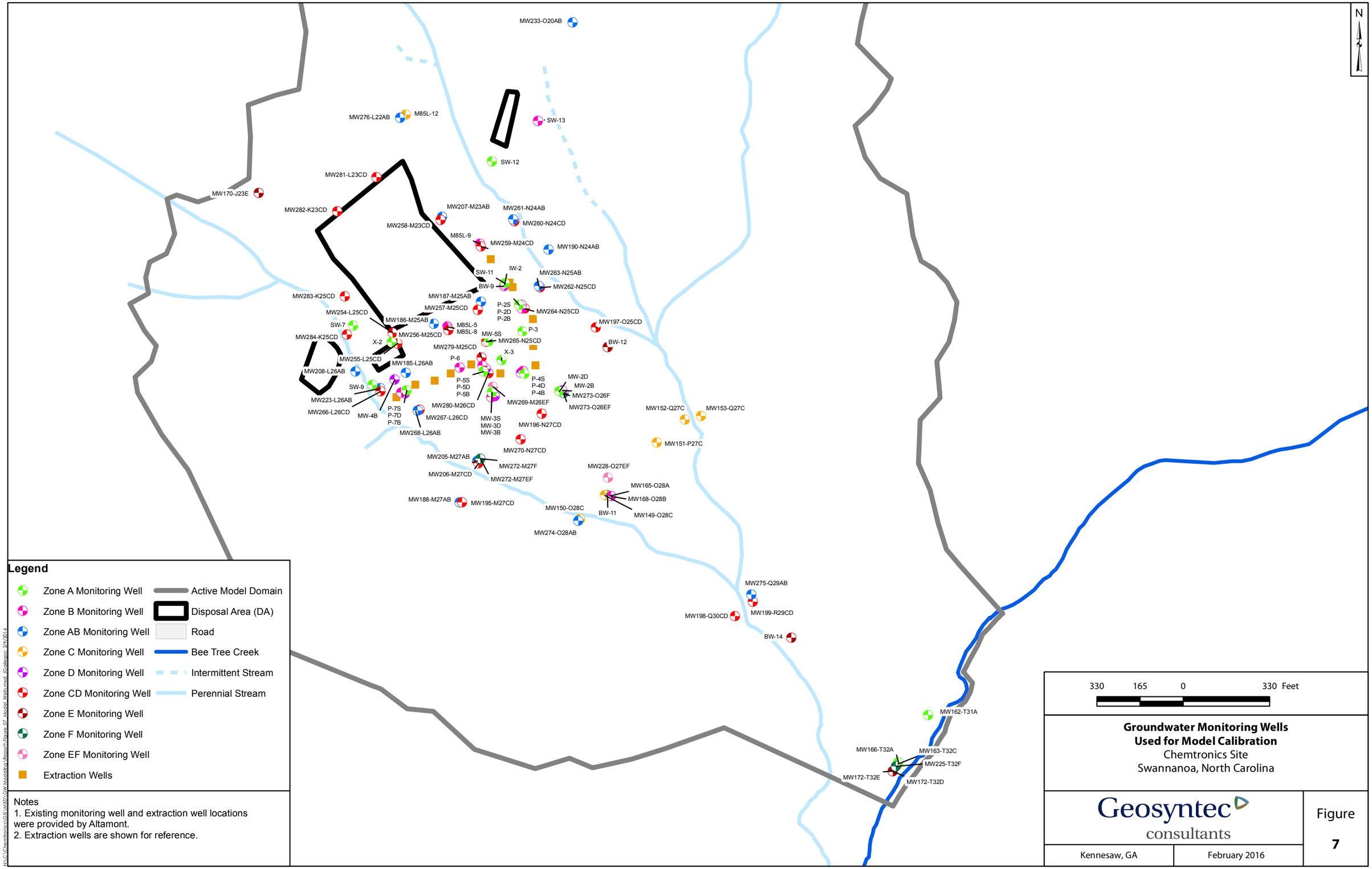
Model Hydraulic Conductivity Zones
Chemtronics Site
Swannanoa, North Carolina

Geosyntec consultants

Kennesaw, GA | February 2016

Figure 6

N:\C\Chemtronics\GIS\MXD\GW Modeling\Report\Figure 06_Model K_Zones.mxd; JGallegos; 2/9/2016



Notes
1. Existing monitoring well and extraction well locations were provided by Altamont.
2. Extraction wells are shown for reference.

