

## Appendix 3.5: Permeable Reactive Barriers

- Acapesket Peninsula Groundwater Report Final

# **Falmouth Acapesket Peninsula Groundwater Investigation Report**

Prepared for:

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# Falmouth Acapesket Peninsula Groundwater Investigation Report

## EXECUTIVE SUMMARY

MT Environmental Restoration has completed tasks defined in the August 14, 2014 Field Work Plan for the Falmouth Acapesket Peninsula Groundwater Investigation project. Nitrogen loading from point and non-point sources in the watersheds is impacting Falmouth's south coastal estuaries. The objective of the work was to collect specific initial information to assess groundwater conditions related to nitrate in the vicinity of Lewis Neck (Acapesket peninsula) in East Falmouth. The information gathered during this effort may also inform future efforts to evaluate nitrate treatment systems.

A Permeable Reactive Barrier (PRB) is a type of nitrate treatment system designed to intercept and reduce nitrate concentrations in groundwater. A PRB would be most cost effective where:

1. Geologic and hydrogeologic conditions are well understood such that the required location and dimensions of the barrier can be accurately specified
2. Groundwater chemistry is defined and favorable for efficient implementation of treatment
3. Groundwater transport of nitrogen to the pond is significant (i.e., high concentration and high flow = high mass flux)

Soil borings and monitoring wells were installed at three locations on the western side of the peninsula 3,500 feet south of the mainland (RT 28-East Falmouth Highway) adjacent to the upper reach of Great Pond. One round of groundwater sampling and analysis was completed.

Results of the study indicate:

- The freshwater sand and gravel aquifer is approximately 50 ft thick near the center of the peninsula and underlain by saline groundwater; flow appears to be local and lateral or radial off the peninsula (to the northwest in the immediate study area)
- Groundwater chemistry is generally conducive to operation of a PRB
- Nitrate was the only detectable form of nitrogen
- Limited testing showed nitrate concentrations are relatively low and the horizontal groundwater velocity is slow, on the order of 32 ft per year to 77 ft per year in the study area
- Aquifer materials are outwash sand and gravel to the depth of investigation 85 ft below ground surface (BGS)
- The fresh groundwater is well-oxygenated while the saline groundwater is anoxic

Sufficient data to evaluate mass flux is critical to assess groundwater nitrate remediation options. The limited testing completed during this study provides useful new information but does not

include sufficient data to reach definitive conclusions regarding mass flux. The relatively low concentration of nitrate observed in the few samples collected to date and slow groundwater velocity indicate that mass flux of nitrate from the section of the peninsula investigated out to Great Pond may be low. A location with low mass flux is not ideal for a Permeable Reactive Barrier. Additional information is necessary to evaluate mass flux in the study area.

The slow groundwater velocity observed in the study area results in a long travel-time from the center of the peninsula to the shoreline, likely greater than 10 years. This long travel time may allow for limited natural attenuation of nitrate through denitrification, if there are localized zones of low oxygen concentration, reducing nitrate migration from inland sources on the peninsula to Great Pond. Sources of nitrate along the immediate shoreline, where transport-time to the pond is short with little time for attenuation, may be more significant than inland sources on the outer peninsula.

### 1.0 INTRODUCTION

MT Environmental Restoration has completed tasks defined in the August 14, 2014 Field Work Plan for the Falmouth Acapesket Peninsula Groundwater Investigation project. The project area is illustrated on Figure 1.

Nitrogen loadings from point and non-point sources in the watersheds are impacting Falmouth's south coastal estuaries. The objective of the work was to collect specific initial information to assess groundwater conditions related to nitrate in the vicinity of the Acapesket peninsula in East Falmouth. One approach to nitrate remediation is to design PRBs to stimulate denitrifying bacteria by the placement of organic substrates in the subsurface or by other means. Organic substrates generate high dissolved organic carbon concentrations, resulting in consumption of oxygen and making the use of nitrate for respiration by naturally occurring bacteria energetically favorable. The work included a field investigation to characterize aquifer materials and collect groundwater elevation and chemistry data and inform future efforts to evaluate nitrate treatment systems..

The completed field investigation included:

- Installation of a multi-level monitoring well cluster with individual 2-inch diameter screens and risers near the end of Seaview Drive
- Installation of one 2-inch diameter water table well near the intersection of Seaview Drive and Shorewood Drive
- Installation of one 2-inch diameter water table well near the intersection of Harborview Drive and Shorewood Drive
- Collection of soil cores from selected depths to confirm soil type
- Collection of one soil sample for laboratory analysis to determine soil orthophosphate concentration
- Assessment of groundwater elevations relative to vertical datum NAVD 88 and determination of the local direction of groundwater flow
- Monitoring of field parameters (dissolved oxygen, oxidation reduction potential, specific conductivity and pH) during groundwater sampling

- Collection of groundwater samples for laboratory analyses to assess groundwater chemistry

The study area was located on the west side of the Acapesket Peninsula in the vicinity of Shorewood Drive, south of Shorecrest Drive and north of Harborview Drive. The area borders the upper Great Pond estuary, which, according to the Massachusetts Estuaries Project (MEP), has some of the highest nitrogen levels and lowest environmental health within the Great Pond system (Howes, 2005).

## 2.0 SOIL BORINGS AND MONITORING WELL INSTALLATION

Monitoring well installations were completed in the Town right-of-way near the edge of the paved roadway at three locations including MTER-1 (Seaview Drive), MTER-2 (Shorewood Drive), and MTER-3 (Harborview Drive). Monitoring well locations are shown on Figure 1. The owners of adjacent properties were notified of the proposed well installations in advance. Dig Safe System Inc. and the Town of Falmouth Water Department were also notified in advance for subsurface utility marking.

Soil Borings were completed using a Geoprobe 6600 rig starting on November 4, 2014. The boring method is generally referred to as direct push. As the tools are advanced the particles in the subsurface are rearranged by application of weight and percussion; no soil cuttings are generated in the process. Subsurface stratigraphy was assessed by collecting soil samples in 60-inch Macro-Core (Geoprobe Systems) plastic liners at ten-foot depth intervals from the MTER-1 location (see Figure 1). The samples were collected to a maximum depth of 85 feet below land surface (-58.46 ft elev.) on November 4, 2014. Aquifer materials were predominantly medium sand with a range of fine to coarse sand and some fine gravel. One soil sample (MTER-S1) was collected from the saturated zone at the MTER-1 location, approximately 25 ft below land surface, for laboratory analysis of orthophosphate.



Geoprobe 6600 rig crew installing soil boring



Macro-Core section showing fine to medium sand at the water table (~24 ft below ground surface [BGS] MTER-1D)

Attempts to collect groundwater profile samples at the MTER-1 location on November 4 and November 5, 2014 with a Geoprobe SP22 groundwater sampler were unsuccessful. The Geoprobe SP22 sampler is advanced to the target sample depth at the end of Geoprobe casings with a well screen inside a protective pipe and then retracted several feet to expose the screen for sampling. The screen failed to deploy correctly, possibly due to running sands entering and jamming the sampler. In order to obtain groundwater samples from multiple elevations at the MTER-1 location, three additional deeper monitoring wells were installed on November 14, 2014, completing a four well multi-level well cluster.

The water table monitoring wells MTER-1D, MTER-2, and MTER-3 were installed on November 5, 2014. Soil cores were collected at these locations for assessment of stratigraphy at the targeted shallow well screen elevation. Similar sandy materials were found at all locations. Boring logs with more specific soil descriptions are included in Appendix A. Top of well casing elevations (NAVD88) were surveyed by Town of Falmouth staff. The accuracy was reported to be within 0.01 ft.

The MTER-1 wells were labeled MTER-1A through MTER-1D, with MTER-1A identifying the deepest screen. Monitoring well construction details and screen intervals are shown in Table 1. All well casings were constructed with 2-inch schedule 40 PVC pipe with flush threaded joints and 10 ft schedule 40 PVC 10 slot (.010 inch) screens. Wells were completed at the surface with flush mounted steel covers.

### **3.0 ASSESSMENT OF THE DIRECTION OF GROUNDWATER FLOW**

Water table measurements, well development to clear fine sediment, and groundwater sampling were completed on November 18, 2014. Groundwater elevation data are shown in Table 2. Groundwater elevation measurements from November 18, 2014 were used to assess the direction of groundwater flow by creating a groundwater contour map. The groundwater contour map is shown on Figure 1 and indicates groundwater flow to the northwest. Water elevations were measured again on 12/3/2014 and confirmed the same flow direction. Based on the direction of groundwater flow MTER-2 is the most downgradient well of the set. Groundwater gradients may be influenced by tidal fluctuation in Great Pond.

## 4.0 FIELD AND LABORATORY ANALYSES

The monitoring wells were developed and sampled by pumping with a submersible Whale pump. Groundwater parameters (pH, temperature, dissolved oxygen, oxidation reduction potential, and conductivity) were monitored for stability with an In-Situ Inc. TROLL 9500 water quality meter with a flow-through cell prior to sampling. Groundwater samples were submitted to the TestAmerica Laboratory for specified analyses. A summary of groundwater quality data is presented in Table 2. All quality control criteria were within acceptable limits and laboratory reports with results of analyses can be found in Appendix C.

### 4.1 Soil Analysis

One soil sample was collected from the saturated zone at the MTER-1 location, approximately 25 ft below land surface, for laboratory analysis of orthophosphate, which was detected at a concentration of 1.1 mg/kg. This nutrient is necessary for biological growth and the concentration would be important to consider in designing a PRB.

### 4.2 Groundwater Analyses

#### Field Parameters

Field monitoring of groundwater parameters showed high specific conductivity in water pumped from the deepest screened well MTER-1A, and indicated that the well is screened in saline groundwater. The saline groundwater is anoxic with less than 1 mg/L of dissolved oxygen and a very low oxidation reduction potential. The field data indicated that the shallower wells at this location (MTER-1B, MTER-1C, and MTER-1D) and the water table wells at MTER-2 and MTER-3 were screened in fresh oxygenated water. Relatively low oxidation reduction potential values were recorded at the intermediate depth screens, MTER-1B and MTER-1C. The pH was lower, indicating more acidic conditions, at the water table wells compared to the deeper screened wells.

#### Nitrogen Compounds

Samples from all wells were submitted for analysis of nitrate nitrogen concentrations. Nitrate was detected in the freshwater but not in the saline groundwater. A reference background nitrate concentration, unaffected by wastewater disposal, of 0.46 mg/L was previously reported for Cape Cod by the United States Geological Survey (USGS) (LeBlanc, 1984). Earlier data from Frimpter and Gay, 1979, indicate uncontaminated groundwater may have less than 0.1 mg/L nitrate nitrogen. Nitrate concentration results for the test wells ranged from 0.13 to 1.3 mg/L. The highest concentration of nitrate detected, 1.3 mg/L, was found at the most downgradient well MTER-2. Samples from the water table wells (MTER-1D, MTER-2 and MTER-3) were also submitted for analysis of nitrite nitrogen, ammonia nitrogen, and Total Kjeldahl Nitrogen (TKN = organic nitrogen + ammonia nitrogen). Nitrate was the only form of nitrogen detected.

#### Alkalinity

Samples from the water table wells were submitted for analysis of total and bicarbonate alkalinity. Total alkalinity is a measure of the capacity of water for neutralizing or buffering an acid solution. The alkalinity results showed a range of 3.1 to 9.5 mg/L, indicating the water has

a low buffering capacity. The alkalinity present is limited to bicarbonate alkalinity, associated with the formation of carbonic acid from carbon dioxide and water.

### Major Ions

Samples from all wells were submitted for analysis of the anions chloride and sulfate. High concentrations of chloride (14,800 mg/L) and sulfate (2,000 mg/L) were found in the saline groundwater (MTER-1A) and relatively low concentrations were found in the wells screened in fresh water. Fresh water chloride concentrations ranged from 10.1 to 26.8 mg/L. The fresh water concentration of sulfate ranged from 7.2 to 10.7 mg/L. The USGS reported background concentrations of chloride and sulfate on Cape Cod of 8.1 mg/L and 5.2 mg/L respectively (LeBlanc, 1984).

### Elements

Samples from the water table wells were submitted for analysis of dissolved iron and manganese and for boron. Results showed low concentrations (< 1mg/L) of dissolved iron and manganese for all water table wells, typical of well oxygenated groundwater on Cape Cod. Under anoxic conditions, iron and manganese may be dissolved from aquifer solids into solution at higher concentration. Boron was detected in all three water table wells with a concentration range of 0.0066 mg/L to 0.012 mg/L; the highest concentration was found at the downgradient well MTER-2. Boron is present in household products and wastewater and groundwater concentrations higher than background values may indicate the presence of wastewater (USEPA, 2008). The USGS found boron in a subsurface sewage plume on Cape Cod at 0.4 mg/L and reported background values of about 0.050 mg/L (LeBlanc, 1984).

### Dissolved Organic Carbon

Samples from the water table wells were submitted for analysis of dissolved organic carbon (DOC) and concentrations were found to range from 0.88 to 1.2 mg/L. The USGS reported background concentrations of total organic carbon, which may be higher than dissolved concentrations, in Cape Cod groundwater at 2.1 mg/L (LeBlanc, 1984). DOC concentrations that may be considered background were found to range from 0.1 to 1.9 mg/L in groundwater collected from monitoring wells at a forested location in the Crane Wildlife Management Area in Falmouth (Pabich, 2000).

## 5.0 DISCUSSION

### 5.1 Geology and Hydrogeology of the Study Area

Soil borings showed glacial sand and gravel outwash deposits to the vertical extent of investigation. The outwash is characterized by fine to coarse sand with some gravel and silt.

Groundwater elevation measurements from November 18, 2014 were used to assess the direction of groundwater flow by creating a groundwater contour map. This map indicated that groundwater flow is to the northwest.

The average groundwater velocity in the area can be estimated by a form of Darcy's Law expressed as  $V = Ki/n$ , where:

- V = average groundwater velocity
- K = hydraulic conductivity of aquifer materials
- i = hydraulic gradient
- n = effective porosity of the aquifer materials

The slope of the potentiometric surface (water table) establishes the hydraulic gradient. The groundwater gradient beneath the study area was estimated to be 0.00014 ft/ft based on water table elevations measured at monitoring wells (Table 2). This is a relatively slight gradient. A review of groundwater assessment information from a nearby remediated historical gasoline release site (the 21E site), located 3,600 ft away at the north mainland end of the Acapesket Peninsula near the corner of East Falmouth Highway and Acapesket Road, provided relevant values for hydraulic conductivity. Based on direct measurement and aquifer tests conducted at the 21E site, the hydraulic conductivity can be assumed to range from 250 ft/day to 312 ft/day (ABB, 1994). The USGS has reported a range of effective porosity for sand and gravel of 20 to 40 percent (Leblanc, 1984). Based on hydraulic conductivity of 250 ft/day to 312 ft/day and an effective porosity of 20% to 40%, the groundwater velocity was estimated to range from 0.088 ft/day to 0.21 ft/day or 32 ft/year to 77 ft/yr. The groundwater gradient may vary seasonally or periodically based on changing recharge conditions and may be affected by tidal elevation close to the shoreline.

Based on this calculated groundwater velocity, groundwater travel time from MTER-1, the most upgradient location, to the shoreline of Great Pond is greater than 10 years. This well location is close to the center of the Acapesket peninsula and likely near a point of groundwater divide between flow to the west toward Great Pond and flow to the east toward Green Pond. Vertical groundwater flow down may be significant at this location. The estimated time of travel from monitoring wells MTER-2 and MTER-3 to the shoreline of Great Pond is approximately 5 years. The slight groundwater gradient and resulting slow groundwater velocity is markedly different from the observed gradient and velocity at the 21E site to the north near East Falmouth Highway where groundwater flow was found to be 2.6 ft/day (ABB, 1994). It is also significant to note that the assessment information from the 21E site provides a confirmed flow path for groundwater flowing from north to south just west of the center of the Acapesket peninsula. Data from numerous monitoring wells indicated that groundwater flows south from the source a little over 1,000 ft and then turns more westerly, flowing to the shoreline of Great Pond approximately 1,500 ft south of East Falmouth Highway (ABB, 1994). A map showing the known groundwater flow path from the 21E site and the local groundwater flow direction in the study area is included as Figure 2.

A Conceptual Site Model Cross Section of the peninsula was prepared to help visualize sampling locations and findings and is included in Appendix B (Modified from presentation by CDM Smith). Saline groundwater was encountered below the freshwater lens at the MTER-1 location. The MTER-1A well screen indicated the presence of salt water based on conductivity, chloride, and sulfate concentrations. MTER-1A is screened at elevation -50.46 ft to -60.46 ft. Additional

information on the depth of saline groundwater was obtained by measuring conductivity in deionized water mixed with retained soil samples from various depths. The water mixed with soil core material collected from elevation -43.46 ft to -48.46 ft and deeper exhibited elevated specific conductance, while water mixed with soil cores from -33.46 ft to -38.46 ft and shallower showed low specific conductance (data not shown). A band of reddish orange stained sand with precipitated iron was encountered in a section of soil core from approximately 75 ft below land surface (-48.46 ft elevation). Given the presence of oxic fresh groundwater over anoxic saline groundwater with a very low redox potential, this band of precipitated iron oxides is potentially a visual indicator of the transition zone. High dissolved iron that is likely present (not measured) in the anoxic saline groundwater may be precipitated where it comes in contact with oxic fresh groundwater. Charette and Sholkovitz (2002) reported the presence of similar bands of precipitated iron oxide in soil cores from the intertidal zone of Waquoit Bay in Falmouth. For the location they investigated, Charette and Sholkovitz hypothesized an opposite scenario with the same result, the precipitation of iron from anoxic fresh groundwater carrying dissolved ferrous iron at the groundwater-seawater interface where it contacts oxygenated seawater. Chloride and conductivity data along with the observed iron banding suggest that the fresh/saltwater interface is likely near -48 ft elevation and that the freshwater lens is approximately 50 ft thick at the MTER-1 location near the center of the peninsula.



Soil core from approximately 75 feet below land surface (-48.46 ft elevation) showing precipitated iron

Groundwater flow in the study area appears to be predominantly local with flow from the center of the peninsula generally toward the west. There may be lateral flow off the peninsula or local variation depending on groundwater recharge resulting in mounding with radial flow that accounts for the observed northwest flow direction.

The known flow path for groundwater onto the Acapesket Peninsula west of center from the north, the presence of saline groundwater at an approximate elevation of -48 ft, and the flow direction observed in the study area, indicate that groundwater on the outer portion of the Acapesket Peninsula, more than 1,500 feet south of East Falmouth Highway, is likely present as a result of local recharge. These data also suggest that groundwater flows radially off the peninsula.

## 5.2 Nitrogen Assessment

Nitrate was the only form of nitrogen detected with a maximum concentration of 1.3 mg/L found at the most downgradient well MTER-2. **Data from this study are limited to one round of groundwater sampling from three sampling locations and are unlikely to be fully representative of the concentration in the area and over time.** Nitrate observed in the study area was found to be at a relatively low concentration compared to other nearby sampling locations. Past nitrate monitoring at the 21E site 3,600 ft to the north near East Falmouth Highway showed a highly variable concentration ranging from 1.7 mg/L to 12.5 mg/L nitrate over a period of 5 years. According to the USGS, a multi-level monitoring well recently installed on the east side of the Acapesket Peninsula near Green Pond was found to have a maximum nitrate concentration of 9.8 mg/L (Denis LeBlanc, USGS personal communication).

Considering that the monitoring wells were only sampled one time at three locations, some potential reasons for the relatively low observed nitrate concentrations include:

- The limited potential for encountering septic plumes with such a small number of monitoring wells
- The density of housing in the study area limits the number of septic systems and lawns forming septic plumes and contributing nitrate to groundwater
- Seasonality and intensity of use may result in significant temporal fluctuations in concentration
- Two of the three well locations had only one ten ft screen at the water table; septic plumes from farther upgradient may be present at greater depth

Calculating the mass flux of nitrate is a useful way to evaluate the findings and is a common assessment when planning groundwater remediation. The mass flux of a contaminant in groundwater is the mass that passes through a predefined cross sectional area over a period of time expressed as mass/time/area (e.g., kg/yr/m<sup>2</sup>). The mass flux calculation is sensitive to both nitrate concentration and groundwater velocity (ITRC, 2010). As an example, the observed nitrate maximum concentration of 1.3 mg/L can be used to estimate mass flux across a defined transect representing the Acapesket watershed flow to the upper reach of Great Pond. The flux was estimated considering the specific discharge, also known as the Darcy Velocity of groundwater and a representational cross sectional area of the aquifer 5,000 feet long by 50 feet deep. The estimated mass flux through this cross sectional area is approximately 140 kg/yr (0.00056 kg/yr/m<sup>2</sup>). Data from this study are limited to one round of groundwater sampling from three sampling locations and are unlikely to be fully representative of nitrate concentration and mass flux. Based on sampling locations, this mass flux estimate would not take into account nitrate from septic systems west of Shorewood Drive along the shoreline downgradient of the groundwater sampling locations.

## 5.3 Groundwater Chemistry

The groundwater chemistry data collected are useful for considering the fate and transport of nitrogen and ultimately designing a groundwater nitrate treatment system. Denitrification can be mediated by heterotrophic bacteria in the aquifer that consume dissolved organic carbon and use nitrate as an electron acceptor, resulting in the conversion of nitrate to inert nitrogen gas. The

presence of dissolved oxygen is known to inhibit denitrification. Laboratory results showing relatively low concentrations of dissolved iron and manganese in samples from the water table wells supported direct field measurements that showed the fresh water is generally well oxygenated. Dissolved iron and manganese analyses were limited to samples collected from the water table wells. The redox potential (ORP) measured in shallow groundwater was in the positive range, where use of oxygen as an electron acceptor is energetically favorable. The oxygen levels observed at the deeper freshwater well screens MTER-1B and MTER-1C were also near saturation, however the ORP measured in groundwater at these screens was lower with negative values -132 mV and -121 mV respectively. Lower redox potentials may indicate reducing conditions where denitrifying bacteria may be active (Rivetta, 2008). While bulk measurements of dissolved oxygen and dissolved iron and manganese in groundwater generally indicate aerobic conditions, there may be localized micro-environments on the pore-scale where oxygen is limited and denitrification is energetically favorable (Rivetta, 2008; Pabich, 2000; Weiskel and Howes, 1992).

Several lines of evidence exist for denitrification in groundwater including observations of decreasing concentrations of nitrate and DOC along groundwater gradients, mass balance calculations showing loss of nitrogen in studied aquifers, and direct measurement of denitrification (Valiela, 1997). Denitrification was observed in groundwater during an investigation of septic system effluent plumes on Cape Cod using stable isotopes (denitrifying organisms preferentially use the lighter isotope  $^{14}\text{N}$ , resulting in enrichment of the heavier isotope  $^{15}\text{N}$ ). Higher rates of denitrification were observed where both nitrate and dissolved organic carbon concentrations were higher (Pabich, 2000). Dissolved organic carbon was found at a maximum concentration of 1.2 mg/L at the downgradient well MTER-2. This concentration is near what may be considered a background concentration, but it was found with the highest concentration of nitrate and boron and taken together, these results may indicate the presence of dilute wastewater.

Saline groundwater was encountered at depth, roughly 50 ft below the water table at the MTER-1 location near the center of the peninsula as indicated by high specific conductance and chloride and sulfate concentrations. The saline groundwater was also found to be anoxic with a very low ORP and nitrate was not detected. Analyses for other forms of nitrogen were not completed on saline groundwater samples.

The observed low fresh groundwater alkalinity indicates that the water has a low buffering capacity and may be subject to acidification by some potential nitrate groundwater treatment systems. The low concentration of sulfate observed in fresh groundwater monitoring wells is beneficial to certain nitrate treatment systems. Sulfate in high concentration would be a significant competing electron acceptor in biological systems, exerting a demand for substrate added to groundwater to stimulate use of nitrate as an electron acceptor in bacterial respiration.

Boron was detected in all three water table wells with a concentration range of 0.0066 mg/L to 0.012 mg/L; the highest concentration was found at the downgradient well MTER-2. Like dissolved organic carbon discussed above, the concentration in the downgradient well was near what may be considered a background concentration, but the highest concentration was found in

the same monitoring well that also had the highest concentration of nitrate and boron may indicate the presence of dilute wastewater.

## 6.0 CONCLUSIONS

The objective of the work was to collect specific initial information to assess groundwater conditions related to nitrate in the vicinity of the Acapesket peninsula in East Falmouth. The information gathered during this effort may also inform future efforts to evaluate nitrate treatment systems.

Results of the study indicate:

- The freshwater sand and gravel aquifer is approximately 50 ft thick near the center of the peninsula and underlain by saline groundwater; flow appears to be local and radial off the peninsula (to the northwest in the immediate study area)
- Groundwater chemistry is generally conducive to operation of a PRB
- Nitrate was the only detectable form of nitrogen
- Limited testing showed nitrate concentrations are relatively low and the horizontal groundwater velocity was relatively slow and estimated to range from 0.088 ft/day to 0.21 ft/day or 32 ft/year to 77 ft/yr in the study area
- Aquifer materials are outwash sand and gravel to the depth of investigation 85 ft BGS
- The fresh groundwater is well-oxygenated while the saline groundwater is anoxic

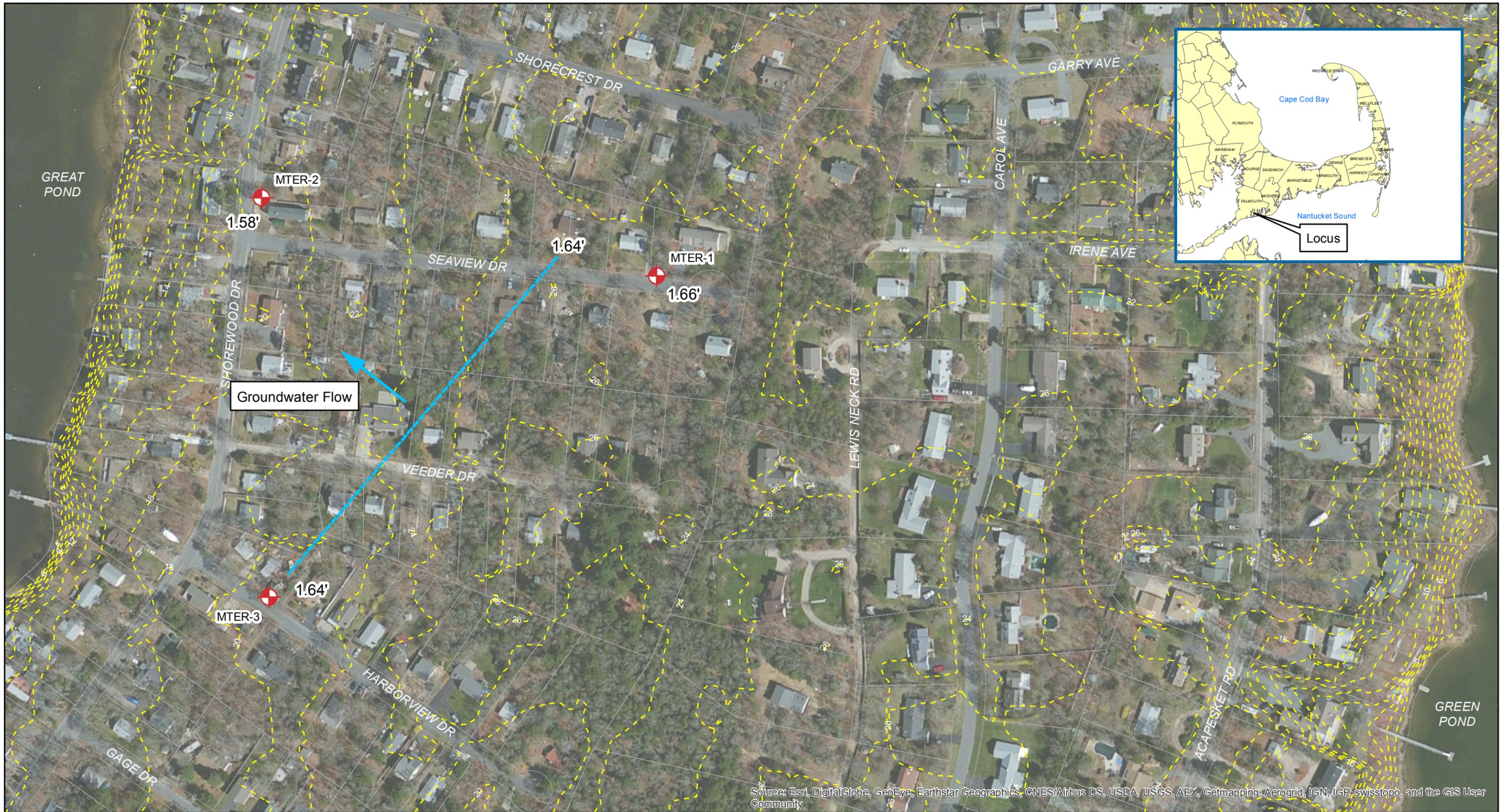
Sufficient data to evaluate mass flux is critical to assess groundwater nitrate remediation options. Data from this study are limited to one round of groundwater sampling from a limited number of sampling locations and are unlikely to be fully representative of the concentration in the area and over time. However, the relatively low concentration of nitrate observed in the samples collected to date and slow groundwater velocity indicate a potentially low mass flux of nitrate from the section of the peninsula investigated out to Great Pond. A location with low mass flux is not ideal for a Permeable Reactive Barrier. **Additional investigation of this study area is necessary to determine if the flux rate could be significantly higher.**

**Based upon the results and discussions raised through this study, the Town is also interested in evaluating hydrogeologic conditions north of this area on the peninsula where models and previous field work have indicated steeper gradients and higher groundwater velocities in the vicinity of public lands for potential future use.**

The slow groundwater velocity estimated through the data from this limited study indicate travel-time from the center of the peninsula to the shoreline is likely greater than 10 years. This long travel time may allow for limited natural attenuation of nitrate through denitrification if micro-environments with low oxygen levels are present, reducing nitrate migration from inland sources on the peninsula to Great Pond. **Sources of nitrate along the immediate shoreline, where transport-time to the pond is short with little time for attenuation, may be more significant than inland sources on the outer peninsula.**

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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



Map Projection: Lambert Conformal Conic  
Horizontal Datum: North American 1983  
Grid: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet



LEGEND

- Monitoring Well Location
- Groundwater Contour
- Topography
- Falmouth Parcels
- 1.64'** Groundwater Elevation (Typ)



Town of Falmouth, Massachusetts  
Acapesket Groundwater Investigation

Job Number 86-18162  
Revision A  
Date 12 Jan 2015

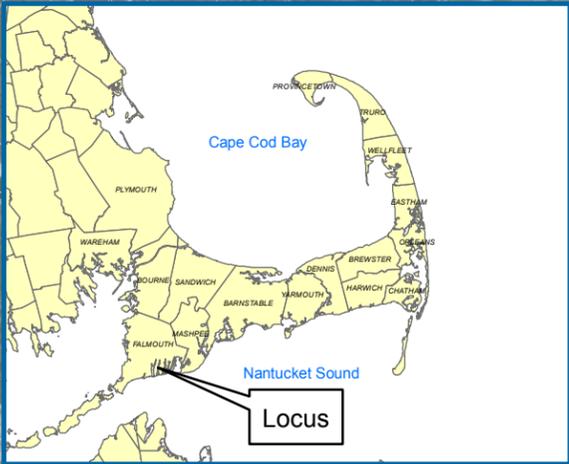
**LOCATION MAP &  
GROUNDWATER CONTOURS**

**Figure 1**



Known Groundwater Flow Path From 21E Site Investigation

Groundwater Flow Path Observed 2014 Acapesket Investigation Area

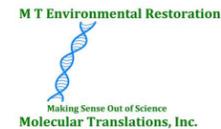


Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



LEGEND

- Monitoring Well Location
  - Groundwater Contour
  - Falmouth Parcels
- 1.64' Groundwater Elevation (Typ)



Town of Falmouth, Massachusetts  
Acapesket Groundwater Investigation

Job Number 86-18162  
Revision A  
Date 30 Jan 2015

GROUNDWATER FLOW PATHS

Figure 2

N:\USI\Hyannis\Projects\8618182\GIS\Maps\MXD\_Deliverables\8618162\F02.mxd  
© 2012. Whilst every care has been taken to prepare this map, GHD (and DATA CUSTODIAN) make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.  
Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by: jobrien

**Falmouth Acapesket Groundwater Investigation**  
**Table 1 Monitoring Well Construction Details**

Location	Northing Coordinate (ft)	Easting Coordinate (ft)	Surface Elevation (ft)	TOC Elevation (ft)	Total Well Depth (ft bgs)	Screen Beginning Depth (ft bgs)	Screen End Depth (ft bgs)	Top Screen Elevation (ft)	Bottom Screen Elevation (ft)	Screen Length (ft)	Inst. Date	Address
MTER-1A	2669273.219	910026.638	26.54	NM	87.00	77.00	87.00	-50.46	-60.46	10	11/14/2014	36 Seaview
MTER-1B	2669273.219	910026.638	26.54	NM	62.00	52.00	62.00	-25.46	-35.46	10	11/14/2014	36 Seaview
MTER-1C	2669273.219	910026.638	26.54	NM	47.00	37.00	47.00	-10.46	-20.46	10	11/14/2014	36 Seaview
MTER-1D	2669273.219	910026.638	26.54	26.14	32.00	22.00	32.00	4.54	-5.46	10	11/5/2014	36 Seaview
MTER-2	2669400.233	909385.891	19.96	19.58	26.00	16.00	26.00	3.96	-6.04	10	11/5/2014	174 Shorewood
MTER-3	2668753.872	909397.569	20.96	20.55	27.00	17.00	27.00	3.96	-6.04	10	11/5/2014	4 Harborview

Notes:

bgs - below ground surface

Elevation Datum - North American Vertical Datum of 1988 (NAVD 88),

NM - Not Measured

All wells constructed with 2-inch Schedule 40 PVC threaded flush joint casings, 10 ft screens with Schedule 40 PVC .010" 10 slot well screen

## Falmouth Acapesket Groundwater Investigation

### Table 2 Groundwater Elevation and Analytical Data Summary

Sample ID/Location	Deep Screen Wells			Water Table Wells		
	MTER-1A	MTER-1B	MTER-1C	MTER-1D	MTER-2	MTER-3
Well Screen Elevation (ft)	-50.46 to -60.46	-25.46 to -35.46	-10.46 to -20.46	4.54 to -5.46	3.96 to -6.04	3.96 to -6.04
Sampling Date	11/18/2014	11/18/2014	11/18/2014	11/18/2014	11/18/2014	11/18/2014
TestAmerica Lab ID #	480-71627-1	480-71627-2	480-71627-3	480-71627-4	480-71627-5	480-71627-6
<b>FIELD MEASUREMENTS</b>						
Top of Casing Elevation (ft)	NM	NM	NM	26.14	19.58	20.55
Depth to Water (ft-btoc) Pre-purge	24.66	24.59	24.65	24.48	18.00	18.91
Groundwater Elevation (ft)	NM	NM	NM	1.66	1.58	1.64
<b>FIELD PARAMETERS</b>						
pH (SU)	<b>6.3</b>	<b>6.6</b>	<b>6.1</b>	<b>5.7</b>	<b>5.1</b>	<b>5.9</b>
Temperature (°C)	<b>11.3</b>	<b>11.4</b>	<b>11.6</b>	<b>12.5</b>	<b>12.6</b>	<b>13.3</b>
Dissolved Oxygen (DO; mg/L)	<b>0.6</b>	<b>9.1</b>	<b>8.1</b>	<b>10.7</b>	<b>7.4</b>	<b>10.9</b>
Redox Potential (ORP; mV)	<b>-501</b>	<b>-132</b>	<b>-121</b>	<b>43</b>	<b>162</b>	<b>158</b>
Conductivity (mS/cm)	<b>36,990</b>	<b>84</b>	<b>158</b>	<b>79</b>	<b>111</b>	<b>108</b>
<b>NITROGEN</b>						
Nitrate as N (mg/L)	0.05	U	<b>0.15</b>	<b>0.13</b>	<b>0.13</b>	<b>1.3</b>
Nitrite as N (mg/L)	NS	NS	NS	0.05	U	0.05
Ammonia (mg/L)	NS	NS	NS	0.02	U	0.02
Total Kjeldahl Nitrogen (mg/L)	NS	NS	NS	0.2	U	0.2
<b>ALKALINITY</b>						
Total Alkalinity (mg/L)	NS	NS	NS	<b>8.4</b>	<b>3.1</b>	<b>9.5</b>
Bicarbonate Alkalinity (mg/L)	NS	NS	NS	<b>8.4</b>	<b>3.1</b>	<b>9.5</b>
<b>ANIONS</b>						
Chloride (mg/L)	<b>14,800.0</b>	<b>11.6</b>	<b>26.8</b>	<b>10.1</b>	<b>14.9</b>	<b>13.3</b>
Sulfate (mg/L)	<b>2,000.0</b>	<b>7.2</b>	<b>10.7</b>	<b>7.2</b>	<b>8.4</b>	<b>8.0</b>
<b>Elements</b>						
Dissolved Iron (mg/L)	NS	NS	NS	<b>0.20</b>	J	<b>0.098</b>
Dissolved Manganese (mg/L)	NS	NS	NS	<b>0.50</b>		<b>0.32</b>
Boron (mg/L)	NS	NS	NS	<b>0.0066</b>	J	<b>0.012</b>
<b>DISSOLVED ORGANIC CARBON (DOC)</b>						
DOC (mg/L)	NS	NS	NS	<b>0.88</b>	J	<b>1.2</b>

**Notes:**

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria.

The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

NS - Not Sampled / NM-Not Measured

Values in **bold** were detected above the Minimum Detection Limit

ft-btoc = feet below top of well casing

Elevation Datum - North American Vertical Datum of 1988 (NAVD 88),

# Appendix A

## Soil Boring Logs

# MONITORING WELL BORING LOG

Boring No. SB / MTER-1A

<b>MT Environmental Restoration</b>		<b>Date:</b> 11/14/2014
<b>Project:</b> Falmouth Acapesket Investigation		<b>Completion Depth:</b> 87'
<b>Boring Contractor:</b> New England Geotech		<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing		<b>Inspector:</b> JFB
Page 1 of 2		

Proportions Used:				Abbreviations:					
		<u>Color</u>		<u>Angular</u>		<u>Misc.</u>		<u>Size</u>	
trace (tr)	0 - 10%	Blue (Bl)	Green (Gr)	Round (rnd.)		Fragments (frag.)		Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Gray (Gy)	Angular (ang.)		Cement (cem.)		Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Brown (Br)			Well-Graded Sand (SW)		Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Orange (Or)			Poorly-Graded Sand (SP)		Dark = (dk)	
		Rust (Ru)	Black (Blk)			Well-Graded Gravel (GW)			
						Poorly-Graded Gravel (GP)			
						Below Land Surface (BLS)			
						Not Available (N/A)			

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement	█	0
5							Native Soil	█	5
10								█	10
15								█	15
20	sand f to m some gravel, trace f gravel	5'	48"	ang	tan	N/A	Bentonite Seal	█	20
25								█	25
30	sand f to c	5'	29"	ang	tan	N/A		█	30
35								█	35
40	sand m to c	5'	27"	ang	tan	N/A		█	40
45								█	45
50	course sand	5'	50"	ang	tan	N/A		█	50



# MONITORING WELL BORING LOG

Boring No. SB / MTER-1B

<b>MT Environmental Restoration</b>	<b>Date:</b> 11/14/2014
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 62'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 1

Proportions Used:	Color	Angular	Misc.	Size
trace (tr) 0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f) Fine to Coarse = (f-c)
little (li) 10 - 20%	Red (R) Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m) Very = (v)
some (so) 20 - 35%	Light (lt) Brown (Br)		Well-Graded Sand (SW)	Coarse = (c) More/Less = (+/-)
and 35 - 50%	Dark (dk) Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)
	Rust (Ru) Black (Blk)		Well-Graded Gravel (GW)	
			Poorly-Graded Gravel (GP)	
			Below Land Surface (BLS)	
			Not Available (N/A)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement →	█	0
5							Native Soil →	█	5
10								█	10
15								█	15
20	sand f to m some gravel, trace f gravel	5'	48"	ang	tan	N/A	Bentonite Seal →	█	20
25								█	25
30	sand f to c	5'	29"	ang	tan	N/A		█	30
35								█	35
40	sand m to c	5'	27"	ang	tan	N/A		█	40
45								█	45
50	course sand	5'	50"	ang	tan	N/A		█	50
55							.010 Slot PVC Screen →	█	55
60	sand f to c little f gravel	5'	30"	ang	tan	N/A		█	60

# MONITORING WELL BORING LOG

Boring No. SB / MTER-1C

<b>MT Environmental Restoration</b>	<b>Date:</b> 11/14/2014
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 47'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 1

Proportions Used:	Abbreviations:			
	Color	Angular	Misc.	Size
trace (tr) 0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f) Fine to Coarse = (f-c)
little (li) 10 - 20%	Red (R) Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m) Very = (v)
some (so) 20 - 35%	Light (lt) Brown (Br)		Well-Graded Sand (SW)	Coarse = (c) More/Less = (+/-)
and 35 - 50%	Dark (dk) Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)
	Rust (Ru) Black (Blk)		Well-Graded Gravel (GW)	
			Poorly-Graded Gravel (GP)	
			Below Land Surface (BLS)	
			Not Available (N/A)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement →	█	0
5							Native Soil →	█	5
10								█	10
15								█	15
20	sand f to m some gravel, trace f gravel	5'	48"	ang	tan	N/A	Bentonite Seal →	█	20
25								█	25
30	sand f to c	5'	29"	ang	tan	N/A		█	30
35								█	35
40	sand m to c	5'	27"	ang	tan	N/A	.010 Slot PVC Screen →	█	40
45								█	45

# MONITORING WELL BORING LOG

Boring No. SB / MTER-1D

<b>MT Environmental Restoration</b>	<b>Date:</b> 11/5/2014
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 32'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b> 26.14
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	<b>Page 1 of 1</b>

Proportions Used:	Abbreviations:																																
	<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%;"><u>Color</u></th> <th style="width: 25%;"><u>Angular</u></th> <th style="width: 25%;"><u>Misc.</u></th> <th style="width: 25%;"><u>Size</u></th> </tr> </table>	<u>Color</u>	<u>Angular</u>	<u>Misc.</u>	<u>Size</u>																												
<u>Color</u>	<u>Angular</u>	<u>Misc.</u>	<u>Size</u>																														
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">trace (tr)      0 - 10%</td> <td style="width: 25%;">Blue (Bl)    Green (Gr)</td> <td style="width: 25%;">Round (rnd.)</td> <td style="width: 25%;">Fragments (frag.)</td> </tr> <tr> <td>little (li)     10 - 20%</td> <td>Red (R)     Gray (Gy)</td> <td>Angular (ang.)</td> <td>Cement (cem.)</td> </tr> <tr> <td>some (so)     20 - 35%</td> <td>Light (lt)   Brown (Br)</td> <td></td> <td>Well-Graded Sand (SW)</td> </tr> <tr> <td>and             35 - 50%</td> <td>Dark (dk)   Orange (Or)</td> <td></td> <td>Poorly-Graded Sand (SP)</td> </tr> <tr> <td></td> <td>Rust (Ru)   Black (Blk)</td> <td></td> <td>Well-Graded Gravel (GW)</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Poorly-Graded Gravel (GP)</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Below Land Surface (BLS)</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Not Available (N/A)</td> </tr> </table>	trace (tr)      0 - 10%	Blue (Bl)    Green (Gr)	Round (rnd.)	Fragments (frag.)	little (li)     10 - 20%	Red (R)     Gray (Gy)	Angular (ang.)	Cement (cem.)	some (so)     20 - 35%	Light (lt)   Brown (Br)		Well-Graded Sand (SW)	and             35 - 50%	Dark (dk)   Orange (Or)		Poorly-Graded Sand (SP)		Rust (Ru)   Black (Blk)		Well-Graded Gravel (GW)				Poorly-Graded Gravel (GP)				Below Land Surface (BLS)				Not Available (N/A)	
trace (tr)      0 - 10%	Blue (Bl)    Green (Gr)	Round (rnd.)	Fragments (frag.)																														
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	Rust (Ru)   Black (Blk)		Well-Graded Gravel (GW)																														
			Poorly-Graded Gravel (GP)																														
			Below Land Surface (BLS)																														
			Not Available (N/A)																														

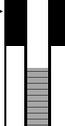
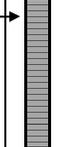
Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement	0	0
5							Native Soil	5	5
10								10	10
15								15	15
20	sand f to m some gravel, trace f gravel	5'	48"	ang	tan	N/A	Bentonite Seal	20	20
25							Groundwater - 24.48' BTOC	25	25
30	sand f to c	5'	29"	ang	tan	N/A	.010 Slot PVC Screen	30	30

# MONITORING WELL BORING LOG

Boring No. SB / MTER-2

<b>MT Environmental Restoration</b>		<b>Date:</b> 11/5/2014	
<b>Project:</b> Falmouth Acapesket Investigation		<b>Completion Depth:</b> 26'	
<b>Boring Contractor:</b> New England Geotech		<b>Elevation:</b> 19.58	
<b>Boring Equipment:</b> Direct Push, 2" casing		<b>Inspector:</b> JFB	
Page 1 of 1			

Proportions Used:		Abbreviations:					
		<u>Color</u>		<u>Angular</u>	<u>Misc.</u>	<u>Size</u>	
trace (tr)	0 - 10%	Blue (Bl)	Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Brown (Br)		Well-Graded Sand (SW)	Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)	
		Rust (Ru)	Black (Blk)		Well-Graded Gravel (GW)		
					Poorly-Graded Gravel (GP)		
					Below Land Surface (BLS)		
					Not Available (N/A)		

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement		0
5							Native Soil		5
10							Bentonite Seal		10
15							Groundwater - 18' BTOC		15
20	sand m to c	5'	48"	ang	tan	N/A	.010 Slot PVC Screen		20
25									25

# MONITORING WELL BORING LOG

Boring No. SB / MTER-3

<b>MT Environmental Restoration</b>	<b>Date:</b> 11/5/2014
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 27'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b> 20.55
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 2

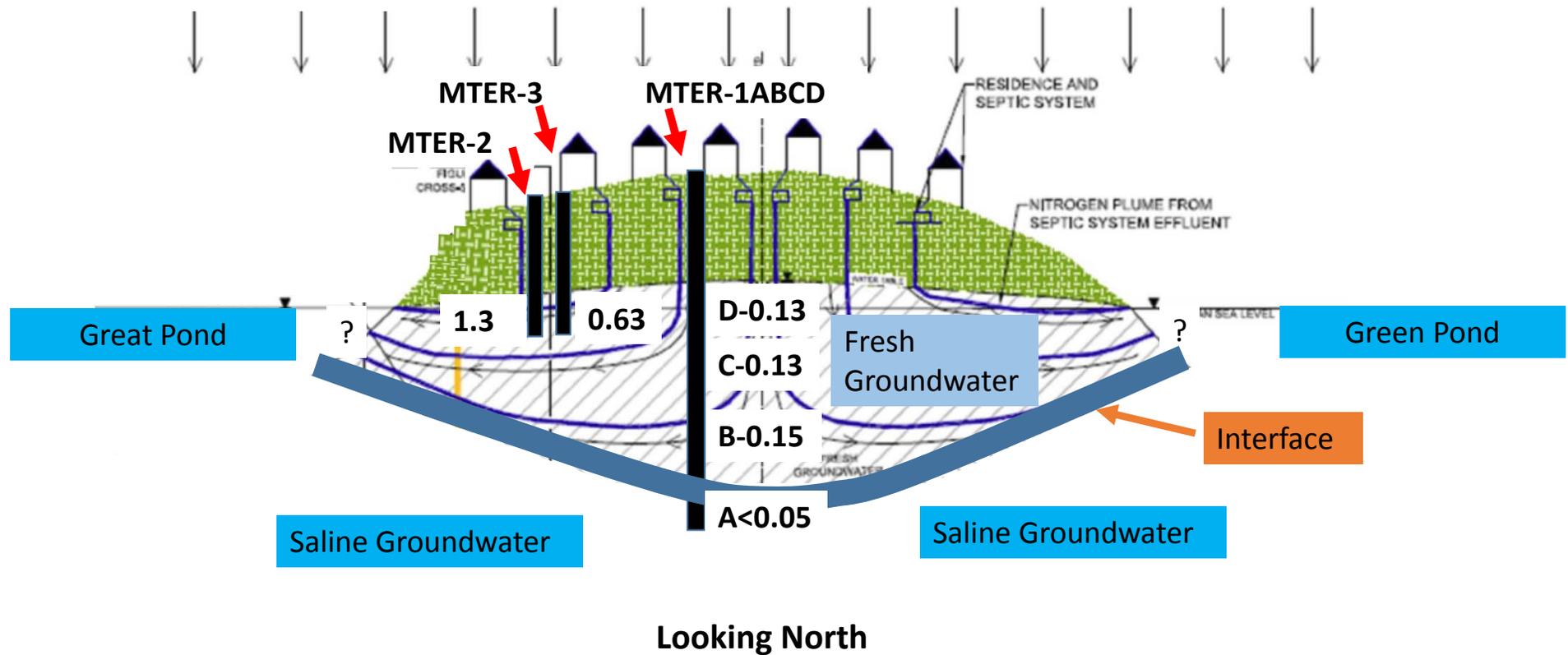
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<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">trace (tr)</td> <td style="width: 15%;">0 - 10%</td> <td style="width: 15%;">Blue (Bl) Green (Gr)</td> <td style="width: 15%;">Round (rnd.)</td> <td style="width: 35%;">Fragments (frag.)</td> <td style="width: 35%;">Fine = (f) Fine to Coarse = (f-c)</td> </tr> <tr> <td>little (li)</td> <td>10 - 20%</td> <td>Red (R) Gray (Gy)</td> <td>Angular (ang.)</td> <td>Cement (cem.)</td> <td>Medium = (m) Very = (v)</td> </tr> <tr> <td>some (so)</td> <td>20 - 35%</td> <td>Light (lt) Brown (Br)</td> <td></td> <td>Well-Graded Sand (SW)</td> <td>Coarse = (c) More/Less = (+/-)</td> </tr> <tr> <td>and</td> <td>35 - 50%</td> <td>Dark (dk) Orange (Or)</td> <td></td> <td>Poorly-Graded Sand (SP)</td> <td>Dark = (dk)</td> </tr> <tr> <td></td> <td></td> <td>Rust (Ru) Black (Blk)</td> <td></td> <td>Well-Graded Gravel (GW)</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>Poorly-Graded Gravel (GP)</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>Below Land Surface (BLS)</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>Not Available (N/A)</td> <td></td> </tr> </table>	trace (tr)	0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f) Fine to Coarse = (f-c)	little (li)	10 - 20%	Red (R) Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m) Very = (v)	some (so)	20 - 35%	Light (lt) Brown (Br)		Well-Graded Sand (SW)	Coarse = (c) More/Less = (+/-)	and	35 - 50%	Dark (dk) Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)			Rust (Ru) Black (Blk)		Well-Graded Gravel (GW)						Poorly-Graded Gravel (GP)						Below Land Surface (BLS)						Not Available (N/A)		
trace (tr)	0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f) Fine to Coarse = (f-c)																																												
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Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement	0	0
5							Native Soil	5	5
10								10	10
15							Bentonite Seal	15	15
20	sand m to c some f gravel	5'	48"	ang	tan	N/A	Groundwater -18.91' BTOC	20	20
25							.010 Slot PVC Screen	25	25

## Appendix B

### Conceptual Site Model Cross Section

# Groundwater Nitrate Concentrations at Well Screens (mg/L)



## Conceptual Site Model

Modified from CDM Smith

# Appendix C

## Laboratory Reports

# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Buffalo

10 Hazelwood Drive

Amherst, NY 14228-2298

Tel: (716)691-2600

TestAmerica Job ID: 480-71627-1

Client Project/Site: General Chemistry Pricing

For:

MT Environmental Restoration

24 Bay View Avenue

Plymouth, Massachusetts 02360

Attn: Mr. Jim Begley



Authorized for release by:

12/17/2014 5:35:37 PM

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*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Definitions/Glossary

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

## Qualifiers

### Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

### General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

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**Job ID: 480-71627-1**

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**Laboratory: TestAmerica Buffalo**

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**Narrative**

**Job Narrative**  
**480-71627-1**

**Comments**

No additional comments.

**Receipt**

The samples were received on 11/19/2014 10:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.0° C.

Except:

Sample coc requested DOC. However, lab was not provided volume for this method. Volume was poured off and filtered in the lab.

**HPLC/IC**

Method(s) 9056A: The following sample(s) was diluted to bring the concentration of target analytes within the calibration range: MTER-1A-1 (480-71627-1). Elevated reporting limits (RLs) are provided.

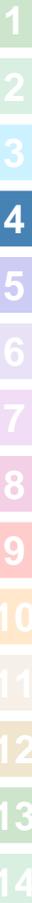
No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**Metals**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

**General Chemistry**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.



# Detection Summary

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

## Client Sample ID: MTER-1A-1

Lab Sample ID: 480-71627-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	14800		100	56.4	mg/L	200		9056A	Total/NA
Sulfate	2000		200	34.9	mg/L	100		9056A	Total/NA

## Client Sample ID: MTER-1B-1

Lab Sample ID: 480-71627-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Nitrate as N	0.15		0.050	0.020	mg/L	1		353.2	Total/NA
Chloride	11.6		0.50	0.28	mg/L	1		9056A	Total/NA
Sulfate	7.2		2.0	0.35	mg/L	1		9056A	Total/NA

## Client Sample ID: MTER-1C-1

Lab Sample ID: 480-71627-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Nitrate as N	0.13		0.050	0.020	mg/L	1		353.2	Total/NA
Chloride	26.8		0.50	0.28	mg/L	1		9056A	Total/NA
Sulfate	10.7		2.0	0.35	mg/L	1		9056A	Total/NA

## Client Sample ID: MTER-1D-1

Lab Sample ID: 480-71627-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.0066	J	0.020	0.0040	mg/L	1		6010C	Total/NA
Iron	0.020	J	0.050	0.019	mg/L	1		6010C	Dissolved
Manganese	0.50		0.0030	0.00040	mg/L	1		6010C	Dissolved
Nitrate as N	0.13		0.050	0.020	mg/L	1		353.2	Total/NA
Chloride	10.1		0.50	0.28	mg/L	1		9056A	Total/NA
Sulfate	7.2		2.0	0.35	mg/L	1		9056A	Total/NA
Alkalinity, Total	8.4		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	8.4		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Dissolved Organic Carbon	0.88	J	1.0	0.43	mg/L	1		SM5310_D	Dissolved

## Client Sample ID: MTER-2-1

Lab Sample ID: 480-71627-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.012	J	0.020	0.0040	mg/L	1		6010C	Total/NA
Iron	0.098		0.050	0.019	mg/L	1		6010C	Dissolved
Manganese	0.32		0.0030	0.00040	mg/L	1		6010C	Dissolved
Nitrate as N	1.3		0.050	0.020	mg/L	1		353.2	Total/NA
Chloride	14.9		0.50	0.28	mg/L	1		9056A	Total/NA
Sulfate	8.4		2.0	0.35	mg/L	1		9056A	Total/NA
Alkalinity, Total	3.1	J	5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	3.1	J	5.0	0.79	mg/L	1		SM 2320B	Total/NA
Dissolved Organic Carbon	1.2		1.0	0.43	mg/L	1		SM5310_D	Dissolved

## Client Sample ID: MTER-3-1

Lab Sample ID: 480-71627-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.0085	J	0.020	0.0040	mg/L	1		6010C	Total/NA
Iron	0.064		0.050	0.019	mg/L	1		6010C	Dissolved
Manganese	0.24		0.0030	0.00040	mg/L	1		6010C	Dissolved
Nitrate as N	0.63		0.050	0.020	mg/L	1		353.2	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Buffalo

# Detection Summary

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

**Client Sample ID: MTER-3-1 (Continued)**

**Lab Sample ID: 480-71627-6**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	13.3		0.50	0.28	mg/L	1		9056A	Total/NA
Sulfate	8.0		2.0	0.35	mg/L	1		9056A	Total/NA
Alkalinity, Total	9.5		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Alkalinity, Bicarbonate	9.5		5.0	0.79	mg/L	1		SM 2320B	Total/NA
Dissolved Organic Carbon	1.2		1.0	0.43	mg/L	1		SM5310_D	Dissolved

This Detection Summary does not include radiochemical test results.

TestAmerica Buffalo

# Client Sample Results

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

**Client Sample ID: MTER-1A-1**

**Lab Sample ID: 480-71627-1**

Date Collected: 11/18/14 09:30

Matrix: Water

Date Received: 11/19/14 10:00

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	ND		0.050	0.020	mg/L			11/19/14 20:16	1
Chloride	14800		100	56.4	mg/L			12/01/14 11:15	200
Sulfate	2000		200	34.9	mg/L			11/28/14 20:43	100

**Client Sample ID: MTER-1B-1**

**Lab Sample ID: 480-71627-2**

Date Collected: 11/18/14 10:00

Matrix: Water

Date Received: 11/19/14 10:00

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.15		0.050	0.020	mg/L			11/19/14 22:08	1
Chloride	11.6		0.50	0.28	mg/L			11/28/14 20:53	1
Sulfate	7.2		2.0	0.35	mg/L			11/28/14 20:53	1

**Client Sample ID: MTER-1C-1**

**Lab Sample ID: 480-71627-3**

Date Collected: 11/18/14 10:30

Matrix: Water

Date Received: 11/19/14 10:00

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.13		0.050	0.020	mg/L			11/19/14 22:09	1
Chloride	26.8		0.50	0.28	mg/L			11/28/14 21:03	1
Sulfate	10.7		2.0	0.35	mg/L			11/28/14 21:03	1

**Client Sample ID: MTER-1D-1**

**Lab Sample ID: 480-71627-4**

Date Collected: 11/18/14 10:55

Matrix: Water

Date Received: 11/19/14 10:00

**Method: 6010C - Metals (ICP)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.0066	J	0.020	0.0040	mg/L		11/20/14 10:40	11/22/14 14:36	1

**Method: 6010C - Metals (ICP) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.020	J	0.050	0.019	mg/L		11/20/14 10:33	11/21/14 22:51	1
Manganese	0.50		0.0030	0.00040	mg/L		11/20/14 10:33	11/21/14 22:51	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			11/28/14 19:43	1
Total Kjeldahl Nitrogen	ND		0.20	0.15	mg/L		11/25/14 04:15	11/25/14 17:00	1
Nitrate as N	0.13		0.050	0.020	mg/L			11/19/14 22:10	1
Nitrite as N	ND		0.050	0.020	mg/L			11/19/14 22:10	1
Chloride	10.1		0.50	0.28	mg/L			11/28/14 21:18	1
Sulfate	7.2		2.0	0.35	mg/L			11/28/14 21:18	1
Alkalinity, Total	8.4		5.0	0.79	mg/L			11/21/14 08:56	1
Alkalinity, Bicarbonate	8.4		5.0	0.79	mg/L			11/21/14 08:56	1

**General Chemistry - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	0.88	J	1.0	0.43	mg/L			12/11/14 10:20	1

TestAmerica Buffalo

# Client Sample Results

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

**Client Sample ID: MTER-2-1**

**Lab Sample ID: 480-71627-5**

Date Collected: 11/18/14 11:30

Matrix: Water

Date Received: 11/19/14 10:00

**Method: 6010C - Metals (ICP)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.012	J	0.020	0.0040	mg/L		11/20/14 10:40	11/22/14 14:39	1

**Method: 6010C - Metals (ICP) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.098		0.050	0.019	mg/L		11/20/14 10:33	11/21/14 23:05	1
Manganese	0.32		0.0030	0.00040	mg/L		11/20/14 10:33	11/21/14 23:05	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			11/28/14 19:44	1
Total Kjeldahl Nitrogen	ND		0.20	0.15	mg/L		11/25/14 04:15	11/25/14 17:00	1
Nitrate as N	1.3		0.050	0.020	mg/L			11/19/14 22:13	1
Nitrite as N	ND		0.050	0.020	mg/L			11/19/14 22:13	1
Chloride	14.9		0.50	0.28	mg/L			11/28/14 21:28	1
Sulfate	8.4		2.0	0.35	mg/L			11/28/14 21:28	1
Alkalinity, Total	3.1	J	5.0	0.79	mg/L			11/21/14 09:01	1
Alkalinity, Bicarbonate	3.1	J	5.0	0.79	mg/L			11/21/14 09:01	1

**General Chemistry - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	1.2		1.0	0.43	mg/L			12/11/14 10:35	1

**Client Sample ID: MTER-3-1**

**Lab Sample ID: 480-71627-6**

Date Collected: 11/18/14 12:00

Matrix: Water

Date Received: 11/19/14 10:00

**Method: 6010C - Metals (ICP)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.0085	J	0.020	0.0040	mg/L		11/20/14 10:40	11/22/14 14:41	1

**Method: 6010C - Metals (ICP) - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	0.064		0.050	0.019	mg/L		11/20/14 10:33	11/21/14 23:07	1
Manganese	0.24		0.0030	0.00040	mg/L		11/20/14 10:33	11/21/14 23:07	1

**General Chemistry**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			12/09/14 17:02	1
Total Kjeldahl Nitrogen	ND		0.20	0.15	mg/L		11/25/14 04:15	11/25/14 17:10	1
Nitrate as N	0.63		0.050	0.020	mg/L			11/19/14 22:16	1
Nitrite as N	ND		0.050	0.020	mg/L			11/19/14 22:16	1
Chloride	13.3		0.50	0.28	mg/L			11/28/14 21:38	1
Sulfate	8.0		2.0	0.35	mg/L			11/28/14 21:38	1
Alkalinity, Total	9.5		5.0	0.79	mg/L			11/21/14 09:06	1
Alkalinity, Bicarbonate	9.5		5.0	0.79	mg/L			11/21/14 09:06	1

**General Chemistry - Dissolved**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	1.2		1.0	0.43	mg/L			12/11/14 10:50	1

TestAmerica Buffalo

# QC Sample Results

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

## Method: 6010C - Metals (ICP)

**Lab Sample ID: MB 480-215013/1-A**  
**Matrix: Water**  
**Analysis Batch: 215585**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 215013**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.020	0.0040	mg/L		11/20/14 10:40	11/22/14 13:58	1

**Lab Sample ID: LCS 480-215013/2-A**  
**Matrix: Water**  
**Analysis Batch: 215585**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 215013**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	0.200	0.202		mg/L		101	80 - 120

**Lab Sample ID: MB 480-215014/1-A**  
**Matrix: Water**  
**Analysis Batch: 215427**

**Client Sample ID: Method Blank**  
**Prep Type: Total Recoverable**  
**Prep Batch: 215014**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Iron	ND		0.050	0.019	mg/L		11/20/14 10:33	11/21/14 22:46	1
Manganese	ND		0.0030	0.00040	mg/L		11/20/14 10:33	11/21/14 22:46	1

**Lab Sample ID: LCS 480-215014/2-A**  
**Matrix: Water**  
**Analysis Batch: 215427**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total Recoverable**  
**Prep Batch: 215014**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Iron	10.0	9.70		mg/L		97	80 - 120
Manganese	0.200	0.210		mg/L		105	80 - 120

**Lab Sample ID: 480-71627-4 MS**  
**Matrix: Water**  
**Analysis Batch: 215427**

**Client Sample ID: MTER-1D-1**  
**Prep Type: Dissolved**  
**Prep Batch: 215014**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Iron	0.020	J	10.0	9.88		mg/L		99	75 - 125
Manganese	0.50		0.200	0.701		mg/L		100	75 - 125

**Lab Sample ID: 480-71627-4 MSD**  
**Matrix: Water**  
**Analysis Batch: 215427**

**Client Sample ID: MTER-1D-1**  
**Prep Type: Dissolved**  
**Prep Batch: 215014**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Iron	0.020	J	10.0	10.02		mg/L		100	75 - 125	1	20
Manganese	0.50		0.200	0.703		mg/L		101	75 - 125	0	20

## Method: 350.1 - Nitrogen, Ammonia

**Lab Sample ID: MB 480-216426/123**  
**Matrix: Water**  
**Analysis Batch: 216426**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			11/28/14 19:29	1

TestAmerica Buffalo

# QC Sample Results

Client: MT Environmental Restoration  
 Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

## Method: 350.1 - Nitrogen, Ammonia (Continued)

Lab Sample ID: MB 480-216426/99

Matrix: Water

Analysis Batch: 216426

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			11/28/14 19:08	1

Lab Sample ID: LCS 480-216426/100

Matrix: Water

Analysis Batch: 216426

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	1.07		mg/L		107	90 - 110

Lab Sample ID: LCS 480-216426/124

Matrix: Water

Analysis Batch: 216426

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	1.06		mg/L		106	90 - 110

Lab Sample ID: MB 480-218154/123

Matrix: Water

Analysis Batch: 218154

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			12/09/14 18:24	1

Lab Sample ID: MB 480-218154/27

Matrix: Water

Analysis Batch: 218154

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			12/09/14 17:01	1

Lab Sample ID: MB 480-218154/3

Matrix: Water

Analysis Batch: 218154

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			12/09/14 16:40	1

Lab Sample ID: LCS 480-218154/124

Matrix: Water

Analysis Batch: 218154

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	1.05		mg/L		105	90 - 110

Lab Sample ID: LCS 480-218154/28

Matrix: Water

Analysis Batch: 218154

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	1.06		mg/L		106	90 - 110

TestAmerica Buffalo

# QC Sample Results

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

**Lab Sample ID:** LCS 480-218154/4  
**Matrix:** Water  
**Analysis Batch:** 218154

**Client Sample ID:** Lab Control Sample  
**Prep Type:** Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	1.06		mg/L		106	90 - 110

## Method: 351.2 - Nitrogen, Total Kjeldahl

**Lab Sample ID:** MB 480-215781/1-A  
**Matrix:** Water  
**Analysis Batch:** 215985

**Client Sample ID:** Method Blank  
**Prep Type:** Total/NA  
**Prep Batch:** 215781

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Kjeldahl Nitrogen	ND		0.20	0.15	mg/L		11/25/14 04:15	11/25/14 13:54	1

**Lab Sample ID:** LCS 480-215781/2-A  
**Matrix:** Water  
**Analysis Batch:** 215985

**Client Sample ID:** Lab Control Sample  
**Prep Type:** Total/NA  
**Prep Batch:** 215781

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Kjeldahl Nitrogen	2.50	2.48		mg/L		99	90 - 110

## Method: 353.2 - Nitrogen, Nitrite

**Lab Sample ID:** MB 480-214994/27  
**Matrix:** Water  
**Analysis Batch:** 214994

**Client Sample ID:** Method Blank  
**Prep Type:** Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrite as N	ND		0.050	0.020	mg/L			11/19/14 22:00	1

**Lab Sample ID:** LCS 480-214994/28  
**Matrix:** Water  
**Analysis Batch:** 214994

**Client Sample ID:** Lab Control Sample  
**Prep Type:** Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrite as N	1.50	1.48		mg/L		99	90 - 110

**Lab Sample ID:** 480-71627-5 MS  
**Matrix:** Water  
**Analysis Batch:** 214994

**Client Sample ID:** MTER-2-1  
**Prep Type:** Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrite as N	ND		1.00	0.989		mg/L		99	90 - 110

## Method: 9056A - Anions, Ion Chromatography

**Lab Sample ID:** MB 480-216391/4  
**Matrix:** Water  
**Analysis Batch:** 216391

**Client Sample ID:** Method Blank  
**Prep Type:** Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.28	mg/L			11/28/14 20:13	1
Sulfate	ND		2.0	0.35	mg/L			11/28/14 20:13	1

TestAmerica Buffalo

# QC Sample Results

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

## Method: 9056A - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCS 480-216391/3

Matrix: Water

Analysis Batch: 216391

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	19.17		mg/L		96	83 - 121
Sulfate	20.0	19.33		mg/L		97	80 - 129

Lab Sample ID: MB 480-216461/4

Matrix: Water

Analysis Batch: 216461

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.28	mg/L			12/01/14 09:33	1
Sulfate	ND		2.0	0.35	mg/L			12/01/14 09:33	1

Lab Sample ID: LCS 480-216461/3

Matrix: Water

Analysis Batch: 216461

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	19.83		mg/L		99	83 - 121
Sulfate	20.0	19.65		mg/L		98	80 - 129

## Method: SM 2320B - Alkalinity

Lab Sample ID: MB 480-215288/30

Matrix: Water

Analysis Batch: 215288

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		5.0	0.79	mg/L			11/21/14 08:24	1
Alkalinity, Bicarbonate	ND		5.0	0.79	mg/L			11/21/14 08:24	1

Lab Sample ID: MB 480-215288/6

Matrix: Water

Analysis Batch: 215288

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		5.0	0.79	mg/L			11/21/14 05:51	1
Alkalinity, Bicarbonate	ND		5.0	0.79	mg/L			11/21/14 05:51	1

Lab Sample ID: LCS 480-215288/31

Matrix: Water

Analysis Batch: 215288

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	100	97.41		mg/L		97	90 - 110

TestAmerica Buffalo

# QC Sample Results

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

## Method: SM 2320B - Alkalinity (Continued)

Lab Sample ID: LCS 480-215288/7

Matrix: Water

Analysis Batch: 215288

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	100	99.35		mg/L		99	90 - 110

## Method: SM5310\_D - Organic Carbon, Dissolved (DOC)

Lab Sample ID: MB 480-219451/3

Matrix: Water

Analysis Batch: 219451

Client Sample ID: Method Blank

Prep Type: Dissolved

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	ND		1.0	0.43	mg/L			12/11/14 05:33	1

Lab Sample ID: LCS 480-219451/4

Matrix: Water

Analysis Batch: 219451

Client Sample ID: Lab Control Sample

Prep Type: Dissolved

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Dissolved Organic Carbon	60.0	60.35		mg/L		101	90 - 110

Lab Sample ID: MB 480-219471/3

Matrix: Water

Analysis Batch: 219471

Client Sample ID: Method Blank

Prep Type: Dissolved

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	ND		1.0	0.43	mg/L			12/11/14 19:25	1

Lab Sample ID: LCS 480-219471/4

Matrix: Water

Analysis Batch: 219471

Client Sample ID: Lab Control Sample

Prep Type: Dissolved

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Dissolved Organic Carbon	60.0	59.55		mg/L		99	90 - 110

## Method: 353.2\_Nitrite -

Lab Sample ID: MB 480-214994/3

Matrix:

Analysis Batch: 214994

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrite as N	ND		0.050	0.020	mg/L		11/19/14 21:33	1

Lab Sample ID: LCS 480-214994/4

Matrix:

Analysis Batch: 214994

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrite as N	1.50	1.46		mg/L		97	90 - 110

TestAmerica Buffalo

# QC Association Summary

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

## Metals

### Prep Batch: 215013

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71627-4	MTER-1D-1	Total/NA	Water	3005A	
480-71627-5	MTER-2-1	Total/NA	Water	3005A	
480-71627-6	MTER-3-1	Total/NA	Water	3005A	
LCS 480-215013/2-A	Lab Control Sample	Total/NA	Water	3005A	
MB 480-215013/1-A	Method Blank	Total/NA	Water	3005A	

### Prep Batch: 215014

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71627-4	MTER-1D-1	Dissolved	Water	3005A	
480-71627-4 MS	MTER-1D-1	Dissolved	Water	3005A	
480-71627-4 MSD	MTER-1D-1	Dissolved	Water	3005A	
480-71627-5	MTER-2-1	Dissolved	Water	3005A	
480-71627-6	MTER-3-1	Dissolved	Water	3005A	
LCS 480-215014/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
MB 480-215014/1-A	Method Blank	Total Recoverable	Water	3005A	

### Analysis Batch: 215427

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71627-4	MTER-1D-1	Dissolved	Water	6010C	215014
480-71627-4 MS	MTER-1D-1	Dissolved	Water	6010C	215014
480-71627-4 MSD	MTER-1D-1	Dissolved	Water	6010C	215014
480-71627-5	MTER-2-1	Dissolved	Water	6010C	215014
480-71627-6	MTER-3-1	Dissolved	Water	6010C	215014
LCS 480-215014/2-A	Lab Control Sample	Total Recoverable	Water	6010C	215014
MB 480-215014/1-A	Method Blank	Total Recoverable	Water	6010C	215014

### Analysis Batch: 215585

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71627-4	MTER-1D-1	Total/NA	Water	6010C	215013
480-71627-5	MTER-2-1	Total/NA	Water	6010C	215013
480-71627-6	MTER-3-1	Total/NA	Water	6010C	215013
LCS 480-215013/2-A	Lab Control Sample	Total/NA	Water	6010C	215013
MB 480-215013/1-A	Method Blank	Total/NA	Water	6010C	215013

## General Chemistry

### Analysis Batch: 214994

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71627-4	MTER-1D-1	Total/NA	Water	353.2	
480-71627-5	MTER-2-1	Total/NA	Water	353.2	
480-71627-5 MS	MTER-2-1	Total/NA	Water	353.2	
480-71627-6	MTER-3-1	Total/NA	Water	353.2	
LCS 480-214994/28	Lab Control Sample	Total/NA	Water	353.2	
MB 480-214994/27	Method Blank	Total/NA	Water	353.2	

### Analysis Batch: 214997

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71627-1	MTER-1A-1	Total/NA	Water	353.2	
480-71627-2	MTER-1B-1	Total/NA	Water	353.2	
480-71627-3	MTER-1C-1	Total/NA	Water	353.2	

TestAmerica Buffalo

# QC Association Summary

Client: MT Environmental Restoration  
 Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

## General Chemistry (Continued)

### Analysis Batch: 214997 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71627-4	MTER-1D-1	Total/NA	Water	353.2	
480-71627-5	MTER-2-1	Total/NA	Water	353.2	
480-71627-6	MTER-3-1	Total/NA	Water	353.2	

### Analysis Batch: 215288

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71627-4	MTER-1D-1	Total/NA	Water	SM 2320B	
480-71627-5	MTER-2-1	Total/NA	Water	SM 2320B	
480-71627-6	MTER-3-1	Total/NA	Water	SM 2320B	
LCS 480-215288/31	Lab Control Sample	Total/NA	Water	SM 2320B	
LCS 480-215288/7	Lab Control Sample	Total/NA	Water	SM 2320B	
MB 480-215288/30	Method Blank	Total/NA	Water	SM 2320B	
MB 480-215288/6	Method Blank	Total/NA	Water	SM 2320B	

### Prep Batch: 215781

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71627-4	MTER-1D-1	Total/NA	Water	351.2	
480-71627-5	MTER-2-1	Total/NA	Water	351.2	
480-71627-6	MTER-3-1	Total/NA	Water	351.2	
LCS 480-215781/2-A	Lab Control Sample	Total/NA	Water	351.2	
MB 480-215781/1-A	Method Blank	Total/NA	Water	351.2	

### Analysis Batch: 215985

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71627-4	MTER-1D-1	Total/NA	Water	351.2	215781
480-71627-5	MTER-2-1	Total/NA	Water	351.2	215781
480-71627-6	MTER-3-1	Total/NA	Water	351.2	215781
LCS 480-215781/2-A	Lab Control Sample	Total/NA	Water	351.2	215781
MB 480-215781/1-A	Method Blank	Total/NA	Water	351.2	215781

### Analysis Batch: 216391

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71627-1	MTER-1A-1	Total/NA	Water	9056A	
480-71627-2	MTER-1B-1	Total/NA	Water	9056A	
480-71627-3	MTER-1C-1	Total/NA	Water	9056A	
480-71627-4	MTER-1D-1	Total/NA	Water	9056A	
480-71627-5	MTER-2-1	Total/NA	Water	9056A	
480-71627-6	MTER-3-1	Total/NA	Water	9056A	
LCS 480-216391/3	Lab Control Sample	Total/NA	Water	9056A	
MB 480-216391/4	Method Blank	Total/NA	Water	9056A	

### Analysis Batch: 216426

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71627-4	MTER-1D-1	Total/NA	Water	350.1	
480-71627-5	MTER-2-1	Total/NA	Water	350.1	
LCS 480-216426/100	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-216426/124	Lab Control Sample	Total/NA	Water	350.1	
MB 480-216426/123	Method Blank	Total/NA	Water	350.1	
MB 480-216426/99	Method Blank	Total/NA	Water	350.1	

TestAmerica Buffalo

# QC Association Summary

Client: MT Environmental Restoration  
 Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

## General Chemistry (Continued)

### Analysis Batch: 216461

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71627-1	MTER-1A-1	Total/NA	Water	9056A	
LCS 480-216461/3	Lab Control Sample	Total/NA	Water	9056A	
MB 480-216461/4	Method Blank	Total/NA	Water	9056A	

### Analysis Batch: 218154

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71627-6	MTER-3-1	Total/NA	Water	350.1	
LCS 480-218154/124	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-218154/28	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-218154/4	Lab Control Sample	Total/NA	Water	350.1	
MB 480-218154/123	Method Blank	Total/NA	Water	350.1	
MB 480-218154/27	Method Blank	Total/NA	Water	350.1	
MB 480-218154/3	Method Blank	Total/NA	Water	350.1	

### Filtration Batch: 219450

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71627-4	MTER-1D-1	Dissolved	Water	Filtration	
480-71627-5	MTER-2-1	Dissolved	Water	Filtration	
480-71627-6	MTER-3-1	Dissolved	Water	Filtration	

### Analysis Batch: 219451

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71627-4	MTER-1D-1	Dissolved	Water	SM5310_D	219450
480-71627-5	MTER-2-1	Dissolved	Water	SM5310_D	219450
480-71627-6	MTER-3-1	Dissolved	Water	SM5310_D	219450
LCS 480-219451/4	Lab Control Sample	Dissolved	Water	SM5310_D	
MB 480-219451/3	Method Blank	Dissolved	Water	SM5310_D	

### Analysis Batch: 219471

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 480-219471/4	Lab Control Sample	Dissolved	Water	SM5310_D	
MB 480-219471/3	Method Blank	Dissolved	Water	SM5310_D	

### Analysis Batch: 214994

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 480-214994/4	Lab Control Sample	Total/NA		353.2_Nitrite	
MB 480-214994/3	Method Blank	Total/NA		353.2_Nitrite	

# Lab Chronicle

Client: MT Environmental Restoration  
 Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

**Client Sample ID: MTER-1A-1**

**Lab Sample ID: 480-71627-1**

Date Collected: 11/18/14 09:30

Matrix: Water

Date Received: 11/19/14 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	353.2		1	214997	11/19/14 20:16	MRF	TAL BUF
Total/NA	Analysis	9056A		100	216391	11/28/14 20:43	NDB	TAL BUF
Total/NA	Analysis	9056A		200	216461	12/01/14 11:15	NDB	TAL BUF

**Client Sample ID: MTER-1B-1**

**Lab Sample ID: 480-71627-2**

Date Collected: 11/18/14 10:00

Matrix: Water

Date Received: 11/19/14 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	353.2		1	214997	11/19/14 22:08	MRF	TAL BUF
Total/NA	Analysis	9056A		1	216391	11/28/14 20:53	NDB	TAL BUF

**Client Sample ID: MTER-1C-1**

**Lab Sample ID: 480-71627-3**

Date Collected: 11/18/14 10:30

Matrix: Water

Date Received: 11/19/14 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	353.2		1	214997	11/19/14 22:09	MRF	TAL BUF
Total/NA	Analysis	9056A		1	216391	11/28/14 21:03	NDB	TAL BUF

**Client Sample ID: MTER-1D-1**

**Lab Sample ID: 480-71627-4**

Date Collected: 11/18/14 10:55

Matrix: Water

Date Received: 11/19/14 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			215014	11/20/14 10:33	KJ1	TAL BUF
Dissolved	Analysis	6010C		1	215427	11/21/14 22:51	TRB	TAL BUF
Total/NA	Prep	3005A			215013	11/20/14 10:40	KJ1	TAL BUF
Total/NA	Analysis	6010C		1	215585	11/22/14 14:36	JRK	TAL BUF
Total/NA	Analysis	350.1		1	216426	11/28/14 19:43	RS	TAL BUF
Total/NA	Prep	351.2			215781	11/25/14 04:15	LAW	TAL BUF
Total/NA	Analysis	351.2		1	215985	11/25/14 17:00	CLT	TAL BUF
Total/NA	Analysis	353.2		1	214997	11/19/14 22:10	MRF	TAL BUF
Total/NA	Analysis	353.2		1	214994	11/19/14 22:10	MRF	TAL BUF
Total/NA	Analysis	9056A		1	216391	11/28/14 21:18	NDB	TAL BUF
Total/NA	Analysis	SM 2320B		1	215288	11/21/14 08:56	VAJ	TAL BUF
Dissolved	Analysis	SM5310_D		1	219451	12/11/14 10:20	CAS	TAL BUF
Dissolved	Filtration	Filtration			219450	12/11/14 10:20	CAS	TAL BUF

# Lab Chronicle

Client: MT Environmental Restoration  
 Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

## Client Sample ID: MTER-2-1

Lab Sample ID: 480-71627-5

Date Collected: 11/18/14 11:30

Matrix: Water

Date Received: 11/19/14 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			215014	11/20/14 10:33	KJ1	TAL BUF
Dissolved	Analysis	6010C		1	215427	11/21/14 23:05	TRB	TAL BUF
Total/NA	Prep	3005A			215013	11/20/14 10:40	KJ1	TAL BUF
Total/NA	Analysis	6010C		1	215585	11/22/14 14:39	JRK	TAL BUF
Total/NA	Analysis	350.1		1	216426	11/28/14 19:44	RS	TAL BUF
Total/NA	Prep	351.2			215781	11/25/14 04:15	LAW	TAL BUF
Total/NA	Analysis	351.2		1	215985	11/25/14 17:00	CLT	TAL BUF
Total/NA	Analysis	353.2		1	214997	11/19/14 22:13	MRF	TAL BUF
Total/NA	Analysis	353.2		1	214994	11/19/14 22:13	MRF	TAL BUF
Total/NA	Analysis	9056A		1	216391	11/28/14 21:28	NDB	TAL BUF
Total/NA	Analysis	SM 2320B		1	215288	11/21/14 09:01	VAJ	TAL BUF
Dissolved	Analysis	SM5310_D		1	219451	12/11/14 10:35	CAS	TAL BUF
Dissolved	Filtration	Filtration			219450	12/11/14 10:35	CAS	TAL BUF

## Client Sample ID: MTER-3-1

Lab Sample ID: 480-71627-6

Date Collected: 11/18/14 12:00

Matrix: Water

Date Received: 11/19/14 10:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	3005A			215014	11/20/14 10:33	KJ1	TAL BUF
Dissolved	Analysis	6010C		1	215427	11/21/14 23:07	TRB	TAL BUF
Total/NA	Prep	3005A			215013	11/20/14 10:40	KJ1	TAL BUF
Total/NA	Analysis	6010C		1	215585	11/22/14 14:41	JRK	TAL BUF
Total/NA	Analysis	350.1		1	218154	12/09/14 17:02	RS	TAL BUF
Total/NA	Prep	351.2			215781	11/25/14 04:15	LAW	TAL BUF
Total/NA	Analysis	351.2		1	215985	11/25/14 17:10	CLT	TAL BUF
Total/NA	Analysis	353.2		1	214997	11/19/14 22:16	MRF	TAL BUF
Total/NA	Analysis	353.2		1	214994	11/19/14 22:16	MRF	TAL BUF
Total/NA	Analysis	9056A		1	216391	11/28/14 21:38	NDB	TAL BUF
Total/NA	Analysis	SM 2320B		1	215288	11/21/14 09:06	VAJ	TAL BUF
Dissolved	Analysis	SM5310_D		1	219451	12/11/14 10:50	CAS	TAL BUF
Dissolved	Filtration	Filtration			219450	12/11/14 10:50	CAS	TAL BUF

**Laboratory References:**

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

# Certification Summary

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

## Laboratory: TestAmerica Buffalo

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
Massachusetts	State Program	1	M-NY044	06-30-15

The following analytes are included in this report, but are not certified under this certification:

Analysis Method	Prep Method	Matrix	Analyte
353.2		Water	Nitrate as N

The following analytes are included in this report, but certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
6010C	3005A	Water	Boron
6010C	3005A	Water	Iron
6010C	3005A	Water	Manganese
9056A		Water	Chloride
9056A		Water	Sulfate
SM5310_D		Water	Dissolved Organic Carbon

# Method Summary

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

Method	Method Description	Protocol	Laboratory
6010C	Metals (ICP)	SW846	TAL BUF
350.1	Nitrogen, Ammonia	MCAWW	TAL BUF
351.2	Nitrogen, Total Kjeldahl	MCAWW	TAL BUF
353.2	Nitrogen, Nitrite	MCAWW	TAL BUF
353.2	Nitrate	EPA	TAL BUF
9056A	Anions, Ion Chromatography	SW846	TAL BUF
SM 2320B	Alkalinity	SM	TAL BUF
SM5310_D	Organic Carbon, Dissolved (DOC)	SM	TAL BUF
353.2_Nitrite			TAL BUF

#### Protocol References:

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

#### Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

# Sample Summary

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71627-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-71627-1	MTER-1A-1	Water	11/18/14 09:30	11/19/14 10:00
480-71627-2	MTER-1B-1	Water	11/18/14 10:00	11/19/14 10:00
480-71627-3	MTER-1C-1	Water	11/18/14 10:30	11/19/14 10:00
480-71627-4	MTER-1D-1	Water	11/18/14 10:55	11/19/14 10:00
480-71627-5	MTER-2-1	Water	11/18/14 11:30	11/19/14 10:00
480-71627-6	MTER-3-1	Water	11/18/14 12:00	11/19/14 10:00

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# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Temperature on Receipt \_\_\_\_\_

Drinking Water? Yes  No

## Chain of Custody Record

TAL-4124 (1007)

Client: **MT Environmental Restoration (MTER)** Project Manager: **Jim Besley** Date: **11/18/14** Chain of Custody Number: **279568**

Address: **24 Bay View Ave** Telephone Number (Area Code)/Fax Number: **508 732 0121 / 508 732 0122** Lab Number: **1** of **1**

City: **Plymouth** State: **MA** Zip Code: **02360** Site Contact: **Jim Besley** Carrier/Waybill Number: \_\_\_\_\_

Project Name and Location (State): **Town of Falmouth MA**

Contract/Purchase Order/Quote No.: **48010707**

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix					Containers & Preservatives					Special Instructions/ Conditions of Receipt					
			Air	Aqueous	Sed	Soil	Unpres	H2SO4	HNO3	HCl	NaOH	ZnAc		NaOH				
MTER-1A-1	11/18/14	0930	X					X										
MTER-1B-1	11/18/14	1000	X					X										
MTER-1C-1	11/18/14	1030	X					X										
MTER-1A-1 (-1B-1)	11/18/14	1055	X					X										(Assigned)
MTER-2-1	11/18/14	1130	X					X										Field Filtered for IAM
MTER-3-1	11/18/14	1200	X					X										Field Filtered for IAM



Possible Hazard Identification:  Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Sample Disposal:  Return To Client  Disposal By Lab  Archive For \_\_\_\_\_ Months longer than 1 month)

Turn Around Time Required:  24 Hours  48 Hours  7 Days  14 Days  21 Days  Other \_\_\_\_\_

QC Requirements (Specify): \_\_\_\_\_

1. Relinquished By: **Jim Besley** Date: **11/18/14** Time: **14:20**

2. Relinquished By: **Jim Besley** Date: **11/19/14** Time: **1000**

3. Relinquished By: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Comments: **Temp 2.0 #1**

## Login Sample Receipt Checklist

Client: MT Environmental Restoration

Job Number: 480-71627-1

**Login Number: 71627**

**List Source: TestAmerica Buffalo**

**List Number: 1**

**Creator: Kolb, Chris M**

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	False	Refer to job narrative for details
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	MTER
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	True	
Chlorine Residual checked.	N/A	

# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Buffalo  
10 Hazelwood Drive  
Amherst, NY 14228-2298  
Tel: (716)691-2600

TestAmerica Job ID: 480-71626-1

Client Project/Site: General Chemistry Pricing  
Revision: 1

For:

MT Environmental Restoration  
24 Bay View Avenue  
Plymouth, Massachusetts 02360

Attn: Mr. Jim Begley



Authorized for release by:  
12/19/2014 10:26:22 AM

Brian Fischer, Manager of Project Management  
(716)504-9835  
[brian.fischer@testamericainc.com](mailto:brian.fischer@testamericainc.com)

### LINKS

Review your project  
results through  
**TotalAccess**

Have a Question?



Visit us at:  
[www.testamericainc.com](http://www.testamericainc.com)

*The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.*

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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## Definitions/Glossary

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71626-1

### Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

# Case Narrative

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71626-1

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**Job ID: 480-71626-1**

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**Laboratory: TestAmerica Buffalo**

---

**Narrative**

**Job Narrative**  
**480-71626-1**

**Comments**

This report has been revised to remove the holding time qualifier (H) applied in error to results.

**Receipt**

The sample was received on 11/19/2014 10:00 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 1.4° C.

**General Chemistry**

Method(s) SM 4500 P E: The following sample(s) was received outside of holding time: MTER-S1 (480-71626-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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# Detection Summary

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71626-1

**Client Sample ID: MTER-S1**

**Lab Sample ID: 480-71626-1**

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
ortho-Phosphate	1.1		0.37	0.11	mg/Kg	1		SM 4500 P E	ASTM Leach

This Detection Summary does not include radiochemical test results.