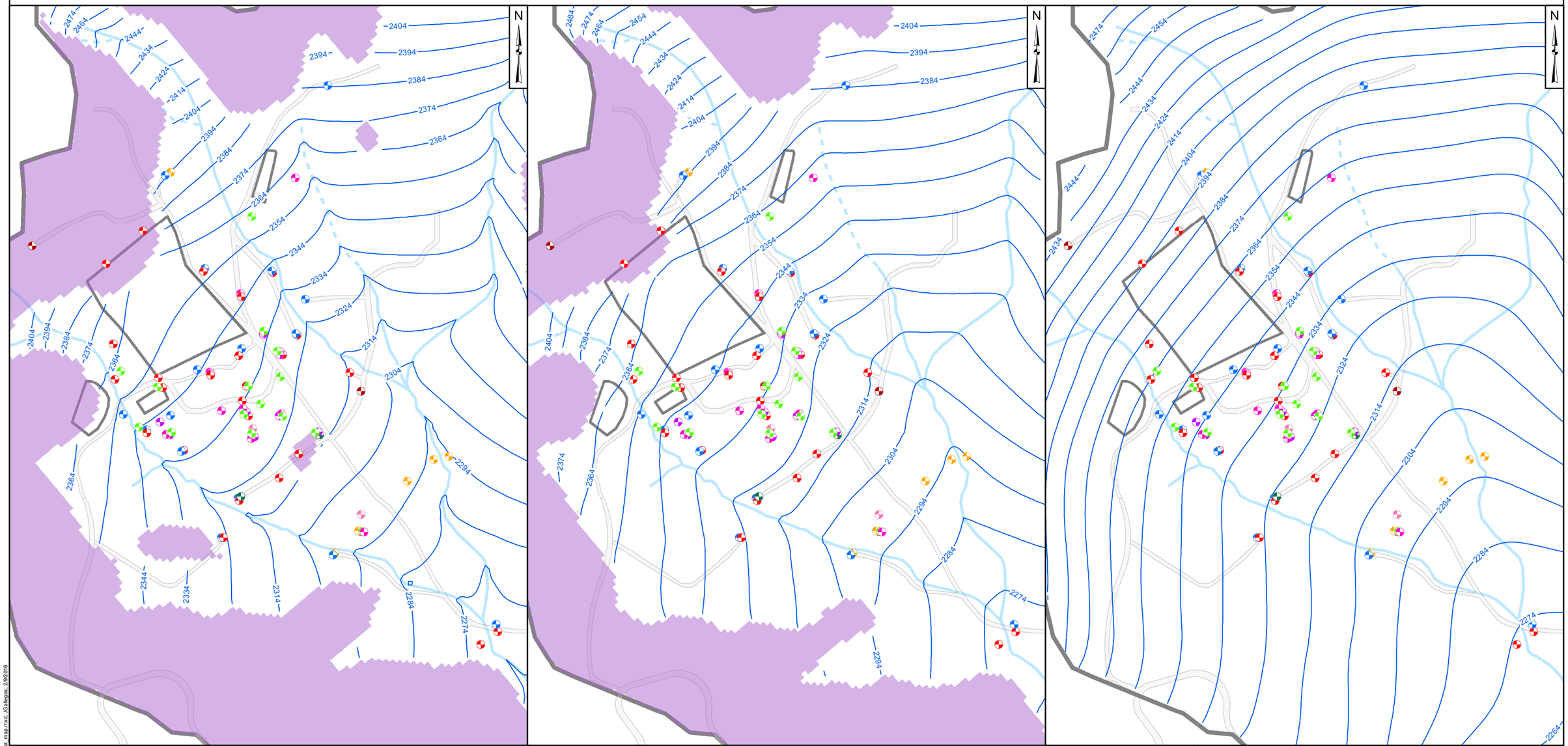
Groundwater Monitoring Wells Used for Model Calibration
Chemtronics Site
Swannanoa, North Carolina

Geosyntec consultants

Kennesaw, GA | February 2016

Figure 7

N:\C\Chemtronics\GIS\MXD\GW Modeling\Report\Figure 07_Model Wells.mxd; JGallegos; 2/9/2016



Legend

- Zone A Monitoring Well
- Zone B Monitoring Well
- Zone AB Monitoring Well
- Zone C Monitoring Well
- Zone D Monitoring Well
- Zone CD Monitoring Well
- Zone E Monitoring Well
- Zone F Monitoring Well
- Zone EF Monitoring Well
- Simulated Potentiometric Elevation Contour (ft)
- Dry Model Cells
- Disposal Area (DA)
- Road
- Intermittent Stream
- Perennial Stream
- Active Model Domain