TestAmerica Buffalo

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# Client Sample Results

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71626-1

**Client Sample ID: MTER-S1**

**Lab Sample ID: 480-71626-1**

**Date Collected: 11/04/14 13:40**

**Matrix: Solid**

**Date Received: 11/19/14 10:00**

## General Chemistry - ASTM Leach

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
ortho-Phosphate	1.1		0.37	0.11	mg/Kg			12/03/14 00:41	1

# QC Sample Results

Client: MT Environmental Restoration  
 Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71626-1

## Method: SM 4500 P E - Orthophosphate

Lab Sample ID: MB 480-216555/1-A  
 Matrix: Solid  
 Analysis Batch: 216877

Client Sample ID: Method Blank  
 Prep Type: ASTM Leach

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
ortho-Phosphate	ND		0.40	0.12	mg/Kg			12/03/14 00:39	1

Lab Sample ID: 480-71626-1 MS  
 Matrix: Solid  
 Analysis Batch: 216877

Client Sample ID: MTER-S1  
 Prep Type: ASTM Leach

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
ortho-Phosphate	1.1		18.4	21.24		mg/Kg		109	49 - 138

Lab Sample ID: 480-71626-1 MSD  
 Matrix: Solid  
 Analysis Batch: 216877

Client Sample ID: MTER-S1  
 Prep Type: ASTM Leach

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
ortho-Phosphate	1.1		18.4	21.35		mg/Kg		110	49 - 138	0	20

# QC Association Summary

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71626-1

## General Chemistry

### Analysis Batch: 215145

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71626-1	MTER-S1	Total/NA	Solid	Moisture	

### Leach Batch: 216555

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71626-1	MTER-S1	ASTM Leach	Solid	D3987-85	
480-71626-1 MS	MTER-S1	ASTM Leach	Solid	D3987-85	
480-71626-1 MSD	MTER-S1	ASTM Leach	Solid	D3987-85	
MB 480-216555/1-A	Method Blank	ASTM Leach	Solid	D3987-85	

### Analysis Batch: 216877

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-71626-1	MTER-S1	ASTM Leach	Solid	SM 4500 P E	216555
480-71626-1 MS	MTER-S1	ASTM Leach	Solid	SM 4500 P E	216555
480-71626-1 MSD	MTER-S1	ASTM Leach	Solid	SM 4500 P E	216555
MB 480-216555/1-A	Method Blank	ASTM Leach	Solid	SM 4500 P E	216555

# Lab Chronicle

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71626-1

**Client Sample ID: MTER-S1**

**Lab Sample ID: 480-71626-1**

**Date Collected: 11/04/14 13:40**

**Matrix: Solid**

**Date Received: 11/19/14 10:00**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	Moisture		1	215145	11/20/14 18:12	CMK	TAL BUF
ASTM Leach	Leach	D3987-85			216555	12/01/14 09:55	MDL	TAL BUF
ASTM Leach	Analysis	SM 4500 P E		1	216877	12/03/14 00:41	VAJ	TAL BUF

**Laboratory References:**

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

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# Certification Summary

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71626-1

## Laboratory: TestAmerica Buffalo

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Massachusetts	State Program	1	M-NY044	06-30-15

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# Method Summary

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71626-1

Method	Method Description	Protocol	Laboratory
Moisture	Percent Moisture	EPA	TAL BUF
SM 4500 P E	Orthophosphate	SM	TAL BUF

**Protocol References:**

EPA = US Environmental Protection Agency

SM = "Standard Methods For The Examination Of Water And Wastewater",

**Laboratory References:**

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600



# Sample Summary

Client: MT Environmental Restoration  
Project/Site: General Chemistry Pricing

TestAmerica Job ID: 480-71626-1

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Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-71626-1	MTER-S1	Solid	11/04/14 13:40	11/19/14 10:00

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## Login Sample Receipt Checklist

Client: MT Environmental Restoration

Job Number: 480-71626-1

**Login Number: 71626**

**List Source: TestAmerica Buffalo**

**List Number: 1**

**Creator: Kolb, Chris M**

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	MTER
Samples received within 48 hours of sampling.	False	
Samples requiring field filtration have been filtered in the field.	True	
Chlorine Residual checked.	N/A	

## Appendix 3.5: Permeable Reactive Barriers

- Acapesket Peninsula Groundwater Report Phase 2

# **Falmouth Acapesket Peninsula Groundwater Investigation Phase 2 Report**

Prepared for:

Falmouth DPW and Permeable Reactive Barrier Working Group of the Water Quality  
Management Committee, Falmouth MA  
and  
GHD Inc.

Prepared by:

MT Environmental Restoration  
147 Elm St.  
Duxbury, MA 02332

December 21, 2015

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Table 2	Groundwater Elevation and Analytical Data Summary
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Table 4	Acapesket MTER-4 USGS MLS Well Groundwater Data Summary

### Charts

Cart 1	Chart 1 MTER-9 - Oxygen vs. Depth
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Cart 6	Nitrate vs. Depth 0 Shorewood Wells

### APPENDICES

Appendix A	Soil Boring Logs
Appendix B	Laboratory Reports

# Falmouth Acapesket Peninsula Groundwater Investigation Report –Phase 2

## EXECUTIVE SUMMARY

This report documents the second phase of investigation for the Falmouth Acapesket Peninsula Groundwater Investigation Project. Nitrogen loading from point and non-point sources in the watersheds is impacting Falmouth's south coastal estuaries. The objective of the work was to collect additional information to assess groundwater conditions related to nitrate in the vicinity of Lewis Neck (Acapesket peninsula) in East Falmouth (Figure 1). A report on the first phase of investigation was completed in March 2015 (MTER, 2015). The information gathered through the Groundwater Investigation Project is intended to inform future efforts to evaluate the efficacy of groundwater nitrate treatment systems i.e. Permeable Reactive Barriers (PRBs).

During Phase 1, soil borings and monitoring wells were installed at three locations on the western side of the peninsula 3,500 feet south of the State Route 28 (East Falmouth Highway) adjacent to the upper reach of Great Pond. The Phase 1 investigation area is referred to as Acapesket South. One round of groundwater sampling and analysis was completed for Acapesket South wells in November 2014.

The relatively low nitrogen mass flux observed with limited data in the Acapesket South area led to planning additional groundwater investigation in a second area to the north, where higher groundwater velocity and potentially higher nitrate concentrations could be present. Phase 2 included the collection of additional data at the Acapesket South location as well as in the vicinity of 0 Shorewood Drive, a Town owned property to the north near the intersection of the East Falmouth Highway and Shorewood Drive referred to as Acapesket North.

Phase 2 results for the Acapesket South area confirmed previous results for the specific locations investigated in 2014. However, the newly installed MTER-5 well cluster showed that there are also locations in this area with significant nitrate concentrations where groundwater is likely directly affected by wastewater discharge.

Conditions observed in the Acapesket North area indicate the area is a good potential candidate for groundwater nitrate remediation. High concentrations of nitrate are present in groundwater across the area. Combined with a fast groundwater velocity the results indicate a significant flux of nitrate through the area. The vertical profile data for nitrate in groundwater shows a clear vertical distribution with a relatively shallow peak in concentration and a fairly well defined depth limit for significant concentrations. The nitrate vertical distribution is within feasible treatment depth.

## 1.0 INTRODUCTION

MT Environmental Restoration has completed tasks defined in the April 28, 2015 Acapesket Groundwater Investigation - Phase 2 Field Work Plan for the Falmouth Acapesket Peninsula Groundwater Investigation Project.

The objective of the Groundwater Investigation Project is to collect specific data to assess groundwater conditions related to nitrate and potential groundwater remediation in the vicinity of the Acapesket peninsula in East Falmouth. One approach to groundwater nitrate remediation is to design Permeable Reactive Barriers (PRBs) to stimulate naturally occurring denitrifying bacteria to degrade nitrate. Groundwater treatment would be most effective where the mass flux of nitrate in groundwater is high based on groundwater concentrations and groundwater flow velocity.

A report on the first phase of investigation was completed in March 2015 (MTER, 2015). During Phase 1, soil borings and monitoring wells were installed at three locations in an area on the western side of the peninsula 3,500 feet south of the East Falmouth Highway, adjacent to the upper reach of Great Pond (Acapesket South). The Acapesket South location is shown on Figure 2. One round of groundwater sampling and analysis was completed in November 2014.

Results of Phase 1 indicated:

- The freshwater sand and gravel aquifer was approximately 50 ft thick near the center of the peninsula and underlain by saline groundwater; flow appeared to be local and lateral or radial off the peninsula (to the northwest in the immediate study area)
- Nitrate was the only detectable form of nitrogen
- Limited testing showed nitrate concentrations were relatively low and the horizontal groundwater velocity was slow, on the order of 32 ft per year to 77 ft per year in the study area
- Aquifer materials encountered were outwash sand and gravel to the depth of investigation 85 ft below ground surface (BGS)
- The fresh groundwater monitored was well-oxygenated while the saline groundwater was anoxic

The relatively low nitrogen mass flux in the Acapesket South area estimated from the limited data collected in Phase 1 led to planning additional groundwater data collection from an expanded area during Phase 2. The Phase 2 investigation included additional data collection in the Acapesket South area and in an area to the north, near the intersection of East Falmouth Highway and Shorewood Drive (Acapesket North). The Acapesket North location was focused on the Town owned parcel identified as the 0 Shorewood Drive property and is shown on Figure 3.

Phase 2 work included a field investigation to characterize aquifer materials and collect groundwater elevation and chemistry data. The completed field investigation included:

- Installation of three multi-level monitoring well clusters with between four and six individual 2-inch diameter screens and risers at each location
- Installation of one 15-port multilevel sampler in coordination with the USGS
- Installation of three 2-inch diameter water table monitoring wells
- Collection of soil cores from deep borings to confirm soil type

- Assessment of groundwater elevations and determination of the local direction of groundwater flow
- Monitoring of field parameters (dissolved oxygen, oxidation-reduction potential, specific conductivity and pH) during groundwater sampling
- Collection of groundwater samples for laboratory analyses to assess nitrogen (nitrate, nitrite, ammonia, and total nitrogen) concentrations and groundwater chemistry

### **2.0 SOIL BORINGS AND MONITORING WELL INSTALLATION**

All new soil borings were completed with a Geoprobe 6600 rig using the direct push method. Subsurface stratigraphy was assessed by collecting soil cores at selected locations. The Phase 2 investigation was implemented with two stages of work.

The first stage of work implemented in May 2015 included installation of:

- Multi-level monitoring well cluster MTER-9 in the Acapesket North area, and
- Multi-level monitoring well cluster MTER-5 located in the Acapesket South area, and
- Water table monitoring wells MTER-7 and MTER-8 in the Acapesket North area

A casing elevation survey was completed for these wells with the assistance of the Falmouth DPW with an accuracy reported to be within 0.01 ft. The elevations for two previously existing wells in the Acapesket North area, designated MTER-11 located on Thatcher's Lane and MTER-12 located off Acapesket Road, were tied in during the survey. The depths to groundwater from the top of well casings at the Acapesket North locations were used to determine groundwater elevations and the local direction of groundwater flow in the vicinity of 0 Shorewood Drive. Multi-level monitoring well cluster MTER-9 was also sampled to get initial groundwater nitrogen profile concentration data in the north area.

The groundwater flow direction assessment was used to plan locations for the second stage of monitoring well installation in the Acapesket North area. The second stage of work was implemented in October, 2015 and included the installation of the following monitoring wells on the 0 Shorewood Drive property:

- Multi-level monitoring well cluster MTER-6, a six screen 2-inch well cluster,
- MTER-4, a 15-point multilevel sampling (MLS) well installed with the USGS, and
- Water table monitoring well MTER-10



Installing MTER-6 Well Cluster near center of 0 Shorewood property

### **2.1 Acapesket South Area Investigation**

Monitoring well construction details and screened intervals are presented in Table 1. The soil borings for the new 4-screen multi-level well cluster MTER-5 were completed in the Shorewood Association Right-of Way to Great Pond adjacent to 171 Shorewood Drive. Soil cores were collected in 60-inch Geoprobe Macro-Core plastic liners to log stratigraphy in the cluster's deepest boring to a maximum depth of 54 feet below ground surface (elevation -28.47). Boring logs are included in Appendix A. Aquifer materials were predominantly medium sand with a range of fine to coarse sand and some fine gravel. Red bands of iron staining were observed in medium to fine sand 30 to 40 ft. below land surface. A conductivity meter was used to screen

soil for indication of increased pore water salinity due to the potential for encountering saline groundwater at this location. A significant increase in conductivity was noted 40 to 50 ft. below land surface.

One monitoring well in the cluster, MTER-5D, was set as a water table well with a screen located 14 to 24 ft. below ground surface (elevation 1.25 to -8.75 ft.). Additional wells in the cluster were set with screens at ten foot intervals; the deepest screen (MTER-5A) was screened 44 to 54 ft. below land surface (elevation -28.47 to -38.47 ft.). All monitoring well construction details and screened intervals are presented in Table 1.

### 2.2 Acapesket North Area Investigation

Soil borings for the 4-screen multi-level monitoring well cluster MTER-9 were completed adjacent to Shorewood Drive on the 0 Shorewood property. Soil cores were collected from the deepest boring to a maximum depth of 80 feet below ground surface (elevation -61.42). Aquifer materials encountered were outwash sand and gravel, predominantly medium sand with a range of fine to coarse sand and some fine gravel. Layers of medium to coarse gravel were encountered at 70 to 80 ft. The deep gravel layers presented strong resistance against deeper penetration with the Geoprobe rig. Iron stained sand was encountered in layers starting below 35 ft. No significant increase in conductivity was noted in soil samples. MTER-9D, was set as a water table well with a screen located 14 to 24 ft. below ground surface (elevation 4.46 to -5.55 ft.). MTER-9C was set 34 to 44 ft below ground surface (elevation -15.48 to -25.48). Additional deeper wells in the cluster were set with screens at ten foot intervals; the deepest screen (MTER-9A) was placed at 64 to 74 ft. below land surface (elevation -45.42 to -55.42 ft.).

Water table monitoring well MTER-7 was installed on the verge of John Parker Road near the intersection of John Parker Road and the East Falmouth highway (edge of driveway on John Parker Rd for 46 East Falmouth Highway). MTER-7 was set with a screen located 18 to 28 ft. below ground surface (elevation 6.01 to -3.99 ft.).

Water table monitoring well MTER-8 was installed at the rear of the 94 East Falmouth highway property (Johnny's Tune and Lube Service Station). MTER-8 was set with a screen located 27 to 37 ft. below ground surface (elevation 6.54 to -3.46 ft.).

The USGS multilevel sampler (MLS) MTER-4 was constructed in a boring completed to a depth of 74 feet below ground surface (-54.93) near the corner of Shorewood Drive and the East Falmouth Highway. No soil samples were collected at this location. The MLS was installed with a pre-constructed 1.25-inch diameter PVC casing containing 15 color-coded polyethylene tubes (0.25-inch outside diameter and a 0.17-inch inside diameter) ending at sampling ports. The tubes extend down from the surface inside the casing, opening out through holes in the side of the casing at approximately 4-foot increments. The bottom of each tube is screened with nylon fabric. A total of 15 sampling ports were installed in the single borehole to profile groundwater conditions.



Finishing MTER-4 USGS Multilevel Sampling Well at ground surface

Soil borings for the 6-screen multi-level monitoring well cluster MTER-6 were completed near the center of the 0 Shorewood property accessed off Shorewood Drive. Soil cores were collected from the cluster's deepest boring to a maximum depth of 70 feet below ground surface (elevation -60.17). Aquifer materials encountered were glacial outwash, predominantly medium sand with a range of fine to coarse sand and some fine gravel. Coarse gravel layers were encountered in the deepest soil sample 65 to 70 ft. below land surface, similar to the gravels observed in the soil boring for MTER-9.

MTER-6F, was set as a water table well with a screen located 7 to 17 ft. below ground surface (elevation 3.17 to -6.83 ft.). The next screen down, MTER-6E, was set with a screen between 20

and 30 ft. below land surface. Additional wells in the cluster were set with screens at ten foot intervals; the deepest screen (MTER-6A) was screened 60 to 70 ft. below land surface (elevation -50.17 to -60.17 ft.).

### **3.0 ASSESSMENT OF THE DIRECTION OF GROUNDWATER FLOW**

A casing elevation survey was completed for the second stage wells with the assistance of the Falmouth DPW. The depths to groundwater from the top of well casings at selected wells in the Acapesket North and South areas were used to determine groundwater elevations and the local direction of groundwater flow for both areas. Elevation data is included in Table 2. Groundwater contours based on data collected in October/November 2015 are presented on Figure 2 (Acapesket South) and Figure 3 (Acapesket North).

#### **3.1 Acapesket South Area Groundwater Flow**

The 2015 groundwater contour map for Acapesket South indicates groundwater flow from the area closer to the center of the peninsula to the northwest, similar to the flow direction observed in November 2014. However with the additional elevation data from MTER-5, a shift in flow direction near Great Pond more to the west was observed.

#### **3.2 Acapesket North Area Groundwater Flow**

The groundwater contour map for Acapesket North indicates groundwater flow to the southwest in the vicinity of the 0 Shorewood property. The contours shown on Figure 3 based on October/November 2015 data are similar to the contours developed with data available in June 2015.

### **4.0 FIELD AND LABORATORY ANALYSES**

The USGS MLS ports were sampled by the USGS with a peristaltic pump. All 2-inch diameter water table and multi-level monitoring well clusters were developed and sampled by pumping with a submersible pump. Groundwater parameters (pH, temperature, dissolved oxygen, oxidation-reduction potential, and conductivity) were monitored for stability over time with an In-Situ Inc. TROLL 9500 water quality meter with a flow-through cell prior to sampling the 2-inch monitoring wells. Groundwater samples from the USGS MLS (MTER-4) and selected 2-inch monitoring wells were submitted to the ESS Laboratory for specified analyses. A summary of field and laboratory groundwater data for the 2-inch monitoring wells is presented in Table 3. USGS MLS groundwater laboratory data from ESS laboratory analyses are presented in Table 4. All quality control criteria were within acceptable limits and laboratory reports with results of analyses can be found in Appendix B.

#### **4.1 Groundwater Analyses Acapesket South**

##### **Field Parameters – 2-inch Monitoring Wells**

Field monitoring of groundwater parameters at the deepest screened well MTER-1A in the MTER-1 cluster showed very high specific conductivity, indicating as seen previously in November 2014, that the deep well is screened in saline groundwater. The saline groundwater is anoxic with less than 1 mg/L of dissolved oxygen. Shallower wells in the MTER-1 cluster were aerobic with significant dissolved oxygen concentrations.

Groundwater pumped from water table monitoring wells MTER-2 and MTER-3 showed well oxygenated fresh groundwater with field data similar to observations in 2014.

Field monitoring of groundwater parameters showed very high specific conductivity in water pumped from the deepest screened well MTER-5A, and indicated that the deep well is screened in saline groundwater. The saline groundwater is borderline anoxic with approximately 1 mg/L of dissolved oxygen. The field data indicated that the shallower wells at this location (MTER-5B, MTER-5C, and MTER-5D) were screened in freshwater but had elevated conductivity and lower dissolved oxygen levels compared to fresh groundwater at other nearby locations.



Sampling MTER-6 Well Cluster 0 Shorewood property

### Laboratory Analyses

Samples from all Acapesket South wells were submitted for analysis of nitrate nitrogen concentrations. Nitrate concentrations observed at well cluster MTER-1 and water table monitoring wells MTER-2 and MTER-3 were similar to concentrations observed in 2014. One noted exception was a low concentration detection of nitrate nitrogen in the saline groundwater MTER-1A sample where nitrate nitrogen was previously below the detection limit.

A reference background nitrate concentration, unaffected by wastewater disposal, of 0.46 mg/L was previously reported for Cape Cod by the United States Geological Survey (USGS) (LeBlanc, 1984). Earlier data from Frimpter and Gay, 1979, indicate uncontaminated groundwater may have less than 0.1 mg/L nitrate nitrogen. Current nitrate concentration results for fresh water well screens the MTER-1, MTER-2 and MTER-3 test wells ranged from 0.06 to 0.66 mg/L. The highest concentration of nitrate detected from these wells was again found at MTER-2, where 1.3 mg/L was detected in 2014.

Nitrate concentrations were significantly higher in the freshwater samples collected from the new wells MTER-5B, 5C, and 5D, ranging from 8.2 to 14.7 mg/L. The MTER-5 cluster wells were also analyzed for ammonia, nitrite, and total nitrogen. These data indicate that only nitrate was present in the shallowest well MTER-5D, but low levels of ammonia were also present in freshwater samples from MTER-5B and MTER-5C. Chloride and sulfate concentrations were also elevated at MTER-5B MTER-5C and MTER-5D compared to other freshwater sampling locations in Acapesket South (see Table 3). The USGS reported background concentrations of chloride and sulfate on Cape Cod is 8.1 mg/L and 5.2 mg/L respectively (LeBlanc, 1984).

Samples from the saline groundwater wells (MTER-1A and MTER-5A) were also submitted for analysis of nitrite nitrogen, ammonia nitrogen, and total nitrogen (total nitrogen = organic nitrogen + ammonia nitrogen + nitrate + nitrite). All target nitrogen compounds were detected in the saline groundwater with total nitrogen concentrations of 0.84 mg/L and 2.60 mg/L at MTER-1A and MTER-5A, respectively.

### 4.2 Groundwater Analyses Acapesket North

#### Field Parameters – 2-inch Monitoring Wells

Groundwater sampled from water table monitoring wells MTER-7 and MTER-8, located upgradient from the 0 Shorewood Drive property, showed well oxygenated fresh groundwater. Saline groundwater if present would be expected at greater than 100 ft. below the water table.

The MTER-9 cluster well was sampled twice in 2015. Samples showed fairly consistent results for dissolved oxygen between the June and October 2015 analyses. The deeper monitoring wells MTER-9A and MTER-9B have low dissolved oxygen or are anoxic while the shallower MTER-9C and MTER-9D are aerobic. The oxygen concentration measured at MTER-9D was higher in June than in October with oxygen levels measured at 7.7 mg/L and 4.5 mg/L, respectively. A profile of dissolved oxygen in the MTER-9 cluster is shown on Chart 1. Conductivity was higher in the shallower wells compared to the deep wells. The deepest monitoring well at this location, MTER-9A, is screened in fresh water.

The MTER-6 cluster well showed generally aerobic conditions in the three shallowest screens (MTER-6F, E, and D) and anoxic conditions in three deepest screens (MTER-6C, B, and A). The oxygen level in the shallowest screen, MTER-6F, was relatively low (1.7 mg/L) with higher levels in the MTER-6E and D screens, 4.1 mg/L and 5.6 mg/L, respectively. Deeper screens showed dissolved oxygen concentrations less than 1 mg/L. A profile of dissolved oxygen in the MTER-6 cluster is shown on Chart 2.

Field monitoring completed by the USGS for the MLS well (MTER-4) located generally upgradient of the MTER-6 cluster showed a similar pattern in dissolved oxygen data, with low oxygen concentration in the shallowest monitoring point, then higher concentrations down to an elevation of approximately -15 ft., and then anoxic conditions down to approximately -54 ft. elevation.

### Laboratory Analyses

Samples from all new Acapesket North wells and the existing MTER-12 well were submitted for analysis of nitrate nitrogen concentrations. Groundwater sampled from water table monitoring wells MTER-7 and MTER-8, located upgradient from the 0 Shorewood Drive property showed nitrate concentrations of 3.26 mg/L and 9.29 mg/L, respectively. Water table well MTER-12, located cross-gradient from the Shorewood property near the center of the peninsula adjacent to Acapesket Road showed a nitrate concentration of 11.9 mg/L.

The MTER-9 monitoring well cluster was sampled twice for nitrate, in June and October 2015. The results indicated a similar nitrate concentration on each sampling date for individual screens. A profile of nitrate concentrations in October at the MTER-9 cluster (Chart 3) shows the highest concentration at an intermediate depth in well MTER-9C at a mid-screen elevation of -20.48 ft., where 8.26 mg/L was detected. The nitrate concentration dropped to low levels at -40 ft. and below. A very low concentration of nitrite was detected in MTER-9B in October but not in the June sampling.

Nitrate data from the MTER-6 cluster also showed a nitrate profile with the highest concentration of 11.60 mg/L at an intermediate depth (MTER-6D) at mid-screen elevation -24.93. The nitrate concentration dropped to very low levels, less than 1 mg/L, at MTER-6B (mid-screen elevation -45.14). A profile of nitrate concentrations at the MTER-6 cluster is shown in Chart 4.

The USGS MLS well was sampled for nitrate at all ports. Additional analyses were completed for samples from a near water table port, MTER-4-02GNT and deep port, MTER-4-14BK. A profile of nitrate concentrations at the MTER-4 cluster is shown in Chart 5. A pronounced peak in nitrate concentration was seen at sample port MTER-4-07O at elevation -22.12 ft. with a concentration of 11.6 mg/L. Lower but still significant nitrate concentrations were measured in shallow ports. The concentration dropped to very low levels, less than 1 mg/L, at MTER-4-10P (elevation -34.15). Nitrite and ammonia were detected at low concentrations at the shallow port, MTER-4-02GNT and a low concentration of ammonia was detected at deep port, MTER-4-14BK.

## 5.0 DISCUSSION

### 5.1 Geology and Hydrogeology of the Study Area

Soil borings in both the Acapesket North and Acapesket South areas showed glacial sand and gravel outwash deposits to the vertical extent of investigation approximately 80 ft. below ground surface. The outwash is characterized by fine to coarse sand with some gravel and silt. Layers of coarse gravel limit the depth of efficient direct push soil borings to approximately 70 ft. below land surface in the Acapesket North Area.

Groundwater elevation measurements from October 2015 were used to assess the direction of groundwater flow by creating groundwater contour maps. Groundwater flow in the Acapesket South area was to the northwest and west, similar to the direction found in 2014. The addition of the MTER-5 cluster allowed for a refinement in the groundwater map, showing a more westerly flow direction close to Great Pond. The groundwater gradient in the Acapesket South area was similar to that observed in 2014 when the groundwater velocity was estimated to range from 0.088 ft/day to 0.21 ft/day or 32 ft/year to 77 ft/yr.

The horizontal groundwater flow direction in the Acapesket North area was found to be to the southwest. This direction of flow corresponds to the expected flow direction from regional water table and watershed maps. The hydraulic conductivity was assumed to range from 250 ft/day to 312 ft/day based on a nearby hydrogeologic assessment (ABB, 1994). The groundwater velocity was estimated to range from 1.67 ft/day to 2.0 ft/day or 610 ft/year to 730 ft/yr based on the observed gradient of 0.002 ft./ft.

### 5.2 Groundwater Chemistry and Nitrogen Assessment

The groundwater chemistry data collected are useful for considering the fate and transport of nitrogen and ultimately designing a groundwater nitrate treatment system. Denitrification can be mediated by heterotrophic bacteria in the aquifer that consume dissolved organic carbon and use nitrate as an electron acceptor, resulting in the conversion of nitrate to inert nitrogen gas. Conditions for growth of denitrifying bacteria are favorable where groundwater is anoxic. The presence of dissolved oxygen is known to inhibit denitrification as oxygen respiration is more energetically favorable; aerobic bacteria will be predominant where oxygen is available. When the supply of oxygen in groundwater is depleted ( $< 1$  mg/L) and sufficient organic carbon is available as food for bacteria, oxygen reducers are inactive and denitrifying bacteria will utilize available nitrate in their metabolism. Monitoring groundwater chemistry indicators such as dissolved oxygen and other parameters including dissolved iron and manganese gauges groundwater conditions and indicates which type of bacteria may be active.

#### Acapesket South

New data collected in 2015 supports the previous assessment that the fresh water aquifer is generally well oxygenated. The deep screen wells (MTER-1A and MTER-5A) indicate that the underlying saline groundwater is anoxic. The results of laboratory analyses showed low concentrations of nitrate in MTER-1, MTER-2, and MTER-3, similar to concentrations observed in 2014.

Higher conductivity and chloride concentrations at the MTER-5 cluster relative to other freshwater wells in the area indicates MTER-5 may be located near a wastewater source or downgradient of a septic system. Oxygen levels (3.1 mg/L to 4.5 mg/L) are lower in MTER-5 wells than other nearby wells screened in fresh water but still in the aerobic range. Significant nitrate concentrations were measured in groundwater samples from all freshwater screens at the MTER-5 cluster with 8.24 mg/L, 14.7 mg/L and 13.4 mg/L at MTER-5D, MTER-5C, and MTER-5B, respectively. Trace concentrations of ammonia were also detected in MTER-5C and MTER-5B.

### **Acapesket North**

Shallow groundwater monitoring wells install upgradient and cross-gradient from the 0 Shorewood Drive property (MTER-7, MTER-8, and MTER-12) showed oxygenated groundwater with significant nitrate concentrations (3.26 to 11.9 mg/L).

Monitoring wells were installed at four locations on the 0 Shorewood Drive property including the MTER-4/USGS MLS, MTER-6 multi-level cluster, MTER-9 multi-level cluster and MTER-10 water table monitoring well. Groundwater data from the 0 Shorewood Drive property generally indicated lower levels of oxygen near the water table with higher levels at intermediate depths and then dropping off to anoxic conditions below elevation -40 ft. (see Charts 1 and 2). All these wells showed significant nitrate concentrations, up to 11.6 mg/L (MTER-6E and MTER-4-07O). Generally the highest nitrate concentrations were found near elevation -20 ft., approximately 23 ft. below the water table (30 to 38 ft. below land surface). Nitrate concentrations dropped off to low levels below elevation -30 ft. to -40 ft. (33 ft. to 43 ft. below the water table) (see Chart 6).

## **6.0 CONCLUSIONS**

The objective of the Groundwater Investigation Project was to collect data to assess groundwater conditions related to nitrate and potential groundwater remediation in the vicinity of the Acapesket peninsula in East Falmouth. The second phase of investigation provided substantial additional information to meet the project objectives.

### **Acapesket South**

The additional data collected in the Acapesket South area confirmed previous results for the specific locations investigated in 2014 (MTER-1, MTER-2 and MTER-3). However, the newly installed MTER-5 well cluster showed that there are also locations with significant nitrate concentrations where groundwater is likely directly affected by wastewater discharge in the Acapesket South area. The full thickness of the fresh water lens showed high nitrate concentrations at this location. Conceptually these data support a picture of discrete nitrate plumes arising from individual wastewater system.

### **Acapesket North**

High concentrations of nitrate present in groundwater and a significant groundwater velocity indicate a significant flux of nitrate through the area. The vertical profile data for nitrate in groundwater shows a clear vertical distribution of nitrate with a relatively shallow peak in concentration and a fairly well defined limit or bottom for significant concentrations. To an extent, this nitrate distribution corresponds to the vertical distribution of aerobic conditions.

There are however, indications that significant nitrate concentrations extend somewhat below the aerobic zone, and more assessment would be needed to understand that observation.

Results of the Acapesket North study indicate:

- The freshwater sand and gravel aquifer is more than 60 ft. thick in the study area
- Groundwater chemistry and nitrate distribution are generally conducive to groundwater nitrate treatment
- Nitrate was the main form of nitrogen detected and flux is significant
- Analyses showed nitrate concentrations are high and the horizontal groundwater velocity is relatively fast, estimated to range from 1.67 ft./day to 2.0 ft./day or 610 ft./year to 730 ft./yr in the study area
- Aquifer materials are outwash sand and gravel to the depth of investigation 80 ft BGS
- Groundwater conditions are variable but generally aerobic conditions are present to elevation -20 to -30 and anoxic conditions are seen at greater depths.

Conditions observed in the Acapesket North area indicate the location is a good potential candidate for groundwater nitrate remediation.

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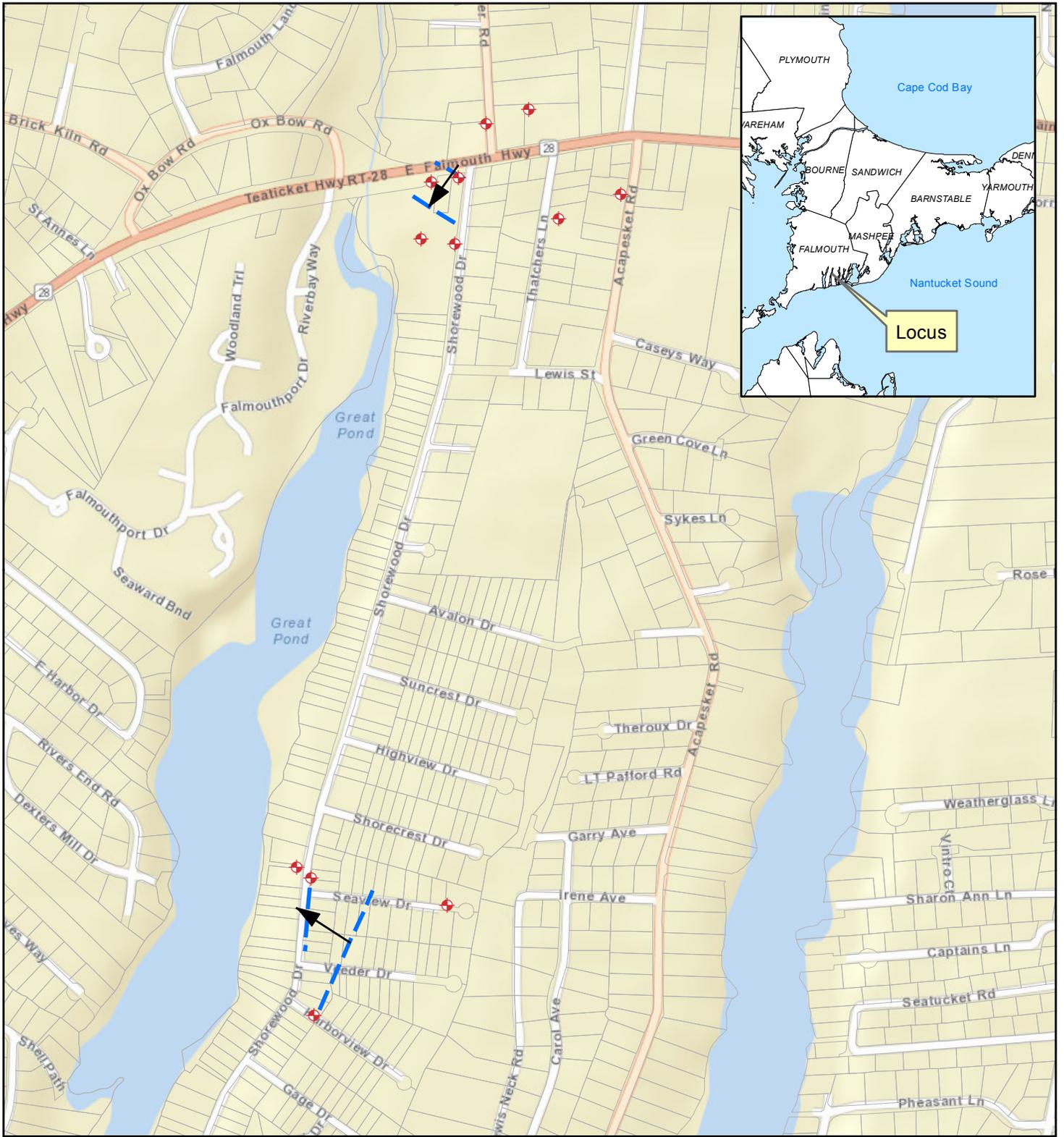
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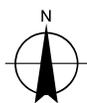
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LEGEND

- ◆ Monitoring Well Location
- Groundwater Contour

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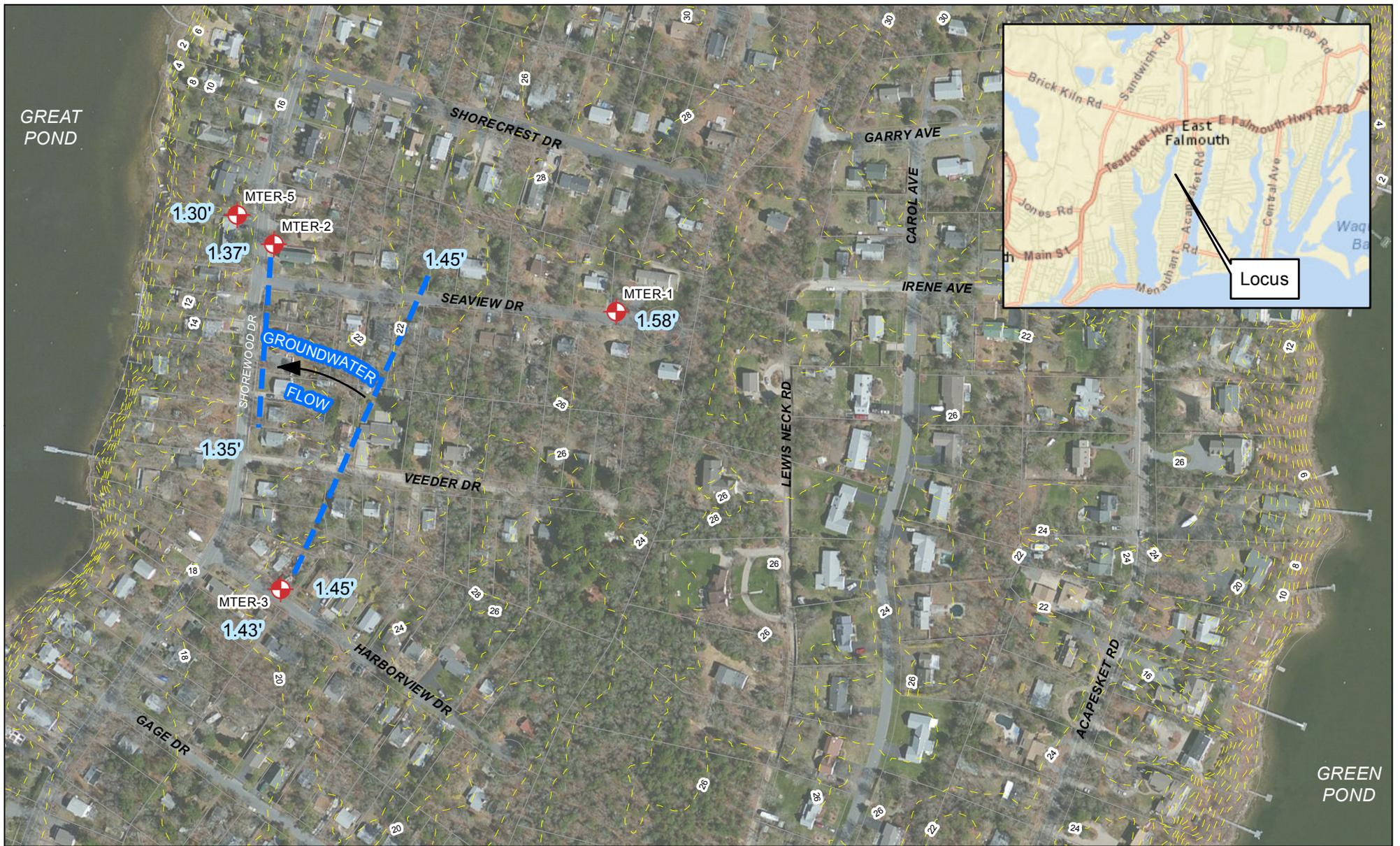


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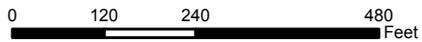
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GROUNDWATER FLOW PATHS

Figure 1



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Map Projection: Lambert Conformal Conic  
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LEGEND 1.43' Groundwater El. (Ft)



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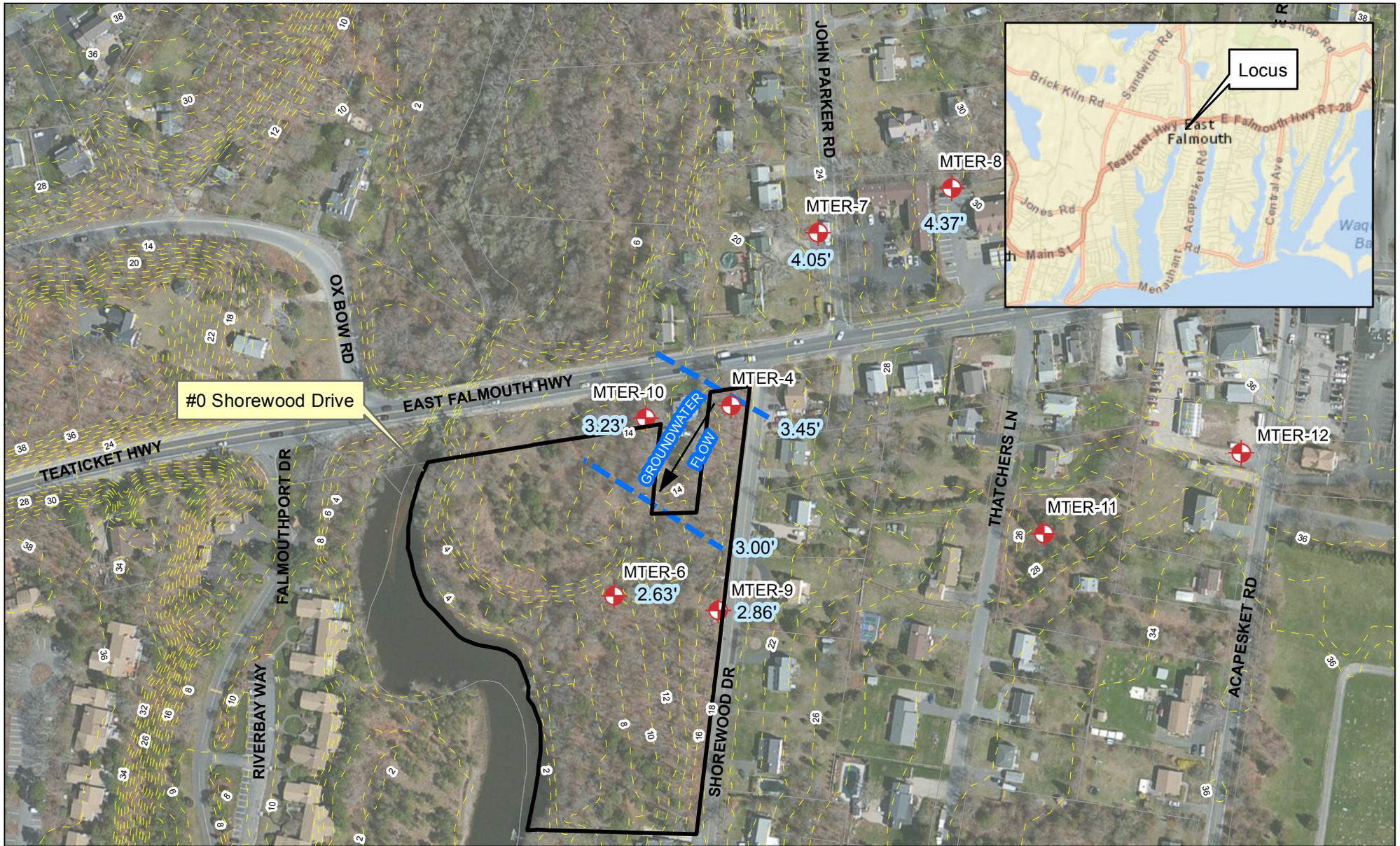
## LOCATION MAP & GROUNDWATER CONTOURS ACAPESKET SOUTH **Figure 2**

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 Grid: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet



**LEGEND**

- 1.43' Groundwater El. (Ft)
- Monitoring Well Location
- Topography
- Falmouth Parcels
- Groundwater Contour



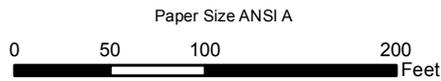
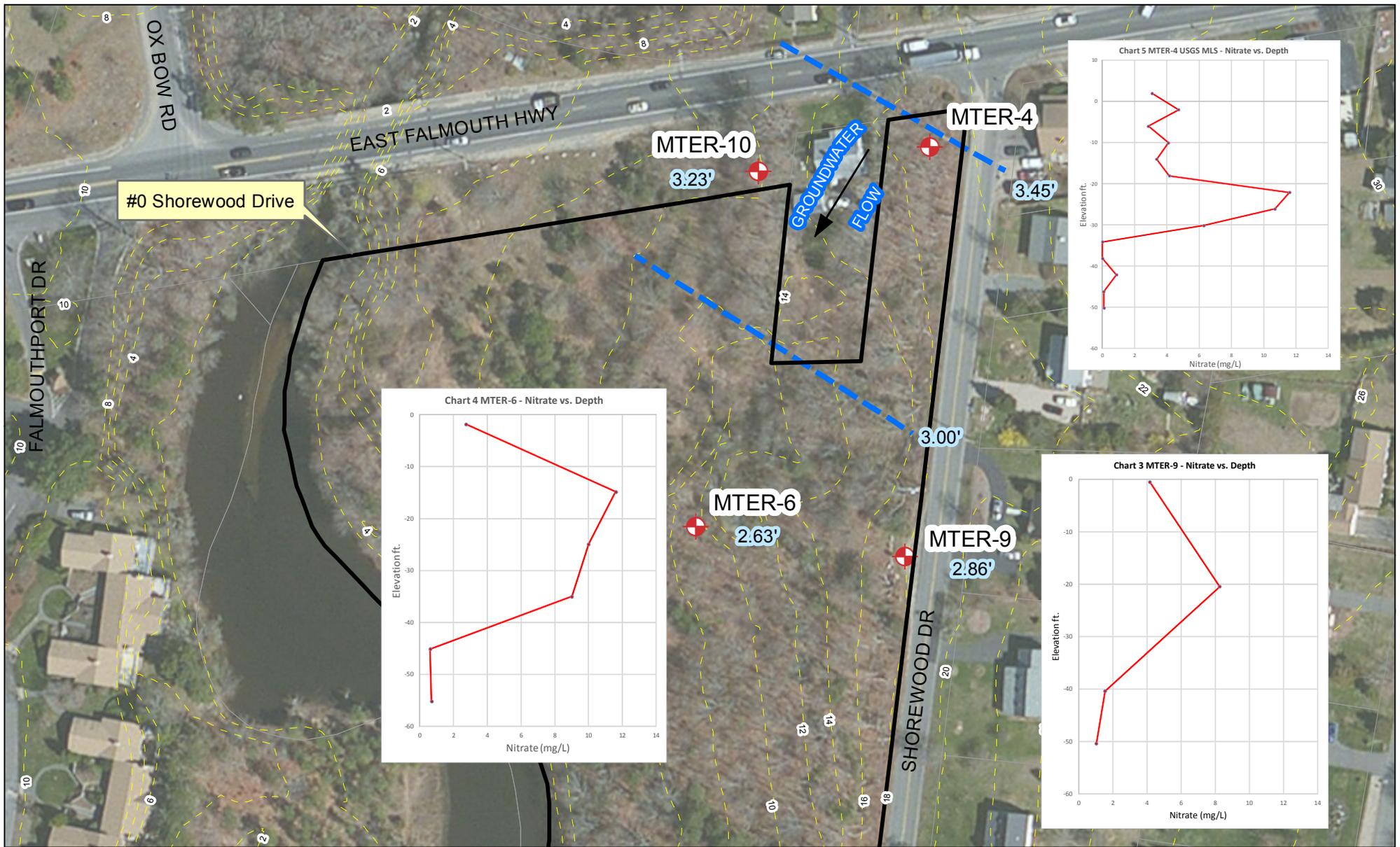
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**LOCATION MAP & GROUNDWATER CONTOURS ACAPESKET NORTH** Figure 3

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Map Projection: Lambert Conformal Conic  
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**LEGEND**

- 1.43' Groundwater El. (Ft)
- Monitoring Well Location
- Topography
- Falmouth Parcels
- Groundwater Contour



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 Acapesket Groundwater Investigation

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 Revision | A  
 Date | 22 Dec 2015

**GROUNDWATER NITRATE CONCENTRATION PROFILES - #0 SHOREWOOD DRIVE**

**Figure 4**

Table 1 Acapesket Monitoring Well Construction Details

Location	Surface Elevation (ft)	TOC Elevation (ft)	Total Well Depth (ft bgs)	Screen Beginning Depth (ft bgs)	Screen End Depth (ft bgs)	Top Screen Elevation (ft)	Bottom Screen Elevation (ft)	Mid-Screen Elevation (ft)	Screen Length (ft)	Inst. Date	Address
MTER-1A	26.54	NM	87.0	77.0	87.0	-50.46	-60.46	-55.46	10	11/14/2014	36 Seaview
MTER-1B	26.54	NM	62.0	52.0	62.0	-25.46	-35.46	-30.46	10	11/14/2014	36 Seaview
MTER-1C	26.54	NM	47.0	37.0	47.0	-10.46	-20.46	-15.46	10	11/14/2014	36 Seaview
MTER-1D	26.54	26.14	32.0	22.0	32.0	4.54	-5.46	-0.46	10	11/5/2014	36 Seaview
MTER-2	19.96	19.58	26.0	16.0	26.0	3.96	-6.04	-1.04	10	11/5/2014	174 Shorewood
MTER-3	20.96	20.55	27.0	17.0	27.0	3.96	-6.04	-1.04	10	11/5/2014	4 Harborview
MTER-4	19.07	18.60	74.0	14 - Point Multilevel Sampler						10/5/2015	0 Shorewood
MTER-5A	15.53	15.17	54.0	44.0	54.0	-28.47	-38.47	-33.47	10	5/20/2015	ROW by 171 Shorewood
MTER-5B	15.44	15.16	44.0	34.0	44.0	-18.56	-28.56	-23.56	10	5/20/2015	ROW by 171 Shorewood
MTER-5C	15.36	14.92	34.0	24.0	34.0	-8.64	-18.64	-13.64	10	5/20/2015	ROW by 171 Shorewood
MTER-5D	15.25	14.85	24.0	14.0	24.0	1.25	-8.75	-3.75	10	5/20/2015	ROW by 171 Shorewood
MTER-6A	9.83	9.50	70.0	60.0	70.0	-50.17	-60.17	-55.17	10	10/6/2015	0 Shorewood
MTER-6B	9.86	9.45	60.0	50.0	60.0	-40.14	-50.14	-45.14	10	10/6/2015	0 Shorewood
MTER-6C	9.98	9.63	50.0	40.0	50.0	-30.02	-40.02	-35.02	10	10/6/2015	0 Shorewood
MTER-6D	10.07	9.67	40.0	30.0	40.0	-19.93	-29.93	-24.93	10	10/6/2015	0 Shorewood
MTER-6E	10.16	9.84	30.0	20.0	30.0	-9.84	-19.84	-14.84	10	10/6/2015	0 Shorewood
MTER-6F	10.17	9.83	17.0	7.0	17.0	3.17	-6.83	-1.83	10	10/6/2015	0 Shorewood
MTER-7	24.01	23.70	28.0	18.0	28.0	6.01	-3.99	1.01	10	5/21/2015	46 E.F.H./John Parker Rd
MTER-8	33.54	39.17	37.0	27.0	37.0	6.54	-3.46	1.54	10	5/21/2015	94 E.F.Highway
MTER-9A	18.58	18.30	74.0	64.0	74.0	-45.42	-55.42	-50.42	10	5/20/2015	0 Shorewood
MTER-9B	18.59	18.40	64.0	54.0	64.0	-35.41	-45.41	-40.41	10	5/20/2015	0 Shorewood
MTER-9C	18.52	18.29	44.0	34.0	44.0	-15.48	-25.48	-20.48	10	5/20/2015	0 Shorewood
MTER-9D	18.46	18.06	24.0	14.0	24.0	4.46	-5.54	-0.54	10	5/20/2015	0 Shorewood
MTER-10	13.92	13.53	20.0	10.0	20.0	3.92	-6.08	-1.08	10	10/5/2015	0 Shorewood
MTER-11	27.12	28.00	35.0	25.0	35.0	2.12	-7.88	-2.88	10	existing	Thatcher Lane
MTER-12	35.85	34.47	44.0	29.0	44.0	6.85	-8.15	-0.65	15	existing	Acapesket Rd

Notes: TOC = Top of Casing

bgs = below ground surface

Elevation Datum - North American Vertical Datum of 1929

All new wells except USGS MLS constructed with 2-inch Schedule 40 PVC threaded flush joint casings, 10 ft screens with Schedule 40 PVC .010" 10 slot well screen

Table 2 Acapesket Groundwater Elevations

Location	Date	TOC Elevation (ft)	Depth to Water (ft )	GW Elevation (ft)
MTER-1D		26.14		
	11/18/2014		24.48	1.66
	12/3/2014		24.47	1.67
	10/27/2015		24.56	1.58
MTER-2		19.58		
	11/18/2014		18.00	1.58
	12/3/2014		18.00	1.58
	10/27/2015		18.21	1.37
MTER-3		20.55		
	11/18/2014		18.91	1.64
	12/3/2014		18.90	1.65
	10/27/2015		19.12	1.43
MTER-4D		18.60		
MTER-5D		14.85		
	6/11/2015		13.65	1.20
	10/27/2015		13.55	1.30
MTER-6F		9.83		
	10/26/2015		7.20	2.63
MTER-7		23.70		
	6/11/2015		19.63	4.07
			19.65	4.05
MTER-8		33.17		
	6/11/2015		28.77	4.40
	10/27/2015		28.80	4.37
MTER-9D		18.06		
	6/9/2015		15.13	2.93
	10/26/2015		15.20	2.86
MTER-10		13.53		
	11/5/2015		10.30	3.23
MTER-11		28.00		
	6/11/2015		24.58	3.42
MTER-12		35.47		
	6/11/2015		31.66	3.81

Notes: TOC = Top of Casing  
Elevation Datum - North American Vertical Datum of 1929 (NAVD 29),

Table 3 Acapesket 2-inch Monitoring Well Groundwater Data Summary

Sample ID/Location	MTER-1A		MTER-1A		MTER-1B		MTER-1B		MTER-1C	
Sampling Date	11/18/2014		10/27/2015		11/18/2014		10/27/2015		11/18/2014	
Field Measurements										
pH (SU)	<b>6.3</b>		<b>5.3</b>		<b>6.6</b>		<b>5.1</b>		<b>6.1</b>	
Temperature (°C)	<b>11.3</b>		<b>11.5</b>		<b>11.4</b>		<b>11.7</b>		<b>11.6</b>	
Dissolved Oxygen (DO; mg/L)	<b>0.6</b>		<b>0.0</b>		<b>9.1</b>		<b>9.5</b>		<b>8.1</b>	
Redox Potential (ORP; mV)	<b>-501.0</b>		<b>1.3</b>	R	<b>-132.0</b>		<b>1.3</b>	R	<b>-121.0</b>	
Conductivity (mS/cm)	<b>36,990</b>		<b>23,500</b>		<b>84</b>		<b>54</b>		<b>158</b>	
Laboratory Analyses										
Nitrogen										
Nitrate as N (mg/L)	0.05	U	<b>0.11</b>		<b>0.15</b>		<b>0.13</b>		<b>0.13</b>	
Nitrite as N (mg/L)	NM		<b>0.02</b>		NM		NM		NM	
Ammonia (mg/L)	NM		<b>0.68</b>		NM		NM		NM	
Total Kjeldahl Nitrogen (TKN) (mg/L)	NM		NM		NM		NM		NM	
Total Nitrogen (mg/L)	NM		<b>0.84</b>		NM		NM		NM	
Alkalinity										
Total Alkalinity (mg/L)	NM		NM		NM		NM		NM	
Bicarbonate Alkalinity (mg/L)	NM		NM		NM		NM		NM	
Anions										
Chloride (mg/L)	<b>14,800.0</b>		<b>13,900.0</b>		<b>11.6</b>		NM		<b>26.8</b>	
Sulfate (mg/L)	<b>2,000.0</b>		<b>132.0</b>		<b>7.2</b>		NM		<b>10.7</b>	
Elements										
Dissolved Iron (mg/L)	NM		NM		NM		NM		NM	
Dissolved Manganese (mg/L)	NM		NM		NM		NM		NM	
Boron (mg/L)	NM		NM		NM		NM		NM	
Dissolved Organic Carbon										
DOC (mg/L)	NM		NM		NM		NM		NM	

Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

R - Suspected error in ORP measurements 10/26 and 10/27

NS - Not Sampled / NM-Not Measured

Bold - detected above the Minimum Detection Limit

TKN does not include nitrate and nitrite nitrogen

Table 3 Acapesket 2-inch Monitoring Well Groundwater Data Summary

Sample ID/Location	MTER-1C		MTER-1D		MTER-1D		MTER-2		MTER-2	
Sampling Date	10/27/2015		11/18/2014		10/27/2015		11/18/2014		10/27/2015	
Field Measurements										
pH (SU)	<b>5.2</b>		<b>5.7</b>		<b>5.3</b>		<b>5.1</b>		<b>5.5</b>	
Temperature (°C)	<b>11.7</b>		<b>12.5</b>		<b>12.4</b>		<b>12.6</b>		<b>12.7</b>	
Dissolved Oxygen (DO; mg/L)	<b>8.5</b>		<b>10.7</b>		<b>9.5</b>		<b>7.4</b>		<b>5.5</b>	
Redox Potential (ORP; mV)	<b>1.3</b>	R	<b>43.0</b>		<b>1.3</b>	R	<b>162.0</b>		<b>1.4</b>	R
Conductivity (mS/cm)	<b>77</b>		<b>79</b>		<b>66</b>		<b>111</b>		<b>81</b>	
Laboratory Analyses										
Nitrogen										
Nitrate as N (mg/L)	<b>0.18</b>		<b>0.13</b>		<b>0.06</b>		<b>1.3</b>		<b>0.66</b>	
Nitrite as N (mg/L)	NM		0.05	U	NM		0.05	U	NM	
Ammonia (mg/L)	NM		0.02	U	NM		0.02	U	NM	
Total Kjeldahl Nitrogen (TKN) (mg/L)	NM		0.2	U	NM		0.2	U	NM	
Total Nitrogen (mg/L)	NM		NM		NM		NM		NM	
Alkalinity										
Total Alkalinity (mg/L)	NM		<b>8.4</b>		NM		<b>3.1</b>	J	NM	
Bicarbonate Alkalinity (mg/L)	NM		<b>8.4</b>		NM		<b>3.1</b>	J	NM	
Anions										
Chloride (mg/L)	NM		<b>10.1</b>		NM		<b>14.9</b>		NM	
Sulfate (mg/L)	NM		<b>7.2</b>		NM		<b>8.4</b>		NM	
Elements										
Dissolved Iron (mg/L)	NM		<b>0.20</b>	J	NM		<b>0.098</b>		NM	
Dissolved Manganese (mg/L)	NM		<b>0.500</b>		NM		<b>0.320</b>		NM	
Boron (mg/L)	NM		<b>0.0066</b>	J	NM		<b>0.012</b>	J	NM	
Dissolved Organic Carbon										
DOC (mg/L)	NM		<b>0.88</b>	J	NM		<b>1.2</b>		NM	

Notes:

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R - Suspected error in ORP measurements 10/26 and 10/27

NS - Not Sampled / NM-Not Measured

Bold - detected above the Minimum Detection Limit

TKN does not include nitrate and nitrite nitrogen

Table 3 Acapesket 2-inch Monitoring Well Groundwater Data Summary

Sample ID/Location	MTER-3		MTER-3		MTER-5A		MTER-5B		MTER-5C	
Sampling Date	11/18/2014		10/27/2015		10/27/2015		10/27/2015		10/27/2015	
Field Measurements										
pH (SU)	<b>5.9</b>		<b>5.5</b>		<b>4.8</b>		<b>4.5</b>		<b>4.3</b>	
Temperature (°C)	<b>13.3</b>		<b>13.5</b>		<b>11.6</b>		<b>11.7</b>		<b>12.3</b>	
Dissolved Oxygen (DO; mg/L)	<b>10.9</b>		<b>9.1</b>		<b>1.1</b>		<b>3.1</b>		<b>4.5</b>	
Redox Potential (ORP; mV)	<b>158</b>		<b>1.3</b>	R	<b>1.4</b>	R	<b>1.4</b>	R	<b>1.4</b>	R
Conductivity (mS/cm)	<b>108</b>		<b>73</b>		<b>22,190</b>		<b>690</b>		<b>524</b>	
Laboratory Analyses										
Nitrogen										
Nitrate as N (mg/L)	<b>0.63</b>		<b>0.43</b>		<b>0.01</b>		<b>13.40</b>		<b>14.70</b>	
Nitrite as N (mg/L)	0.05	U	NM		<b>0.01</b>		0.01	U	0.01	U
Ammonia (mg/L)	0.02	U	NM		<b>0.11</b>		<b>0.06</b>		<b>0.03</b>	
Total Kjeldahl Nitrogen (TKN) (mg/L)	0.2	U	NM		NM		NM		NM	
Total Nitrogen (mg/L)	NM		NM		<b>2.60</b>		<b>13.50</b>		14.7	
Alkalinity										
Total Alkalinity (mg/L)	<b>9.5</b>		NM		NM		NM		NM	
Bicarbonate Alkalinity (mg/L)	<b>9.5</b>		NM		NM		NM		NM	
Anions										
Chloride (mg/L)	<b>13.3</b>		NM		<b>10,200.0</b>		<b>207.0</b>		<b>125.0</b>	
Sulfate (mg/L)	<b>8.0</b>		NM		<b>129.0</b>		<b>13.4</b>		<b>13.5</b>	
Elements										
Dissolved Iron (mg/L)	<b>0.064</b>		NM		NM		NM		NM	
Dissolved Manganese (mg/L)	<b>0.240</b>		NM		NM		NM		NM	
Boron (mg/L)	<b>0.0085</b>	J	NM		NM		NM		NM	
Dissolved Organic Carbon										
DOC (mg/L)	<b>1.2</b>		NM		NM		NM		NM	

Notes:

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R - Suspected error in ORP measurements 10/26 and 10/27

NS - Not Sampled / NM-Not Measured

Bold - detected above the Minimum Detection Limit

TKN does not include nitrate and nitrite nitrogen

Table 3 Acapesket 2-inch Monitoring Well Groundwater Data Summary

Sample ID/Location	MTER-5D		MTER-6A		MTER-6B		MTER-6C		MTER-6D	
Sampling Date	10/27/2015		10/26/2015		10/26/2015		10/26/2015		10/26/2015	
Field Measurements										
pH (SU)	<b>4.8</b>		<b>5.4</b>		<b>5.6</b>		<b>5.4</b>		<b>4.9</b>	
Temperature (°C)	<b>14.0</b>		<b>11.8</b>		<b>11.8</b>		<b>11.8</b>		<b>11.7</b>	
Dissolved Oxygen (DO; mg/L)	<b>4.4</b>		<b>0.2</b>		<b>0.0</b>		<b>0.9</b>		<b>5.6</b>	
Redox Potential (ORP; mV)	<b>1.3</b>	R	<b>1.4</b>	R	<b>1.3</b>	R	<b>1.3</b>		<b>1.3</b>	R
Conductivity (mS/cm)	<b>463</b>		<b>79</b>		<b>84</b>		<b>146</b>		<b>222</b>	
Laboratory Analyses										
Nitrogen										
Nitrate as N (mg/L)	<b>8.24</b>		<b>0.69</b>		<b>0.62</b>		<b>9.01</b>		<b>10.00</b>	
Nitrite as N (mg/L)	0.01	U								
Ammonia (mg/L)	0.02	U								
Total Kjeldahl Nitrogen (TKN) (mg/L)	NM									
Total Nitrogen (mg/L)	<b>8.24</b>		<b>0.77</b>		<b>0.71</b>		<b>9.01</b>		<b>10.00</b>	
Alkalinity										
Total Alkalinity (mg/L)	NM									
Bicarbonate Alkalinity (mg/L)	NM									
Anions										
Chloride (mg/L)	<b>121.0</b>		<b>13.4</b>		<b>14.4</b>		<b>13.7</b>		<b>43.0</b>	
Sulfate (mg/L)	<b>13.0</b>		<b>7.5</b>		<b>6.2</b>		5.0	U	<b>6.2</b>	
Elements										
Dissolved Iron (mg/L)	NM		<b>0.417</b>		<b>0.565</b>		<b>0.839</b>		<b>0.263</b>	
Dissolved Manganese (mg/L)	NM		<b>0.370</b>		<b>0.315</b>		<b>0.183</b>		<b>0.344</b>	
Boron (mg/L)	NM		0.050	U	0.050	U	0.100	U	0.100	U
Dissolved Organic Carbon										
DOC (mg/L)	NM		<b>1.5</b>		<b>2.4</b>		<b>4.4</b>		<b>2.2</b>	

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R - Suspected error in ORP measurements 10/26 and 10/27

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TKN does not include nitrate and nitrite nitrogen

Table 3 Acapesket 2-inch Monitoring Well Groundwater Data Summary

Sample ID/Location	MTER-6E		MTER-6F		MTER-7		MTER-8		MTER-9A	
Sampling Date	10/26/2015		10/26/2015		10/27/2015		10/27/2015		6/9/2015	
Field Measurements										
pH (SU)	<b>5.4</b>		<b>5.9</b>		<b>6.0</b>		<b>5.6</b>		<b>5.0</b>	
Temperature (°C)	<b>14.0</b>		<b>13.0</b>		<b>13.5</b>		<b>11.8</b>		<b>12.8</b>	
Dissolved Oxygen (DO; mg/L)	<b>4.1</b>		<b>1.7</b>		<b>7.4</b>		<b>8.2</b>		<b>1.5</b>	
Redox Potential (ORP; mV)	<b>1.3</b>	R	<b>1.3</b>	R	<b>1.4</b>	R	<b>1.3</b>	R	<b>167.7</b>	
Conductivity (mS/cm)	<b>429</b>		<b>450</b>		<b>131</b>		<b>170</b>		<b>76</b>	
Laboratory Analyses										
Nitrogen										
Nitrate as N (mg/L)	<b>11.60</b>		<b>2.73</b>		<b>3.26</b>		<b>9.29</b>		<b>0.645</b>	
Nitrite as N (mg/L)	0.01	U	0.01	U	NM		NM		0.01	U
Ammonia (mg/L)	0.02	U	0.02	U	NM		NM		<b>0.03</b>	
Total Kjeldahl Nitrogen (TKN) (mg/L)	NM		NM		NM		NM		NM	
Total Nitrogen (mg/L)	<b>11.60</b>		<b>2.89</b>		NM		NM		<b>1.51</b>	
Alkalinity										
Total Alkalinity (mg/L)	NM		NM		NM		NM		NM	
Bicarbonate Alkalinity (mg/L)	NM		NM		NM		NM		NM	
Anions										
Chloride (mg/L)	<b>113.0</b>		<b>146.0</b>		NM		NM		<b>18.2</b>	
Sulfate (mg/L)	<b>6.0</b>		<b>7.1</b>		NM		NM		<b>9.1</b>	
Elements										
Dissolved Iron (mg/L)	<b>0.236</b>		0.050	U	NM		NM		<b>0.440</b>	
Dissolved Manganese (mg/L)	<b>0.029</b>		<b>0.026</b>		NM		NM		<b>0.799</b>	
Boron (mg/L)	0.050	U	0.050	U	NM		NM		NM	
Dissolved Organic Carbon										
DOC (mg/L)	<b>2.3</b>		<b>2.9</b>		NM		NM		1.0	U

Notes:

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R - Suspected error in ORP measurements 10/26 and 10/27

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TKN does not include nitrate and nitrite nitrogen

Table 3 Acapesket 2-inch Monitoring Well Groundwater Data Summary

Sample ID/Location	MTER-9A		MTER-9B		MTER-9B		MTER-9C		MTER-9C	
Sampling Date	10/26/2015		6/9/2015		10/26/2015		6/9/2015		10/26/2015	
Field Measurements										
pH (SU)	<b>5.0</b>		<b>4.9</b>		<b>5.2</b>		<b>4.2</b>		<b>4.5</b>	
Temperature (°C)	<b>12.0</b>		<b>12.3</b>		<b>12.0</b>		<b>12.1</b>		<b>12.1</b>	
Dissolved Oxygen (DO; mg/L)	<b>2.2</b>		<b>1.8</b>		<b>0.2</b>		<b>7.8</b>		<b>7.5</b>	
Redox Potential (ORP; mV)	<b>1.4</b>	R	<b>204.6</b>		<b>1.3</b>	R	<b>347.5</b>		<b>1.4</b>	R
Conductivity (mS/cm)	<b>83</b>		<b>115</b>		<b>94</b>		<b>143</b>		<b>153</b>	
Laboratory Analyses										
Nitrogen										
Nitrate as N (mg/L)	<b>1.03</b>		<b>2.36</b>		<b>1.54</b>		<b>8.69</b>		<b>8.26</b>	
Nitrite as N (mg/L)	0.01	U	0.01	U	<b>0.014</b>		0.01	U	0.01	U
Ammonia (mg/L)	0.02	U								
Total Kjeldahl Nitrogen (TKN) (mg/L)	NM									
Total Nitrogen (mg/L)	<b>1.09</b>		<b>3.16</b>		<b>1.56</b>		<b>9.13</b>		<b>8.26</b>	
Alkalinity										
Total Alkalinity (mg/L)	NM									
Bicarbonate Alkalinity (mg/L)	NM									
Anions										
Chloride (mg/L)	<b>15.4</b>		<b>32.6</b>		<b>19.3</b>		<b>25.8</b>		<b>18.6</b>	
Sulfate (mg/L)	<b>6.5</b>		<b>7.5</b>		<b>6.2</b>		<b>9.3</b>		<b>5.0</b>	
Elements										
Dissolved Iron (mg/L)	0.050	U	<b>0.255</b>		0.050	U	<b>0.118</b>		0.050	U
Dissolved Manganese (mg/L)	<b>0.031</b>		<b>0.186</b>		<b>0.039</b>		<b>0.184</b>		<b>0.172</b>	
Boron (mg/L)	0.200	U	NM		0.100	U	NM		0.200	U
Dissolved Organic Carbon										
DOC (mg/L)	1.0	U	1.0	U	<b>1.6</b>		1.0	U	<b>1.2</b>	

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Table 3 Acapesket 2-inch Monitoring Well Groundwater Data Summary

Sample ID/Location	MTER-9D		MTER-9D		MTER-10		MTER-11		MTER-12	
Sampling Date	6/9/2015		10/26/2015		11/23/2015		10/27/2015		10/27/2015	
Field Measurements										
pH (SU)	<b>4.4</b>		<b>4.7</b>		NM		NS		<b>5.2</b>	
Temperature (°C)	<b>11.0</b>		<b>14.5</b>		NM		NS		<b>13.0</b>	
Dissolved Oxygen (DO; mg/L)	<b>7.7</b>		<b>4.5</b>		NM		NS		<b>5.8</b>	
Redox Potential (ORP; mV)	<b>311.0</b>		<b>1.3</b>	R	NM		NS		<b>1.3</b>	R
Conductivity (mS/cm)	<b>310</b>		<b>356</b>		NM		NS		<b>395</b>	
Laboratory Analyses										
Nitrogen										
Nitrate as N (mg/L)	<b>6.42</b>		<b>4.17</b>		<b>3.12</b>		NS		<b>11.90</b>	
Nitrite as N (mg/L)	0.01	U	0.01	U	NM		NS		NM	
Ammonia (mg/L)	0.02	U	0.02	U	NM		NS		NM	
Total Kjeldahl Nitrogen (TKN) (mg/L)	NM		NM		NM		NS		NM	
Total Nitrogen (mg/L)	<b>7.34</b>		<b>4.17</b>		NM		NS		NM	
Alkalinity										
Total Alkalinity (mg/L)	NM		NM		NM		NS		NM	
Bicarbonate Alkalinity (mg/L)	NM		NM		NM		NS		NM	
Anions										
Chloride (mg/L)	<b>97.0</b>		<b>99.9</b>		NM		NS		NM	
Sulfate (mg/L)	<b>15.1</b>		<b>9.9</b>		NM		NS		NM	
Elements										
Dissolved Iron (mg/L)	<b>0.076</b>		0.050	U	NM		NS		<b>0.625</b>	
Dissolved Manganese (mg/L)	<b>0.101</b>		<b>0.085</b>		NM		NS		<b>0.412</b>	
Boron (mg/L)	NM		0.050	U	NM		NS		NM	
Dissolved Organic Carbon										
DOC (mg/L)	<b>1.4</b>		<b>3.0</b>		NM		NS		NM	

Notes:

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

R - Suspected error in ORP measurements 10/26 and 10/27

NS - Not Sampled / NM-Not Measured

Bold - detected above the Minimum Detection Limit

TKN does not include nitrate and nitrite nitrogen

Table 4 Acapesket USGS MLS Well Groundwater Data Summary

<b>Sample Location MTER-4 USGS MLS</b>				
<b>Sample Date:</b>	<b>10/26/2015</b>	<b>10/26/2015</b>	<b>10/26/2015</b>	<b>10/26/2015</b>
<b>Sample ID</b>	<b>MTER-4-01PT</b>	<b>MTER-4-02GNT</b>	<b>MTER-4-03RT</b>	<b>MTER-4-04BUT</b>
Laboratory Analyses				
<b>Analyte</b>				
Nitrate as N (mg/L)	<b>3.07</b>	<b>4.73</b>	<b>2.85</b>	<b>4.09</b>
Nitrite as N (mg/L)	-	<b>0.017</b>	-	-
Ammonia as N (mg/L)	-	<b>0.046</b>	-	-
Total Nitrogen (mg/L)	-	<b>5.03</b>	-	-
Chloride (mg/L)	-	<b>182</b>	-	-
Sulfate (mg/L)	-	<b>5.3</b>	-	-
Dissolved Iron (mg/L)	-	<b>0.498</b>	-	-
Dissolved Manganese (mg/L)	-	<b>0.473</b>	-	-
Boron (mg/L)	-	<50	-	-
Dissolved Organic Carbon (mg/L)	-	<b>1.9</b>	-	-

Notes: MLS = Multilevel Sampler

Table 4 Acapesket USGS MLS Well Groundwater Data Summary

<b>Sample Location MTER-4 USGS MLS</b>				
<b>Sample Date:</b>	<b>10/26/2015</b>	<b>10/26/2015</b>	<b>10/26/2015</b>	<b>10/26/2015</b>
<b>Sample ID</b>	<b>MTER-4-05BKT</b>	<b>MTER-4-06WT</b>	<b>MTER-4-07O</b>	<b>MTER-4-08GY</b>
Laboratory Analyses				
<b>Analyte</b>				
Nitrate as N (mg/L)	<b>3.37</b>	<b>4.15</b>	<b>11.6</b>	<b>10.7</b>
Nitrite as N (mg/L)	-	-	-	-
Ammonia as N (mg/L)	-	-	-	-
Total Nitrogen (mg/L)	-	-	-	-
Chloride (mg/L)	-	-	-	-
Sulfate (mg/L)	-	-	-	-
Dissolved Iron (mg/L)	-	-	-	-
Dissolved Manganese (mg/L)	-	-	-	-
Boron (mg/L)	-	-	-	-
Dissolved Organic Carbon (mg/L)	-	-	-	-

Notes: MLS = Multilevel Sampler

Table 4 Acapesket USGS MLS Well Groundwater Data Summary

<b>Sample Location MTER-4 USGS MLS</b>				
<b>Sample Date:</b>	<b>10/26/2015</b>	<b>10/26/2015</b>	<b>10/26/2015</b>	<b>10/26/2015</b>
<b>Sample ID</b>	<b>MTER-4-09Y</b>	<b>MTER-4-10P</b>	<b>MTER-4-11GN</b>	<b>MTER-4-12R</b>
Laboratory Analyses				
<b>Analyte</b>				
Nitrate as N (mg/L)	<b>6.3</b>	<0.03	<0.03	<b>0.869</b>
Nitrite as N (mg/L)	-	-	-	-
Ammonia as N (mg/L)	-	-	-	-
Total Nitrogen (mg/L)	-	-	-	-
Chloride (mg/L)	-	-	-	-
Sulfate (mg/L)	-	-	-	-
Dissolved Iron (mg/L)	-	-	-	-
Dissolved Manganese (mg/L)	-	-	-	-
Boron (mg/L)	-	-	-	-
Dissolved Organic Carbon (mg/L)	-	-	-	-

Notes: MLS = Multilevel Sampler

Table 4 Acapesket USGS MLS Well Groundwater Data Summary

<b>Sample Location MTER-4 USGS MLS</b>		
<b>Sample Date:</b>	<b>10/26/2015</b>	<b>10/26/2015</b>
<b>Sample ID</b>	<b>MTER-4-13BU</b>	<b>MTER-4-14BK</b>
Laboratory Analyses		
<b>Analyte</b>		
Nitrate as N (mg/L)	<b>0.09</b>	<b>0.106</b>
Nitrite as N (mg/L)	-	<0.01
Ammonia as N (mg/L)	-	<b>0.039</b>
Total Nitrogen (mg/L)	-	<b>0.201</b>
Chloride (mg/L)	-	<b>13.8</b>
Sulfate (mg/L)	-	<b>7.3</b>
Dissolved Iron (mg/L)	-	<b>6.24</b>
Dissolved Manganese (mg/L)	-	<b>1.28</b>
Boron (mg/L)	-	<50
Dissolved Organic Carbon (mg/L)	-	<b>2</b>

Notes: MLS = Multilevel Sampler

Chart 1 MTER-9 - Oxygen vs. Depth

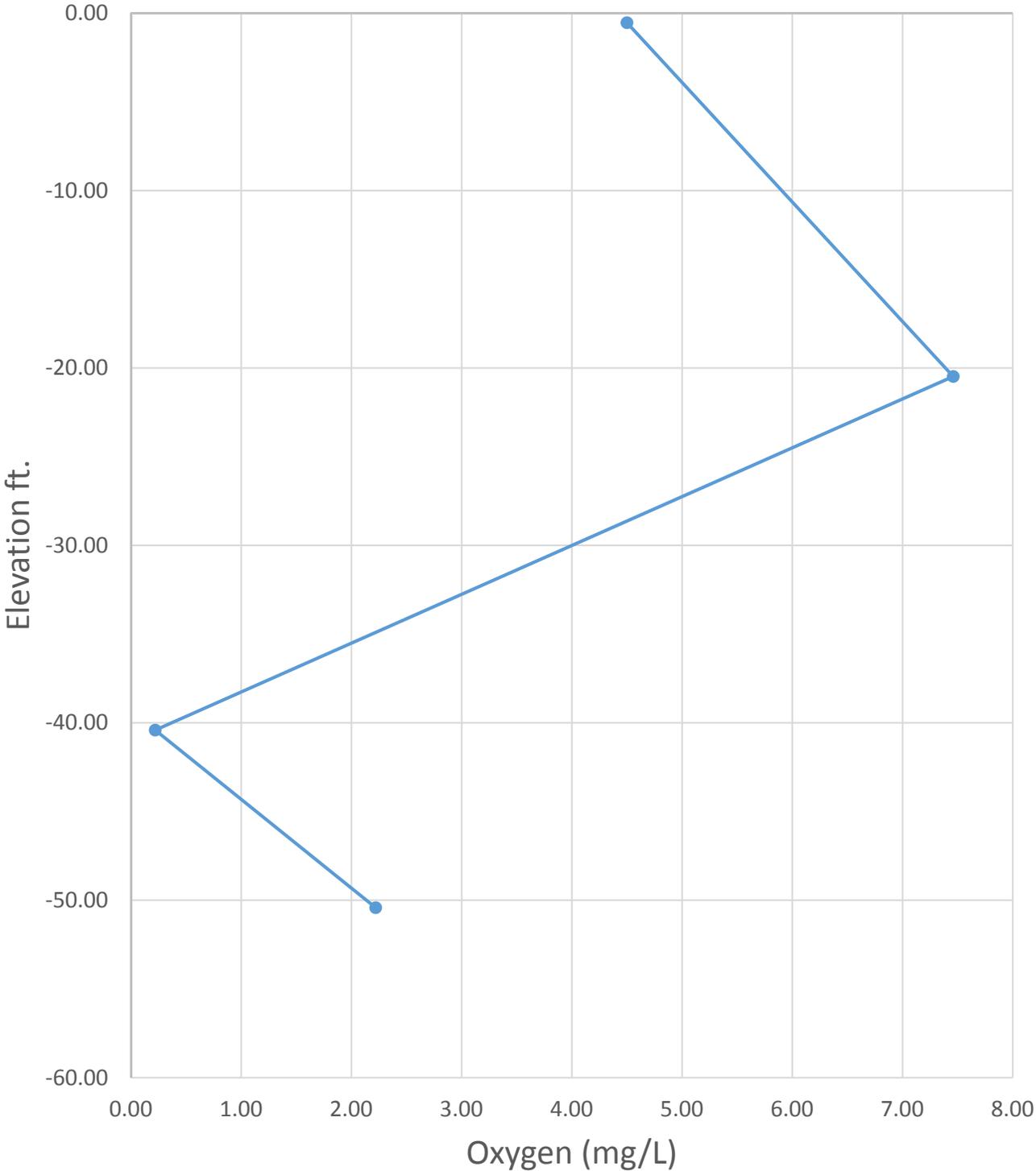


Chart 2 MTER-6 - Oxygen vs. Depth

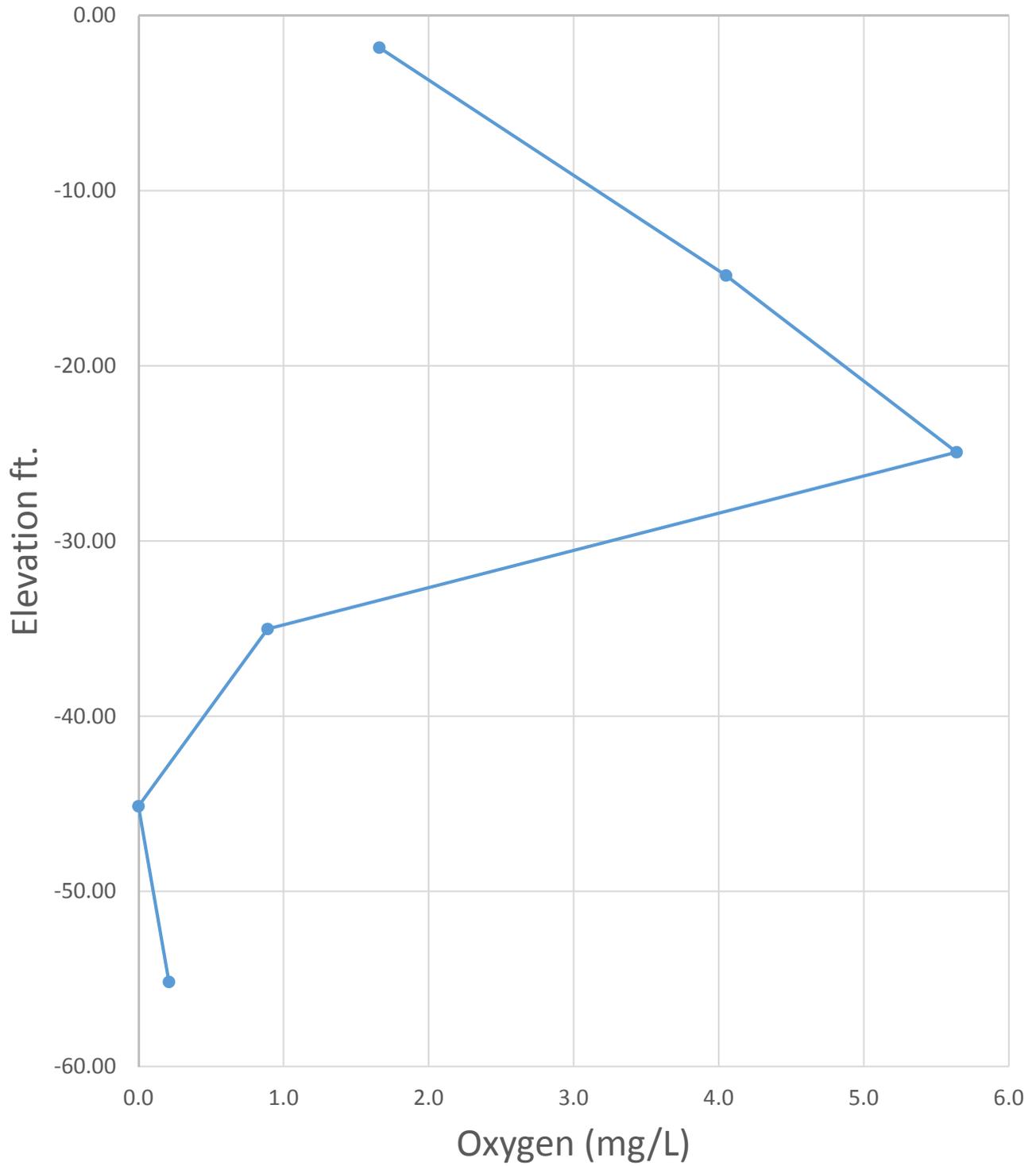


Chart 3 MTER-9 - Nitrate vs. Depth

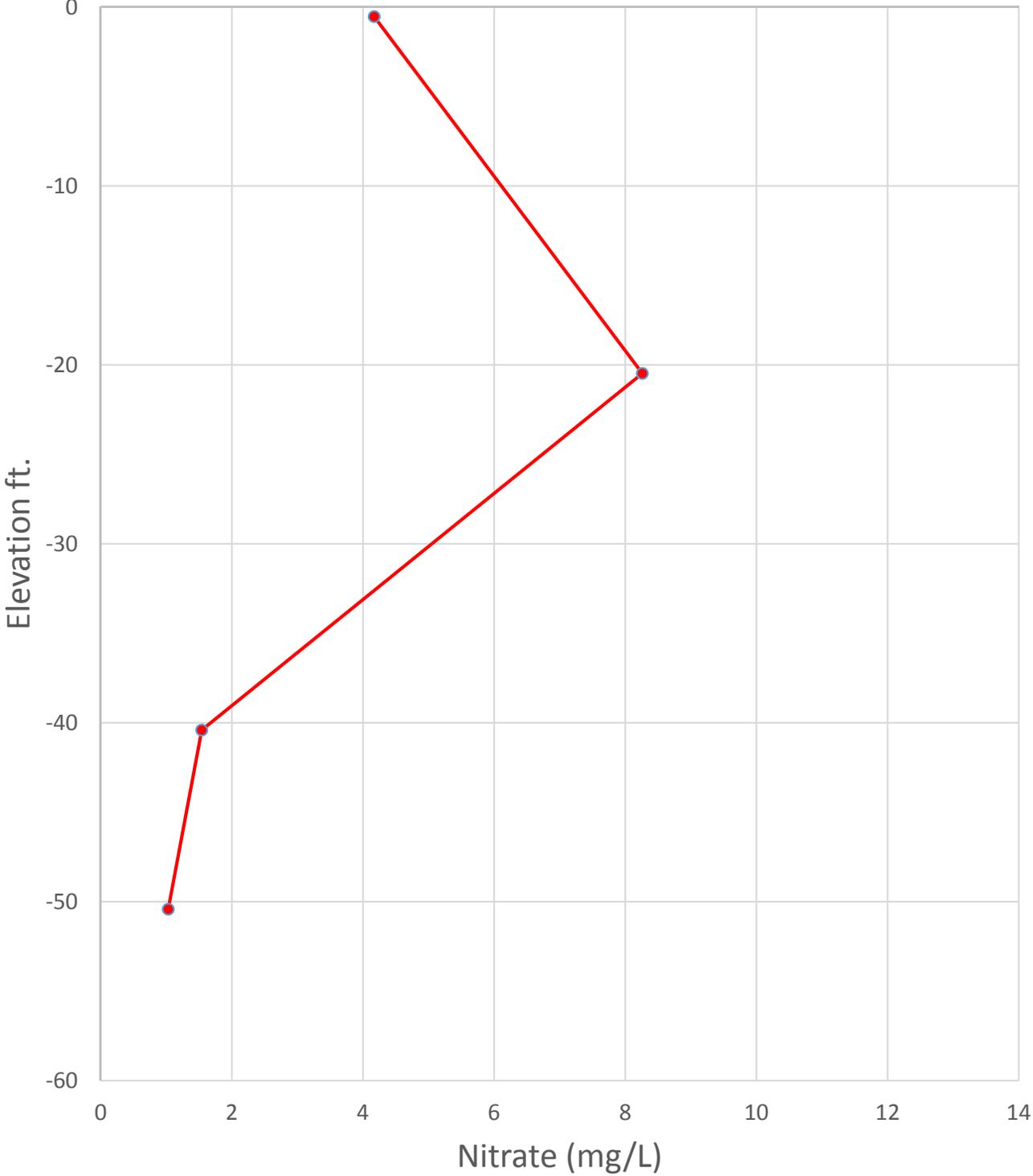


Chart 4 MTER-6 - Nitrate vs. Depth

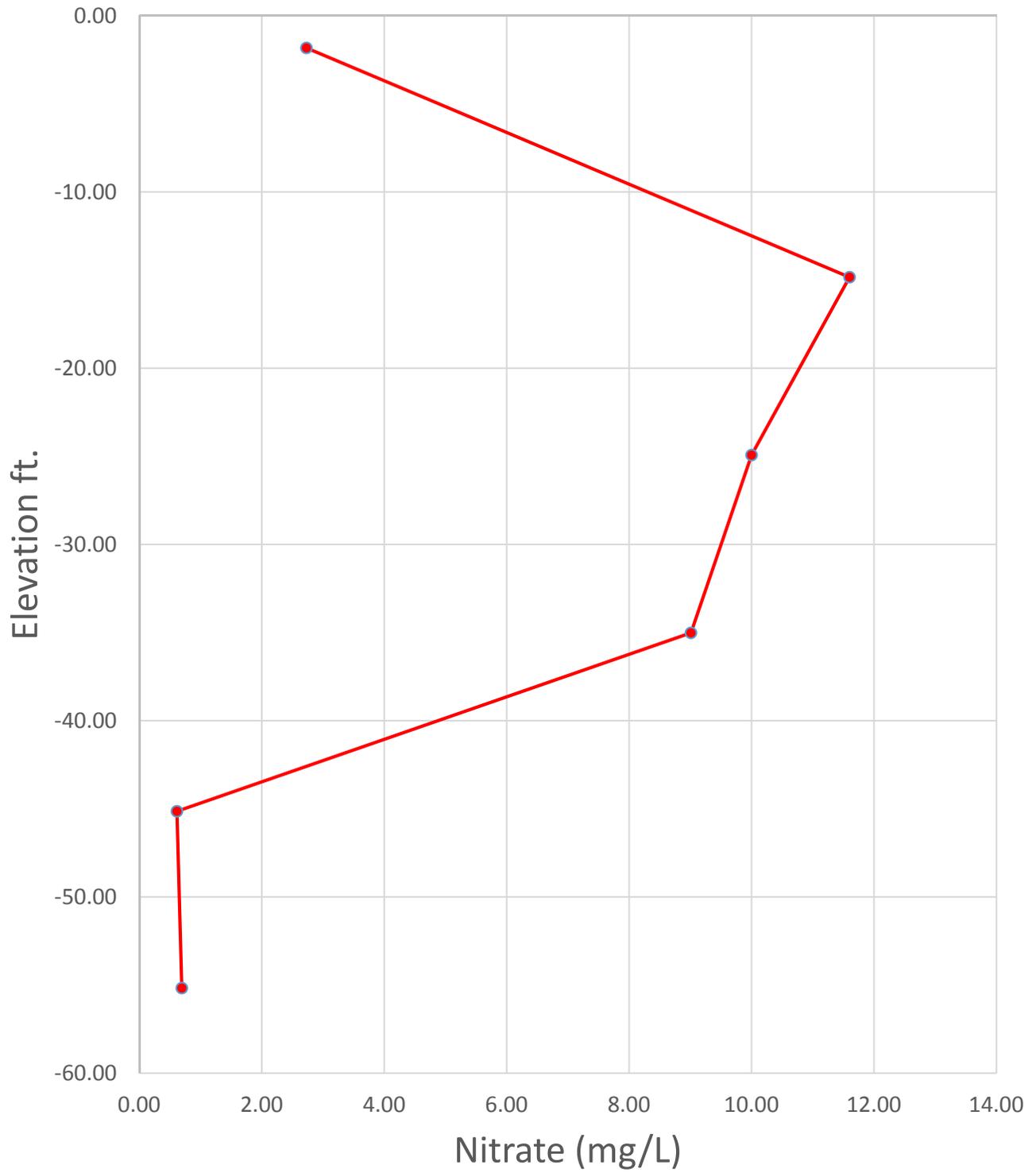
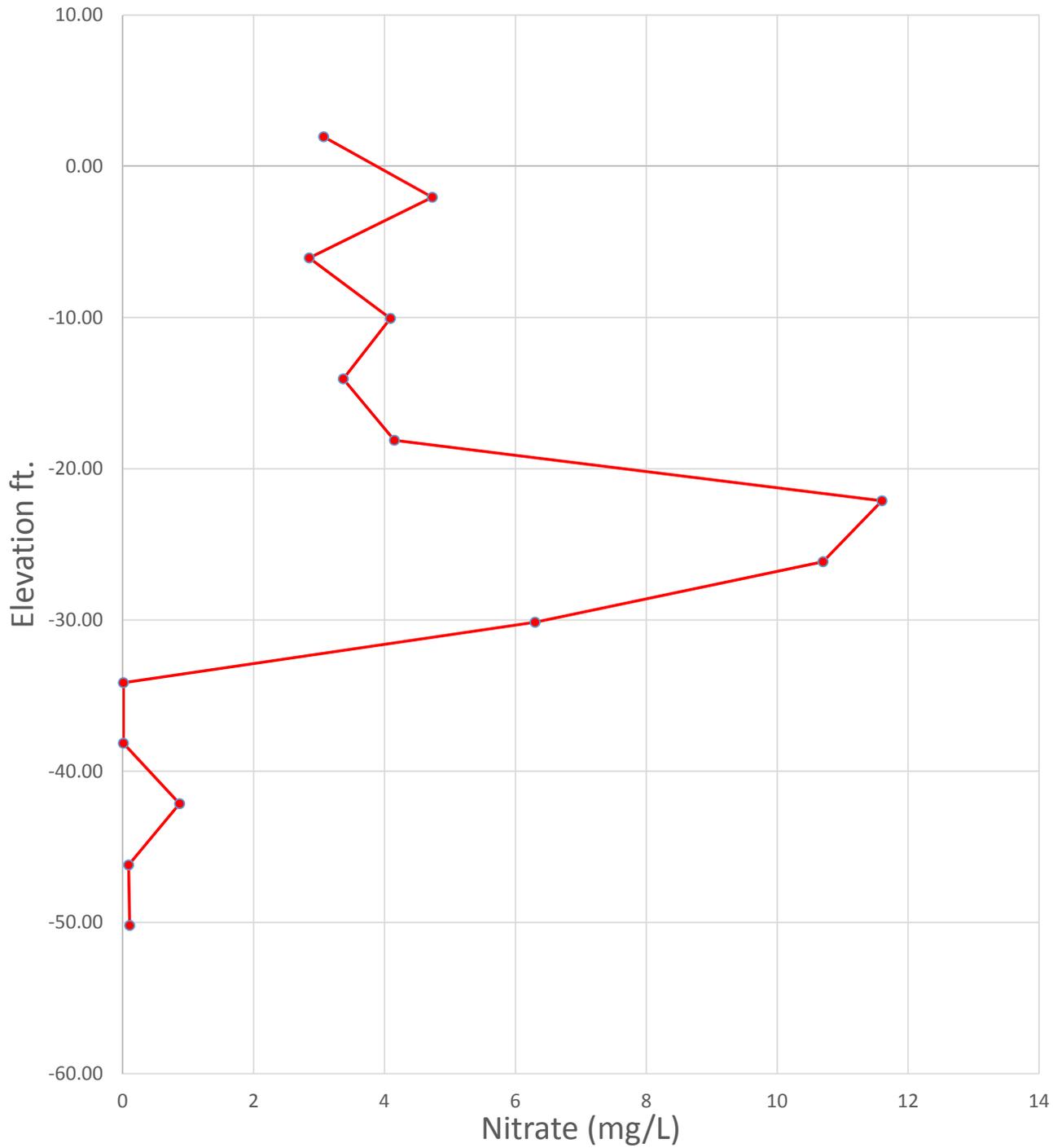
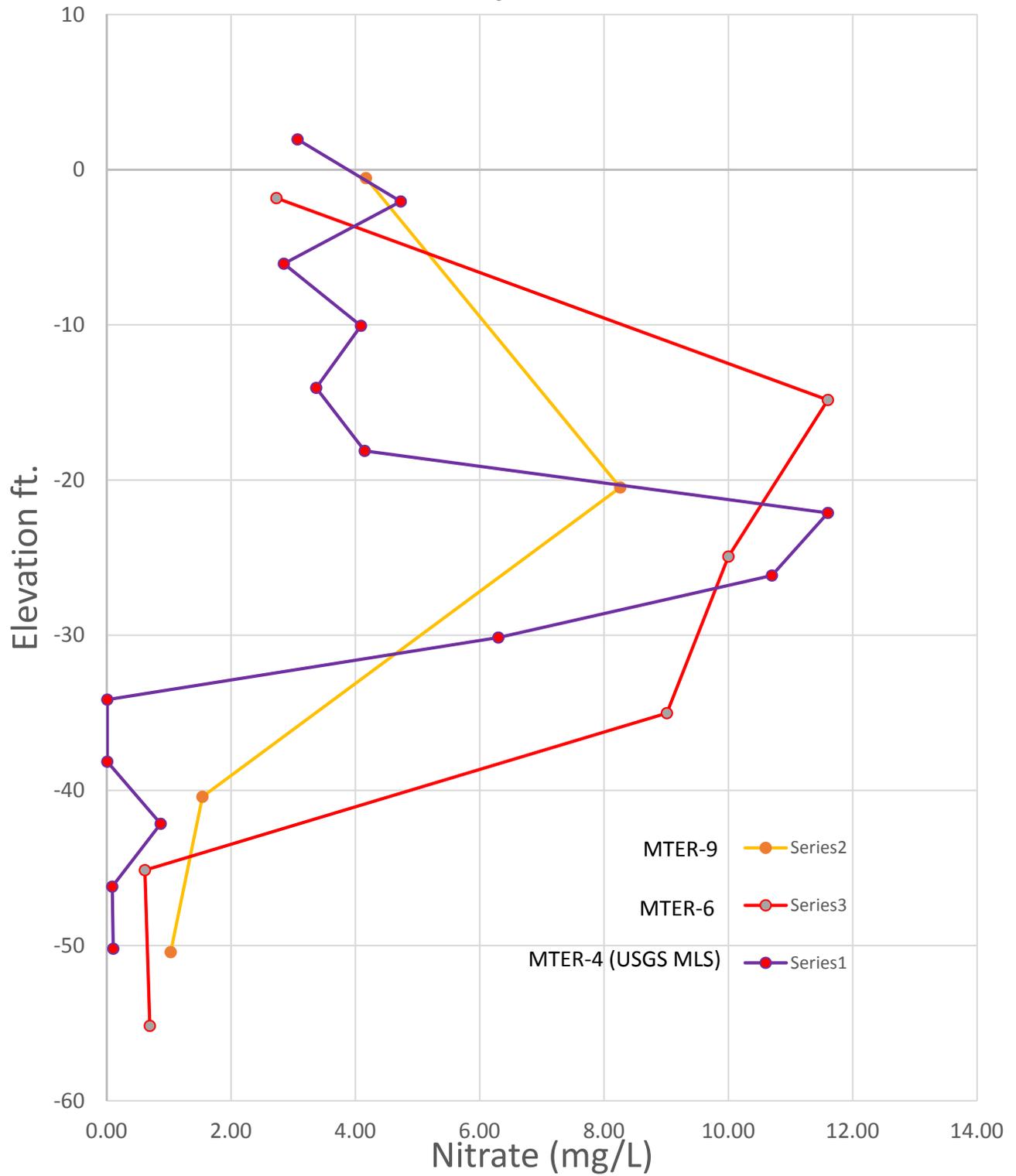


Chart 5 MTER-4 USGS MLS - Nitrate vs. Depth



### Chart 6 Nitrate vs. Depth 0 Shorwood Wells



## Appendix A Soil Boring Logs

# MONITORING WELL BORING LOG

Boring No. SB / MTER-1A

<b>MT Environmental Restoration</b>	<b>Date:</b> 11/14/2014
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 87'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 2

Proportions Used:	Abbreviations:					
	Color		Angular	Misc.	Size	
trace (tr) 0 - 10%	Blue (Bl)	Green (Gr)	Round (md.)	Fragments (frag.)	Fine = (f)	Fine to Coarse = (f-c)
little (li) 10 - 20%	Red (R)	Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m)	Very = (v)
some (so) 20 - 35%	Light (lt)	Brown (Br)		Well-Graded Sand (SW)	Coarse = (c)	More/Less = (+/-)
and 35 - 50%	Dark (dk)	Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)	
	Rust (Ru)	Black (Blk)		Well-Graded Gravel (GW)		
				Poorly-Graded Gravel (GP)		
				Below Land Surface (BLS)		
				Not Available (N/A)		

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement	█	0
5							Native Soil	█	5
10								█	10
15								█	15
20	sand f to m some gravel, trace f gravel	5'	48"	ang	br	N/A	Bentonite Seal	█	20
25								█	25
30	sand f to c	5'	29"	ang	br	N/A		█	30
35								█	35
40	sand m to c	5'	27"	ang	br	N/A		█	40
45								█	45
50	course sand	5'	50"	ang	br	N/A		█	50



# MONITORING WELL BORING LOG

Boring No. SB / MTER-1B

<b>MT Environmental Restoration</b>	<b>Date:</b> 11/14/2014
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 62'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 1

Proportions Used:	Color	Angular	Misc.	Size
trace (tr) 0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f) Fine to Coarse = (f-c)
little (li) 10 - 20%	Red (R) Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m) Very = (v)
some (so) 20 - 35%	Light (lt) Brown (Br)		Well-Graded Sand (SW)	Coarse = (c) More/Less = (+/-)
and 35 - 50%	Dark (dk) Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)
	Rust (Ru) Black (Blk)		Well-Graded Gravel (GW)	
			Poorly-Graded Gravel (GP)	
			Below Land Surface (BLS)	
			Not Available (N/A)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement	█	0
5							Native Soil	█	5
10								█	10
15								█	15
20	sand f to m some gravel, trace f gravel	5'	48"	ang	br	N/A	Bentonite Seal	█	20
25								█	25
30	sand f to c	5'	29"	ang	br	N/A		█	30
35								█	35
40	sand m to c	5'	27"	ang	br	N/A		█	40
45								█	45
50	course sand	5'	50"	ang	br	N/A		█	50
55							.010 Slot PVC Screen	█	55
60	sand f to c little f gravel	5'	30"	ang	br	N/A		█	60

# MONITORING WELL BORING LOG

Boring No. SB / MTER-1C

<b>MT Environmental Restoration</b>	<b>Date:</b> 11/14/2014
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 47'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 1

Proportions Used:	Abbreviations:			
	Color	Angular	Misc.	Size
trace (tr) 0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f) Fine to Coarse = (f-c)
little (li) 10 - 20%	Red (R) Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m) Very = (v)
some (so) 20 - 35%	Light (lt) Brown (Br)		Well-Graded Sand (SW)	Coarse = (c) More/Less = (+/-)
and 35 - 50%	Dark (dk) Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)
	Rust (Ru) Black (Blk)		Well-Graded Gravel (GW)	
			Poorly-Graded Gravel (GP)	
			Below Land Surface (BLS)	
			Not Available (N/A)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement →	█	0
5							Native Soil →	█	5
10								█	10
15								█	15
20	sand f to m some gravel, trace f gravel	5'	48"	ang	br	N/A	Bentonite Seal →	█	20
25								█	25
30	sand f to c	5'	29"	ang	br	N/A		█	30
35								█	35
40	sand m to c	5'	27"	ang	br	N/A	.010 Slot PVC Screen →	█	40
45								█	45

# MONITORING WELL BORING LOG

Boring No. SB / MTER-1D

<b>MT Environmental Restoration</b>	<b>Date:</b> 11/5/2014
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 32'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b> 26.14
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	<b>Page 1 of 1</b>

Proportions Used:	Abbreviations:																																
	<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%;"><u>Color</u></th> <th style="width: 25%;"><u>Angular</u></th> <th style="width: 25%;"><u>Misc.</u></th> <th style="width: 25%;"><u>Size</u></th> </tr> </table>	<u>Color</u>	<u>Angular</u>	<u>Misc.</u>	<u>Size</u>																												
<u>Color</u>	<u>Angular</u>	<u>Misc.</u>	<u>Size</u>																														
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">trace (tr)      0 - 10%</td> <td style="width: 25%;">Blue (Bl)    Green (Gr)</td> <td style="width: 25%;">Round (rnd.)</td> <td style="width: 25%;">Fragments (frag.)</td> </tr> <tr> <td>little (li)     10 - 20%</td> <td>Red (R)     Gray (Gy)</td> <td>Angular (ang.)</td> <td>Cement (cem.)</td> </tr> <tr> <td>some (so)     20 - 35%</td> <td>Light (lt)   Brown (Br)</td> <td></td> <td>Well-Graded Sand (SW)</td> </tr> <tr> <td>and             35 - 50%</td> <td>Dark (dk)   Orange (Or)</td> <td></td> <td>Poorly-Graded Sand (SP)</td> </tr> <tr> <td></td> <td>Rust (Ru)   Black (Blk)</td> <td></td> <td>Well-Graded Gravel (GW)</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Poorly-Graded Gravel (GP)</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Below Land Surface (BLS)</td> </tr> <tr> <td></td> <td></td> <td></td> <td>Not Available (N/A)</td> </tr> </table>	trace (tr)      0 - 10%	Blue (Bl)    Green (Gr)	Round (rnd.)	Fragments (frag.)	little (li)     10 - 20%	Red (R)     Gray (Gy)	Angular (ang.)	Cement (cem.)	some (so)     20 - 35%	Light (lt)   Brown (Br)		Well-Graded Sand (SW)	and             35 - 50%	Dark (dk)   Orange (Or)		Poorly-Graded Sand (SP)		Rust (Ru)   Black (Blk)		Well-Graded Gravel (GW)				Poorly-Graded Gravel (GP)				Below Land Surface (BLS)				Not Available (N/A)	
trace (tr)      0 - 10%	Blue (Bl)    Green (Gr)	Round (rnd.)	Fragments (frag.)																														
little (li)     10 - 20%	Red (R)     Gray (Gy)	Angular (ang.)	Cement (cem.)																														
some (so)     20 - 35%	Light (lt)   Brown (Br)		Well-Graded Sand (SW)																														
and             35 - 50%	Dark (dk)   Orange (Or)		Poorly-Graded Sand (SP)																														
	Rust (Ru)   Black (Blk)		Well-Graded Gravel (GW)																														
			Poorly-Graded Gravel (GP)																														
			Below Land Surface (BLS)																														
			Not Available (N/A)																														

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement →	0	0
5							Native Soil →	5	5
10								10	10
15								15	15
20	sand f to m some gravel, trace f gravel	5'	48"	ang	br	N/A	Bentonite Seal →	20	20
25							Groundwater - 24.48' BTOC →	25	25
30	sand f to c	5'	29"	ang	br	N/A	.010 Slot PVC Screen →	30	30

# MONITORING WELL BORING LOG

Boring No. SB / MTER-2

<b>MT Environmental Restoration</b>		<b>Date:</b> 11/5/2014	
<b>Project:</b> Falmouth Acapesket Investigation		<b>Completion Depth:</b> 26'	
<b>Boring Contractor:</b> New England Geotech		<b>Elevation:</b> 19.58	
<b>Boring Equipment:</b> Direct Push, 2" casing		<b>Inspector:</b> JFB	
Page 1 of 1			

Proportions Used:		Abbreviations:					
		<u>Color</u>		<u>Angular</u>	<u>Misc.</u>	<u>Size</u>	
trace (tr)	0 - 10%	Blue (Bl)	Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Brown (Br)		Well-Graded Sand (SW)	Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)	
		Rust (Ru)	Black (Blk)		Well-Graded Gravel (GW)		
					Poorly-Graded Gravel (GP)		
					Below Land Surface (BLS)		
					Not Available (N/A)		

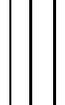
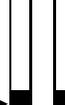
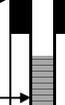
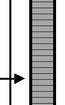
Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement		0
5							Native Soil		5
10							Bentonite Seal		10
15							Groundwater - 18' BTOC		15
20	sand m to c	5'	48"	ang	br	N/A	.010 Slot PVC Screen		20
25									25

# MONITORING WELL BORING LOG

Boring No. SB / MTER-3

<b>MT Environmental Restoration</b>	<b>Date:</b> 11/5/2014
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 27'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b> 20.55
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 2

Proportions Used:	Abbreviations:																																																								
	<table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 15%;"><u>Color</u></th> <th style="width: 15%;"><u>Angular</u></th> <th style="width: 35%;"><u>Misc.</u></th> <th style="width: 35%;"><u>Size</u></th> </tr> </table>	<u>Color</u>	<u>Angular</u>	<u>Misc.</u>	<u>Size</u>																																																				
<u>Color</u>	<u>Angular</u>	<u>Misc.</u>	<u>Size</u>																																																						
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trace (tr)	0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f)	Fine to Coarse = (f-c)																																																			
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				Poorly-Graded Gravel (GP)																																																					
				Below Land Surface (BLS)																																																					
				Not Available (N/A)																																																					

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement		0
5							Native Soil		5
10									10
15							Bentonite Seal		15
20	sand m to c some f gravel	5'	48"	ang	br	N/A	Groundwater -18.91' BTOC		20
25							.010 Slot PVC Screen		25

# MONITORING WELL BORING LOG

Boring No. SB / MTER-5A

<b>MT Environmental Restoration</b>	<b>Date:</b> 5/18/2015
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 54'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 1

Proportions Used:		Abbreviations:					
		Color		Angular	Misc.	Size	
trace (tr)	0 - 10%	Blue (Bl)	Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Brown (Br)		Well-Graded Sand (SW)	Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)	
		Rust (Ru)	Black (Blk)		Well-Graded Gravel (GW)		
					Poorly-Graded Gravel (GP)		
					Below Land Surface (BLS)		
					Not Available (N/A)		

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement	█	0
5	medium brown sand	5'			br			█	5
							Native Soil	█	
10	medium brown sand	5'			br		Bentonite Seal	█	10
15	medium brown sand	5'			br			█	15
20	medium to coarse brown sand	5'			br	N/A		█	20
25	medium brown sand	5'			br			█	25
30	fine brown sand some silt	5'			br	N/A		█	30
35	fine brown sand some silt	5'			br			█	35
40	no recovery	5'	0'			N/A	Approx. Fresh/Saltwater interface	█	40
45	fine to medium brown sand red banding at 48'	5'			br/ru		.010 Slot PVC Screen	█	45
50	fine to medium brown sand	4'			br	N/A		█	50

# MONITORING WELL BORING LOG

Boring No. SB / MTER-5B

<b>MT Environmental Restoration</b>	<b>Date:</b> 5/18/2015
<b>Project:</b> Falmouth Acapestet Investigation	<b>Completion Depth:</b> 44'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 1

Proportions Used:	Abbreviations:		
	<u>Color</u>	<u>Angular</u>	<u>Misc.</u>
trace (tr) 0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)
little (li) 10 - 20%	Red (R) Gray (Gy)	Angular (ang.)	Cement (cem.)
some (so) 20 - 35%	Light (lt) Brown (Br)		Well-Graded Sand (SW)
and 35 - 50%	Dark (dk) Orange (Or)		Poorly-Graded Sand (SP)
	Rust (Ru) Black (Blk)		Well-Graded Gravel (GW)
			Poorly-Graded Gravel (GP)
			Below Land Surface (BLS)
			Not Available (N/A)

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0	Not Sampled						Cement	█	0
5	medium brown sand				br		Native Soil	█	5
10	medium brown sand				br		Bentonite Seal	█	10
15	medium brown sand				br				15
20	medium to coarse brown sand				br				20
25	medium brown sand				br				25
30	fine brown sand some silt				br				30
35	fine brown sand some silt				br				35
40	no recovery						.010 Slot PVC Screen	█	40

# MONITORING WELL BORING LOG

Boring No. SB / MTER-5C

<b>MT Environmental Restoration</b> <b>Project:</b> Falmouth Acapesket Investigation <b>Boring Contractor:</b> New England Geotech <b>Boring Equipment:</b> Direct Push, 2" casing	<b>Date:</b> 5/18/2015 <b>Completion Depth:</b> 34' <b>Elevation:</b> <b>Inspector:</b> JFB Page 1 of 1
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Proportions Used:		Abbreviations:			
		Color	Angular	Misc.	Size
trace (tr)	0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f) Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R) Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m) Very = (v)
some (so)	20 - 35%	Light (lt) Brown (Br)		Well-Graded Sand (SW)	Coarse = (c) More/Less = (+/-)
and	35 - 50%	Dark (dk) Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)
		Rust (Ru) Black (Blk)		Well-Graded Gravel (GW)	
				Poorly-Graded Gravel (GP)	
				Below Land Surface (BLS)	
				Not Available (N/A)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0	Not Sampled						Cement →	█	0
5	medium brown sand				br		Native Soil →	█	5
10	medium brown sand				br		Bentonite Seal →	█	10
15	medium brown sand				br			█	15
20	medium to coarse brown sand				br			█	20
25	medium brown sand				br			█	25
30	fine brown sand some silt				br		.010 Slot PVC Screen →	█	30

# MONITORING WELL BORING LOG

Boring No. SB / MTER-5D

<b>MT Environmental Restoration</b> <b>Project:</b> Falmouth Acapesket Investigation <b>Boring Contractor:</b> New England Geotech <b>Boring Equipment:</b> Direct Push, 2" casing	<b>Date:</b> 5/18/2015 <b>Completion Depth:</b> 24' <b>Elevation:</b> <b>Inspector:</b> JFB Page 1 of 1
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Proportions Used:		Abbreviations:			
		<u>Color</u>	<u>Angular</u>	<u>Misc.</u>	<u>Size</u>
trace (tr)	0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f) Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R) Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m) Very = (v)
some (so)	20 - 35%	Light (lt) Brown (Br)		Well-Graded Sand (SW)	Coarse = (c) More/Less = (+/-)
and	35 - 50%	Dark (dk) Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)
		Rust (Ru) Black (Blk)		Well-Graded Gravel (GW)	
				Poorly-Graded Gravel (GP)	
				Below Land Surface (BLS)	
				Not Available (N/A)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0	Not Sampled						Cement →	█	0
5	medium brown sand				br		Native Soil →	█	5
10	medium brown sand				br		Bentonite Seal →	█	10
15	medium brown sand				br			█	15
20	medium to coarse brown sand				br		.010 Slot PVC Screen →	█	20

# MONITORING WELL BORING LOG

Boring No. SB / MTER-6A

<b>MT Environmental Restoration</b>	<b>Date:</b> 10/6/2015
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 70'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 2

Proportions Used:		Abbreviations:			
		Color	Angular	Misc.	Size
trace (tr)	0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f) Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R) Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m) Very = (v)
some (so)	20 - 35%	Light (lt) Brown (Br)		Well-Graded Sand (SW)	Coarse = (c) More/Less = (+/-)
and	35 - 50%	Dark (dk) Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)
		Rust (Ru) Black (Blk)		Well-Graded Gravel (GW)	
				Poorly-Graded Gravel (GP)	
				Below Land Surface (BLS)	
				Not Available (N/A)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0	medium brown sand	5'			br		Cement →		0
5	medium brown sand	5'			br		Native Soil → Bentonite Seal →		5
10	medium brown sand	5'			br				10
15	medium brown sand	5'			br				15
20	medium brown sand	5'			br	N/A			20
25	medium brown sand	5'			br				25
30	medium brown sand	5'			br	N/A			30
35	medium brown sand with bands of reddish sand	5'			br/ru				35
40	fine to medium brown sand	5'			br	N/A			40
45	medium brown sand with bands of reddish sand	5'			br/ru				45
50	medium brown sand	5'			br	N/A			50

# MONITORING WELL BORING LOG

Boring No. SB / MTER-6A

MT Environmental Restoration						Date: 10/6/2015
Project: Falmouth Acapesket Investigation						Completion Depth: 70'
Boring Contractor: New England Geotech						Elevation:
Boring Equipment: Direct Push, 2" casing						Inspector: JFB
						Page 2 of 2
55	medium brown sand	5'		br		
60	medium brown sand	5'		br	N/A	
65	medium brown sand layers of fine sand coarse gravel layer at bottom	5'		br		
						70'

# MONITORING WELL BORING LOG

Boring No. SB / MTER-6B

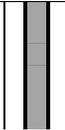
<b>MT Environmental Restoration</b>	<b>Date:</b> 10/6/2015
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 60'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	<b>Page 1 of 2</b>

Proportions Used:		Abbreviations:			
		<u>Color</u>	<u>Angular</u>	<u>Misc.</u>	<u>Size</u>
trace (tr)	0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f) Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R) Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m) Very = (v)
some (so)	20 - 35%	Light (lt) Brown (Br)		Well-Graded Sand (SW)	Coarse = (c) More/Less = (+/-)
and	35 - 50%	Dark (dk) Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)
		Rust (Ru) Black (Blk)		Well-Graded Gravel (GW)	
				Poorly-Graded Gravel (GP)	
				Below Land Surface (BLS)	
				Not Available (N/A)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement		0
5	medium brown sand	5'			br		Native Soil		5
							Bentonite Seal		
10	medium brown sand	5'			br				10
15	medium brown sand	5'			br				15
20	medium brown sand	5'			br	N/A			20
25	medium brown sand	5'			br				25
30	medium brown sand	5'			br	N/A			30
35	medium brown sand with bands of reddish sand	5'			br/ru				35
40	fine to medium brown sand	5'			br	N/A			40
45	medium brown sand with bands of red	5'			br/ru				45
50	medium brown sand	5'			br	N/A	.010 Slot PVC Screen		50

# MONITORING WELL BORING LOG

Boring No. SB / MTER-6B

<b>MT Environmental Restoration</b>						<b>Date:</b> 10/6/2015	
<b>Project:</b> Falmouth Acapesket Investigation						<b>Completion Depth:</b> 60'	
<b>Boring Contractor:</b> New England Geotech						<b>Elevation:</b>	
<b>Boring Equipment:</b> Direct Push, 2" casing						<b>Inspector:</b> JFB	
						<b>Page 2 of 2</b>	
55	medium brown sand	5'		br			55
60	medium brown sand	5'		br	N/A		60

# MONITORING WELL BORING LOG

Boring No. SB / MTER-6C

<b>MT Environmental Restoration</b>	<b>Date:</b> 10/6/2015
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 50'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 1

Proportions Used:	Abbreviations:				
	Color		Angular	Misc.	Size
trace (tr) 0 - 10%	Blue (Bl)	Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f) Fine to Coarse = (f-c)
little (li) 10 - 20%	Red (R)	Gray (Gy)	Angular (ang)	Cement (cem.)	Medium = (m) Very = (v)
some (so) 20 - 35%	Light (lt)	Brown (Br)		Well-Graded Sand (SW)	Coarse = (c) More/Less = (+/-)
and 35 - 50%	Dark (dk)	Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)
	Rust (Ru)	Black (Blk)		Well-Graded Gravel (GW)	
				Poorly-Graded Gravel (GP)	
				Below Land Surface (BLS)	
				Not Available (N/A)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID parts per millic	Comments	Well Details	Depth Feet
0							Cement		0
5	medium brown sand	5'			br		Native Soil		5
10	medium brown sand	5'			br		Bentonite Seal		10
15	medium brown sand	5'			br				15
20	medium brown sand	5'			br	N/A			20
25	medium brown sand	5'			br				25
30	medium brown sand	5'			br	N/A			30
35	medium brown sand with bands of red	5'			br/ru				35
40	fine to medium brown sand	5'			br	N/A			40
45	medium brown sand with bands of reddish	5'			br/ru				45
50	medium brown sand	5'			br		.010 Slot PVC Screen		50

# MONITORING WELL BORING LOG

Boring No. SB / MTER-6D

<b>MT Environmental Restoration</b>	<b>Date:</b> 10/6/2015
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 40'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 1

Proportions Used:	Color	Angular	Misc.	Abbreviations:
trace (tr) 0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f) Fine to Coarse = (f-c)
little (li) 10 - 20%	Red (R) Gray (Gy)	Angular (ang)	Cement (cem.)	Medium = (m) Very = (v)
some (so) 20 - 35%	Light (lt) Brown (Br)		Well-Graded Sand (SW)	Coarse = (c) More/Less = (+/-)
and 35 - 50%	Dark (dk) Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)
	Rust (Ru) Black (Blk)		Well-Graded Gravel (GW)	
			Poorly-Graded Gravel (GP)	
			Below Land Surface (BLS)	
			Not Available (N/A)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID arts per millio	Comments	Well Details	Depth Feet
0							Cement		0
5	medium brown sand	5'			br		Native Soil		5
10	medium brown sand	5'			br		Bentonite Seal		10
15	medium brown sand	5'			br				15
20	medium brown sand	5'			br	N/A			20
25	medium brown sand	5'			br				25
30	medium brown sand	5'			br	N/A			30
35	medium brown sand with bands of red	5'			br/ru				35
40	fine to medium brown sand	5'			br	N/A	.010 Slot PVC Screen		40

# MONITORING WELL BORING LOG

Boring No. SB / MTER-6E

<b>MT Environmental Restoration</b>	<b>Date:</b> 10/6/2015
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 30'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 1

Proportions Used:		Abbreviations:					
		<u>Color</u>	<u>Angular</u>	<u>Misc.</u>	<u>Size</u>		
trace (tr)	0 - 10%	Blue (Bl)	Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Gray (Gy)	Angular (ang)	Cement (cem.)	Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Brown (Br)		Well-Graded Sand (SW)	Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)	
		Rust (Ru)	Black (Blk)		Well-Graded Gravel (GW)		
					Poorly-Graded Gravel (GP)		
					Below Land Surface (BLS)		
					Not Available (N/A)		

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID parts per million	Comments	Well Details	Depth Feet
0							Cement →		0
							Native Soil →		
5	medium brown sand	5'			br		Bentonite Seal →		5
									
10	medium brown sand	5'			br				10
									
15	medium brown sand	5'			br				15
									
20	medium brown sand	5'			br	N/A			20
									
25	medium brown sand	5'			br				25
									
30	medium brown sand	5'			br	N/A			30

# MONITORING WELL BORING LOG

Boring No. SB / MTER-6F

<b>MT Environmental Restoration</b>	<b>Date:</b> 10/6/2015
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 17'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 1

Proportions Used:		Abbreviations:			
		<u>Color</u>	<u>Angular</u>	<u>Misc.</u>	<u>Size</u>
trace (tr)	0 - 10%	Blue (Bl)    Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f)    Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)      Gray (Gy)	Angular (ang)	Cement (cem.)	Medium = (m)    Very = (v)
some (so)	20 - 35%	Light (lt)    Brown (Br)		Well-Graded Sand (SW)	Coarse = (c)    More/Less = (+/-)
and	35 - 50%	Dark (dk)    Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)
		Rust (Ru)    Black (Blk)		Well-Graded Gravel (GW)	
				Poorly-Graded Gravel (GP)	
				Below Land Surface (BLS)	
				Not Available (N/A)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID parts per million	Comments	Well Details	Depth Feet
0							Cement →		0
5	medium brown sand	5'			br		Native Soil → Bentonite Seal →		5
10	medium brown sand	5'			br				10
15	medium brown sand	5'			br		.010 Slot PVC Screen →		15

# MONITORING WELL BORING LOG

Boring No. SB / MTER-7

<b>MT Environmental Restoration</b>	<b>Date:</b> 5/21/2015
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 28'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 1

Proportions Used:		Abbreviations:				
		<u>Color</u>	<u>Angular</u>	<u>Misc.</u>	<u>Size</u>	
trace (tr)	0 - 10%	Blue (Bl)	Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f)    Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Gray (Gy)	Angular (ang)	Cement (cem.)	Medium = (m)    Very = (v)
some (so)	20 - 35%	Light (lt)	Brown (Br)		Well-Graded Sand (SW)	Coarse = (c)    More/Less = (+/-)
and	35 - 50%	Dark (dk)	Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)
		Rust (Ru)	Black (Blk)		Well-Graded Gravel (GW)	
					Poorly-Graded Gravel (GP)	
					Below Land Surface (BLS)	
					Not Available (N/A)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID parts per million	Comments	Well Details	Depth Feet
0							Cement →	█	0
							Native Soil →	█	
5	fine to medium brown sand				br		Bentonite Seal →	█	5
								█	
10	fine to medium brown sand				br			█	10
								█	
15	fine to medium brown sand				br			█	15
								█	
20	fine to medium brown sand				br	N/A		█	20
							.010 Slot PVC Screen →	█	
25								█	25

# MONITORING WELL BORING LOG

Boring No. SB / MTER-8

<b>MT Environmental Restoration</b>	<b>Date:</b> 5/21/2015
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 37'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 1

Proportions Used:		Abbreviations:					
		<u>Color</u>		<u>Angular</u>	<u>Misc.</u>	<u>Size</u>	
trace (tr)	0 - 10%	Blue (Bl)	Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Gray (Gy)	Angular (ang)	Cement (cem.)	Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Brown (Br)		Well-Graded Sand (SW)	Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)	
		Rust (Ru)	Black (Blk)		Well-Graded Gravel (GW)		
					Poorly-Graded Gravel (GP)		
					Below Land Surface (BLS)		
					Not Available (N/A)		

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID parts per million	Comments	Well Details	Depth Feet
0							Cement →	█	0
							Native Soil →	█	
5	medium brown sand				br		Bentonite Seal →	█	5
10	medium brown sand				br			█	10
15	medium brown sand				br			█	15
20	medium brown sand				br	N/A		█	20
25	medium brown sand				br			█	25
30						N/A		█	30
							.010 Slot PVC Screen →	█	
35								█	35

# MONITORING WELL BORING LOG

Boring No. SB / MTER-9A

<b>MT Environmental Restoration</b>	<b>Date:</b> 5/20/2015
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 74'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 2

Proportions Used:	Color	Angular	Misc.	Size
trace (tr) 0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f) Fine to Coarse = (f-c)
little (li) 10 - 20%	Red (R) Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m) Very = (v)
some (so) 20 - 35%	Light (lt) Brown (Br)		Well-Graded Sand (SW)	Coarse = (c) More/Less = (+/-)
and 35 - 50%	Dark (dk) Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)
	Rust (Ru) Black (Blk)		Well-Graded Gravel (GW)	
			Poorly-Graded Gravel (GP)	
			Below Land Surface (BLS)	
			Not Available (N/A)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0	medium brown sand	5'					Cement →	█	0
							Native Soil →	█	
5	medium brown sand	5'						█	5
10	medium brown sand	5'						█	10
							Bentonite Seal →	█	
15	medium brown sand	5'						█	15
20	medium brown sand	5'				N/A		█	20
25	medium brown sand	5'						█	25
30	medium brown sand	5'				N/A		█	30
35	fine to medium brown sand with red iron staining	5'						█	35
40	fine to medium brown sand iron staining	5'				N/A		█	40
45	medium to coarse brown sand with red staining	5'						█	45
50	medium brown sand with red staining	5'				N/A		█	50

# MONITORING WELL BORING LOG

Boring No. SB / MTER-9A

MT Environmental Restoration			Date: 5/20/2015				
Project: Falmouth Acapesket Investigation			Completion Depth: 74'				
Boring Contractor: New England Geotech			Elevation:				
Boring Equipment: Direct Push, 2" casing			Inspector: JFB				
			Page 2 of 2				
55	medium to coarse brown sand with red staining	5'					55
60	medium to coarse gravel with red to black staining	5'			N/A		60
65	medium brown sand	5'				.010 Slot PVC Screen →	65
70	medium to coarse gravel with red staining	5'					70
75	medium to coarse gravel with red staining	5'					75

# MONITORING WELL BORING LOG

Boring No. SB / MTER-9B

<b>MT Environmental Restoration</b> <b>Project:</b> Falmouth Acapesket Investigation <b>Boring Contractor:</b> New England Geotech <b>Boring Equipment:</b> Direct Push, 2" casing	<b>Date:</b> 5/20/2015 <b>Completion Depth:</b> 64' <b>Elevation:</b> <b>Inspector:</b> JFB Page 1 of 2
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Proportions Used:	Color	Angular	Misc.	Size
trace (tr) 0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f) Fine to Coarse = (f-c)
little (li) 10 - 20%	Red (R) Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m) Very = (v)
some (so) 20 - 35%	Light (lt) Brown (Br)		Well-Graded Sand (SW)	Coarse = (c) More/Less = (+/-)
and 35 - 50%	Dark (dk) Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)
	Rust (Ru) Black (Blk)		Well-Graded Gravel (GW)	
			Poorly-Graded Gravel (GP)	
			Below Land Surface (BLS)	
			Not Available (N/A)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement →		0
							Native Soil →		
5									5
10									10
							Bentonite Seal →		
15									15
20						N/A			20
25									25
30						N/A			30
35									35
40						N/A			40
45									45
50						N/A			50

# MONITORING WELL BORING LOG

Boring No. SB / MTER-9B

MT Environmental Restoration							Date: 5/20/2015	
Project: Falmouth Acapesket Investigation							Completion Depth: 64'	
Boring Contractor: New England Geotech							Elevation:	
Boring Equipment: Direct Push, 2" casing							Inspector: JFB	
							Page 2 of 2	
55							.010 Slot PVC Screen →	55
60					N/A			60

# MONITORING WELL BORING LOG

Boring No. SB / MTER-9C

<b>MT Environmental Restoration</b>	<b>Date:</b> 5/20/2015
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 44'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 2

Proportions Used:	Abbreviations:			
	Color	Angular	Misc.	Size
trace (tr) 0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f) Fine to Coarse = (f-c)
little (li) 10 - 20%	Red (R) Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m) Very = (v)
some (so) 20 - 35%	Light (lt) Brown (Br)		Well-Graded Sand (SW)	Coarse = (c) More/Less = (+/-)
and 35 - 50%	Dark (dk) Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)
	Rust (Ru) Black (Blk)		Well-Graded Gravel (GW)	
			Poorly-Graded Gravel (GP)	
			Below Land Surface (BLS)	
			Not Available (N/A)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement	█	0
5							Native Soil	█	5
10								█	10
15							Bentonite Seal	█	15
20						N/A		█	20
25								█	25
30						N/A		█	30
35							.010 Slot PVC Screen	█	35
40						N/A		█	40

# MONITORING WELL BORING LOG

Boring No. SB / MTER-9D

<b>MT Environmental Restoration</b> <b>Project:</b> Falmouth Acapesket Investigation <b>Boring Contractor:</b> New England Geotech <b>Boring Equipment:</b> Direct Push, 2" casing	<b>Date:</b> 5/20/2015 <b>Completion Depth:</b> 24' <b>Elevation:</b> <b>Inspector:</b> JFB Page 1 of 2
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Proportions Used:	Color	Angular	Misc.	Size
trace (tr) 0 - 10%	Blue (Bl) Green (Gr)	Round (rnd.)	Fragments (frag.)	Fine = (f) Fine to Coarse = (f-c)
little (li) 10 - 20%	Red (R) Gray (Gy)	Angular (ang.)	Cement (cem.)	Medium = (m) Very = (v)
some (so) 20 - 35%	Light (lt) Brown (Br)		Well-Graded Sand (SW)	Coarse = (c) More/Less = (+/-)
and 35 - 50%	Dark (dk) Orange (Or)		Poorly-Graded Sand (SP)	Dark = (dk)
	Rust (Ru) Black (Blk)		Well-Graded Gravel (GW)	
			Poorly-Graded Gravel (GP)	
			Below Land Surface (BLS)	
			Not Available (N/A)	

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID (parts per million)	Comments	Well Details	Depth Feet
0							Cement	0	0
5							Native Soil	5	5
10								10	10
15							Bentonite Seal	15	15
20						N/A	.010 Slot PVC Screen	20	20

# MONITORING WELL BORING LOG

Boring No. SB / MTER-10

<b>MT Environmental Restoration</b>	<b>Date:</b> 10/5/2015
<b>Project:</b> Falmouth Acapesket Investigation	<b>Completion Depth:</b> 20'
<b>Boring Contractor:</b> New England Geotech	<b>Elevation:</b>
<b>Boring Equipment:</b> Direct Push, 2" casing	<b>Inspector:</b> JFB
	Page 1 of 1

Proportions Used:	Abbreviations:		
	<u>Color</u>	<u>Angular</u>	<u>Misc.</u>
trace (tr)      0 - 10%	Blue (Bl)    Green (Gr)	Round (rnd.)	Fragments (frag.)
little (li)     10 - 20%	Red (R)      Gray (Gy)	Angular (ang)	Cement (cem.)
some (so)     20 - 35%	Light (lt)    Brown (Br)		Well-Graded Sand (SW)
and             35 - 50%	Dark (dk)    Orange (Or)		Poorly-Graded Sand (SP)
	Rust (Ru)    Black (Blk)		Well-Graded Gravel (GW)
			Poorly-Graded Gravel (GP)
			Below Land Surface (BLS)
			Not Available (N/A)

Depth Feet	Description	Penetration	Recovery	USCS Code	USCS Color	PID parts per million	Comments	Well Details	Depth Feet
0							Cement →	0	0
5							Native Soil → Bentonite Seal →	5	5
10								10	10
15							.010 Slot PVC Screen →	15	15
20								20	20

## Appendix B Laboratory Reports



*CERTIFICATE OF ANALYSIS*

Jim Begley  
MT Environmental Restoration  
24 Bay View Avenue  
Plymouth, MA 02360

**RE: Falmouth AP (N/A)**  
**ESS Laboratory Work Order Number: 1506250**

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard  
Laboratory Director

**REVIEWED**

**By ESS Laboratory at 1:37 pm, Jun 25, 2015**

**Analytical Summary**

The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with NELAC Standards, A2LA and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Falmouth AP

ESS Laboratory Work Order: 1506250

**SAMPLE RECEIPT**

The following samples were received on June 09, 2015 for the analyses specified on the enclosed Chain of Custody Record.

<b>Lab Number</b>	<b>Sample Name</b>	<b>Matrix</b>	<b>Analysis</b>
1506250-01	MTER-9D	Ground Water	353.2, 4500N, 4500NH3 D, 5310B, 6010C, 9038, 9250
1506250-02	MTER-9C	Ground Water	353.2, 4500N, 4500NH3 D, 5310B, 6010C, 9038, 9250
1506250-03	MTER-9B	Ground Water	353.2, 4500N, 4500NH3 D, 5310B, 6010C, 9038, 9250
1506250-04	MTER-9A	Ground Water	353.2, 4500N, 4500NH3 D, 5310B, 6010C, 9038, 9250



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Falmouth AP

ESS Laboratory Work Order: 1506250

**PROJECT NARRATIVE**

**Dissolved Metals**

CF51043-BSD1

Relative percent difference for duplicate is outside of criteria (D+).

Iron (26% @ 20%)

**No other observations noted.**

**End of Project Narrative.**

**DATA USABILITY LINKS**

[Definitions of Quality Control Parameters](#)

[Semivolatile Organics Internal Standard Information](#)

[Semivolatile Organics Surrogate Information](#)

[Volatile Organics Internal Standard Information](#)

[Volatile Organics Surrogate Information](#)

[EPH and VPH Alkane Lists](#)



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Falmouth AP

ESS Laboratory Work Order: 1506250

**CURRENT SW-846 METHODOLOGY VERSIONS**

**Analytical Methods**

- 1010A - Flashpoint
- 6010C - ICP
- 6020A - ICP MS
- 7010 - Graphite Furnace
- 7196A - Hexavalent Chromium
- 7470A - Aqueous Mercury
- 7471B - Solid Mercury
- 8011 - EDB/DBCP/TCP
- 8015D - GRO/DRO
- 8081B - Pesticides
- 8082A - PCB
- 8100M - TPH
- 8151A - Herbicides
- 8260B - VOA
- 8270D - SVOA
- 8270D SIM - SVOA Low Level
- 9014 - Cyanide
- 9038 - Sulfate
- 9040C - Aqueous pH
- 9045D - Solid pH (Corrosivity)
- 9050A - Specific Conductance
- 9056A - Anions (IC)
- 9060A - TOC
- 9095B - Paint Filter
- MADEP 04-1.1 - EPH / VPH

**Prep Methods**

- 3005A - Aqueous ICP Digestion
- 3020A - Aqueous Graphite Furnace / ICP MS Digestion
- 3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
- 3060A - Solid Hexavalent Chromium Digestion
- 3510C - Separatory Funnel Extraction
- 3520C - Liquid / Liquid Extraction
- 3540C - Manual Soxhlet Extraction
- 3541 - Automated Soxhlet Extraction
- 3546 - Microwave Extraction
- 3580A - Waste Dilution
- 5030B - Aqueous Purge and Trap
- 5030C - Aqueous Purge and Trap
- 5035 - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Falmouth AP  
Client Sample ID: MTER-9D  
Date Sampled: 06/09/15 07:30  
Percent Solids: N/A

ESS Laboratory Work Order: 1506250  
ESS Laboratory Sample ID: 1506250-01  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A

**Dissolved Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Iron	76.1 (50.0)		6010C		1	KJK	06/11/15 18:06	100	50	CF51043
Manganese	101 (10.0)		6010C		1	KJK	06/11/15 18:06	100	50	CF51043



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Falmouth AP  
Client Sample ID: MTER-9D  
Date Sampled: 06/09/15 07:30  
Percent Solids: N/A

ESS Laboratory Work Order: 1506250  
ESS Laboratory Sample ID: 1506250-01  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	06/15/15 13:35	mg/L	CF51516
Chloride	97.0 (3.0)		9250		1	JLK	06/13/15 13:37	mg/L	CF51301
Nitrate as N	6.42 (0.410)		353.2		20	EEM	06/09/15 19:12	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	EEM	06/09/15 19:12	mg/L	CF50929
Sulfate	15.1 (5.0)		9038		1	EEM	06/12/15 16:05	mg/L	CF51225
Total Nitrogen	7.34 (0.430)		4500N		20	EEM	06/15/15 14:45	mg/L	[CALC]
Dissolved Organic Carbon	1.4 (1.0)		5310B		1	NAR	06/24/15 8:00	mg/L	CF52439



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Falmouth AP  
Client Sample ID: MTER-9C  
Date Sampled: 06/09/15 08:30  
Percent Solids: N/A

ESS Laboratory Work Order: 1506250  
ESS Laboratory Sample ID: 1506250-02  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A

**Dissolved Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Iron	118 (50.0)		6010C		1	KJK	06/11/15 18:40	50	25	CF51043
Manganese	184 (10.0)		6010C		1	KJK	06/11/15 18:40	50	25	CF51043



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Falmouth AP  
Client Sample ID: MTER-9C  
Date Sampled: 06/09/15 08:30  
Percent Solids: N/A

ESS Laboratory Work Order: 1506250  
ESS Laboratory Sample ID: 1506250-02  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	06/15/15 13:35	mg/L	CF51516
Chloride	25.8 (3.0)		9250		1	JLK	06/13/15 13:39	mg/L	CF51301
Nitrate as N	8.69 (0.410)		353.2		20	EEM	06/09/15 19:13	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	EEM	06/09/15 19:13	mg/L	CF50929
Sulfate	9.3 (5.0)		9038		1	EEM	06/12/15 16:05	mg/L	CF51225
Total Nitrogen	9.13 (0.430)		4500N		20	EEM	06/15/15 14:45	mg/L	[CALC]
Dissolved Organic Carbon	ND (1.0)		5310B		1	NAR	06/24/15 8:00	mg/L	CF52439



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Falmouth AP  
Client Sample ID: MTER-9B  
Date Sampled: 06/09/15 09:25  
Percent Solids: N/A

ESS Laboratory Work Order: 1506250  
ESS Laboratory Sample ID: 1506250-03  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A

**Dissolved Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Iron	255 (50.0)		6010C		1	KJK	06/11/15 18:44	50	25	CF51043
Manganese	186 (10.0)		6010C		1	KJK	06/11/15 18:44	50	25	CF51043



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Falmouth AP  
Client Sample ID: MTER-9B  
Date Sampled: 06/09/15 09:25  
Percent Solids: N/A

ESS Laboratory Work Order: 1506250  
ESS Laboratory Sample ID: 1506250-03  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	06/15/15 13:35	mg/L	CF51516
Chloride	32.6 (3.0)		9250		1	JLK	06/13/15 13:40	mg/L	CF51301
Nitrate as N	2.36 (0.210)		353.2		10	EEM	06/09/15 19:14	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	EEM	06/09/15 19:14	mg/L	CF50929
Sulfate	7.5 (5.0)		9038		1	EEM	06/12/15 16:05	mg/L	CF51225
Total Nitrogen	3.16 (0.230)		4500N		10	EEM	06/15/15 14:45	mg/L	[CALC]
Dissolved Organic Carbon	ND (1.0)		5310B		1	NAR	06/24/15 8:00	mg/L	CF52439



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Falmouth AP  
Client Sample ID: MTER-9A  
Date Sampled: 06/09/15 10:20  
Percent Solids: N/A

ESS Laboratory Work Order: 1506250  
ESS Laboratory Sample ID: 1506250-04  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A

**Dissolved Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Iron	440 (50.0)		6010C		1	KJK	06/11/15 18:49	50	25	CF51043
Manganese	799 (10.0)		6010C		1	KJK	06/11/15 18:49	50	25	CF51043



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Falmouth AP  
Client Sample ID: MTER-9A  
Date Sampled: 06/09/15 10:20  
Percent Solids: N/A

ESS Laboratory Work Order: 1506250  
ESS Laboratory Sample ID: 1506250-04  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	0.030 (0.020)		4500NH3 D		1	EEM	06/15/15 13:35	mg/L	CF51516
Chloride	18.2 (3.0)		9250		1	JLK	06/13/15 13:40	mg/L	CF51301
Nitrate as N	0.645 (0.030)		353.2		1	EEM	06/09/15 19:15	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	EEM	06/09/15 19:15	mg/L	CF50929
Sulfate	9.1 (5.0)		9038		1	EEM	06/12/15 16:05	mg/L	CF51225
Total Nitrogen	1.51 (0.050)		4500N		1	EEM	06/15/15 14:45	mg/L	[CALC]
Dissolved Organic Carbon	ND (1.0)		5310B		1	NAR	06/24/15 8:00	mg/L	CF52439



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Falmouth AP

ESS Laboratory Work Order: 1506250

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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Dissolved Metals

**Batch CF51043 - 3005A**

**Blank**

Iron	ND	50.0	ug/L							
Manganese	ND	10.0	ug/L							

**LCS**

Iron	999	50.0	ug/L	1250		80	80-120			
Manganese	201	10.0	ug/L	250.0		80	80-120			

**LCS Dup**

Iron	1300	50.0	ug/L	1250		104	80-120	26	20	D+
Manganese	230	10.0	ug/L	250.0		92	80-120	13	20	

Classical Chemistry

**Batch CF50929 - [CALC]**

**Blank**

Nitrate as N	ND	0.010	mg/L							
Nitrite as N	ND	0.010	mg/L							
Nitrite as N	ND	0.010	mg/L							

**LCS**

Nitrate as N	ND		mg/L							
Nitrite as N	0.252		mg/L	0.2497		101	90-110			
Nitrite as N	0.252		mg/L	0.2497		101	90-110			

**Batch CF50930 - [CALC]**

**Blank**

Nitrate as N	ND	0.020	mg/L							
Nitrate/Nitrite as N	ND	0.020	mg/L							
Nitrate/Nitrite as N	ND	0.020	mg/L							
Total Nitrogen	ND	0.020	mg/L							

**LCS**

Nitrate as N	0.512		mg/L							
Nitrate/Nitrite as N	0.512		mg/L	0.5000		102	90-110			
Nitrate/Nitrite as N	0.512		mg/L	0.5000		102	90-110			
Total Nitrogen	0.512		mg/L							

**Batch CF51225 - General Preparation**

**Blank**

Sulfate	ND	5.0	mg/L							
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**LCS**

Sulfate	9.6	5.0	mg/L	9.988		96	85-115			
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**Batch CF51301 - General Preparation**

**Blank**

Chloride	ND	3.0	mg/L							
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**LCS**

Chloride	30.2		mg/L	30.00		101	90-110			
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*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Falmouth AP

ESS Laboratory Work Order: 1506250

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
<b>Classical Chemistry</b>										
<b>Batch CF51515 - TKN Prep</b>										
<b>Blank</b>										
Total Kjeldahl Nitrogen as N	ND	0.03	mg/L							
Total Nitrogen	ND	0.030	mg/L							
<b>LCS</b>										
Total Kjeldahl Nitrogen as N	20.4	0.03	mg/L	20.60		99	80-120			
Total Nitrogen	20.4	0.030	mg/L							
<b>Batch CF51516 - NH4 Prep</b>										
<b>Blank</b>										
Ammonia as N	ND	0.020	mg/L							
<b>LCS</b>										
Ammonia as N	0.102		mg/L	0.09994		102	80-120			
<b>Batch CF52439 - General Preparation</b>										
<b>Blank</b>										
Dissolved Organic Carbon	ND	1.0	mg/L							
<b>LCS</b>										
Dissolved Organic Carbon	4.9	1.0	mg/L	5.000		98	80-120			
<b>LCS Dup</b>										
Dissolved Organic Carbon	4.8	1.0	mg/L	5.000		96	80-120	2	200	



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Falmouth AP

ESS Laboratory Work Order: 1506250

**Notes and Definitions**

- U Analyte included in the analysis, but not detected
- D+ Relative percent difference for duplicate is outside of criteria (D+).
- ND Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- MDL Method Detection Limit
- MRL Method Reporting Limit
- LOD Limit of Detection
- LOQ Limit of Quantitation
- DL Detection Limit
- I/V Initial Volume
- F/V Final Volume
- § Subcontracted analysis; see attached report
- 1 Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
- 2 Range result excludes concentrations of target analytes eluting in that range.
- 3 Range result excludes the concentration of the C9-C10 aromatic range.
- Avg Results reported as a mathematical average.
- NR No Recovery
- [CALC] Calculated Analyte
- SUB Subcontracted analysis; see attached report



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Falmouth AP

ESS Laboratory Work Order: 1506250

**ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS**

**ENVIRONMENTAL**

Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP)

A2LA Accredited: Testing Cert# 2864.01  
<http://www.a2la.org/scopepdf/2864-01.pdf>

Rhode Island Potable and Non Potable Water: LAI00179

<http://www.health.ri.gov/find/labs/analytical/ESS.pdf>

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750

[http://www.ct.gov/dph/lib/dph/environmental\\_health/environmental\\_laboratories/pdf/OutOfStateCommercialLaboratories.pdf](http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutOfStateCommercialLaboratories.pdf)

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI0002

<http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/documents/AllLabs.xls>

Massachusetts Potable and Non Potable Water: M-RI002

<http://public.dep.state.ma.us/Labcert/Labcert.aspx>

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424

<http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313

<http://www.wadsworth.org/labcert/elap/comm.html>

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006

[http://datamine2.state.nj.us/DEP\\_Opra/OpraMain/pi\\_main?mode=pi\\_by\\_site&sort\\_order=PI\\_NAMEA&Select+a+Site:=58715](http://datamine2.state.nj.us/DEP_Opra/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715)

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752

[http://www.depweb.state.pa.us/portal/server.pt/community/labs/13780/laboratory\\_accreditation\\_program/590095](http://www.depweb.state.pa.us/portal/server.pt/community/labs/13780/laboratory_accreditation_program/590095)

**CHEMISTRY**

A2LA Accredited: Testing Cert # 2864.01

Lead in Paint, Phthalates, Lead in Children's Metals Products (Including Jewelry)

<http://www.A2LA.org/dirsearchnew/newsearch.cfm>

CPSC ID# 1141

Lead Paint, Lead in Children's Metals Jewelry

<http://www.epsc.gov/cgi-bin/labapplist.aspx>

# ESS Laboratory

Division of Thielsch Engineering, Inc.

185 Frances Avenue, Cranston, RI 02910-2211  
 Tel. (401) 461-7181 Fax (401) 461-4486  
 www.esslaboratory.com

# CHAIN OF CUSTODY

Turn Time Standard Other \_\_\_\_\_  
 Regulatory State: MA BU CT NH NJ NY ME Other \_\_\_\_\_  
 Is this project for any of the following: (please circle)  
 MA-MCP Navy USACE CT DEP Other \_\_\_\_\_

ESS Lab # 1506250

Reporting Limits - \_\_\_\_\_

Electronic Deliverables Excel Access PDF

Co. Name MT Env. Restoration (MTER)  
 Contact Person Jim Bogley  
 City Plymouth State MA  
 Address 24 Bay View Ave Zip 02360  
 Project Name Feelmouth AP  
 PO # \_\_\_\_\_  
 email: jim@esslab.com

ESS Lab ID	Date	Collection Time	Grab -G Composite-C	Matrix	Sample ID	Pres. Code	# of Containers	Type of Container	Vol of Container	Analysis
1	9/6/15	0730	G	6W	MTER-9B	3	1	P	1000	X
1	9/6/15	0730	G	6W	"-9D	1	1	P	1000	X
1	9/6/15	0730	G	6W	"-9D	1	2	V	40	X
1	9/6/15	0730	G	6W	"-9D	4	1	P	250	X
2	9/6/15	0820	G	6W	"-9C	3	1	P	1000	X
2	9/6/15	0820	G	6W	"-9C	1	1	P	1000	X
2	9/6/15	0820	G	6W	"-9C	1	2	V	40	X
2	9/6/15	0820	G	6W	"-9C	4	1	P	250	X
3	9/6/15	0925	G	6W	"-9B	3	1	P	1000	X
3	9/6/15	0925	G	6W	"-9B	1	1	P	1000	X

Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present  Yes  No Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Ascorbic Acid, 8-ZnAct, 9-\_\_\_\_\_

Seals Intact  Yes  No NA:  Pickup

Cooler Temperature: 5.1°C m- 6/2/15

Relinquished by: (Signature, Date & Time) Jim Bogley 9/15/15

Relinquished by: (Signature, Date & Time) Jim Bogley 9/15/15

Relinquished by: (Signature, Date & Time) Jim Bogley 9/15/15

Relinquished by: (Signature, Date & Time) Jim Bogley 9/15/15

Relinquished by: (Signature, Date & Time) Jim Bogley 9/15/15

Relinquished by: (Signature, Date & Time) Jim Bogley 9/15/15

Relinquished by: (Signature, Date & Time) Jim Bogley 9/15/15

Relinquished by: (Signature, Date & Time) Jim Bogley 9/15/15

\* By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VIIA

Please fax to the laboratory all changes to Chain of Custody

1 (White) Lab Copy

2 (Yellow) Client Receipt





*CERTIFICATE OF ANALYSIS*

Jim Begley  
 MT Environmental Restoration  
 147 Elm Street  
 Duxbury, MA 02332

**RE: Fal-2 (N/A)**  
**ESS Laboratory Work Order Number: 1510755**

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard  
 Laboratory Director

**REVIEWED**  
 By ESS Laboratory at 3:01 pm, Nov 03, 2015

**Analytical Summary**

The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with NELAC Standards, A2LA and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

**Subcontracted Analyses**

Premier Laboratory - Dayville, CT

Dissolved Organic Carbon



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510755

**SAMPLE RECEIPT**

The following samples were received on October 27, 2015 for the analyses specified on the enclosed Chain of Custody Record.

<b>Lab Number</b>	<b>Sample Name</b>	<b>Matrix</b>	<b>Analysis</b>
1510755-01	Fal-2-MTER-4-02GNT	Ground Water	§, 353.2, 4500N, 4500NH3 D, 6010C, 9038, 9250
1510755-02	Fal-2-MTER-4-14BK	Ground Water	§, 353.2, 4500N, 4500NH3 D, 6010C, 9038, 9250
1510755-03	Fal-2-MTER-4-01PT	Ground Water	353.2
1510755-04	Fal-2-MTER-4-03RT	Ground Water	353.2
1510755-05	Fal-2-MTER-4-04BUT	Ground Water	353.2
1510755-06	Fal-2-MTER-4-05BKT	Ground Water	353.2
1510755-07	Fal-2-MTER-4-06WT	Ground Water	353.2
1510755-08	Fal-2-MTER-4-07O	Ground Water	353.2
1510755-09	Fal-2-MTER-4-08GY	Ground Water	353.2
1510755-10	Fal-2-MTER-4-09Y	Ground Water	353.2
1510755-11	Fal-2-MTER-4-10P	Ground Water	353.2
1510755-12	Fal-2-MTER-4-11GN	Ground Water	353.2
1510755-13	Fal-2-MTER-4-12R	Ground Water	353.2
1510755-14	Fal-2-MTER-4-13BU	Ground Water	353.2



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510755

**PROJECT NARRATIVE**

**No unusual observations noted.**

**End of Project Narrative.**

**DATA USABILITY LINKS**

[Definitions of Quality Control Parameters](#)

[Semivolatile Organics Internal Standard Information](#)

[Semivolatile Organics Surrogate Information](#)

[Volatile Organics Internal Standard Information](#)

[Volatile Organics Surrogate Information](#)

[EPH and VPH Alkane Lists](#)



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510755

**CURRENT SW-846 METHODOLOGY VERSIONS**

**Analytical Methods**

- 1010A - Flashpoint
- 6010C - ICP
- 6020A - ICP MS
- 7010 - Graphite Furnace
- 7196A - Hexavalent Chromium
- 7470A - Aqueous Mercury
- 7471B - Solid Mercury
- 8011 - EDB/DBCP/TCP
- 8015D - GRO/DRO
- 8081B - Pesticides
- 8082A - PCB
- 8100M - TPH
- 8151A - Herbicides
- 8260B - VOA
- 8270D - SVOA
- 8270D SIM - SVOA Low Level
- 9014 - Cyanide
- 9038 - Sulfate
- 9040C - Aqueous pH
- 9045D - Solid pH (Corrosivity)
- 9050A - Specific Conductance
- 9056A - Anions (IC)
- 9060A - TOC
- 9095B - Paint Filter
- MADEP 04-1.1 - EPH / VPH

**Prep Methods**

- 3005A - Aqueous ICP Digestion
- 3020A - Aqueous Graphite Furnace / ICP MS Digestion
- 3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
- 3060A - Solid Hexavalent Chromium Digestion
- 3510C - Separatory Funnel Extraction
- 3520C - Liquid / Liquid Extraction
- 3540C - Manual Soxhlet Extraction
- 3541 - Automated Soxhlet Extraction
- 3546 - Microwave Extraction
- 3580A - Waste Dilution
- 5030B - Aqueous Purge and Trap
- 5030C - Aqueous Purge and Trap
- 5035 - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-02GNT  
Date Sampled: 10/26/15 11:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-01  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Dissolved Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Iron	498 (50.0)		6010C		1	JP	10/30/15 21:10	50	25	CJ52847
Manganese	47.3 (10.0)		6010C		1	JP	10/30/15 21:10	50	25	CJ52847



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-02GNT  
Date Sampled: 10/26/15 11:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-01  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Boron	ND (50.0)		6010C		1	KJK	10/30/15 4:14	50	25	CJ52848



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-02GNT  
Date Sampled: 10/26/15 11:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-01  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	0.046 (0.020)		4500NH3 D		1	EEM	11/02/15 13:45	mg/L	CK50218
Chloride	182 (15.0)		9250		5	EEM	11/02/15 11:04	mg/L	CK50215
Dissolved Organic Carbon	1.9 (1.0)		§		1	SUB	10/30/15 21:55	mg/L	CK50309
Nitrate as N	4.73 (0.210)		353.2		10	EEM	10/28/15 12:58	mg/L	[CALC]
Nitrite as N	0.017 (0.010)		353.2		1	EEM	10/27/15 18:29	mg/L	CJ52739
Sulfate	5.3 (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53002
Total Nitrogen	5.03 (0.230)		4500N		10	EEM	11/02/15 16:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-14BK  
Date Sampled: 10/26/15 13:10  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-02  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Dissolved Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Iron	6240 (50.0)		6010C		1	JP	10/30/15 21:28	50	25	CJ52847
Manganese	1280 (10.0)		6010C		1	JP	10/30/15 21:28	50	25	CJ52847



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-14BK  
Date Sampled: 10/26/15 13:10  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-02  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Boron	ND (50.0)		6010C		1	KJK	10/30/15 4:31	50	25	CJ52848



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-14BK  
Date Sampled: 10/26/15 13:10  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-02  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	0.039 (0.020)		4500NH3 D		1	EEM	11/02/15 13:45	mg/L	CK50218
Chloride	13.8 (3.0)		9250		1	EEM	11/02/15 11:02	mg/L	CK50215
Dissolved Organic Carbon	2.0 (1.0)		§		1	SUB	10/30/15 22:08	mg/L	CK50309
Nitrate as N	0.106 (0.030)		353.2		1	EEM	10/28/15 13:02	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	EEM	10/27/15 18:32	mg/L	CJ52739
Sulfate	7.3 (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53002
Total Nitrogen	0.201 (0.050)		4500N		1	EEM	11/02/15 16:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-01PT  
Date Sampled: 10/26/15 10:50  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-03  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	3.07 (0.210)		353.2		10	EEM	10/28/15 13:26	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-03RT  
Date Sampled: 10/26/15 11:32  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-04  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	2.85 (0.210)		353.2		10	EEM	10/28/15 13:27	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-04BUT  
Date Sampled: 10/26/15 11:39  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-05  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	4.09 (0.410)		353.2		20	EEM	10/28/15 13:28	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-05BKT  
Date Sampled: 10/26/15 11:48  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-06  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	3.37 (0.410)		353.2		20	EEM	10/28/15 13:29	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-06WT  
Date Sampled: 10/26/15 11:54  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-07  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	4.15 (0.410)		353.2		20	EEM	10/28/15 13:30	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-070  
Date Sampled: 10/26/15 11:59  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-08  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	11.6 (1.01)		353.2		50	EEM	10/28/15 13:31	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-08GY  
Date Sampled: 10/26/15 12:15  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-09  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	10.7 (1.01)		353.2		50	EEM	10/28/15 13:34	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-09Y  
Date Sampled: 10/26/15 12:20  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-10  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	6.30 (0.410)		353.2		20	EEM	10/28/15 13:35	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-10P  
Date Sampled: 10/26/15 12:26  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-11  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	ND (0.030)		353.2		1	EEM	10/28/15 13:15	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-11GN  
Date Sampled: 10/26/15 12:32  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-12  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	ND (0.030)		353.2		1	EEM	10/28/15 13:16	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-12R  
Date Sampled: 10/26/15 12:37  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-13  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	0.869 (0.030)		353.2		1	EEM	10/28/15 13:17	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-13BU  
Date Sampled: 10/26/15 12:47  
Percent Solids: N/A

ESS Laboratory Work Order: 1510755  
ESS Laboratory Sample ID: 1510755-14  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	0.090 (0.030)		353.2		1	EEM	10/28/15 13:18	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510755

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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Dissolved Metals

**Batch CJ52847 - 3005A/200.7**

**Blank**

Iron	ND	50.0	ug/L							
Manganese	ND	10.0	ug/L							

**LCS**

Iron	1180	50.0	ug/L	1250		94	80-120			
Manganese	239	10.0	ug/L	250.0		96	80-120			

**LCS Dup**

Iron	1190	50.0	ug/L	1250		95	80-120	0.6	20	
Manganese	244	10.0	ug/L	250.0		97	80-120	2	20	

Total Metals

**Batch CJ52848 - 3005A/200.7**

**Blank**

Boron	ND	50.0	ug/L							
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**LCS**

Boron	254	50.0	ug/L	250.0		102	80-120			
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**LCS Dup**

Boron	260	50.0	ug/L	250.0		104	80-120	2	20	
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Classical Chemistry

**Batch CJ52739 - [CALC]**

**Blank**

Nitrate as N	ND	0.010	mg/L							
Nitrite as N	ND	0.010	mg/L							
Nitrite as N	ND	0.010	mg/L							

**LCS**

Nitrate as N	ND		mg/L							
Nitrite as N	0.266		mg/L	0.2497		107	90-110			
Nitrite as N	0.266		mg/L	0.2497		107	90-110			

**Batch CJ52741 - [CALC]**

**Blank**

Nitrate as N	ND	0.020	mg/L							
Nitrate/Nitrite as N	ND	0.020	mg/L							
Nitrate/Nitrite as N	ND	0.020	mg/L							
Total Nitrogen	ND	0.020	mg/L							

**LCS**

Nitrate as N	0.490		mg/L							
Nitrate/Nitrite as N	0.490		mg/L	0.5000		98	90-110			
Nitrate/Nitrite as N	0.490		mg/L	0.5000		98	90-110			
Total Nitrogen	0.490		mg/L							

**Batch CJ53002 - General Preparation**



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510755

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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Classical Chemistry

**Batch CJ53002 - General Preparation**

**Blank**

Sulfate	ND	5.0	mg/L							
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**LCS**

Sulfate	9.5		mg/L	9.988		95	85-115			
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**Batch CJ53025 - TKN Prep**

**Blank**

Total Kjeldahl Nitrogen as N	ND	0.03	mg/L							
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Total Nitrogen	ND	0.030	mg/L							
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**LCS**

Total Kjeldahl Nitrogen as N	17.4	0.03	mg/L	17.60		99	80-120			
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Total Nitrogen	17.4	0.030	mg/L							
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**Batch CK50215 - General Preparation**

**Blank**

Chloride	ND	3.0	mg/L							
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**LCS**

Chloride	30.0		mg/L	30.00		100	90-110			
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**Batch CK50218 - NH4 Prep**

**Blank**

Ammonia as N	ND	0.020	mg/L							
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**LCS**

Ammonia as N	0.103		mg/L	0.09994		103	80-120			
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*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510755

**Notes and Definitions**

- U Analyte included in the analysis, but not detected
- D Diluted.
- ND Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- MDL Method Detection Limit
- MRL Method Reporting Limit
- LOD Limit of Detection
- LOQ Limit of Quantitation
- DL Detection Limit
- I/V Initial Volume
- F/V Final Volume
- § Subcontracted analysis; see attached report
- 1 Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
- 2 Range result excludes concentrations of target analytes eluting in that range.
- 3 Range result excludes the concentration of the C9-C10 aromatic range.
- Avg Results reported as a mathematical average.
- NR No Recovery
- [CALC] Calculated Analyte
- SUB Subcontracted analysis; see attached report



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510755

**ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS**

**ENVIRONMENTAL**

Rhode Island Potable and Non Potable Water: LAI00179

<http://www.health.ri.gov/find/labs/analytical/ESS.pdf>

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750

[http://www.ct.gov/dph/lib/dph/environmental\\_health/environmental\\_laboratories/pdf/OutOfStateCommercialLaboratories.pdf](http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutOfStateCommercialLaboratories.pdf)

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002

<http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/documents/AllLabs.xls>

Massachusetts Potable and Non Potable Water: M-RI002

<http://public.dep.state.ma.us/Labcert/Labcert.aspx>

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424

<http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313

<http://www.wadsworth.org/labcert/elap/comm.html>

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006

[http://datamine2.state.nj.us/DEP\\_OPRA/OpraMain/pi\\_main?mode=pi\\_by\\_site&sort\\_order=PI\\_NAMEA&Select+a+Site:=58715](http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715)

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752

[http://www.depweb.state.pa.us/portal/server.pt/community/labs/13780/laboratory\\_accreditation\\_program/590095](http://www.depweb.state.pa.us/portal/server.pt/community/labs/13780/laboratory_accreditation_program/590095)

61 Louisa Viens Drive  
Dayville, CT 06241  
Fax: 860-774-2689  
Phone: 860-774-6814  
Toll-Free: 800-334-0103

## ANALYTICAL DATA REPORT

prepared for:

ESS Laboratory  
185 Frances Avenue  
Cranston, RI 02910-2211  
Shawn Morrell

Report Number: E510S58  
Project: MA-Groundwater

Received Date: 10/29/2015  
Report Date: 11/02/2015



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David Dickinson  
Technical Director



CT DPH #PH-0465  
NH ELAP #2020

EPA #CT00008  
NY ELAP #11549

MA DEP #M-CT008  
PA DEP #68-04413

MD #349  
RI DOH #LAO00346

ME DHHS #CT0050  
VA #460279

VT DOH #VT11549



101-000000481616

Report No: E510S58  
Client: ESS Laboratory  
Project: MA-Groundwater

### **CASE NARRATIVE / METHOD CONFORMANCE SUMMARY**

The results presented in this report relate only to the samples received.

This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included, along with a copy of the chain of custody and any subcontracted analyses reports, if applicable, for the sample(s) in this report. Subcontractor results are identified by 'SUB' next to the analysis.

Microbac Laboratories, Inc. received three samples from ESS Laboratory on 10/29/2015. The samples were analyzed for the following list of analyses in accordance with MA DEP regulations unless otherwise indicated:

Dissolved Organic Carbon (DOC)  
SM 5310C

**Non-Conformances:**  
**Work Order:**

None

**Sample:**

None

**Analysis:**

None

# Microbac Laboratories, Inc.

## Analytical Data Report

Report No: E510S58  
 Date Received: 10/29/2015 16:05

Customer: ESS Laboratory  
 Project: MA-Groundwater

Parameter	Result	DL	Units	Completed	By	Dilution
<b>(1) 1510755-01</b>						
<b>Date Collected: 10/26/2015 11:00</b>		<b>Matrix: Aqueous</b>				
Dissolved Organic Carbon (DOC)	1.9	1.0	mg/L	10/30/2015 21:55	M_B	
<b>(2) 1510755-02</b>						
<b>Date Collected: 10/26/2015 13:10</b>		<b>Matrix: Aqueous</b>				
Dissolved Organic Carbon (DOC)	2.0	1.0	mg/L	10/30/2015 22:08	M_B	
<b>(3) Filter Blank</b>						
<b>Date Collected: 10/29/2015</b>		<b>Matrix: Aqueous</b>				
Dissolved Organic Carbon (DOC)	ND	1.0	mg/L	10/30/2015 21:37	M_B	
<b>(4) Method Blank</b>						
<b>Date Collected: 10/29/2015</b>		<b>Matrix: Aqueous</b>				
Dissolved Organic Carbon (DOC)	ND	1.0	mg/L	10/30/2015 20:41	M_B	

### Wet Chemistry Duplicate/Matrix Spike Summary

***E510S58***

							LCS			Analysis Date
Sample	Sample	Sample Duplicate	RPD	Spike Amount	LFM Result	% Recovery	Recovery Limits	Result	% Recovery	

<b>DOC</b>											
<b>ICV</b>				<b>12</b>				12.5	104	<b>90-110</b>	10/30/2015
<b>E510S57-1</b>	2.91			<b>5.0</b>	7.73	96.4	<b>80-120</b>				
<b>E510S02-2</b>	2.87	2.95	2.7				<b>25</b>				

When the sample or duplicate concentration is < 5X the DL, the control limit becomes +/- the DL.

When the sample concentration is > 4 X the spiked concentration there is no QC action limit.



**Sample and Cooler Receipt Checklist**

Client: MT Environmental Restoration  
 Client Project ID: \_\_\_\_\_  
 Shipped/Delivered Via: ESS Courier

ESS Project ID: 15100755  
 Date Project Due: 11/3/15  
 Days For Project: 5 Day

**Items to be checked upon receipt:**

- |   |                               |   |   |
|---|-------------------------------|---|---|
| 1. Air Bill Manifest Present?                 | <input type="checkbox"/> * No | 10. Are the samples properly preserved?   | <input type="checkbox"/> Yes  |
| Air No.:                                      |                               | 11. Proper sample containers used?        | <input type="checkbox"/> Yes  |
| 2. Were Custody Seals Present?                | <input type="checkbox"/> No   | 12. Any air bubbles in the VOA vials?     | <input type="checkbox"/> N/A  |
| 3. Were Custody Seals Intact?                 | <input type="checkbox"/> N/A  | 13. Holding times exceeded?               | <input type="checkbox"/> No   |
| 4. Is Radiation count < 100 CPM?              | <input type="checkbox"/> Yes  | 14. Sufficient sample volumes?            | <input type="checkbox"/> Yes  |
| 5. Is a cooler present?                       | <input type="checkbox"/> Yes  | 15. Any Subcontracting needed?            | <input type="checkbox"/> * Yes  |
| <input type="text" value="Cooler Temp: 4.0"/> |                               | 16. Are ESS labels on correct containers? | <input checked="" type="checkbox"/> Yes   <input type="checkbox"/> No |
| <input type="text" value="Iced With: Ice"/>   |                               | 17. Were samples received intact?         | <input checked="" type="checkbox"/> Yes   <input type="checkbox"/> No |
| 6. Was COC included with samples?             | <input type="checkbox"/> Yes  | ESS Sample IDs: <u>01-02</u>              |   |
| 7. Was COC signed and dated by client?        | <input type="checkbox"/> Yes  | Sub Lab: <u>Premier</u>                   |   |
| 8. Does the COC match the sample              | <input type="checkbox"/> Yes  | Analysis: <u>DOC</u>                      |   |
| 9. Is COC complete and correct?               | <input type="checkbox"/> Yes  | TAT: <u>STW</u>                           |   |

18. Was there need to call project manager to discuss status? If yes, please explain.

\_\_\_\_\_

\_\_\_\_\_

Who was called?: \_\_\_\_\_ By whom? \_\_\_\_\_

Sample Number	Properly Preserved	Container Type	# of Containers	Preservative
1	Yes	1 L Glass	1	NP
1	Yes	250 ml Plastic	1	H2SO4
1	Yes	250 ml Plastic	2	HNO3
1	Yes	250 ml Plastic	3	NP
1	Yes	40 ml - VOA	2	H2SO4
1	Yes	500 ml Plastic	1	H2SO4
2	Yes	1 L Glass	1	NP
2	Yes	250 ml Plastic	1	H2SO4
2	Yes	250 ml Plastic	2	HNO3
2	Yes	250 ml Plastic	3	NP
2	Yes	40 ml - VOA	2	H2SO4
2	Yes	500 ml Plastic	1	H2SO4
3	Yes	250 ml Plastic	1	NP
4	Yes	250 ml Plastic	1	NP
5	Yes	250 ml Plastic	1	NP
6	Yes	250 ml Plastic	1	NP
7	Yes	250 ml Plastic	1	NP
8	Yes	250 ml Plastic	1	NP
9	Yes	250 ml Plastic	1	NP
10	Yes	250 ml Plastic	1	NP
11	Yes	250 ml Plastic	1	NP
12	Yes	250 ml Plastic	1	NP
13	Yes	250 ml Plastic	1	NP
14	Yes	250 ml Plastic	1	NP

**Sample and Cooler Receipt Checklist**

Client: MT Enviromental Restoration

ESS Project ID: 15100755

Completed By: [Signature]

Date/Time: 10/27/15 1238

Reviewed By: [Signature]

Date/Time: 10/27/15 13<sup>20</sup>

# ESS Laboratory

Division of Thiefsch Engineering, Inc.  
 185 Frances Avenue, Cranston RI 02910-2211  
 Tel. (401)461-7181 Fax (401)461-4486  
 www.esslaboratory.com

# CHAIN OF CUSTODY

Turn Time  Standard Other \_\_\_\_\_  
 Regulatory State: MA RI CT NH NJ NY ME Other \_\_\_\_\_  
 Is this project for any of the following: (please circle)  
 MA-MCP Navy USACE CT DEP Other \_\_\_\_\_

ESS Lab # 1570755

Reporting Limits - \_\_\_\_\_

Electronic Deliverables \*Excel Access PDF

Co. Name MT Env. Restoration (MTER)  
 Contact Person Jim Besley  
 Address 147 Elm St  
 City, State Duxbury MA  
 Zip 02332  
 email: jbesley@cape.com

Project # \_\_\_\_\_  
 Project Name Fal-2  
 Proj. Location Falmouth, MA  
 PO # \_\_\_\_\_

ESS Lab ID	Date	Collection Time	Grab-G Composite-C	Matrix	Sample ID	Pres Code	# of Containers	Type of Container	Vol of Container	Analysis
1	10/26/15	1100	G	GW	Fal-2-MTER-4-026NT	143	8	8 Ag	250	Nitrite
2	10/26/15	1310	G	GW	Fal-2-MTER-4-148K	143	8	8 Ag	250	Nitrite
3	10/26/15	1050	G	GW	Fal-2-MTER-4-01PT	1	1	8	250	Nitrite
4	10/26/15	1132	G	GW	Fal-2-MTER-4-03RT	1	1	8	250	Nitrite
5	10/26/15	1139	G	GW	Fal-2-MTER-4-04BT	1	1	8	250	Nitrite
6	10/26/15	1148	G	GW	Fal-2-MTER-4-05BT	1	1	8	250	Nitrite
7	10/26/15	1154	G	GW	Fal-2-MTER-4-06WT	1	1	8	250	Nitrite

Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present Yes No  
 Seals Intact Yes No NA: \_\_\_\_\_  
 Internal Use Only  
 [ ] Pickup [ ] Technician

Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-  
 Sampled by: Tammy McCall  
 Comments: \_\_\_\_\_

Cooler Temperature: 3.2, 4.0, 3.8 °C  
 Reinquished by: (Signature, Date & Time)  
[Signature] 10/27/15 8:38

Received by: (Signature, Date & Time)  
[Signature] 10/27/15 10:23  
 Reinquished by: (Signature, Date & Time)  
[Signature] 10/27/15 8:38

Received by: (Signature, Date & Time)  
[Signature] 10/27/15 11:20  
 Reinquished by: (Signature, Date & Time)  
[Signature] 10/27/15

## Report Method Blank & Laboratory Control Sample Results

Please fax to the laboratory all changes to Chain of Custody

\* By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VIIA

# ESS Laboratory

Division of Thielsch Engineering, Inc.

185 Frances Avenue, Cranston RI 02910-2211  
 Tel. (401)461-7181 Fax (401)461-4486  
 www.esslaboratory.com

# CHAIN OF CUSTODY

Turn Time Standard Other \_\_\_\_\_

Regulatory State: MA RI CT NH NJ NY ME Other \_\_\_\_\_

Is this project for any of the following: (please circle)  
 MA-MCP Navy USACE CT DEP Other \_\_\_\_\_

ESS Lab # 1510755

Reporting Limits - \_\_\_\_\_

Electronic Deliverables \*Exclg Access PDF

Co. Name MT ENV. RESTORATION (MTER)

Contact Person Jim Begley

Address 147 Elm St

Tel. 508-380-2857

Project # \_\_\_\_\_

Proj. Location Falmouth MA

City, State Duxbury MA

Zip 02332

email: ilbegley@dcapc.com

Project Name Fal-2

PO # \_\_\_\_\_

Sample ID \_\_\_\_\_

Matrix \_\_\_\_\_

Grab-G Composite-C \_\_\_\_\_

Collection Time \_\_\_\_\_

Date \_\_\_\_\_

ESS Lab ID \_\_\_\_\_

11/26/15

10/26/15

10/26/15

10/26/15

10/26/15

10/26/15

10/26/15

10/26/15

10/26/15

10/26/15

10/26/15

10/26/15

10/26/15

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10/26/15

10/26/15

10/26/15

10/26/15

10/26/15

Analysis	Vol of Container	Type of Container	# of Containers	Pres Code	Sample ID	Matrix	Grab-G Composite-C	Collection Time	Date	ESS Lab ID
Nitrate	250	P	1	1	Fal-2-MTER-4-070	GW	G	1159	10/26/15	8
	250	P	1	1	Fal-2-MTER-4-086Y	GW	G	1215	10/26/15	9
	250	P	1	1	Fal-2-MTER-4-09Y	GW	G	1220	10/26/15	10
	250	P	1	1	Fal-2-MTER-4-10P	GW	G	1226	10/26/15	11
	250	P	1	1	Fal-2-MTER-4-11GN	GW	G	1232	10/26/15	12
	250	P	1	1	Fal-2-MTER-4-12R	GW	G	1237	10/26/15	13
	250	P	1	1	Fal-2-MTER-4-13BU	GW	G	1247	10/26/15	14

Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA  
 Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter  
 Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-  
 Sampled by: Timothy McColey  
 Comments: \_\_\_\_\_

Cooler Present Yes No NA: \_\_\_\_\_  
 Seals Intact Yes No NA: \_\_\_\_\_  
 Cooler Temperature: 3.2, 4.0, 3.8 °C

Relinquished by: (Signature, Date & Time) \_\_\_\_\_  
 Relinquished by: (Signature, Date & Time) \_\_\_\_\_

Relinquished by: (Signature, Date & Time) \_\_\_\_\_  
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 Relinquished by: (Signature, Date & Time) \_\_\_\_\_

Relinquished by: (Signature, Date & Time) \_\_\_\_\_  
 Relinquished by: (Signature, Date & Time) \_\_\_\_\_

Please fax to the laboratory all changes to Chain of Custody

## Report Method Blank & Laboratory Control Sample Results

\* By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VIII



*CERTIFICATE OF ANALYSIS*

Jim Begley  
 MT Environmental Restoration  
 147 Elm Street  
 Duxbury, MA 02332

**RE: Fal-2 (N/A)**  
**ESS Laboratory Work Order Number: 1510756**

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard  
 Laboratory Director

**REVIEWED**  
 By ESS Laboratory at 3:12 pm, Nov 03, 2015

**Analytical Summary**

The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with NELAC Standards, A2LA and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

**Subcontracted Analyses**

Premier Laboratory - Dayville, CT

Dissolved Organic Carbon



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510756

**SAMPLE RECEIPT**

The following samples were received on October 27, 2015 for the analyses specified on the enclosed Chain of Custody Record.