0 400 800 Feet

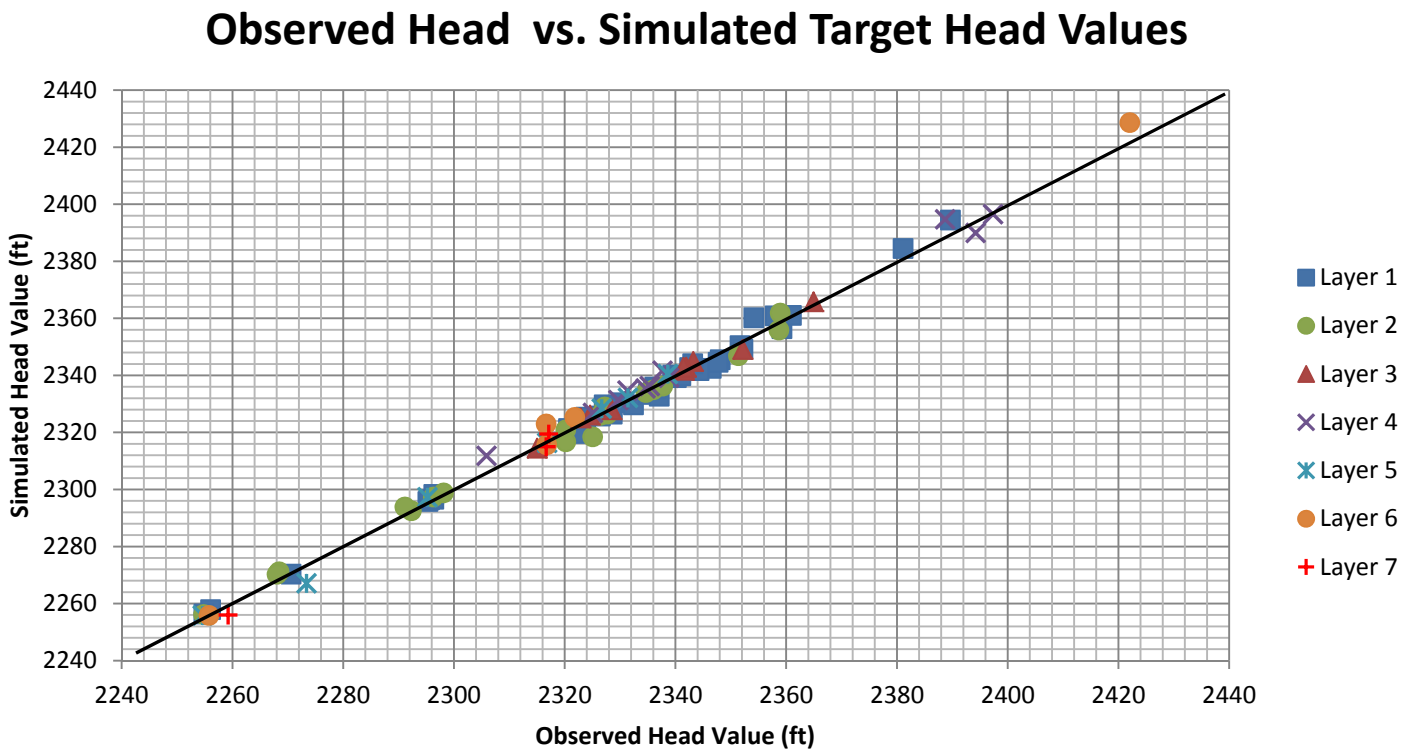
Simulated Potentiometric Surface Map
Chemtronics Site
Swannanoa, North Carolina