<b>Lab Number</b>	<b>Sample Name</b>	<b>Matrix</b>	<b>Analysis</b>
1510756-01	Fal-2-MTER-6F	Ground Water	§, 353.2, 4500N, 4500NH3 D, 6010C, 9038, 9250
1510756-02	Fal-2-MTER-6E	Ground Water	§, 353.2, 4500N, 4500NH3 D, 6010C, 9038, 9250
1510756-03	Fal-2-MTER-6D	Ground Water	§, 353.2, 4500N, 4500NH3 D, 6010C, 9038, 9250
1510756-04	Fal-2-MTER-6C	Ground Water	§, 353.2, 4500N, 4500NH3 D, 6010C, 9038, 9250
1510756-05	Fal-2-MTER-6B	Ground Water	§, 353.2, 4500N, 4500NH3 D, 6010C, 9038, 9250
1510756-06	Fal-2-MTER-6A	Ground Water	§, 353.2, 4500N, 4500NH3 D, 6010C, 9038, 9250
1510756-07	Fal-2-MTER-9D	Ground Water	§, 353.2, 4500N, 4500NH3 D, 6010C, 9038, 9250
1510756-08	Fal-2-MTER-9C	Ground Water	§, 353.2, 4500N, 4500NH3 D, 6010C, 9038, 9250
1510756-09	Fal-2-MTER-4-15W	Ground Water	353.2
1510756-10	Fal-2-MTER-9B	Ground Water	§, 353.2, 4500N, 4500NH3 D, 6010C, 9038, 9250
1510756-11	Fal-2-MTER-9A	Ground Water	§, 353.2, 4500N, 4500NH3 D, 6010C, 9038, 9250



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510756

**PROJECT NARRATIVE**

**No unusual observations noted.**

**End of Project Narrative.**

**DATA USABILITY LINKS**

[Definitions of Quality Control Parameters](#)

[Semivolatile Organics Internal Standard Information](#)

[Semivolatile Organics Surrogate Information](#)

[Volatile Organics Internal Standard Information](#)

[Volatile Organics Surrogate Information](#)

[EPH and VPH Alkane Lists](#)



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510756

**CURRENT SW-846 METHODOLOGY VERSIONS**

**Analytical Methods**

- 1010A - Flashpoint
- 6010C - ICP
- 6020A - ICP MS
- 7010 - Graphite Furnace
- 7196A - Hexavalent Chromium
- 7470A - Aqueous Mercury
- 7471B - Solid Mercury
- 8011 - EDB/DBCP/TCP
- 8015D - GRO/DRO
- 8081B - Pesticides
- 8082A - PCB
- 8100M - TPH
- 8151A - Herbicides
- 8260B - VOA
- 8270D - SVOA
- 8270D SIM - SVOA Low Level
- 9014 - Cyanide
- 9038 - Sulfate
- 9040C - Aqueous pH
- 9045D - Solid pH (Corrosivity)
- 9050A - Specific Conductance
- 9056A - Anions (IC)
- 9060A - TOC
- 9095B - Paint Filter
- MADEP 04-1.1 - EPH / VPH

**Prep Methods**

- 3005A - Aqueous ICP Digestion
- 3020A - Aqueous Graphite Furnace / ICP MS Digestion
- 3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
- 3060A - Solid Hexavalent Chromium Digestion
- 3510C - Separatory Funnel Extraction
- 3520C - Liquid / Liquid Extraction
- 3540C - Manual Soxhlet Extraction
- 3541 - Automated Soxhlet Extraction
- 3546 - Microwave Extraction
- 3580A - Waste Dilution
- 5030B - Aqueous Purge and Trap
- 5030C - Aqueous Purge and Trap
- 5035 - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6F  
Date Sampled: 10/26/15 10:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-01  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Dissolved Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Iron	ND (50.0)		6010C		1	KJK	10/30/15 21:32	50	25	CJ52847
Manganese	25.6 (10.0)		6010C		1	KJK	10/30/15 21:32	50	25	CJ52847



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6F  
Date Sampled: 10/26/15 10:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-01  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Boron	ND (50.0)		6010C		1	KJK	10/30/15 19:53	50	25	CJ52835



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6F  
Date Sampled: 10/26/15 10:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-01  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	11/02/15 13:45	mg/L	CK50218
Chloride	146 (15.0)		9250		5	EEM	11/02/15 11:30	mg/L	CK50216
Dissolved Organic Carbon	2.9 (1.0)		§		1	SUB	10/30/15 18:29	mg/L	CK50309
Nitrate as N	2.73 (0.210)		353.2		10	EEM	10/28/15 13:38	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	EEM	10/27/15 18:50	mg/L	CJ52739
Sulfate	7.1 (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53002
Total Nitrogen	2.89 (0.230)		4500N		10	EEM	11/02/15 16:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6E  
Date Sampled: 10/26/15 11:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-02  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Dissolved Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Iron	236 (50.0)		6010C		1	KJK	10/30/15 21:36	50	25	CJ52847
Manganese	29.1 (10.0)		6010C		1	KJK	10/30/15 21:36	50	25	CJ52847



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6E  
Date Sampled: 10/26/15 11:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-02  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Boron	ND (50.0)		6010C		1	KJK	10/30/15 19:58	50	25	CJ52835



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6E  
Date Sampled: 10/26/15 11:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-02  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	11/02/15 13:45	mg/L	CK50218
Chloride	113 (15.0)		9250		5	EEM	11/02/15 11:32	mg/L	CK50216
Dissolved Organic Carbon	2.3 (1.0)		§		1	SUB	10/30/15 18:57	mg/L	CK50309
Nitrate as N	11.6 (1.01)		353.2		50	EEM	10/28/15 13:39	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	EEM	10/27/15 18:51	mg/L	CJ52739
Sulfate	6.0 (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53002
Total Nitrogen	11.6 (1.03)		4500N		50	EEM	11/02/15 16:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6D  
Date Sampled: 10/26/15 11:30  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-03  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Dissolved Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Iron	263 (50.0)		6010C		1	KJK	10/30/15 21:41	50	25	CJ52847
Manganese	344 (10.0)		6010C		1	KJK	10/30/15 21:41	50	25	CJ52847



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6D  
Date Sampled: 10/26/15 11:30  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-03  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Boron	ND (100)		6010C		2	KJK	10/30/15 20:02	50	25	CJ52835



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6D  
Date Sampled: 10/26/15 11:30  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-03  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	11/02/15 13:45	mg/L	CK50218
Chloride	43.0 (3.0)		9250		1	EEM	11/02/15 11:15	mg/L	CK50216
Dissolved Organic Carbon	2.2 (1.0)		§		1	SUB	10/30/15 19:08	mg/L	CK50309
Nitrate as N	10.0 (1.01)		353.2		50	EEM	10/28/15 13:40	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	EEM	10/27/15 18:52	mg/L	CJ52739
Sulfate	6.2 (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53002
Total Nitrogen	10.0 (1.03)		4500N		50	EEM	11/02/15 16:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6C  
Date Sampled: 10/26/15 12:30  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-04  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Dissolved Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Iron	839 (50.0)		6010C		1	KJK	10/30/15 21:45	50	25	CJ52847
Manganese	183 (10.0)		6010C		1	KJK	10/30/15 21:45	50	25	CJ52847



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6C  
Date Sampled: 10/26/15 12:30  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-04  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Boron	ND (100)		6010C		2	KJK	10/30/15 20:06	50	25	CJ52835



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6C  
Date Sampled: 10/26/15 12:30  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-04  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	11/02/15 13:45	mg/L	CK50218
Chloride	13.7 (3.0)		9250		1	EEM	11/02/15 11:15	mg/L	CK50216
Dissolved Organic Carbon	4.4 (1.0)		§		1	SUB	10/30/15 19:21	mg/L	CK50309
Nitrate as N	9.01 (1.01)		353.2		50	EEM	10/28/15 13:41	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	EEM	10/27/15 18:53	mg/L	CJ52739
Sulfate	ND (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53002
Total Nitrogen	9.01 (1.03)		4500N		50	EEM	11/02/15 16:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6B  
Date Sampled: 10/26/15 13:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-05  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Dissolved Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Iron	565 (50.0)		6010C		1	KJK	10/30/15 21:49	50	25	CJ52847
Manganese	315 (10.0)		6010C		1	KJK	10/30/15 21:49	50	25	CJ52847



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6B  
Date Sampled: 10/26/15 13:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-05  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Boron	ND (50.0)		6010C		1	KJK	10/30/15 20:11	50	25	CJ52835



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6B  
Date Sampled: 10/26/15 13:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-05  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	11/02/15 13:45	mg/L	CK50218
Chloride	14.4 (3.0)		9250		1	EEM	11/02/15 11:16	mg/L	CK50216
Dissolved Organic Carbon	2.4 (1.0)		§		1	SUB	10/30/15 19:33	mg/L	CK50309
Nitrate as N	0.615 (0.030)		353.2		1	EEM	10/28/15 13:52	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	EEM	10/27/15 19:12	mg/L	CJ52740
Sulfate	6.2 (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53002
Total Nitrogen	0.710 (0.050)		4500N		1	EEM	11/02/15 16:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6A  
Date Sampled: 10/26/15 14:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-06  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Dissolved Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Iron	417 (50.0)		6010C		1	KJK	10/30/15 21:54	50	25	CJ52847
Manganese	370 (10.0)		6010C		1	KJK	10/30/15 21:54	50	25	CJ52847



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6A  
Date Sampled: 10/26/15 14:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-06  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Boron	ND (50.0)		6010C		1	KJK	10/30/15 20:15	50	25	CJ52835



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-6A  
Date Sampled: 10/26/15 14:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-06  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	11/02/15 13:45	mg/L	CK50218
Chloride	13.4 (3.0)		9250		1	EEM	11/02/15 11:17	mg/L	CK50216
Dissolved Organic Carbon	1.5 (1.0)		§		1	SUB	10/30/15 19:50	mg/L	CK50309
Nitrate as N	0.694 (0.030)		353.2		1	EEM	10/28/15 13:55	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	EEM	10/27/15 19:15	mg/L	CJ52740
Sulfate	7.5 (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53002
Total Nitrogen	0.765 (0.050)		4500N		1	EEM	11/02/15 16:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-9D  
Date Sampled: 10/26/15 14:30  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-07  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Dissolved Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Iron	ND (50.0)		6010C		1	KJK	10/30/15 21:58	50	25	CJ52847
Manganese	85.2 (10.0)		6010C		1	KJK	10/30/15 21:58	50	25	CJ52847



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-9D  
Date Sampled: 10/26/15 14:30  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-07  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Boron	ND (50.0)		6010C		1	KJK	10/30/15 20:32	50	25	CJ52835



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-9D  
Date Sampled: 10/26/15 14:30  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-07  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	11/02/15 13:45	mg/L	CK50218
Chloride	99.9 (3.0)		9250		1	EEM	11/02/15 11:19	mg/L	CK50216
Dissolved Organic Carbon	3.0 (1.0)		§		1	SUB	10/30/15 20:02	mg/L	CK50309
Nitrate as N	4.17 (0.410)		353.2		20	EEM	10/28/15 14:04	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	EEM	10/27/15 19:16	mg/L	CJ52740
Sulfate	9.9 (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53002
Total Nitrogen	4.17 (0.430)		4500N		20	EEM	11/02/15 16:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-9C  
Date Sampled: 10/26/15 15:15  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-08  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Dissolved Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Iron	ND (50.0)		6010C		1	KJK	10/30/15 22:02	50	25	CJ52847
Manganese	172 (10.0)		6010C		1	KJK	10/30/15 22:02	50	25	CJ52847



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-9C  
Date Sampled: 10/26/15 15:15  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-08  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Boron	ND (100)		6010C		2	KJK	10/30/15 20:36	50	25	CJ52835



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-9C  
Date Sampled: 10/26/15 15:15  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-08  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	11/02/15 13:45	mg/L	CK50218
Chloride	18.6 (3.0)		9250		1	EEM	11/02/15 11:19	mg/L	CK50216
Dissolved Organic Carbon	1.2 (1.0)		§		1	SUB	10/30/15 20:58	mg/L	CK50309
Nitrate as N	8.26 (1.01)		353.2		50	EEM	10/28/15 14:13	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	EEM	10/27/15 19:17	mg/L	CJ52740
Sulfate	5.0 (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53002
Total Nitrogen	8.26 (1.03)		4500N		50	EEM	11/02/15 16:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-4-15W  
Date Sampled: 10/26/15 13:30  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-09  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	0.183 (0.030)		353.2		1	EEM	10/28/15 13:59	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-9B  
Date Sampled: 10/26/15 15:45  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-10  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Dissolved Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Iron	ND (50.0)		6010C		1	KJK	10/30/15 22:06	50	25	CJ52847
Manganese	39.4 (10.0)		6010C		1	KJK	10/30/15 22:06	50	25	CJ52847



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-9B  
Date Sampled: 10/26/15 15:45  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-10  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Boron	ND (200)		6010C		2	KJK	10/30/15 20:41	50	50	CJ52835



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-9B  
Date Sampled: 10/26/15 15:45  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-10  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	11/02/15 13:45	mg/L	CK50218
Chloride	19.3 (3.0)		9250		1	EEM	11/02/15 11:20	mg/L	CK50216
Dissolved Organic Carbon	1.6 (1.0)		§		1	SUB	10/30/15 21:09	mg/L	CK50309
Nitrate as N	1.54 (0.110)		353.2		5	EEM	10/28/15 14:06	mg/L	[CALC]
Nitrite as N	0.014 (0.010)		353.2		1	EEM	10/27/15 19:19	mg/L	CJ52740
Sulfate	6.2 (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53002
Total Nitrogen	1.56 (0.130)		4500N		5	EEM	11/02/15 16:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-9A  
Date Sampled: 10/26/15 16:15  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-11  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Dissolved Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Iron	ND (50.0)		6010C		1	KJK	10/30/15 22:37	100	50	CJ52847
Manganese	31.3 (10.0)		6010C		1	KJK	10/30/15 22:37	100	50	CJ52847



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-9A  
Date Sampled: 10/26/15 16:15  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-11  
Sample Matrix: Ground Water  
Units: ug/L

Extraction Method: 3005A/200.7

**Total Metals**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Boron	ND (200)		6010C		2	KJK	10/30/15 20:45	50	50	CJ52835



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-9A  
Date Sampled: 10/26/15 16:15  
Percent Solids: N/A

ESS Laboratory Work Order: 1510756  
ESS Laboratory Sample ID: 1510756-11  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	11/02/15 13:45	mg/L	CK50218
<b>Chloride</b>	<b>15.4</b> (3.0)		9250		1	EEM	11/02/15 11:20	mg/L	CK50216
Dissolved Organic Carbon	ND (1.0)		§		1	SUB	10/30/15 21:27	mg/L	CK50309
<b>Nitrate as N</b>	<b>1.03</b> (0.110)		353.2		5	EEM	10/28/15 14:07	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	EEM	10/27/15 19:22	mg/L	CJ52740
<b>Sulfate</b>	<b>6.5</b> (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53003
<b>Total Nitrogen</b>	<b>1.09</b> (0.130)		4500N		5	EEM	11/02/15 16:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510756

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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**Dissolved Metals**

**Batch CJ52847 - 3005A/200.7**

**Blank**

Iron	ND	50.0	ug/L							
Manganese	ND	10.0	ug/L							

**LCS**

Iron	1180	50.0	ug/L	1250		94	80-120			
Manganese	239	10.0	ug/L	250.0		96	80-120			

**LCS Dup**

Iron	1190	50.0	ug/L	1250		95	80-120	0.6	20	
Manganese	244	10.0	ug/L	250.0		97	80-120	2	20	

**Total Metals**

**Batch CJ52835 - 3005A/200.7**

**Blank**

Boron	ND	50.0	ug/L							
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**LCS**

Boron	249	50.0	ug/L	250.0		100	80-120			
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**LCS Dup**

Boron	242	50.0	ug/L	250.0		97	80-120	3	20	
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**Classical Chemistry**

**Batch CJ52739 - [CALC]**

**Blank**

Nitrate as N	ND	0.010	mg/L							
Nitrite as N	ND	0.010	mg/L							
Nitrite as N	ND	0.010	mg/L							

**LCS**

Nitrate as N	ND		mg/L							
Nitrite as N	0.266		mg/L	0.2497		107	90-110			
Nitrite as N	0.266		mg/L	0.2497		107	90-110			

**Batch CJ52740 - [CALC]**

**Blank**

Nitrate as N	ND	0.010	mg/L							
Nitrite as N	ND	0.010	mg/L							
Nitrite as N	ND	0.010	mg/L							

**LCS**

Nitrate as N	ND		mg/L							
Nitrite as N	0.261		mg/L	0.2497		104	90-110			
Nitrite as N	0.261		mg/L	0.2497		104	90-110			

**Batch CJ52741 - [CALC]**

**Blank**

Nitrate as N	ND	0.020	mg/L							
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*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510756

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
<b>Classical Chemistry</b>										
<b>Batch CJ52741 - General Preparation</b>										
Nitrate/Nitrite as N	ND	0.020	mg/L							
Nitrate/Nitrite as N	ND	0.020	mg/L							
Total Nitrogen	ND	0.020	mg/L							
<b>LCS</b>										
Nitrate as N	0.490		mg/L							
Nitrate/Nitrite as N	0.490		mg/L	0.5000		98	90-110			
Nitrate/Nitrite as N	0.490		mg/L	0.5000		98	90-110			
Total Nitrogen	0.490		mg/L							
<b>Batch CJ52742 - [CALC]</b>										
<b>Blank</b>										
Nitrate as N	ND	0.020	mg/L							
Nitrate/Nitrite as N	ND	0.020	mg/L							
Nitrate/Nitrite as N	ND	0.020	mg/L							
Total Nitrogen	ND	0.020	mg/L							
<b>LCS</b>										
Nitrate as N	0.472		mg/L							
Nitrate/Nitrite as N	0.472		mg/L	0.5000		94	90-110			
Nitrate/Nitrite as N	0.472		mg/L	0.5000		94	90-110			
Total Nitrogen	0.472		mg/L							
<b>Batch CJ53002 - General Preparation</b>										
<b>Blank</b>										
Sulfate	ND	5.0	mg/L							
<b>LCS</b>										
Sulfate	9.5		mg/L	9.988		95	85-115			
<b>Batch CJ53003 - General Preparation</b>										
<b>Blank</b>										
Sulfate	ND	5.0	mg/L							
<b>LCS</b>										
Sulfate	9.5		mg/L	9.988		95	85-115			
<b>Batch CJ53025 - TKN Prep</b>										
<b>Blank</b>										
Total Kjeldahl Nitrogen as N	ND	0.03	mg/L							
Total Nitrogen	ND	0.030	mg/L							
<b>LCS</b>										
Total Kjeldahl Nitrogen as N	17.4	0.03	mg/L	17.60		99	80-120			
Total Nitrogen	17.4	0.030	mg/L							
<b>Batch CK50216 - General Preparation</b>										
<b>Blank</b>										
Chloride	ND	3.0	mg/L							
<b>LCS</b>										
Chloride	29.1		mg/L	30.00		97	90-110			



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510756

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
---------	--------	-----	-------	-------------	---------------	------	-------------	-----	-----------	-----------

Classical Chemistry

**Batch CK50218 - NH4 Prep**

**Blank**

Ammonia as N	ND	0.020	mg/L							
--------------	----	-------	------	--	--	--	--	--	--	--

**LCS**

Ammonia as N	0.103		mg/L	0.09994		103	80-120			
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*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510756

**Notes and Definitions**

- U Analyte included in the analysis, but not detected
- D Diluted.
- ND Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- MDL Method Detection Limit
- MRL Method Reporting Limit
- LOD Limit of Detection
- LOQ Limit of Quantitation
- DL Detection Limit
- I/V Initial Volume
- F/V Final Volume
- § Subcontracted analysis; see attached report
- 1 Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
- 2 Range result excludes concentrations of target analytes eluting in that range.
- 3 Range result excludes the concentration of the C9-C10 aromatic range.
- Avg Results reported as a mathematical average.
- NR No Recovery
- [CALC] Calculated Analyte
- SUB Subcontracted analysis; see attached report



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510756

**ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS**

**ENVIRONMENTAL**

Rhode Island Potable and Non Potable Water: LAI00179

<http://www.health.ri.gov/find/labs/analytical/ESS.pdf>

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750

[http://www.ct.gov/dph/lib/dph/environmental\\_health/environmental\\_laboratories/pdf/OutOfStateCommercialLaboratories.pdf](http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutOfStateCommercialLaboratories.pdf)

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002

<http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/documents/AllLabs.xls>

Massachusetts Potable and Non Potable Water: M-RI002

<http://public.dep.state.ma.us/Labcert/Labcert.aspx>

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424

<http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313

<http://www.wadsworth.org/labcert/elap/comm.html>

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006

[http://datamine2.state.nj.us/DEP\\_OPRA/OpraMain/pi\\_main?mode=pi\\_by\\_site&sort\\_order=PI\\_NAMEA&Select+a+Site:=58715](http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715)

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752

[http://www.depweb.state.pa.us/portal/server.pt/community/labs/13780/laboratory\\_accreditation\\_program/590095](http://www.depweb.state.pa.us/portal/server.pt/community/labs/13780/laboratory_accreditation_program/590095)

61 Louisa Viens Drive  
Dayville, CT 06241  
Fax: 860-774-2689  
Phone: 860-774-6814  
Toll-Free: 800-334-0103

## ANALYTICAL DATA REPORT

prepared for:

ESS Laboratory  
185 Frances Avenue  
Cranston, RI 02910-2211  
Shawn Morrell

Report Number: E510S57  
Project: MA-Groundwater

Received Date: 10/29/2015  
Report Date: 11/02/2015



---

David Dickinson  
Technical Director



CT DPH #PH-0465  
NH ELAP #2020

EPA #CT00008  
NY ELAP #11549

MA DEP #M-CT008  
PA DEP #68-04413

MD #349  
RI DOH #LAO00346

ME DHHS #CT0050  
VA #460279

VT DOH #VT11549



101-000000481615

Report No: E510S57  
Client: ESS Laboratory  
Project: MA-Groundwater

### **CASE NARRATIVE / METHOD CONFORMANCE SUMMARY**

The results presented in this report relate only to the samples received.

This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included, along with a copy of the chain of custody and any subcontracted analyses reports, if applicable, for the sample(s) in this report. Subcontractor results are identified by 'SUB' next to the analysis.

Microbac Laboratories, Inc. received 11 samples from ESS Laboratory on 10/29/2015. The samples were analyzed for the following list of analyses in accordance with MA DEP regulations unless otherwise indicated:

Dissolved Organic Carbon (DOC)  
SM 5310C

**Non-Conformances:**  
**Work Order:**

None

**Sample:**

None

**Analysis:**

None

# Microbac Laboratories, Inc.

## Analytical Data Report

Report No: E510S57  
 Date Received: 10/29/2015 16:05

Customer: ESS Laboratory  
 Project: MA-Groundwater

Parameter	Result	DL	Units	Completed	By	Dilution
<b>(1) 1510756-01</b>						
<b>Date Collected: 10/26/2015 10:00</b>		<b>Matrix: Aqueous</b>				
Dissolved Organic Carbon (DOC)	2.9	1.0	mg/L	10/30/2015 18:29	M_B	
<b>(2) 1510756-02</b>						
<b>Date Collected: 10/26/2015 11:00</b>		<b>Matrix: Aqueous</b>				
Dissolved Organic Carbon (DOC)	2.3	1.0	mg/L	10/30/2015 18:57	M_B	
<b>(3) 1510756-03</b>						
<b>Date Collected: 10/26/2015 11:30</b>		<b>Matrix: Aqueous</b>				
Dissolved Organic Carbon (DOC)	2.2	1.0	mg/L	10/30/2015 19:08	M_B	
<b>(4) 1510756-04</b>						
<b>Date Collected: 10/26/2015 12:30</b>		<b>Matrix: Aqueous</b>				
Dissolved Organic Carbon (DOC)	4.4	1.0	mg/L	10/30/2015 19:21	M_B	
<b>(5) 1510756-05</b>						
<b>Date Collected: 10/26/2015 13:00</b>		<b>Matrix: Aqueous</b>				
Dissolved Organic Carbon (DOC)	2.4	1.0	mg/L	10/30/2015 19:33	M_B	
<b>(6) 1510756-06</b>						
<b>Date Collected: 10/26/2015 14:00</b>		<b>Matrix: Aqueous</b>				
Dissolved Organic Carbon (DOC)	1.5	1.0	mg/L	10/30/2015 19:50	M_B	
<b>(7) 1510756-07</b>						
<b>Date Collected: 10/26/2015 14:30</b>		<b>Matrix: Aqueous</b>				
Dissolved Organic Carbon (DOC)	3.0	1.0	mg/L	10/30/2015 20:02	M_B	
<b>(8) 1510756-08</b>						
<b>Date Collected: 10/26/2015 15:15</b>		<b>Matrix: Aqueous</b>				
Dissolved Organic Carbon (DOC)	1.2	1.0	mg/L	10/30/2015 20:58	M_B	
<b>(9) 1510756-10</b>						
<b>Date Collected: 10/26/2015 15:45</b>		<b>Matrix: Aqueous</b>				
Dissolved Organic Carbon (DOC)	1.6	1.0	mg/L	10/30/2015 21:09	M_B	
<b>(10) 1510756-11</b>						
<b>Date Collected: 10/26/2015 16:15</b>		<b>Matrix: Aqueous</b>				
Dissolved Organic Carbon (DOC)	1.0	1.0	mg/L	10/30/2015 21:27	M_B	
<b>(11) Filter Blank</b>						
<b>Date Collected: 10/29/2015</b>		<b>Matrix: Aqueous</b>				
Dissolved Organic Carbon (DOC)	ND	1.0	mg/L	10/30/2015 21:37	M_B	
<b>(12) Method Blank</b>						
<b>Date Collected: 10/29/2015</b>		<b>Matrix: Aqueous</b>				
Dissolved Organic Carbon (DOC)	ND	1.0	mg/L	10/30/2015 20:41	M_B	

### Wet Chemistry Duplicate/Matrix Spike Summary

**E510S57**

							LCS			Analysis Date
Sample	Sample	Sample Duplicate	RPD	Spike Amount	LFM Result	% Recovery	Recovery Limits	Result	% Recovery	

<b>DOC</b>											
<b>ICV</b>				<b>12</b>				12.5	104	<b>90-110</b>	10/30/2015
<b>E510S57-1</b>	2.91			<b>5.0</b>	7.73	96.4	<b>80-120</b>				
<b>E510S02-2</b>	2.87	2.95	2.7				<b>25</b>				

When the sample or duplicate concentration is < 5X the DL, the control limit becomes +/- the DL.  
 When the sample concentration is > 4 X the spiked concentration there is no QC action limit.

ES10557

**ESS Laboratory**

**Premier/ Microbac**

**CHAIN OF CUSTODY**

ESS Lab # 1510756

YAU

Division of Thielsch Engineering, Inc.

185 Frances Avenue, Cranston RI 02910-2211

Tel. (401)461-7181 Fax (401)461-4486

www.esslaboratory.com

Turn Time **Standard** Other

Regulatory State: **MA** RI CT NH NJ NY ME Other

Is this project for any of the following: (please circle)

MA-MCP Navy USACE CT DEP Other

Reporting Limits -

Electronic Deliverables Excel\* Access PDF

Co. Name		ESS Laboratory		Project #		1510756						
Contact Person		Shawn Morrell		Project Name		1510756						
Address		City, State		Zip		PO #						
Tel.		email:		email:		B02199						
ESS Lab ID	Date	Collection Time	Grab -G Composite-C	Matrix	Sample ID	Pres Code	# of Containers	Type of Container	Vol of Container	Analysis	To	Doc
	10/26/15	1000	G	GW	1510756-01	3	2	V	40mL			X
	10/26/15	1100	G	GW	1510756-02	3	2	V	40mL			X
	10/26/15	1130	G	GW	1510756-03	3	2	V	40mL			X
	10/26/15	1230	G	GW	1510756-04	3	2	V	40mL			X
	10/26/15	1300	G	GW	1510756-05	3	2	V	40mL			X
	10/26/15	1400	G	GW	1510756-06	3	2	V	40mL			X
	10/26/15	1430	G	GW	1510756-07	3	2	V	40mL			X
	10/26/15	1515	G	GW	1510756-08	3	2	V	40mL			X
	10/26/15	1545	G	GW	1510756-10	3	2	V	40mL			X
	10/26/15	1615	G	GW	1510756-11	3	2	V	40mL			X
			--	--	Filter Blank							

Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA

Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Ascorbic Acid, 8-ZnAct, 9-

Cooler Present Yes No NA:  Yes  No  NA

Seals Intact Yes No NA:  Yes  No  NA

Cooler Temperature:  Internal Use Only  Pickup  Technician

Relinquished by: (Signature, Date & Time)

Comments: \*Please Provide ESS Deliverables - no charge filter blank

\* By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VIIA

Please fax to the laboratory all changes to Chain of Custody

**Report Method Blank & Laboratory Control Sample Results**

Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)
Received by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)

5.46L

**Sample and Cooler Receipt Checklist**

Client: MT Environmental Restoration  
Client Project ID: \_\_\_\_\_  
Shipped/Delivered Via: ESS Courier

ESS Project ID: 15100756  
Date Project Due: 11/3/15  
Days For Project: 5 Day

**Items to be checked upon receipt:**

- |   |                               |   |   |
|---|-------------------------------|---|---|
| 1. Air Bill Manifest Present?   | <input type="checkbox"/> * No | 10. Are the samples properly preserved?   | <input type="checkbox"/> Yes                              |
| Air No.:  |                               | 11. Proper sample containers used?        | <input type="checkbox"/> Yes                              |
| 2. Were Custody Seals Present?  | <input type="checkbox"/> No   | 12. Any air bubbles in the VOA vials?     | <input type="checkbox"/> N/A                              |
| 3. Were Custody Seals Intact?   | <input type="checkbox"/> N/A  | 13. Holding times exceeded?               | <input type="checkbox"/> No                               |
| 4. Is Radiation count < 100 CPM?  | <input type="checkbox"/> Yes  | 14. Sufficient sample volumes?            | <input type="checkbox"/> Yes                              |
| 5. Is a cooler present?   | <input type="checkbox"/> Yes  | 15. Any Subcontracting needed?            | <input type="checkbox"/> * Yes                            |
| <input type="text" value="Cooler Temp: 4.0"/>   |                               | 16. Are ESS labels on correct containers? | <input type="checkbox"/> Yes  <input type="checkbox"/> No |
| <input type="text" value="Iced With: Ice"/>   |                               | 17. Were samples received intact?         | <input type="checkbox"/> Yes  <input type="checkbox"/> No |
| 6. Was COC included with samples?   | <input type="checkbox"/> Yes  | ESS Sample IDs: <u>1-8, 10-11</u>         |   |
| 7. Was COC signed and dated by client?  | <input type="checkbox"/> Yes  | Sub Lab: <u>Premier</u>                   |   |
| 8. Does the COC match the sample  | <input type="checkbox"/> Yes  | Analysis: <u>DOC</u>                      |   |
| 9. Is COC complete and correct?   | <input type="checkbox"/> Yes  | TAT: <u>STD</u>                           |   |
| 18. Was there need to call project manager to discuss status? If yes, please explain. |                               |   |   |

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Who was called?: \_\_\_\_\_ By whom? \_\_\_\_\_

Sample Number	Properly Preserved	Container Type	# of Containers	Preservative
1	Yes	1 L Glass	1	NP
1	Yes	250 ml Plastic	1	H2SO4
1	Yes	250 ml Plastic	2	HNO3
1	Yes	250 ml Plastic	3	NP
1	Yes	40 ml - VOA	2	H2SO4
1	Yes	500 ml Plastic	1	H2SO4
2	Yes	1 L Glass	1	NP
2	Yes	250 ml Plastic	1	H2SO4
2	Yes	250 ml Plastic	2	HNO3
2	Yes	250 ml Plastic	3	NP
2	Yes	40 ml - VOA	2	H2SO4
2	Yes	500 ml Plastic	1	H2SO4
3	Yes	1 L Glass	1	NP
3	Yes	250 ml Plastic	1	H2SO4
3	Yes	250 ml Plastic	2	HNO3
3	Yes	250 ml Plastic	3	NP
3	Yes	40 ml - VOA	2	H2SO4
3	Yes	500 ml Plastic	1	H2SO4
4	Yes	1 L Glass	1	NP
4	Yes	250 ml Plastic	1	H2SO4
4	Yes	250 ml Plastic	2	HNO3
4	Yes	250 ml Plastic	3	NP
4	Yes	40 ml - VOA	2	H2SO4
4	Yes	500 ml Plastic	1	H2SO4
5	Yes	1 L Glass	1	NP

**Sample and Cooler Receipt Checklist**

Client: MT Environmental Restoration

ESS Project ID: 15100756

5	Yes	250 ml Plastic	1	H2SO4
5	Yes	250 ml Plastic	2	HNO3
5	Yes	250 ml Plastic	3	NP
5	Yes	40 ml - VOA	2	H2SO4
5	Yes	500 ml Plastic	1	H2SO4
6	Yes	1 L Glass	1	NP
6	Yes	250 ml Plastic	1	H2SO4
6	Yes	250 ml Plastic	2	HNO3
6	Yes	250 ml Plastic	3	NP
6	Yes	40 ml - VOA	2	H2SO4
6	Yes	500 ml Plastic	1	H2SO4
7	Yes	1 L Glass	1	NP
7	Yes	250 ml Plastic	1	H2SO4
7	Yes	250 ml Plastic	2	HNO3
7	Yes	250 ml Plastic	3	NP
7	Yes	40 ml - VOA	2	H2SO4
7	Yes	500 ml Plastic	1	H2SO4
8	Yes	1 L Glass	1	NP
8	Yes	250 ml Plastic	1	H2SO4
8	Yes	250 ml Plastic	2	HNO3
8	Yes	250 ml Plastic	3	NP
8	Yes	40 ml - VOA	2	H2SO4
8	Yes	500 ml Plastic	1	H2SO4
9	Yes	250 ml Plastic	1	NP
10	Yes	1 L Glass	1	NP
10	Yes	250 ml Plastic	1	H2SO4
10	Yes	250 ml Plastic	2	HNO3
10	Yes	250 ml Plastic	3	NP
10	Yes	40 ml - VOA	2	H2SO4
10	Yes	500 ml Plastic	1	H2SO4
11	Yes	1 L Glass	1	NP
11	Yes	250 ml Plastic	1	H2SO4
11	Yes	250 ml Plastic	2	HNO3
11	Yes	250 ml Plastic	3	NP
11	Yes	40 ml - VOA	2	H2SO4
11	Yes	500 ml Plastic	1	H2SO4

Completed By: [Signature]

Date/Time: 10/27/15 1238

Reviewed By: [Signature]

Date/Time: 10/27/15 1337



# ESS Laboratory

Division of Thielsch Engineering, Inc.

185 Frances Avenue, Cranston RI 02910-2211

Tel. (401)461-7181 Fax (401)461-4486

www.esslaboratory.com

Co. Name WT Env. Restoration (MTER)

Contact Person Jim Bogley

Address 147 Elm St

Tel. 803 360 2359

City, State Duxbury MA

email: jbogley@cape.com

Project # FD-2

Proj. Location Falmouth, MA

Zip 02532

PO #

# CHAIN OF CUSTODY

Turn Time Standard Other \_\_\_\_\_

Regulatory State: MA RI CT NH NJ NY ME Other \_\_\_\_\_

Is this project for any of the following: (please circle)

MA-MCP  Navy USACE  CT DEP  Other \_\_\_\_\_

Project # FD-2

Proj. Location Falmouth, MA

Zip 02532

PO #

ESS Lab # 1510756

Reporting Limits - \_\_\_\_\_

Electronic Deliverables  Excel  Access  PDF

ESS Lab ID	Date	Collection Time	Grab-G Composite-C	Matrix	Sample ID	Pres Code	# of Containers	Type of Container	Vol of Container	Analysis						
										Nitrite	Total Nitrogen	Diss. Organic Carbon	Nitrate	Chlor. / Sulfate	Boron	Ammonia
1	10/24/15	1000	6	GW	FD-2-MTER-6F	1	1	P	250	X						
2	10/26/15	1100	6	GW	FD-2-MTER-6E	3	1	P	500	X						
2	10/26/15	1100	6	GW	FD-2-MTER-6E	1	1	AG	1000	X						
2	10/26/15	1100	6	GW	FD-2-MTER-6E	1	1	P	250		X					
2	10/26/15	1100	6	GW	FD-2-MTER-6E	1	1	P	250			X				
2	10/26/15	1100	6	GW	FD-2-MTER-6E	4	1	P	250				X			
2	10/26/15	1100	6	GW	FD-2-MTER-6E	3	1	P	250					X		

Container Type: P-Poly G-Glass AG-Amber Glass S-Steelie V-VOA  
 Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filler

Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Ascorbic Acid, 8-ZnAc2, 9-\_\_\_\_\_

Cooler Present Yes \_\_\_\_\_ No \_\_\_\_\_ Internal Use Only

Seals Intact Yes \_\_\_\_\_ No NA: \_\_\_\_\_  Pickup

Cooler Temperature: 32, 4.0, 3.8, 8.1, 10.0 Technician \_\_\_\_\_

Relinquished by: (Signature, Date & Time)  10/27/15 8:58	Relinquished by: (Signature, Date & Time) E. Heston 10/27/15	Received by: (Signature, Date & Time) M. Nail 10/27/15
Relinquished by: (Signature, Date & Time)	Relinquished by: (Signature, Date & Time)	Received by: (Signature, Date & Time)

Comments: \_\_\_\_\_

Sampled by: \_\_\_\_\_

Reinquired by: (Signature, Date & Time)

Report Method Blank & Laboratory Control Sample Results

Please fax to the laboratory all changes to Chain of Custody

By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VIIA

Page 49 of 51

# ESS Laboratory

Division of Thielsch Engineering, Inc.

185 Frances Avenue, Cranston RI 02910-2211

Tel. (401)461-7181 Fax (401)461-4486

www.esslaboratory.com

Co. Name WV Env Restoration (MER)

Contact Person Jim Belsky

Address 147 Elm St

City, State Duxbury MA

email: \_\_\_\_\_

Project # FEL-2

Proj. Location Falmouth, MA

PO # 02-332

# CHAIN OF CUSTODY

Turn Time  Standard Other \_\_\_\_\_

Regulatory State  MA  RI  CT  NH  NJ  NY  ME Other \_\_\_\_\_

Is this project for any of the following: (please circle)  
 MA-MCP  Navy  USACE  CT DEP Other \_\_\_\_\_

ESS Lab # 1570756

Reporting Limits - \_\_\_\_\_

Electronic Deliverables  Excel  Access  PDF

ESS Lab ID	Date	Collection Time	Grab-G Composite-C	Matrix	Sample ID	Pres Code	# of Containers	Type of Container	Vol of Container	Analysis							
										Nitrite	Total Phosphate	Total Nitrate	CL/Sulfate	Boron	Ammuniac	Nitrate	PDC
2	10/24/15	1100	6	6W	FEL-2-MTER-6E	1,4	8	P, P	230, 250	X	X	X	X	X	X	X	X
3	10/26/15	1130	6	6W	FEL-2-MTER-6D	1,4,3	8	P, A6	500, 550, 1000	X	X	X	X	X	X	X	X
4	10/26/15	1230	6	6W	FEL-2-MTER-6C	1,4,3	8	P, A6	1000, 1500	X	X	X	X	X	X	X	X
5	10/26/15	1300	6	6W	FEL-2-MTER-6B	1,4,3	8	P, A6	500, 750, 1000	X	X	X	X	X	X	X	X
6	10/26/15	1400	6	6W	FEL-2-MTER-6A	1,4,3	8	P, A6	500, 750, 1000	X	X	X	X	X	X	X	X
7	10/26/15	1430	6	6W	FEL-2-MTER-9D	1,4,3	8	P, A6	500, 750, 1000	X	X	X	X	X	X	X	X
8	10/26/15	15:15	6	6W	FEL-2-MTER-9C	1,4,3	8	P, A6	500, 750, 1000	X	X	X	X	X	X	X	X

Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present  Yes  No  Internal Use Only

Seals Intact  Yes  No NA:  Pickup  Technician

Cooler Temperature: 3.2, 4.0, 3.8°C ice

Reinquired by: (Signature, Date & Time) \_\_\_\_\_

Reinquired by: (Signature, Date & Time) F. Adeline 10/27/15 8:30

Reinquired by: (Signature, Date & Time) \_\_\_\_\_

Reinquired by: (Signature, Date & Time) F. Adeline 10/27/15 10:23

Reinquired by: (Signature, Date & Time) \_\_\_\_\_

Reinquired by: (Signature, Date & Time) M. J. ... 10/27/15

Received by: (Signature, Date & Time) \_\_\_\_\_

Received by: (Signature, Date & Time) \_\_\_\_\_

# Report Method Blank & Laboratory Control Sample Results

Please fax to the laboratory all changes to Chain of Custody

\* By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VIIA

# ESS Laboratory

Division of Thielsch Engineering, Inc.

185 Frances Avenue, Cranston RI 02910-2211

Tel. (401)461-7181 Fax (401)461-4486

www.esslaboratory.com

# CHAIN OF CUSTODY

ESS Lab # 1570756

Turn Time  Standard  Other \_\_\_\_\_

Regulatory State  MA  RI  CT  NH  NJ  NY  ME  Other \_\_\_\_\_

Is this project for any of the following (please circle)  
 MA-MCP  Navy  USACE  CT DEP  Other \_\_\_\_\_

Co. Name MT ENV. Restoration (MTER)

Contact Person Jim Begley

Address 147 Elm St

Tel. 508-350-2857

Project # \_\_\_\_\_ Project Name Fal-2

Proj. Location Falmouth MA

City, State Duxbury MA

Zip 02332

ESS Lab ID	Date	Collection Time	Grab-G Composite-C	Matrix	Sample ID	Pres Code	# of Containers	Type of Container	Vol of Container	Analysis
9	10/26/15	1330	G	GW	Fal-2-MTER-4-15W	1	1	8	250	Nitrite
10	10/26/15	1545	G	GW	Fal-2-MTER-9B	143	8	8, A6	500, 250, 1000	X Nitrate X Ammonia X BOD X CL/Sulfide X Total Nitrogen X Dis. Iron & Manganese
11	10/26/15	1615	G	GW	Fal-2-MTER-9A	143	8	8, A6	500, 250, 1000	X Nitrite X Nitrate X Ammonia X BOD X CL/Sulfide X Total Nitrogen X Dis. Iron & Manganese

Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present  Yes  No Internal Use Only  Yes  No NA: \_\_\_\_\_

Seals Intact  Yes  No NA: \_\_\_\_\_

Cooler Temperature: 3.2, 4.0, 3.8

Relinquished by: (Signature, Date & Time) [Signature] 10/27/15 8:30

Relinquished by: (Signature, Date & Time) [Signature] 10/27/15

Relinquished by: (Signature, Date & Time) [Signature] 10/27/15

Relinquished by: (Signature, Date & Time) [Signature] 10/27/15

\* By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VIIA

Please fax to the laboratory all changes to Chain of Custody

## Report Method Blank & Laboratory Control Sample Results



*CERTIFICATE OF ANALYSIS*

Jim Begley  
MT Environmental Restoration  
147 Elm Street  
Duxbury, MA 02332

**RE: Fal-2 (N/A)**  
**ESS Laboratory Work Order Number: 1510817**

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard  
Laboratory Director

**REVIEWED**

*By ESS Laboratory at 1:09 pm, Nov 04, 2015*

**Analytical Summary**

The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with NELAC Standards, A2LA and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510817

**SAMPLE RECEIPT**

The following samples were received on October 28, 2015 for the analyses specified on the enclosed Chain of Custody Record.

<b>Lab Number</b>	<b>Sample Name</b>	<b>Matrix</b>	<b>Analysis</b>
1510817-01	Fal-2-MTER-5D	Ground Water	353.2, 4500N, 4500NH3 D, 9038, 9250
1510817-02	Fal-2-MTER-5C	Ground Water	353.2, 4500N, 4500NH3 D, 9038, 9250
1510817-03	Fal-2-MTER-5B	Ground Water	353.2, 4500N, 4500NH3 D, 9038, 9250
1510817-04	Fal-2-MTER-5A	Ground Water	353.2, 4500N, 4500NH3 D, 9038, 9250
1510817-05	Fal-2-MTER-2	Ground Water	353.2
1510817-06	Fal-2-MTER-3	Ground Water	353.2
1510817-07	Fal-2-MTER-1D	Ground Water	353.2
1510817-08	Fal-2-MTER-1C	Ground Water	353.2
1510817-09	Fal-2-MTER-1B	Ground Water	353.2
1510817-10	Fal-2-MTER-1A	Ground Water	353.2, 4500N, 4500NH3 D, 9038, 9250
1510817-11	Fal-2-MTER-7	Ground Water	353.2
1510817-12	Fal-2-MTER-8	Ground Water	353.2
1510817-13	Fal-2-CR	Surface Water	353.2, 4500N, 4500NH3 D, 9038, 9250
1510817-14	Fal-2-CR-DUP	Surface Water	353.2, 4500N, 4500NH3 D, 9038, 9250
1510817-15	Fal-2-MP	Surface Water	353.2, 4500N, 4500NH3 D, 9038, 9250
1510817-16	Fal-2-BR	Surface Water	353.2, 4500N, 4500NH3 D, 9038, 9250



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510817

**PROJECT NARRATIVE**

**No unusual observations noted.**

**End of Project Narrative.**

**DATA USABILITY LINKS**

[Definitions of Quality Control Parameters](#)

[Semivolatile Organics Internal Standard Information](#)

[Semivolatile Organics Surrogate Information](#)

[Volatile Organics Internal Standard Information](#)

[Volatile Organics Surrogate Information](#)

[EPH and VPH Alkane Lists](#)



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510817

**CURRENT SW-846 METHODOLOGY VERSIONS**

**Analytical Methods**

- 1010A - Flashpoint
- 6010C - ICP
- 6020A - ICP MS
- 7010 - Graphite Furnace
- 7196A - Hexavalent Chromium
- 7470A - Aqueous Mercury
- 7471B - Solid Mercury
- 8011 - EDB/DBCP/TCP
- 8015D - GRO/DRO
- 8081B - Pesticides
- 8082A - PCB
- 8100M - TPH
- 8151A - Herbicides
- 8260B - VOA
- 8270D - SVOA
- 8270D SIM - SVOA Low Level
- 9014 - Cyanide
- 9038 - Sulfate
- 9040C - Aqueous pH
- 9045D - Solid pH (Corrosivity)
- 9050A - Specific Conductance
- 9056A - Anions (IC)
- 9060A - TOC
- 9095B - Paint Filter
- MADEP 04-1.1 - EPH / VPH

**Prep Methods**

- 3005A - Aqueous ICP Digestion
- 3020A - Aqueous Graphite Furnace / ICP MS Digestion
- 3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
- 3060A - Solid Hexavalent Chromium Digestion
- 3510C - Separatory Funnel Extraction
- 3520C - Liquid / Liquid Extraction
- 3540C - Manual Soxhlet Extraction
- 3541 - Automated Soxhlet Extraction
- 3546 - Microwave Extraction
- 3580A - Waste Dilution
- 5030B - Aqueous Purge and Trap
- 5030C - Aqueous Purge and Trap
- 5035 - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-5D  
Date Sampled: 10/27/15 09:45  
Percent Solids: N/A

ESS Laboratory Work Order: 1510817  
ESS Laboratory Sample ID: 1510817-01  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	11/02/15 15:35	mg/L	CK50219
Chloride	121 (15.0)		9250		5	EEM	11/02/15 11:46	mg/L	CK50216
Nitrate as N	8.24 (0.210)		353.2		10	JLK	10/29/15 10:20	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	JLK	10/29/15 8:50	mg/L	CJ52901
Sulfate	13.0 (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53003
Total Nitrogen	8.24 (0.230)		4500N		10	EEM	11/02/15 17:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-5C  
Date Sampled: 10/27/15 10:15  
Percent Solids: N/A

ESS Laboratory Work Order: 1510817  
ESS Laboratory Sample ID: 1510817-02  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	0.028 (0.020)		4500NH3 D		1	EEM	11/02/15 15:35	mg/L	CK50219
Chloride	125 (15.0)		9250		5	EEM	11/02/15 11:48	mg/L	CK50216
Nitrate as N	14.7 (0.410)		353.2		20	JLK	10/29/15 10:29	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	JLK	10/29/15 8:51	mg/L	CJ52901
Sulfate	13.5 (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53003
Total Nitrogen	14.7 (0.430)		4500N		20	EEM	11/02/15 17:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-5B  
Date Sampled: 10/27/15 10:30  
Percent Solids: N/A

ESS Laboratory Work Order: 1510817  
ESS Laboratory Sample ID: 1510817-03  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	0.056 (0.020)		4500NH3 D		1	EEM	11/02/15 15:35	mg/L	CK50219
Chloride	207 (15.0)		9250		5	EEM	11/02/15 11:49	mg/L	CK50216
Nitrate as N	13.4 (0.410)		353.2		20	JLK	10/29/15 10:30	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	JLK	10/29/15 8:52	mg/L	CJ52901
Sulfate	13.4 (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53003
Total Nitrogen	13.5 (0.430)		4500N		20	EEM	11/02/15 17:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-5A  
Date Sampled: 10/27/15 10:45  
Percent Solids: N/A

ESS Laboratory Work Order: 1510817  
ESS Laboratory Sample ID: 1510817-04  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	0.113 (0.020)		4500NH3 D		1	EEM	11/02/15 15:35	mg/L	CK50219
Chloride	10200 (600)		9250		200	EEM	11/02/15 11:49	mg/L	CK50216
Nitrate as N	2.47 (0.110)		353.2		5	JLK	10/29/15 10:25	mg/L	[CALC]
Nitrite as N	0.012 (0.010)		353.2		1	JLK	10/29/15 8:55	mg/L	CJ52901
Sulfate	129 (25.0)		9038		5	JLK	10/30/15 9:12	mg/L	CJ53003
Total Nitrogen	2.60 (0.130)		4500N		5	EEM	11/02/15 17:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-2  
Date Sampled: 10/27/15 11:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510817  
ESS Laboratory Sample ID: 1510817-05  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	0.658 (0.030)		353.2		1	JLK	10/29/15 10:01	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-3  
Date Sampled: 10/27/15 11:45  
Percent Solids: N/A

ESS Laboratory Work Order: 1510817  
ESS Laboratory Sample ID: 1510817-06  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	0.425 (0.030)		353.2		1	JLK	10/29/15 10:02	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-1D  
Date Sampled: 10/27/15 12:15  
Percent Solids: N/A

ESS Laboratory Work Order: 1510817  
ESS Laboratory Sample ID: 1510817-07  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	0.063 (0.030)		353.2		1	JLK	10/29/15 10:03	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-1C  
Date Sampled: 10/27/15 12:45  
Percent Solids: N/A

ESS Laboratory Work Order: 1510817  
ESS Laboratory Sample ID: 1510817-08  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	0.183 (0.030)		353.2		1	JLK	10/29/15 10:04	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-1B  
Date Sampled: 10/27/15 13:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510817  
ESS Laboratory Sample ID: 1510817-09  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	0.127 (0.030)		353.2		1	JLK	10/29/15 10:05	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-1A  
Date Sampled: 10/27/15 13:45  
Percent Solids: N/A

ESS Laboratory Work Order: 1510817  
ESS Laboratory Sample ID: 1510817-10  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	0.675 (0.020)		4500NH3 D		1	EEM	11/02/15 15:35	mg/L	CK50219
Chloride	13900 (600)		9250		200	EEM	11/02/15 11:50	mg/L	CK50216
Nitrate as N	0.109 (0.030)		353.2		1	JLK	10/29/15 10:06	mg/L	[CALC]
Nitrite as N	0.015 (0.010)		353.2		1	JLK	10/29/15 9:01	mg/L	CJ52901
Sulfate	132 (25.0)		9038		5	JLK	10/30/15 9:12	mg/L	CJ53003
Total Nitrogen	0.840 (0.050)		4500N		1	EEM	11/02/15 17:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-7  
Date Sampled: 10/27/15 14:15  
Percent Solids: N/A

ESS Laboratory Work Order: 1510817  
ESS Laboratory Sample ID: 1510817-11  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	3.26 (0.110)		353.2		5	JLK	10/29/15 10:26	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-8  
Date Sampled: 10/27/15 14:45  
Percent Solids: N/A

ESS Laboratory Work Order: 1510817  
ESS Laboratory Sample ID: 1510817-12  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	9.29 (0.210)		353.2		10	JLK	10/29/15 10:27	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-CR  
Date Sampled: 10/27/15 15:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510817  
ESS Laboratory Sample ID: 1510817-13  
Sample Matrix: Surface Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	11/02/15 15:35	mg/L	CK50219
Chloride	70.3 (3.0)		9250		1	EEM	11/02/15 11:27	mg/L	CK50216
Nitrate as N	0.692 (0.030)		353.2		1	JLK	10/29/15 10:09	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	JLK	10/29/15 9:04	mg/L	CJ52901
Sulfate	9.5 (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53003
Total Nitrogen	0.793 (0.050)		4500N		1	EEM	11/02/15 17:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-CR-DUP  
Date Sampled: 10/27/15 15:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1510817  
ESS Laboratory Sample ID: 1510817-14  
Sample Matrix: Surface Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	11/02/15 15:35	mg/L	CK50219
Chloride	36.4 (3.0)		9250		1	EEM	11/02/15 11:28	mg/L	CK50216
Nitrate as N	0.689 (0.030)		353.2		1	JLK	10/29/15 10:12	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	JLK	10/29/15 9:07	mg/L	CJ52901
Sulfate	8.9 (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53003
Total Nitrogen	0.794 (0.050)		4500N		1	EEM	11/02/15 17:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MP  
Date Sampled: 10/27/15 15:15  
Percent Solids: N/A

ESS Laboratory Work Order: 1510817  
ESS Laboratory Sample ID: 1510817-15  
Sample Matrix: Surface Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
<b>Ammonia as N</b>	<b>0.072</b> (0.020)		4500NH3 D		1	EEM	11/02/15 15:35	mg/L	CK50219
<b>Chloride</b>	<b>20.3</b> (3.0)		9250		1	EEM	11/02/15 11:29	mg/L	CK50216
Nitrate as N	ND (0.030)		353.2		1	JLK	10/29/15 10:13	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	JLK	10/29/15 9:08	mg/L	CJ52901
<b>Sulfate</b>	<b>6.9</b> (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53003
<b>Total Nitrogen</b>	<b>0.174</b> (0.050)		4500N		1	EEM	11/02/15 17:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-BR  
Date Sampled: 10/27/15 15:30  
Percent Solids: N/A

ESS Laboratory Work Order: 1510817  
ESS Laboratory Sample ID: 1510817-16  
Sample Matrix: Surface Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.020)		4500NH3 D		1	EEM	11/02/15 15:35	mg/L	CK50219
Chloride	16.3 (3.0)		9250		1	EEM	11/02/15 11:29	mg/L	CK50216
Nitrate as N	0.334 (0.030)		353.2		1	JLK	10/29/15 10:14	mg/L	[CALC]
Nitrite as N	ND (0.010)		353.2		1	JLK	10/29/15 9:09	mg/L	CJ52901
Sulfate	8.9 (5.0)		9038		1	JLK	10/30/15 9:12	mg/L	CJ53003
Total Nitrogen	0.442 (0.050)		4500N		1	EEM	11/02/15 17:40	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510817

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
<b>Classical Chemistry</b>										
<b>Batch CJ52901 - [CALC]</b>										
<b>Blank</b>										
Nitrate as N	ND	0.010	mg/L							
Nitrite as N	ND	0.010	mg/L							
Nitrite as N	ND	0.010	mg/L							
<b>LCS</b>										
Nitrate as N	ND		mg/L							
Nitrite as N	0.249		mg/L	0.2497		100	90-110			
Nitrite as N	0.249		mg/L	0.2497		100	90-110			
<b>Batch CJ52902 - [CALC]</b>										
<b>Blank</b>										
Nitrate as N	ND	0.020	mg/L							
Nitrate/Nitrite as N	ND	0.020	mg/L							
Nitrate/Nitrite as N	ND	0.020	mg/L							
Total Nitrogen	ND	0.020	mg/L							
<b>LCS</b>										
Nitrate as N	0.495		mg/L							
Nitrate/Nitrite as N	0.495		mg/L	0.5000		99	90-110			
Nitrate/Nitrite as N	0.495		mg/L	0.5000		99	90-110			
Total Nitrogen	0.495		mg/L							
<b>Batch CJ53003 - General Preparation</b>										
<b>Blank</b>										
Sulfate	ND	5.0	mg/L							
<b>LCS</b>										
Sulfate	9.5		mg/L	9.988		95	85-115			
<b>Batch CK50216 - General Preparation</b>										
<b>Blank</b>										
Chloride	ND	3.0	mg/L							
<b>LCS</b>										
Chloride	29.1		mg/L	30.00		97	90-110			
<b>Batch CK50217 - TKN Prep</b>										
<b>Blank</b>										
Total Kjeldahl Nitrogen as N	ND	0.03	mg/L							
Total Nitrogen	ND	0.030	mg/L							
<b>LCS</b>										
Total Kjeldahl Nitrogen as N	17.5	0.03	mg/L	17.60		99	80-120			
Total Nitrogen	17.5	0.030	mg/L							
<b>Batch CK50219 - NH4 Prep</b>										
<b>Blank</b>										
Ammonia as N	ND	0.020	mg/L							
<b>LCS</b>										
Ammonia as N	0.104		mg/L	0.09994		104	80-120			



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510817

**Notes and Definitions**

- U Analyte included in the analysis, but not detected
- D Diluted.
- ND Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- MDL Method Detection Limit
- MRL Method Reporting Limit
- LOD Limit of Detection
- LOQ Limit of Quantitation
- DL Detection Limit
- I/V Initial Volume
- F/V Final Volume
- § Subcontracted analysis; see attached report
- 1 Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
- 2 Range result excludes concentrations of target analytes eluting in that range.
- 3 Range result excludes the concentration of the C9-C10 aromatic range.
- Avg Results reported as a mathematical average.
- NR No Recovery
- [CALC] Calculated Analyte
- SUB Subcontracted analysis; see attached report



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1510817

**ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS**

**ENVIRONMENTAL**

Rhode Island Potable and Non Potable Water: LAI00179

<http://www.health.ri.gov/find/labs/analytical/ESS.pdf>

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750

[http://www.ct.gov/dph/lib/dph/environmental\\_health/environmental\\_laboratories/pdf/OutOfStateCommercialLaboratories.pdf](http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutOfStateCommercialLaboratories.pdf)

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002

<http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/documents/AllLabs.xls>

Massachusetts Potable and Non Potable Water: M-RI002

<http://public.dep.state.ma.us/Labcert/Labcert.aspx>

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424

<http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313

<http://www.wadsworth.org/labcert/elap/comm.html>

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006

[http://datamine2.state.nj.us/DEP\\_OPRA/OpraMain/pi\\_main?mode=pi\\_by\\_site&sort\\_order=PI\\_NAMEA&Select+a+Site:=58715](http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715)

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752

[http://www.depweb.state.pa.us/portal/server.pt/community/labs/13780/laboratory\\_accreditation\\_program/590095](http://www.depweb.state.pa.us/portal/server.pt/community/labs/13780/laboratory_accreditation_program/590095)

**Sample and Cooler Receipt Checklist**

Client: MT Environmental Restoration  
Client Project ID: \_\_\_\_\_  
Shipped/Delivered Via: ESS Courier

ESS Project ID: 15100817  
Date Project Due: 11/4/15  
Days For Project: 5 Day

**Items to be checked upon receipt:**

1. Air Bill Manifest Present?

\* No

Air No.:

2. Were Custody Seals Present?

No

3. Were Custody Seals Intact?

N/A

4. Is Radiation count < 100 CPM?

Yes

5. Is a cooler present?

Yes

Cooler Temp: 2.6

Iced With: Ice

6. Was COC included with samples?

Yes

7. Was COC signed and dated by client?

Yes

8. Does the COC match the sample

Yes

9. Is COC complete and correct?

Yes

10. Are the samples properly preserved?

Yes

11. Proper sample containers used?

Yes

12. Any air bubbles in the VOA vials?

N/A

13. Holding times exceeded?

No

14. Sufficient sample volumes?

Yes

15. Any Subcontracting needed?

No

16. Are ESS labels on correct containers?  Yes  No

17. Were samples received intact?  Yes  No

ESS Sample IDs: \_\_\_\_\_

Sub Lab: \_\_\_\_\_

Analysis: \_\_\_\_\_

TAT: \_\_\_\_\_

18. Was there need to call project manager to discuss status? If yes, please explain.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Who was called?: \_\_\_\_\_

By whom? \_\_\_\_\_

Sample Number	Properly Preserved	Container Type	# of Containers	Preservative
1	Yes	250 ml Plastic	2	H2SO4
1	Yes	250 ml Plastic	3	NP
2	Yes	250 ml Plastic	2	H2SO4
2	Yes	250 ml Plastic	3	NP
3	Yes	250 ml Plastic	2	H2SO4
3	Yes	250 ml Plastic	3	NP
4	Yes	250 ml Plastic	2	H2SO4
4	Yes	250 ml Plastic	3	NP
5	Yes	250 ml Plastic	1	NP
6	Yes	250 ml Plastic	1	NP
7	Yes	250 ml Plastic	1	NP
8	Yes	250 ml Plastic	1	NP
9	Yes	250 ml Plastic	1	NP
10	Yes	250 ml Plastic	2	H2SO4
10	Yes	250 ml Plastic	3	NP
11	Yes	250 ml Plastic	1	NP
12	Yes	250 ml Plastic	1	NP
13	Yes	250 ml Plastic	2	H2SO4
13	Yes	250 ml Plastic	2	NP
14	Yes	250 ml Plastic	2	H2SO4
14	Yes	250 ml Plastic	2	NP
15	Yes	250 ml Plastic	2	H2SO4
15	Yes	250 ml Plastic	2	NP
16	Yes	250 ml Plastic	2	H2SO4
16	Yes	250 ml Plastic	2	NP

**Sample and Cooler Receipt Checklist**

Client: MT Environmental Restoration

ESS Project ID: 15100817

Completed By: *[Signature]*

Date/Time: 10/28/15 1657

Reviewed By: *[Signature]*

Date/Time: 10/28/15 1712



# ESS Laboratory

Division of Thielisch Engineering, Inc.  
 185 Frances Avenue, Cranston, RI 02910-2211  
 Tel. (401) 461-7181 Fax (401) 461-4486  
 www.esslaboratory.com

# CHAIN OF CUSTODY

Turn Time  Standard Other \_\_\_\_\_  
 If faster than 5 days, prior approval by laboratory is required # \_\_\_\_\_  
 State where samples were collected from:  
 (MA) RI CT NH NJ NY ME Other \_\_\_\_\_  
 Is this project for any of the following: USACE Other \_\_\_\_\_  
 MA-MCP Navy USACE Other \_\_\_\_\_

Reporting Limits  
 ESS LAB PROJECT ID  
 1570817

Electronic Deliverable  
 Yes \_\_\_\_\_ No \_\_\_\_\_  
 Format: Excel \_\_\_\_\_ Access \_\_\_\_\_ PDF \_\_\_\_\_ Other \_\_\_\_\_

ESS LAB Sample #	Date	Collection Time	COMP	GRAB	MATRIX	Sample Identification (20 Char. or less)	Pres Code	Number of Containers	Type of Containers	8260 TIC 8260 624 5242	8021 VPH 8015 GRO 8015 VPH	8100 DRO 8015 DRO	EPA EPA EPA EPA EPA EPA	8081 608 608 PCB Pesticides 8081 608 608 PCB	8270 PAH 8270 625 PAH	RCAAS RCAAS RCAAS RCAAS RCAAS RCAAS	TCLP RCAAS NBC7	MCP METALS (13) MCP METALS (13)	Nitrate Nitrite Ammonia Total Nitrogen	
11	10/27/15	1415	X SW			FEL-2-MEK-7	1	1	8											
12	10/27/15	1445	X SW			FEL-2-MEK-8	1	1	8											
13	10/27/15	1500	X SW			FEL-2-CR	13	4	8											
14	10/27/15	1500	X SW			FEL-2-CR-Dup	13	4	8											
15	10/27/15	1515	X SW			FEL-2-MP	13	4	8											
16	10/27/15	1530	X SW			FEL-2-BR	13	4	8											

Co. Name: MT Env. Restoration (MTER)  
 Project #:  
 Project Name (20 Char. or less): FEL-2  
 Address: 147 Elm St  
 City: Duxbury MA  
 State: MA  
 Zip: 02332  
 PO #:  
 Email Address: jbesley@duxbury.com

Container Type: P-Poly G-Glass S-Sterile V-VOA Matrix: S-Soil SD-Solid D-Sludge WW-Waste Water GW-Ground Water SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filters

Cooler Present: Yes \_\_\_\_\_ No \_\_\_\_\_ Internal Use Only  
 Seals Intact: Yes \_\_\_\_\_ No NA: \_\_\_\_\_ [ ] Pickup  
 Cooler Temp: 2.6 ice [ ] Technicians \_\_\_\_\_

Received by: (Signature) \_\_\_\_\_ Date/Time 10/27/15 1100  
 Relinquished by: (Signature) \_\_\_\_\_ Date/Time 10/28/15 1100

Received by: (Signature) \_\_\_\_\_ Date/Time 10/28/15 16:25  
 Relinquished by: (Signature) \_\_\_\_\_ Date/Time 10/28/15 16:32

Received by: (Signature) \_\_\_\_\_ Date/Time \_\_\_\_\_  
 Relinquished by: (Signature) \_\_\_\_\_ Date/Time \_\_\_\_\_

Comments: \_\_\_\_\_



*CERTIFICATE OF ANALYSIS*

Jim Begley  
MT Environmental Restoration  
147 Elm Street  
Duxbury, MA 02332

**RE: Fal-2 (N/A)**  
**ESS Laboratory Work Order Number: 1511608**

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard  
Laboratory Director

**REVIEWED**

**By ESS Laboratory at 11:47 am, Dec 03, 2015**

**Analytical Summary**

The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with NELAC Standards, A2LA and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1511608

**SAMPLE RECEIPT**

The following samples were received on November 24, 2015 for the analyses specified on the enclosed Chain of Custody Record.

<b>Lab Number</b>	<b>Sample Name</b>	<b>Matrix</b>	<b>Analysis</b>
1511608-01	Fal-2-MTER-10	Ground Water	353.2



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1511608

**PROJECT NARRATIVE**

**No unusual observations noted.**

**End of Project Narrative.**

**DATA USABILITY LINKS**

[Definitions of Quality Control Parameters](#)

[Semivolatile Organics Internal Standard Information](#)

[Semivolatile Organics Surrogate Information](#)

[Volatile Organics Internal Standard Information](#)

[Volatile Organics Surrogate Information](#)

[EPH and VPH Alkane Lists](#)



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1511608

**CURRENT SW-846 METHODOLOGY VERSIONS**

**Analytical Methods**

- 1010A - Flashpoint
- 6010C - ICP
- 6020A - ICP MS
- 7010 - Graphite Furnace
- 7196A - Hexavalent Chromium
- 7470A - Aqueous Mercury
- 7471B - Solid Mercury
- 8011 - EDB/DBCP/TCP
- 8015D - GRO/DRO
- 8081B - Pesticides
- 8082A - PCB
- 8100M - TPH
- 8151A - Herbicides
- 8260B - VOA
- 8270D - SVOA
- 8270D SIM - SVOA Low Level
- 9014 - Cyanide
- 9038 - Sulfate
- 9040C - Aqueous pH
- 9045D - Solid pH (Corrosivity)
- 9050A - Specific Conductance
- 9056A - Anions (IC)
- 9060A - TOC
- 9095B - Paint Filter
- MADEP 04-1.1 - EPH / VPH

**Prep Methods**

- 3005A - Aqueous ICP Digestion
- 3020A - Aqueous Graphite Furnace / ICP MS Digestion
- 3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
- 3060A - Solid Hexavalent Chromium Digestion
- 3510C - Separatory Funnel Extraction
- 3520C - Liquid / Liquid Extraction
- 3540C - Manual Soxhlet Extraction
- 3541 - Automated Soxhlet Extraction
- 3546 - Microwave Extraction
- 3580A - Waste Dilution
- 5030B - Aqueous Purge and Trap
- 5030C - Aqueous Purge and Trap
- 5035 - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2  
Client Sample ID: Fal-2-MTER-10  
Date Sampled: 11/23/15 14:00  
Percent Solids: N/A

ESS Laboratory Work Order: 1511608  
ESS Laboratory Sample ID: 1511608-01  
Sample Matrix: Ground Water

**Classical Chemistry**

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Nitrate as N	3.12 (0.210)		353.2		10	EEM	11/24/15 18:36	mg/L	[CALC]



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1511608

**Quality Control Data**

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
---------	--------	-----	-------	-------------	---------------	------	-------------	-----	-----------	-----------

Classical Chemistry

**Batch CK52421 - [CALC]**

**Blank**

Nitrate as N	ND	0.010	mg/L							
Nitrite as N	ND	0.010	mg/L							

**LCS**

Nitrate as N	ND		mg/L							
Nitrite as N	0.267		mg/L	0.2497		107	90-110			

**Batch CK52422 - [CALC]**

**Blank**

Nitrate as N	ND	0.020	mg/L							
Nitrate/Nitrite as N	ND	0.020	mg/L							

**LCS**

Nitrate as N	0.531		mg/L							
Nitrate/Nitrite as N	0.531		mg/L	0.5000		106	90-110			



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1511608

**Notes and Definitions**

- U Analyte included in the analysis, but not detected
- D Diluted.
- ND Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- MDL Method Detection Limit
- MRL Method Reporting Limit
- LOD Limit of Detection
- LOQ Limit of Quantitation
- DL Detection Limit
- I/V Initial Volume
- F/V Final Volume
- § Subcontracted analysis; see attached report
- 1 Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
- 2 Range result excludes concentrations of target analytes eluting in that range.
- 3 Range result excludes the concentration of the C9-C10 aromatic range.
- Avg Results reported as a mathematical average.
- NR No Recovery
- [CALC] Calculated Analyte
- SUB Subcontracted analysis; see attached report



*CERTIFICATE OF ANALYSIS*

Client Name: MT Environmental Restoration  
Client Project ID: Fal-2

ESS Laboratory Work Order: 1511608

**ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS**

**ENVIRONMENTAL**

Rhode Island Potable and Non Potable Water: LAI00179

<http://www.health.ri.gov/find/labs/analytical/ESS.pdf>

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750

[http://www.ct.gov/dph/lib/dph/environmental\\_health/environmental\\_laboratories/pdf/OutOfStateCommercialLaboratories.pdf](http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutOfStateCommercialLaboratories.pdf)

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002

<http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/documents/AllLabs.xls>

Massachusetts Potable and Non Potable Water: M-RI002

<http://public.dep.state.ma.us/Labcert/Labcert.aspx>

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424

<http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313

<http://www.wadsworth.org/labcert/elap/comm.html>

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006

[http://datamine2.state.nj.us/DEP\\_OPRA/OpraMain/pi\\_main?mode=pi\\_by\\_site&sort\\_order=PI\\_NAMEA&Select+a+Site:=58715](http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715)

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752

[http://www.depweb.state.pa.us/portal/server.pt/community/labs/13780/laboratory\\_accreditation\\_program/590095](http://www.depweb.state.pa.us/portal/server.pt/community/labs/13780/laboratory_accreditation_program/590095)

# ESS Laboratory

Division of Thielsch Engineering, Inc.

185 Frances Avenue, Cranston RI 02910-2211

Tel. (401)461-7181 Fax (401)461-4486

www.esslaboratory.com

Co. Name MT Env. Restoration

Contact Person

Jim Begley

Address

147 Elm St

City, State

Duxbury

Edmorth, MA

Zip

MA

email:

208 3602859

## CHAIN OF CUSTODY

Turn Time  Standard Other

Regulatory State: MA RI CT NH NJ NY ME Other

Is this project for any of the following: (please circle)  
 MA-MCP  Navy  USACE  CTDEP Other

Project # Fed-2

Project Name

PO #

ESS Lab # 1511608

Reporting Limits

Electronic Deliverables: \*Excel Access PDF

Analysis

Nitrate

Vol of Container

250

Type of Container

P

# of Containers

1

Pres Code

1

Sample ID

Fed-2-Nitro

Matrix

SW

Grab-G Composite-C

S

Collection Time

11/24/15 1400

Date

11/24/15

ESS Lab ID

1

Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA

Cooler Present  Yes  No

Seals Intact  Yes  No NA: RB

Cooler Temperature: 2-6 ice 11/24/15

Relinquished by: (Signature, Date & Time)

Jim Begley 11/24/15

Received by: (Signature, Date & Time)

Scott P. Ben 11/24/15

Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-

Sampled by: Jim Begley

Comments:

Relinquished by: (Signature, Date & Time)

Scott P. Ben 11/24/15

Received by: (Signature, Date & Time)

Scott P. Ben 11/24/15

Relinquished by: (Signature, Date & Time)

Scott P. Ben 17:14

Received by: (Signature, Date & Time)

Scott P. Ben 1722

Please fax to the laboratory all changes to Chain of Custody

## Report Method Blank & Laboratory Control Sample Results

\* By circling MA-MCP, client acknowledges samples were collected in accordance with MADEP CAM VIIA

## Appendix 3.5: Permeable Reactive Barriers

- WaterVision PRB Memo

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## WATERVISION LLC TECHNICAL MEMORANDUM

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**To:** Ray Cody, Marcel Belaval, and Bryan Dore - USEPA Region 1  
**From:** Danna Truslow, Pete Shanahan - WaterVision LLC  
**CC:** Ken Hickey, Emily DiFranco, and Sarah Large - WaterVision LLC  
**Subject:** Supplemental Sampling Summary Memorandum  
Site Characterization for Design of Pilot-Scale Permeable Reactive Barriers for Nitrogen Reduction in Groundwater on Cape Cod - Supplemental Fieldwork at Shorewood Drive, Falmouth, MA

**Date:** April 18, 2017

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### Introduction and Purpose

A round of water quality sampling at selected locations was performed in January 2017 at the Falmouth PRB project location on Shorewood Drive in Falmouth, MA. This work was conducted to supplement the well installation, water level measurement, and water quality sampling conducted by WaterVision LLC in 2016 (WaterVision LLC, 2016) and by MT Environmental Restoration (MTER) in 2015 (MTER, 2015). The purpose of the additional work was to determine if stable nitrogen isotope ( $\delta^{15}\text{N-NO}_3$ ) analysis would aid in site characterization and design of a pilot permeable reactive barrier (PRB) to treat nitrogen currently being studied by the town at this site.

The two stable isotopes of nitrogen are  $^{15}\text{N}$  and  $^{14}\text{N}$ . The organisms (anaerobic bacteria) that effect denitrification preferentially utilize  $^{14}\text{N}$  so that  $^{15}\text{N}$  becomes enriched compared to  $^{14}\text{N}$  during these biological reactions (Pabich, 2001). The ratio of  $^{15}\text{N}/^{14}\text{N}$  is captured as  $\delta^{15}\text{N}$  (reported in parts per thousand, ‰):

$$\delta^{15}\text{N} = 1000 \frac{s - a}{a}$$

where, a = relative abundance of  $^{15}\text{N}$  in atmospheric air, and  
s = relative abundance of  $^{15}\text{N}$  in the sample.

$\delta^{15}\text{N}$  has a stable value of 0.366 ‰ in air in the atmosphere (Kendall, 1998). This ratio can be analyzed for  $\text{NH}_4$ ,  $\text{NO}_3$ , or  $\text{N}_2$  in groundwater to determine the ratio  $\delta^{15}\text{N}$ . The  $\delta^{15}\text{N}$  of nitrate-N was analyzed for this study since it is the species of interest at the Shorewood site. For clarity, stable nitrogen isotope analyses completed for this study are listed as  $\delta^{15}\text{N}\text{-NO}_3$  to specify that the ratio was measured in nitrate-N. Measurements of  $\delta^{15}\text{N}\text{-NO}_3$  have been used at a variety of sites to understand the extent of denitrification in groundwater and to evaluate the sources of nitrate-N detected in groundwater based on apparent enrichment of  $^{15}\text{N}$  (Cravotta, 1997; Robertson & Merkely, 2009; Kendall, 2007; Degnan et al. 2015).

A distinct nitrate-N and dissolved oxygen (DO) profile with depth has been identified at the Shorewood site. Therefore, the measurement of the  $\delta^{15}\text{N}\text{-NO}_3$  ratio may help to define the zones of denitrification and to refine the appropriate depths for PRB treatment of nitrate-N in groundwater at the site.

A WaterVision LLC summary memorandum (WaterVision LLC, 2016) describes the site work completed in 2016 and provides background on subsurface sediment characteristics, groundwater levels and gradients, groundwater velocity estimates, and site-wide water quality. The monitoring wells and sample locations for the site work are shown in Figure 1. In summary, the following characteristics that are relevant to this follow-up work were observed:

- Groundwater flows from northeast to southwest across the site towards Great Pond.
- Native subsurface sediments are primarily medium-to-coarse sand, likely glacial outwash deposits.
- The average hydraulic gradient is 0.004 and the groundwater velocity is estimated at 4.0 ft./day along the flow line between MTER-7 and SW-101.
- Modest downward gradients were measured in the northerly upland piezometer cluster PZ-1 and upward gradients were measured at PZ-2, the piezometer cluster closest to Great Pond.
- Nitrate-N was measured at significant concentrations in groundwater. The highest concentration measured at a water table well was at MTER-9d at 14 mg-N/L.
- The highest concentrations of nitrate-N at a discrete depth in the vertical profile occurred between elevation -14 and -18 feet above mean sea level (ft. msl) in the upper portion of the site at MTER-4-05-BKT (14 mg-N/L), at PZ-1d (-22 ft. msl) near Route 28 at 7.1 mg-N/L, and at PZ-2d (-28 ft. msl) near Great Pond at 10 mg-N/L.

The points selected for analysis in this supplemental sampling were guided by the 2015 and 2016 water quality sampling results and included sampling intervals at

the MTER-4 multiport well and the downgradient water table well, SW-102. The MTER-4 multilevel sampling well has a total of 15 sampling ports. This multiport well was fully sampled two times for a range of water quality parameters in 2016. Figure 2 shows the concentrations of nitrate-N and DO measured at all intervals in June 2016. At that time nitrate-N concentrations peaked at 14 mg-N/L at MTER-4-05-BKT (elevation -14 ft. msl) and MTER-4-06-WT (elevation -18 ft. msl) and declined to approximately 0.028 mg-N/L at MTER-4-10-P (-34 ft. msl), then increased slightly at MTER-4-13-BU (-46 ft. msl) to 3.4 mg-N/L.

Based on this established concentration profile, the following sampling points were then chosen as representative for assessing  $\delta^{15}\text{N-NO}_3$ .

- MTER-4-01-PT,
- MTER-4-03-RT,
- MTER-4-05-BKT,
- MTER-4-07-O,
- MTER-4-09-Y,
- MTER-4-10-P, and
- MTER-4-13-BU.

Downgradient water table well SW-102 was also selected for analysis. This well is nearly directly downgradient from the MTER-4 sampling points and is close to the shoreline. In May and June 2016, the concentration of nitrate-N at this point was low (0.13 mg-N/L) compared to other shallow wells and the DO was also comparatively low here suggesting that denitrification could be occurring at this location as well as at depth in the aquifer in the MTER-4 well location.

### **Work Performed**

Sampling took place on January 12, 2017. The weather was clear with a slight breeze; temperatures were in the high 40's. As per the proposed scope of work, site fieldwork was limited to sampling the seven of the MTER-4 multi-level sampling ports listed above and one downgradient water table well - SW-102. A duplicate sample and field parameter measurement were taken at MTER-4-13-BU (MTER-4-13-BU DUP).

Calibration of field water quality meters was completed before sampling began. Field parameter values on each meter were also checked at the end of the day against parameter standards to gauge any drift during the day. A Yellow Springs Instrument (YSI) Model 556 Pro multi-parameter sonde was used for field parameter sampling.

Sampling tasks included purging the chosen multi-port sampler intervals and monitoring well, measuring field water quality parameters, and sampling the well and ports for laboratory analyses. Well purging and sampling first commenced at the MTER-4 sampling ports. A Geotech peristaltic pump was used to purge the selected ports. A Whale submersible pump was used to purge SW-102. All sampling points or wells were purged of at least three well volumes.

Water temperature, pH, DO (mg/L), specific conductance, and oxidation/reduction potential (ORP) were regularly measured using the YSI as purging continued. A visual description of the purged water was also noted. At the multiport well, the flow-through chamber of the YSI was used throughout purging. At SW-102, initial field parameter values were measured using the calibration cup, however after initial sediment buildup in the well cleared, field parameter measurement continued using the flow-through chamber to allow for more accurate DO measurements and for improved parameter stabilization during sampling. All field measurements and observations were noted on field sheets.

Water samples were taken in laboratory-provided pre-preserved sample bottles for the following parameters:

Name	Type
Nitrate-N, Nitrate and Nitrate-N, Total Kjeldahl Nitrogen	General chemistry
Chloride, Sulfate, Total Alkalinity	General chemistry
Organic carbon (dissolved)	Carbon analyses
Iron (dissolved), Manganese (dissolved), Arsenic (dissolved)	Metals
Stable Nitrogen Isotopes in Nitrate ( $\delta^{15}\text{N}-\text{NO}_3$ )	Isotope analyses

Samples taken for  $\delta^{15}\text{N}-\text{NO}_3$  analyses were first field-filtered with a 0.01-micron cartridge filter before collection into sample bottles. Two sample bottles were filled at each sample location. These samples were to be fully frozen before laboratory delivery so adequate headspace was allowed in these bottles to allow for water expansion during freezing.

Samples were then taken for dissolved iron, manganese, and arsenic and for dissolved organic carbon analyses. These samples were field-filtered with a 0.45-

micron cartridge filter before collection into sample bottles. Water samples collected for the remaining analyses were not field-filtered.

Field-collected samples for standard laboratory analyses were kept on ice in laboratory-provided coolers until delivery to Alpha Analytical Laboratory in Westborough, Massachusetts.

The stable nitrogen samples were immediately cooled, then frozen for approximately 24 hours. The samples were carefully wrapped and placed into insulated shipping containers with blue ice packs to keep the samples frozen. The samples were then overnight-shipped to the University of California at Davis Stable Isotope Laboratory in Davis, California. Duplicate samples for stable nitrogen analysis taken at all well locations were kept frozen and on reserve in case the initial samples did not stay frozen or were deemed unusable by the laboratory upon delivery. When the results of the nitrate-N general-chemistry analyses were received from Alpha Analytical, these results were provided to UC-Davis for use in the isotope analyses.

WaterVision LLC maintained custody of all samples until delivery to Alpha Analytical laboratory or via overnight delivery by Federal Express to the University of California at Davis Stable Nitrogen Isotope Laboratory in Davis, California.

## Results

Field-measured and laboratory-analyzed constituent concentrations for the 2016 sampling rounds and recent sampling in January 2017 are listed in Table 1 for the MTER-4 sampling ports and in Table 2 for the water table wells installed in 2016. Of the wells listed in Table 2, only SW-102 was sampled in January 2017. Laboratory analytical reports are included in the Appendix. Nitrate-N and  $\delta^{15}\text{N-NO}_3$  are highlighted in green and orange respectively for ease of table review. Dissolved oxygen is highlighted in blue.

Figure 3 compares nitrate-N concentrations detected in June 2016 and January 2017 at the MTER-4 intervals sampled during the January 2017 round of sampling. Concentrations are similar between June 2016 and January 2017 but there are some notable differences. The concentration of nitrate-N was modestly lower in the two shallowest sampling ports in June 2017. Additionally, the nitrate-N concentration was below detection limits at MTER-4-10-P (at -34 ft. msl) in January 2017 compared to approximately 0.028 mg-N/L in June 2016. Since nitrate-N was below detection limits at this interval, the analysis for  $\delta^{15}\text{N-NO}_3$  could not be completed. Thus, only seven analyses (six intervals at MTER-4 and one at SW-102) rather than

the full eight samples (seven intervals at MTER-4 and one at SW-102) submitted to UC-Davis for analysis were completed for this constituent.

Figure 4 illustrates the concentrations of nitrate-N, dissolved organic carbon (DOC), dissolved oxygen (DO), and  $\delta^{15}\text{N-NO}_3$  at the sampled multiport intervals. The highest concentration of nitrate-N, 15 mg-N/L, occurred at MTER-4-07-0 (at -24 ft. msl) and dropped to 2 mg-N/L or lower below this elevation. DO was detected at a high of 8.7 mg/L at MTER-4-03-RT (at -8 ft. msl) and dropped to below 1 mg/L at depths below -34 ft. msl. The DOC concentration was greatest at -30 ft. msl at 2.4 mg/L. The values of  $\delta^{15}\text{N-NO}_3$  at the upper four sampling intervals (-22 ft. msl and higher) were between 5.13 and 5.74 ‰. The deeper two intervals (-30 and -46 ft. msl) had values of 20.32 and 20.66 ‰.

Figure 5 shows the concentrations of nitrate-N, total alkalinity, chloride, and sulfate at the sampled MTER sampling ports. The concentration of chloride at the shallowest port – MTER-4-01-PT (at 2 ft. msl) was 140 mg/L and dropped to below 20 mg/L below -26 ft. msl. Sulfate and total alkalinity concentrations are similar throughout the profile, with alkalinity decreasing to 3.9 mg/L at the deepest interval sampled.

Figure 6 includes the concentrations of nitrate-N, iron, manganese, and arsenic at the MTER-4 sampling ports. Iron was detected at less than 0.01 mg/L at all sampled ports and manganese concentrations increased slightly between -22 and -46 ft. msl to a concentration of 0.39 mg/L. Arsenic was at very low level (0.002 to 0.006 mg/L to below the detection limit of 0.002 mg/L.

At SW-102, the concentration of nitrate-N increased to 5.2 mg/L in January 2017 from 0.13 mg/L during May and June of 2016. Sulfate also increased to 10.2 mg/L from a concentration of 5.16 to 5.42 mg/L in May and June 2016, and the measured specific conductance was 256 uS/cm compared to 78 to 87 uS/cm in May and June 2016. The  $\delta^{15}\text{N-NO}_3$  ratio at SW-102 was measured at 7.28 ‰.

## Discussion

The variation in  $\delta^{15}\text{N-NO}_3$  values in groundwater can reflect different sources of nitrate-N and fractionation due to biological processes. Since the Shorewood site is in a developed area and is underlain by a sand and gravel aquifer with a water table that is 10 to 15 feet below land surface, there are likely multiple sources of nitrate contributing to the subsurface concentrations. These include infiltrating precipitation, vehicle emission deposition, fertilizer, and septic discharge. A review

of stable isotope concentrations by Kendall et al. (2007) includes the following range of  $\delta^{15}\text{N}-\text{NO}_3$  for these sources:

Precipitation for the Cape Cod area -	-5.4 to -3.5
Vehicle Emissions -	-13 to +3.7
Fertilizer – inorganic-	-4 to +4
Fertilizer – organic -	+2 to +30
Animal and human waste	+10 to +20

A recent study of the impacts of blasting on water quality also provided some ranges of  $\delta^{15}\text{N}-\text{NO}_3$  from blast chemicals and septic systems in southern New Hampshire (Degnan et al., 2015). Groundwater downgradient from blasting had  $\delta^{15}\text{N}-\text{NO}_3$  values of 1 to 3 ‰ and groundwater downgradient of septic influence was found to have ratios between 11.4 and 15.3 ‰. The higher ratio was in an area of low DO, where denitrification may have been active. Others reported  $\delta^{15}\text{N}-\text{NO}_3$  in groundwater downgradient of septic systems as 7 ‰ (Fogg et al., 1998) and 8.1 to 13.9 ‰ (Aravena et al., 1993).

The limited sampling program at Shorewood identified a groundwater  $\delta^{15}\text{N}-\text{NO}_3$  between 5 and 20 ‰. It is likely that the nitrate-N detected in the subsurface is the result of a mixture of precipitation, vehicle emissions, septic waste, and fertilizer sources.

The most effective means of identifying sources uses a combination of stable oxygen and stable nitrogen isotope analysis of nitrate-N in soil and groundwater. To determine the impact of denitrification on  $\delta^{15}\text{N}-\text{NO}_3$ , additional analyses such as DO, DOC, and dissolved metals are needed (Kendall et al., 2007). The Shorewood data include these additional analyses, which are discussed below.

The additional collection of  $\delta^{15}\text{N}-\text{NO}_3$  data at Shorewood appears to confirm the previous conclusion that denitrification is occurring below the nitrate plume present in the saturated zone between -12 and -28 ft. msl. The overall difference in ratios between upper elevations from 2 to -24 ft. msl (less than 6 ‰) and lower elevations below -28 ft. msl (approximately 20 ‰) suggests there is considerable enrichment in deeper groundwater compared to shallow groundwater. The lower DO concentrations where the  $\delta^{15}\text{N}-\text{NO}_3$  ratios are high support this conclusion. DOC is also at its highest concentration in the profile where nitrate and DO concentrations decline and  $\delta^{15}\text{N}-\text{NO}_3$  increases to over 20 ‰.

The somewhat enriched  $\delta^{15}\text{N}\text{-NO}_3$  ratio at SW-102 compared to the shallow zone at MTER-4 suggests some denitrification may be active at this location close to the pond as well but not to the extent observed in the deeper monitoring intervals at MTER-4. The anaerobic muds along the shore are an environment likely to foster denitrification.

Based on the information generated during this and the prior studies, it appears that natural denitrification is occurring below -28 ft. msl at MTER-4 and that PRB treatment would be most beneficial in the saturated zone above this elevation.

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## **TABLES**

### **Supplemental Sampling Summary Memorandum**

#### **Site Characterization for Design of Pilot-Scale Permeable Reactive Barriers for Nitrogen Reduction in Groundwater on Cape Cod - Supplemental Fieldwork at Shorewood Drive, Falmouth, MA**

Table 1 - Groundwater Quality Data Summary -																
MTER-4 Multiport Well																
Cape Cod PRB Shorewood Road Site, Falmouth, MA																
Sample ID/Location	MTER-4-06-WT			MTER-4-07-O			MTER-4-08 GY		MTER-4-09-Y			MTER-4-10 P				
Elevation of Sampling Port (feet above mean sea level)	-18			-22			-26		-30			-34				
Sampling Date	5/18/16	6/21/16	5/18/16	6/21/16	1/12/17	5/18/16	6/21/16	5/18/16	6/21/16	1/12/17	5/18/16	6/21/16	1/12/17			
<b>Field Measurements</b>																
pH (SU)	NM	4.2	4.7	4.3	4.6	5.3	4.8	5.7	5.4	5.4	5.8	5.5	5.5			
Temperature (°C)	12.5	13.6	12.3	14.0	12.1	12.5	13.4	12.3	13.6	12	12.4	13.7	11.9			
Dissolved Oxygen (DO; mg/L)	6	5	4	4	4	0	2	0	2	1	0	1	1			
Specific Conductance (uS/cm)	234	250	190	200	248	143	150	152	137	107	112	112	116			
Redox Potential (ORP; mV)	NA	307	NA	311	256.7	NA	293	NA	287.6	219.4	NA	288	215.1			
<b>Laboratory Analyses</b>																
Nitrate as N (mg/L)	14	14	9.7	11	15	4.9	5.2	3.6	1.6	0.74	0.14	0.028	<0.019			
d15N-NO3 (0/00)					5.74					20.66			NA			
Total Kjeldahl Nitrogen (TKN) (mg/L)	<0.330	<0.330	<0.132	<0.330	<0.066	<0.066	<0.132	0.161	J	0.272	J	0.383	0.253	J	0.223	0.176
Total Nitrogen (mg/L)	14	14	9.7	11	15	4.9	5.2	3.6	1.6	1.1	<0.30	<0.30	<0.30			
Total Alkalinity (mg/L CaCO3)	NA	NA	NA	NA	ND	NA	NA	NA	NA	13.3	NA	NA	15.1			
Chloride (mg/L)	NA	NA	NA	NA	23.8	NA	NA	NA	NA	15.1	NA	NA	15.1			
Sulfate (mg/L)	NA	NA	NA	NA	7.62	NA	NA	NA	NA	4.92	NA	NA	9.21			
Dissolved Iron (mg/L)	0.091	<0.020	<0.020	<0.020	<0.01	<0.020	<0.020	<0.020	0.031	J	<0.01	<0.020	<0.020	0.01	J	
Dissolved Manganese (mg/L)	0.472	0.341	0.353	0.188	0.388	0.294	0.384	0.0841	0.0751	0.076	0.0327	0.0346	0.031			
Dissolved Arsenic (mg/L)	0.0034	J	0.0026	J	0.0104	0.0044	J	0.006	0.0030	J	<0.0020	0.0031	J	<0.002		
Dissolved Organic Carbon (mg/L)	1.1	1.3	0.99	J	1.0	0.97	J	1.4	1.3	3.1	3.8	2.4	2.0	1.5		

**Notes:**

J - Data indicates a presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

NS - Not Sampled / NM -Not Measured

NA - Not Analyzed

E- Exceeded RPD of 20%

Table 1 - Groundwater Quality Data Summary -												
MTER-4 Multiport Well												
Cape Cod PRB Shorewood Road Site, Falmouth, MA												
Sample ID/Location	MTER-04-11-GN		MTER-4-12-R		MTER-4-13 BU			MTER-4-14 BK		MTER-4-15 W		
Elevation of Sampling Port (feet above mean sea level)	-38		-42		-46			-50		-54		
Sampling Date	5/18/16	6/21/16	5/18/16	6/21/16	5/18/16	6/21/16	1/12/17	5/18/16	6/21/16	5/18/16	6/21/16	
Field Measurements												
pH (SU)	5.9	5.6	5.7	5.4	5.4	5.2	5.4	5.5	5.1	6.0	5.5	
Temperature (°C)	12.3	13.8	12.1	13.5	12.3	13.6	11.9	12.2	13.5	12.4	13.4	
Dissolved Oxygen (DO; mg/L)	0	2	0	1	0	2	1	1	2	2	3	
Specific Conductance (uS/cm)	111	117	97	105	99	127	108	86	95	101	106	
Redox Potential (ORP; mV)	NA	248	NA	267	NA	292	218	NA	290	NA	241	
Laboratory Analyses												
Nitrate as N (mg/L)	<0.019	0.021 J	0.66	0.67	1.5	3.4	1.7	0.41	0.50	0.87	0.89	
d15N-NO3 (0/00)							20.32					
Total Kjeldahl Nitrogen (TKN) (mg/L)	0.17 J	0.301	0.096 J	0.192 J	<0.066	0.069 J	2.46 E	0.151 J	0.184 J	0.199 J	0.233 J	
Total Nitrogen (mg/L)	<0.30	0.3	0.66	0.67	1.5	3.4	4.2 E	0.41	0.50	0.87	0.89	
Total Alkalinity (mg/L CaCO3)	NA	NA	NA	NA	NA	NA	3.9	NA	NA	NA	NA	
Chloride (mg/L)	NA	NA	NA	NA	NA	NA	16.5	NA	NA	NA	NA	
Sulfate (mg/L)	NA	NA	NA	NA	NA	NA	8.12	NA	NA	NA	NA	
Dissolved Iron (mg/L)	0.99	1.1	<0.020	<0.020	<0.020	<0.020	<0.01	<0.020	<0.020	2.0	1.5	
Dissolved Manganese (mg/L)	0.0230	0.0227	0.291	0.32	0.534	0.738	0.502	0.0765	0.0662	0.306	0.302	
Dissolved Arsenic (mg/L)	<0.0020	0.0027 J	<0.0020	<0.0020	0.0024 J	<0.0020	<0.002	0.0031 J	<0.0020	0.0032 J	<0.0020	
Dissolved Organic Carbon (mg/L)	1.5	1.5	1.1	0.79 J	0.58	0.72 J	0.51 J	0.55 J	0.81 J	0.47	0.55 J	

Notes:  
 J - Data indicates a presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

NS - Not Sampled / NM - Not Measured  
 NA - Not Analyzed  
 E - Exceeded RPD of 20%

**Table 2 - Groundwater Data Summary - WaterVision  
Water Table Wells Installed 2016  
Cape Cod PRB Shorewood Road Site, Falmouth, MA**

Sample ID/Location	SW-101		SW-102			SW-103		SW-104	
	5/26/16	6/23/16	5/25/16	6/22/16	1/12/17	5/25/16	6/23/16	5/25/16	6/22/17
Field Measurements									
pH (SU)	6.05	5.45	6.0	5.81	5.5	5.39	5.91	4.65	5.03
Temperature (°C)	10.6	12.29	11.3	14	8.7	12.2	12.6	12.9	12.8
Dissolved Oxygen (DO; mg/L)	0.56	1.74	4.6	0.5	2.98	0.3	12.3	7.7	11.39
Specific Conductance (uS/cm)	580	588	78	87	256	455	458	277	571
Redox Potential (ORP; mV)	24.9	21	128	189	247	172	77	195	112
Laboratory Analyses									
Nitrate as N (mg/L)	<0.019	0.041 J	0.13	0.13	5.2	7.8	7.3	2.7	2.6
Nitrite as N (mg/L)	0.024 J	0.028 J	<0.010	<0.010	<0.019	<0.010	<0.010	0.016 J	0.012
d15N-NO3 (0/00)	NM	NM	NM	NM	7.28	NM	NM	NM	NM
Ammonia as N (mg/L)	5.30	3.65	<0.028	<0.028	NA	<0.028	0.048 J	<0.028	<0.028
Total Kjeldahl Nitrogen (TKN) (mg/L)	5.70	4.80	0.694	<0.066	0.299 J	<0.132	0.218 J	0.257 J	0.55
Total Nitrogen (mg/L)	5.7	4.8	0.82	<0.30	5.2	7.8	7.3	2.7	3.2
Orthophosphate (mg/L)	0.007	0.015	0.007	0.009	NA	0.005		0.005	0.006
Total Alkalinity	131	107	17.6	19.2	23.1	10.1	8.70	ND	ND
Chloride (mg/L)	72.6	141	7.76	7.64	38.2	81	127	48.3	111
Sulfate (mg/L)	0.263 J	0.307 J	5.16	5.41	10.2	8.04	10.3	12.4	12.4
Dissolved Iron (mg/L)	19	18	2.2	0.13	0.05	0.27	<0.02	0.14	0.19
Dissolved Manganese (mg/L)	0.566	0.546	0.0599	0.0101	0.025	0.197	0.021	0.0763	0.082
Dissolved Boron (mg/L)	0.055	0.045	0.0175 J	0.0157 J	NA	0.0238 J	0.025 J	0.0176 J	0.017
Dissolved Arsenic (mg/L)	<0.002	0.003 J	0.0041 J	<0.002	<0.002	0.003 J	0.003 J	0.0045 J	<0.002
Dissolved Organic Carbon (mg/L)	11	10	3.0	3.0	4	1.1	1.2	1.4	1.6

Notes:

J - Data indicates a presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

R - Suspected error in field pH and ORP measurements

NS - Not Sampled / NM - Not Measured

NA - Not analyzed

**Table 2 - Groundwater Data Summary - WaterVision  
Water Table Wells Installed 2016  
Cape Cod PRB Shorewood Road Site, Falmouth, MA**

Sample ID/Location	WP-1				WP-3				Great Pond at WP-2		Great Pond at WP-3	
	16	5/25/16	6/22/16		5/25/16	6/22/16			5/25/16	6/22/16		
Field Measurements												
pH (SU)		4.62	NA		5.9	4.3		6.62		6.29		
Temperature (°C)		16.2	NA		16.8	23.9		20.7		24.4		
Dissolved Oxygen (DO; mg/L)		4.47	NA		1.2	4.63		9.9		6.7		
Specific Conductance (uS/cm)		212	NA		716	286		825		750		
Redox Potential (ORP; mV)		203	NA		184	280		184		281		
Laboratory Analyses												
Nitrate as N (mg/L)		7.9	NA		2.5	7.8		NA		0.80		
Nitrite as N (mg/L)	J	<0.010	NA		<0.010	0.016	J	NA		0.011	J	
d15N-NO3 (0/00)		NM	NA		NM	NM		NA		NM		
Ammonia as N (mg/L)		0.029	J	NA	0.815	<0.028		NA		0.039	J	
Total Kjeldahl Nitrogen (TKN) (mg/L)		0.146	J	NA	4.08	0.158	J	NA		0.330		
Total Nitrogen (mg/L)		7.9		NA	6.6	7.8		NA		1.1		
Orthophosphate (mg/L)		0.005		NA	0.012	0.007		NA		0.007		
Total Alkalinity		2.00		NA	41.7	ND		NA		12.4		
Chloride (mg/L)		23.0		NA	138	41.1		NA		192		
Sulfate (mg/L)		12.8		NA	16.0	14.9		NA		29.8		
Dissolved Iron (mg/L)		<0.020		NA	0.49	0.14		NA		0.22		
Dissolved Manganese (mg/L)		0.241		NA	0.0814	0.224		NA		0.030		
Dissolved Boron (mg/L)	J	0.0362		NA	0.0386	0.028	J	NA		0.059		
Dissolved Arsenic (mg/L)		0.0059		NA	0.005	0.004	J	NA		0.002	J	
Dissolved Organic Carbon (mg/L)	J	0.89		NA	3.0	1.2		NA		2.1		

Notes:

J - Data indicates a presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

R - Suspected error in field pH and ORP measurements

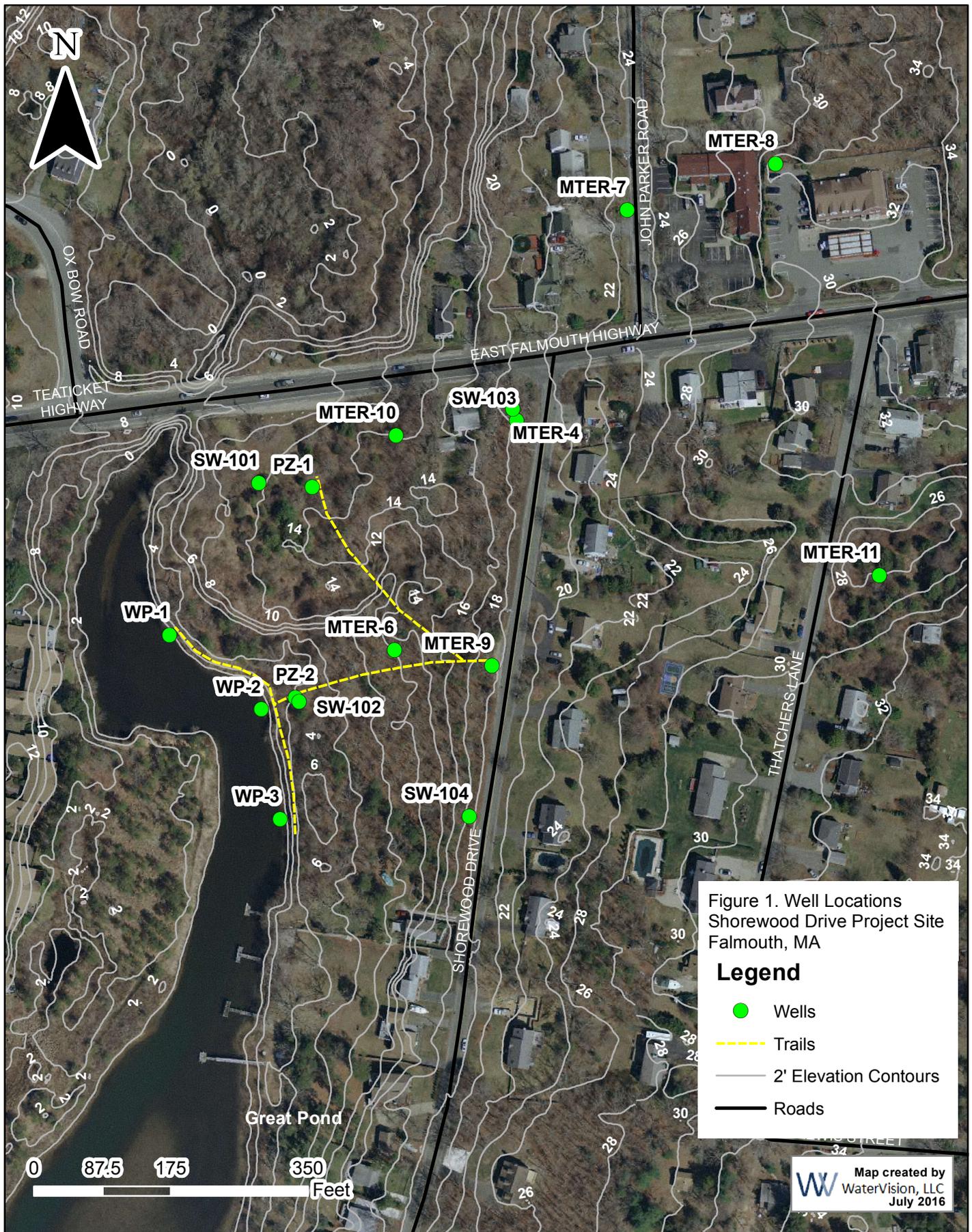
NS - Not Sampled / NM -Not Measured

NA -Not analyzed

## **FIGURES**

### **Supplemental Sampling Summary Memorandum**

**Site Characterization for Design of Pilot-Scale Permeable  
Reactive Barriers for Nitrogen Reduction in Groundwater on  
Cape Cod - Supplemental Fieldwork at Shorewood Drive,  
Falmouth, MA**



Sources: Aerial photography 2013-2014 and Roads from Mass GIS, Elevation contours from Cape Cod Commission, Site surveys completed by Falmouth Public Works Department and CEI to NAVD 88 vertical datum. MTER well locations and trails are approximate.

Figure 2 - Nitrate-N and Dissolved Oxygen at MTER-4 Multi-port Well Intervals  
Shorewood Drive, Falmouth, MA,  
June 2016

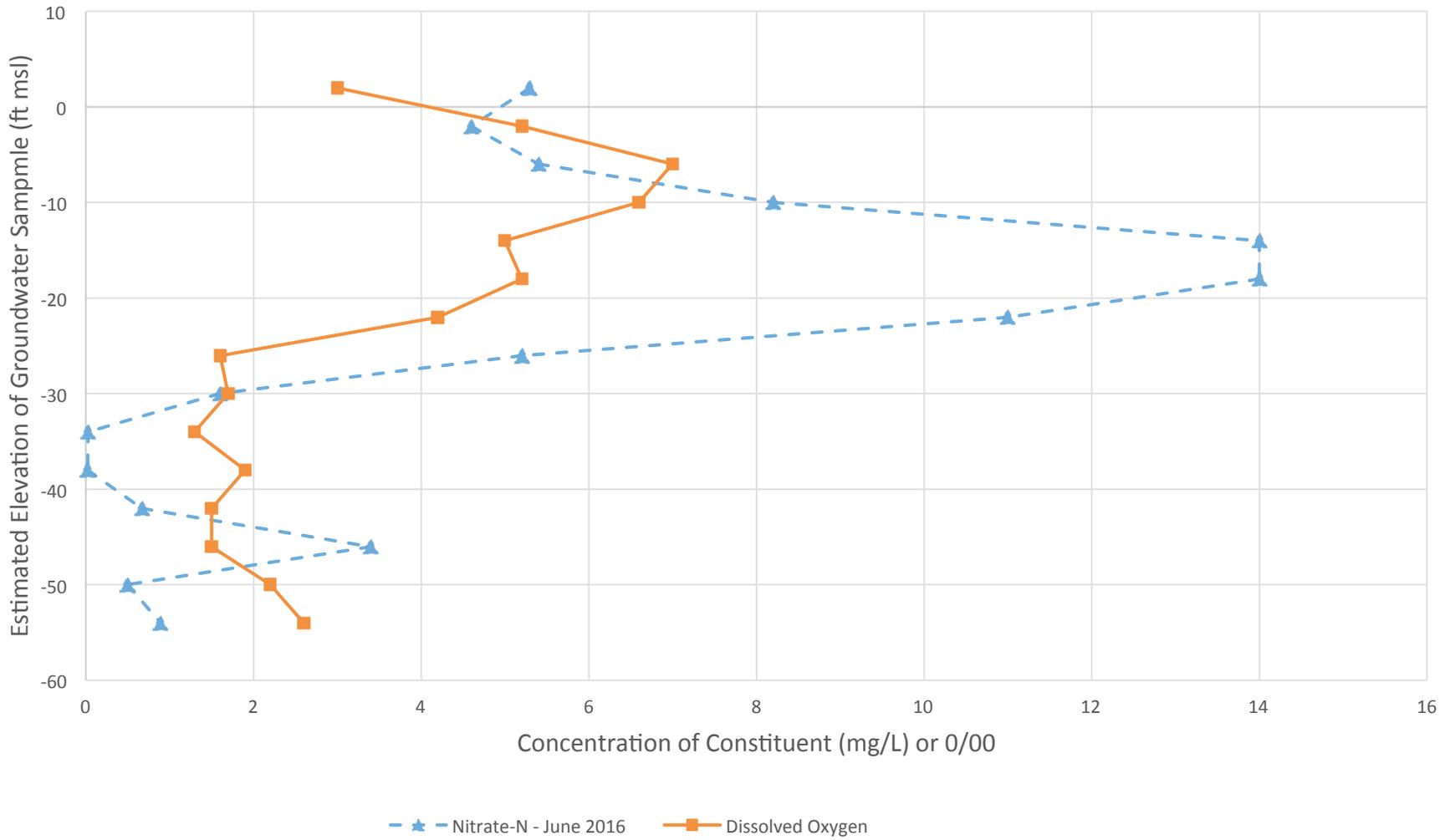


Figure 3 - Nitrate-N at Sampled MTER-4 Multi-port Well Intervals  
Shorewood Drive, Falmouth, MA,  
June 2016 and January 2017

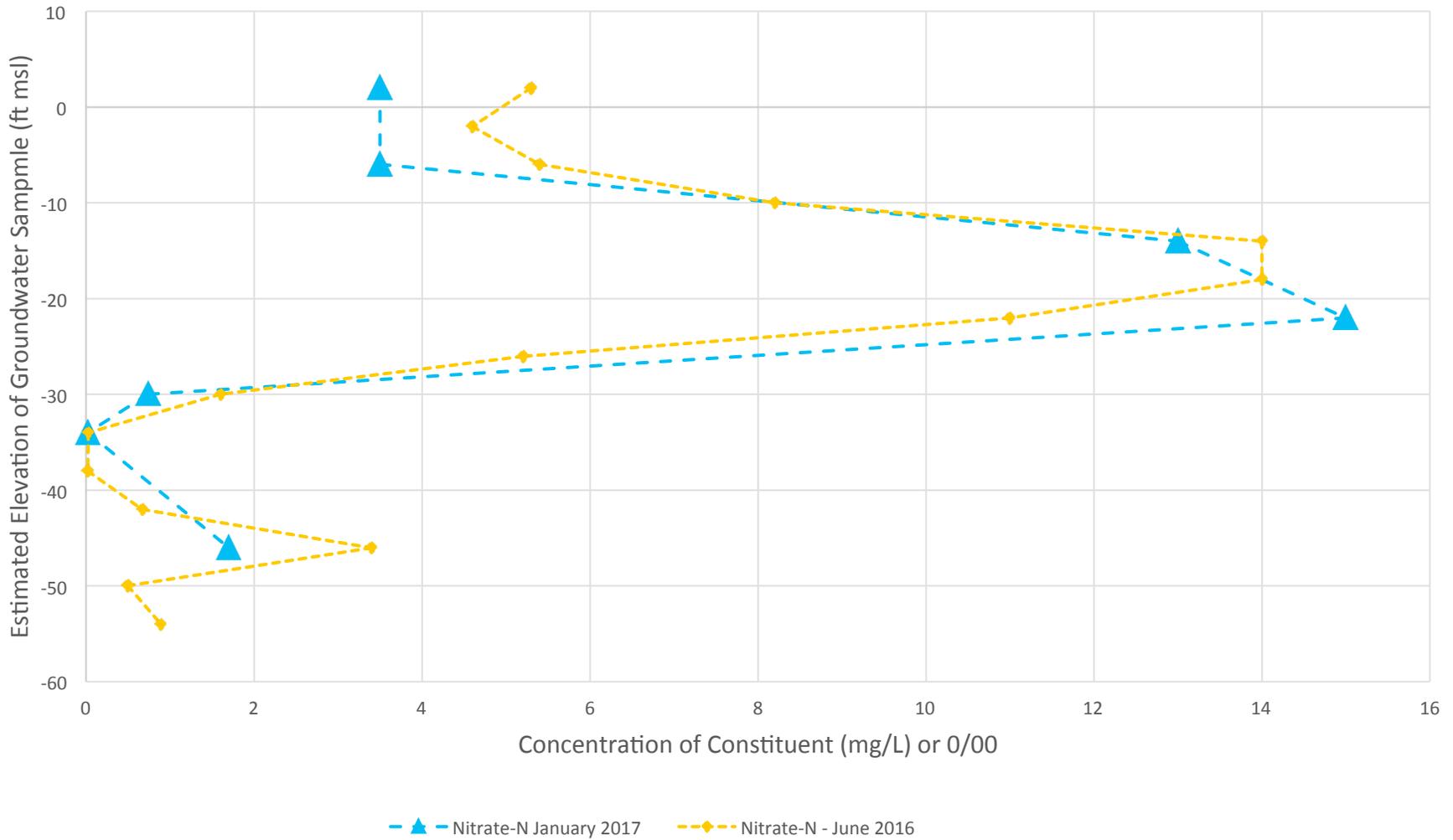


Figure 4 - Variation of Nitrate-N, Stable Nitrogen Isotope, Dissolved Oxygen, and Dissolved Organic Carbon at MTER-4 Multi-port Well Shorewood Drive, Falmouth, MA, Dec 2016 to Jan 2017

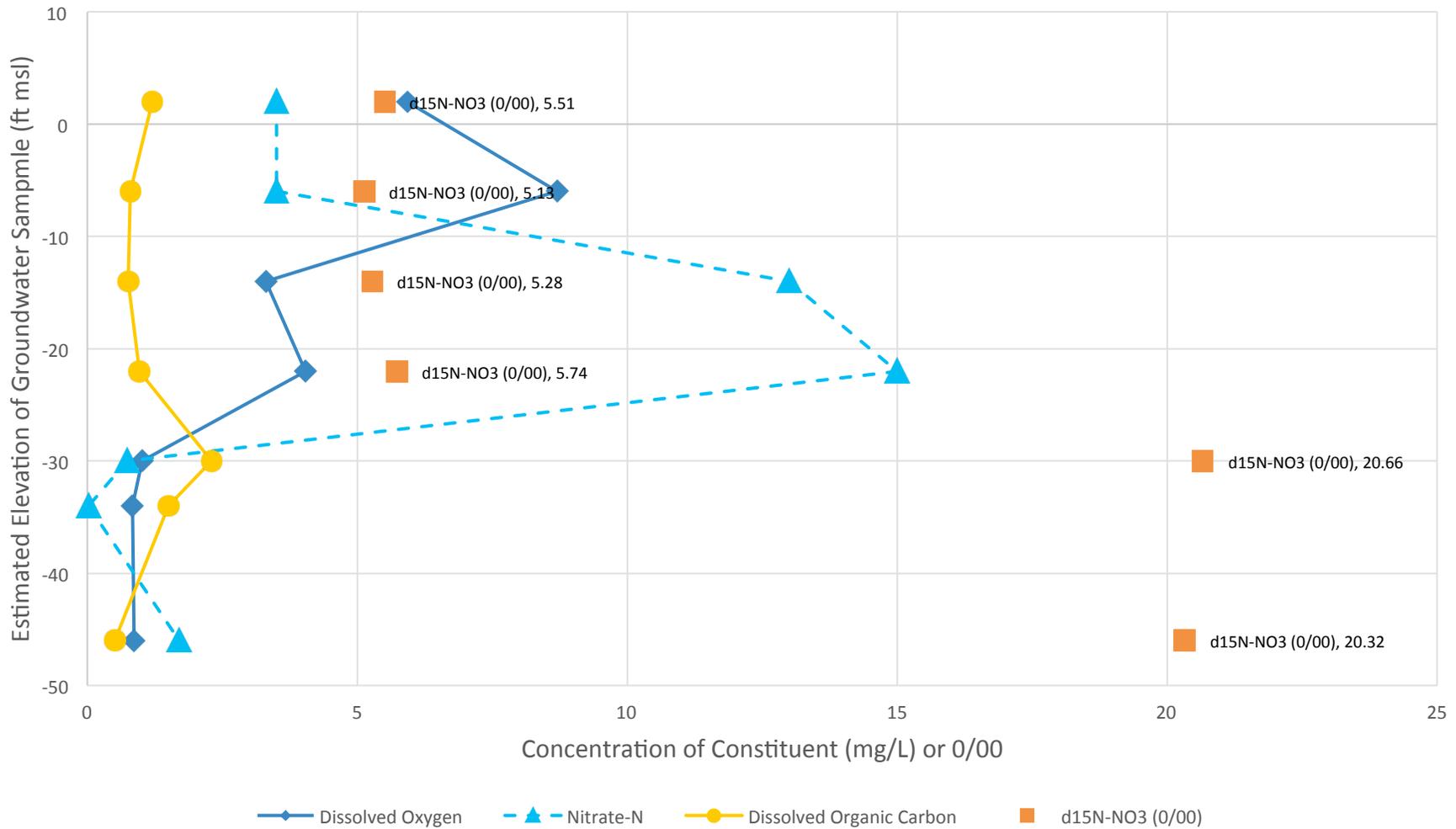


Figure 5 - Variation of Nitrate-N, Total Alkalinity, Chloride, and Sulfate at MTER-4 Multi-port Well Shorewood Drive, Falmouth, MA, Dec 2016 to Jan 2017

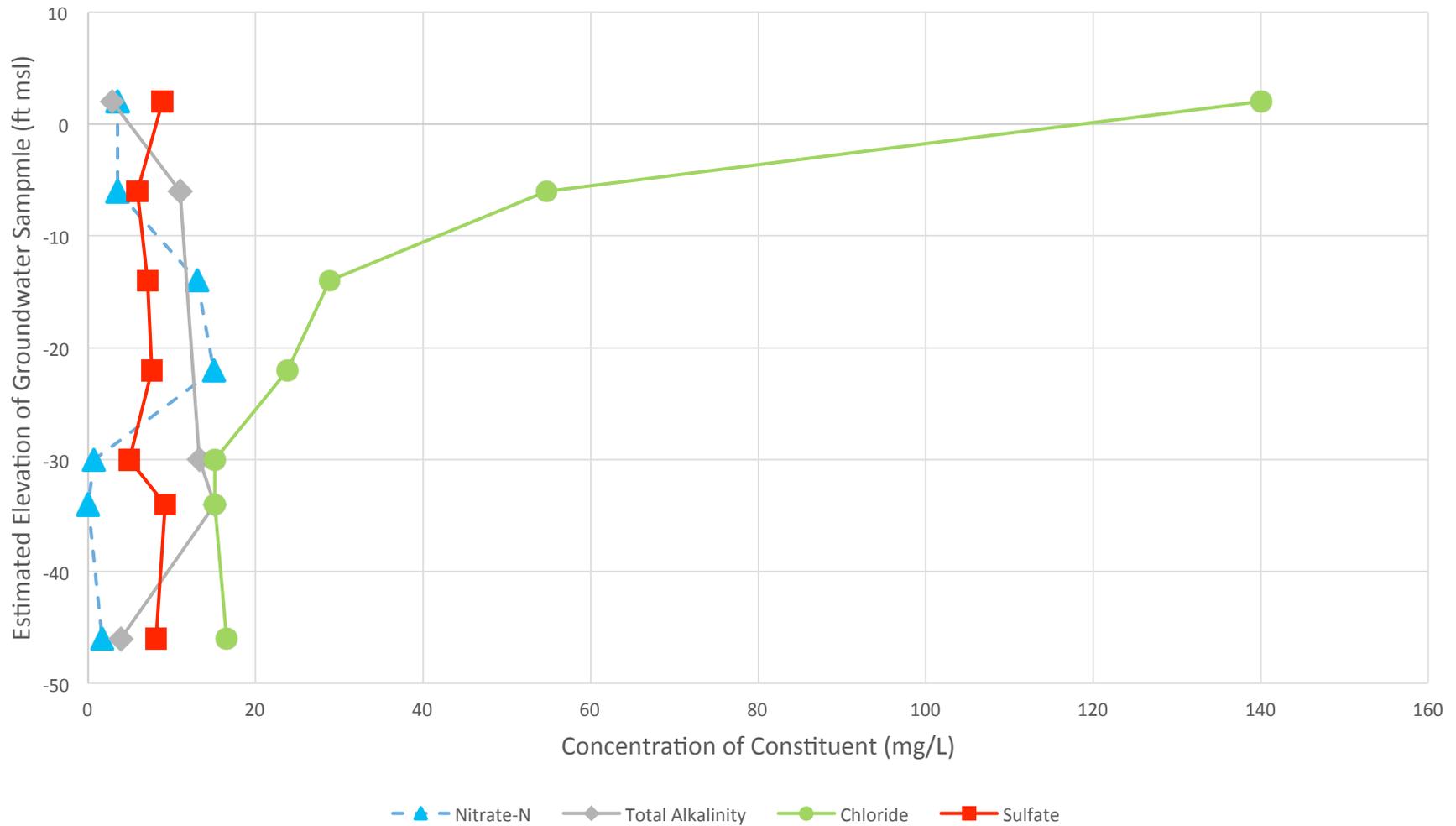
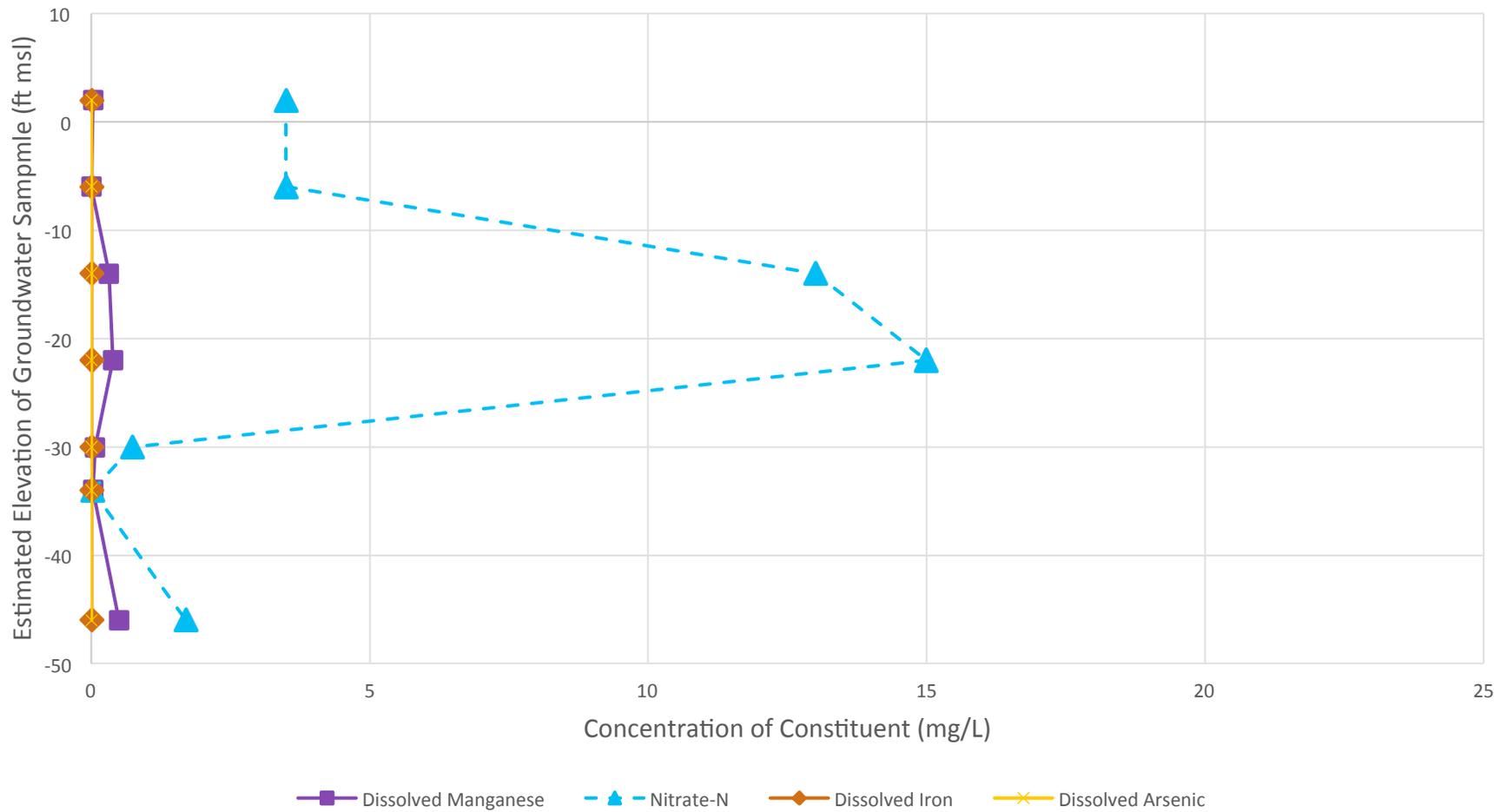


Figure 6 - Variation of Nitrate-N, Dissolved Iron, Dissolved Manganese, and Dissolve Arsenic at MTER-4 Multi-Port Well Shorewood Drive, Falmouth, MA, Dec 2016 to Jan 2017



**APPENDIX**  
**LABORATORY ANALYTICAL REPORTS**

**Supplemental Sampling Summary Memorandum**

**Site Characterization for Design of Pilot-Scale Permeable  
Reactive Barriers for Nitrogen Reduction in Groundwater on  
Cape Cod - Supplemental Fieldwork at Shorewood Drive,  
Falmouth, MA**



## ANALYTICAL REPORT

Lab Number:	L1701230
Client:	Watervision, LLC 454 Court Street Suite 304 Portsmouth, NH 03801
ATTN:	Danna Truslow
Phone:	(603) 766-6670
Project Name:	CAPE COD PRB
Project Number:	WV10009
Report Date:	01/18/17

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), VA (460195), MD (348), IL (200077), NC (666), TX (T104704476), DOD (L2217), USDA (Permit #P-330-11-00240).

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Eight Walkup Drive, Westborough, MA 01581-1019  
508-898-9220 (Fax) 508-898-9193 800-624-9220 - [www.alphalab.com](http://www.alphalab.com)



Project Name: CAPE COD PRB

Project Number: WV10009

Lab Number: L1701230

Report Date: 01/18/17

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1701230-01	MTER-4-13-BU DUP	WATER	CAPE COD PRB	01/12/17 15:40	01/12/17
L1701230-02	MTER-4-13-BU	WATER	CAPE COD PRB	01/12/17 15:32	01/12/17
L1701230-03	MTER-4-10-P	WATER	CAPE COD PRB	01/12/17 15:15	01/12/17
L1701230-04	MTER-4-01-PT	WATER	CAPE COD PRB	01/12/17 14:05	01/12/17
L1701230-05	MTER-4-03-RT	WATER	CAPE COD PRB	01/12/17 14:15	01/12/17
L1701230-06	MTER-4-05-BKT	WATER	CAPE COD PRB	01/12/17 14:30	01/12/17
L1701230-07	MTER-4-09-Y	WATER	CAPE COD PRB	01/12/17 14:45	01/12/17
L1701230-08	MTER-4-7-0	WATER	CAPE COD PRB	01/12/17 15:00	01/12/17
L1701230-09	VL-6B	WATER	CAPE COD PRB	01/12/17 11:50	01/12/17
L1701230-10	VL-6B DUP	WATER	CAPE COD PRB	01/12/17 11:55	01/12/17
L1701230-11	SW-1	WATER	CAPE COD PRB	01/12/17 09:30	01/12/17
L1701230-12	WP-2	WATER	CAPE COD PRB	01/12/17 10:50	01/12/17
L1701230-13	WP-3	WATER	CAPE COD PRB	01/12/17 11:10	01/12/17
L1701230-14	WP-1	WATER	CAPE COD PRB	01/12/17 10:20	01/12/17
L1701230-15	VL-3	WATER	CAPE COD PRB	01/12/17 08:55	01/12/17
L1701230-16	SW-102	WATER	CAPE COD PRB	01/12/17 16:35	01/12/17

**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

### Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

#### HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

### Case Narrative (continued)

#### Report Submission

The project information and metals reporting list were provided by the client.

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

#### Dissolved Organic Carbon

L1701230-11 and -14: The sample has an elevated detection limit due to the dilution required by the sample matrix.

The samples, with the exception of L1701230-11, were field filtered; a filter blank was not received.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:

 Cristin Walker

Title: Technical Director/Representative

Date: 01/18/17

## METALS

**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

**SAMPLE RESULTS**

Lab ID: L1701230-01  
 Client ID: MTER-4-13-BU DUP  
 Sample Location: CAPE COD PRB  
 Matrix: Water

Date Collected: 01/12/17 15:40  
 Date Received: 01/12/17  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals + DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	0.002	J	mg/l	0.005	0.002	1	01/16/17 15:05	01/16/17 20:33	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.05	0.01	1	01/16/17 15:05	01/16/17 20:33	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.536		mg/l	0.010	0.002	1	01/16/17 15:05	01/16/17 20:33	EPA 3005A	1,6010C	PS



**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

**SAMPLE RESULTS**

Lab ID: L1701230-02  
 Client ID: MTER-4-13-BU  
 Sample Location: CAPE COD PRB  
 Matrix: Water

Date Collected: 01/12/17 15:32  
 Date Received: 01/12/17  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	01/16/17 15:05	01/16/17 20:49	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.05	0.01	1	01/16/17 15:05	01/16/17 20:49	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.502		mg/l	0.010	0.002	1	01/16/17 15:05	01/16/17 20:49	EPA 3005A	1,6010C	PS



Project Name: CAPE COD PRB

Lab Number: L1701230

Project Number: WV10009

Report Date: 01/18/17

## SAMPLE RESULTS

Lab ID: L1701230-03

Date Collected: 01/12/17 15:15

Client ID: MTER-4-10-P

Date Received: 01/12/17

Sample Location: CAPE COD PRB

Field Prep: Field Filtered

Matrix: Water

(Dissolved  
Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	01/16/17 15:05	01/16/17 20:53	EPA 3005A	1,6010C	PS
Iron, Dissolved	0.01	J	mg/l	0.05	0.01	1	01/16/17 15:05	01/16/17 20:53	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.031		mg/l	0.010	0.002	1	01/16/17 15:05	01/16/17 20:53	EPA 3005A	1,6010C	PS



Project Name: CAPE COD PRB

Lab Number: L1701230

Project Number: WV10009

Report Date: 01/18/17

## SAMPLE RESULTS

Lab ID: L1701230-04

Date Collected: 01/12/17 14:05

Client ID: MTER-4-01-PT

Date Received: 01/12/17

Sample Location: CAPE COD PRB

Field Prep: Field Filtered

Matrix: Water

(Dissolved  
Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	01/16/17 15:05	01/16/17 20:57	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.05	0.01	1	01/16/17 15:05	01/16/17 20:57	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.029		mg/l	0.010	0.002	1	01/16/17 15:05	01/16/17 20:57	EPA 3005A	1,6010C	PS



Project Name: CAPE COD PRB

Lab Number: L1701230

Project Number: WV10009

Report Date: 01/18/17

## SAMPLE RESULTS

Lab ID: L1701230-05

Date Collected: 01/12/17 14:15

Client ID: MTER-4-03-RT

Date Received: 01/12/17

Sample Location: CAPE COD PRB

Field Prep: Field Filtered

Matrix: Water

(Dissolved  
Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	0.002	J	mg/l	0.005	0.002	1	01/16/17 15:05	01/16/17 21:14	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.05	0.01	1	01/16/17 15:05	01/16/17 21:14	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.002	J	mg/l	0.010	0.002	1	01/16/17 15:05	01/16/17 21:14	EPA 3005A	1,6010C	PS



Project Name: CAPE COD PRB

Lab Number: L1701230

Project Number: WV10009

Report Date: 01/18/17

## SAMPLE RESULTS

Lab ID: L1701230-06

Date Collected: 01/12/17 14:30

Client ID: MTER-4-05-BKT

Date Received: 01/12/17

Sample Location: CAPE COD PRB

Field Prep: Field Filtered

Matrix: Water

(Dissolved  
Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	0.003	J	mg/l	0.005	0.002	1	01/16/17 15:05	01/16/17 21:18	EPA 3005A	1,6010C	PS
Iron, Dissolved	0.01	J	mg/l	0.05	0.01	1	01/16/17 15:05	01/16/17 21:18	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.321		mg/l	0.010	0.002	1	01/16/17 15:05	01/16/17 21:18	EPA 3005A	1,6010C	PS



Project Name: CAPE COD PRB

Lab Number: L1701230

Project Number: WV10009

Report Date: 01/18/17

## SAMPLE RESULTS

Lab ID: L1701230-07

Date Collected: 01/12/17 14:45

Client ID: MTER-4-09-Y

Date Received: 01/12/17

Sample Location: CAPE COD PRB

Field Prep: Field Filtered

Matrix: Water

(Dissolved  
Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	0.002	J	mg/l	0.005	0.002	1	01/16/17 15:05	01/16/17 21:22	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.05	0.01	1	01/16/17 15:05	01/16/17 21:22	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.076		mg/l	0.010	0.002	1	01/16/17 15:05	01/16/17 21:22	EPA 3005A	1,6010C	PS



**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

**SAMPLE RESULTS**

Lab ID: L1701230-08  
 Client ID: MTER-4-7-0  
 Sample Location: CAPE COD PRB  
 Matrix: Water

Date Collected: 01/12/17 15:00  
 Date Received: 01/12/17  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	0.006		mg/l	0.005	0.002	1	01/16/17 15:05	01/16/17 21:26	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.05	0.01	1	01/16/17 15:05	01/16/17 21:26	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.388		mg/l	0.010	0.002	1	01/16/17 15:05	01/16/17 21:26	EPA 3005A	1,6010C	PS



Project Name: CAPE COD PRB

Lab Number: L1701230

Project Number: WV10009

Report Date: 01/18/17

## SAMPLE RESULTS

Lab ID: L1701230-15

Date Collected: 01/12/17 08:55

Client ID: VL-3

Date Received: 01/12/17

Sample Location: CAPE COD PRB

Field Prep: Field Filtered

Matrix: Water

(Dissolved  
Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	01/16/17 15:05	01/16/17 21:51	EPA 3005A	1,6010C	PS
Iron, Dissolved	0.03	J	mg/l	0.05	0.01	1	01/16/17 15:05	01/16/17 21:51	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.063		mg/l	0.010	0.002	1	01/16/17 15:05	01/16/17 21:51	EPA 3005A	1,6010C	PS



Project Name: CAPE COD PRB

Lab Number: L1701230

Project Number: WV10009

Report Date: 01/18/17

## SAMPLE RESULTS

Lab ID: L1701230-16

Date Collected: 01/12/17 16:35

Client ID: SW-102

Date Received: 01/12/17

Sample Location: CAPE COD PRB

Field Prep: Field Filtered

Matrix: Water

(Dissolved  
Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	01/16/17 15:05	01/16/17 22:04	EPA 3005A	1,6010C	PS
Iron, Dissolved	0.05		mg/l	0.05	0.01	1	01/16/17 15:05	01/16/17 22:04	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.025		mg/l	0.010	0.002	1	01/16/17 15:05	01/16/17 22:04	EPA 3005A	1,6010C	PS



**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

## Method Blank Analysis Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 11 Batch: WG969963-1										
Arsenic, Dissolved	ND		mg/l	0.0050	0.0019	1	01/16/17 12:20	01/17/17 13:58	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.0090	1	01/16/17 12:20	01/17/17 13:58	1,6010C	PS
Manganese, Dissolved	ND		mg/l	0.0100	0.0016	1	01/16/17 12:20	01/17/17 13:58	1,6010C	PS

### Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01-10,12-16 Batch: WG970001-1										
Arsenic, Dissolved	0.002	J	mg/l	0.005	0.002	1	01/16/17 15:05	01/16/17 20:25	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.05	0.01	1	01/16/17 15:05	01/16/17 20:25	1,6010C	PS
Manganese, Dissolved	ND		mg/l	0.010	0.002	1	01/16/17 15:05	01/16/17 20:25	1,6010C	PS

### Prep Information

Digestion Method: EPA 3005A

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: CAPE COD PRB

Project Number: WV10009

Lab Number: L1701230

Report Date: 01/18/17

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 11 Batch: WG969963-2								
Arsenic, Dissolved	102		-		80-120	-		
Iron, Dissolved	89		-		80-120	-		
Manganese, Dissolved	94		-		80-120	-		
Dissolved Metals - Mansfield Lab Associated sample(s): 01-10,12-16 Batch: WG970001-2								
Arsenic, Dissolved	103		-		80-120	-		
Iron, Dissolved	92		-		80-120	-		
Manganese, Dissolved	91		-		80-120	-		

### Matrix Spike Analysis Batch Quality Control

**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 11 QC Batch ID: WG969963-3 QC Sample: L1701230-11 Client ID: SW-1												
Arsenic, Dissolved	ND	0.12	0.135	112		-	-		75-125	-		20
Iron, Dissolved	0.11	1	1.0	89		-	-		75-125	-		20
Manganese, Dissolved	0.0215	0.5	0.518	99		-	-		75-125	-		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01-10,12-16 QC Batch ID: WG970001-3 QC Sample: L1701230-01 Client ID: MTER-4-13-BU DUP												
Arsenic, Dissolved	0.002J	0.12	0.124	103		-	-		75-125	-		20
Iron, Dissolved	ND	1	0.92	92		-	-		75-125	-		20
Manganese, Dissolved	0.536	0.5	0.982	89		-	-		75-125	-		20

## Lab Duplicate Analysis

Batch Quality Control

Project Name: CAPE COD PRB

Project Number: WV10009

Lab Number: L1701230

Report Date: 01/18/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 11 QC Batch ID: WG969963-4 QC Sample: L1701230-11 Client ID: SW-1						
Arsenic, Dissolved	ND	ND	mg/l	NC		20
Iron, Dissolved	0.11	0.12	mg/l	9		20
Manganese, Dissolved	0.0215	0.0209	mg/l	3		20
Dissolved Metals - Mansfield Lab Associated sample(s): 01-10,12-16 QC Batch ID: WG970001-4 QC Sample: L1701230-01 Client ID: MTER-4-13-BU DUP						
Arsenic, Dissolved	0.002J	ND	mg/l	NC		20
Iron, Dissolved	ND	ND	mg/l	NC		20
Manganese, Dissolved	0.536	0.523	mg/l	2		20

# **INORGANICS & MISCELLANEOUS**

**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

**SAMPLE RESULTS**

**Lab ID:** L1701230-01  
**Client ID:** MTER-4-13-BU DUP  
**Sample Location:** CAPE COD PRB  
**Matrix:** Water

**Date Collected:** 01/12/17 15:40  
**Date Received:** 01/12/17  
**Field Prep:** Field Filtered  
(Dissolved Metals +  
DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	4.00		mg CaCO3/L	2.00	NA	1	-	01/13/17 13:02	121,2320B	BR
Nitrogen, Nitrate	1.7		mg/l	0.10	0.019	1	-	01/13/17 17:54	44,353.2	MR
Nitrogen, Nitrate/Nitrite	1.7		mg/l	0.10	0.019	1	-	01/13/17 17:54	44,353.2	MR
Total Nitrogen	1.7		mg/l	0.30	0.30	1	-	01/16/17 14:57	107,-	JO
Nitrogen, Total Kjeldahl	0.248	J	mg/l	0.300	0.066	1	01/13/17 03:30	01/13/17 23:23	121,4500N-C	AT
Dissolved Organic Carbon	0.49	J	mg/l	1.0	0.12	1	01/13/17 07:10	01/13/17 07:10	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	16.5		mg/l	0.500	0.054	1	-	01/13/17 17:39	44,300.0	AU
Sulfate	8.12		mg/l	1.00	0.150	1	-	01/13/17 17:39	44,300.0	AU



**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

**SAMPLE RESULTS**

**Lab ID:** L1701230-02  
**Client ID:** MTER-4-13-BU  
**Sample Location:** CAPE COD PRB  
**Matrix:** Water

**Date Collected:** 01/12/17 15:32  
**Date Received:** 01/12/17  
**Field Prep:** Field Filtered  
(Dissolved  
Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	3.90		mg CaCO3/L	2.00	NA	1	-	01/13/17 13:02	121,2320B	BR
Nitrogen, Nitrate	1.7		mg/l	0.10	0.019	1	-	01/13/17 17:56	44,353.2	MR
Nitrogen, Nitrate/Nitrite	1.7		mg/l	0.10	0.019	1	-	01/13/17 17:56	44,353.2	MR
Total Nitrogen	4.2		mg/l	0.30	0.30	1	-	01/16/17 14:57	107,-	JO
Nitrogen, Total Kjeldahl	2.46		mg/l	0.300	0.066	1	01/13/17 03:30	01/13/17 23:24	121,4500N-C	AT
Dissolved Organic Carbon	0.51	J	mg/l	1.0	0.12	1	01/13/17 07:10	01/13/17 07:10	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	16.5		mg/l	0.500	0.054	1	-	01/13/17 17:51	44,300.0	AU
Sulfate	8.12		mg/l	1.00	0.150	1	-	01/13/17 17:51	44,300.0	AU



**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

**SAMPLE RESULTS**

**Lab ID:** L1701230-03  
**Client ID:** MTER-4-10-P  
**Sample Location:** CAPE COD PRB  
**Matrix:** Water

**Date Collected:** 01/12/17 15:15  
**Date Received:** 01/12/17  
**Field Prep:** Field Filtered  
(Dissolved  
Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	15.1		mg CaCO3/L	2.00	NA	1	-	01/13/17 13:02	121,2320B	BR
Nitrogen, Nitrate	ND		mg/l	0.10	0.019	1	-	01/13/17 17:57	44,353.2	MR
Nitrogen, Nitrate/Nitrite	ND		mg/l	0.10	0.019	1	-	01/13/17 17:57	44,353.2	MR
Total Nitrogen	ND		mg/l	0.30	0.30	1	-	01/16/17 14:57	107,-	JO
Nitrogen, Total Kjeldahl	0.176	J	mg/l	0.300	0.066	1	01/13/17 03:30	01/13/17 23:25	121,4500N-C	AT
Dissolved Organic Carbon	1.5		mg/l	1.0	0.12	1	01/13/17 07:10	01/13/17 07:10	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	15.7		mg/l	0.500	0.054	1	-	01/13/17 18:03	44,300.0	AU
Sulfate	9.21		mg/l	1.00	0.150	1	-	01/13/17 18:03	44,300.0	AU



**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

**SAMPLE RESULTS**

**Lab ID:** L1701230-04  
**Client ID:** MTER-4-01-PT  
**Sample Location:** CAPE COD PRB  
**Matrix:** Water

**Date Collected:** 01/12/17 14:05  
**Date Received:** 01/12/17  
**Field Prep:** Field Filtered  
(Dissolved  
Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	2.90		mg CaCO3/L	2.00	NA	1	-	01/13/17 13:02	121,2320B	BR
Nitrogen, Nitrate	3.5		mg/l	0.10	0.019	1	-	01/13/17 17:58	44,353.2	MR
Nitrogen, Nitrate/Nitrite	3.5		mg/l	0.10	0.019	1	-	01/13/17 17:58	44,353.2	MR
Total Nitrogen	3.5		mg/l	0.30	0.30	1	-	01/16/17 14:57	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.300	0.066	1	01/13/17 03:30	01/13/17 23:27	121,4500N-C	AT
Dissolved Organic Carbon	1.2		mg/l	1.0	0.12	1	01/13/17 07:10	01/13/17 07:10	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	140.		mg/l	5.00	0.541	10	-	01/13/17 22:27	44,300.0	AU
Sulfate	8.88		mg/l	1.00	0.150	1	-	01/13/17 18:15	44,300.0	AU



**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

**SAMPLE RESULTS**

**Lab ID:** L1701230-05  
**Client ID:** MTER-4-03-RT  
**Sample Location:** CAPE COD PRB  
**Matrix:** Water

**Date Collected:** 01/12/17 14:15  
**Date Received:** 01/12/17  
**Field Prep:** Field Filtered  
(Dissolved  
Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	11.0		mg CaCO3/L	2.00	NA	1	-	01/13/17 13:02	121,2320B	BR
Nitrogen, Nitrate	3.5		mg/l	0.10	0.019	1	-	01/13/17 18:00	44,353.2	MR
Nitrogen, Nitrate/Nitrite	3.5		mg/l	0.10	0.019	1	-	01/13/17 18:00	44,353.2	MR
Total Nitrogen	3.5		mg/l	0.30	0.30	1	-	01/16/17 14:57	107,-	JO
Nitrogen, Total Kjeldahl	0.190	J	mg/l	0.300	0.066	1	01/13/17 03:30	01/13/17 23:28	121,4500N-C	AT
Dissolved Organic Carbon	0.80	J	mg/l	1.0	0.12	1	01/13/17 07:10	01/13/17 07:10	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	54.7		mg/l	5.00	0.541	10	-	01/13/17 22:39	44,300.0	AU
Sulfate	5.85		mg/l	1.00	0.150	1	-	01/13/17 18:27	44,300.0	AU



**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

**SAMPLE RESULTS**

**Lab ID:** L1701230-06  
**Client ID:** MTER-4-05-BKT  
**Sample Location:** CAPE COD PRB  
**Matrix:** Water

**Date Collected:** 01/12/17 14:30  
**Date Received:** 01/12/17  
**Field Prep:** Field Filtered  
(Dissolved  
Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	ND		mg CaCO3/L	2.00	NA	1	-	01/13/17 13:02	121,2320B	BR
Nitrogen, Nitrate	13.		mg/l	0.50	0.094	5	-	01/13/17 18:39	44,353.2	MR
Nitrogen, Nitrate/Nitrite	13.		mg/l	0.50	0.094	5	-	01/13/17 18:39	44,353.2	MR
Total Nitrogen	13.		mg/l	0.50	0.48	1.6	-	01/16/17 14:57	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.300	0.066	1	01/13/17 03:30	01/13/17 23:32	121,4500N-C	AT
Dissolved Organic Carbon	0.76	J	mg/l	1.0	0.12	1	01/13/17 07:10	01/13/17 07:10	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	28.8		mg/l	0.500	0.054	1	-	01/13/17 18:39	44,300.0	AU
Sulfate	7.08		mg/l	1.00	0.150	1	-	01/13/17 18:39	44,300.0	AU



**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

**SAMPLE RESULTS**

**Lab ID:** L1701230-07  
**Client ID:** MTER-4-09-Y  
**Sample Location:** CAPE COD PRB  
**Matrix:** Water

**Date Collected:** 01/12/17 14:45  
**Date Received:** 01/12/17  
**Field Prep:** Field Filtered  
(Dissolved  
Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	13.3		mg CaCO3/L	2.00	NA	1	-	01/13/17 13:02	121,2320B	BR
Nitrogen, Nitrate	0.74		mg/l	0.10	0.019	1	-	01/13/17 18:40	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.74		mg/l	0.10	0.019	1	-	01/13/17 18:40	44,353.2	MR
Total Nitrogen	1.1		mg/l	0.30	0.30	1	-	01/16/17 14:57	107,-	JO
Nitrogen, Total Kjeldahl	0.383		mg/l	0.300	0.066	1	01/13/17 03:30	01/13/17 23:33	121,4500N-C	AT
Dissolved Organic Carbon	2.3		mg/l	1.0	0.12	1	01/13/17 07:10	01/13/17 07:10	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	15.1		mg/l	0.500	0.054	1	-	01/13/17 18:51	44,300.0	AU
Sulfate	4.92		mg/l	1.00	0.150	1	-	01/13/17 18:51	44,300.0	AU



**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

**SAMPLE RESULTS**

**Lab ID:** L1701230-15  
**Client ID:** VL-3  
**Sample Location:** CAPE COD PRB  
**Matrix:** Water

**Date Collected:** 01/12/17 08:55  
**Date Received:** 01/12/17  
**Field Prep:** Field Filtered  
(Dissolved  
Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	ND		mg CaCO3/L	2.00	NA	1	-	01/13/17 13:02	121,2320B	BR
Nitrogen, Nitrate	4.2		mg/l	0.10	0.019	1	-	01/13/17 18:22	44,353.2	MR
Nitrogen, Nitrate/Nitrite	4.2		mg/l	0.10	0.019	1	-	01/13/17 18:22	44,353.2	MR
Total Nitrogen	4.2		mg/l	0.30	0.30	1	-	01/16/17 14:57	107,-	JO
Nitrogen, Total Kjeldahl	0.072	J	mg/l	0.300	0.066	1	01/13/17 03:30	01/13/17 23:39	121,4500N-C	AT
Dissolved Organic Carbon	0.85	J	mg/l	1.0	0.12	1	01/13/17 07:10	01/13/17 07:10	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	71.2		mg/l	5.00	0.541	10	-	01/13/17 23:27	44,300.0	AU
Sulfate	11.2		mg/l	1.00	0.150	1	-	01/13/17 21:03	44,300.0	AU



**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

**SAMPLE RESULTS**

**Lab ID:** L1701230-16  
**Client ID:** SW-102  
**Sample Location:** CAPE COD PRB  
**Matrix:** Water

**Date Collected:** 01/12/17 16:35  
**Date Received:** 01/12/17  
**Field Prep:** Field Filtered  
(Dissolved  
Metals+DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	23.1		mg CaCO3/L	2.00	NA	1	-	01/13/17 13:02	121,2320B	BR
Nitrogen, Nitrate	5.2		mg/l	0.10	0.019	1	-	01/13/17 18:23	44,353.2	MR
Nitrogen, Nitrate/Nitrite	5.2		mg/l	0.10	0.019	1	-	01/13/17 18:23	44,353.2	MR
Total Nitrogen	5.2		mg/l	0.30	0.30	1	-	01/16/17 14:57	107,-	JO
Nitrogen, Total Kjeldahl	0.299	J	mg/l	0.300	0.066	1	01/13/17 09:47	01/14/17 00:05	121,4500N-C	AT
Dissolved Organic Carbon	4.0		mg/l	1.0	0.12	1	01/13/17 07:10	01/13/17 07:10	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	38.2		mg/l	0.500	0.054	1	-	01/13/17 21:51	44,300.0	AU
Sulfate	10.2		mg/l	1.00	0.150	1	-	01/13/17 21:51	44,300.0	AU



**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

**Method Blank Analysis**  
**Batch Quality Control**

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-15 Batch: WG969251-1										
Nitrogen, Total Kjeldahl	0.075	J	mg/l	0.300	0.022	1	01/13/17 03:30	01/13/17 23:21	121,4500N-C	AT
General Chemistry - Westborough Lab for sample(s): 01-10,12-16 Batch: WG969302-1										
Dissolved Organic Carbon	0.13	J	mg/l	1.0	0.12	1	01/13/17 07:10	01/13/17 07:10	121,5310C	DW
General Chemistry - Westborough Lab for sample(s): 16 Batch: WG969348-1										
Nitrogen, Total Kjeldahl	ND		mg/l	0.300	0.022	1	01/13/17 09:47	01/13/17 23:45	121,4500N-C	AT
General Chemistry - Westborough Lab for sample(s): 11 Batch: WG969362-1										
Dissolved Organic Carbon	0.28	J	mg/l	1.0	0.12	1	01/13/17 02:14	01/13/17 07:10	121,5310C	DW
General Chemistry - Westborough Lab for sample(s): 01-16 Batch: WG969483-1										
Alkalinity, Total	ND		mg CaCO3/L	2.00	NA	1	-	01/13/17 13:02	121,2320B	BR
General Chemistry - Westborough Lab for sample(s): 01-10 Batch: WG969533-1										
Nitrogen, Nitrate	ND		mg/l	0.10	0.019	1	-	01/13/17 17:45	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-10 Batch: WG969534-1										
Nitrogen, Nitrate/Nitrite	ND		mg/l	0.10	0.019	1	-	01/13/17 17:45	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 11-16 Batch: WG969536-1										
Nitrogen, Nitrate	ND		mg/l	0.10	0.019	1	-	01/13/17 17:48	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 11-16 Batch: WG969537-1										
Nitrogen, Nitrate/Nitrite	ND		mg/l	0.10	0.019	1	-	01/13/17 17:48	44,353.2	MR
Anions by Ion Chromatography - Westborough Lab for sample(s): 01-16 Batch: WG969612-1										
Chloride	ND		mg/l	0.500	0.054	1	-	01/13/17 17:15	44,300.0	AU
Sulfate	ND		mg/l	1.00	0.150	1	-	01/13/17 17:15	44,300.0	AU

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: CAPE COD PRB

Project Number: WV10009

Lab Number: L1701230

Report Date: 01/18/17

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
General Chemistry - Westborough Lab Associated sample(s): 01-15 Batch: WG969251-2								
Nitrogen, Total Kjeldahl	95		-		78-122	-		
General Chemistry - Westborough Lab Associated sample(s): 01-10,12-16 Batch: WG969302-2								
Dissolved Organic Carbon	100		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 16 Batch: WG969348-2								
Nitrogen, Total Kjeldahl	92		-		78-122	-		
General Chemistry - Westborough Lab Associated sample(s): 11 Batch: WG969362-2								
Dissolved Organic Carbon	100		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-16 Batch: WG969483-2								
Alkalinity, Total	102		-		90-110	-		10
General Chemistry - Westborough Lab Associated sample(s): 01-10 Batch: WG969533-2								
Nitrogen, Nitrate	100		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-10 Batch: WG969534-2								
Nitrogen, Nitrate/Nitrite	100		-		90-110	-		

## Lab Control Sample Analysis

Batch Quality Control

Project Name: CAPE COD PRB

Project Number: WV10009

Lab Number: L1701230

Report Date: 01/18/17

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 11-16 Batch: WG969536-2					
Nitrogen, Nitrate	98	-	90-110	-	
General Chemistry - Westborough Lab Associated sample(s): 11-16 Batch: WG969537-2					
Nitrogen, Nitrate/Nitrite	98	-	90-110	-	
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-16 Batch: WG969612-2					
Chloride	102	-	90-110	-	
Sulfate	102	-	90-110	-	

### Matrix Spike Analysis Batch Quality Control

Project Name: CAPE COD PRB

Lab Number: L1701230

Project Number: WV10009

Report Date: 01/18/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-15 QC Batch ID: WG969251-4 QC Sample: L1701230-03 Client ID: MTER-4-10-P												
Nitrogen, Total Kjeldahl	0.176J	8	8.00	100	-	-	-	-	77-111	-	-	24
General Chemistry - Westborough Lab Associated sample(s): 01-10,12-16 QC Batch ID: WG969302-4 QC Sample: L1701230-04 Client ID: MTER-4-01-PT												
Dissolved Organic Carbon	1.2	4	5.1	96	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 16 QC Batch ID: WG969348-4 QC Sample: L1700963-02 Client ID: MS Sample												
Nitrogen, Total Kjeldahl	6.72	8	14.5	97	-	-	-	-	77-111	-	-	24
General Chemistry - Westborough Lab Associated sample(s): 11 QC Batch ID: WG969362-4 QC Sample: L1701230-11 Client ID: SW-1												
Dissolved Organic Carbon	8.0J	160	160	103	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-16 QC Batch ID: WG969483-4 QC Sample: L1701131-01 Client ID: MS Sample												
Alkalinity, Total	94.2	100	197	103	-	-	-	-	86-116	-	-	10
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG969533-4 QC Sample: L1701230-10 Client ID: VL-6B DUP												
Nitrogen, Nitrate	4.6	4	8.5	98	-	-	-	-	83-113	-	-	6
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG969534-4 QC Sample: L1701230-10 Client ID: VL-6B DUP												
Nitrogen, Nitrate/Nitrite	4.6	4	8.5	98	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 11-16 QC Batch ID: WG969536-4 QC Sample: L1701230-11 Client ID: SW-1												
Nitrogen, Nitrate	0.78	4	4.8	100	-	-	-	-	83-113	-	-	6
General Chemistry - Westborough Lab Associated sample(s): 11-16 QC Batch ID: WG969537-4 QC Sample: L1701230-11 Client ID: SW-1												
Nitrogen, Nitrate/Nitrite	0.78	4	4.8	100	-	-	-	-	80-120	-	-	20

**Matrix Spike Analysis**  
Batch Quality Control

Project Name: CAPE COD PRB

Lab Number: L1701230

Project Number: WV10009

Report Date: 01/18/17

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-16 QC Batch ID: WG969612-3 QC Sample: L1701230-01 Client ID: MTER-4-13-BU DUP									
Chloride	16.5	4	20.0	88	-	-	40-151	-	18
Sulfate	8.12	8	16.0	98	-	-	60-140	-	20

## Lab Duplicate Analysis

### Batch Quality Control

**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-15 QC Batch ID: WG969251-3 QC Sample: L1701230-03 Client ID: MTER-4-10-P						
Nitrogen, Total Kjeldahl	0.176J	0.237J	mg/l	NC		24
General Chemistry - Westborough Lab Associated sample(s): 01-10,12-16 QC Batch ID: WG969302-3 QC Sample: L1701230-03 Client ID: MTER-4-10-P						
Dissolved Organic Carbon	1.5	1.5	mg/l	0		20
General Chemistry - Westborough Lab Associated sample(s): 16 QC Batch ID: WG969348-3 QC Sample: L1700963-02 Client ID: DUP Sample						
Nitrogen, Total Kjeldahl	6.72	6.70	mg/l	0		24
General Chemistry - Westborough Lab Associated sample(s): 11 QC Batch ID: WG969362-3 QC Sample: L1701230-11 Client ID: SW-1						
Dissolved Organic Carbon	8.0J	7.7J	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-16 QC Batch ID: WG969483-3 QC Sample: L1701131-01 Client ID: DUP Sample						
Alkalinity, Total	94.2	94.4	mg CaCO3/L	0		10
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG969533-3 QC Sample: L1701230-10 Client ID: VL-6B DUP						
Nitrogen, Nitrate	4.6	4.7	mg/l	2		6
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG969534-3 QC Sample: L1701230-10 Client ID: VL-6B DUP						
Nitrogen, Nitrate/Nitrite	4.6	4.7	mg/l	2		20
General Chemistry - Westborough Lab Associated sample(s): 11-16 QC Batch ID: WG969536-3 QC Sample: L1701230-11 Client ID: SW-1						
Nitrogen, Nitrate	0.78	0.79	mg/l	1		6
General Chemistry - Westborough Lab Associated sample(s): 11-16 QC Batch ID: WG969537-3 QC Sample: L1701230-11 Client ID: SW-1						
Nitrogen, Nitrate/Nitrite	0.78	0.79	mg/l	1		20

## Lab Duplicate Analysis

Batch Quality Control

Project Name: CAPE COD PRB

Project Number: WV10009

Lab Number: L1701230

Report Date: 01/18/17

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-16 QC Batch ID: WG969612-4 QC Sample: L1701230-01 Client ID: MTER-4-13-BU DUP					
Chloride	16.5	16.5	mg/l	0	18
Sulfate	8.12	8.06	mg/l	1	20

Project Name: CAPE COD PRB

Lab Number: L1701230

Project Number: WV10009

Report Date: 01/18/17

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

## Cooler Information Custody Seal

## Cooler

A Absent  
B Absent

## Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1701230-01A	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-01B	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-01B1	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-01C	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	SO4-300(28),CL-300(28),NO3-353(2)
L1701230-01D	Plastic 250ml H2SO4 preserved	A	<2	5.6	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1701230-01E	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	ALK-T-2320(14)
L1701230-01F	Plastic 250ml HNO3 preserved	A	<2	5.6	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1701230-02A	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-02B	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-02B1	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-02C	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	SO4-300(28),CL-300(28),NO3-353(2)
L1701230-02D	Plastic 250ml H2SO4 preserved	A	<2	5.6	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1701230-02E	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	ALK-T-2320(14)
L1701230-02F	Plastic 250ml HNO3 preserved	A	<2	5.6	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1701230-03A	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-03B	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-03B1	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-03C	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	SO4-300(28),CL-300(28),NO3-353(2)
L1701230-03D	Plastic 250ml H2SO4 preserved	A	<2	5.6	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1701230-03E	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	ALK-T-2320(14)
L1701230-03F	Plastic 250ml HNO3 preserved	A	<2	5.6	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1701230-04A	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-04B	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-04B1	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)

\*Values in parentheses indicate holding time in days

Project Name: CAPE COD PRB

Project Number: WV10009

Lab Number: L1701230

Report Date: 01/18/17

**Container Information**

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1701230-04C	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	SO4-300(28),CL-300(28),NO3-353(2)
L1701230-04D	Plastic 250ml H2SO4 preserved	A	<2	5.6	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1701230-04E	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	ALK-T-2320(14)
L1701230-04F	Plastic 250ml HNO3 preserved	A	<2	5.6	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1701230-05A	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-05B	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-05B1	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-05C	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	SO4-300(28),CL-300(28),NO3-353(2)
L1701230-05D	Plastic 250ml H2SO4 preserved	A	<2	5.6	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1701230-05E	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	ALK-T-2320(14)
L1701230-05F	Plastic 250ml HNO3 preserved	A	<2	5.6	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1701230-06A	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-06B	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-06B1	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-06C	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	SO4-300(28),CL-300(28),NO3-353(2)
L1701230-06D	Plastic 250ml H2SO4 preserved	A	<2	5.6	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1701230-06E	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	ALK-T-2320(14)
L1701230-06F	Plastic 250ml HNO3 preserved	A	<2	5.6	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1701230-07A	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-07B	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-07B1	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-07C	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	SO4-300(28),CL-300(28),NO3-353(2)
L1701230-07D	Plastic 250ml H2SO4 preserved	A	<2	5.6	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1701230-07E	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	ALK-T-2320(14)
L1701230-07F	Plastic 250ml HNO3 preserved	A	<2	5.6	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1701230-08A	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-08B	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-08B1	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-08C	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	SO4-300(28),CL-300(28),NO3-353(2)
L1701230-08D	Plastic 250ml H2SO4 preserved	A	<2	5.6	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)

\*Values in parentheses indicate holding time in days



Project Name: CAPE COD PRB

Project Number: WV10009

Lab Number: L1701230

Report Date: 01/18/17

**Container Information**

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1701230-08E	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	ALK-T-2320(14)
L1701230-08F	Plastic 250ml HNO3 preserved	A	<2	5.6	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1701230-09A	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-09B	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-09B1	Vial H2SO4 preserved	A	N/A	5.6	Y	Absent	DOC-5310(28)
L1701230-09C	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	SO4-300(28),CL-300(28),NO3-353(2)
L1701230-09D	Plastic 250ml H2SO4 preserved	A	<2	5.6	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1701230-09E	Plastic 250ml unpreserved	A	7	5.6	Y	Absent	ALK-T-2320(14)
L1701230-09F	Plastic 250ml HNO3 preserved	A	<2	5.6	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1701230-10A	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-10B	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-10B1	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-10C	Plastic 250ml unpreserved	B	7	4.7	Y	Absent	SO4-300(28),CL-300(28),NO3-353(2)
L1701230-10D	Plastic 250ml H2SO4 preserved	B	<2	4.7	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1701230-10E	Plastic 250ml unpreserved	B	7	4.7	Y	Absent	ALK-T-2320(14)
L1701230-10F	Plastic 250ml HNO3 preserved	B	<2	4.7	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1701230-11A	Vial unpreserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-11B	Vial unpreserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-11B1	Vial unpreserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-11C	Plastic 250ml unpreserved	B	7	4.7	Y	Absent	SO4-300(28),CL-300(28),NO3-353(2)
L1701230-11D	Plastic 250ml H2SO4 preserved	B	<2	4.7	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1701230-11E	Plastic 250ml unpreserved	B	7	4.7	Y	Absent	ALK-T-2320(14)
L1701230-11F	Plastic 250ml unpreserved	B	8	4.7	Y	Absent	-
L1701230-11T	Vial H2SO4 preserved Filtrates	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-11U	Vial H2SO4 preserved Filtrates	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-11V	Vial H2SO4 preserved Filtrates	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-11X	Plastic 120ml HNO3 preserved Fil	B	<2	4.7	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1701230-12A	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-12B	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-12B1	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-12C	Plastic 250ml unpreserved	B	7	4.7	Y	Absent	SO4-300(28),CL-300(28),NO3-353(2)

\*Values in parentheses indicate holding time in days



Project Name: CAPE COD PRB

Lab Number: L1701230

Project Number: WV10009

Report Date: 01/18/17

## Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1701230-12D	Plastic 250ml H2SO4 preserved	B	<2	4.7	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1701230-12E	Plastic 250ml unpreserved	B	7	4.7	Y	Absent	ALK-T-2320(14)
L1701230-12F	Plastic 250ml HNO3 preserved	B	<2	4.7	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1701230-13A	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-13B	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-13B1	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-13C	Plastic 250ml unpreserved	B	7	4.7	Y	Absent	SO4-300(28),CL-300(28),NO3-353(2)
L1701230-13D	Plastic 250ml H2SO4 preserved	B	<2	4.7	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1701230-13E	Plastic 250ml unpreserved	B	7	4.7	Y	Absent	ALK-T-2320(14)
L1701230-13F	Plastic 250ml HNO3 preserved	B	<2	4.7	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1701230-14A	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-14B	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-14B1	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-14C	Plastic 250ml unpreserved	B	7	4.7	Y	Absent	SO4-300(28),CL-300(28),NO3-353(2)
L1701230-14D	Plastic 250ml H2SO4 preserved	B	<2	4.7	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1701230-14E	Plastic 250ml unpreserved	B	7	4.7	Y	Absent	ALK-T-2320(14)
L1701230-14F	Plastic 250ml HNO3 preserved	B	<2	4.7	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1701230-15A	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-15B	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-15B1	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-15C	Plastic 250ml unpreserved	B	7	4.7	Y	Absent	SO4-300(28),CL-300(28),NO3-353(2)
L1701230-15D	Plastic 250ml H2SO4 preserved	B	<2	4.7	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1701230-15E	Plastic 250ml unpreserved	B	7	4.7	Y	Absent	ALK-T-2320(14)
L1701230-15F	Plastic 250ml HNO3 preserved	B	<2	4.7	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1701230-16A	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-16B	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-16B1	Vial H2SO4 preserved	B	N/A	4.7	Y	Absent	DOC-5310(28)
L1701230-16C	Plastic 250ml unpreserved	B	7	4.7	Y	Absent	SO4-300(28),CL-300(28),NO3-353(2)
L1701230-16D	Plastic 250ml H2SO4 preserved	B	<2	4.7	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1701230-16E	Plastic 250ml unpreserved	B	7	4.7	Y	Absent	ALK-T-2320(14)

\*Values in parentheses indicate holding time in days

**Project Name:** CAPE COD PRB**Project Number:** WV10009**Lab Number:** L1701230**Report Date:** 01/18/17**Container Information**

<b>Container ID</b>	<b>Container Type</b>	<b>Cooler</b>	<b>pH</b>	<b>Temp deg C</b>	<b>Pres</b>	<b>Seal</b>	<b>Analysis(*)</b>
L1701230-16F	Plastic 250ml HNO3 preserved	B	<2	4.7	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)

\*Values in parentheses indicate holding time in days

**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

## GLOSSARY

### Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

### Footnotes

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### Terms

**Total:** With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

**Analytical Method:** Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### Data Qualifiers

- A** - Spectra identified as "Aldol Condensation Product".
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the

**Report Format:** DU Report with 'J' Qualifiers



**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

#### Data Qualifiers

- reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
  - D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
  - E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
  - G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
  - H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
  - I** - The lower value for the two columns has been reported due to obvious interference.
  - M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
  - NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
  - P** - The RPD between the results for the two columns exceeds the method-specified criteria.
  - Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
  - R** - Analytical results are from sample re-analysis.
  - RE** - Analytical results are from sample re-extraction.
  - S** - Analytical results are from modified screening analysis.
  - J** - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
  - ND** - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

**Project Name:** CAPE COD PRB  
**Project Number:** WV10009

**Lab Number:** L1701230  
**Report Date:** 01/18/17

## REFERENCES

- 1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.
- 44 Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993.
- 107 Alpha Analytical - In-house calculation method.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



## Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

### Westborough Facility

**EPA 624:** m/p-xylene, o-xylene

**EPA 8260C:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.

**EPA 8270D:** NPW: Dimethylnaphthalene, 1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene, 1,4-Diphenylhydrazine.

**EPA 300:** DW: Bromide

**EPA 6860:** NPW and SCM: Perchlorate

**EPA 9010:** NPW and SCM: Amenable Cyanide Distillation

**EPA 9012B:** NPW: Total Cyanide

**EPA 9050A:** NPW: Specific Conductance

**SM3500:** NPW: Ferrous Iron

**SM4500:** NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO<sub>2</sub>, NO<sub>3</sub>.

**SM5310C:** DW: Dissolved Organic Carbon

### Mansfield Facility

**SM 2540D:** TSS

**EPA 3005A** NPW

**EPA 8082A:** NPW: PCB: 1, 5, 31, 87, 101, 110, 141, 151, 153, 180, 183, 187.

**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

**Biological Tissue Matrix:** EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

### Westborough Facility:

#### Drinking Water

**EPA 300.0:** Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**

**EPA 332:** Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.

**Microbiology:** **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, SM9222D.**

#### Non-Potable Water

**SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH, EPA 350.1:** Ammonia-N, **LACHAT 10-107-06-1-B:** Ammonia-N, **SM4500NO3-F, EPA 353.2:** Nitrate-N, **EPA 351.1, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D.**

**EPA 624:** Volatile Halocarbons & Aromatics,

**EPA 608:** Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

**EPA 625:** SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

**Microbiology:** **SM9223B-Colilert-QT; Enterolert-QT, SM9221E.**

### Mansfield Facility:

#### Drinking Water

**EPA 200.7:** Ba, Be, Cd, Cr, Cu, Ni, Na, Ca. **EPA 200.8:** Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, TL. **EPA 245.1 Hg.**

#### Non-Potable Water

**EPA 200.7:** Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.

**EPA 200.8:** Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn.

**EPA 245.1 Hg.**

**SM2340B**

For a complete listing of analytes and methods, please contact your Alpha Project Manager.



# CHAIN OF CUSTODY

PAGE 1 OF 2

Date Rec'd in Lab: 01/12/17

ALPHA Job #: L1701230

8 Walkup Drive  
Westboro, MA 01581  
Tel: 508-898-9220

320 Forbes Blvd  
Mansfield, MA 02048  
Tel: 508-822-9300

## Project Information

Project Name: Cape Cod PRB  
Project Location: Cape Cod Peninsula  
Project #: WV10009  
Project Manager: Danna Truslow  
ALPHA Quote #:

## Report Information - Data Deliverables

ADEX  EMAIL

## Billing Information

Same as Client info PO #:

## Client Information

Client: WaterVision LLC  
Address: 481 Great Road  
Acton, MA 01720  
Phone: (603) 766-6670  
Email: Danna.truslow@wv.com

## Turn-Around Time

Standard  RUSH (only confirmed if pre-approved)  
Date Due:

## Regulatory Requirements & Project Information Requirements

Yes  No MA MCP Analytical Methods  Yes  No CT RCP Analytical Methods  
 Yes  No Matrix Spike Required on this SDG? (Required for MCP Inorganics)  
 Yes  No GW1 Standards (Info Required for Metals & EPH with Targets)  
 Yes  No NPDES RGP  
 Other State /Fed Program \_\_\_\_\_ Criteria \_\_\_\_\_

Additional Project Information:

ANALYSIS	VOC: <input type="checkbox"/> 8260 <input type="checkbox"/> 624 <input type="checkbox"/> 524.2	SVOC: <input type="checkbox"/> ABN <input type="checkbox"/> PAH	METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> MCP 15	METALS: <input type="checkbox"/> RCRA5 <input type="checkbox"/> RCRA8 <input type="checkbox"/> PPT13	EPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	VPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	PCB <input type="checkbox"/> PEST	TPH: <input type="checkbox"/> Quant Only <input type="checkbox"/> Fingerprint	Dissolved Metals *	POC *	Total Nitrogen Calc. TKM	ALK-T-2320	SO4, Cl, NO3	SAMPLE INFO	TOTAL # BOTTLES
														Filtration	
														<input checked="" type="checkbox"/> Field *	
														<input type="checkbox"/> Lab to do	
														Preservation	
														<input type="checkbox"/> Lab to do	
														Sample Comments	

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
<u>01230-01</u>	<u>MTER-4-13-BU Dup</u>	<u>1/12/17</u>	<u>15:40</u>	<u>H2O</u>	<u>PT/SL</u>
<u>02</u>	<u>MTER-4-13-BU</u>	<u>1/12/17</u>	<u>15:32</u>	<u>H2O</u>	<u>DT/SL</u>
<u>03</u>	<u>MTER-4-10-P</u>	<u>1/12/17</u>	<u>15:15</u>	<u>H2O</u>	<u>DT/SL</u>
<u>04</u>	<u>MTER-4-01-PT</u>	<u>1/12/17</u>	<u>14:05</u>	<u>H2O</u>	<u>DT/SL</u>
<u>05</u>	<u>MTER-4-03-RT</u>	<u>1/12/17</u>	<u>14:15</u>	<u>H2O</u>	<u>DT/SL</u>
<u>06</u>	<u>MTER-4-05-BKT</u>	<u>1/12/17</u>	<u>14:30</u>	<u>H2O</u>	<u>DT/SL</u>
<u>07</u>	<u>MTER-4-09-Y</u>	<u>1/12/17</u>	<u>14:45</u>	<u>H2O</u>	<u>DT/SL</u>
<u>08</u>	<u>MTER-4-07-O</u>	<u>1/12/17</u>	<u>15:00</u>	<u>H2O</u>	<u>DT/SL</u>
<u>09</u>	<u>VL-66</u>	<u>1/12/17</u>	<u>11:50</u>	<u>H2O</u>	<u>SL</u>
<u>10</u>	<u>VL-66 Dup</u>	<u>1/12/17</u>	<u>11:55</u>	<u>H2O</u>	<u>SL</u>

**Container Type**  
P= Plastic  
A= Amber glass  
V= Vial  
G= Glass  
B= Bacteria cup  
C= Cube  
O= Other  
E= Encore  
D= BOD Bottle

**Preservative**  
A= None  
B= HCl  
C= HNO3  
D= H2SO4  
E= NaOH  
F= MeOH  
G= NaHSO4  
H= Na2S2O3  
I= Ascorbic Acid  
J= NH4Cl  
K= Zn Acetate  
O= Other

Container Type  
Preservative

Relinquished By: Sarah E. Lange Date/Time: 1/12/17 10:32  
Received By: [Signature] Date/Time: 1/12/17 18:32

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.  
FORM NO: 01-01 (rev. 12-Mar-2012)



# CHAIN OF CUSTODY

PAGE 2 OF 2

8 Walkup Drive  
Westboro, MA 01581  
Tel: 508-898-9220

320 Forbes Blvd  
Mansfield, MA 02048  
Tel: 508-822-9300

## Project Information

Project Name: Cape Cod PRB  
Project Location: Cape Cod  
Project #: WV10009  
Project Manager: Danna Truslow  
ALPHA Quote #:

## Turn-Around Time

Standard  RUSH (only confirmed if pre-approved!)  
Date Due:

Date Rec'd in Lab: 01/12/17

ALPHA Job #: L1701230

## Report Information - Data Deliverables

ADEX  EMAIL

## Billing Information

Same as Client info PO #:

## Client Information

Client: WaterVision LLC  
Address: 481 Great Road  
Acton, MA 01720  
Phone: (603) 766-6670  
Email: Danna@truslowrc.com

## Additional Project Information:

\* SW-1, → Dissolved Metals and DOC Not field filtered  
~~SW~~ preservative rinsed out from bottle

## Regulatory Requirements & Project Information Requirements

Yes  No MA MCP Analytical Methods  Yes  No CT RCP Analytical Methods  
 Yes  No Matrix Spike Required on this SDG? (Required for MCP Inorganics)  
 Yes  No GW1 Standards (Info Required for Metals & EPH with Targets)  
 Yes  No NPDES RGP  
 Other State /Fed Program \_\_\_\_\_ Criteria \_\_\_\_\_

ANALYSIS		SAMPLE INFO	
VOC: <input type="checkbox"/> 8260 <input type="checkbox"/> 624 <input type="checkbox"/> 524.2		Filtration	
SVOC: <input type="checkbox"/> ABN <input type="checkbox"/> PAH		<input checked="" type="checkbox"/> Field	
METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> MCP 15		<input type="checkbox"/> Lab to do	
METALS: <input type="checkbox"/> RCRA5 <input type="checkbox"/> RCRA8		Preservation	
EPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only		<input type="checkbox"/> Lab to do	
VPH: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only			
PCB <input type="checkbox"/> PEST			
TPH: <input type="checkbox"/> Quant Only <input type="checkbox"/> Fingerprint			
Dissolved Metals*			
DOC*			
Total Nitrogen			
Alk-T-a3a0			
SO4, Cl, NO3			

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
<u>01230-11</u>	<u>SW-1</u>	<u>1/12/17</u>	<u>9:30</u>	<u>H<sub>2</sub>O</u>	<u>DT SL</u>
<u>12</u>	<u>WP-2</u>	<u>1/12/17</u>	<u>10:50</u>	<u>H<sub>2</sub>O</u>	<u>DT/SL</u>
<u>13</u>	<u>WP-3</u>	<u>1/12/17</u>	<u>11:10</u>	<u>H<sub>2</sub>O</u>	<u>DT/SL</u>
<u>14</u>	<u>WP-1</u>	<u>1/12/17</u>	<u>10:30</u>	<u>H<sub>2</sub>O</u>	<u>DT/SL</u>
<u>15</u>	<u>VL-3</u>	<u>1/12/17</u>	<u>8:55</u>	<u>H<sub>2</sub>O</u>	<u>DT/SL</u>
<u>16</u>	<u>SW-102</u>	<u>1/12/17</u>	<u>16:35</u>	<u>H<sub>2</sub>O</u>	<u>DT</u>

**Container Type**  
P= Plastic  
A= Amber glass  
V= Vial  
G= Glass  
B= Bacteria cup  
C= Cube  
O= Other  
E= Encore  
D= BOD Bottle

**Preservative**  
A= None  
B= HCl  
C= HNO<sub>3</sub>  
D= H<sub>2</sub>SO<sub>4</sub>  
E= NaOH  
F= MeOH  
G= NaHSO<sub>4</sub>  
H= Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>  
I= Ascorbic Acid  
J= NH<sub>4</sub>Cl  
K= Zn Acetate  
O= Other

Container Type	Preservative

Relinquished By:	Date/Time	Received By:	Date/Time
<u>Sarah Large</u>	<u>1/12/17 1832</u>	<u>[Signature]</u>	<u>1/12/17 1832</u>

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.  
FORM NO. 01-01 (rev. 12-Mar-2012)

TOTAL # BOTTLES

## Appendix 3.5: Permeable Reactive Barriers

- WaterVision Sailfish Drive PRB Report

CAPE COD PERMEABLE REACTIVE BARRIER  
INITIAL HYDROGEOLOGIC SITE  
CHARACTERIZATION RESULTS AND  
EVALUATION OF SITE SUITABILITY FOR  
PERMEABLE REACTIVE BARRIER  
INSTALLATION

*SAILFISH DRIVE SITE, FALMOUTH,  
MASSACHUSETTS*

JULY 29, 2016

Prepared for:

US Environmental Protection Agency, Region 1  
Contract #: EP-BPA-13-W-0001

Prepared by:

Danna Truslow, P.G.

Samantha Wright

Peter Shanahan, Ph.D., P.E.

Emily DiFranco

Ken Hickey



481 Great Road, Suite 3  
Acton, Massachusetts 01720  
(978) 263-1092

**CAPE COD PERMEABLE REACTIVE BARRIER  
INITIAL HYDROGEOLOGIC SITE CHARACTERIZATION RESULTS  
AND EVALUATION OF SITE SUITABILITY FOR PERMEABLE  
REACTIVE BARRIER INSTALLATION**

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### **Appendix A – Well Construction, Location and Continuous Core Logs**

- Well/ piezometer construction details tables
- Establishment of Cape Code PRB Initial Site Characterization Benchmark Elevations
- List of Latitude and Longitude of Wells and Piezometers at ISC Sites
- Summary of unique hydrogeologic units
- Detailed piezometer locations maps
- Well construction diagrams for water table wells
- Combined piezometer continuous core log, screens, with selected water quality data

## **Appendix B – ISC Round 2 Groundwater Elevation Map**

## **Appendix C – Water Quality**

- Field-measured parameters and Hach kit nitrate-nitrogen concentrations  
Alpha Analytical laboratory reports
- Summary of Water Quality Sampling at ISC sites
- Summary of QA/QC data reviews

## **Appendix D – Mass Flux Calculation Spreadsheets**

## Executive Summary

As part of its Southeast New England Program (SNEP), Region 1 of the U.S. Environmental Protection Agency (U.S. EPA) is partnering with the United States Geological Survey (USGS) and the Cape Cod Commission (CCC) to characterize hydrogeologic and geochemical conditions at a number of sites across southern Cape Cod to help identify suitable preliminary site locations for further Permeable Reactive Barrier (PRB) characterization pilot tests.

WaterVision LLC (WV), contractor to U.S. EPA for Contract #: EP-BPA-13-W-0001 completed Initial Site Characterization (ISC) activities at five sites selected as part of the local partnership program. The sites selected included:

- Barnstable – Prince Avenue near Prince Cove
- Mashpee – Timber Landing Road near the Mashpee River
- Falmouth – Sailfish Drive near Great Pond
- Dennis – Vinland Drive near Bass River at Kelleys Bay
- Orleans – Herring Pond Way near Lonnie’s Pond

The following report provides data, evaluation of results and summaries based on the work under Task 2 of the contract: Initial Site Characterizations for the Sailfish Drive site in Falmouth, MA. The objective of the Task 2 ISC work was to collect hydrogeologic and geochemical information to calculate dissolved nitrogen flux and to generally assess the suitability of sites for installation of PRBs for pilot-scale demonstrations of the technology.

Field work to complete the ISCs was completed from February 2016 to May 2016 and included completion of continuous cores using Geoprobe direct push technology, installation of water table wells, installation of piezometer clusters, measurement of water levels at all wells and piezometers, analysis of field parameters at all wells, and sampling of wells and piezometers for a range of laboratory analyzed parameters. Water level measurements and field and laboratory analysis of parameters was completed twice each site. Sampling rounds were completed approximately one month apart. Evaluation of site hydrogeologic and geochemical data and calculation of mass flux of nitrate-N was then completed for the site.

## Introduction and Purpose of Initial Site Characterization

As part of its Southeast New England Program (SNEP), Region 1 of the U.S. Environmental Protection Agency (U.S. EPA) is partnering with the United States Geological Survey (USGS) and the Cape Cod Commission (CCC) to:

- (1) Assess the feasibility of employing a streamlined characterization regimen for identifying potentially suitable site locations for Permeable Reactive Barrier (PRB) technology for treatment of dissolved-phase nitrogen in groundwater on Cape Cod;
- (2) Employ the characterization regimen to a number of site locations across southern Cape Cod to help identify suitable preliminary site locations for further PRB characterization pilot tests (Task 2); and
- (3) Further characterize one or more of the preliminary site locations to develop sufficient data to support PRB design (Task 3).

This report provides data, evaluation of results and summaries based on the work under Task 2: Initial Site Characterizations.

The objective of the Task 2 Initial Site Characterization work under U.S. EPA contract number EP-BPA-13-W-0001 was to collect hydrogeologic and geochemical information to calculate dissolved nitrogen flux and to generally assess the suitability of sites for installation of Permeable Reactive Barriers (PRBs) for pilot-scale demonstrations of the technology. A longer-term objective of this and related investigations is to formalize, if appropriate, the streamlined characterization regimen identifying site conditions appropriate for installation and implementation of in-situ remediation approaches, such as permeable reactive barriers (PRB) and related technologies.

WaterVision LLC (WV), contractor to U.S. EPA for Contract #: EP-BPA-13-W-0001 completed Task 2 Initial Site Characterization (ISC) activities at Sailfish Drive in Falmouth; one of five sites selected as part of the local partnership program. The sites are shown on a map of Cape Cod in Figure 1. (Figures are included at the end of the report.) The sites selected included:

- Barnstable – Prince Avenue near Prince Cove
- Mashpee – Timber Landing Road near the Mashpee River
- Falmouth – Sailfish Drive near Great Pond
- Orleans – Herring Pond Way near Lonnie’s Pond
- Dennis – Vinland Drive near Bass River at Kelleys Bay

Between February and July 2016 WaterVision completed or coordinated the following work at the site:

- Preparation and organization of all drilling and laboratory subcontractors;
- DigSafe and ground-opening permitting and related town permissions;
- Completion of continuous cores and installation of seven water table monitoring wells;
- Completion of a deep continuous core;
- Completion of 9 piezometers at discrete depths near the deep core location;
- Completion of a survey to locate and measure elevations at each well and piezometer and associated features;
- Measurement of depth to groundwater at all wells and piezometers (two rounds);
- Collection of field-measured water quality parameters at each well and piezometer (two rounds);
- Sampling of each well and piezometer for laboratory analysis of groundwater samples for water-quality constituents (two rounds);
- Evaluation of field-collected and laboratory data;
- Evaluation of mass flux of nitrate-nitrogen;

## Quality Assurance and Quality Control

WV developed a Quality Assurance Project Plan (QAPP) under Task 1d of this contract. The QAPP was reviewed by U.S. EPA and approved on January 15, 2016. It is available for review on request from U.S. EPA .

## Work Performed

Prior to starting field work, the Task 2 scope developed by USEPA for this project was reviewed by WV as part of Task 1c. WV visited proposed sites with other members of the project team in December 2015 to further refine the field work. The scope of work was slightly modified to include installation of additional water table wells and field testing for nitrate during boring advancement. In addition, well decommissioning was removed from the scope of work as each participating town wished to continue monitoring at these wells after the initial site characterization work was complete.

In summary the tasks included:

- Task 2a – Complete continuous cores and water table well installation at five to six locations to determine groundwater flow direction and area-wide

groundwater quality information. Obtain in-situ water samples as part of well advancement and analyze using field nitrate-nitrogen test kits.

- Task 2b – Complete a continuous core up to 100 feet deep to characterize subsurface sediments and to estimate depth to saline water transition zone.
- Task 2c – Install six to ten piezometers adjacent to the continuous core location to provide water quality and vertical hydraulic gradient data. Survey well and piezometer elevations and locations.
- Task 2d – Complete two full rounds of water level measurements at all wells and piezometers and measure field parameters in preparation for groundwater sampling.
- Task 2e – Complete two full rounds of groundwater sampling to assess nitrogen species concentrations and other groundwater chemistry characteristics.

After completion of Tasks 2a, b and c, WV prepared a technical memo for each site detailing well installation and preliminary testing results. A second WV technical memo was prepared after completion of the first round of water level measurement and sampling (Tasks 2d and 2e) to describe the water level and water quality sampling work and present data obtained during the first round of measurement and sampling. A review of methodologies used for these tasks are included below. For more detail on field tasks beyond that described below, consult the project QAPP.

### **Well and Piezometer Installation and Subsurface Characterization**

Boring advancement and well installation was performed using a Geoprobe direct-push drilling rig operated by New England Geotech, Inc. of Jamestown, Rhode Island. Depending on field and access conditions, either the truck-mounted Model 6600 or track-rig-mounted Model 7822dt was used for site work. Danna Truslow, PG and Samantha Wright of WaterVision LLC oversaw boring advancement, well installation, and sampling.