Geosyntec consultants

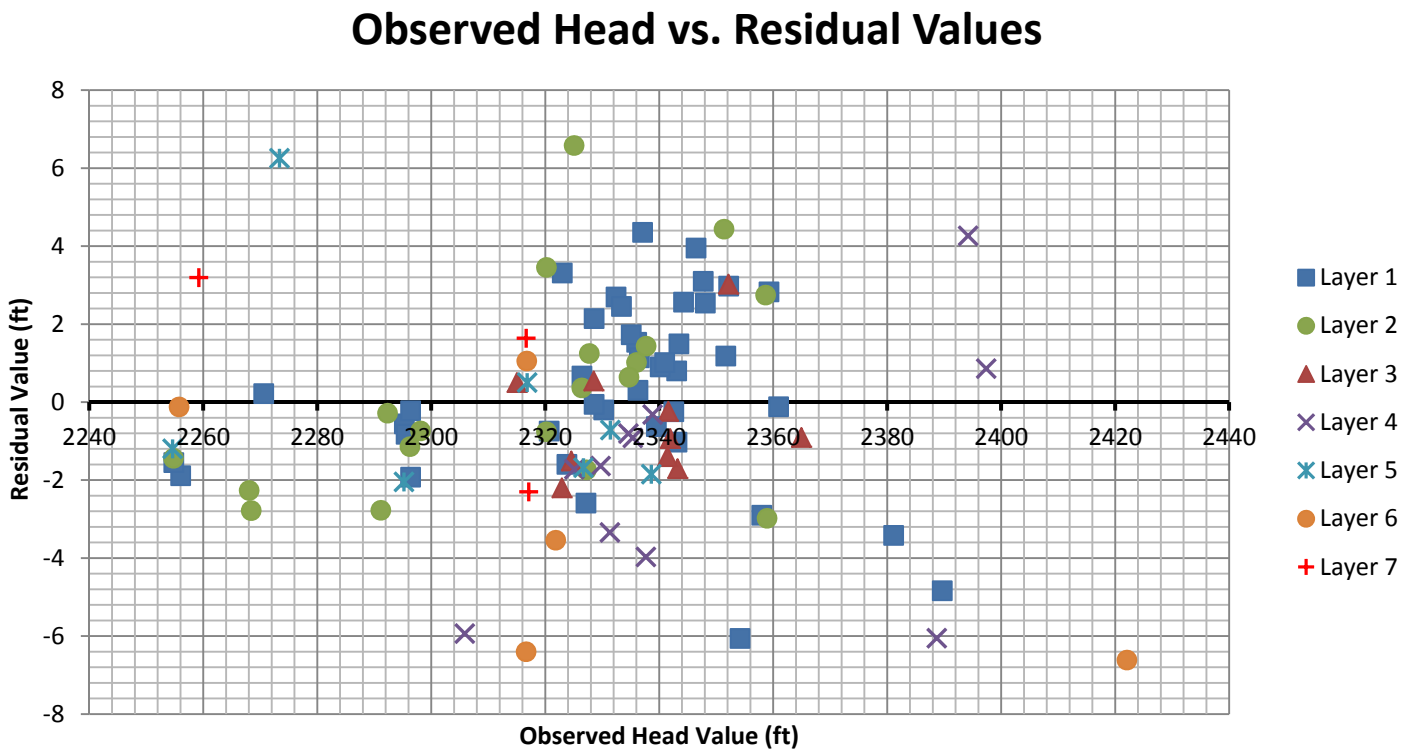
Kennesaw, GA | February 2016

Figure 8

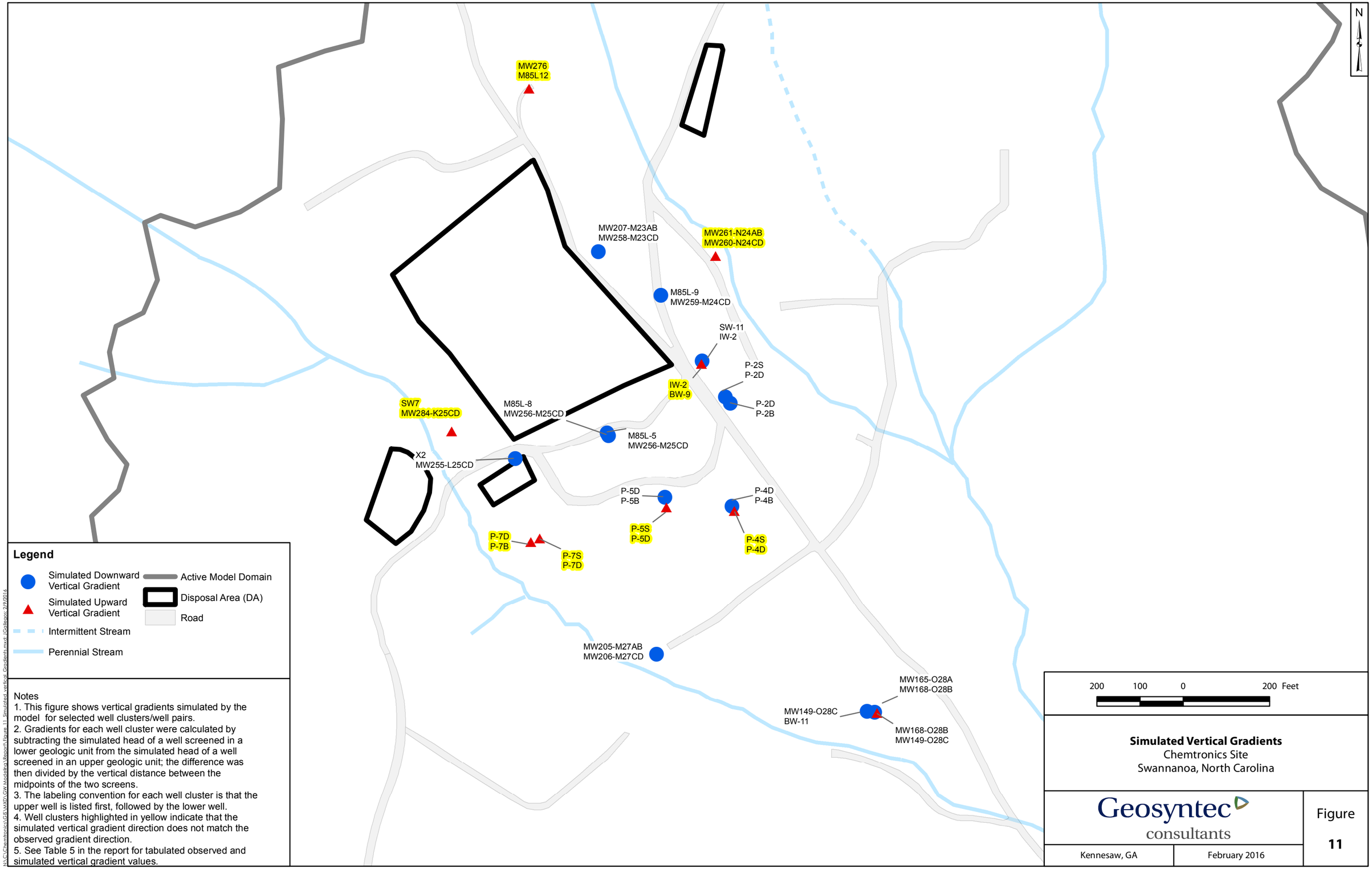
N:\Chemtronics\GIS\MXD\GW Modeling\Report\Figure_08_Model_Pot_map.mxd, JGallegos, 2/9/2016



Observed vs. Simulated Target Head Values	Geosyntec consultants	Figure
Kennesaw, GA	February 2016	9



Observed Head vs. Residual Values	Geosyntec consultants	Figure
Kennesaw, GA	February 2016	10



Notes
1. This figure shows vertical gradients simulated by the model for selected well clusters/well pairs.
2. Gradients for each well cluster were calculated by subtracting the simulated head of a well screened in a lower geologic unit from the simulated head of a well screened in an upper geologic unit; the difference was then divided by the vertical distance between the midpoints of the two screens.
3. The labeling convention for each well cluster is that the upper well is listed first, followed by the lower well.
4. Well clusters highlighted in yellow indicate that the simulated vertical gradient direction does not match the observed gradient direction.
5. See Table 5 in the report for tabulated observed and simulated vertical gradient values.