As borings were advanced, a five foot core was collected into a clear plastic sleeve. NE Geotech opened the sleeve for measurement, sediment description and sample collection by WaterVision LLC (WV). The length of the core recovered was recorded along with subsurface characteristics including degree of saturation. Samples were taken into bags and labeled by well location and sample depth for later inspection and sieve analyses as part of Task 3. Typically, these cores were completed to a depth of 15 to 20 feet below the water table at each well site.

Water table wells were constructed from two-inch diameter PVC riser and were completed with five foot screens. Wells were screened across the water table as estimated by initial saturation encountered during core advancement.

In addition the Geoprobe SP-15 method was used to obtain discrete groundwater samples at regular intervals. This method entails driving a small diameter casing

fitted with tubing to the depth desired and pumping groundwater for real time sample analysis. This method was limited to a depth of 50 feet (the limit of the driller's equipment) and groundwater levels less than about 25 feet deep that could be pumped with a peristaltic pump. Samples obtained were field analyzed for pH and specific conductance, using a YSI Model 556 multi-parameter water quality meter and nitrate-nitrogen concentrations of each sample was estimated using a Hach colorimetric test kit (Model NI-11).

A deep core up to 100 feet bgs was also completed at each site. This core was completed to obtain subsurface sediment characteristics and to evaluate the depth to the freshwater/saline interface if present. Some cores were terminated at depths shallower than 100 feet at several locations due to coarse sediments that could not be penetrated by the Geoprobe or due to thick clay or fine sediment below which no further anthropogenic effects were expected.

Nine 1-inch-diameter piezometers were installed with one-foot-long screens at each site adjacent to the deep boring location. The screened intervals of the piezometers were evenly spaced vertically from the water table to the bottom of the boring or located so as to sample from subsurface sediment intervals. Well construction details for each site are provided included in Appendix A. Tables listing field-measured parameters and nitrate-nitrogen concentrations (using the Hach test kit) measured during well installation at each site are included in Appendix C. The locations of wells and piezometers at each site are shown in Figures 2. Detailed maps of piezometer locations are included in Appendix A.

### Well Elevation and Location Survey

Comprehensive Environmental Inc (CEI) of Merrimack, NH completed a survey of all newly installed wells and piezometers for the project. The top of PVC casing, top of road box casing, and ground elevation adjacent to each well were surveyed for elevation and location. The survey was completed using a TOPCON AT-G4 Series autolevel and survey rod, tape measure, and a Trimble Global Positioning System (GPS) receiver. Hydrants and catch basins were used as benchmarks for each site. Elevation was recorded by using an auto level and survey rod, while horizontal location (x, y) was recorded using a Trimble Global Positioning System (GPS) receiver. The well and piezometer box covers were removed to measure top-of-PVC-casing elevations. In certain situations, when the survey rod could not fit into the well box to record an elevation, a tape measure was used to record the vertical distance to the top of the PVC casing. GPS Pathfinder software was used in the office to extract the data from the Trimble GPS. These data were uploaded to make an ArcGIS shapefile and an AutoCAD file. Point elevation data were recorded in a spreadsheet. A table of latitude and longitude for all sampling locations is included in Appendix A.

## Water level Measurement

As part of each water quality sampling round, a full round of water levels was taken at each well and piezometer after well caps were removed to allow equilibration with the atmosphere and before water quality sampling commenced. A Solinst water level meter was used to measure water levels to the top of the PVC casing at each well. The water levels were recorded for later evaluation and analysis.

## Field Parameter Measurement

Water temperature, pH, dissolved oxygen (DO) in mg/L, specific conductance (SC), and oxidation/reduction potential (ORP) was regularly measured using a YSI Professional Series and/or a YSI 556 multi-parameter meter during well pumping. A visual description of the purged water was also noted. Initial samples were taken and measured using the calibration cup, however after initial sediment buildup in the wells declined, the YSI was mounted in a flow cell to allow for more accurate parameter measurement and for improved parameter stabilization during sampling. All field measurements and observations were noted on field sheets.

## Water Quality Sampling and Analysis

All wells and piezometers were purged of at least three well volumes and/or until all field parameter measurements had stabilized. Water samples were taken in laboratory-provided and pre-preserved sample bottles for the parameters listed in Table 1.

**Table 1 – List of Laboratory Analyses for ISC sites**

Laboratory Analysis	Purpose
Nitrate-N, Nitrite-N, Ammonia-N, Total Kjeldahl nitrogen (TKN), Chloride, Sulfate, Total Alkalinity, Orthophosphate, pH	General chemistry
Organic carbon (dissolved)	Carbon analyses
Boron (dissolved), Iron (dissolved), Manganese (dissolved), Arsenic (dissolved)	Metals and minor elements

Samples taken for dissolved iron, manganese, arsenic, and boron and for dissolved organic carbon analyses were first field-filtered with a single-use 0.45-micron cartridge filter before collection into sample bottles. Water samples collected for the remaining analyses were not field-filtered. All samples were kept chilled at 4° C

and under proper chain of custody until either sample courier pickup or delivery to Alpha Analytical, Inc. of Westborough, MA for laboratory analyses.

## Site Description

Sailfish Drive is in the Fisherman's Cove neighborhood in East Falmouth south of Route 28. It lies on the eastern side of a north-south peninsula bisected by Davisville Road. The tidal Bourne's Pond lies to the east of the neighborhood. The freshwater portion of the stream that feeds the pond flows through a golf course and then drains a cranberry bog operation before crossing to the tidal portion of the drainage area. A tidal stream surrounded by a salt marsh parallels Sailfish Drive and flows east to the pond just south of Sailfish Drive. Homes in this subdivision date from the early 1970s and are generally closely spaced. All utilities are buried along Sailfish and Tarpon Drive. This includes cable, electric, water, stormwater, and gas utility lines. The elevation difference between Sailfish Drive and the pond is approximately 20 feet.

Most of the wells for the ISC project are along Sailfish Drive. Two of the water table wells and the piezometer cluster are located just north of a neighborhood park that borders Bourne's Pond (Figure 2). The upgradient well is located on eastern Tarpon Drive north of Sailfish Drive.

## Data Evaluation

### Continuous Core and Well Completion logs

Boring and well completion logs were developed for each well. Subsurface sediment characteristics were described in detail in the field and this detail was transferred into boring logs for each well. After evaluation of sediment characteristics between borings, a broader classification and description of color and texture of subsurface units was developed for use in evaluating overall sediment character and estimating hydraulic conductivities of saturated material for each site.

In addition, a specialized well log was developed for the deep continuous core at which includes the generalized sediment descriptions, the screened interval for each piezometer and the corresponding vertical hydraulic gradient, nitrate concentration, and dissolved oxygen concentration at that interval. Continuous core logs with well construction diagrams and the consolidated piezometer logs for each site are included in Appendix A.

### Water Table Elevation and Gradient Calculations

Water level data were reduced to water table elevations and hydraulic head for wells and piezometers. Groundwater elevations were mapped and the water table

surface and overall groundwater flow directions and horizontal groundwater gradients were estimated for each site. Horizontal gradients were also calculated for each site using the formula:

$$i_x = \frac{(h_2 - h_1)}{l} \quad (1)$$

Where:

- $i_x$ =hydraulic gradient (ft/ft)
- $h_2$ =groundwater elevation at upgradient location (ft. msl)
- $h_1$ =groundwater elevation and downgradient location (ft. msl)
- $l$  = distance between  $h_2$  and  $h_1$  (ft)

Vertical gradients were also calculated between adjacent piezometers at each site using the formula:

$$i_z = \frac{(hz_2 - hz_1)}{l} \quad (2)$$

Where:

- $i_z$ =hydraulic gradient (ft/ft)
- $hz_2$ =groundwater elevation at lower piezometer (ft. msl)
- $hz_1$ =groundwater elevation at upper piezometer (ft. msl)
- $l$  = distance between  $h_2$  and  $h_1$  (ft)

Tables 2, which follows the text of the report, summarize site water level and gradient data.

### Groundwater Velocity Estimates

Using the lithologic characterization and hydraulic gradients developed from the field data for each site, we used Darcy's Law to estimate groundwater velocity:

$$V = (K * i_x) / n \quad (3)$$

Where:

- $V$  is the groundwater velocity (ft/day);
- $K$  is the hydraulic conductivity (ft/day) of near-surface sediments from Masterson et al. (1997);
- $i_x$  is the horizontal hydraulic gradient (ft/ft); and
- $n$  is the porosity (dimensionless).

## Water Quality Data Evaluation

Water quality data were tabulated and then graphed to determine the spatial and vertical distribution of nitrogen compound concentrations and to better understand groundwater chemistry and anthropogenic impacts at sites. The Alpha Analytical Laboratory reports are included in Appendix C. Measured field parameter and laboratory analyzed concentrations of analyzed groundwater constituents are summarized in tables, which appear following the text.

All data were subject to QA/QC review and some water quality data were flagged due to relative percent difference (RPD) variations greater than 20% between duplicate samples. A summary of QA/QC data reviews is included in Appendix C.

## Mass Flux Analysis

A calculation of the mass flux of nitrate through the depth of investigation was completed for each site. The mass flux was estimated based on subsurface hydraulic characteristics and nitrate concentrations measured for each continuous core and corresponding piezometers. The calculation required the assignment of measured nitrate concentration to different vertical intervals through the depth of investigation. The calculation also needed to account for the different hydraulic properties of the different sediments encountered. To this end, we defined water quality intervals and within each water quality interval, sediment sub-intervals.

Each water quality interval was defined as the vertical distance between the midpoints between vertically adjacent piezometer screens. If several lithologic units were present within one water quality interval then the interval was subdivided accordingly. The calculated horizontal hydraulic gradient(s) and the nitrate concentration from the first round of water quality sampling for each piezometer depth were used to estimate flux within the water quality interval.

A portion of the spreadsheet developed is included below (Table 5) to illustrate how vertical intervals were divided first by water quality interval and then by sediment sub-interval to assess nitrate flux.

**Table 5– Segment of mass flux spreadsheet calculation showing discretization approach for water quality intervals and sediment sub-intervals**

Reference Piezometer	Top of sample depth	Bottom of sample depth	Top of water quality interval	Bottom of water quality interval	Sediment description	Top of sediment sub-interval	Bottom of sediment sub-interval	Thickness of sediment sub-interval
	feet bgs	feet bgs	feet bgs	feet bgs		feet bgs	feet bgs	feet
VLZ-44	43.0	44.0	42.3	45.5	Medium to coarse sand with gravel	42.3	45.5	3.2
VLZ-48	47.0	48.0	45.5	49.5	Medium to coarse sand with gravel	45.5	48.55	3.1
					Clay with silt and sand	48.55	49.5	1.0

Using these defined vertical intervals, unit nitrate mass flux was calculated for each sediment sub-interval using the relationship (ITRC, 2010):

$$J = K*i*C \quad (4)$$

Where:

- J = unit mass flux of constituent within the sediment sub-interval (g/day/m<sup>2</sup>);
- K = hydraulic conductivity of the sediment sub-interval (ft/day);
- i = horizontal hydraulic gradient (ft/ft); and
- C = concentration of NO<sub>3</sub>-N in mg/L within the water quality interval.

K was estimated based on the sediment properties of each unit characterized for each site. These K values were based on Cape Cod specific data collected and utilized by USGS for several groundwater modeling studies (Masterson et al., 1997). Horizontal hydraulic conductivity values used were those calculated for each site based on measured groundwater elevations. The same hydraulic gradient was assumed for all piezometer depths.

This calculated unit mass flux was then multiplied by the thickness of the corresponding lithologic unit within the water quality interval to arrive at the total mass flux for that sub-interval. These individually calculated mass fluxes were then summed over the study interval to arrive at the total mass flux through the study depth.

## Results

Wells installed for this ISC are SF-1, SF-2, SF-3, SF-4, SF-5S, and SF-6 and are screened across or just below the water table. Well SF-5D was installed approximately 15 feet below the water table adjacent to SF-5S. In addition, a set of depth-nested piezometers was also installed adjacent to water table well SF-2. The deep continuous sediment core was also completed at SF-2.

The suffix on each of the nine piezometers installed for the ISC, SFZ-19 through SFZ-77, indicates the total depth of the well in feet. Each piezometer is completed with a one-foot screen at the bottom of the well. The well locations are shown on Figure 2. A detailed piezometer location map is included in Appendix A.

### Subsurface Sediments – Falmouth

Sediments encountered between the surface and 20-25 feet bgs (-3 to -6 ft. msl) typically consist of fine to medium or medium to coarse sand. A zone of silty fine to medium sand with some clay was encountered (16 feet thick at SF-2) immediately below this unit to -18 ft. msl. Sediments coarsened below silty sand and were described as fine to coarse sand with cobbles and fine gravel to 75 ft. bgs (-57 ft. msl). At the very bottom of the continuous core, a coarse sand and gravel was encountered that prevented further penetration by the Geoprobe rig. Sediments were generally tan to brown with orange and red oxidized zones composed of coarse sand to 40 ft. bgs. Below this sediments were grey but a red brown layer of fine to coarse sand was encountered at SF-2 from 61.9 to 63.4 ft. bgs (-43.5 to - 45 ft. msl). At SF-6, the upgradient well, organic inclusions were noted from 12 to 20 feet bgs.

### Water Level Data – Falmouth

Water table wells are located in five locations along Sailfish Drive and one location on Tarpon Drive. Figure 3 shows the water level elevations at each well on March 22, 2016 and provides an estimate of the water table surface elevation and flow direction based on these measured levels and their relationship to Bourne's Pond. Table 2 lists the measured depths to water, water level elevations, and horizontal and vertical gradients calculated for three rounds of water level measurements. Although there is currently no data available on how tide change may influence water levels at the Sailfish site, we did note that the tide was near high at the time of water level measurements on all three measurement dates.

The depth to groundwater is between 17 and 26 feet bgs. The apparent horizontal groundwater gradient is low and between SF-6 and SF-2 is estimated at 0.0013. Subsurface materials below the water table include a zone of silty sand with some

clay near the water table at some wells, but fine to coarse sand was the predominant sediment type encountered throughout the study section.

Based on this round of water levels, vertical gradients between adjacent screens are nearly flat or downward between sea level and -15 feet msl, suggesting shallow recharge and horizontal discharge to Bourne's Pond. However, gradients are upward or strongly upward below this depth, consistent with predominately medium to coarse sand found below this zone. However, the May 2016 vertical gradients suggest downward flow between the mid-range piezometers. The presence of a lower permeability silty zone from sea level to about -25 feet msl, underlain by the more hydraulically conductive materials may contribute to the observed distribution of upward gradients. A downward gradient between adjacent piezometers was observed below -40 feet msl. A zone of coarse sand and gravel was encountered below -50 feet msl, which may also be a zone of preferential groundwater flow.

### Estimated Groundwater Velocity – Falmouth

Groundwater velocities were estimated based on sediment characteristics identified within the screened interval of the water table wells and with the horizontal groundwater gradients measured during sampling rounds. The estimated groundwater velocity is 1.4 feet/day in the shallow water table zone. Sediments coarsen with depth suggesting increased velocity in lower zones. This combined with the measured positive gradients suggest local groundwater discharge from shallow and intermediate groundwater zones to nearby Bourne's Pond.

### Water Quality Data Summary – Falmouth

*Water Table Wells* - Field-measured and laboratory-analyzed constituents from the both rounds of sampling are listed in Table 3. Laboratory-measured pH at water table wells ranged from 4.7 to 6.4. Field-measured specific conductance (SC) was measured between 50.7 and 146  $\mu\text{S}/\text{cm}$ . Field-measured DO varied between wells with the highest DO at 9.6 mg/L in SF-5D and a low of 3.32 mg/L at SF-2 in Round 1. Round 2 measurements recorded higher DO overall.

Figure 4 shows the concentration of selected constituents at water table wells. Nitrate-N varied between wells with the lowest concentration at 0.52 mg/L at SF-4 and the highest at 3.1 mg/L at SF-5D. Nitrate was also below 1 mg/L at SF-6 for both rounds. Nitrite-N was not detected at wells, but ammonia-N was detected at several wells at low concentrations. DOC was found at relatively high concentrations especially at SF-4 where it exceeds 3 mg/L. Dissolved metals concentrations were low at water table wells and at Well SF-5D consistent with the aerobic conditions observed in all wells. Chloride concentrations are greatest at SF-1.

Well SF-4 reveals a different chemistry than the other wells, with significantly higher alkalinity, lower acidity, and the lowest level of nitrate and highest level of DOC of any of the wells. This pattern may point to higher levels of organic matter and greater levels of microbiological activity at this well. There is however nothing apparent with respect to the location of this well within the surrounding neighborhood (Figure 2) that would suggest it should be unusual.

*Piezometer Cluster* - Differences in constituent concentrations with depth at the piezometer cluster location are illustrated in Table 4 and Figures 5, 6 and 7. These small-diameter wells are located adjacent to SF-2. Laboratory-measured pH is between 4.7 (SF-26) and 7.8 (SF-77). The pH at the remaining piezometers is 5.4 to 5.7. Thus, all of the wells are acidic with the exception of the single deepest well. SC values are in the range of 103 at the shallowest piezometer to 314  $\mu\text{S}/\text{cm}$  at the deepest piezometer. Dissolved oxygen is relatively high at all depths at 6.5 to 9 mg/L.

Figure 5 illustrates the concentrations of nitrate, dissolved organic carbon (DOC), dissolved iron, and dissolved oxygen versus the elevation of the piezometer screen. Groundwater sample elevations begin nearly at sea level (the elevation of the water table at this location is approximately 1.0 ft. msl) and extend to -60 ft. msl. Nitrate-N increases from 0.72 close to the water table to 8.9 mg/L just 7 feet below the water table. Nitrate-N concentrations then drop to 4.3 mg/L 14 feet below the water table and stay within the range of 1.7 to 3.0 to the bottom of the study depth as shown in this figure. DO concentrations also vary with depth but do not track nitrate concentrations exactly. DOC is at its highest concentration (1.3 mg/L) at the surface and drops to less than 1 mg/L below this depth. This is in contrast to the water table wells where DOC was as high as 3.0 mg/L.

Figures 6 and 7 illustrate variations in selected water quality constituents with depth. Note that concentration units in Figure 6 have been modified as noted from those reported in Table 4 in order to compare them on the same graph. Figures 6 and 7 reveal likely anthropogenic influence between elevations of roughly -5 feet msl and -40 feet msl. Several constituents are potentially related to anthropogenic influences. Nitrogen compounds and especially nitrate are associated with septic system discharges as are dissolved solids and chlorides. Chlorides are also introduced by road deicing.

Boron is found in many cleaning products and has been linked to septic system discharge in several studies (MPCA, 1999 and Burgess, 2008). Although dissolved boron is found at low concentrations, it increases from 0.015 in the shallowest piezometer to 0.0425 before dropping back down to below 0.02 mg/L below -32 ft. msl. Thus the zone between roughly -5 and -30 ft. msl shows in situ boron with a signature of potential septic influence. Specific conductance is elevated at -8 feet msl and again at -27 and -32 feet msl (Figure 6), the latter overlapping a zone of

elevated chloride between -22 and -39 feet msl. These various indicators point to anthropogenic influence on groundwater quality between about -5 feet msl and -40 feet msl, with the shallower portion likely influenced by more local sources and the deeper portion by more distance sources, however the relatively high DO and nitrate to the depth of investigation suggest manmade influence throughout the flow system.

Anomalously higher alkalinity is seen in the deepest piezometer with a concentration of 86.4 mg/L in contrast to concentrations less than 10 mg/L at other depths (Figure 7). The pH of 7.8 measured at this depth indicates slightly basic groundwater. This portion of the aquifer also exhibits weaker upward gradients (Table 2) suggesting lower rates of discharge to Bourne's Pond than the shallower depths. One possible explanation for this differing chemistry is that this is older and slower-moving groundwater with chemistry reflecting longer contact times between aquifer solids and groundwater and perhaps less affected by acid rain.

#### Discharge to Adjacent Surface Water – Falmouth

Groundwater discharge to local surface water is suggested to an elevation of -39 ft. msl based on slightly downward gradients at shallowest depths and upward gradients above -40 ft. msl. This suggests that the local flow system discharges towards Bourne's Pond but intermediate and regional flow may discharge downgradient. On a portion of the nitrate impacted water discharges to Bourne's Pond with the remainder discharging further downgradient to adjacent ponds or the Nantucket Sound. Little or no salt marsh is present along the immediate shoreline but the tidal creek and marsh south of Sailfish Drive may provide some denitrification of local groundwater discharge to this surface water feature.

#### Estimate of Mass Flux

At Sailfish Drive, the treatment zone is estimated to extend from 22 to 77 feet below land surface. The nitrate-nitrogen concentration falls below 1 mg/L only at the shallow piezometer and remains greater than 1 mg/L to the depth of investigation of 77 feet. The zones of greatest contribution to mass flux are at 26 feet bgs and 67 feet bgs. Due to the low gradient, the treatment zone mass flux and the total mass flux of nitrate-N are calculated as being fairly low at 5.5 and 5.6 g/day respectively.

## Summary – Falmouth

In summary,

- Subsurface sediments are predominately fine to medium or medium to coarse sands with a unit of silty fine sand at depth. A coarse sand and gravel was encountered at the bottom of the study interval approximately 78 ft. bgs.
- The water table lies between 17 and 26 feet bgs.
- The horizontal groundwater gradient is low and groundwater velocity was estimated at 1.4 ft/day.
- Nitrate-N concentrations are significantly elevated within the first 20 feet of the saturated zone (up to 8.9 mg/L), and remain elevated between 1.7 and 3 mg/L to the full depth of investigation. No significant reducing zone was encountered.
- Anthropogenic influences are apparent in groundwater above an elevation of -40 feet msl but may alter groundwater quality to 77 ft. bgs based on DO and still elevated nitrate at this depth.
- Groundwater at approximately -60 feet msl shows distinctly different chemistry than the shallower water, perhaps a reflection of older, slower-moving groundwater at this depth.
- Shallow groundwater likely discharges to local surface water based on upward gradients above - 40 ft. msl but deeper zones likely discharge downgradient of the pond.
- The treatment zone mass flux and the total mass flux of nitrate-N are calculated at 5.5 and 5.6 g/day respectively.

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**Table 2 - Water Levels and Hydraulic Gradients - PRB ISC Site - Falmouth, MA (Sailfish Drive)**

Well	Top of PVC Casing (ft. msl)	Depth to Water (ft) 3/22/16	Water Surface Elevation (ft msl) 3/22/16	Horizontal Gradients 3/22/16	Depth to Water (ft) 4/6/16	Water Surface Elevation (ft msl) 4/6/16	Horizontal Gradients 4/6/16	Depth to Water (ft) 5/5/16	Water Surface Elevation (ft msl) 5/5/16	Horizontal Gradients 5/5/16			
SF-1	19.32	18.24	1.08	SF-6 to SF-2	18.42	0.90	SF-6 to SF-2	18.01	1.31	SF-6 to SF-2			
SF-2	17.84	16.83	1.01	0.0014	17.01	0.83	0.0013	16.55	1.29	0.0010			
SF-3	23.62	22.52	1.10		22.70	0.92		22.17	1.45				
SF-4	23.04	21.75	1.29		21.94	1.1		21.46	1.58				
SF-5S	26.11	24.60	1.51		24.82	1.29		24.38	1.73				
SF-5D	26.42	24.98	1.44		25.22	1.2		24.75	1.67				
SF-6	26.97	25.43	1.54		25.65	1.32		25.31	1.66				
				Vertical Gradients between adjacent screens			Vertical Gradients between adjacent screens			Vertical Gradients between adjacent screens			
SFZ-19	18.50	17.52	0.98		17.71	0.79		17.15	1.35				
SFZ-26	18.39	17.4	0.99	0.001	slightly upward	17.61	0.78	-0.001	slightly downward	17.05	1.34	-0.001	slightly downward
SFZ-33	18.26	17.29	0.97	-0.003	slightly downward	17.67	0.59	-0.027	downward	16.92	1.34	0.000	flat
SFZ-40	18.19	17.19	1.00	0.004	slightly upward	17.23	0.96	0.053	strongly upward	16.96	1.23	-0.016	downward
SFZ-45	18.10	17.09	1.01	0.002	slightly upward	17.12	0.98	0.004	slightly upward	16.93	1.17	-0.012	downward
SFZ-50	18.04	16.98	1.06	0.010	upward	17.06	0.98	0.000	flat	16.60	1.44	0.054	strongly upward
SFZ-57	18.05	17.02	1.03	0.007	slightly upward	17.05	1	0.000	flat	16.59	1.46	0.039	upward
SFZ-67	18.07	17.05	1.02	-0.001	slightly downward	17.12	0.95	-0.005	slightly downward	16.59	1.48	0.002	slightly upward
SFZ-77	17.95	18.42	-0.47	-0.149	strongly downward	17.01	0.94	-0.001	slightly downward	16.50	1.45	-0.003	slightly downward

 elevated nitrate zone

**Vertical gradient rankings**  
 0.05 or greater - strongly upward  
 0.009 to 0.049- upward  
 less than 0.009 - slightly upward  
  
 -0.05 or greater - strongly downward  
 -0.009 to 0.049- downward  
 less than- 0.009 - slightly downward

**Table 3 - Measured Water Quality Concentrations at Falmouth Sailfish ISC Site - Water Table Wells**

Sample ID/Location	SF-1		SF-2		SF-3		SF-4		SF-5S		SF-5D		SF-6	
	3/24/20	5/6/20	3/24/20	5/6/20	3/24/20	5/6/20	3/24/20	5/6/20	3/24/20	5/7/20	3/24/20	5/6/20	3/24/20	5/6/20
<b>Field Measurements</b>														
pH (SU)	NM	R 4.92	5.01	4.67	NM	R 4.67	NM	R 6.49	4.86	5.14	5.72	5.45	NM	R 4.72
Temperature (°C)	10.5	14.48	10.9	12.84	11.4	10.6	11.5	10.7	13.8	14.4	12.1	10.38	11.4	11.06
Dissolved Oxygen (DO; mg/L)	7.86	6.48	3.32	3.89	6.65	9.76	6.78	3.92	7.09	9.10	9.60	9.47	5.59	7.42
Specific Conductance (uS/cm)	128	177	86.7	95	108	108.0	146	134.4	50.7	116.3	94.5	120	94	102
Redox Potential (ORP; mV)	355.6	R 138	299.0	208	271.8	R 313.8	238.9	R 126.0	290.0	369.3	174.6	155.1	259.8	R 212
<b>Laboratory Analyses</b>														
pH (SU)	4.9	5.3	5.2	5	4.9	4.5	6.4	6.3	4.7	4.4	5.8	5.9	5.4	5
Nitrate as N (mg/L)	3.0	3.8	2.3	1.6	2.5	3.4	0.52	0.5	2.8	2.2	3.1	2.4	0.72	0.59
Nitrite as N (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.019	<0.010	<0.019	<0.010	<0.010	<0.010	J <0.010	<0.010	<0.010	0.016
Ammonia as N (mg/L)	0.029	J,E 0.215	<0.021	0.064	J 0.06	0.034	J,E <0.021	<0.021	0.025	J 0.051	J <0.021	0.038	J 0.024	J <0.021
Total Kjeldahl Nitrogen (TKN) (mg/L)	<0.093	0.224	J <0.093	0.094	J <0.093	<0.3	E 0.208	J 0.268	J 0.335	0.081	J <0.093	0.118	J 0.101	J 0.169
Total Nitrogen (mg/L)	3.0	3.8	2.3	1.6	2.5	3.4	0.5	0.5	3.1	2.2	3.1	2.4	0.72	0.59
Orthophosphate (mg/L)	0.002	J 0.003	J 0.005	0.006	0.002	J 0.004	J,E 0.003	J 0.005	0.002	J 0.006	0.002	J 0.004	J 0.002	J 0.004
Total Alkalinity (mg/L CaCO3)	2.20	3.9	3.90	3.9	4.10	2.3	45.9	41.3	3.10	2.1	9.90	9.0	5.10	4.4
Chloride (mg/L)	29.7	28.6	12.8	12.9	20.1	15.8	16.4	13.6	15.4	11.4	13.4	16.6	20.2	14.7
Sulfate (mg/L)	10.2	9.94	10.7	8.65	12.8	12.4	13.2	11.2	16.0	16.1	6.86	6.64	10.8	11.4
Dissolved Iron (mg/L)	0.040	J 0.25	<0.020	0.039	J 0.74	0.36	E <0.020	0.062	0.12	0.026	J,E 0.091	0.22	0.21	<0.020
Dissolved Manganese (mg/L)	0.249	0.397	0.0478	0.0546	0.503	0.12	0.0100	0.078	0.302	0.0746	0.0526	0.049	0.310	0.0594
Dissolved Boron (mg/L)	0.015	J 0.0205	J 0.0147	0.012	J 0.0228	J 0.0172	J <0.0070	<0.0070	0.0086	J <0.0070	0.0079	0.0105	J 0.0147	J 0.0117
Dissolved Arsenic (mg/L)	0.0024	J <0.0020	<0.0020	<0.0020	<0.0020	0.002	J <0.0020	<0.0020	0.0020	J <0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Dissolved Organic Carbon (mg/L)	1.1	0.55	J 0.98	J 0.88	J 1.6	1.4	3.3	2	1.1	1.3	0.7	J 0.76	J 1.7	1.7

**Notes:**  
 J - Data indicates a presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.  
 R - Suspected error in field pH and ORP measurements  
 NS - Not Sampled / NM - Not Measured  
 E - Exceeds RPD of 20% with duplicate sample  
 Grey shaded cell data should not be relied upon based on QA/QC review

**Table 4 - Measured Water Quality Concentrations - Falmouth-Sailfish ISC Site Piezometer Groundwater Data**

Sample ID/Location	SFZ-19		SFZ-26		SFZ-33		SFZ-40		SFZ-45									
Screen bottom elevation (ft msl)	-0.5		-7.6		-14.7		-21.8		-26.9									
Sampling Date	3/23/16	5/6/16	3/23/16	5/6/16	3/23/16	5/6/16	3/23/16	5/6/16	3/23/16	5/6/16								
Field Measurements																		
pH (SU)	4.92	4.11	NM	R	4.29	5.12	5.10	4.88	5.12	NM	R	5.22						
Temperature (°C)	11.0	11.06	11.10	11.54	11.7	11.74	11.5	11.9	10.92	11.85								
Dissolved Oxygen (DO; mg/L)	7.16	5.21	6.5	6.53	7.53	6.28	8.89	8.53	7.22	7.58								
Specific Conductance (uS/cm)	103.3	188	213	173	121.2	140	132.2	123	218	175								
Redox Potential (ORP; mV)	285	212	-70.1	R	206	121.9	164	244.4	280	-41.7	R	159.9						
Laboratory Analyses																		
pH (SU)	5.4	5	4.7	4.5	5.5	5.3	5.5	5.2	5.5	5.4								
Nitrate as N (mg/L)	0.72	0.59	8.9	7	4.3	4.3	2.4	3	3.0	2.8								
Nitrite as N (mg/L)	<0.010	<0.010	<0.010	<0.05	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010								
Ammonia as N (mg/L)	<0.021	0.043	J	0.023	J,E	0.05	J	0.035	J	0.04	J	<0.021	0.124	J	<0.021	0.049	J	
Total Kjeldahl Nitrogen (TKN) (mg/L)	0.102	J	0.282	J	<0.186	<0.132	<0.093	0.215	J	<0.093	0.14	J	<0.093	0.15	J			
Total Nitrogen (mg/L)	0.72	0.59	8.9	7	4.3	4.3	2.4	3	3.0	2.8								
Orthophosphate (mg/L)	0.041	0.033	0.004	J	0.004	J	0.00	J	0.004	J	0.007	<0.001	0.006	<0.001				
Total Alkalinity (mg/L CaCO3)	5.30	4.1	2.60	2.4	6.40	3.8	4.80	4.1	3.30	5.9								
Chloride (mg/L)	20.2	39.1	19.8	19.1	19.0	19.9	26.5	23.4	31.0	30.2								
Sulfate (mg/L)	9.31	10	12.3	10.4	9.81	8.4	10.2	11.5	13.9	13.2								
Dissolved Iron (mg/L)	<0.020	<0.020	<0.020	0.05	0.120	0.026	J	0.0417	0.022	J	0.021	J	<0.020					
Dissolved Manganese (mg/L)	0.0237	0.0418	0.317	0.287	0.108	0.0663	0.0338	0.0284	0.0189	0.016								
Dissolved Boron (mg/L)	0.015	J	0.0102	J	0.0310	0.0249	J	0.0425	0.0366	0.0417	0.0394	0.0419	0.0368					
Dissolved Arsenic (mg/L)	<0.0020	<0.0020	0.0021	J,E	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020						
Dissolved Organic Carbon (mg/L)	1.3	1.4	0.76	J	0.68	J	0.58	J	0.59	J	0.84	J	0.61	J	0.61	J	0.6	J

**Notes:**

J - Data indicates a presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

R - Suspected error in field pH and ORP measurements

NS - Not Sampled / NM - Not Measured

E - Exceeds RPD of 20% with duplicate sample

Grey shaded cell data should not be relied upon based on QA/QC review

**Table 4 - Measured Water Quality Concentrations -  
Falmouth-Sailfish ISC Site Piezometer Groundwater  
Data**

Sample ID/Location	SFZ-50		SFZ-57		SFZ-67		SFZ-77									
	-32.0		-39.0		-48.9		-59.6									
Screen bottom elevation (ft msl)																
Sampling Date	3/23/16	5/6/16	3/23/16	5/6/16	3/23/16	5/6/16	3/23/16	5/6/16								
Field Measurements																
pH (SU)	NM	R	5.14	5.3	5.12	5.29	5.42	NM	R	7.79						
Temperature (°C)	11.0	11.8	11.3	11.84	11	11.8	10.65	11.87								
Dissolved Oxygen (DO; mg/L)	7.76	8.88	9.02	8.0	8.69	8.55	6.55	7.53								
Specific Conductance (uS/cm)	243	161	139.1	154	112.6	110	314	246								
Redox Potential (ORP; mV)	-126.3	R	267	160.0	157.1	172.2	218.1	-153.1	R	42.9						
Laboratory Analyses																
pH (SU)	5.5	5.5	5.7	5.4	5.7	5.6	7.8	7.7								
Nitrate as N (mg/L)	1.7	1.6	2.6	2.6	2.9	3.1	1.7	1.6								
Nitrite as N (mg/L)	<0.010	<0.010	<0.010	0.017	J,E	0.012	J	<0.010	0.014	J	<0.010					
Ammonia as N (mg/L)	0.031	J	0.068	J	0.025	J	0.035	J	0.026	J	0.241	J	0.072	J	0.080	
Total Kjeldahl Nitrogen (TKN) (mg/L)	<0.093	0.358	<0.093	0.087	J	<0.093	0.15	J	<0.093	0.228	J					
Total Nitrogen (mg/L)	1.7	2	2.6	2.6	2.9	3.1	1.7	1.6								
Orthophosphate (mg/L)	0.002	J	<0.001	0.004	J	<0.001	0.006	<0.001	0.034	0.037						
Total Alkalinity (mg/L CaCO3)	6.10	<2.0	7.50	6.1	7.90	7	86.4	82.8								
Chloride (mg/L)	43.0	41	28.1	27.7	17.5	18.5	15.8	14.9								
Sulfate (mg/L)	9.57	8.88	9.94	9.13	11.5	10.3	15.5	14.4								
Dissolved Iron (mg/L)	0.3	0.049	J	0.27	0.042	J	0.11	0.041	J	<0.020	<0.020					
Dissolved Manganese (mg/L)	0.146	0.128	0.0224	0.0112	0.0281	0.0106	0.0252	0.0098	J							
Dissolved Boron (mg/L)	0.0174	J	0.0135	J	0.0165	J	0.0149	J	0.0200	J	0.0178	J	0.0209	J	0.0194	J
Dissolved Arsenic (mg/L)	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0028	J					
Dissolved Organic Carbon (mg/L)	0.68	J	0.91	J	0.6	J	0.49	J	0.50	J	0.48	J	0.66	J	0.51	J

Notes:

J - Data indicates a presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

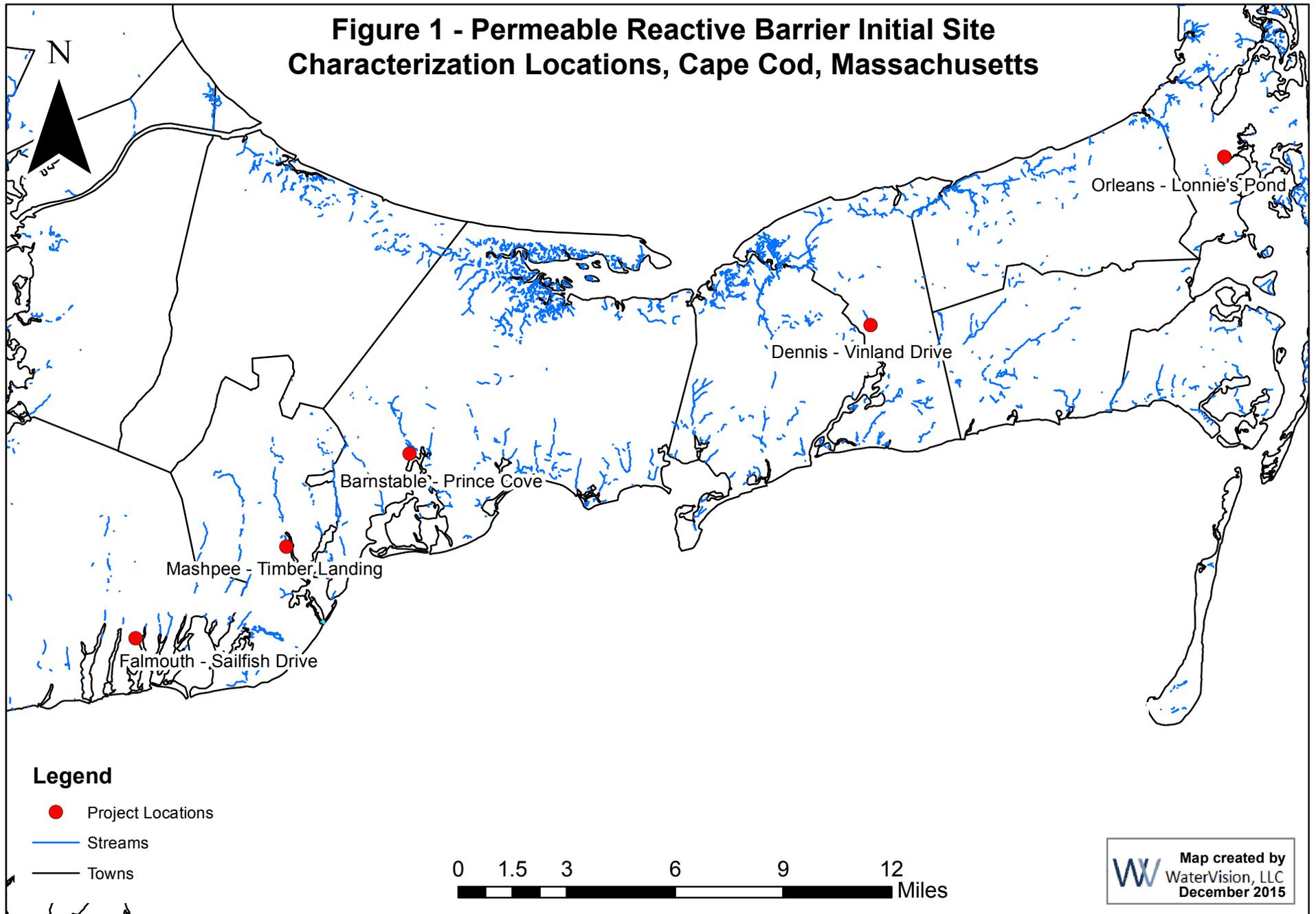
R - Suspected error in field pH and ORP measurements

NS - Not Sampled / NM - Not Measured

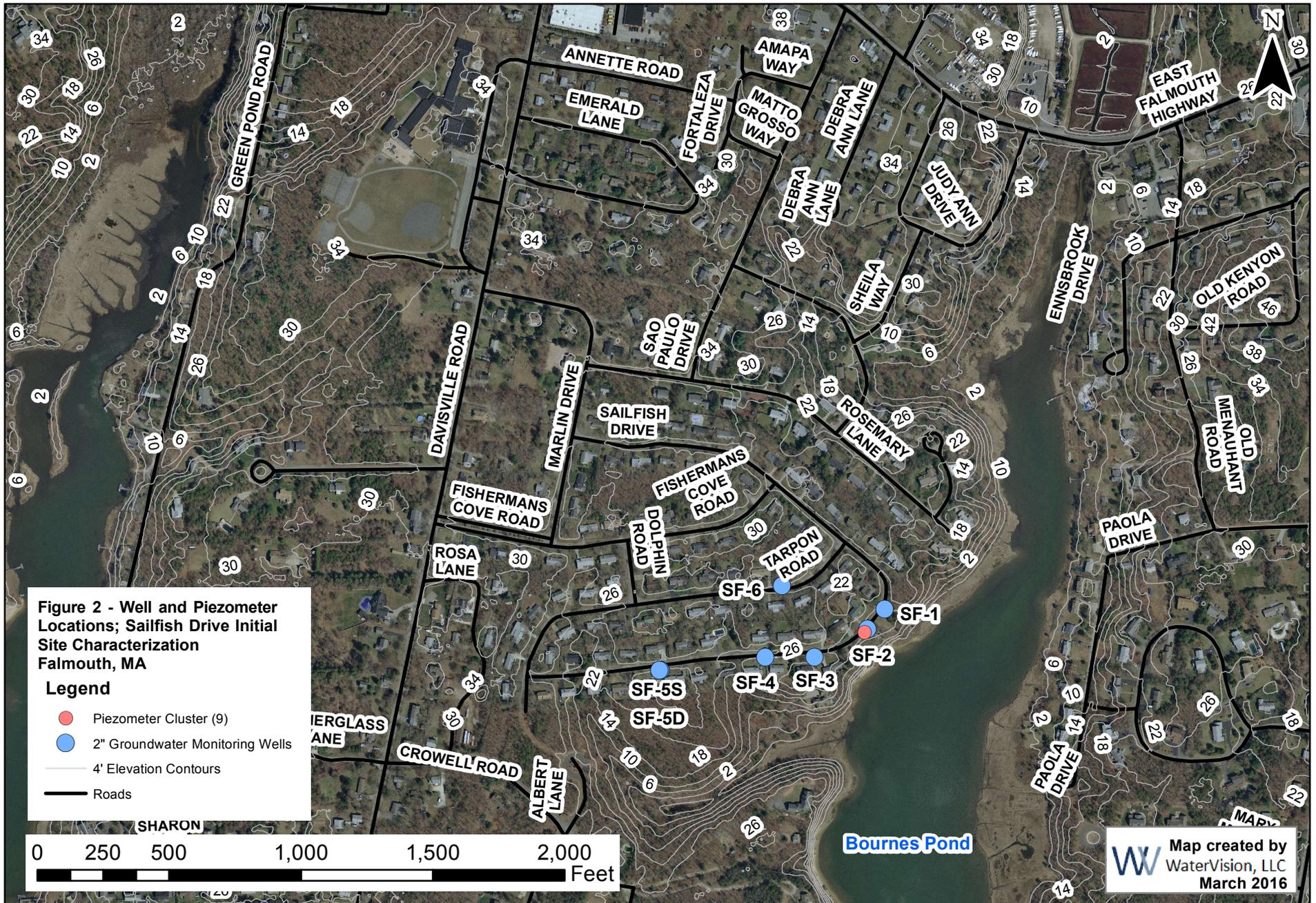
E - Exceeds RPD of 20% with duplicate sample

Grey shaded cell data should not be relied upon based on QA/QC review

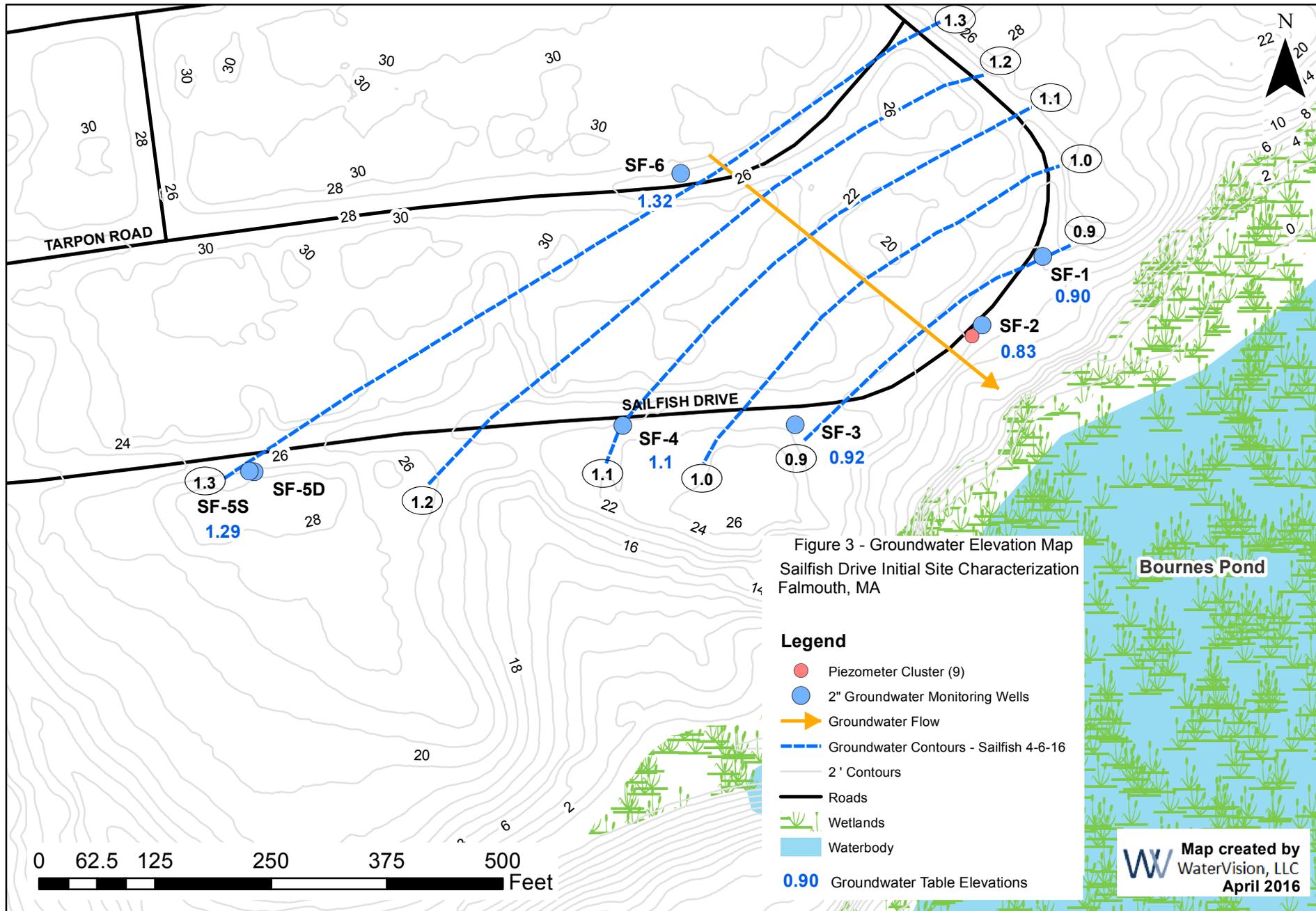
**Figure 1 - Permeable Reactive Barrier Initial Site Characterization Locations, Cape Cod, Massachusetts**



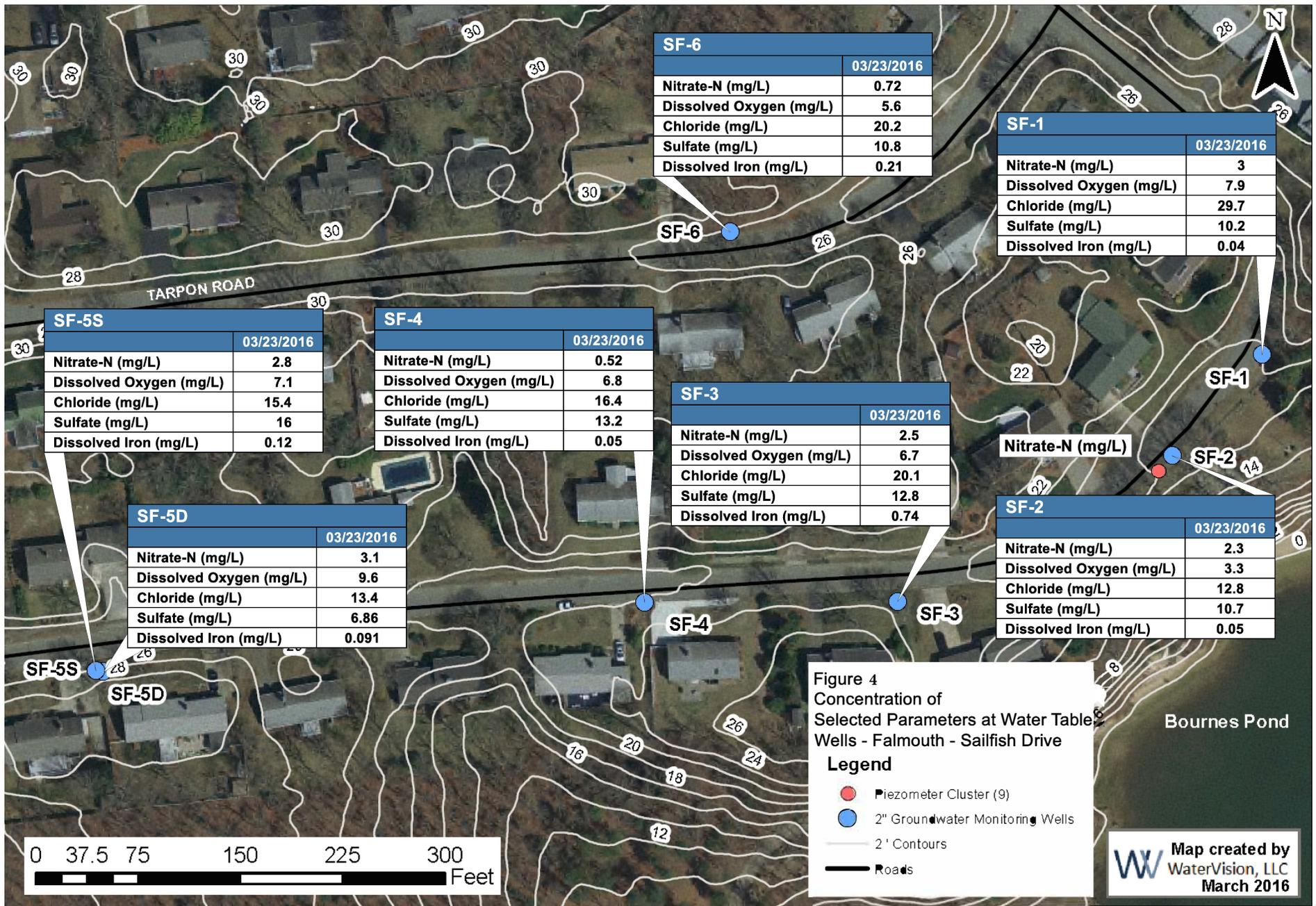
Sources: Town boundaries from Mass GIS, Streams from MassDEP Hydrography.



Sources: Aerial photography 2013-2014 and Roads from Mass GIS, Parcel Boundaries from Cape Cod Commission, Surveyed Groundwater Monitoring Well and Piezometer locations from WaterVision LLC. Elevation contours from the Cape Cod Commission.

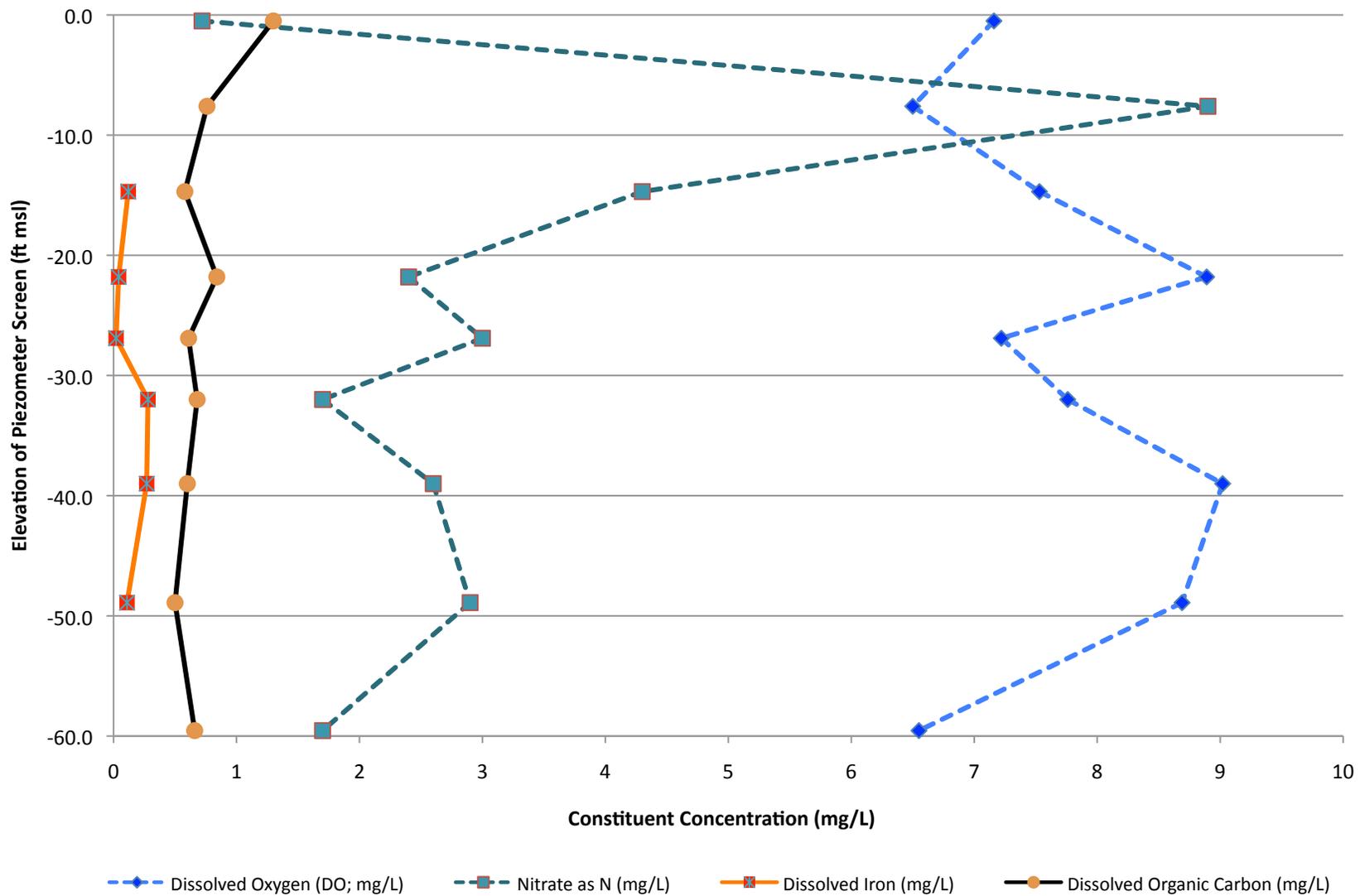


Sources: Roads from Mass GIS, Surveyed Groundwater Monitoring Well and Piezometer locations and groundwater table elevations (4/6/16) from WaterVision LLC. 2 foot surface elevation contours from the Cape Cod Commission.



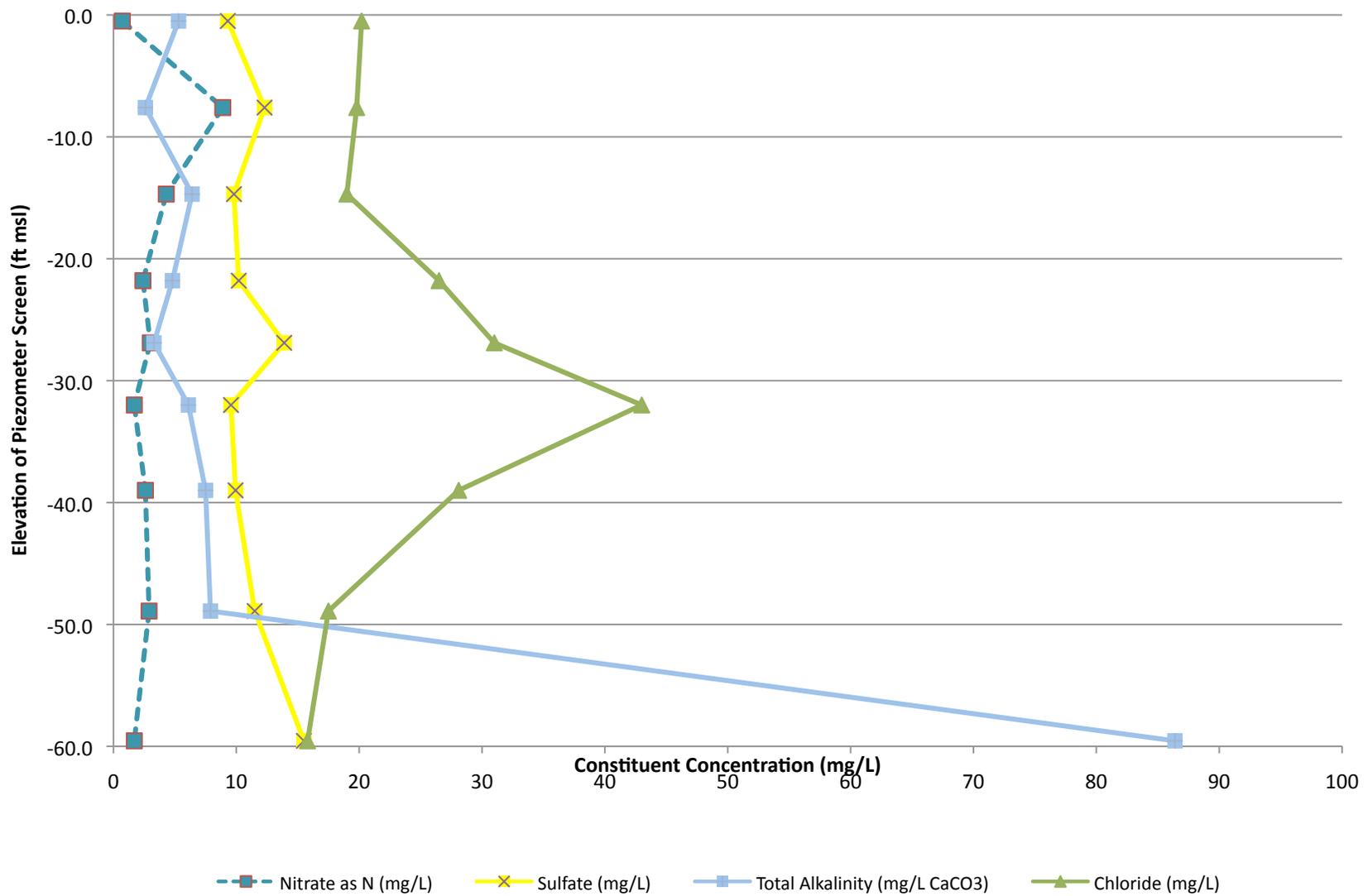
Sources: Aerial photography 2013 - 2014 and Roads from Mass GIS, Parcel Boundaries from Cape Cod Commission, Surveyed Groundwater Monitoring Well and Piezometer locations from WaterVision LLC. 2 foot elevation contours from the Cape Cod Commission.

**Figure 5 - Variation of Nitrate-N, Dissolved Oxygen, Dissolved Iron, and Dissolved Organic Carbon with Elevation, PRB ISC Site Piezometer Data - Falmouth-Sailfish Site - March 2016**





**Figure 7 - Variation of Nitrate-N, Sulfate, Alkalinity and Chloride with Elevation, PRB ISC Site  
Piezometer Data - Falmouth-Sailfish Site - March 2016**



## Appendix 3.5: Permeable Reactive Barriers

- WaterVision Shorewood PRB Memo

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**WATERVISION TECHNICAL MEMORANDUM**

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**To:** Ray Cody, Marcel Belaval, Karen Simpson, Bryan Dore, USEPA  
**From:** Danna Truslow, Samantha Wright, Pete Shanahan WaterVision LLC  
**CC:** Ken Hickey, Emily DiFranco WaterVision LLC  
**Subject:** **Project Summary Memorandum**  
Site Characterization for Design of Pilot-Scale Permeable Reactive Barriers for Nitrogen Reduction in Groundwater on Cape Cod- Supplemental Fieldwork at Shorewood Drive, Falmouth, MA  
**Date:** September 26, 2016

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This memorandum provides a summary of well installation, water level measurement, and water quality sampling fieldwork performed by WaterVision LLC at town-owned property at the intersection of Shorewood Drive and Route 28 in Falmouth, MA from April to July 2016. Most tables and all figures are included at the end of the memorandum. Attachments A and B are included in a separate document.

Previous hydrogeologic and water quality sampling at the Shorewood site had been completed by MT Environmental Restoration (MTER) of Duxbury, MA on behalf of the Town of Falmouth, to evaluate the site as a possible Permeable Reactive Barrier (PRB) pilot site for the town. The United States Geological Survey (USGS) also installed a multiport sampling well at one sampling location as part of the project for the Town of Falmouth. This work was summarized in a report dated December 21, 2015 (MTER, 2015).

Supplemental field work was planned by the project team working on the cooperative Cape PRB project, U.S. EPA Region 1 Contract #: EP-BPA-13-W-0001, that is being carried out by WaterVision LLC. Representatives from Cape Cod Commission, USGS, US EPA, Town of Falmouth, MTER, and WaterVision LLC met in January 2016 to determine the additional field work that would complement the existing data.

## Work Performed

### Well Installation

Well installation fieldwork was conducted at the Shorewood Drive site in Falmouth, MA between April 11 and April 15, 2016. Continuous coring and well installation was completed using a direct-push Geoprobe track-mounted drilling rig operated by New England Geotech. Danna Truslow of WaterVision LLC was on site to oversee and direct well installation work. A total of four 2-inch-diameter water-table wells were completed with five-foot-long screens (see Table 1). These water table wells are referred to as SW-101 to SW-104. Continuous cores at these wells were completed to 10 to 30 feet below ground surface (bgs) depending on location and wells were completed with five-foot screens to 10 to 23 feet bgs based on the inferred position of the water table at the time of installation.

The continuous core for PZ-1 was advanced at five-foot intervals to 78 feet bgs where dense gravel and cobbles were encountered that could not be further penetrated by the Geoprobe rig. PZ-2 was continued to 70 feet bgs. At each boring location piezometer clusters of five piezometers each were also installed and are referred to as PZ-1 a through e and PZ-2 a through e. In order to follow the naming convention established by MTER, the deepest piezometer received the "a" designation and the shallowest the "e" designation. All piezometers were installed with one-foot screens.

Three 1¼-inch well points (stainless steel screen and galvanized riser) were installed by WV on April 14, 2016 in Great Pond near the property shoreline. The well points are designated WP-1 through WP-3 in Table 1. The well points were advanced using a 4-pound mall and consist of a three-foot wire-wrapped stainless steel screen and seven feet of riser. The top of the screened interval was advanced to approximately ½ foot below the pond bottom. At WP-2 the upper 5 feet of riser is PVC to allow Bluetooth communication with the HOBO pressure transducer that was installed in the well after well point installation.

Figure 1 shows the locations of the existing onsite and off-site wells and the new wells installed by WaterVision LLC. The figure also shows the locations of trails at the site. Table 1 lists the well construction details for the wells installed by WaterVision LLC during the 2016 field work and the existing MTER wells. Comprehensive Environmental, Inc. completed a survey of all new monitoring points and provided elevations and a shapefile which was used by WaterVision LLC to develop base maps and associated elevation reference information for the site. The elevations of existing MTER wells, surveyed by the Town of Falmouth, were adjusted to NAVD-88 elevations by subtracting 0.86 feet. Attachment A includes continuous core logs, well construction diagrams, and a table of latitude, longitude and elevation for each newly installed well or well point.

## **Bluetooth HOBO Water Level Data loggers Installation**

On April 14, 2016, two Onset HOBO water level loggers with Bluetooth communication capabilities were installed at the Shorewood ISC site in Falmouth, MA. Each HOBO water level logger has two components: the probe and the logger, which are attached by a cable. The probe is suspended just above the well bottom and the logger is located near the top of the well to allow for Bluetooth connectivity and to ensure the logger does not become submerged. The loggers were programmed to start collecting data at 15:00 on 4/14/16 at a 15-minute measurement interval.

HOBO #10843903 was installed in groundwater monitoring well SW-102. The reference water level programmed into the HOBO application was 2.89 feet, which is the distance from the top of the logger to the water level. The top of the data logger is suspended 3.5 inches from the inside of the PVC cap.

HOBO #10843904 was installed in well point WP-2 just off shore of the site in Great Pond. A two-foot metal coupler was attached to the screen well point (23 inches of the metal was above the pond bottom). An additional 62 inches of PVC (including PVC well cap) was attached to the metal coupler. PVC was used for this section of the well, instead of metal pipe, so that the Bluetooth connection could be established between the data logger and Bluetooth device (cell phone, tablet, etc.). The data logger and probe were suspended from the inside of the well cap. The top of the logger was approximately 3.5 inches below the top of the PVC pipe. The reference water level programmed into the HOBO application was 5.92 feet, which is the distance from the top of the logger to the water level at the time of installation.

Figure 2 shows the HOBO installation set up at WP-2 and SW-102 wells. The water levels were converted to elevations based on the survey completed of new monitoring points. Reference level readouts from the HOBO Smartphone application were not registering as programmed, but have been adjusted during data processing.

## **Water Level Monitoring and Water Quality Sampling**

The first round of water quality sampling at the Falmouth - Shorewood Initial Site Characterization (ISC) site on Shorewood Drive took place on May 18<sup>th</sup>, 25<sup>th</sup>, and 26<sup>th</sup>. Due to the number of wells at this site and coordination with USGS on sampling the multi-port well, field work was broken up over two weeks. This field work encompassed tasks 2d and 2e - measuring water levels at wells and piezometers, developing and purging wells and piezometers, measuring field water quality parameters, and sampling each well and piezometer for laboratory analysis for a range of parameters. Danna Truslow and Samantha Wright of WaterVision LLC, Dennis LeBlanc and Robert Hull of USGS, and Marcel Belaval of the USEPA completed all field measurements and sampling.

Upon arrival at the site all wells and piezometers were opened and well caps removed to allow equilibration with the atmosphere. Tubing was dedicated for the PZ-2a-e piezometer cluster and the PZ-1a-e piezometer cluster. Tubing was reused for all other wells on the site. Water levels were measured to the nearest hundredth of a foot with a Solinst water level meter. Water levels were not measured on May 25<sup>th</sup> and 26<sup>th</sup> due to a malfunctioning water level meter.

Calibration of field sampling meters was also completed before sampling began each day. Field parameter values on each meter were also checked at the end of each day against parameter standards to gauge any drift during the day. A Yellow Springs Instrument (YSI) Model 556 multi-parameter sonde and a YSI-Pro multi-parameter sonde were used for field parameter sampling. The YSI-Pro was re-calibrated on the morning of May 18<sup>th</sup> after the initial meter check showed conductivity and DO readings out of normal range and no further calibration problems occurred during the day. The YSI-Pro was also re-calibrated on May 25<sup>th</sup> after initial meter checks showed the conductivity value lower than the standard.

Well purging and sampling commenced after water level measurement was complete. A Geotech peristaltic pump was used to purge piezometer clusters PZ-1 and PZ-2. A Grundfos Redi-Flo submersible pump was used to purge the remaining wells both on- and off-site. All wells were purged of at least three well volumes (unless noted otherwise) or until field parameter measurements stabilized.

Field measurement of water temperature, pH, DO (mg/L), specific conductance, and oxidation/reduction potential (ORP) was regularly measured using the YSI sondes as purging continued. A visual description of the purged water was also noted. Initial samples were taken and measured using the calibration cup, however after initial sediment buildup in the wells cleared, field parameter measurement continued using a flow-through chamber to allow for more accurate DO measurements and for improved parameter stabilization during sampling. All field measurements and observations were noted on field sheets.

Water samples were taken in laboratory-provided and pre-preserved sample bottles for the following parameters at all wells and piezometers installed by WV in 2016:

Name	Type
Nitrogen (total), Nitrogen (ammonia), Nitrogen (nitrate), Nitrogen (nitrite), Chloride, Sulfate, Total Alkalinity, Orthophosphate	General chemistry
Organic carbon (dissolved)	Carbon analyses
Boron (dissolved), Iron (dissolved), Manganese (dissolved), Arsenic (dissolved)	Metals and minor elements

A reduced suite of parameters was analyzed at on-site and off-site MTER wells including total nitrogen, nitrate-N, dissolved iron, manganese, arsenic, and dissolved organic carbon.

Samples taken for dissolved iron, manganese, arsenic, boron, and dissolved organic carbon analyses were first field-filtered with a 0.45-micron cartridge filter before collection into sample bottles (see the exception on May 26<sup>th</sup> in Attachment B field work write-up). Water samples collected for the remaining analyses were not field-filtered. A duplicate set of samples was taken at one location during each day of sampling. Samples were kept on ice in laboratory-provided coolers until laboratory courier pickup or delivery to Alpha Analytical Laboratory in Westborough, Massachusetts.

The second round of water quality sampling took place on June 21, 22, and 23, 2016. This field work encompassed tasks 2d and 2e - measuring water levels at wells and piezometers, developing and purging wells and piezometers, measuring field water quality parameters, and sampling each well and piezometer for laboratory analysis for a range of parameters. Danna Truslow and Sarah Large of WaterVision LLC completed all field measurements and sampling.

Field work was completed using the same methodology and procedures as the first round of sampling with the following exceptions.

- The full round of water level measurements was made on the second day of fieldwork - June 22, 2016.
- On June 22 in the afternoon it was noted that pH readings were out of normal range on the YSI-Pro. Samples taken at MTER-9c, -9d, and MTER-6a were also lab analyzed for pH. On June 23, 2016 only the YSI-556 was used for field parameter analysis.
- No off-site wells were sampled in this round.

- The duplicate sample was taken at MTER-9A on 6/21/16, at MTER-6D on 6/22/16, and at SW-103 on 6/23/16.

Additional detail on water quality sampling field methods, quality assurance, and all laboratory analytical reports are included in Attachment B.

## **Results**

### **Subsurface Sediment Characteristics**

Sediments encountered in the subsurface water were generally glacial outwash and were predominantly medium to coarse sand with zones of coarse sand. At PZ-1a coarse sand, with gravel and cobbles was encountered at 77.5 ft bgs and proved too resistant to continue the boring. Some organic sediments were encountered in shallow zones at SW-101 and PZ-2 and minor clay and silt layers were encountered at PZ-2 at depth. Fill and rubble were encountered at PZ-1 to 20 ft bgs and at SW-101 to 10 ft bgs. This material included soil, asphalt, wood, concrete, and other debris. Continuous core logs and well construction diagrams are included in Attachment A.

### **Groundwater levels and gradients**

Measured water levels and computed vertical hydraulic gradients are summarized in Table 2a. Computed horizontal gradients are listed in Table 2b. Groundwater at the site was encountered from approximately 3 to 17 feet bgs depending on location. Between the May and June measurement rounds water levels fell approximately 0.3 feet at most wells except at SW-102 adjacent to the pond where groundwater levels were similar between measuring rounds. Groundwater depths at off-site wells were as deep as 32 feet bgs.

Groundwater flows from northeast to southwest towards Great Pond (Figure 3). MTER-12 was also not included in the groundwater elevation contouring based on lower than expected water levels at this well.

Table 2b lists the calculated horizontal hydraulic gradients at the site. The proposed PRB alignment is expected to trend northwest to southeast and roughly follow a groundwater contour in an area immediately northeast of the PZ-1 piezometers. The average site gradient was estimated between MTER-7 and SW-101 and between SW-103- and SW-101. Horizontal gradients of smaller segments along these flow lines were also estimated.

The overall horizontal groundwater gradient between MTER-7 and SW-101 was estimated at 0.003 in May 2016 and 0.002 in June 2016. Similar gradients were estimated between other project wells.

Vertical groundwater gradients were evaluated for the PZ-1 and PZ-2 piezometer clusters and for the MTER-6 and MTER-9 well clusters. PZ-1 piezometers are located in an upland area near the northern boundary of the Shorewood site. Vertical gradients were slight between the upper four piezometers, especially during the June 2016 measurement period. The gradient between the deepest piezometers completed at -41 and -54.5 feet of elevation respectively were downward to strongly downward at PZ-1.

At the PZ-2 piezometer cluster, located approximately 20 feet from the shoreline of Great Pond, vertical gradients were upward between all piezometers for the Jun 21, 2016 round and mixed during the May 18, 2016 round of water level measurements. Upward gradients at this location are consistent with groundwater discharge to nearby Great Pond.

At both the MTER-6 and MTER-9 well clusters there was little to no vertical elevation difference between wells. This may be due to the long well screens that effectively average and minimize potentiometric differences between wells.

### **Water Level Measurements at WP-2 and SW-102**

Water levels were recorded at 15-minute intervals at WP-2 and SW-102 from April to June 2016. WP-2 and SW-2 are separated by about 20 feet horizontally, however SW-102 is completed in the upland adjacent to the Great Pond shoreline and WP-2 is screened within the shallow sediment of Great Pond. In order to illustrate the differences in water level between the two measuring points, data are plotted from June 1 to June 22, 2016 in Figure 4. Tidal variation is apparent in both sets of water level measurements but is more pronounced in WP-2. The tide cycle variation in water level is about 0.5 feet at SW-102 but is closer to 2.5 feet at WP-2, although the magnitudes at both wells vary depending on the tidal range in Great Pond. Groundwater elevations at SW-102 are greater than those at WP-2 except at very high tide.

When groundwater samples were taken from WP-1 and WP-3, the water level in each well was measured against the surface water at the time of sampling. The water level of the wellpoint was higher than the surface water elevation by 0.1 to 0.2 feet during the May 2016 measurement round. Water was observed flowing from the WP-3 measuring point during the June 2016 sampling event, so its water level could not be measured at that time. This prevents estimation of the difference in between groundwater and surface-water elevations but there was obviously an upward gradient. The groundwater level in the well was approximately 2 feet above the pond bottom in both rounds of sampling. These measurements indicate groundwater discharge to the pond from adjacent upland.

## Estimated Groundwater Velocity

Groundwater velocities were estimated based on sediment characteristics identified within the screened interval of the water-table wells and with the horizontal groundwater gradients measured during this round of water level measurement. We used Darcy's Law to estimate groundwater velocity:

$$V = (K * i) / n$$

Where,

V is the groundwater velocity (ft/day);

K is the hydraulic conductivity (ft/day) estimated from Freeze & Cherry (1979);

i is the hydraulic gradient (ft/ft); and,

n is the porosity (dimensionless).

**Table 3 - Groundwater Velocity Estimates at Shorewood Drive Site, Falmouth, MA**

	MTER-7 to SW-101 (May 2016)	MTER-7 to SW-101 (June 2016)
Sediment characteristic and estimated hydraulic conductivity (ft/day)	medium to coarse sand 250	
Porosity (estimated), n (-)	0.25	
Horizontal gradient, i (ft/ft)	0.003	0.002
Estimated horizontal groundwater velocity, V (ft/day)	3.0	2.1

Horizontal gradients were calculated across multiple segments. The average gradients between MTER-7 and SW-101 in May and June 2016 were used to calculate overall groundwater velocities at the site (Table 3).

The estimated groundwater velocity is 2.1 to 3.0 feet per day in the shallow water table zone using the overall site gradients between MTER-7 to SW-101.

The velocity estimates represent the water table zone of groundwater flow. The coarser gravel zone encountered at 77 feet bgs at PZ-1 suggests a higher velocity is possible in deeper aquifer zones. Groundwater velocities greatly influence overall mass flux of groundwater and dissolved chemical constituents. These data combined with the observed upward gradients at the Great Pond well points and at

the PZ-2 wells adjacent to the pond suggest local groundwater discharge from shallow and intermediate groundwater zones to nearby Great Pond.

### **Water Quality Data Summary**

Field-measured and laboratory-analyzed constituents for both rounds of sampling are listed in Table 4 for new two-inch wells and Table 5 for existing two-inch wells. The MTER-4 sampling port data are listed in Table 6 and piezometer water quality data are included in Table 7. DO in mg/L and nitrate-N are highlighted in blue and green respectively for ease of table review.

Laboratory-measured pH at water-table wells ranged from 4.0 to 6.0 at both on-site and off-site wells. At MTER-6 the lower pH overall was measured at MTER-6D (-25 ft. msl interval). At the MTER-4 sampling ports the deeper monitoring points tended to have higher pH (MTER-4 sampling ports). All pH values at the MTER-9 wells were below 5.0. At the PZ-1 cluster pH did not vary greatly with depth and was measured between 5 and 6. The pH dipped below 5.0 at the PZ-2d piezometer completed at -28 ft. msl. Field-measured specific conductance (SC) was measured between 80 and 580  $\mu\text{S}/\text{cm}$  at new water table wells. At the deepest piezometers and sampling ports, SC was generally below 100 and exceeded 400  $\mu\text{S}/\text{cm}$  at the shallow measuring ports. Field-measured DO varied between wells with the lowest DO measured below -27 ft. msl. However DO concentrations increased slightly at the deepest piezometers in the PZ-2 cluster (< 45 ft. msl) and at the deepest sampling port at MTER-4 (-55 ft. msl).

The concentration of laboratory-analyzed nitrogen compounds at sampling points was similar to that observed by MTER (2015). Nitrate-N concentrations were greatest between -11 and -23 ft. msl at the MTER sampling ports with the highest concentration detected at 14 mg-N/L (Figure 5). At the PZ-1 piezometer cluster the highest nitrate-N was at -23 ft. msl at 7.1 mg-N/L in June 2016 (Figure 6) and at the PZ-2 cluster closest to Great Pond, nitrate-N peaked at -27 ft. msl at 10 mg-N/L in May 2016 (Figure 7). At the well points installed in Great Pond, nitrate-N was measured at 7.9 mg-N/L at WP-1 in May 2016 and 7.8 mg-N/L at WP-3 in June 2016. These well points are screened approximately 0.5 feet below the bottom of the pond between -2 and -5 ft msl.

At most wells nitrate-N was the major nitrogen species but ammonia-N was also present at several wells. At SW-101, low concentrations of nitrate-N were detected but elevated ammonia-N was detected in both rounds at 5.3 and 3.65 mg-N/L respectively. At this well, redox potential was low and DO was measured below 1.0 mg/L. Alkalinity was much higher at SW-101 than at other water-table wells and sulfate was generally much lower than at other wells. Unique geochemical conditions at this well are suggested by these results. Organic sediments and fill were also observed near the water table at this well, which may impact shallow groundwater chemistry in this location.

At most other wells, ammonia-N concentrations were low or below detection limits. However at WP-3, the southernmost well point, ammonia-N was detected at 0.8 mg-N/L in May with a corresponding nitrate-N concentration of 2.5 mg-N/L. During the June 2016 round, nitrate-N was measured at 7.8 mg-N/L and ammonia-N was below detection limits at WP-3.

A surface water sample was collected from Great Pond near WP-3 during the June 2016 sampling round. The concentration of nitrate-N in the surface water was 0.8 mg-N/L and minor concentrations of nitrite-N and ammonia-N were also detected. The SC was 750 in surface water compared to 286  $\mu\text{S}/\text{cm}$  from the adjacent groundwater sampling point WP-3. This suggests brackish but not highly saline water in the pond at that time. Relatively low concentrations of dissolved metals were detected in the surface water sample.

## Summary

The installation of additional water-table wells, two sets of nested piezometers, and well points driven into Great Pond added significantly to the hydrogeologic understanding of the site and confirmed much of the water quality data evaluated in previous investigations.

- Native subsurface sediments were primarily medium to coarse sand, likely glacial outwash deposits.
- Significant amounts of fill, wood, and asphalt were detected within the first 20 feet of drilling at PZ-1 near Route 28. At SW-101 fill was also encountered in the first 10 feet and organic sediments were noted just below this fill layer.
- Dense gravel and cobbles were encountered at the bottom of PZ-1 (at 77.5 feet bgs) and silt and clay layers were detected at depth in PZ-2 close to Great Pond.
- Groundwater flows from northeast to southwest towards Great Pond.
- Well MTER-10 had an anomalously higher groundwater elevation than presumably upgradient well SW-103 located in the northeast portion of the site.
- The average hydraulic gradient is 0.004 and the groundwater velocity is estimated at 4.0 ft/day along the flow line between MTER-7 and SW-101. If the hydraulic gradient between SW-103 to SW-101 is used, the velocity is approximately 2.1 ft/day.
- Modest downward gradients were measured in the northerly upland piezometer cluster PZ-1 and upward gradients were measured at PZ-2, the piezometer cluster closest to Great Pond.
- Continuously measured water levels illustrate the tidal impact on water levels near and beneath Great Pond. At SW-102 a water-table well installed adjacent to Great Pond, tidally induced changes are approximately 0.5 feet in magnitude. Water levels in a well point installed in the sediments beneath Great Pond itself (WP-2) are also significantly influenced by tidal changes

- with a variation over 2.5 feet. The water level elevation is generally lower in Great Pond well points than at nearby upland water-table wells.
- Well point groundwater levels were greater than surface water levels indicating upward gradients and groundwater discharge to the pond.
  - Nitrate-N was measured at significant concentrations in groundwater. The highest concentration measured at a water table well was at MTER-9c and -9D at 14 mg-N/L.
  - The highest concentrations of nitrate-N at a discrete depth in vertical profile occurred between elevation -14 and -18 ft msl in the upper portion of the site at MTER-4 (14 mg-N/L) and PZ-1D (-21 ft msl) near Route 28 at 7.1 mg/L N/L and at PZ-2D (-27 ft msl) near Great Pond at 10 mg-N/L.
  - Ammonia-N was detected in significant concentrations (3.6 to 5.3 mg-N/L) at water table well SW-101 during both sampling rounds and accounted for the majority of nitrogen at this well.
  - The concentration of nitrate-N measured in Great Pond during the June 2016 round was 0.5 mg-N/L.

### **Preliminary Recommendations**

- Conduct in-situ hydraulic conductivity testing to more accurately estimate groundwater velocity and mass flux;
- Sample selected wells or piezometers for stable N isotopes to determine source and denitrification characteristics at various sampling depths.
- Evaluate whether fill material encountered within the northern portion of the site may impact PRB operation or post PRB installation water quality;
- Further evaluate high ammonia-N detected at SW-101; and
- Continue to measure water levels regularly to determine seasonal changes in vertical gradient and groundwater/surface water interaction.

### **Cited references:**

Freeze, R. A., and J. A. Cherry, 1979. *Groundwater*. Prentice Hall, Englewood Cliffs, New Jersey.

MTER, 2015. Falmouth Acapesket Peninsula Groundwater Investigation Phase 2 Report. MT Environmental Restoration, December 21, 2015.