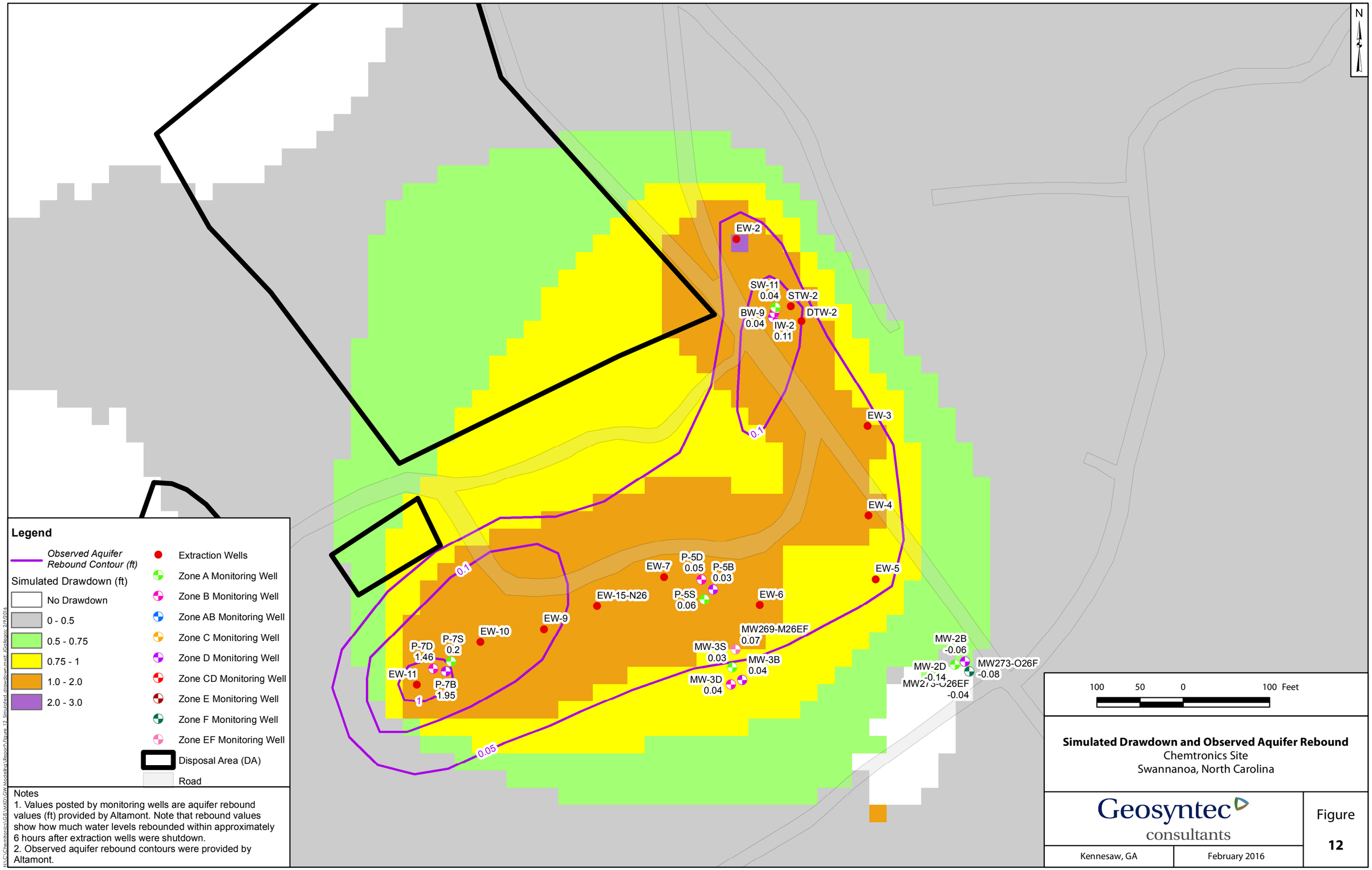
Simulated Vertical Gradients
Chemtronics Site
Swannanoa, North Carolina

Geosyntec consultants

Kennesaw, GA | February 2016

Figure 11

N:\C\Chemtronics\GIS\MXD\GW Modeling\Report\Figure 11_Simulated_vertical_Gradients.mxd; JGallegos; 2/9/2016



Notes
1. Values posted by monitoring wells are aquifer rebound values (ft) provided by Altamont. Note that rebound values show how much water levels rebounded within approximately 6 hours after extraction wells were shutdown.
2. Observed aquifer rebound contours were provided by Altamont.

Simulated Drawdown and Observed Aquifer Rebound
Chemtronics Site
Swannanoa, North Carolina

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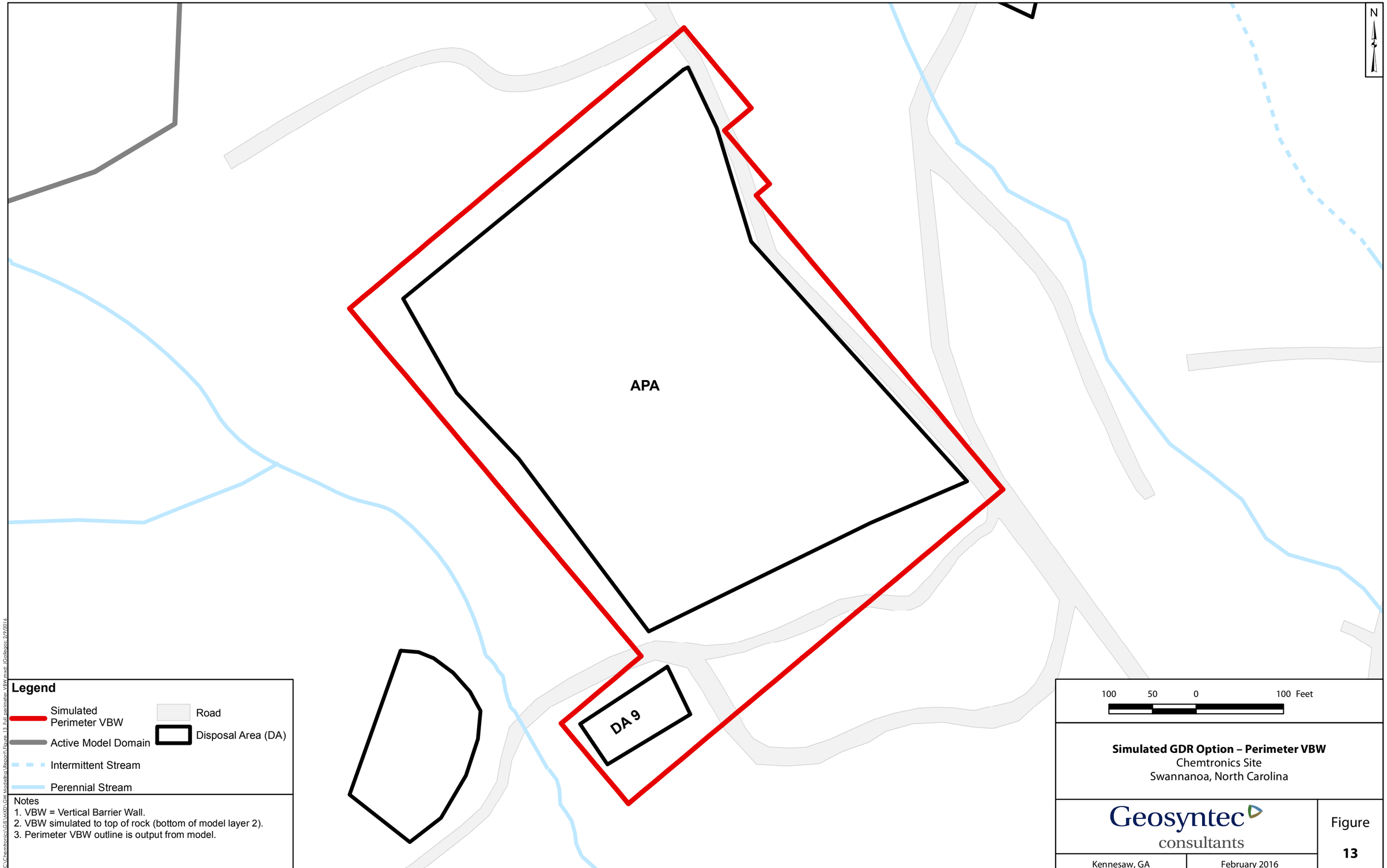
Figure 12

N:\Chemtronics\GIS\MXD\GW Modeling\Reports\Figure 12 Simulated drawdown.mxd; JGalbraith; 2/9/2016



Legend

- Simulated Perimeter VBW
- Active Model Domain
- Intermittent Stream
- Perennial Stream
- Road
- Disposal Area (DA)

Notes
1. VBW = Vertical Barrier Wall.
2. VBW simulated to top of rock (bottom of model layer 2).
3. Perimeter VBW outline is output from model.