<b>Table 1 - Well/Piezometer Construction Details - Shorewood Drive Site, Falmouth, MA</b>									
<b>Well and Piezometer Installation - WaterVision LLC - April 2016</b>									
<b>Well Designation</b>	<b>Date of installation</b>	<b>Well Diameter (inches)</b>	<b>Top of PVC/Steel Casing (ft. msl)*</b>	<b>Ground Elevation (ft. msl)*</b>	<b>Total Depth of boring/ core (ft)</b>	<b>Top of screen (feet bgs)**</b>	<b>Bottom of screen (feet bgs)**</b>	<b>Elevation - Top of Screen (ft. msl)*</b>	<b>Elevation - Bottom of Screen (ft. msl)*</b>
PZ-1a	4/15/16	1	13.09	13.58	78.0	67.5	68.5	-53.92	-54.92
PZ-1b	4/15/16	1	12.96	13.52	54.5	53.5	54.5	-39.98	-40.98
PZ-1c	4/15/16	1	13.05	13.39	44.4	43.4	44.4	-30.01	-31.01
PZ-1d	4/15/16	1	13.00	13.31	34.6	33.6	34.6	-20.29	-21.29
PZ-1e	4/15/16	1	13.01	13.43	24.6	23.6	24.6	-10.17	-11.17
PZ-2a	4/13/16	1	3.97	4.35	70.0	62.6	63.6	-58.25	-59.25
PZ-2b	4/13/16	1	4.06	4.39	56.8	55.8	56.8	-51.41	-52.41
PZ-2c	4/13/16	1	4.04	4.43	44.5	43.5	44.5	-39.07	-40.07
PZ-2d	4/13/16	1	4.15	4.52	32.6	31.6	32.6	-27.08	-28.08
PZ-2e	4/13/16	1	4.11	4.55	20.8	19.8	20.8	-15.25	-16.25
SW-101	4/14/16	2	11.25	11.72	30.0	12.0	17.0	-0.28	-5.28
SW-102 (1)	4/14/16	2	4.24	4.67	10.0	5.0	10.0	-0.33	-5.33
SW-103	4/15/16	2	17.66	18.17	30.0	18.0	23.0	0.17	-4.83
SW-104	4/15/16	2	15.85	16.30	30.0	15.0	20.0	1.30	-3.70
WP-1	4/15/16	1.25	5.61	-1.57	3.5	0.5	3.5	-2.07	-5.07
WP-2 (1)	4/15/16	1.25	5.57	-1.69	3.5	0.5	3.5	-2.19	-5.19
WP-3	4/15/16	1.25	5.86	-1.36	3.5	0.5	3.5	-1.86	-4.86
<b>Wells Previously Installed by MT Environmental Restoration or US Geological Survey</b>									
MTER-4	Oct-15	1.25	17.74	NA	74.0	Multiport Sampler completed with 15 ports spaced at 4' intervals			
MTER-6a	Oct-15	2	8.64	NA	70.0	60.0	70.0	-51.36	-61.36
MTER-6b	Oct-15	2	8.59	NA	60.0	50.0	60.0	-41.41	-51.41
MTER-6c	Oct-15	2	8.77	NA	50.0	40.0	50.0	-31.23	-41.23
MTER-6d	Oct-15	2	8.81	NA	40.0	30.0	40.0	-21.19	-31.19
MTER-6e	Oct-15	2	8.98	NA	30.0	20.0	30.0	-11.02	-21.02
MTER-6f	Oct-15	2	8.97	NA	17.0	7.0	17.0	1.97	-8.03
MTER-7	May-15	2	22.84	NA	28.0	18.0	28.0	4.84	-5.16
MTER-8	May-15	2	32.31	NA	37.0	27.0	37.0	5.31	-4.69
MTER-9a	May-15	2	17.44	NA	74.0	64.0	74.0	-46.56	-56.56
MTER-9b	May-15	2	17.54	NA	64.0	54.0	64.0	-36.46	-46.46
MTER-9c	May-15	2	17.43	NA	44.0	34.0	44.0	-16.57	-26.57
MTER-9d	May-15	2	17.20	NA	24.0	14.0	24.0	3.20	-6.8
MTER-10	Oct-15	2	12.67	NA	20.0	10.0	20.0	2.67	-7.33
MTER-11	Oct-15	2	27.14	NA	35.0	25.0	35.0	2.14	-7.86
MTER-12	Oct-15	2	33.61	NA	44.0	29.0	44.0	4.61	-8.15

\* Surveyed to NAVD88 by CEI (WV) and Town of Falmouth (MTER). Town of Falmouth data converted to NAVD88 by subtracting 0.86' as per CEI

\*\* bgs- below land surface

(1) Onset HOBO pressure transducer installed in well 4/14/16

Table 2a - Water Level Elevations and Vertical Gradients at Water-Table Wells and Piezometers - Falmouth-Sailfish ISC Site

Well	Top of PVC Casing (ft. msl)*	Elevation - Bottom of Screen (ft. msl)	May 18, 2016 measurement round				June 21, 2016 measurement round			
			Depth to Groundwater (ft below top of PVC casing)	Groundwater Elevation (ft msl)	Estimated Vertical Gradients		Depth to Groundwater (ft below top of PVC casing)	Groundwater Elevation (ft msl)	Estimated Vertical Gradients	
SW-101	11.25	-5.3	9.18	2.07			9.51	1.74		
SW-102 (1)	4.24	-5.3	2.98	1.26			2.97	1.27		
SW-103	17.66	-4.8	14.92	2.74			15.29	2.37		
SW-104	15.85	-3.7	14.14	1.71			14.45	1.40		
					Vertical gradient relative to adjacent shallow well				Vertical gradient relative to adjacent shallow well	
MTER-6f	8.97	-6.8	7.14	1.83			7.38	1.59		
MTER-6e	8.98	-19.8	7.13	1.85	-0.002		7.44	1.54	0.004	
MTER-6d	8.81	-29.9	6.97	1.84	0.001		7.25	1.56	-0.002	
MTER-6c	8.77	-40.0	6.92	1.85	-0.001		7.22	1.55	0.001	
MTER-6b	8.59	-50.1	6.74	1.85	0.000		7.05	1.54	0.001	
MTER-6a	8.64	-60.2	6.79	1.85	0.000		7.11	1.53	0.001	
MTER-7	22.84	-4.0	19.21	3.63			19.72	3.12		
MTER-8	32.31	-3.5	28.38	3.93			28.87	3.44		
MTER-9d	17.20	-5.5	15.09	2.11			15.41	1.79		
MTER-9c	17.43	-25.5	15.32	2.11	0.000		15.63	1.80	0.000	
MTER-9b	17.54	-45.4	15.44	2.10	0.001		15.69	1.85	-0.003	
MTER-9a	17.44	-55.4	15.35	2.09	0.001		15.65	1.79	0.006	
MTER-10	12.67	-6.1	10.12	2.55			10.5	2.17		
MTER-11	27.14	-7.9	24.21	2.93			24.64	2.50		
MTER-12	33.61	-8.2	NM	-			31.69	1.92		
					Vertical gradient relative to adjacent shallow piezometer				Vertical gradient relative to adjacent shallow piezometer	
Piezometers shallow (e) to deep (a)										
PZ-1e	13.01	-11.2	10.82	2.19			11.14	1.87		
PZ-1d	13.00	-21.3	10.95	2.05	0.014	downward	11.15	1.85	0.002	slightly downward
PZ-1c	13.05	-31.0	10.98	2.07	-0.002	slightly upward	11.2	1.85	0.000	flat
PZ-1b	12.96	-41.0	10.78	2.18	-0.011	upward	11.08	1.88	-0.003	slightly upward
PZ-1a	13.09	-54.9	11.85	1.24	0.068	strongly downward	11.52	1.57	0.022	strongly downward
PZ-2e	4.11	-16.3	2.86	1.25			3.51	0.60		
PZ-2d	4.15	-28.1	3.03	1.12	0.011	downward	3.35	0.80	-0.017	upward
PZ-2c	4.04	-40.1	2.68	1.36	-0.020	upward	3.03	1.01	-0.018	upward
PZ-2b	4.06	-52.4	2.82	1.24	0.010	downward	3.02	1.04	-0.002	upward
PZ-2a	3.97	-59.3	2.59	1.38	-0.020	upward	2.92	1.05	-0.001	upward
WP-1	5.51	-5.1	5.4	0.16			NM	-		
Great Pond at WP-1				0.06		upward				
WP-2 (1)	5.47	-5.2								
Great Pond at WP-2										
WP-3	5.76	-4.9	5.0	0.76			flowing slightly			upward
Great Pond at WP-3				0.56		upward				
(1) HOBO pressure transducer installed in well										elevated nitrate zone (> 2 mg/L)

Vertical gradient rankings  
 0.05 or greater - strongly upward  
 0.009 to 0.049- upward  
 less than 0.09 - slightly upward

\* Surveyed to NAVD88 by CEI (WV) and Town of Falmouth (MTER). Town of Falmouth data converted to NAVD88 by subtracting 0.86' as per CEI

-0.05 or greater - strongly downward  
 -0.009 to 0.049- downward  
 less than- 0.09 - slightly downward

Water Table Wells

**Table 2b - Horizontal Gradients - Shorewood Drive Site, Falmouth, MA**

Groundwater Flowline Endpoints	Calculated Horizontal Gradient		Description	
	May-16	Jun-16		
MTER-7 to SW-101	0.003	0.002	Overall Site Gradient Estimate	MTER-10 and SW-103 not considered
MTER-7 to MTER-10	0.002	0.002	Northeastern Area	using MTER- 10 elevation
MTER-10 to SW-101	0.003	0.002	Northwestern Area	using MTER- 10 elevation
MTER-7 to SW-103	0.003	0.003	Northeastern Area	using SW-103 elevation
SW-103 to SW-101	0.002	0.002	Overall Site Gradient Estimate	using SW-103 elevation

Table 3 - New Water Table Well and Surface Water Sampling Data Summary, Shorewood Drive Site, Falmouth, MA

Sample ID/Location	SW-101		SW-102		SW-103		SW-104		WP-1		WP-3		Great Pond at	Great Pond at
	5/26/16	6/23/16	5/25/16	6/22/16	5/25/16	6/23/16	5/25/16	6/22/16	5/25/16	6/22/16	5/25/16	6/22/16	5/25/16	6/22/16
Field Measurements														
pH (SU)	6.05	6	6.0	5.81	5.39	5.91	4.65	5.03	4.62	NA	5.9	4.3	6.62	6.29
Temperature (°C)	10.6	11.6	11.3	14	12.2	12.6	12.9	12.8	16.2	NA	16.8	23.9	20.7	24.4
Dissolved Oxygen(DO; mg/L)	0.56	1.57	4.6	0.5	0.3	11.2 R	7.7	8.01	4.47	NA	1.2	4.63	9.9	6.7
Conductivity (uS/cm)	580	536	78	87	455	458	277	571	212	NA	716	286	825	750
Redox Potential (ORP; mV)	24.9	-34.6	128	189	172	77	195	112	203	NA	184	280.2	184	281
Laboratory Analyses														
Nitrate as N (mg/L)	<0.019	0.041 J	0.13	0.13	7.8	7.3	2.7	2.6	7.9		2.5	7.8		0.80
Nitrite as N (mg/L)	0.024 J	0.028 J	<0.010	<0.010	<0.010	<0.010	0.016 J	0.012 J	<0.010	NA	<0.010	0.016 J	NA	0.011 J
Ammonia as N (mg/L)	5.30	3.65	<0.028	<0.028	<0.028	0.048 J,E	<0.028	<0.028	0.029 J	NA	0.815	<0.028	NA	0.039 J
Total Kjeldahl Nitrogen (TKN) (mg/L)	5.70	4.80	0.694	<0.066	<0.132	0.218 J	0.257 J	0.55	0.146 J	NA	4.08	0.158 J	NA	0.330
Total Nitrogen (mg/L)	5.7	4.8	0.82	<0.30	7.8	7.3	2.7	3.2	7.9	NA	6.6	7.8	NA	1.1
Orthophosphate (mg/L)	0.007	0.015	0.007	0.009	0.005		0.005	0.006	0.005	NA	0.012	0.007	NA	0.007
Total Alkalinity (mg/L as CaCO3)	131	107	17.6	19.2	10.1	8.70	ND	ND	2.00	NA	41.7	ND	NA	12.4
Chloride (mg/L)	72.6	141	7.76	7.64	81	127	48.3	111	23.0	NA	138	41.1	NA	192
Sulfate (mg/L)	0.263 J	0.307 J	5.16	5.41	8.04	10.3	12.4	12.4	12.8	NA	16.0	14.9	NA	29.8
Dissolved Iron (mg/L)	19	18	2.2	0.13	0.27	<0.02 E	0.14	0.19	<0.020	NA	0.49	0.14	NA	0.22
Dissolved Manganese (mg/L)	0.566	0.546	0.0599	0.0101	0.197	0.021	0.0763	0.082	0.241	NA	0.0814	0.224	NA	0.030
Dissolved Boron (mg/L)	0.055	0.045	0.0175 J	0.0157 J	0.0238 J	0.025 J	0.0176 J	0.017 J	0.0362	NA	0.0386	0.028 J	NA	0.059
Dissolved Arsenic (mg/L)	<0.002	0.003 J	0.0041 J	<0.0020	0.003 J	0.003 J,E	0.0045 J	<0.002	<0.0059	NA	0.005	0.004 J	NA	0.002 J
Dissolved Organic Carbon (mg/L)	11	10	3.0	3.0	1.1	1.2	1.4	1.6 J	0.89	NA	3.0	1.2	NA	2.1

Notes:

J - Data indicates a presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

R - Suspected error in field measurements

NS - Not Sampled / NM - Not Measured / NA - Not Analyzed

E - Exceeded RPD of 20%

**Table 4 - Existing 2-inch Monitoring Wells Water Quality - Shorewood Drive Site, Falmouth, MA**

Sample ID/Location	MTER-6A		MTR-6B		MTER-6C		MTER-6D		MTER-6E	
	5/25/16	6/22/16	5/25/16	6/22/16	5/25/16	6/22/16	5/25/16	6/22/16	5/25/16	6/22/16
<b>Field Measurements</b>										
pH (SU)	5.22	4.42 R	5.63	5.80	5.47	5.62	4.73	5.13	5.37	5.69
Temperature (°C)	12.3	12.1	12.1	12.3	12.4	12.3	13	12.66	12.9	12.5
Dissolved Oxygen(DO; mg/L)	0.5	0.8	0.23	0.5	0.5	0.8	6.7	10.24	5.4	11.9
Specific Conductance(uS/cm)	101	110	118.2	123	151	129	928	425	994	702
Redox Potential (ORP; mV)	154	147	150.6	72	156	95	194	121	196	111
<b>Laboratory Analyses</b>										
pH (SU)	NA	5.6	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate as N (mg/L)	1.5	1.5	1.6	1.7	3.3	2.8	8.6	6.9	9.0	6.6
Total Kjeldahl Nitrogen (TKN) (mg/L)	<0.066	<0.066	0.265 J	0.122 J	0.143 E	0.15 J	0.170 J	0.143 J	<0.132	<0.132
Total Nitrogen (mg/L)	1.5	1.5	1.6	1.7	3.3	2.8	8.6	6.9	9.0	6.6
Dissolved Iron (mg/L)	0.047 J	0.25	0.51	0.27	0.11 E	0.059	<0.020	0.026 J,E	<0.020	0.021 J
Dissolved Manganese (mg/L)	0.0651	0.105	0.263	0.244	0.0856	0.0611	0.219	0.088	0.0209	0.0096 J
Dissolved Arsenic (mg/L)	0.0028 J	<0.0020	0.0033 J	<0.0020	0.0026 J	<0.0020	0.0055	<0.0020	0.0032 J	<0.0020
Dissolved Organic Carbon (mg/L)	0.43 J	0.44 J	0.83	0.89 J	1.6	1.9	1.0 J	0.84 J,E	1.1 J	1.3

**Notes:**

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R - Suspected error in field measurements

NS - Not Sampled / NM -Not Measured /NA-Not Analyzed

E- Exceeded RPD of 20%

**Table 4 - Existing 2-inch Monitoring Wells Water Quality - Shorewood Drive Site, Falmouth, MA**

Sample ID/Location	MTER-6F		MTER-7	MTER-8	MTER-9A		MTER-9B	
	5/25/16	6/22/16	5/25/16	5/25/16	5/25/16	6/21/16	5/25/16	6/21/16
<b>Field Measurements</b>								
pH (SU)	5.95	5.75	5.6	5.1	4.39	4.86	4.69	4.97
Temperature (°C)	12.2	11.6	13.7	13.6	12.5	12.4	12.8	12.6
Dissolved Oxygen(DO; mg/L)	1.4	4.1	7.5	6.7	0.2	6.8	0.0	4.2
Specific Conductance(uS/cm)	121	186	408	199	112	109	154	134
Redox Potential (ORP; mV)	169	125	150.2	154	171	329	149	345
<b>Laboratory Analyses</b>								
pH (SU)	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate as N (mg/L)	0.79	1.4	6.6	9.0	2.1	2.2	4.6	3.1
Total Kjeldahl Nitrogen (TKN) (mg/L)	0.264 J	0.353	<0.132 E	0.141 J	0.677	<0.066	0.183 J	0.104
Total Nitrogen (mg/L)	0.79	1.8	6.6	9.0	2.8	2.2	4.6	3.1
Dissolved Iron (mg/L)	0.047 J	0.075	<0.02 E	<0.02	<0.020	<0.020	0.060	0.025 J
Dissolved Manganese (mg/L)	0.0073 J	0.0138	0.024	0.168	0.0146	0.0121	0.0396	0.0338
Dissovled Arsenic (mg/L)	0.0025 J	<0.0020	<0.002	<0.002	0.0027 J	<0.0020	<0.0020	<0.0020
Dissovled Organic Carbon (mg/L)	4.2	3.8	1.0		0.42 J	0.59 J,E	0.65 J	0.64

**Notes:**

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R - Suspected error in field measurements

NS - Not Sampled / NM -Not Measured /NA-Not Analyzed

E- Exceeded RPD of 20%

**Table 4 - Existing 2-inch Monitoring Wells Water Quality - Shorewood Drive Site, Falmouth, MA**

Sample ID/Location	MTER-9C		METER-9D		MTER-10		MTER-11	MTER-12
	5/25/16	6/21/16	5/25/16	6/21/16	5/25/16	6/22/16	5/25/16	5/25/16
<b>Field Measurements</b>								
pH (SU)	4.09	3.2 R	4.39	4.06 R	5.1	5.63	5	5.5
Temperature (°C)	19.9	13.6	13	13.4	10.5	12.4	13	15.3
Dissolved Oxygen(DO; mg/L)	0.4	8.6	0.3	8.6	3.6	5.2	7	5.4
Specific Conductance(uS/cm)	263	217	480	276	861	784	295	510
Redox Potential (ORP; mV)	203	282	238	208	120	109	146	122
<b>Laboratory Analyses</b>								
pH (SU)	NA	4.5	NA	4.5	NA	NA	NA	NA
Nitrate as N (mg/L)	14	14	10	14	8.9	5.7	5.5	6.6
Total Kjeldahl Nitrogen (TKN) (mg/L)	<0.330	0.872 J	0.804	0.458 J	<0.132	0.334	0.221 J	0.150 J
Total Nitrogen (mg/L)	14	14	11	14	8.9	6.0	5.5	6.6
Dissolved Iron (mg/L)	<0.020	<0.020	0.083	<0.020	0.03 J	0.023 J	<0.020	0.96
Dissolved Manganese (mg/L)	0.331	0.159	0.172	0.157	0.041	0.0477	0.092	0.167
Dissolved Arsenic (mg/L)	0.0072	0.0024 J	0.0046 J	0.0023 J	<0.002	<0.0020	<0.002	<0.002
Dissolved Organic Carbon (mg/L)	0.66 J	0.72	1.7		2.8	3.2	1.1	2.0

**Notes:**

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R - Suspected error in field measurements

NS - Not Sampled / NM - Not Measured / NA - Not Analyzed

E - Exceeded RPD of 20%

**Table 5- MTER-4 Multiport Well Water Quality - Shorewood Drive Site, Falmouth, MA**

Sample ID/Location	MTER-4-01 PT		MTER 4-02 GNT		MTER-4-03 RT		MTER-4-04 BUT	
Approximate Elevation of Sampling Port (ft. msl)	1.9		-2.1		-6.1		-10.1	
Sampling Date	5/18/16	6/21/16	5/18/16	6/21/16	1/0/00	6/21/16	5/18/16	6/21/16
<b>Field Measurements</b>								
pH (SU)	5.47	5.18	5.92	5.36	6.01	5.58	5.29	5.01
Temperature (°C)	11.6	13.9	11.4	14.1	12.7	13.6	13.1	13.8
Dissolved Oxygen(DO; mg/L)	3.8	3.04	7	5.21	7	7	8	6.7
Specific Conductance (uS/cm)	369	479	361	356	251	189	223	213
Redox Potential (ORP; mV)	NA	195	NA	214	NA	222	NA	245
<b>Laboratory Analyses</b>								
Nitrate as N (mg/L)	4.1	5.3	5.4	4.6	5.1	5.4	9.3	8.2
Total Kjeldahl Nitrogen (TKN) (mg/L)	0.114 J	0.179 J	0.084 J	<0.132	0.07 J	<0.132	0.122 J	<0.132
Total Nitrogen (mg/L)	4.1	5.3	5.4	4.6	5.1	5.4	9.3	8.2
Dissolved Iron (mg/L)	<0.020	<0.020	<0.020	0.028 J	<0.020	<0.020	<0.020	<0.020
Dissolved Manganese (mg/L)	0.0229	0.0470	0.0080 J	0.0174	0.0031 J	0.009 J	0.0421	0.341
Dissolved Arsenic (mg/L)	0.0043 J	0.0023 J	<0.0020	0.0028 J	<0.0020	<0.0020	0.0031 J	0.0026 J
Dissolved Organic Carbon (mg/L)	1.6	1.5 J	1.5 J	1.2	1.2	0.94 J	0.82 J	0.84 J

**Notes:**

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**Table 5- MTER-4 Multiport Well Water Quality - Shorewood Drive Site, Falmouth, MA**

Sample ID/Location	MTER-4-05- BKT		MTER-4-06-WT		MTER-4-07-O		MTER-4-08 GY	
Approximate Elevation of Sampling Port (ft. msl)	-14.1		-18.2		-22.2		-26.2	
Sampling Date	5/18/16	6/21/16	5/18/16	6/21/16	5/18/16	6/21/16	5/18/16	6/21/16
<b>Field Measurements</b>								
pH (SU)	4.71	4.33	NM	4.2	4.67	4.25	5.29	4.87
Temperature (°C)	12.3	13.9	12.5	13.6	12.3	14.0	12.5	13.8
Dissolved Oxygen(DO; mg/L)	6.1	5	6.0	5.2	4.1	4.2	0.02	1.91
Specific Conductance (uS/cm)	234	260	234.2	250	190	200	143	149
Redox Potential (ORP; mV)	NA	293	NA	307	NA	311	NA	293
<b>Laboratory Analyses</b>								
Nitrate as N (mg/L)	13	14	14	14	9.7	11	4.9	5.2
Total Kjeldahl Nitrogen (TKN) (mg/L)	<0.330	<0.330	<0.330	<0.330	<0.132	<0.330	<0.066	<0.132
Total Nitrogen (mg/L)	13	14	14	14	9.7	11	4.9	5.2
Dissolved Iron (mg/L)	<0.020	<0.020	0.091	<0.020	<0.020	<0.020	<0.020	<0.020
Dissolved Manganese (mg/L)	0.436	0.348	0.472	0.341	0.353	0.188	0.294	0.384
Dissolved Arsenic (mg/L)	0.0026 J	-0.0025 J	0.0034 J	0.0026 J	0.0104	0.0044 J	0.0030 J	<0.0020
Dissolved Organic Carbon (mg/L)	0.97 J	0.90 J	1.1	1.3	0.99 J	1.0	1.4	1.3

**Notes:**

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**Table 5- MTER-4 Multiport Well Water Quality - Shorewood Drive Site, Falmouth, MA**

Sample ID/Location	MTER-4-09-Y				MTER-4-10 P				MTER-04-11-GN				MTER-4-12-R			
Approximate Elevation of Sampling Port (ft. msl)	-30.2				-34.2				-38.2				-42.2			
Sampling Date	5/18/16		6/21/16		5/18/16		6/21/16		5/18/16		6/21/16		5/18/16		6/21/16	
<b>Field Measurements</b>																
pH (SU)	5.68		5.32		5.79		5.47		5.85		5.57		5.67		5.35	
Temperature (°C)	12.3		13.6		12.4		13.7		12.3		13.8		12.1		13.5	
Dissolved Oxygen(DO; mg/L)	0.03		1.7		0.02		1.34		0.0		1.91		0.01		1.5	
Specific Conductance (uS/cm)	152		137		112		112		111		117		97		105	
Redox Potential (ORP; mV)	NA		287.6		NA		288		NA		248		NA		267	
<b>Laboratory Analyses</b>																
Nitrate as N (mg/L)	3.6		1.6		0.14		0.028	J	<0.019		0.021	J	0.66		0.67	
Total Kjeldahl Nitrogen (TKN) (mg/L)	0.161	J	0.272	J	0.253	J	0.223		0.17	J	0.301		0.096	J	0.192	
Total Nitrogen (mg/L)	3.6		1.6		<0.30		<0.30		<0.30		0.3		0.66		0.67	
Dissolved Iron (mg/L)	<0.020		0.031	J	<0.020		<0.020		0.99		1.1		<0.020		<0.020	
Dissolved Manganese (mg/L)	0.0841		0.0751		0.0327		0.0346		0.0230		0.0227		0.291		0.32	
Dissolved Arsenic (mg/L)	<0.0020		<0.0020		<0.0020		0.0031	J	<0.0020		0.0027	J	<0.0020		<0.0020	
Dissolved Organic Carbon (mg/L)	3.1		3.8		2.4		2.0		1.5		1.5		1.1		0.79	

**Notes:**

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E- Exceeded RPD of 20%

**Table 5- MTER-4 Multiport Well Water Quality -  
Shorewood Drive Site, Falmouth, MA**

Sample ID/Location	MTER-4-13 BU		MTER-4-14 BK		MTER-4-15 W	
Approximate Elevation of Sampling Port (ft. msl)	-46.3		-50.3		-54.3	
Sampling Date	5/18/16	6/21/16	5/18/16	6/21/16	5/18/16	6/21/16
<b>Field Measurements</b>						
pH (SU)	5.44	5.01	5.54	5.1	6.00	5.44
Temperature (°C)	12.3	13.5	12.2	13.5	12.4	13.5
Dissolved Oxygen(DO; mg/L)	0.02	1.5	0.5	2.14	1.8	2.6
Specific Conductance (uS/cm)	99	127	86	94	101	106
Redox Potential (ORP; mV)	NA	292	NA	290	NA	241
<b>Laboratory Analyses</b>						
Nitrate as N (mg/L)	1.5	3.4	0.41	0.50	0.87	0.89
Total Kjeldahl Nitrogen (TKN) (mg/L)	<0.066	0.069 J	0.151 J	0.184 J	0.199 J	0.233 J
Total Nitrogen (mg/L)	1.5	3.4	0.41	0.50	0.87	0.89
Dissolved Iron (mg/L)	<0.020	<0.020	<0.020	<0.020	2.0	1.5
Dissolved Manganese (mg/L)	0.534	0.738	0.0765	0.0662	0.306	0.302
Dissolved Arsenic (mg/L)	0.0024 J	<0.0020	0.0031 J	<0.0020	0.0032 J	<0.0020
Dissolved Organic Carbon (mg/L)	0.58	0.72 J	0.55 J	0.81 J	0.47	0.55 J

**Notes:**

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E- Exceeded RPD of 20%

**Table 6 - New Piezometer Water Quality -  
Shorewood Drive Site, Falmouth, MA**

Sample ID/Location	PZ-1A		PZ-1B		PZ-1C		PZ-1D		PZ-1E	
	5/18/16	6/23/16	5/18/16	6/23/16	5/18/16	6/23/16	5/18/16	6/23/16	5/18/16	6/23/16
Sampling Date										
Field Measurements										
pH (SU)	5.84	6.63	5.25	5.84	5.55	5.88	5.20	5.92	5.84	5.56
Temperature (°C)	12.5	12.5	12.0	12.36	12.1	12.75	12.3	12.4	12.2	12.6
Dissolved Oxygen(DO; mg/L)	2.0	6.2	1.9	2.9	0.2	0.92	6	6.7	8.0	5.8
Specific Conductance(uS/cm)	106	96	107	94	96	87	163	217	229	324
Redox Potential (ORP; mV)	64	52	129	53	53	56.4	257	100	186	104
Laboratory Analyses										
pH (SU)	6.2	NA								
Nitrate as N (mg/L)	0.40	0.40	3.4	2.3	0.71	0.59	4.2	7.1	2.8	4.3
Nitrite as N (mg/L)	<0.010	<0.010	0.014 J	0.013 J	0.035 J	0.031 J	0.014 J	<0.010	0.066 J	<0.010
Ammonia as N (mg/L)	0.033 J	<0.028	0.044 J	<0.028	0.045 J	<0.028	0.037 J	<0.028	0.066 J	0.094
Total Kjeldahl Nitrogen (TKN) (mg/L)	0.312	0.240 J	0.096 J	<0.066	0.178 J	0.082 J	<0.066	0.199 J	0.272 J	<0.066
Total Nitrogen (mg/L)	0.71	0.4	3.4	2.3	0.71	0.59	4.2	7.1	2.8	4.3
Orthophosphate (mg/L)	0.024	0.043	0.004 J	0.006	0.004 J	0.005	0.002 J	0.005	0.005	0.005
Total Alkalinity (mg/L as CaCO3)	17.2	16.2	3.90	6.00	8.50	5.90	4.20	3.20	11.1	6.70
Chloride (mg/L)	12.3	11.7	12.8	12.9	12.6	12.8	24.9	32.8	42.5	83.8
Sulfate (mg/L)	6.93	8.07	5.14	7.03	9.02	11.2	9.70	9.26	12.0	6.85
Dissolved Iron (mg/L)	0.70	0.18	0.19	0.44	1.5	2.1	0.67	0.22	0.63	0.09
Dissolved Manganese (mg/L)	0.041	0.016	0.012	0.014	0.430	0.268	0.194	0.124	0.212	0.036
Dissolved Boron (mg/L)	0.010 J	0.013 J	0.021 J	0.018 J	0.017 J	0.016 J	0.023 J	0.029 J	0.040	0.036
Dissolved Arsenic (mg/L)	<0.002	0.002 J	0.002 J	<0.002	<0.002	0.003 J	<0.002	0.002 J	0.002 J	0.002 J
Dissolved Organic Carbon (mg/L)	0.48 J	0.54	0.43	0.69	0.6 J	0.76 J	0.77 J	0.81	1.2	0.95 J

Notes:

J - Data indicates a presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

R - Suspected error in field measurements

NS - Not Sampled / NM - Not Measured /NA-Not Analyzed

E- Exceeded RPD of 20%

**Table 6 - New Piezometer Water Quality -  
Shorewood Drive Site, Falmouth, MA**

Sample ID/Location	PZ-2A		PZ-2B		PZ-2C		PZ-2D		PZ-2E	
	5/18/16	6/22/16	5/18/16	6/22/16	5/18/16	6/22/16	5/18/16	6/22/16	5/15/16	6/22/16
Sampling Date										
Field Measurements										
pH (SU)	5.8 E	5.52	5.35	5.19	5.6	5.45	4.5	4.22	5.55	5.31
Temperature (°C)	12.0 E	12.2	11.9	12.3	12.4	12.3	12.7	12.5	12.3	12.1
Dissolved Oxygen(DO; mg/L)	5.3	5.18	1.3	0.4	0.5	0.09	2.3	3.04	7.0	7.9
Specific Conductance(uS/cm)	92	100	86	95	138	132	180	188	227	285
Redox Potential (ORP; mV)	325	184	336	204.1	199	206	364	256	280	254
Laboratory Analyses										
pH (SU)	NA	NA	5.5	NA	5.5	NA	4.4	NA	5.5	NA
Nitrate as N (mg/L)	0.50	0.46	0.41	0.3	4.3	1.8	10	8.6	4.9	5.6
Nitrite as N (mg/L)	<0.010	<0.010	<0.010	<0.010	0.052	1.8	<0.094	<0.010	<0.010	<0.010
Ammonia as N (mg/L)	0.034 E	<0.028	<0.028	0.029 J	0.131	0.047 J	<0.028	<0.028	0.045	<0.057
Total Kjeldahl Nitrogen (TKN) (mg/L)	0.072 J,E	0.135 J	0.205 J	0.116 J	<0.066	0.366	0.283 J	0.165 J	<0.066	0.09 J
Total Nitrogen (mg/L)	0.50	0.46	0.41	0.30	4.3	2.2	10	8.6	4.9	5.6
Orthophosphate (mg/L)	0.025	0.031	0.007	0.013	0.005	0.012	0.005	0.009	0.005	0.01
Total Alkalinity (mg/L as CaCO3)	9.30	8.70	5.90	5.40	17.4	19.3	ND	ND	9.20	8.10
Chloride (mg/L)	13.9	13.7	13.2	13.0	12.5	12.5	15.8	15.3	40.2	46.8
Sulfate (mg/L)	8.27	8.78	8.72	10.7	7.66	8.20	11.3	12	7.53	10.7
Dissolved Iron (mg/L)	<0.02	<0.020	0.1	0.092	0.18	0.031 J	0.06	<0.020	0.06	<0.020
Dissolved Manganese (mg/L)	0.018	0.0091	0.013	0.0193	0.072	0.0493	0.264	0.115	0.015	0.0095 J
Dissolved Boron (mg/L)	0.011 J	0.011 J	0.0150 J	0.0144 J	0.028 J	0.0193 J	0.028 J	0.0115 J	0.039	0.0338
Dissolved Arsenic (mg/L)	<0.002	<0.0020	<0.002	<0.0020	<0.002	<0.0020	0.015	0.0050	<0.002	<0.0020
Dissovled Organic Carbon (mg/L)	0.32	0.39 J	0.64	0.56	2.2	2.4	1.1		0.80	0.81 J

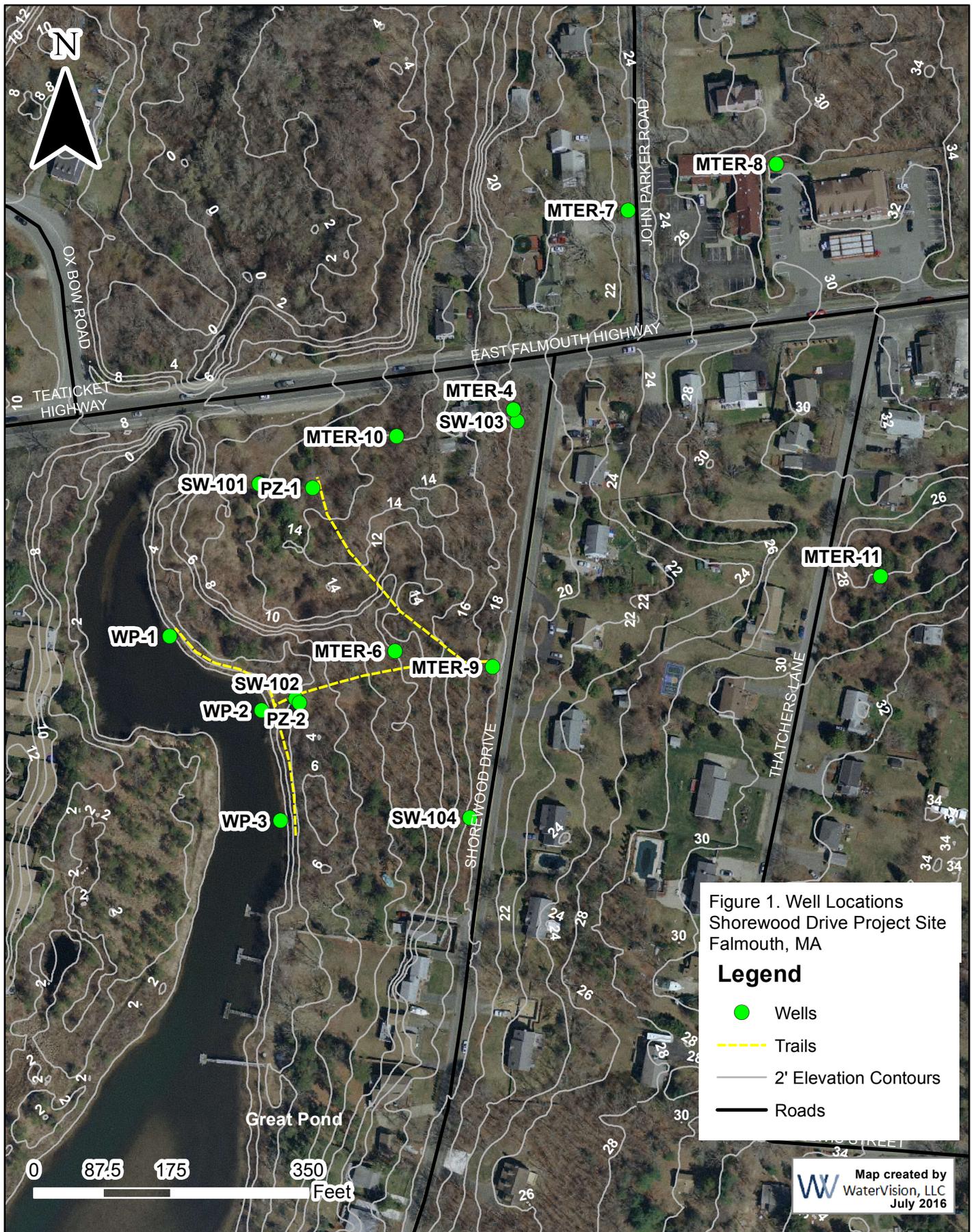
Notes:

J - Data indicates a presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

R - Suspected error in field measurements

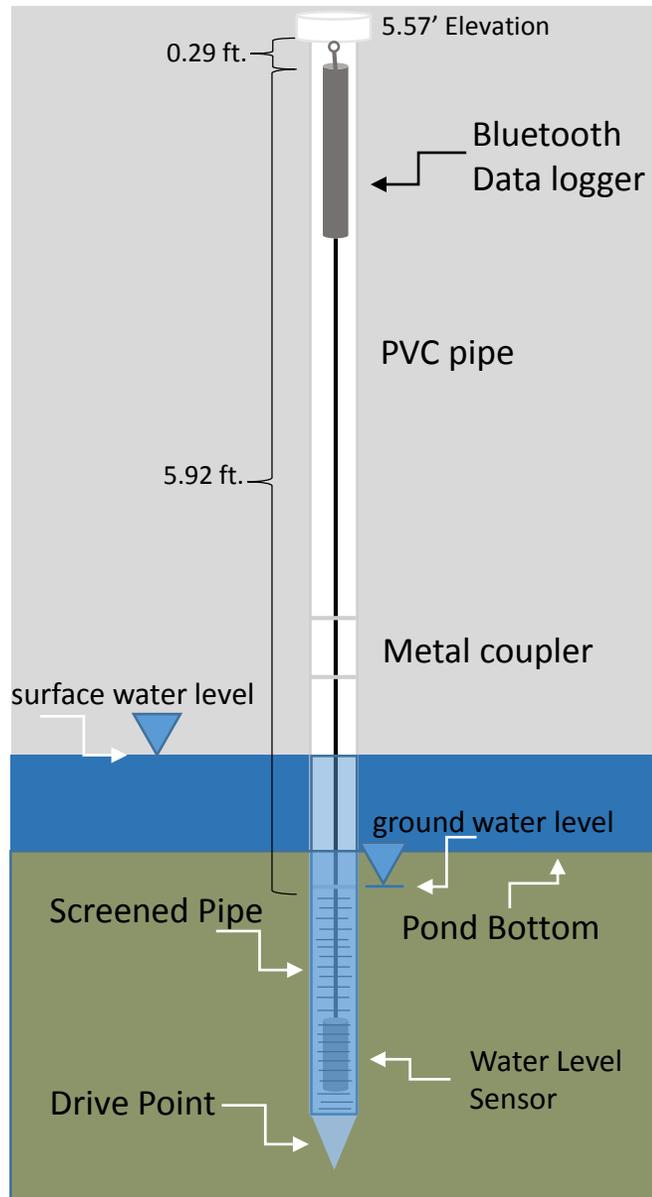
NS - Not Sampled / NM -Not Measured /NA-Not Analyzed

E- Exceeded RPD of 20%

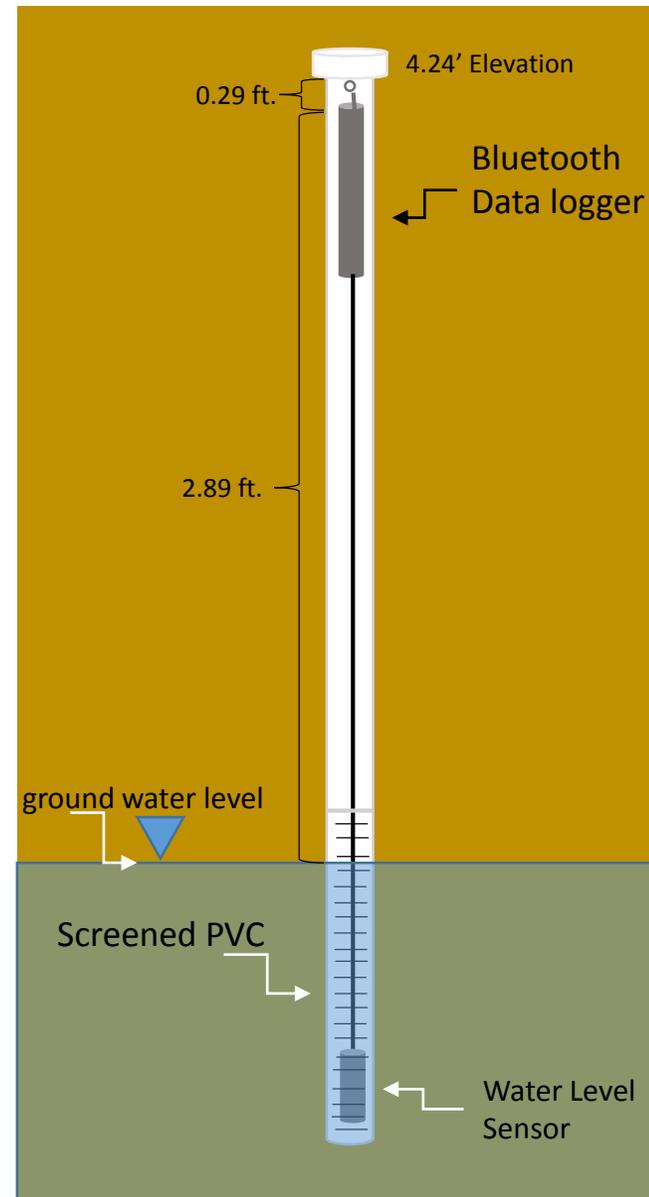


Sources: Aerial photography 2013-2014 and Roads from Mass GIS, Elevation contours from Cape Cod Commission, Site surveys completed by Falmouth Public Works Department and CEI to NAVD 88 vertical datum. MTER well locations and trails are approximate.

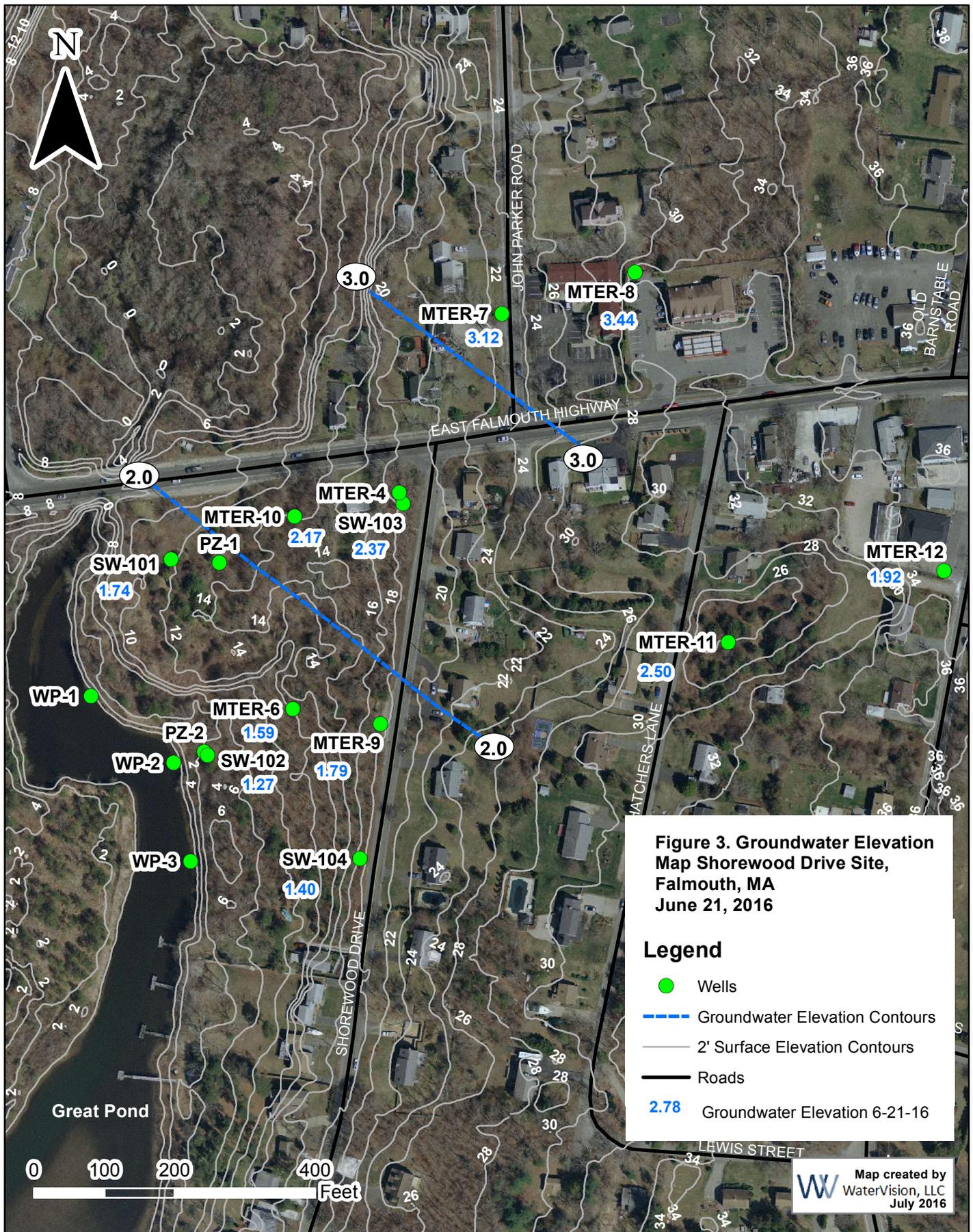
Figure 2- Onset Hobo Pressure Transducer Installation at Shorewood Drive PRB Pilot Site, Falmouth, MA



Installation at WP-2 in Great Pond

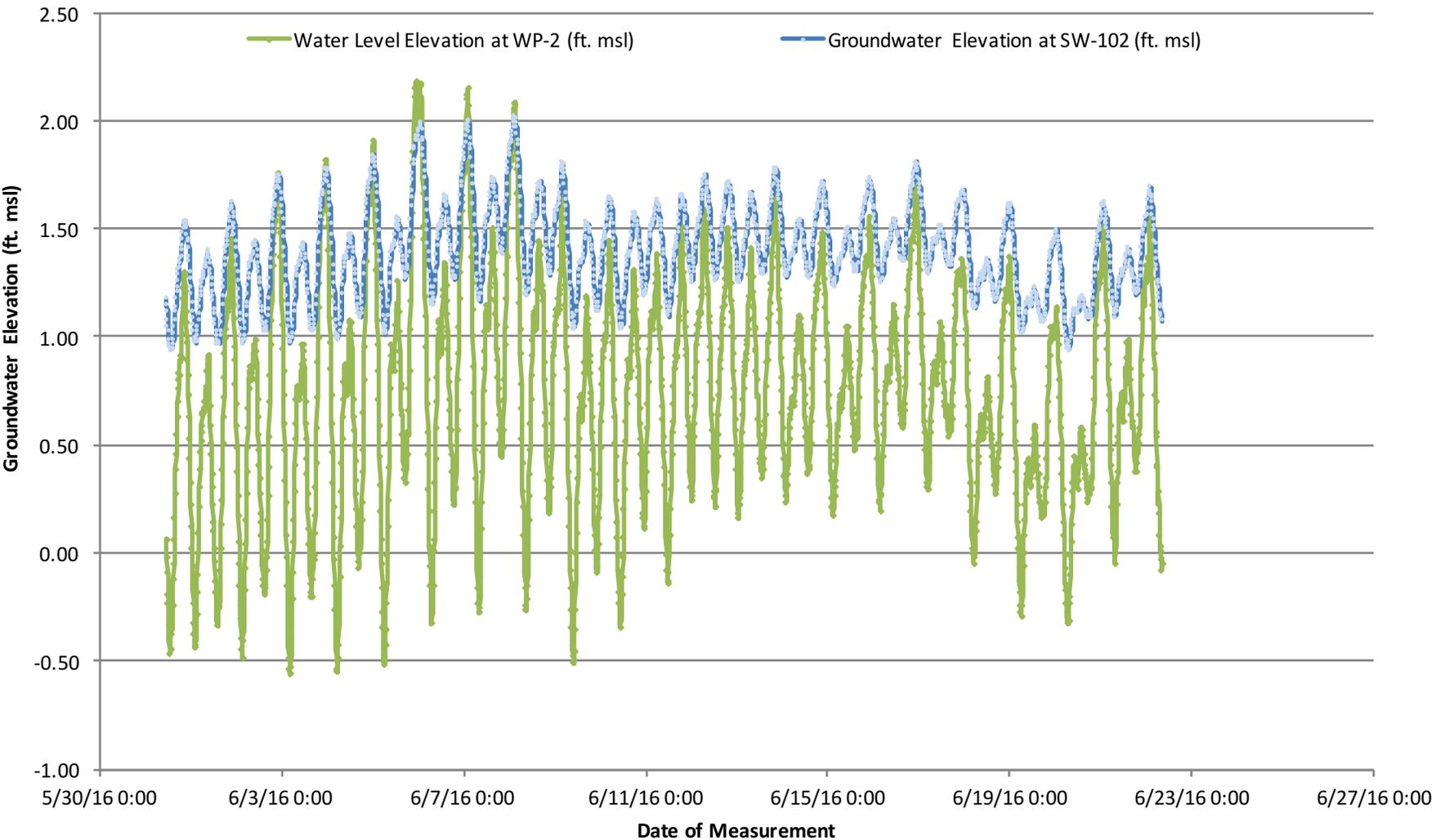


Installation at Water Table Well SW-102

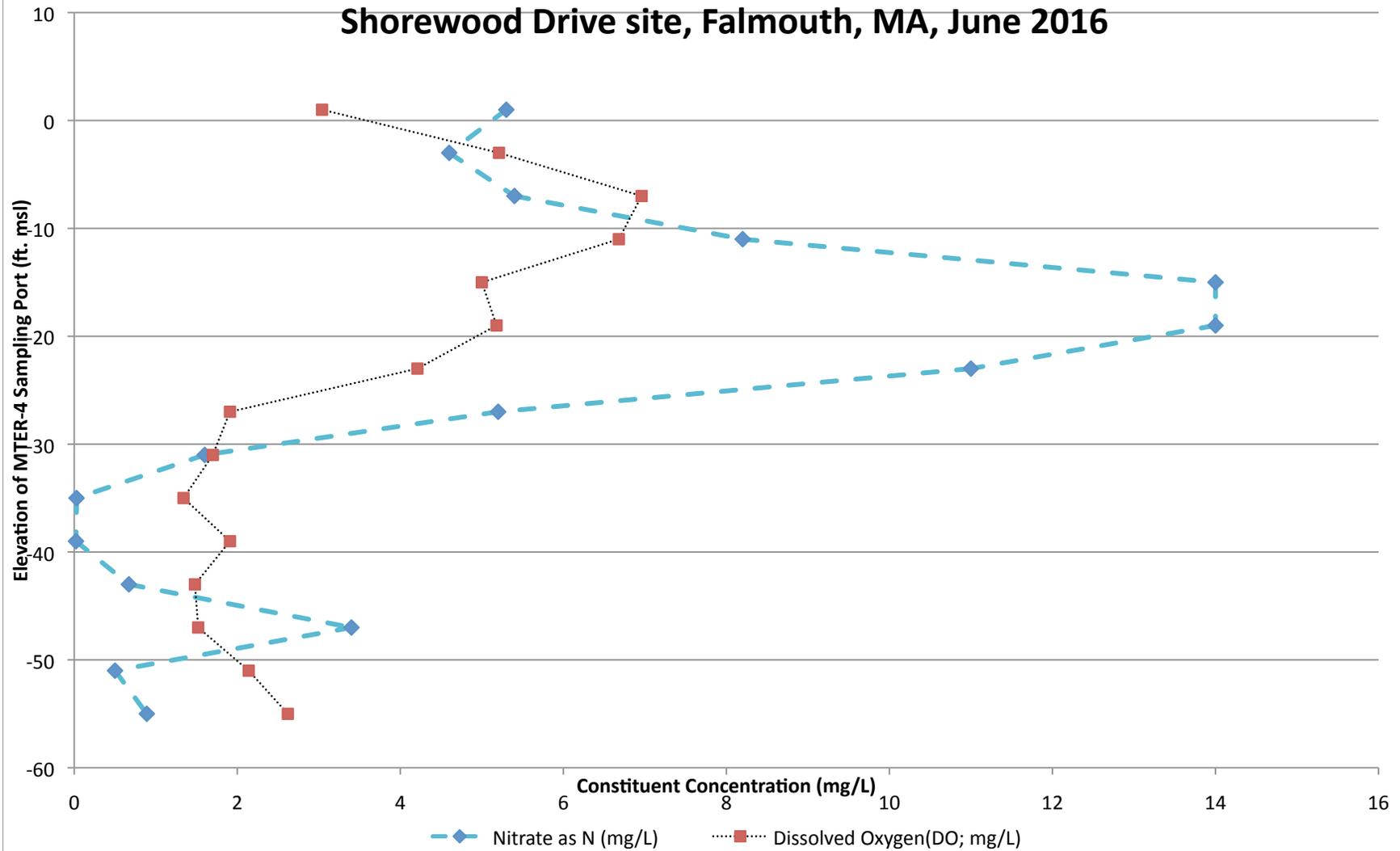


Sources: Aerial photography 2013-2014 and Roads from Mass GIS, Elevation contours from Cape Cod Commission, Site surveys completed by Falmouth Public Works Department and CEI to NAVD 88 vertical datum. MTER well locations are approximate.

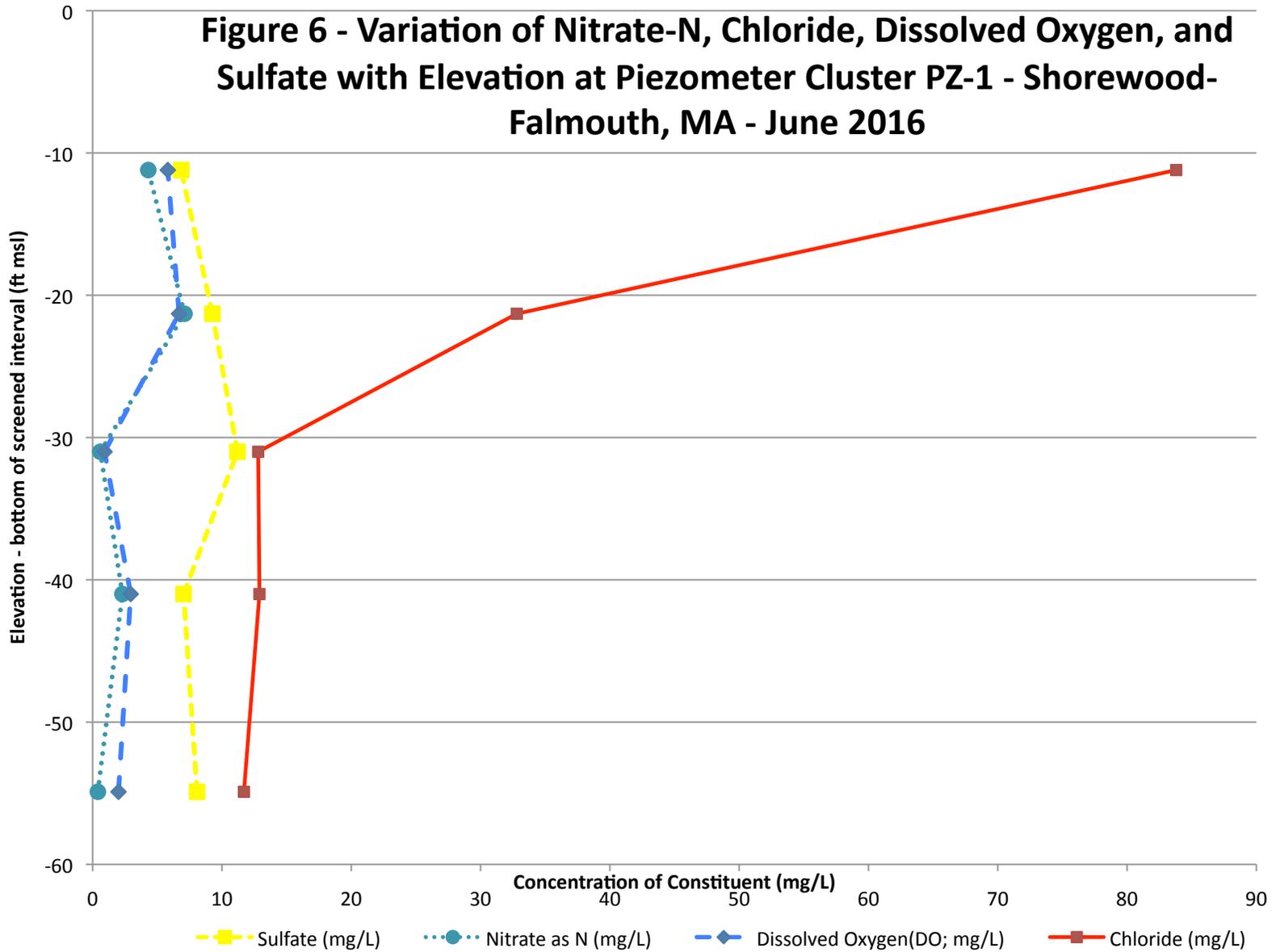
**Figure 4 - Continuous Water Level Measurements at WP-2 and SW-102, Shorewood Drive site, Falmouth, MA**



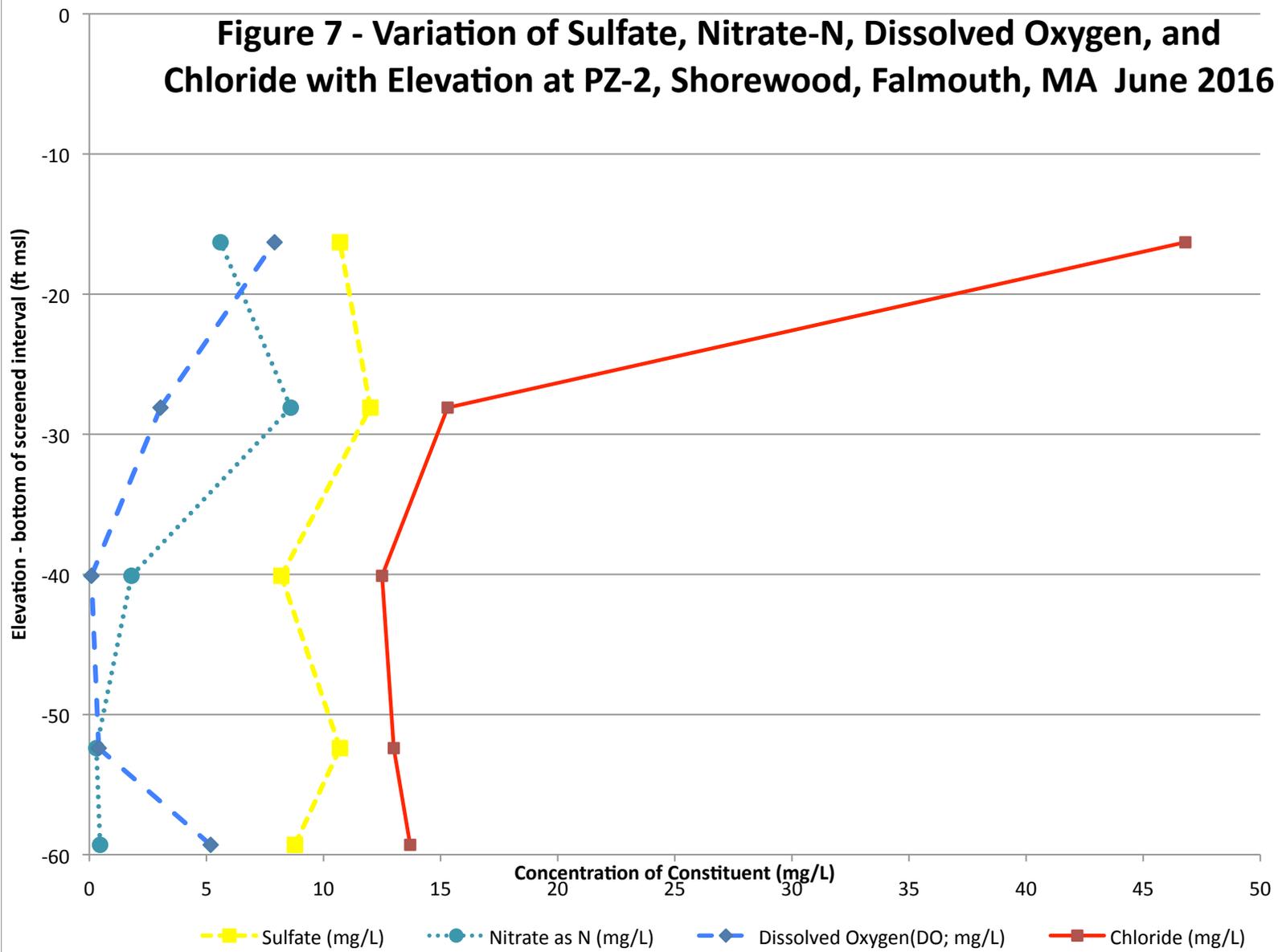
**Figure 5 - Variation in Nitrate-N and Dissolved Oxygen Concentrations with Elevation at MTER-4 Multiport Well, Shorewood Drive site, Falmouth, MA, June 2016**



**Figure 6 - Variation of Nitrate-N, Chloride, Dissolved Oxygen, and Sulfate with Elevation at Piezometer Cluster PZ-1 - Shorewood-Falmouth, MA - June 2016**



**Figure 7 - Variation of Sulfate, Nitrate-N, Dissolved Oxygen, and Chloride with Elevation at PZ-2, Shorewood, Falmouth, MA June 2016**



**SW-101**

**SW-102**

**SW-103**

**SW-104**



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**WELL / BORING SW-101**

Project: EPA Cape Cod PRB Project, Falmouth, MA  
 Location: Shorewood Drive - see Well ID Map  
 Driller: New England Geotech  
 WV Staff: Danna Truslow  
 Date: 4/13/2016

**NOTES:**  
 Top of PVC Casing (ft above msl): 11.25  
 Surface Elevation (ft above msl): 11.72  
 (1) Geoprobe Installation  
 (2) well constructed of 2" PVC  
 (3) well protected with road box

Elevation (ft above msl)	Depth (ft bls)	Sample Interval	Recovery (ft.)	Sample Descriptions and Classifications	Well Constr.	Remarks	
9	4	0 - 5'	3.0	0-9' A- rubble/ fill /dump materials and some organics			
6		5 - 10'	4.0				
3	8						
0	12	10 - 15'	No Recovery	Recovered material I- saturated organic sandy soil/ muck (dark brown)			top of bentonite at 9' water level at 10.2' top of filter pack at 11' top of screen at 12'
-3	16	15 - 20'	4.2	15-27.8' K - medium to coarse sand (grey, brown, tan)			
-6							bottom of well at 17'
-9	20	20 - 25'	2.6				
-12	24						
-15	28	25 - 30'	2.8				



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**WELL / BORING SW-102**

Project: EPA Cape Cod PRB Project, Falmouth, MA  
 Location: Shorewood Drive - see Well ID Map  
 Driller: New England Geotech  
 WV Staff: Danna Truslow  
 Date: 4/11/2016

**NOTES:**  
 Top of PVC Casing (ft above msl): 4.24  
 Surface Elevation (ft above msl): 4.61  
 (1) Geoprobe Installation  
 (2) well constructed of 2" PVC  
 (3) well protected with road box

Elevation (ft above msl)	Depth (ft bls)	Sample Interval	Recovery (ft.)	Sample Descriptions and Classifications	Well Constr.	Remarks	
3		0 - 5'	3.9	0-1.1' A- soil/ organics 1.1-3.15' D- medium to coarse sand dark (brown/ black)		top of bentonite at 2'	
0	4	5 - 10'	5	3.15-6.8' F- fine to coarse sand (dark brown) with gravel		top of filter pack at 4'	top of screen at 5'
-3	8			6.8-10' L- medium to coarse sand (brown, grey, and orange tinting)			water level at 7.6'
-6	12	10 - 15'	3.6				bottom of well at 10'
-9	16	15 - 20'	2.6				
-12	20	20 - 25'	3.2				
-15	24	25 - 30'	3.0				
-18	28						
-21							
-24							



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**WELL / BORING SW-103**

Project: EPA Cape Cod PRB Project, Falmouth, MA  
 Location: Shorewood Drive - see Well ID Map  
 Driller: New England Geotech  
 WV Staff: Danna Truslow  
 Date: 4/13/2016

**NOTES:**  
 Top of PVC Casing (ft above msl): 17.66  
 Surface Elevation (ft above msl): 18.13  
 (1) Geoprobe Installation  
 (2) well constructed of 2" PVC  
 (3) well protected with road box

Elevation (ft above msl)	Depth (ft bls)	Sample Interval	Recovery (ft.)	Sample Descriptions and Classifications	Well Constr.	Remarks
15	4	0 - 5'	2.9	0-0.3' A- soil/ organics 0.3-1.6' E- fine to coarse sand (dark red-brown) 1.6-13' J- medium to coarse sand (grey-brown) with minor gravel		
12	8	5 - 10'	No Recovery			
9	12	10 - 15'	3.0			top of bentonite at 11' top of filter pack at 13'
6	16	15 - 20'	2.5	15-29.2' L- medium to coarse sand (brown, grey, and orange tinting)		water level at 15.9'
3	20	20 - 25'	3.0			top of screen at 18'
0	24	25 - 30'	4.2			bottom of well at 23'
-3	28					



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**WELL / BORING SW-104**

Project: EPA Cape Cod PRB Project, Falmouth, MA  
 Location: Shorewood Drive - see Well ID Map  
 Driller: New England Geotech  
 WV Staff: Danna Truslow  
 Date: 4/13/2016

**NOTES:**  
 Top of PVC Casing (ft above msl): 15.85  
 Surface Elevation (ft above msl): 16.33  
 (1) Geoprobe Installation  
 (2) well constructed of 2" PVC  
 (3) well protected with road box

Elevation (ft above msl)	Depth (ft bls)	Sample Interval	Recovery (ft.)	Sample Descriptions and Classifications	Well Constr.	Remarks	
15		0 - 5'	2	0-0.8' A- soil/ organics 0.8-2' sand, gravel, and cobbles			
12	4	5 - 10'	3.9	5-8.9' G- medium sand (medium brown)			
9	8					top of bentonite at 8'	
6	10 - 15'	3.0	10-12.7' H- fine to medium sand (grey) with some coarse sand	top of filter pack at 10'			
3				12.7-28.9' L- medium to coarse sand (brown, grey, and orange tinting)			
0	15 - 20'	2.8				top of screen at 15'	
						water level at 15.5'	
-3	20	20 - 25'	3.8				bottom of well at 20'
-6							
-9	24	25 - 30'	3.9				
-12	28						

## **PZ-ALL**

### **Cape Cod Permeable Reactive Barrier Characterization Project**

Project Number - WV-1009  
Combined Description Piezometer Well Logs for  
Shorewood Drive- Falmouth, MA

#### **PZ-1ALL**

PZ-1e

PZ-1d

PZ-1c

PZ-1b

PZ-1a

#### **PZ-2ALL**

PZ-2e

PZ-2d

PZ-2c

PZ-2b

PZ-2a



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**WELL / BORING PZ-1 ALL**

Project: EPA Cape Cod PRB Project, Falmouth, MA  
 Location: Shorewood Drive - see Well ID Map  
 Driller: New England Geotech  
 WV Staff: Danna Truslow  
 Date: 4/12/2016

**NOTES:**

Top of PVC Casing (ft above msl): 13.01  
 Surface Elevation (ft above msl): 13.43  
 (1) Geoprobe Installation  
 (2) well constructed of 2" PVC  
 (3) well protected with road box

Elevation (ft above msl)	Depth (ft bis)	Sample Interval	Recovery (ft.)	Sample Descriptions	Well Construction	Remarks	Vertical Gradient	Nitrate-Nitrogen	ORP	DO	
							(ft/ft) 6/21/16	(mg/L) 6/23/16	(mV) 6/23/16	(mg/L) 6/23/16	
12	4	0 - 5'	4	0-0.6' A- soil/ organics 0.6-17.7' B- rubble/ fill / dump materials and some organics		water level at 10'     PZ-1e					
9	8	5 - 10'	No Recovery								
6	12	10 - 15'	2.5								
3	16	15 - 20'	4	17.7-20.7' E- fine to coarse sand (dark red-brown)							
0	20	20 - 25'	2.6	20.7-34.1' K- medium to coarse sand (grey, brown, tan)							
-3	24	25 - 30'	2.7								
-6								4.30	104	5.80	

\*Vertical Gradient Between Adjacent Piezometers



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WELL / BORING PZ-1 ALL

Elevation (ft above msl)	Depth (ft bis)	Sample Interval	Recovery (ft.)	Sample Descriptions	Well Construction	Remarks	Vertical Gradient	Nitrate-Nitrogen	ORP	DO
							(ft/ft) 6/21/16	(mg/L) 6/23/16	(mV) 6/23/16	(mg/L) 6/23/16
-15	28	25 - 30'	2.7	20.7-34.1' K- medium to coarse sand (grey, brown, tan)						
-18	32	30 - 35'	4.1							
-21	36	35 - 40'	2.9	35-57.7' O- medium to coarse sand (orange/tan) with minor coarse sand and gravel		PZ-1d	0.002	7.10	100	6.70
-24	40	40 - 45'	2.9							
-30	44	45 - 50'	2.7			PZ-1c	0.000	0.59	56	0.92
-33	48	50 - 55'	2.2							
-36	52	55 - 60'	2.5			PZ-1b	-0.003	2.30	53	2.90
-42	56									
-45										

\*Vertical Gradient Between Adjacent Piezometers



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WELL / BORING PZ-1 ALL

Elevation (ft above msl)	Depth (ft bis)	Sample Interval	Recovery (ft.)	Sample Descriptions	Well Construction	Remarks	Vertical Gradient	Nitrate-Nitrogen	ORP	DO
							(ft/ft) 6/21/16	(mg/L) 6/23/16	(mV) 6/23/16	(mg/L) 6/23/16
60	55 - 60'		2.5	60-72.7' Q- fine to coarse sand (orange)			0.022	0.40	52	6.20
-48	60 - 65'		3							
64						top of bentonite at 64.5'				
-51	64					top of filter pack at 66.5'				
-54	68	65 - 70'	2.5			PZ-1a				
-57	72	70 - 75'	2.7							
-60										
-63	76	75 - 80'	2.5	75-77.57' T- medium to coarse sand with gravel and cobbles						
-66	80					bottom of boring at 80'				
-69	84									
-72										
-75	88									

\*Vertical Gradient Between Adjacent Piezometers



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**WELL / BORING PZ-2 ALL**

Project: EPA Cape Cod PRB Project, Falmouth, MA  
 Location: Shorewood Drive - see Well ID Map  
 Driller: New England Geotech  
 WV Staff: Danna Truslow  
 Date: 4/11/2016

**NOTES:**

Top of PVC Casing (ft above msl): 4.11  
 Surface Elevation (ft above msl): 4.55  
 (1) Geoprobe Installation  
 (2) well constructed of 2" PVC  
 (3) well protected with road box

Elevation (ft above msl)	Depth (ft bis)	Sample Interval	Recovery (ft.)	Sample Descriptions	Well Construction	Remarks	Vertical Gradient (ft/ft) 6/21/16	Nitrate-Nitrogen (mg/L) 6/22/16	ORP (mV) 6/22/16	DO (mg/L) 6/22/16	
3		0 - 5'	3.9	0-1.1' A- soil/ organics							
				1.1-3.15' D- medium to coarse sand (dark brown/ black)							
0	4			3.15-6.8' F- fine to coarse sand (dark brown) with gravel							
		5 - 10'	5								
-3	8			6.8-17.6' L- medium to coarse sand (brown, grey, and orange tinting)			water level at 7.6'				
-6	12	10 - 15'	3.6								
-9											
-12	16	15 - 20'	2.6								
-15	20										
-18	24	20 - 25'	3.2	20-36.1' M- medium to coarse sand (interlayered grey and orange)		PZ-2e		5.60	254	7.90	
-21		25 - 30'	3.0								

\*Vertical Gradient Between Adjacent Piezometers



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WELL / BORING PZ-2 ALL

Elevation (ft above msl)	Depth (ft bis)	Sample Interval	Recovery (ft.)	Sample Descriptions	Well Construction	Remarks	Vertical Gradient	Nitrate-Nitrogen	ORP	DO
							(ft/ft) 6/21/16	(mg/L) 6/22/16	(mV) 6/22/16	(mg/L) 6/22/16
-24	28	25 - 30'	3.0	20-36.1' M- medium to coarse sand (interlayered grey and orange)		PZ-2d	-0.017	8.60	256	3.04
-27	32	30 - 35'	2.2							
-30	36	35 - 40'	2.8	36.1-42.8' N- fine to medium sand orange brown) with minor coarse sand		PZ-2c	-0.018	1.80	206	0.09
-33	40	40 - 45'	2.8							
-36	44	45 - 50'	2	45-46.3' O- medium to coarse sand (orange/tan) with minor coarse sand and gravel		PZ-2b	-0.002	0.30	204	0.40
-39	48	46.3-60.55'		46.3-60.55' P- fine to coarse sand (grey and tan)						
-42	52	50 - 55'	1.5							
-45	56	55 - 60'	2.2							
-48										
-51										
-54										

\*Vertical Gradient Between Adjacent Piezometers



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WELL / BORING PZ-2 ALL

Elevation (ft above msl)	Depth (ft bis)	Sample Interval	Recovery (ft.)	Sample Descriptions	Well Construction	Remarks	Vertical Gradient	Nitrate-Nitrogen	ORP	DO
							(ft/ft) 6/21/16	(mg/L) 6/22/16	(mV) 6/22/16	(mg/L) 6/22/16
	60	55 - 60'	2.2							
-57		60 - 65'	1.8	60.55-60.9' R- clayey fine sand (medium brown) 60.9-65.8' P- fine to coarse sand (grey and tan)		top of bentonite at 62'				
-60	64					top of filter pack at 64'				
		65 - 70'	1.6	65.8-66.6' S- finely layered silty sand, clay, coarse sand		PZ-2a bottom of well at 66'	-0.001	0.46	184	5.18
-63	68									
-66						bottom of boring at 70'				
-69	72									
-72	76									
-75	80									
-78	84									
-81	88									
-84										

\*Vertical Gradient Between Adjacent Piezometers

## Attachment B

### Water Quality Documentation

- Summary of Round 1 and Round 2 field sampling
- Summary of QA/QC data reviews
- Alpha Analytical laboratory reports

## **Site Characterization for Design of Pilot-Scale Permeable Reactive Barriers for Nitrogen Reduction in Groundwater on Cape Cod**

### **Falmouth - Shorewood Water Quality Sampling May 18, 25, & 26, 2016**

The first round of water quality sampling at the Falmouth - Shorewood Initial Site Characterization (ISC) site on Shorewood Drive took place on May 18<sup>th</sup>, 25<sup>th</sup>, and 26<sup>th</sup>. Due to the number of wells at this site and coordination with USGS on sampling the multi-port well, field work was broken up over two weeks. This field work encompassed tasks 2d and 2e - measuring water levels at wells and piezometers, developing and purging wells and piezometers, measuring field water quality parameters, and sampling each well and piezometer for laboratory analysis for a range of parameters. Danna Truslow and Samantha Wright of WaterVision LLC, Dennis LeBlanc and Robert Hull of USGS, and Marcel Belaval of the USEPA completed all field measurements and sampling.

Upon arrival at the site all wells and piezometers were opened and well caps removed to allow equilibration with the atmosphere. Tubing was dedicated for the PZ-2A-E piezometer cluster and the PZ-1A-E piezometer cluster. Tubing was re used for all other wells on the site. The off-site well MTER 8 was sampled last due to potential contamination in the well. Water levels were then measured to the nearest hundredth of a foot with a Solinst water level meter. Water levels were not measured on May 25<sup>th</sup> and 26<sup>th</sup> due to a malfunctioning water level meter.

Calibration of field parameter meters was also completed before sampling began each day. Field parameters values on each meter were also checked at the end of each day against parameter standards to gauge any drift during the day. A Yellow Springs Instrument (YSI) Model 556 multi-parameter sonde and a YSI Model 556 Pro multi-parameter sonde were used for field parameter sampling. The YSI - Pro was re-calibrated on the morning of May 18<sup>th</sup> after the initial meter check showed conductivity and DO readings out of normal range. This meter did not continue to have issues throughout the day. The YSI - Pro was also re-calibrated on May 25<sup>th</sup> after initial meter checks showed the conductivity value lower than the standard.

Well purging and sampling commenced after water level measurement was complete. A Geotech peristaltic pump was used to purge the piezometer clusters PZ-1 and PZ-2. A Grundfos Redi-Flo submersible pump was used to purge the remaining wells both on and off-site. All wells were purged of at least three well volumes (unless noted otherwise) or until field parameter measurements stabilized.

Field measurement of water temperature, pH, DO (mg/L), specific conductance, and oxidation/reduction potential (ORP) was regularly measured using the YSIs as purging continued. A visual description of the purged water was also noted. Initial samples were taken and measured using the calibration cup, however after initial

sediment buildup in the wells cleared, field parameter measurement continued using a flow through chamber to allow for more accurate DO measurements and for improved parameter stabilization during sampling. All field measurements and observations were noted on field sheets.

Water samples were taken in laboratory provided and pre-preserved sample bottles for the following parameters at all wells and piezometer installed by WV in 2016:

Name	Type
Nitrogen (total), Nitrogen (ammonia), Nitrogen (nitrate), Nitrogen (nitrite), Chloride, Sulfate, Total Alkalinity, Orthophosphate.	General chemistry
Organic carbon (dissolved)	Carbon analyses
Boron (dissolved), Iron (dissolved), Manganese (dissolved), Arsenic (dissolved)	Metals and minor elements

A reduced suite of parameters was analyzed at on site and off-site MTER wells including Total Nitrogen, nitrate-N, dissolved iron, manganese, and arsenic and dissolved organic carbon.

Samples taken for dissolved iron, manganese, arsenic and boron and for dissolved organic carbon analyses were first field filtered with a 0.45-micron cartridge filter before collection into sample bottles (see the exception on May 26<sup>th</sup>). Water samples collected for the remaining analyses were not field filtered. A duplicate set of samples was taken at one location for each day of sampling. Samples were kept on ice in laboratory provided coolers until laboratory courier pickup or delivery to Alpha Analytical Laboratory in Westborough, Massachusetts.

**May 18<sup>th</sup>, 2016**

The weather for May 18<sup>th</sup> was sunny to partly cloudy with temperatures in the low 60s. The following wells were purged and sampled on this sampling day: PZ-1A thru PZ-1E and PZ-2A thru PZ-2E. Additionally,

At PZ-1A no sample was taken for total nitrogen due to a missing bottle.

At PZ-2A the flow through chamber was leaking and the flow was only put through the flow through chamber at regular gallon intervals to take field parameter measurements. This may have had an impact on field parameter readings. The flow through chamber was fixed so that it no longer leaked prior to purging PZ-2B. A duplicate was taken at PZ-2A (PZ-2A DUP)

## **May 25<sup>th</sup>, 2016**

The weather for May 25<sup>th</sup> was sunny with temperatures in the 70s. The following wells were purged and sampled on this sampling day: MTER 6A-6F, MTER 9A-9D, SW-102, SW-103, SW-104, WP-1, and WP-2 (no sample was taken, just field parameters).

A duplicate was taken at MTER 6C on May 25<sup>th</sup>.

At SW-102 the Bluetooth water level logger was removed at 13:19 to purge and sample. It was placed back into the well at 13:41. This well was not purged a full three well volumes due to a miscalculation of total number of gallons that needed to be purged, however, readings were fairly stable when the sample was taken.

At WP-1, water temperatures were higher than expected. It is possible that the water warmed up as it passed through a distance of about 5-10 feet of tubing above the water before reaching the flow through chamber.

## **May 26<sup>th</sup>, 2016**

Weather conditions on May 26 were in the upper 70's and sunny. Danna Truslow was sampling alone early in the day and was joined by Marcel Beval at about 9:00 am. Wells MTER-7, -8-, -10, -11 and -12 were sampled in addition to SW-101. A duplicate was taken at MTER-7. MTER-12 was difficult to find as it had been covered by gravel. It was eventually uncovered and reflagged.

MTER-8 was the last location sampled. Some of the standard laboratory bottles were not available for this sampling, as they had been used for the un-anticipated duplicate. The bottles that were available were not the correctly preserved for dissolved metals and DOC, so the available bottles were thoroughly rinsed with deionized water to remove the incorrect preservative and unfiltered samples were collected into the bottles. It was noted on the bottle, on the chain of custody and upon delivery to the laboratory that this change in procedure had occurred and that the samples were to be laboratory filtered before analysis.

## **Falmouth - Shorewood Water Quality Sampling June 21, 22 & 23, 2016**

The second round of water quality sampling at the Falmouth - Shorewood Hydrologic Characterization (HC) site on Shorewood Drive took place on June 21, 22 and 23, 2016. This field work encompassed tasks 2d and 2e - measuring water levels at wells and piezometers, developing and purging wells and piezometers, measuring field water quality parameters, and sampling each well and piezometer

for laboratory analysis for a range of parameters. Danna Truslow and Sarah Large of WaterVision LLC completed all field measurements and sampling.

Upon arrival at the site all wells and piezometers were opened and well caps removed to allow equilibration with the atmosphere. Tubing was dedicated for the PZ-2A-E piezometer cluster and the PZ-1A-E piezometer cluster during the first round of sampling. New tubing (non-dedicated) was used for all other wells on the site. The off-site well MTER 8 was sampled last due to potential contamination in the well. Water levels were then measured to the nearest hundredth of a foot with a Solinst water level meter. The full round of water level measurements was made on June 22, 2016.

Calibration of field parameter meters was also completed before sampling began each day. Field parameters values on each meter were also checked at the end of each day against parameter standards to gauge any drift during the day. A Yellow Springs Instrument (YSI) Model 556 multi-parameter sonde and a YSI Model 556 Pro multi-parameter sonde were used for field parameter sampling. On June 22 in the afternoon it was noted that pH readings were out of normal range on the YSI-Pro. Samples taken at MTER-9c, -9d, and MTER-6a were also lab analyzed for pH. On June 23, 2016 only the YSI-556 was used for field parameter analysis.

Well purging and sampling commenced after water level measurement was complete. A Geotech peristaltic pump was used to purge the piezometer clusters PZ-1 and PZ-2. A Grundfos Redi-Flo submersible pump was used to purge the remaining wells both on and off-site. All wells were purged of at least three well volumes (unless noted otherwise) or until field parameter measurements stabilized.

Field measurement of water temperature, pH, DO (mg/L), specific conductance, and oxidation/reduction potential (ORP) was regularly measured using the YSIs as purging continued. A visual description of the purged water was also noted. Initial samples were taken and measured using the calibration cup, however after initial sediment buildup in the wells cleared, field parameter measurement continued using a flow through chamber to allow for more accurate DO measurements and for improved parameter stabilization during sampling. All field measurements and observations were noted on field sheets.

Water samples were taken in laboratory provided and pre-preserved sample bottles for the following parameters at all well installed by WV in 2016.

Name	Type
Nitrogen (total), Nitrogen (ammonia), Nitrogen (nitrate), Nitrogen (nitrite), Chloride, Sulfate, Total Alkalinity, Orthophosphate.	General chemistry

Organic carbon (dissolved)	Carbon analyses
Boron (dissolved), Iron (dissolved), Manganese (dissolved), Arsenic (dissolved)	Metals and minor elements

A reduced suite of parameters was analyzed at on site MTER wells including Total Nitrogen, nitrate-N, dissolved iron, manganese, and arsenic and dissolved organic carbon. No offsite wells were sampled in this round.

Samples taken for dissolved iron, manganese, arsenic and boron and for dissolved organic carbon analyses were first field filtered with a 0.45-micron cartridge filter before collection into sample bottles. Water samples collected for the remaining analyses were not field filtered. A duplicate set of samples was taken at one location for each day of sampling. The duplicate sample was taken at MTER9A on 6/21/16, at MTER-6D on 6/22/16, and at SW-103 on 6/23/16.

Samples were kept on ice in laboratory provided coolers until laboratory courier pickup or delivery to Alpha Analytical Laboratory in Westborough, Massachusetts.

### **June 21, 2016**

On June 21, 2016 all of the MTER -4 multilevel sampling ports were sampled. At least one liter of water was purged from each port before sampling. The flow cell was not used for sampling of field parameters at these locations. The two inch well cluster – MTER-9a, 9b, 9c and 9d were also sampled on June 21 and a duplicate sample was taken at MTER-9a. The pH readings were questioned during sampling of MTER-9C and 9D, so pH was included in laboratory parameters for these wells. The flow cell was employed for field parameter sampling at the MTER-9 well cluster.

### **June 22, 2016**

The MTER-6 two-inch well cluster (6A through 6F) were sampled first on June 22. A duplicate sample was taken at MTER-6D. The pH readings were slow to equilibrate on YSI-1 so pH was also measured with YSI-2 for several samples. A laboratory measured pH was included in analyses at MTER-6A. No further pH reading problems were noted after this well was sampled. Two inch wells MTER-10, SW-102 and SW-104 were also sampled on June 22. Piezometer cluster PZ-2a through 2e were sampled on June 22 using the peristaltic pump. Flow through cell analysis of field parameters was employed for all of these well sampled.

The well point WP-3 was also sampled using a peristaltic pump. The flow cell was not employed for sampling at WP-3. A surface water sample was taken from Green Pond adjacent to WP-3. The surface water sample was not filtered. WP-1 was attempted but not sampled for this round. The path to WP-3 was completely choked

with poison ivy vines that reached over four feet above our heads and the approach from the east and north was similarly choked. While sampling at the WP wells, several representatives from Onset instruments visited the site to try to determine data measurement issues at the WP-2 pressure transducer.

### **June 23, 2016**

On June 23, 2016, two inch wells SW-101 and SW-103 as well as the PZ-1a through PZ-1e were sampled. The flow cell was used for field parameter analysis at all locations. The duplicate sample was taken at SW-103.

## QAPP Documentation – Emily DiFranco, WaterVision LLC

6/16/2016

### **Falmouth-Shorewood Water Quality Sampling May 18, 25 and 26, 2016**

1. Review of Falmouth-Shorewood Fieldwork Summary memo
  - PZ-1A – no sample taken (no bottle)
  - PZ-2A – field parameters may be off (leaking flow chamber)
  - WP-2 – only field parameters
  - SW102- did not fully purge
  - WP-1 – higher water temperatures than expected
2. Shorewood data log books (sampling 5,18, 5.25, and 5,26)
3. Shorewood WQ Data Summary V1 review
  - Some data entered incorrectly from field data log (noted in QAQC tabs and highlighted in purple). These data were re-entered correctly in the 2-in and 1-in data tables.
  - RPD calculated for two field dupes collected. Eight total analytes exceeded the RFP of 20% for precision. They are highlighted in yellow.
    - If result was ND, <MDL was entered into spreadsheet. The MDL was used to calculate RPD in these cases.

7/27/2016

### **Falmouth-Shorewood Water Quality Sampling June 21-23, 2016**

1. Review of Falmouth-Shorewood Fieldwork Summary memo
2. Shorewood data log books
3. Shorewood WQ Data Summary V1 review
  - Some data entered incorrectly from field data log (noted in QAQC tabs and highlighted in purple). These data were re-entered correctly in the 2-in and 1-in data tables.
  - RPD calculated for two field dupes collected. Six total analytes exceeded the RFP of 20% for precision. They are highlighted in yellow.
    - If result was ND, <MDL was entered into spreadsheet. The MDL was used to calculate RPD in these cases.



## ANALYTICAL REPORT

Lab Number:	L1616088
Client:	Watervision, LLC 454 Court Street Suite 304 Portsmouth, NH 03801
ATTN:	Danna Truslow
Phone:	(603) 766-6670
Project Name:	USEPA-SHOREWOOD PRB
Project Number:	WV-1009
Report Date:	06/03/16

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), VA (460195), MD (348), IL (200077), NC (666), TX (T104704476), DOD (L2217), USDA (Permit #P-330-11-00240).

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Eight Walkup Drive, Westborough, MA 01581-1019  
508-898-9220 (Fax) 508-898-9193 800-624-9220 - [www.alphalab.com](http://www.alphalab.com)



**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

<b>Alpha Sample ID</b>	<b>Client ID</b>	<b>Matrix</b>	<b>Sample Location</b>	<b>Collection Date/Time</b>	<b>Receive Date</b>
L1616088-01	MTER-8	WATER	FALMOUTH, MA	05/26/16 12:30	05/26/16
L1616088-02	MTER-12	WATER	FALMOUTH, MA	05/26/16 11:45	05/26/16
L1616088-03	SW-101	WATER	FALMOUTH, MA	05/26/16 07:50	05/26/16
L1616088-04	MTER-7-DUP	WATER	FALMOUTH, MA	05/26/16 10:55	05/26/16
L1616088-05	MTER-10	WATER	FALMOUTH, MA	05/26/16 08:50	05/26/16
L1616088-06	MTER-7	WATER	FALMOUTH, MA	05/26/16 10:50	05/26/16
L1616088-07	MTER-11	WATER	FALMOUTH, MA	05/26/16 10:05	05/26/16

**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

### Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

#### HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

### Case Narrative (continued)

#### Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

#### Nitrogen, Total Kjeldahl

L1616088-01, -02, -05, -06, and -07: The sample has elevated detection limits due to the dilution required by the sample matrix.