Simulated GDR Option – Perimeter VBW
Chemtronics Site
Swannanoa, North Carolina

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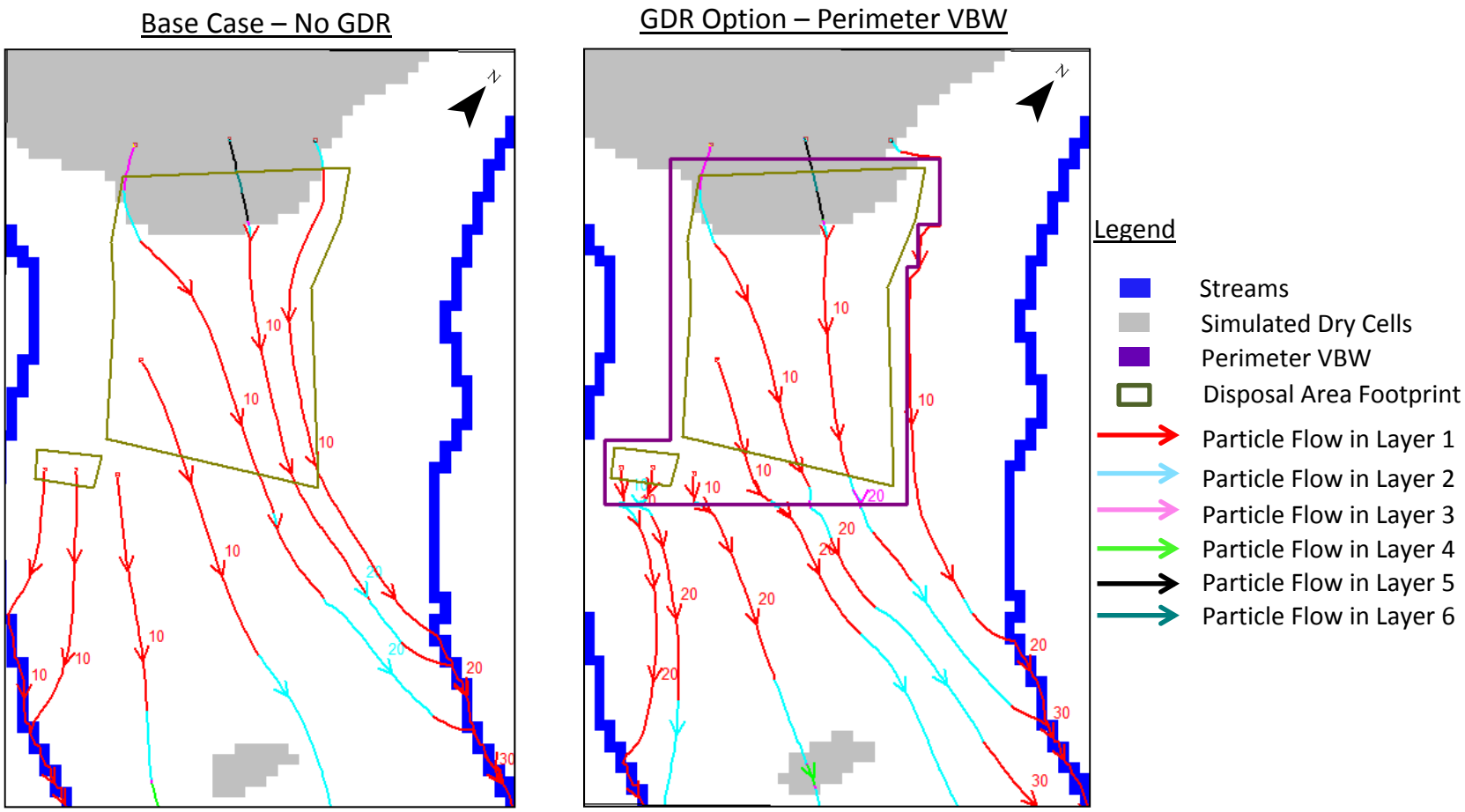
Figure 13

N:\C\Chemtronics\GIS\MXD\GW Modeling\Report\Figure_13_Full perimeter VBW.mxd: JGallegos: 2/9/2016



Notes:

1. Each scenario pane shows results from model layer 1;
2. Each particle flow arrow represents a 5 year span of time for groundwater flow;
3. Posted travel times for groundwater are in units of years;
4. Within the model, both GDR Drain and Streams were simulated used the MODFLOW Drain Package;
5. The VBW was simulated using the MODFLOW Horizontal Flow Barrier Package;
6. Base Case represents simulated flow conditions prior to GDR construction.

Simulated Particle Flow Paths	Geosyntec consultants	Figure 14
Kennesaw, GA	February 2016	

Notes
1. Head differences were calculated by subtracting base case simulated heads from the Perimeter VBW scenario simulated heads.
2. Negative head difference indicates a decrease in head, relative to base case simulated heads.
3. Positive head difference indicates an increase in head, relative to base case simulated heads.

Simulated Head Difference Map
Chemtronics Site
Swannanoa, North Carolina

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Figure 15

N:\C\Chemtronics\GIS\MXD\GW Modeling\Report\Figure_15_PerimeterVBW_Head_Diff.mxd; JGalle;gos; 2/9/2016