#### Dissolved Organic Carbon

L1616088-02 through -07: The samples were field filtered; a filter blank was not received.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:

 Lura L Troy

Title: Technical Director/Representative

Date: 06/03/16

## METALS

**Project Name:** USEPA-SHOREWOOD PRB**Lab Number:** L1616088**Project Number:** WV-1009**Report Date:** 06/03/16**SAMPLE RESULTS**

Lab ID: L1616088-01

Date Collected: 05/26/16 12:30

Client ID: MTER-8

Date Received: 05/26/16

Sample Location: FALMOUTH, MA

Field Prep: Not Specified

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	06/02/16 10:25	06/02/16 21:56	EPA 3005A	1,6010C	FB
Iron, Dissolved	ND		mg/l	0.05	0.02	1	06/02/16 10:25	06/02/16 21:56	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.168		mg/l	0.010	0.002	1	06/02/16 10:25	06/02/16 21:56	EPA 3005A	1,6010C	FB



**Project Name:** USEPA-SHOREWOOD PRB**Lab Number:** L1616088**Project Number:** WV-1009**Report Date:** 06/03/16**SAMPLE RESULTS**

Lab ID: L1616088-02  
 Client ID: MTER-12  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/26/16 11:45  
 Date Received: 05/26/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	06/02/16 10:25	06/02/16 20:14	EPA 3005A	1,6010C	FB
Iron, Dissolved	0.96		mg/l	0.05	0.02	1	06/02/16 10:25	06/02/16 20:14	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.167		mg/l	0.010	0.002	1	06/02/16 10:25	06/02/16 20:14	EPA 3005A	1,6010C	FB



**Project Name:** USEPA-SHOREWOOD PRB**Lab Number:** L1616088**Project Number:** WV-1009**Report Date:** 06/03/16**SAMPLE RESULTS**

Lab ID: L1616088-03  
 Client ID: SW-101  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/26/16 07:50  
 Date Received: 05/26/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	06/02/16 10:25	06/02/16 20:30	EPA 3005A	1,6010C	FB
Boron, Dissolved	0.055		mg/l	0.030	0.007	1	06/02/16 10:25	06/02/16 20:30	EPA 3005A	1,6010C	FB
Iron, Dissolved	19		mg/l	0.05	0.02	1	06/02/16 10:25	06/02/16 20:30	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.566		mg/l	0.010	0.002	1	06/02/16 10:25	06/02/16 20:30	EPA 3005A	1,6010C	FB



**Project Name:** USEPA-SHOREWOOD PRB**Lab Number:** L1616088**Project Number:** WV-1009**Report Date:** 06/03/16**SAMPLE RESULTS**

Lab ID: L1616088-04  
 Client ID: MTER-7-DUP  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/26/16 10:55  
 Date Received: 05/26/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	06/02/16 10:25	06/02/16 20:34	EPA 3005A	1,6010C	FB
Iron, Dissolved	0.03	J	mg/l	0.05	0.02	1	06/02/16 10:25	06/02/16 20:34	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.026		mg/l	0.010	0.002	1	06/02/16 10:25	06/02/16 20:34	EPA 3005A	1,6010C	FB



**Project Name:** USEPA-SHOREWOOD PRB**Lab Number:** L1616088**Project Number:** WV-1009**Report Date:** 06/03/16**SAMPLE RESULTS**

Lab ID: L1616088-05  
 Client ID: MTER-10  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/26/16 08:50  
 Date Received: 05/26/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	06/02/16 10:25	06/02/16 20:38	EPA 3005A	1,6010C	FB
Iron, Dissolved	0.03	J	mg/l	0.05	0.02	1	06/02/16 10:25	06/02/16 20:38	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.041		mg/l	0.010	0.002	1	06/02/16 10:25	06/02/16 20:38	EPA 3005A	1,6010C	FB



**Project Name:** USEPA-SHOREWOOD PRB**Lab Number:** L1616088**Project Number:** WV-1009**Report Date:** 06/03/16**SAMPLE RESULTS**

Lab ID: L1616088-06  
 Client ID: MTER-7  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/26/16 10:50  
 Date Received: 05/26/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	06/02/16 10:25	06/02/16 21:03	EPA 3005A	1,6010C	FB
Iron, Dissolved	ND		mg/l	0.05	0.02	1	06/02/16 10:25	06/02/16 21:03	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.024		mg/l	0.010	0.002	1	06/02/16 10:25	06/02/16 21:03	EPA 3005A	1,6010C	FB



**Project Name:** USEPA-SHOREWOOD PRB**Lab Number:** L1616088**Project Number:** WV-1009**Report Date:** 06/03/16**SAMPLE RESULTS**

Lab ID: L1616088-07  
 Client ID: MTER-11  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/26/16 10:05  
 Date Received: 05/26/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	06/02/16 10:25	06/02/16 21:07	EPA 3005A	1,6010C	FB
Iron, Dissolved	ND		mg/l	0.05	0.02	1	06/02/16 10:25	06/02/16 21:07	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.092		mg/l	0.010	0.002	1	06/02/16 10:25	06/02/16 21:07	EPA 3005A	1,6010C	FB



Project Name: USEPA-SHOREWOOD PRB

Lab Number: L1616088

Project Number: WV-1009

Report Date: 06/03/16

## Method Blank Analysis Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01 Batch: WG899829-1									
Arsenic, Dissolved	ND	mg/l	0.005	0.002	1	06/02/16 10:25	06/02/16 20:55	1,6010C	FB
Iron, Dissolved	ND	mg/l	0.05	0.02	1	06/02/16 10:25	06/02/16 20:55	1,6010C	FB
Manganese, Dissolved	ND	mg/l	0.010	0.002	1	06/02/16 10:25	06/02/16 20:55	1,6010C	FB

### Prep Information

Digestion Method: EPA 3005A

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 02-07 Batch: WG899832-1									
Arsenic, Dissolved	ND	mg/l	0.005	0.002	1	06/02/16 10:25	06/02/16 19:16	1,6010C	FB
Boron, Dissolved	ND	mg/l	0.030	0.007	1	06/02/16 10:25	06/02/16 19:16	1,6010C	FB
Iron, Dissolved	ND	mg/l	0.05	0.02	1	06/02/16 10:25	06/02/16 19:16	1,6010C	FB
Manganese, Dissolved	ND	mg/l	0.010	0.002	1	06/02/16 10:25	06/02/16 19:16	1,6010C	FB

### Prep Information

Digestion Method: EPA 3005A

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** USEPA-SHOREWOOD PRB

**Project Number:** WV-1009

**Lab Number:** L1616088

**Report Date:** 06/03/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01 Batch: WG899829-2								
Arsenic, Dissolved	102		-		80-120	-		
Iron, Dissolved	90		-		80-120	-		
Manganese, Dissolved	92		-		80-120	-		
Dissolved Metals - Mansfield Lab Associated sample(s): 02-07 Batch: WG899832-2								
Arsenic, Dissolved	103		-		80-120	-		
Boron, Dissolved	102		-		80-120	-		
Iron, Dissolved	90		-		80-120	-		
Manganese, Dissolved	93		-		80-120	-		

### Matrix Spike Analysis Batch Quality Control

**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01    QC Batch ID: WG899829-4    QC Sample: L1616088-01    Client ID: MTER-8												
Arsenic, Dissolved	ND	0.12	0.122	102		-	-		75-125	-		20
Iron, Dissolved	ND	1	0.90	90		-	-		75-125	-		20
Manganese, Dissolved	0.168	0.5	0.611	89		-	-		75-125	-		20
Dissolved Metals - Mansfield Lab Associated sample(s): 02-07    QC Batch ID: WG899832-4    QC Sample: L1616088-02    Client ID: MTER-12												
Arsenic, Dissolved	ND	0.12	0.118	98		-	-		75-125	-		20
Boron, Dissolved	0.034	1	1.04	101		-	-		75-125	-		20
Iron, Dissolved	0.96	1	1.8	84		-	-		75-125	-		20
Manganese, Dissolved	0.167	0.5	0.595	86		-	-		75-125	-		20

## Lab Duplicate Analysis

Batch Quality Control

Project Name: USEPA-SHOREWOOD PRB

Project Number: WV-1009

Lab Number: L1616088

Report Date: 06/03/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG899829-3 QC Sample: L1616088-01 Client ID: MTER-8						
Arsenic, Dissolved	ND	ND	mg/l	NC		20
Iron, Dissolved	ND	ND	mg/l	NC		20
Manganese, Dissolved	0.168	0.169	mg/l	1		20
Dissolved Metals - Mansfield Lab Associated sample(s): 02-07 QC Batch ID: WG899832-3 QC Sample: L1616088-02 Client ID: MTER-12						
Arsenic, Dissolved	ND	ND	mg/l	NC		20
Iron, Dissolved	0.96	0.96	mg/l	0		20
Manganese, Dissolved	0.167	0.167	mg/l	0		20

# **INORGANICS & MISCELLANEOUS**

**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

**SAMPLE RESULTS**

**Lab ID:** L1616088-01  
**Client ID:** MTER-8  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/26/16 12:30  
**Date Received:** 05/26/16  
**Field Prep:** Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	9.0		mg/l	0.50	0.094	5	-	05/26/16 23:23	44,353.2	MR
Nitrogen, Nitrate/Nitrite	9.0		mg/l	0.50	0.094	5	-	05/26/16 23:23	44,353.2	MR
Total Nitrogen	9.0		mg/l	0.60	0.60	2	-	06/02/16 11:29	107,-	JO
Nitrogen, Total Kjeldahl	0.141	J	mg/l	0.600	0.132	2	06/01/16 12:29	06/01/16 22:33	121,4500N-C	AT



**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

**SAMPLE RESULTS**

**Lab ID:** L1616088-02  
**Client ID:** MTER-12  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/26/16 11:45  
**Date Received:** 05/26/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	6.6		mg/l	0.10	0.019	1	-	05/26/16 23:25	44,353.2	MR
Nitrogen, Nitrate/Nitrite	6.6		mg/l	0.10	0.019	1	-	05/26/16 23:25	44,353.2	MR
Total Nitrogen	6.6		mg/l	0.60	0.60	2	-	06/02/16 11:29	107,-	JO
Nitrogen, Total Kjeldahl	0.150	J	mg/l	0.600	0.132	2	06/01/16 12:29	06/01/16 22:33	121,4500N-C	AT
Dissolved Organic Carbon	2.0		mg/l	1.0	0.12	1	05/31/16 08:54	05/31/16 08:54	121,5310C	DW



**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

**SAMPLE RESULTS**

**Lab ID:** L1616088-03  
**Client ID:** SW-101  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/26/16 07:50  
**Date Received:** 05/26/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	131.		mg CaCO3/L	2.00	NA	1	-	05/27/16 09:53	121,2320B	AW
Nitrogen, Ammonia	5.30		mg/l	0.150	0.057	2	05/28/16 09:41	05/31/16 17:18	121,4500NH3-BH	JO
Nitrogen, Nitrite	0.024	J	mg/l	0.050	0.010	1	-	05/26/16 22:48	44,353.2	MR
Nitrogen, Nitrate	ND		mg/l	0.10	0.019	1	-	05/26/16 22:48	44,353.2	MR
Nitrogen, Nitrate/Nitrite	ND		mg/l	0.10	0.019	1	-	05/26/16 22:48	44,353.2	MR
Total Nitrogen	5.7		mg/l	0.60	0.60	2	-	06/03/16 10:37	107,-	JO
Nitrogen, Total Kjeldahl	5.70		mg/l	0.600	0.132	2	06/01/16 21:30	06/02/16 22:27	121,4500N-C	AT
Phosphorus, Orthophosphate	0.007		mg/l	0.005	0.001	1	-	05/27/16 01:02	121,4500P-E	MR
Dissolved Organic Carbon	11.		mg/l	2.0	0.24	2	05/31/16 08:54	05/31/16 08:54	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	72.6		mg/l	5.00	0.541	10	-	06/01/16 01:18	44,300.0	AU
Sulfate	0.263	J	mg/l	1.00	0.150	1	-	05/31/16 19:54	44,300.0	AU



**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

**SAMPLE RESULTS**

**Lab ID:** L1616088-04  
**Client ID:** MTER-7-DUP  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/26/16 10:55  
**Date Received:** 05/26/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	6.5		mg/l	0.10	0.019	1	-	05/26/16 22:49	44,353.2	MR
Nitrogen, Nitrate/Nitrite	6.5		mg/l	0.10	0.019	1	-	05/26/16 22:49	44,353.2	MR
Total Nitrogen	7.6		mg/l	0.60	0.60	2	-	06/02/16 11:29	107,-	JO
Nitrogen, Total Kjeldahl	1.06		mg/l	0.600	0.132	2	06/01/16 12:29	06/01/16 22:34	121,4500N-C	AT
Dissolved Organic Carbon	1.1		mg/l	1.0	0.12	1	05/31/16 08:54	05/31/16 08:54	121,5310C	DW



**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

**SAMPLE RESULTS**

**Lab ID:** L1616088-05  
**Client ID:** MTER-10  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/26/16 08:50  
**Date Received:** 05/26/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	8.9		mg/l	0.50	0.094	5	-	05/26/16 23:27	44,353.2	MR
Nitrogen, Nitrate/Nitrite	8.9		mg/l	0.50	0.094	5	-	05/26/16 23:27	44,353.2	MR
Total Nitrogen	8.9		mg/l	0.60	0.60	2	-	06/02/16 11:29	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.600	0.132	2	06/01/16 12:29	06/01/16 22:35	121,4500N-C	AT
Dissolved Organic Carbon	2.8		mg/l	2.0	0.24	2	05/31/16 08:54	05/31/16 08:54	121,5310C	DW



**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

**SAMPLE RESULTS**

**Lab ID:** L1616088-06  
**Client ID:** MTER-7  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/26/16 10:50  
**Date Received:** 05/26/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	6.6		mg/l	0.10	0.019	1	-	05/26/16 23:29	44,353.2	MR
Nitrogen, Nitrate/Nitrite	6.6		mg/l	0.10	0.019	1	-	05/26/16 23:29	44,353.2	MR
Total Nitrogen	6.6		mg/l	0.60	0.60	2	-	06/03/16 10:37	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.600	0.132	2	06/01/16 12:35	06/02/16 23:03	121,4500N-C	AT
Dissolved Organic Carbon	1.0		mg/l	1.0	0.12	1	05/31/16 08:54	05/31/16 08:54	121,5310C	DW



**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

**SAMPLE RESULTS**

**Lab ID:** L1616088-07  
**Client ID:** MTER-11  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/26/16 10:05  
**Date Received:** 05/26/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	5.5		mg/l	0.10	0.019	1	-	05/26/16 22:57	44,353.2	MR
Nitrogen, Nitrate/Nitrite	5.5		mg/l	0.10	0.019	1	-	05/26/16 22:57	44,353.2	MR
Total Nitrogen	5.5		mg/l	0.60	0.60	2	-	06/03/16 10:37	107,-	JO
Nitrogen, Total Kjeldahl	0.221	J	mg/l	0.600	0.132	2	06/01/16 12:35	06/02/16 23:05	121,4500N-C	AT
Dissolved Organic Carbon	1.1		mg/l	1.0	0.12	1	05/31/16 08:54	05/31/16 08:54	121,5310C	DW



**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

**Method Blank Analysis**  
**Batch Quality Control**

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 03 Batch: WG898193-1										
Nitrogen, Nitrite	ND		mg/l	0.050	0.010	1	-	05/26/16 21:32	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-07 Batch: WG898231-1										
Nitrogen, Nitrate	ND		mg/l	0.10	0.019	1	-	05/26/16 22:46	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-07 Batch: WG898232-1										
Nitrogen, Nitrate/Nitrite	ND		mg/l	0.10	0.019	1	-	05/26/16 22:46	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 03 Batch: WG898268-1										
Phosphorus, Orthophosphate	ND		mg/l	0.005	0.001	1	-	05/27/16 00:54	121,4500P-E	MR
General Chemistry - Westborough Lab for sample(s): 03 Batch: WG898420-1										
Alkalinity, Total	ND		mg CaCO3/L	2.00	NA	1	-	05/27/16 09:53	121,2320B	AW
General Chemistry - Westborough Lab for sample(s): 03 Batch: WG898692-1										
Nitrogen, Ammonia	ND		mg/l	0.075	0.028	1	05/28/16 09:41	05/31/16 17:00	121,4500NH3-BH	JO
General Chemistry - Westborough Lab for sample(s): 02-07 Batch: WG898925-1										
Dissolved Organic Carbon	ND		mg/l	1.0	0.12	1	05/31/16 08:54	05/31/16 08:54	121,5310C	DW
General Chemistry - Westborough Lab for sample(s): 01-02,04-05 Batch: WG899370-1										
Nitrogen, Total Kjeldahl	0.082	J	mg/l	0.300	0.022	1	06/01/16 12:29	06/01/16 22:29	121,4500N-C	AT
General Chemistry - Westborough Lab for sample(s): 06-07 Batch: WG899482-1										
Nitrogen, Total Kjeldahl	0.072	J	mg/l	0.300	0.022	1	06/01/16 12:35	06/02/16 22:51	121,4500N-C	AT
Anions by Ion Chromatography - Westborough Lab for sample(s): 03 Batch: WG899590-1										
Chloride	ND		mg/l	0.500	0.054	1	-	05/31/16 16:06	44,300.0	AU
Sulfate	ND		mg/l	1.00	0.150	1	-	05/31/16 16:06	44,300.0	AU
General Chemistry - Westborough Lab for sample(s): 03 Batch: WG899609-1										
Nitrogen, Total Kjeldahl	0.120	J	mg/l	0.300	0.022	1	06/01/16 21:30	06/02/16 22:23	121,4500N-C	AT

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** USEPA-SHOREWOOD PRB

**Project Number:** WV-1009

**Lab Number:** L1616088

**Report Date:** 06/03/16

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
General Chemistry - Westborough Lab Associated sample(s): 03 Batch: WG898193-2								
Nitrogen, Nitrite	98		-		90-110	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-07 Batch: WG898231-2								
Nitrogen, Nitrate	98		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-07 Batch: WG898232-2								
Nitrogen, Nitrate/Nitrite	98		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 03 Batch: WG898268-2								
Phosphorus, Orthophosphate	93		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 03 Batch: WG898420-2								
Alkalinity, Total	102		-		90-110	-		10
General Chemistry - Westborough Lab Associated sample(s): 03 Batch: WG898692-2								
Nitrogen, Ammonia	105		-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 02-07 Batch: WG898925-2								
Dissolved Organic Carbon	102		-		90-110	-		

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** USEPA-SHOREWOOD PRB

**Project Number:** WV-1009

**Lab Number:** L1616088

**Report Date:** 06/03/16

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-02,04-05 Batch: WG899370-2					
Nitrogen, Total Kjeldahl	95	-	78-122	-	
General Chemistry - Westborough Lab Associated sample(s): 06-07 Batch: WG899482-2					
Nitrogen, Total Kjeldahl	103	-	78-122	-	
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 03 Batch: WG899590-2					
Chloride	95	-	90-110	-	
Sulfate	97	-	90-110	-	
General Chemistry - Westborough Lab Associated sample(s): 03 Batch: WG899609-2					
Nitrogen, Total Kjeldahl	97	-	78-122	-	

### Matrix Spike Analysis Batch Quality Control

**Project Name:** USEPA-SHOREWOOD PRB

**Lab Number:** L1616088

**Project Number:** WV-1009

**Report Date:** 06/03/16

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	RPD Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 03 QC Batch ID: WG898193-4 QC Sample: L1616029-01 Client ID: MS Sample												
Nitrogen, Nitrite	ND	4	4.0	100	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG898231-4 QC Sample: L1616088-04 Client ID: MTER-7-DUP												
Nitrogen, Nitrate	6.5	4	10	88	-	-	-	-	83-113	-	-	6
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG898232-4 QC Sample: L1616088-04 Client ID: MTER-7-DUP												
Nitrogen, Nitrate/Nitrite	6.5	4	10	88	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 03 QC Batch ID: WG898268-4 QC Sample: L1615951-02 Client ID: MS Sample												
Phosphorus, Orthophosphate	0.016	0.5	0.523	101	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 03 QC Batch ID: WG898420-4 QC Sample: L1616029-01 Client ID: MS Sample												
Alkalinity, Total	38.8	100	144	105	-	-	-	-	86-116	-	-	10
General Chemistry - Westborough Lab Associated sample(s): 03 QC Batch ID: WG898692-4 QC Sample: L1616053-01 Client ID: MS Sample												
Nitrogen, Ammonia	0.112	4	4.14	101	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 02-07 QC Batch ID: WG898925-4 QC Sample: L1616088-04 Client ID: MTER-7-DUP												
Dissolved Organic Carbon	1.1	4	5.4	108	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-02,04-05 QC Batch ID: WG899370-4 QC Sample: L1615899-08 Client ID: MS Sample												
Nitrogen, Total Kjeldahl	0.677	8	6.82	77	-	-	-	-	77-111	-	-	24
General Chemistry - Westborough Lab Associated sample(s): 06-07 QC Batch ID: WG899482-4 QC Sample: L1616088-07 Client ID: MTER-11												
Nitrogen, Total Kjeldahl	0.221J	16	13.9	87	-	-	-	-	77-111	-	-	24

### Matrix Spike Analysis Batch Quality Control

**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Found	MSD %Recovery	Recovery Limits	RPD	RPD Limits
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 03 QC Batch ID: WG899590-3 QC Sample: L1615912-01 Client ID: MS Sample									
Chloride	20.3	4	23.4	78	-	-	40-151	-	18
Sulfate	25.6	8	33.0	92	-	-	60-140	-	20
General Chemistry - Westborough Lab Associated sample(s): 03 QC Batch ID: WG899609-4 QC Sample: L1616089-02 Client ID: MS Sample									
Nitrogen, Total Kjeldahl	0.443	8	7.82	92	-	-	77-111	-	24

## Lab Duplicate Analysis

### Batch Quality Control

Project Name: USEPA-SHOREWOOD PRB

Project Number: WV-1009

Lab Number: L1616088

Report Date: 06/03/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 03 QC Batch ID: WG898193-3 QC Sample: L1616029-01 Client ID: DUP Sample						
Nitrogen, Nitrite	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG898231-3 QC Sample: L1616088-04 Client ID: MTER-7-DUP						
Nitrogen, Nitrate	6.5	6.6	mg/l	2		6
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG898232-3 QC Sample: L1616088-04 Client ID: MTER-7-DUP						
Nitrogen, Nitrate/Nitrite	6.5	6.6	mg/l	2		20
General Chemistry - Westborough Lab Associated sample(s): 03 QC Batch ID: WG898268-3 QC Sample: L1615951-01 Client ID: DUP Sample						
Phosphorus, Orthophosphate	0.012	0.011	mg/l	9		20
General Chemistry - Westborough Lab Associated sample(s): 03 QC Batch ID: WG898420-3 QC Sample: L1616029-01 Client ID: DUP Sample						
Alkalinity, Total	38.8	38.4	mg CaCO3/L	1		10
General Chemistry - Westborough Lab Associated sample(s): 03 QC Batch ID: WG898692-3 QC Sample: L1616053-01 Client ID: DUP Sample						
Nitrogen, Ammonia	0.112	0.129	mg/l	14		20
General Chemistry - Westborough Lab Associated sample(s): 02-07 QC Batch ID: WG898925-3 QC Sample: L1616088-02 Client ID: MTER-12						
Dissolved Organic Carbon	2.0	1.9	mg/l	5		20
General Chemistry - Westborough Lab Associated sample(s): 01-02,04-05 QC Batch ID: WG899370-3 QC Sample: L1615899-08 Client ID: DUP Sample						
Nitrogen, Total Kjeldahl	0.677	ND	mg/l	NC		24
General Chemistry - Westborough Lab Associated sample(s): 06-07 QC Batch ID: WG899482-3 QC Sample: L1616088-06 Client ID: MTER-7						
Nitrogen, Total Kjeldahl	ND	ND	mg/l	NC		24

## Lab Duplicate Analysis

Batch Quality Control

Project Name: USEPA-SHOREWOOD PRB

Project Number: WV-1009

Lab Number: L1616088

Report Date: 06/03/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 03 QC Batch ID: WG899590-4 QC Sample: L1615912-01 Client ID: DUP Sample					
Chloride	20.3	20.2	mg/l	0	18
Sulfate	25.6	25.5	mg/l	0	20
General Chemistry - Westborough Lab Associated sample(s): 03 QC Batch ID: WG899609-3 QC Sample: L1616089-02 Client ID: DUP Sample					
Nitrogen, Total Kjeldahl	0.443	0.313	mg/l	34	Q 24

**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

### Sample Receipt and Container Information

Were project specific reporting limits specified? YES

#### Cooler Information Custody Seal

##### Cooler

A Absent

#### Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1616088-01A	Plastic 500ml unpreserved	A	7	5.7	Y	Absent	-
L1616088-01B	Plastic 500ml unpreserved	A	7	5.7	Y	Absent	NO3-353(2)
L1616088-01C	Plastic 500ml H2SO4 preserved	A	<2	5.7	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1616088-01X	Plastic 120ml HNO3 preserved Fil	A	<2	5.7	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1616088-02A	Vial H2SO4 preserved	A	N/A	5.7	Y	Absent	DOC-5310(28)
L1616088-02B	Vial H2SO4 preserved	A	N/A	5.7	Y	Absent	DOC-5310(28)
L1616088-02C	Plastic 500ml H2SO4 preserved	A	<2	5.7	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1616088-02D	Plastic 60ml unpreserved	A	7	5.7	Y	Absent	NO3-353(2)
L1616088-02E	Plastic 250ml HNO3 preserved	A	<2	5.7	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1616088-03A	Plastic 500ml H2SO4 preserved	A	<2	5.7	Y	Absent	NO3/NO2-353(28),NH3-4500(28)
L1616088-03B	Plastic 250ml HNO3 preserved	A	<2	5.7	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)
L1616088-03C	Plastic 250ml unpreserved w/No H	A	N/A	5.7	Y	Absent	ALK-T-2320(14)
L1616088-03D	Vial H2SO4 preserved	A	N/A	5.7	Y	Absent	DOC-5310(28)
L1616088-03E	Vial H2SO4 preserved	A	N/A	5.7	Y	Absent	DOC-5310(28)
L1616088-03F	Plastic 500ml unpreserved	A	7	5.7	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2)
L1616088-04A	Vial H2SO4 preserved	A	N/A	5.7	Y	Absent	DOC-5310(28)
L1616088-04B	Vial H2SO4 preserved	A	N/A	5.7	Y	Absent	DOC-5310(28)
L1616088-04C	Plastic 500ml H2SO4 preserved	A	<2	5.7	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1616088-04D	Plastic 60ml unpreserved	A	7	5.7	Y	Absent	NO3-353(2)
L1616088-04E	Plastic 250ml HNO3 preserved	A	<2	5.7	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1616088-05A	Vial H2SO4 preserved	A	N/A	5.7	Y	Absent	DOC-5310(28)
L1616088-05B	Vial H2SO4 preserved	A	N/A	5.7	Y	Absent	DOC-5310(28)
L1616088-05C	Plastic 500ml H2SO4 preserved	A	<2	5.7	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1616088-05D	Plastic 60ml unpreserved	A	7	5.7	Y	Absent	NO3-353(2)
L1616088-05E	Plastic 250ml HNO3 preserved	A	<2	5.7	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)

\*Values in parentheses indicate holding time in days

**Project Name:** USEPA-SHOREWOOD PRB**Project Number:** WV-1009**Lab Number:** L1616088**Report Date:** 06/03/16**Container Information**

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1616088-06A	Vial H2SO4 preserved	A	N/A	5.7	Y	Absent	DOC-5310(28)
L1616088-06B	Vial H2SO4 preserved	A	N/A	5.7	Y	Absent	DOC-5310(28)
L1616088-06C	Plastic 500ml H2SO4 preserved	A	<2	5.7	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1616088-06D	Plastic 60ml unpreserved	A	7	5.7	Y	Absent	NO3-353(2)
L1616088-06E	Plastic 250ml HNO3 preserved	A	<2	5.7	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1616088-07A	Vial H2SO4 preserved	A	N/A	5.7	Y	Absent	DOC-5310(28)
L1616088-07B	Vial H2SO4 preserved	A	N/A	5.7	Y	Absent	DOC-5310(28)
L1616088-07C	Plastic 500ml H2SO4 preserved	A	<2	5.7	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1616088-07D	Plastic 60ml unpreserved	A	7	5.7	Y	Absent	NO3-353(2)
L1616088-07E	Plastic 250ml HNO3 preserved	A	<2	5.7	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)

\*Values in parentheses indicate holding time in days

**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

## GLOSSARY

### Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

### Footnotes

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### Terms

**Total:** With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

**Analytical Method:** Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### Data Qualifiers

- A** - Spectra identified as "Aldol Condensation Product".
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the

**Report Format:** DU Report with 'J' Qualifiers



**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

#### Data Qualifiers

- reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
  - D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
  - E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
  - G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
  - H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
  - I** - The lower value for the two columns has been reported due to obvious interference.
  - M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
  - NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
  - P** - The RPD between the results for the two columns exceeds the method-specified criteria.
  - Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
  - R** - Analytical results are from sample re-analysis.
  - RE** - Analytical results are from sample re-extraction.
  - S** - Analytical results are from modified screening analysis.
  - J** - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
  - ND** - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

**Project Name:** USEPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1616088  
**Report Date:** 06/03/16

## REFERENCES

- 1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.
- 44 Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993.
- 107 Alpha Analytical - In-house calculation method.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



## Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

### Westborough Facility

**EPA 524.2:** 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, m/p-xylene, o-xylene  
**EPA 624:** 2-Butanone (MEK), 1,4-Dioxane, tert-Amylmethyl Ether, tert-Butyl Alcohol, m/p-xylene, o-xylene  
**EPA 625:** Aniline, Benzoic Acid, Benzyl Alcohol, 4-Chloroaniline, 3-Methylphenol, 4-Methylphenol.  
**EPA 1010A:** NPW: Ignitability  
**EPA 6010C:** NPW: Strontium; SCM: Strontium  
**EPA 8151A:** NPW: 2,4-DB, Dicamba, Dichloroprop, MCPA, MCPP; SCM: 2,4-DB, Dichloroprop, MCPA, MCPP  
**EPA 8260C:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene, Isopropanol; SCM: Iodomethane (methyl iodide), Methyl methacrylate (soil); 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.  
**EPA 8270D:** NPW: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine; SCM: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine.  
**EPA 9010:** NPW: Amenable Cyanide Distillation, Total Cyanide Distillation  
**EPA 9038:** NPW: Sulfate  
**EPA 9050A:** NPW: Specific Conductance  
**EPA 9056:** NPW: Chloride, Nitrate, Sulfate  
**EPA 9065:** NPW: Phenols  
**EPA 9251:** NPW: Chloride  
**SM3500:** NPW: Ferrous Iron  
**SM4500:** NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO<sub>2</sub>, NO<sub>3</sub>.  
**SM5310C:** DW: Dissolved Organic Carbon

### Mansfield Facility

**EPA 8270D:** NPW: Biphenyl; SCM: Biphenyl, Caprolactam  
**EPA 8270D-SIM Isotope Dilution:** SCM: 1,4-Dioxane  
**SM 2540D:** TSS  
**SM2540G:** SCM: Percent Solids  
**EPA 1631E:** SCM: Mercury  
**EPA 7474:** SCM: Mercury  
**EPA 8081B:** NPW and SCM: Mirex, Hexachlorobenzene.  
**EPA 8082A:** NPW: PCB: 1, 5, 31, 87, 101, 110, 141, 151, 153, 180, 183, 187.  
**EPA 8270-SIM:** NPW and SCM: Alkylated PAHs.  
**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene, n-Butylbenzene, n-Propylbenzene, sec-Butylbenzene, tert-Butylbenzene.  
**Biological Tissue Matrix:** **8270D-SIM; 3050B; 3051A; 7471B; 8081B; 8082A; 6020A:** Lead; **8270D:** bis(2-ethylhexyl)phthalate, Butylbenzylphthalate, Diethyl phthalate, Dimethyl phthalate, Di-n-butyl phthalate, Di-n-octyl phthalate, Fluoranthene, Pentachlorophenol.

The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:

### Drinking Water

**EPA 200.8:** Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, Ti; **EPA 200.7:** Ba, Be, Ca, Cd, Cr, Cu, Na; **EPA 245.1:** Mercury;  
**EPA 300.0:** Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**  
**EPA 332:** Perchlorate.  
**Microbiology:** **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

### Non-Potable Water

**EPA 200.8:** Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, Ti, Zn;  
**EPA 200.7:** Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, Ti, Tl, V, Zn;  
**EPA 245.1, SM4500H, B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH, EPA 350.1:** Ammonia-N, **LACHAT 10-107-06-1-B:** Ammonia-N, **SM4500NO3-F,**  
**EPA 353.2:** Nitrate-N, **SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**  
**EPA 624:** Volatile Halocarbons & Aromatics,  
**EPA 608:** Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs  
**EPA 625:** SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.  
**Microbiology:** **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF.**

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

STATE FORM - CHAIN OF CUSTODY PAGE \_\_\_\_\_ OF \_\_\_\_\_

**ALPHA**  
LABORATORY  
WESTBORO, MA  
TEL: 508-866-8229  
FAX: 508-866-8182

MANFIELD, MA  
TEL: 508-833-8300  
FAX: 508-820-0268

Date Rec'd in Lab: **5/26/16**

ALPHA Job #: **L1616088**

**Project Information**

Project Name: **USEPA-Shorewood PWS**  
Project Location: **Falmouth, MA**  
Project PWS ID#: **WR-1009**  
Project Manager: **Danica Truslow**  
ALPHA Quote #:

**Report Information - Data Deliverables**

FAX  EMAIL  
 NOEX  ADD'l Deliverable

**Billing Information**

Same as Client Info  PO #

**Client Information**

Client: **INTERVISION LLC**  
Address: **401 GREAT RD  
ACTON, MA**  
Phone: **603-498-2916**  
Fax:

**Turn-Around Time**

Standard  RUSH (see contract for amount)  
Date Due: \_\_\_\_\_ Time: \_\_\_\_\_

**Please Indicate PWS Class Below**

COM  
 NTNC  
 TNC

**ALL FIELD FILTERED  
\* ONLY ON  
MTOR &  
UNFILTERED**

These samples have been previously analyzed by Alpha

Other Project Specific Requirements/Comments/Detection Limits:

**ANALYSIS**

**No<sub>3</sub> Total N  
DOC  
As<sub>3</sub>Mn<sub>3</sub>Fe  
Total N-NH<sub>3</sub>  
As<sub>3</sub>Mn<sub>3</sub>Fe B  
Total Fe  
DOC  
No<sub>3</sub>, No<sub>2</sub>, Cl, S, Hg, Pb**

**SAMPLE HANDLING**

Done  
 Not needed  
 Lab to do  
 Lab to do

(PLEASE CHECK BELOW)

ALPHA LAB ID (LAB USE ONLY)	DEP Location Code	DEP Location Name	Collection		Sample Matrix	Sampler's Initials	ANALYSIS			Source(1)	Type	Sample(2)
			Date	Time			No <sub>3</sub>	Total N	DOC	Multiple	Single	Filter
16088-01		MTOR-8-11	5-26-16	12:30	Water	DT/MS	✓	✓	✓			
02		MTOR-12-2	11	11:45	"	W/HB	✓	✓	✓			
03		SW-101	"	7:50	"	"	✓	✓	✓			
04		MTOR-7-dp	"	10:55	"	DT/HB	✓	✓	✓			
05		MTOR-10	"	9:50	"	DT	✓	✓	✓			
06		MTOR-7	"	10:50	"	DT/HB	✓	✓	✓			
07		MTOR-11	"	10:05	"	DT/HB	✓	✓	✓			

(1) If Source is Multiple, please list connected sources  
(2) If Sample type is special please explain

Container Type

Preservative

Prepared By: **[Signature]** Date/Time: **14:35 5/26/16**  
Received By: **Mark Amy** Date/Time: **5/26/16 1:58**

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguity are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.



## ANALYTICAL REPORT

Lab Number:	L1615111
Client:	Watervision, LLC 454 Court Street Suite 304 Portsmouth, NH 03801
ATTN:	Danna Truslow
Phone:	(603) 766-6670
Project Name:	EPA PRB SHOREWOOD
Project Number:	WV-1009
Report Date:	05/25/16

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), VA (460195), MD (348), IL (200077), NC (666), TX (T104704476), DOD (L2217), USDA (Permit #P-330-11-00240).

---

Eight Walkup Drive, Westborough, MA 01581-1019  
508-898-9220 (Fax) 508-898-9193 800-624-9220 - [www.alphalab.com](http://www.alphalab.com)



**Project Name:** EPA PRB SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615111  
**Report Date:** 05/25/16

<b>Alpha Sample ID</b>	<b>Client ID</b>	<b>Matrix</b>	<b>Sample Location</b>	<b>Collection Date/Time</b>	<b>Receive Date</b>
L1615111-01	PZ-1B	WATER	FALMOUTH, MA	05/18/16 16:20	05/18/16
L1615111-02	PZ-1C	WATER	FALMOUTH, MA	05/18/16 17:40	05/18/16
L1615111-03	PZ-1D	WATER	FALMOUTH, MA	05/18/16 17:35	05/18/16
L1615111-04	PZ-1E	WATER	FALMOUTH, MA	05/18/16 16:53	05/18/16

**Project Name:** EPA PRB SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615111  
**Report Date:** 05/25/16

### Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

#### HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

**Project Name:** EPA PRB SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615111  
**Report Date:** 05/25/16

### Case Narrative (continued)

#### Report Submission

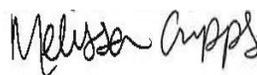
All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

#### Dissolved Organic Carbon

The samples were field filtered; a filter blank was not received.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:

 Melissa Cripps

Title: Technical Director/Representative

Date: 05/25/16

## METALS

**Project Name:** EPA PRB SHOREWOOD**Lab Number:** L1615111**Project Number:** WV-1009**Report Date:** 05/25/16**SAMPLE RESULTS**

Lab ID: L1615111-01

Date Collected: 05/18/16 16:20

Client ID: PZ-1B

Date Received: 05/18/16

Sample Location: FALMOUTH, MA

Field Prep: Field Filtered

Matrix: Water

(Dissolved  
Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	0.002	J	mg/l	0.005	0.002	1	05/20/16 03:30	05/24/16 21:59	EPA 3005A	1,6010C	FB
Boron, Dissolved	0.021	J	mg/l	0.030	0.007	1	05/20/16 03:30	05/24/16 21:59	EPA 3005A	1,6010C	FB
Iron, Dissolved	0.19		mg/l	0.05	0.02	1	05/20/16 03:30	05/24/16 21:59	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.012		mg/l	0.010	0.002	1	05/20/16 03:30	05/24/16 21:59	EPA 3005A	1,6010C	FB



**Project Name:** EPA PRB SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615111  
**Report Date:** 05/25/16

**SAMPLE RESULTS**

Lab ID: L1615111-02  
 Client ID: PZ-1C  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 17:40  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	05/20/16 03:30	05/24/16 22:24	EPA 3005A	1,6010C	FB
Boron, Dissolved	0.017	J	mg/l	0.030	0.007	1	05/20/16 03:30	05/24/16 22:24	EPA 3005A	1,6010C	FB
Iron, Dissolved	1.5		mg/l	0.05	0.02	1	05/20/16 03:30	05/24/16 22:24	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.430		mg/l	0.010	0.002	1	05/20/16 03:30	05/24/16 22:24	EPA 3005A	1,6010C	FB



**Project Name:** EPA PRB SHOREWOOD**Lab Number:** L1615111**Project Number:** WV-1009**Report Date:** 05/25/16**SAMPLE RESULTS**

Lab ID: L1615111-03  
 Client ID: PZ-1D  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 17:35  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	05/20/16 03:30	05/24/16 22:28	EPA 3005A	1,6010C	FB
Boron, Dissolved	0.023	J	mg/l	0.030	0.007	1	05/20/16 03:30	05/24/16 22:28	EPA 3005A	1,6010C	FB
Iron, Dissolved	0.67		mg/l	0.05	0.02	1	05/20/16 03:30	05/24/16 22:28	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.194		mg/l	0.010	0.002	1	05/20/16 03:30	05/24/16 22:28	EPA 3005A	1,6010C	FB



**Project Name:** EPA PRB SHOREWOOD**Lab Number:** L1615111**Project Number:** WV-1009**Report Date:** 05/25/16**SAMPLE RESULTS**

Lab ID: L1615111-04  
 Client ID: PZ-1E  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 16:53  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	0.002	J	mg/l	0.005	0.002	1	05/20/16 03:30	05/24/16 22:32	EPA 3005A	1,6010C	FB
Boron, Dissolved	0.040		mg/l	0.030	0.007	1	05/20/16 03:30	05/24/16 22:32	EPA 3005A	1,6010C	FB
Iron, Dissolved	0.63		mg/l	0.05	0.02	1	05/20/16 03:30	05/24/16 22:32	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.212		mg/l	0.010	0.002	1	05/20/16 03:30	05/24/16 22:32	EPA 3005A	1,6010C	FB



Project Name: EPA PRB SHOREWOOD

Lab Number: L1615111

Project Number: WV-1009

Report Date: 05/25/16

## Method Blank Analysis Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01-04 Batch: WG895980-1										
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	05/20/16 03:30	05/24/16 18:50	1,6010C	FB
Boron, Dissolved	ND		mg/l	0.030	0.007	1	05/20/16 03:30	05/24/16 18:50	1,6010C	FB
Iron, Dissolved	0.03	J	mg/l	0.05	0.02	1	05/20/16 03:30	05/24/16 18:50	1,6010C	FB
Manganese, Dissolved	ND		mg/l	0.010	0.002	1	05/20/16 03:30	05/24/16 18:50	1,6010C	FB

### Prep Information

Digestion Method: EPA 3005A

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** EPA PRB SHOREWOOD

**Project Number:** WV-1009

**Lab Number:** L1615111

**Report Date:** 05/25/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01-04 Batch: WG895980-2								
Arsenic, Dissolved	109		-		80-120	-		
Boron, Dissolved	107		-		80-120	-		
Iron, Dissolved	94		-		80-120	-		
Manganese, Dissolved	97		-		80-120	-		

### Matrix Spike Analysis Batch Quality Control

**Project Name:** EPA PRB SHOREWOOD

**Lab Number:** L1615111

**Project Number:** WV-1009

**Report Date:** 05/25/16

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MS Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	RPD Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01-04 QC Batch ID: WG895980-4 QC Sample: L1614757-01 Client ID: MS Sample												
Arsenic, Dissolved	0.013	0.12	0.206	160	Q	-	-		75-125	-		20
Boron, Dissolved	1.39	1	2.45	106		-	-		75-125	-		20
Iron, Dissolved	55.	1	54	0	Q	-	-		75-125	-		20
Manganese, Dissolved	0.636	0.5	1.28	129	Q	-	-		75-125	-		20

## Lab Duplicate Analysis

Batch Quality Control

Project Name: EPA PRB SHOREWOOD

Project Number: WV-1009

Lab Number: L1615111

Report Date: 05/25/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01-04 QC Batch ID: WG895980-3 QC Sample: L1614757-01 Client ID: DUP Sample						
Arsenic, Dissolved	0.013	0.011	mg/l	15		20
Iron, Dissolved	55.	54	mg/l	2		20
Manganese, Dissolved	0.636	0.626	mg/l	2		20

# **INORGANICS & MISCELLANEOUS**

**Project Name:** EPA PRB SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615111  
**Report Date:** 05/25/16

**SAMPLE RESULTS**

**Lab ID:** L1615111-01  
**Client ID:** PZ-1B  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 16:20  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	3.90		mg CaCO3/L	2.00	NA	1	-	05/19/16 09:39	121,2320B	SG
Nitrogen, Ammonia	0.044	J	mg/l	0.075	0.028	1	05/19/16 12:07	05/20/16 21:36	44,350.1	AT
Nitrogen, Nitrite	0.014	J	mg/l	0.050	0.010	1	-	05/18/16 23:37	44,353.2	MR
Nitrogen, Nitrate	3.4		mg/l	0.10	0.019	1	-	05/18/16 23:37	44,353.2	MR
Nitrogen, Nitrate/Nitrite	3.4		mg/l	0.10	0.019	1	-	05/18/16 23:37	44,353.2	MR
Total Nitrogen	3.4		mg/l	0.30	0.30	1	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	0.096	J	mg/l	0.300	0.066	1	05/19/16 11:40	05/20/16 20:41	121,4500N-C	AT
Phosphorus, Orthophosphate	0.004	J	mg/l	0.005	0.001	1	-	05/19/16 22:12	121,4500P-E	MR
Dissolved Organic Carbon	0.43	J	mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	12.8		mg/l	0.500	0.054	1	-	05/19/16 19:12	44,300.0	AU
Sulfate	5.14		mg/l	1.00	0.150	1	-	05/19/16 19:12	44,300.0	AU



**Project Name:** EPA PRB SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615111  
**Report Date:** 05/25/16

**SAMPLE RESULTS**

**Lab ID:** L1615111-02  
**Client ID:** PZ-1C  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 17:40  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	8.50		mg CaCO3/L	2.00	NA	1	-	05/19/16 09:39	121,2320B	SG
Nitrogen, Ammonia	0.045	J	mg/l	0.075	0.028	1	05/19/16 12:07	05/20/16 21:37	44,350.1	AT
Nitrogen, Nitrite	0.035	J	mg/l	0.050	0.010	1	-	05/18/16 23:48	44,353.2	MR
Nitrogen, Nitrate	0.71		mg/l	0.10	0.019	1	-	05/18/16 23:48	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.71		mg/l	0.10	0.019	1	-	05/18/16 23:48	44,353.2	MR
Total Nitrogen	0.71		mg/l	0.30	0.30	1	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	0.178	J	mg/l	0.300	0.066	1	05/19/16 11:40	05/20/16 20:44	121,4500N-C	AT
Phosphorus, Orthophosphate	0.004	J	mg/l	0.005	0.001	1	-	05/19/16 22:12	121,4500P-E	MR
Dissolved Organic Carbon	0.60	J	mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	12.6		mg/l	0.500	0.054	1	-	05/19/16 19:24	44,300.0	AU
Sulfate	9.02		mg/l	1.00	0.150	1	-	05/19/16 19:24	44,300.0	AU



**Project Name:** EPA PRB SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615111  
**Report Date:** 05/25/16

**SAMPLE RESULTS**

**Lab ID:** L1615111-03  
**Client ID:** PZ-1D  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 17:35  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	4.20		mg CaCO3/L	2.00	NA	1	-	05/19/16 09:39	121,2320B	SG
Nitrogen, Ammonia	0.037	J	mg/l	0.075	0.028	1	05/19/16 12:07	05/20/16 21:38	44,350.1	AT
Nitrogen, Nitrite	0.014	J	mg/l	0.050	0.010	1	-	05/18/16 23:49	44,353.2	MR
Nitrogen, Nitrate	4.2		mg/l	0.10	0.019	1	-	05/18/16 23:49	44,353.2	MR
Nitrogen, Nitrate/Nitrite	4.2		mg/l	0.10	0.019	1	-	05/18/16 23:49	44,353.2	MR
Total Nitrogen	4.2		mg/l	0.30	0.30	1	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.300	0.066	1	05/19/16 11:40	05/20/16 20:47	121,4500N-C	AT
Phosphorus, Orthophosphate	0.002	J	mg/l	0.005	0.001	1	-	05/19/16 22:13	121,4500P-E	MR
Dissolved Organic Carbon	0.77	J	mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	24.9		mg/l	0.500	0.054	1	-	05/19/16 19:36	44,300.0	AU
Sulfate	9.70		mg/l	1.00	0.150	1	-	05/19/16 19:36	44,300.0	AU



**Project Name:** EPA PRB SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615111  
**Report Date:** 05/25/16

**SAMPLE RESULTS**

**Lab ID:** L1615111-04  
**Client ID:** PZ-1E  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 16:53  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	11.1		mg CaCO3/L	2.00	NA	1	-	05/19/16 09:39	121,2320B	SG
Nitrogen, Ammonia	0.066	J	mg/l	0.075	0.028	1	05/19/16 12:07	05/20/16 21:40	44,350.1	AT
Nitrogen, Nitrite	0.011	J	mg/l	0.050	0.010	1	-	05/18/16 23:50	44,353.2	MR
Nitrogen, Nitrate	2.8		mg/l	0.10	0.019	1	-	05/18/16 23:50	44,353.2	MR
Nitrogen, Nitrate/Nitrite	2.8		mg/l	0.10	0.019	1	-	05/18/16 23:50	44,353.2	MR
Total Nitrogen	2.8		mg/l	0.30	0.30	1	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	0.272	J	mg/l	0.300	0.066	1	05/19/16 11:40	05/20/16 20:48	121,4500N-C	AT
Phosphorus, Orthophosphate	0.005		mg/l	0.005	0.001	1	-	05/19/16 22:14	121,4500P-E	MR
Dissolved Organic Carbon	1.2		mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	42.5		mg/l	0.500	0.054	1	-	05/19/16 19:48	44,300.0	AU
Sulfate	12.0		mg/l	1.00	0.150	1	-	05/19/16 19:48	44,300.0	AU



Project Name: EPA PRB SHOREWOOD

Lab Number: L1615111

Project Number: WV-1009

Report Date: 05/25/16

**Method Blank Analysis  
Batch Quality Control**

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-04 Batch: WG895498-1										
Nitrogen, Nitrate	ND		mg/l	0.10	0.019	1	-	05/18/16 23:27	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-04 Batch: WG895501-1										
Nitrogen, Nitrate/Nitrite	ND		mg/l	0.10	0.019	1	-	05/18/16 23:27	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-04 Batch: WG895503-1										
Nitrogen, Nitrite	ND		mg/l	0.050	0.010	1	-	05/18/16 23:30	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-04 Batch: WG895574-1										
Dissolved Organic Carbon	ND		mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW
General Chemistry - Westborough Lab for sample(s): 01-04 Batch: WG895601-1										
Nitrogen, Total Kjeldahl	ND		mg/l	0.300	0.022	1	05/19/16 11:40	05/20/16 20:27	121,4500N-C	AT
General Chemistry - Westborough Lab for sample(s): 01-04 Batch: WG895647-5										
Alkalinity, Total	ND		mg CaCO3/L	2.00	NA	1	-	05/19/16 09:39	121,2320B	SG
General Chemistry - Westborough Lab for sample(s): 01-04 Batch: WG895768-1										
Nitrogen, Ammonia	ND		mg/l	0.075	0.028	1	05/19/16 12:07	05/20/16 20:56	44,350.1	AT
General Chemistry - Westborough Lab for sample(s): 01-04 Batch: WG895930-1										
Phosphorus, Orthophosphate	ND		mg/l	0.005	0.001	1	-	05/19/16 22:07	121,4500P-E	MR
Anions by Ion Chromatography - Westborough Lab for sample(s): 01-04 Batch: WG896288-1										
Chloride	ND		mg/l	0.500	0.054	1	-	05/19/16 18:12	44,300.0	AU
Sulfate	ND		mg/l	1.00	0.150	1	-	05/19/16 18:12	44,300.0	AU

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** EPA PRB SHOREWOOD

**Lab Number:** L1615111

**Project Number:** WV-1009

**Report Date:** 05/25/16

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
General Chemistry - Westborough Lab Associated sample(s): 01-04 Batch: WG895498-2								
Nitrogen, Nitrate	100		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-04 Batch: WG895501-2								
Nitrogen, Nitrate/Nitrite	100		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-04 Batch: WG895503-2								
Nitrogen, Nitrite	100		-		90-110	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-04 Batch: WG895574-2								
Dissolved Organic Carbon	91		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-04 Batch: WG895601-2								
Nitrogen, Total Kjeldahl	91		-		78-122	-		
General Chemistry - Westborough Lab Associated sample(s): 01-04 Batch: WG895647-7								
Alkalinity, Total	102		-		90-110	-		10
General Chemistry - Westborough Lab Associated sample(s): 01-04 Batch: WG895768-2								
Nitrogen, Ammonia	92		-		80-120	-		20

## Lab Control Sample Analysis

Batch Quality Control

**Project Name:** EPA PRB SHOREWOOD

**Lab Number:** L1615111

**Project Number:** WV-1009

**Report Date:** 05/25/16

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-04 Batch: WG895930-2					
Phosphorus, Orthophosphate	99	-	90-110	-	
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-04 Batch: WG896288-2					
Chloride	100	-	90-110	-	
Sulfate	98	-	90-110	-	

### Matrix Spike Analysis Batch Quality Control

Project Name: EPA PRB SHOREWOOD

Lab Number: L1615111

Project Number: WV-1009

Report Date: 05/25/16

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG895498-4 QC Sample: L1615111-01 Client ID: PZ-1B												
Nitrogen, Nitrate	3.4	4	7.4	100	-	-	-	-	83-113	-	-	6
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG895501-4 QC Sample: L1615111-01 Client ID: PZ-1B												
Nitrogen, Nitrate/Nitrite	3.4	4	7.4	100	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG895503-4 QC Sample: L1615111-01 Client ID: PZ-1B												
Nitrogen, Nitrite	0.014J	4	4.1	102	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG895574-4 QC Sample: L1615084-02 Client ID: MS Sample												
Dissolved Organic Carbon	0.47J	4	4.6	116	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG895601-4 QC Sample: L1615111-01 Client ID: PZ-1B												
Nitrogen, Total Kjeldahl	0.096J	8	6.67	83	-	-	-	-	77-111	-	-	24
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG895647-8 QC Sample: L1614883-01 Client ID: MS Sample												
Alkalinity, Total	15.2	100	122	107	-	-	-	-	86-116	-	-	10
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG895768-4 QC Sample: L1615111-03 Client ID: PZ-1D												
Nitrogen, Ammonia	0.037J	4	3.60	90	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG895930-4 QC Sample: L1615088-02 Client ID: MS Sample												
Phosphorus, Orthophosphate	0.025	0.5	0.516	98	-	-	-	-	80-120	-	-	20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG896288-3 QC Sample: L1615111-01 Client ID: PZ-1B												
Chloride	12.8	4	16.3	86	-	-	-	-	40-151	-	-	18
Sulfate	5.14	8	13.2	101	-	-	-	-	60-140	-	-	20

## Lab Duplicate Analysis

Batch Quality Control

Project Name: EPA PRB SHOREWOOD

Project Number: WV-1009

Lab Number: L1615111

Report Date: 05/25/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG895498-3 QC Sample: L1615111-01 Client ID: PZ-1B						
Nitrogen, Nitrate	3.4	3.4	mg/l	0		6
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG895501-3 QC Sample: L1615111-01 Client ID: PZ-1B						
Nitrogen, Nitrate/Nitrite	3.4	3.4	mg/l	0		20
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG895503-3 QC Sample: L1615111-01 Client ID: PZ-1B						
Nitrogen, Nitrite	0.014J	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG895574-3 QC Sample: L1615084-01 Client ID: DUP Sample						
Dissolved Organic Carbon	0.55J	0.57J	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG895601-3 QC Sample: L1615111-01 Client ID: PZ-1B						
Nitrogen, Total Kjeldahl	0.096J	ND	mg/l	NC		24
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG895647-6 QC Sample: L1614883-01 Client ID: DUP Sample						
Alkalinity, Total	15.2	15.2	mg CaCO3/L	0		10
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG895768-3 QC Sample: L1615111-03 Client ID: PZ-1D						
Nitrogen, Ammonia	0.037J	0.046J	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG895930-3 QC Sample: L1615088-01 Client ID: DUP Sample						
Phosphorus, Orthophosphate	0.025	0.025	mg/l	0		20

## Lab Duplicate Analysis

Batch Quality Control

Project Name: EPA PRB SHOREWOOD

Project Number: WV-1009

Lab Number: L1615111

Report Date: 05/25/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-04 QC Batch ID: WG896288-4 QC Sample: L1615111-01 Client ID: PZ-1B					
Chloride	12.8	12.8	mg/l	0	18
Sulfate	5.14	5.18	mg/l	1	20

Project Name: EPA PRB SHOREWOOD

Lab Number: L1615111

Project Number: WV-1009

Report Date: 05/25/16

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

## Cooler Information Custody Seal

## Cooler

A Absent

## Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1615111-01A	Vial H2SO4 preserved	A	N/A	4.2	Y	Absent	DOC-5310(28)
L1615111-01B	Vial H2SO4 preserved	A	N/A	4.2	Y	Absent	DOC-5310(28)
L1615111-01C	Vial H2SO4 preserved	A	N/A	4.2	Y	Absent	DOC-5310(28)
L1615111-01D	Plastic 500ml H2SO4 preserved	A	<2	4.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1615111-01E	Plastic 500ml unpreserved	A	7	4.2	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2)
L1615111-01F	Plastic 250ml HNO3 preserved	A	<2	4.2	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)
L1615111-01G	Plastic 250ml unpreserved w/No H	A	N/A	4.2	Y	Absent	ALK-T-2320(14)
L1615111-02A	Vial H2SO4 preserved	A	N/A	4.2	Y	Absent	DOC-5310(28)
L1615111-02B	Vial H2SO4 preserved	A	N/A	4.2	Y	Absent	DOC-5310(28)
L1615111-02C	Vial H2SO4 preserved	A	N/A	4.2	Y	Absent	DOC-5310(28)
L1615111-02D	Plastic 500ml H2SO4 preserved	A	<2	4.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1615111-02E	Plastic 500ml unpreserved	A	7	4.2	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2)
L1615111-02F	Plastic 250ml HNO3 preserved	A	<2	4.2	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)
L1615111-02G	Plastic 250ml unpreserved w/No H	A	N/A	4.2	Y	Absent	ALK-T-2320(14)
L1615111-03A	Vial H2SO4 preserved	A	N/A	4.2	Y	Absent	DOC-5310(28)
L1615111-03B	Vial H2SO4 preserved	A	N/A	4.2	Y	Absent	DOC-5310(28)
L1615111-03C	Vial H2SO4 preserved	A	N/A	4.2	Y	Absent	DOC-5310(28)
L1615111-03D	Plastic 500ml H2SO4 preserved	A	<2	4.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1615111-03E	Plastic 500ml unpreserved	A	7	4.2	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2)
L1615111-03F	Plastic 250ml HNO3 preserved	A	<2	4.2	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)
L1615111-03G	Plastic 250ml unpreserved w/No H	A	N/A	4.2	Y	Absent	ALK-T-2320(14)
L1615111-04A	Vial H2SO4 preserved	A	N/A	4.2	Y	Absent	DOC-5310(28)

\*Values in parentheses indicate holding time in days

**Project Name:** EPA PRB SHOREWOOD**Project Number:** WV-1009**Lab Number:** L1615111**Report Date:** 05/25/16**Container Information**

<b>Container ID</b>	<b>Container Type</b>	<b>Cooler</b>	<b>pH</b>	<b>Temp deg C</b>	<b>Pres</b>	<b>Seal</b>	<b>Analysis(*)</b>
L1615111-04B	Vial H2SO4 preserved	A	N/A	4.2	Y	Absent	DOC-5310(28)
L1615111-04C	Vial H2SO4 preserved	A	N/A	4.2	Y	Absent	DOC-5310(28)
L1615111-04D	Plastic 500ml H2SO4 preserved	A	<2	4.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1615111-04E	Plastic 500ml unpreserved	A	7	4.2	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2)
L1615111-04F	Plastic 250ml HNO3 preserved	A	<2	4.2	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)
L1615111-04G	Plastic 250ml unpreserved w/No H	A	N/A	4.2	Y	Absent	ALK-T-2320(14)

\*Values in parentheses indicate holding time in days

**Project Name:** EPA PRB SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615111  
**Report Date:** 05/25/16

## GLOSSARY

### Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

### Footnotes

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### Terms

**Total:** With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

**Analytical Method:** Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### Data Qualifiers

- A** - Spectra identified as "Aldol Condensation Product".
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

**Report Format:** DU Report with 'J' Qualifiers



**Project Name:** EPA PRB SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615111  
**Report Date:** 05/25/16

#### **Data Qualifiers**

- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.
- J** - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- ND** - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

**Project Name:** EPA PRB SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615111  
**Report Date:** 05/25/16

## REFERENCES

- 1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.
- 44 Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993.
- 107 Alpha Analytical - In-house calculation method.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



## Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

### Westborough Facility

**EPA 524.2:** 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, m/p-xylene, o-xylene  
**EPA 624:** 2-Butanone (MEK), 1,4-Dioxane, tert-Amylmethyl Ether, tert-Butyl Alcohol, m/p-xylene, o-xylene  
**EPA 625:** Aniline, Benzoic Acid, Benzyl Alcohol, 4-Chloroaniline, 3-Methylphenol, 4-Methylphenol.  
**EPA 1010A:** NPW: Ignitability  
**EPA 6010C:** NPW: Strontium; SCM: Strontium  
**EPA 8151A:** NPW: 2,4-DB, Dicamba, Dichloroprop, MCPA, MCPP; SCM: 2,4-DB, Dichloroprop, MCPA, MCPP  
**EPA 8260C:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene, Isopropanol; SCM: Iodomethane (methyl iodide), Methyl methacrylate (soil); 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.  
**EPA 8270D:** NPW: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine; SCM: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine.  
**EPA 9010:** NPW: Amenable Cyanide Distillation, Total Cyanide Distillation  
**EPA 9038:** NPW: Sulfate  
**EPA 9050A:** NPW: Specific Conductance  
**EPA 9056:** NPW: Chloride, Nitrate, Sulfate  
**EPA 9065:** NPW: Phenols  
**EPA 9251:** NPW: Chloride  
**SM3500:** NPW: Ferrous Iron  
**SM4500:** NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO<sub>2</sub>, NO<sub>3</sub>.  
**SM5310C:** DW: Dissolved Organic Carbon

### Mansfield Facility

**EPA 8270D:** NPW: Biphenyl; SCM: Biphenyl, Caprolactam  
**EPA 8270D-SIM Isotope Dilution:** SCM: 1,4-Dioxane  
**SM 2540D:** TSS  
**SM2540G:** SCM: Percent Solids  
**EPA 1631E:** SCM: Mercury  
**EPA 7474:** SCM: Mercury  
**EPA 8081B:** NPW and SCM: Mirex, Hexachlorobenzene.  
**EPA 8082A:** NPW: PCB: 1, 5, 31, 87, 101, 110, 141, 151, 153, 180, 183, 187.  
**EPA 8270-SIM:** NPW and SCM: Alkylated PAHs.  
**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene, n-Butylbenzene, n-Propylbenzene, sec-Butylbenzene, tert-Butylbenzene.  
**Biological Tissue Matrix:** **8270D-SIM; 3050B; 3051A; 7471B; 8081B; 8082A; 6020A:** Lead; **8270D:** bis(2-ethylhexyl)phthalate, Butylbenzylphthalate, Diethyl phthalate, Dimethyl phthalate, Di-n-butyl phthalate, Di-n-octyl phthalate, Fluoranthene, Pentachlorophenol.

The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:

### Drinking Water

**EPA 200.8:** Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, Ti; **EPA 200.7:** Ba, Be, Ca, Cd, Cr, Cu, Na; **EPA 245.1:** Mercury;  
**EPA 300.0:** Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**  
**EPA 332:** Perchlorate.  
**Microbiology:** **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

### Non-Potable Water

**EPA 200.8:** Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, Ti, Zn;  
**EPA 200.7:** Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, Ti, Tl, V, Zn;  
**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH, EPA 350.1:** Ammonia-N, **LACHAT 10-107-06-1-B:** Ammonia-N, **SM4500NO3-F,**  
**EPA 353.2:** Nitrate-N, **SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**  
**EPA 624:** Volatile Halocarbons & Aromatics,  
**EPA 608:** Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs  
**EPA 625:** SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.  
**Microbiology:** **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF.**

For a complete listing of analytes and methods, please contact your Alpha Project Manager.



# CHAIN OF CUSTODY Page 1 of 1

Date Rec'd In Lab: **5/18/16** ALPHA Job #: **L1615111**

Project Information	Report Information - Data Deliverables	Billing Information
Project Name: <b>EPA PCB Storage</b>	<input type="checkbox"/> ACEX <input checked="" type="checkbox"/> EMAIL	<input checked="" type="checkbox"/> Same as Client info <input type="checkbox"/> PO #

**Client Information**

Client: **Woodsboro LLC**

Address: **401 Great Rd  
Falmouth, MA**

Phone: **603-498-2914**

Email: **J.Trosia@woodsboroltd.com**

**Project Location:** **Falmouth, MA**

**Project #:** **10V-1007**

**Project Manager:** **Danica Johnson**

**ALPHA Quote #:**

**Turn-Around Time**

Standard  RUSH (see comment below)

**Date Due:**

**Regulatory Requirements & Project Information Requirements**

Yes  No MA MCL Analytical Methods  Yes  No CT RCP Analytical Methods

Yes  No Matrix Spike Required on this SDG? (Required for MCP Inspections)

Yes  No GWT Standards (Info Required for Metals & EPH with Targets)

Yes  No NPDES RCP

Other State/Fed Program \_\_\_\_\_

**Additional Project Information:**

ANALYSIS		SAMPLE INFO
PROC	TYPE	
PROC: <input type="checkbox"/> SWR <input type="checkbox"/> L-GLY <input type="checkbox"/> L-INST	TYPE: <input type="checkbox"/> Ground Only <input type="checkbox"/> Suspended	Filtration <input checked="" type="checkbox"/> Field <input type="checkbox"/> Lab to Go Preservation <input type="checkbox"/> Lab to Go
METALS: <input type="checkbox"/> AME <input type="checkbox"/> L-PAN	SWR: <input type="checkbox"/> L-Ranges & Targets <input type="checkbox"/> Ranges Only	
METALS: <input type="checkbox"/> MCLP 13 <input type="checkbox"/> MCLP 14 <input type="checkbox"/> CIRC 13	TYPE: <input type="checkbox"/> Ranges Only <input type="checkbox"/> Ranges Only	
METALS: <input type="checkbox"/> CROMA <input type="checkbox"/> CROMA		
SWR: <input type="checkbox"/> L-Ranges & Targets <input type="checkbox"/> Ranges Only		
TYPE: <input type="checkbox"/> Ranges Only <input type="checkbox"/> Ranges Only		

*Handwritten notes in table:*  
 SWR, Ch-Metals, NO<sub>2</sub>, NO<sub>3</sub>, of 5/18/16  
 Classified as Pb, Mn, Fe, B  
 DOC  
 Total Alk  
 Total P, NH3

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
15111-01	P2-1B	5-18-16	16:30	A <sub>20</sub>	DT
02	P2-1C	5-18-16	17:40	"	DT
03	P2-1D	5-18-16	17:35	"	SW
04	P2-1E	5-18-16	16:55	"	SW

<b>Container Type</b> P= Plastic G= amber glass V= Vial C= Glass B= Borehole Inst O= Cube D= Other F= Fridge S= BOD Bottle	<b>Preservative</b> A= None B= HCl C= HNO <sub>3</sub> D= H <sub>2</sub> SO <sub>4</sub> E= NaOH F= NaCl G= NaClO H= NaFSD I= Na <sub>2</sub> SO <sub>4</sub> J= Residual Acid K= H <sub>2</sub> SO <sub>4</sub> L= Other	<b>Container Type</b> Preservative	Relinquished By: <b>Samantha Wright</b> Date/Time: <b>5/18/16 19:23</b>	Received By: <b>Amal Arora</b> Date/Time: <b>5/18/16 19:28</b>	All SDG items submitted are subject to Alpha's Terms and Conditions. See reverse side. FORM NO: 01-01 (rev. 12-Mar-2012)
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## ANALYTICAL REPORT

Lab Number:	L1615088
Client:	Watervision, LLC 454 Court Street Suite 304 Portsmouth, NH 03801
ATTN:	Danna Truslow
Phone:	(603) 766-6670
Project Name:	EPA-PRB-SHOREWOOD
Project Number:	WV-1009
Report Date:	05/26/16

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), VA (460195), MD (348), IL (200077), NC (666), TX (T104704476), DOD (L2217), USDA (Permit #P-330-11-00240).

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Eight Walkup Drive, Westborough, MA 01581-1019  
508-898-9220 (Fax) 508-898-9193 800-624-9220 - [www.alphalab.com](http://www.alphalab.com)



**Project Name:** EPA-PRB-SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615088  
**Report Date:** 05/26/16

<b>Alpha Sample ID</b>	<b>Client ID</b>	<b>Matrix</b>	<b>Sample Location</b>	<b>Collection Date/Time</b>	<b>Receive Date</b>
L1615088-01	PZ-2A	WATER	FALMOUTH, MA	05/18/16 11:25	05/18/16
L1615088-02	PZ-2A DUP	WATER	FALMOUTH, MA	05/18/16 11:30	05/18/16
L1615088-03	PZ-2B	WATER	FALMOUTH, MA	05/18/16 13:15	05/18/16
L1615088-04	PZ-2C	WATER	FALMOUTH, MA	05/18/16 14:05	05/18/16
L1615088-05	PZ-2D	WATER	FALMOUTH, MA	05/18/16 14:50	05/18/16
L1615088-06	PZ-2E	WATER	FALMOUTH, MA	05/18/16 15:25	05/18/16
L1615088-07	PZ-1A	WATER	FALMOUTH, MA	05/18/16 15:40	05/18/16

**Project Name:** EPA-PRB-SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615088  
**Report Date:** 05/26/16

### Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

#### HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

**Project Name:** EPA-PRB-SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615088  
**Report Date:** 05/26/16

### Case Narrative (continued)

#### Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

#### Nitrogen, Total Kjeldahl

L1615088-05: The sample has elevated detection limits due to the dilution required by the sample matrix.

#### Dissolved Organic Carbon

The samples were field filtered; a filter blank was not received.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:

 Cristin Walker

Title: Technical Director/Representative

Date: 05/26/16

## METALS

**Project Name:** EPA-PRB-SHOREWOOD**Lab Number:** L1615088**Project Number:** WV-1009**Report Date:** 05/26/16**SAMPLE RESULTS**

Lab ID: L1615088-01

Date Collected: 05/18/16 11:25

Client ID: PZ-2A

Date Received: 05/18/16

Sample Location: FALMOUTH, MA

Field Prep: Field Filtered  
(Dissolved  
Metals)

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	05/20/16 03:50	05/20/16 23:53	EPA 3005A	1,6010C	FB
Boron, Dissolved	0.011	J	mg/l	0.030	0.007	1	05/20/16 03:50	05/20/16 23:53	EPA 3005A	1,6010C	FB
Iron, Dissolved	ND		mg/l	0.05	0.02	1	05/20/16 03:50	05/20/16 23:53	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.018		mg/l	0.010	0.002	1	05/20/16 03:50	05/20/16 23:53	EPA 3005A	1,6010C	FB



**Project Name:** EPA-PRB-SHOREWOOD**Lab Number:** L1615088**Project Number:** WV-1009**Report Date:** 05/26/16**SAMPLE RESULTS**

Lab ID: L1615088-02  
 Client ID: PZ-2A DUP  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 11:30  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	05/20/16 03:50	05/20/16 23:58	EPA 3005A	1,6010C	FB
Boron, Dissolved	0.011	J	mg/l	0.030	0.007	1	05/20/16 03:50	05/20/16 23:58	EPA 3005A	1,6010C	FB
Iron, Dissolved	ND		mg/l	0.05	0.02	1	05/20/16 03:50	05/20/16 23:58	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.017		mg/l	0.010	0.002	1	05/20/16 03:50	05/20/16 23:58	EPA 3005A	1,6010C	FB



**Project Name:** EPA-PRB-SHOREWOOD**Lab Number:** L1615088**Project Number:** WV-1009**Report Date:** 05/26/16**SAMPLE RESULTS**

Lab ID: L1615088-03  
 Client ID: PZ-2B  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 13:15  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	05/20/16 03:50	05/21/16 00:30	EPA 3005A	1,6010C	FB
Boron, Dissolved	0.015	J	mg/l	0.030	0.007	1	05/20/16 03:50	05/21/16 00:30	EPA 3005A	1,6010C	FB
Iron, Dissolved	0.07		mg/l	0.05	0.02	1	05/20/16 03:50	05/21/16 00:30	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.013		mg/l	0.010	0.002	1	05/20/16 03:50	05/21/16 00:30	EPA 3005A	1,6010C	FB



**Project Name:** EPA-PRB-SHOREWOOD**Lab Number:** L1615088**Project Number:** WV-1009**Report Date:** 05/26/16**SAMPLE RESULTS**

Lab ID: L1615088-04  
 Client ID: PZ-2C  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 14:05  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	05/20/16 03:50	05/21/16 00:34	EPA 3005A	1,6010C	FB
Boron, Dissolved	0.028	J	mg/l	0.030	0.007	1	05/20/16 03:50	05/21/16 00:34	EPA 3005A	1,6010C	FB
Iron, Dissolved	0.18		mg/l	0.05	0.02	1	05/20/16 03:50	05/21/16 00:34	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.072		mg/l	0.010	0.002	1	05/20/16 03:50	05/21/16 00:34	EPA 3005A	1,6010C	FB



**Project Name:** EPA-PRB-SHOREWOOD**Lab Number:** L1615088**Project Number:** WV-1009**Report Date:** 05/26/16**SAMPLE RESULTS**

Lab ID: L1615088-05  
 Client ID: PZ-2D  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 14:50  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	0.015		mg/l	0.005	0.002	1	05/20/16 03:50	05/21/16 00:38	EPA 3005A	1,6010C	FB
Boron, Dissolved	0.028	J	mg/l	0.030	0.007	1	05/20/16 03:50	05/21/16 00:38	EPA 3005A	1,6010C	FB
Iron, Dissolved	0.06		mg/l	0.05	0.02	1	05/20/16 03:50	05/21/16 00:38	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.264		mg/l	0.010	0.002	1	05/20/16 03:50	05/21/16 00:38	EPA 3005A	1,6010C	FB



**Project Name:** EPA-PRB-SHOREWOOD**Lab Number:** L1615088**Project Number:** WV-1009**Report Date:** 05/26/16**SAMPLE RESULTS**

Lab ID: L1615088-06  
 Client ID: PZ-2E  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 15:25  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	05/20/16 03:50	05/21/16 00:43	EPA 3005A	1,6010C	FB
Boron, Dissolved	0.039		mg/l	0.030	0.007	1	05/20/16 03:50	05/21/16 00:43	EPA 3005A	1,6010C	FB
Iron, Dissolved	0.06		mg/l	0.05	0.02	1	05/20/16 03:50	05/21/16 00:43	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.015		mg/l	0.010	0.002	1	05/20/16 03:50	05/21/16 00:43	EPA 3005A	1,6010C	FB



**Project Name:** EPA-PRB-SHOREWOOD**Lab Number:** L1615088**Project Number:** WV-1009**Report Date:** 05/26/16**SAMPLE RESULTS**

Lab ID: L1615088-07  
 Client ID: PZ-1A  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 15:40  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.005	0.002	1	05/20/16 03:50	05/21/16 00:47	EPA 3005A	1,6010C	FB
Boron, Dissolved	0.010	J	mg/l	0.030	0.007	1	05/20/16 03:50	05/21/16 00:47	EPA 3005A	1,6010C	FB
Iron, Dissolved	0.70		mg/l	0.05	0.02	1	05/20/16 03:50	05/21/16 00:47	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.041		mg/l	0.010	0.002	1	05/20/16 03:50	05/21/16 00:47	EPA 3005A	1,6010C	FB



Project Name: EPA-PRB-SHOREWOOD

Lab Number: L1615088

Project Number: WV-1009

Report Date: 05/26/16

## Method Blank Analysis Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01-07 Batch: WG895978-1									
Arsenic, Dissolved	ND	mg/l	0.005	0.002	1	05/20/16 03:50	05/20/16 22:40	1,6010C	FB
Boron, Dissolved	ND	mg/l	0.030	0.007	1	05/20/16 03:50	05/20/16 22:40	1,6010C	FB
Iron, Dissolved	ND	mg/l	0.05	0.02	1	05/20/16 03:50	05/20/16 22:40	1,6010C	FB
Manganese, Dissolved	ND	mg/l	0.010	0.002	1	05/20/16 03:50	05/20/16 22:40	1,6010C	FB

### Prep Information

Digestion Method: EPA 3005A

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** EPA-PRB-SHOREWOOD

**Project Number:** WV-1009

**Lab Number:** L1615088

**Report Date:** 05/26/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01-07 Batch: WG895978-2								
Arsenic, Dissolved	102		-		80-120	-		
Boron, Dissolved	106		-		80-120	-		
Iron, Dissolved	94		-		80-120	-		
Manganese, Dissolved	96		-		80-120	-		

### Matrix Spike Analysis Batch Quality Control

**Project Name:** EPA-PRB-SHOREWOOD

**Lab Number:** L1615088

**Project Number:** WV-1009

**Report Date:** 05/26/16

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	RPD Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01-07 QC Batch ID: WG895978-4 QC Sample: L1614561-01 Client ID: MS Sample												
Arsenic, Dissolved	0.002J	0.12	0.173	144	Q	-	-		75-125	-		20
Boron, Dissolved	ND	1	1.46	146	Q	-	-		75-125	-		20
Iron, Dissolved	ND	1	1.1	110		-	-		75-125	-		20
Manganese, Dissolved	0.049	0.5	0.591	108		-	-		75-125	-		20

## Lab Duplicate Analysis

Batch Quality Control

Project Name: EPA-PRB-SHOREWOOD

Project Number: WV-1009

Lab Number: L1615088

Report Date: 05/26/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01-07 QC Batch ID: WG895978-3 QC Sample: L1614561-01 Client ID: DUP Sample						
Arsenic, Dissolved	0.002J	0.003J	mg/l	NC		20

# **INORGANICS & MISCELLANEOUS**

**Project Name:** EPA-PRB-SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615088  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615088-01  
**Client ID:** PZ-2A  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 11:25  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	9.30		mg CaCO3/L	2.00	NA	1	-	05/19/16 09:39	121,2320B	SG
pH (H)	6.0		SU	-	NA	1	-	05/18/16 22:33	121,4500H+-B	AA
Nitrogen, Ammonia	0.034	J	mg/l	0.075	0.028	1	05/20/16 10:37	05/20/16 23:49	44,350.1	AT
Nitrogen, Nitrite	ND		mg/l	0.050	0.010	1	-	05/18/16 23:52	44,353.2	MR
Nitrogen, Nitrate	0.50		mg/l	0.10	0.019	1	-	05/18/16 23:52	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.50		mg/l	0.10	0.019	1	-	05/18/16 23:52	44,353.2	MR
Total Nitrogen	0.50		mg/l	0.30	0.30	1	-	05/24/16 18:12	107,-	JO
Nitrogen, Total Kjeldahl	0.072	J	mg/l	0.300	0.066	1	05/20/16 10:16	05/20/16 22:55	121,4500N-C	AT
Phosphorus, Orthophosphate	0.025		mg/l	0.005	0.001	1	-	05/19/16 22:09	121,4500P-E	MR
Dissolved Organic Carbon	0.32	J	mg/l	1.0	0.12	1	05/19/16 17:10	05/19/16 17:10	121,5310C	SD
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	13.9		mg/l	0.500	0.054	1	-	05/19/16 20:36	44,300.0	AU
Sulfate	8.27		mg/l	1.00	0.150	1	-	05/19/16 20:36	44,300.0	AU



**Project Name:** EPA-PRB-SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615088  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615088-02  
**Client ID:** PZ-2A DUP  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 11:30  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	9.10		mg CaCO3/L	2.00	NA	1	-	05/19/16 09:39	121,2320B	SG
pH (H)	5.8		SU	-	NA	1	-	05/18/16 22:33	121,4500H+-B	AA
Nitrogen, Ammonia	0.061	J	mg/l	0.075	0.028	1	05/20/16 10:37	05/20/16 23:36	44,350.1	AT
Nitrogen, Nitrite	ND		mg/l	0.050	0.010	1	-	05/18/16 23:53	44,353.2	MR
Nitrogen, Nitrate	0.49		mg/l	0.10	0.019	1	-	05/18/16 23:53	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.49		mg/l	0.10	0.019	1	-	05/18/16 23:53	44,353.2	MR
Total Nitrogen	0.49		mg/l	0.30	0.30	1	-	05/24/16 18:12	107,-	JO
Nitrogen, Total Kjeldahl	0.119	J	mg/l	0.300	0.066	1	05/20/16 10:16	05/20/16 23:01	121,4500N-C	AT
Phosphorus, Orthophosphate	0.025		mg/l	0.005	0.001	1	-	05/19/16 22:10	121,4500P-E	MR
Dissolved Organic Carbon	0.34	J	mg/l	1.0	0.12	1	05/19/16 17:10	05/19/16 17:10	121,5310C	SD
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	13.7		mg/l	0.500	0.054	1	-	05/19/16 20:48	44,300.0	AU
Sulfate	8.22		mg/l	1.00	0.150	1	-	05/19/16 20:48	44,300.0	AU



**Project Name:** EPA-PRB-SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615088  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615088-03  
**Client ID:** PZ-2B  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 13:15  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	5.90		mg CaCO3/L	2.00	NA	1	-	05/19/16 09:39	121,2320B	SG
pH (H)	5.5		SU	-	NA	1	-	05/18/16 22:33	121,4500H+-B	AA
Nitrogen, Ammonia	ND		mg/l	0.075	0.028	1	05/20/16 10:37	05/20/16 23:39	44,350.1	AT
Nitrogen, Nitrite	ND		mg/l	0.050	0.010	1	-	05/18/16 23:54	44,353.2	MR
Nitrogen, Nitrate	0.41		mg/l	0.10	0.019	1	-	05/18/16 23:54	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.41		mg/l	0.10	0.019	1	-	05/18/16 23:54	44,353.2	MR
Total Nitrogen	0.41		mg/l	0.30	0.30	1	-	05/24/16 18:12	107,-	JO
Nitrogen, Total Kjeldahl	0.205	J	mg/l	0.300	0.066	1	05/20/16 10:16	05/20/16 23:01	121,4500N-C	AT
Phosphorus, Orthophosphate	0.007		mg/l	0.005	0.001	1	-	05/19/16 22:10	121,4500P-E	MR
Dissolved Organic Carbon	0.64	J	mg/l	1.0	0.12	1	05/19/16 17:10	05/19/16 17:10	121,5310C	SD
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	13.2		mg/l	0.500	0.054	1	-	05/19/16 21:00	44,300.0	AU
Sulfate	8.72		mg/l	1.00	0.150	1	-	05/19/16 21:00	44,300.0	AU



**Project Name:** EPA-PRB-SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615088  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615088-04  
**Client ID:** PZ-2C  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 14:05  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	17.4		mg CaCO3/L	2.00	NA	1	-	05/19/16 09:39	121,2320B	SG
pH (H)	5.5		SU	-	NA	1	-	05/18/16 22:33	121,4500H+-B	AA
Nitrogen, Ammonia	0.131		mg/l	0.075	0.028	1	05/20/16 10:37	05/20/16 23:40	44,350.1	AT
Nitrogen, Nitrite	0.052		mg/l	0.050	0.010	1	-	05/19/16 00:05	44,353.2	MR
Nitrogen, Nitrate	4.3		mg/l	0.10	0.019	1	-	05/19/16 00:05	44,353.2	MR
Nitrogen, Nitrate/Nitrite	4.3		mg/l	0.10	0.019	1	-	05/19/16 00:05	44,353.2	MR
Total Nitrogen	4.3		mg/l	0.30	0.30	1	-	05/24/16 18:12	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.300	0.066	1	05/20/16 10:16	05/20/16 23:02	121,4500N-C	AT
Phosphorus, Orthophosphate	0.005		mg/l	0.005	0.001	1	-	05/19/16 22:10	121,4500P-E	MR
Dissolved Organic Carbon	2.2		mg/l	1.0	0.12	1	05/19/16 17:10	05/19/16 17:10	121,5310C	SD
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	12.5		mg/l	0.500	0.054	1	-	05/19/16 21:12	44,300.0	AU
Sulfate	7.66		mg/l	1.00	0.150	1	-	05/19/16 21:12	44,300.0	AU



**Project Name:** EPA-PRB-SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615088  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615088-05  
**Client ID:** PZ-2D  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 14:50  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	ND		mg CaCO3/L	2.00	NA	1	-	05/19/16 09:39	121,2320B	SG
pH (H)	4.4		SU	-	NA	1	-	05/18/16 22:33	121,4500H+-B	AA
Nitrogen, Ammonia	ND		mg/l	0.075	0.028	1	05/20/16 10:37	05/20/16 23:40	44,350.1	AT
Nitrogen, Nitrite	ND		mg/l	0.050	0.010	1	-	05/19/16 00:06	44,353.2	MR
Nitrogen, Nitrate	10.		mg/l	0.50	0.094	5	-	05/19/16 00:43	44,353.2	MR
Nitrogen, Nitrate/Nitrite	10.		mg/l	0.50	0.094	5	-	05/19/16 00:43	44,353.2	MR
Total Nitrogen	10.		mg/l	0.60	0.60	2	-	05/24/16 18:12	107,-	JO
Nitrogen, Total Kjeldahl	0.283	J	mg/l	0.600	0.132	2	05/20/16 10:16	05/20/16 23:03	121,4500N-C	AT
Phosphorus, Orthophosphate	0.005		mg/l	0.005	0.001	1	-	05/19/16 22:11	121,4500P-E	MR
Dissolved Organic Carbon	1.1		mg/l	1.0	0.12	1	05/19/16 17:10	05/19/16 17:10	121,5310C	SD
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	15.8		mg/l	0.500	0.054	1	-	05/19/16 21:24	44,300.0	AU
Sulfate	11.3		mg/l	1.00	0.150	1	-	05/19/16 21:24	44,300.0	AU



**Project Name:** EPA-PRB-SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615088  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615088-06  
**Client ID:** PZ-2E  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 15:25  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	9.20		mg CaCO3/L	2.00	NA	1	-	05/19/16 09:39	121,2320B	SG
pH (H)	5.5		SU	-	NA	1	-	05/18/16 22:33	121,4500H+-B	AA
Nitrogen, Ammonia	0.045	J	mg/l	0.075	0.028	1	05/20/16 10:37	05/20/16 23:44	44,350.1	AT
Nitrogen, Nitrite	ND		mg/l	0.050	0.010	1	-	05/19/16 00:07	44,353.2	MR
Nitrogen, Nitrate	4.9		mg/l	0.10	0.019	1	-	05/19/16 00:45	44,353.2	MR
Nitrogen, Nitrate/Nitrite	4.9		mg/l	0.10	0.019	1	-	05/19/16 00:45	44,353.2	MR
Total Nitrogen	4.9		mg/l	0.30	0.30	1	-	05/24/16 18:12	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.300	0.066	1	05/20/16 10:16	05/20/16 23:04	121,4500N-C	AT
Phosphorus, Orthophosphate	0.005		mg/l	0.005	0.001	1	-	05/19/16 22:11	121,4500P-E	MR
Dissolved Organic Carbon	0.80	J	mg/l	1.0	0.12	1	05/19/16 17:10	05/19/16 17:10	121,5310C	SD
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	40.2		mg/l	0.500	0.054	1	-	05/19/16 21:36	44,300.0	AU
Sulfate	7.53		mg/l	1.00	0.150	1	-	05/19/16 21:36	44,300.0	AU



**Project Name:** EPA-PRB-SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615088  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615088-07  
**Client ID:** PZ-1A  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 15:40  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	17.2		mg CaCO3/L	2.00	NA	1	-	05/19/16 09:39	121,2320B	SG
pH (H)	6.2		SU	-	NA	1	-	05/18/16 22:33	121,4500H+-B	AA
Nitrogen, Ammonia	0.033	J	mg/l	0.075	0.028	1	05/20/16 10:37	05/20/16 23:45	44,350.1	AT
Nitrogen, Nitrite	ND		mg/l	0.050	0.010	1	-	05/19/16 00:08	44,353.2	MR
Nitrogen, Nitrate	0.40		mg/l	0.10	0.019	1	-	05/19/16 00:08	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.40		mg/l	0.10	0.019	1	-	05/19/16 00:08	44,353.2	MR
Total Nitrogen	0.71		mg/l	0.30	0.30	1	-	05/24/16 18:12	107,-	JO
Nitrogen, Total Kjeldahl	0.312		mg/l	0.300	0.066	1	05/20/16 10:16	05/20/16 23:05	121,4500N-C	AT
Phosphorus, Orthophosphate	0.024		mg/l	0.005	0.001	1	-	05/19/16 22:11	121,4500P-E	MR
Dissolved Organic Carbon	0.48	J	mg/l	1.0	0.12	1	05/19/16 17:10	05/19/16 17:10	121,5310C	SD
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	12.3		mg/l	0.500	0.054	1	-	05/19/16 21:48	44,300.0	AU
Sulfate	6.93		mg/l	1.00	0.150	1	-	05/19/16 21:48	44,300.0	AU



**Project Name:** EPA-PRB-SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615088  
**Report Date:** 05/26/16

**Method Blank Analysis**  
**Batch Quality Control**

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-07 Batch: WG895500-1										
Nitrogen, Nitrate	ND		mg/l	0.10	0.019	1	-	05/18/16 23:32	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-07 Batch: WG895502-1										
Nitrogen, Nitrate/Nitrite	ND		mg/l	0.10	0.019	1	-	05/18/16 23:32	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-07 Batch: WG895504-1										
Nitrogen, Nitrite	ND		mg/l	0.050	0.010	1	-	05/18/16 23:35	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-07 Batch: WG895575-1										
Dissolved Organic Carbon	ND		mg/l	1.0	0.12	1	05/19/16 17:10	05/19/16 17:10	121,5310C	SD
General Chemistry - Westborough Lab for sample(s): 01-07 Batch: WG895647-5										
Alkalinity, Total	ND		mg CaCO3/L	2.00	NA	1	-	05/19/16 09:39	121,2320B	SG
General Chemistry - Westborough Lab for sample(s): 01-07 Batch: WG895930-1										
Phosphorus, Orthophosphate	ND		mg/l	0.005	0.001	1	-	05/19/16 22:07	121,4500P-E	MR
General Chemistry - Westborough Lab for sample(s): 01-07 Batch: WG896022-1										
Nitrogen, Total Kjeldahl	0.222	J	mg/l	0.300	0.022	1	05/20/16 10:16	05/20/16 22:48	121,4500N-C	AT
General Chemistry - Westborough Lab for sample(s): 01-07 Batch: WG896149-1										
Nitrogen, Ammonia	ND		mg/l	0.075	0.028	1	05/20/16 10:37	05/20/16 23:22	44,350.1	AT
Anions by Ion Chromatography - Westborough Lab for sample(s): 01-07 Batch: WG896288-1										
Chloride	ND		mg/l	0.500	0.054	1	-	05/19/16 18:12	44,300.0	AU
Sulfate	ND		mg/l	1.00	0.150	1	-	05/19/16 18:12	44,300.0	AU

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** EPA-PRB-SHOREWOOD

**Project Number:** WV-1009

**Lab Number:** L1615088

**Report Date:** 05/26/16

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
General Chemistry - Westborough Lab Associated sample(s): 01-07 Batch: WG895500-2								
Nitrogen, Nitrate	100		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-07 Batch: WG895502-2								
Nitrogen, Nitrate/Nitrite	100		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-07 Batch: WG895504-2								
Nitrogen, Nitrite	102		-		90-110	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-07 Batch: WG895506-1								
pH	100		-		99-101	-		5
General Chemistry - Westborough Lab Associated sample(s): 01-07 Batch: WG895575-2								
Dissolved Organic Carbon	96		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-07 Batch: WG895647-7								
Alkalinity, Total	102		-		90-110	-		10
General Chemistry - Westborough Lab Associated sample(s): 01-07 Batch: WG895930-2								
Phosphorus, Orthophosphate	99		-		90-110	-		

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** EPA-PRB-SHOREWOOD

**Project Number:** WV-1009

**Lab Number:** L1615088

**Report Date:** 05/26/16

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-07 Batch: WG896022-2					
Nitrogen, Total Kjeldahl	101	-	78-122	-	
General Chemistry - Westborough Lab Associated sample(s): 01-07 Batch: WG896149-2					
Nitrogen, Ammonia	97	-	80-120	-	20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-07 Batch: WG896288-2					
Chloride	100	-	90-110	-	
Sulfate	98	-	90-110	-	

### Matrix Spike Analysis Batch Quality Control

**Project Name:** EPA-PRB-SHOREWOOD

**Lab Number:** L1615088

**Project Number:** WV-1009

**Report Date:** 05/26/16

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG895500-4 QC Sample: L1615088-03 Client ID: PZ-2B												
Nitrogen, Nitrate	0.41	4	4.4	100	-	-	-	-	83-113	-	-	6
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG895502-4 QC Sample: L1615088-03 Client ID: PZ-2B												
Nitrogen, Nitrate/Nitrite	0.41	4	4.4	100	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG895504-4 QC Sample: L1615088-03 Client ID: PZ-2B												
Nitrogen, Nitrite	ND	4	4.0	100	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG895575-4 QC Sample: L1615088-05 Client ID: PZ-2D												
Dissolved Organic Carbon	1.1	4	5.1	100	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG895647-8 QC Sample: L1614883-01 Client ID: MS Sample												
Alkalinity, Total	15.2	100	122	107	-	-	-	-	86-116	-	-	10
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG895930-4 QC Sample: L1615088-02 Client ID: PZ-2A DUP												
Phosphorus, Orthophosphate	0.025	0.5	0.516	98	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG896022-4 QC Sample: L1615088-01 Client ID: PZ-2A												
Nitrogen, Total Kjeldahl	0.072J	8	7.38	92	-	-	-	-	77-111	-	-	24
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG896149-4 QC Sample: L1615088-02 Client ID: PZ-2A DUP												
Nitrogen, Ammonia	0.061J	4	3.76	94	-	-	-	-	80-120	-	-	20
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG896288-3 QC Sample: L1615111-01 Client ID: MS Sample												
Chloride	12.8	4	16.3	86	-	-	-	-	40-151	-	-	18
Sulfate	5.14	8	13.2	101	-	-	-	-	60-140	-	-	20

## Lab Duplicate Analysis

### Batch Quality Control

Project Name: EPA-PRB-SHOREWOOD

Project Number: WV-1009

Lab Number: L1615088

Report Date: 05/26/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG895500-3 QC Sample: L1615088-03 Client ID: PZ-2B						
Nitrogen, Nitrate	0.41	0.41	mg/l	0		6
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG895502-3 QC Sample: L1615088-03 Client ID: PZ-2B						
Nitrogen, Nitrate/Nitrite	0.41	0.41	mg/l	0		20
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG895504-3 QC Sample: L1615088-03 Client ID: PZ-2B						
Nitrogen, Nitrite	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG895506-2 QC Sample: L1615041-01 Client ID: DUP Sample						
pH	6.3	6.4	SU	2		5
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG895575-3 QC Sample: L1615088-04 Client ID: PZ-2C						
Dissolved Organic Carbon	2.2	2.2	mg/l	0		20
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG895647-6 QC Sample: L1614883-01 Client ID: DUP Sample						
Alkalinity, Total	15.2	15.2	mg CaCO3/L	0		10
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG895930-3 QC Sample: L1615088-01 Client ID: PZ-2A						
Phosphorus, Orthophosphate	0.025	0.025	mg/l	0		20
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG896022-3 QC Sample: L1615088-01 Client ID: PZ-2A						
Nitrogen, Total Kjeldahl	0.072J	0.184J	mg/l	NC		24
General Chemistry - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG896149-3 QC Sample: L1615088-02 Client ID: PZ-2A DUP						
Nitrogen, Ammonia	0.061J	0.054J	mg/l	NC		20

**Lab Duplicate Analysis**  
**Batch Quality Control**

**Project Name:** EPA-PRB-SHOREWOOD

**Project Number:** WV-1009

**Lab Number:** L1615088

**Report Date:** 05/26/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	RPD Limits
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-07 QC Batch ID: WG896288-4 QC Sample: L1615111-01 Client ID: DUP Sample					
Chloride	12.8	12.8	mg/l	0	18
Sulfate	5.14	5.18	mg/l	1	20

Project Name: EPA-PRB-SHOREWOOD

Lab Number: L1615088

Project Number: WV-1009

Report Date: 05/26/16

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

## Cooler Information Custody Seal

## Cooler

A Absent

## Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1615088-01A	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-01B	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-01C	Plastic 500ml unpreserved	A	8	3.0	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2),PH-4500(.01)
L1615088-01D	Plastic 500ml H2SO4 preserved	A	<2	3.0	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1615088-01E	Plastic 250ml unpreserved w/No H	A	N/A	3.0	Y	Absent	ALK-T-2320(14)
L1615088-01F	Plastic 250ml HNO3 preserved	A	<2	3.0	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)
L1615088-01G	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-02A	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-02B	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-02C	Plastic 500ml unpreserved	A	8	3.0	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2),PH-4500(.01)
L1615088-02D	Plastic 500ml H2SO4 preserved	A	<2	3.0	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1615088-02E	Plastic 250ml unpreserved w/No H	A	N/A	3.0	Y	Absent	ALK-T-2320(14)
L1615088-02F	Plastic 250ml HNO3 preserved	A	<2	3.0	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)
L1615088-02G	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-03A	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-03B	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-03C	Plastic 500ml unpreserved	A	8	3.0	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2),PH-4500(.01)
L1615088-03D	Plastic 500ml H2SO4 preserved	A	<2	3.0	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1615088-03E	Plastic 250ml unpreserved w/No H	A	N/A	3.0	Y	Absent	ALK-T-2320(14)
L1615088-03F	Plastic 250ml HNO3 preserved	A	<2	3.0	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)
L1615088-03G	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-04A	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)

\*Values in parentheses indicate holding time in days



**Project Name:** EPA-PRB-SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615088  
**Report Date:** 05/26/16

**Container Information**

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1615088-04B	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-04C	Plastic 500ml unpreserved	A	7	3.0	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2),PH-4500(.01)
L1615088-04D	Plastic 500ml H2SO4 preserved	A	<2	3.0	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1615088-04E	Plastic 250ml unpreserved w/No H	A	N/A	3.0	Y	Absent	ALK-T-2320(14)
L1615088-04F	Plastic 250ml HNO3 preserved	A	<2	3.0	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)
L1615088-04G	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-05A	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-05B	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-05C	Plastic 500ml unpreserved	A	7	3.0	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2),PH-4500(.01)
L1615088-05D	Plastic 500ml H2SO4 preserved	A	<2	3.0	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1615088-05E	Plastic 250ml unpreserved w/No H	A	N/A	3.0	Y	Absent	ALK-T-2320(14)
L1615088-05F	Plastic 250ml HNO3 preserved	A	<2	3.0	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)
L1615088-05G	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-06A	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-06B	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-06C	Plastic 500ml unpreserved	A	8	3.0	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2),PH-4500(.01)
L1615088-06D	Plastic 500ml H2SO4 preserved	A	<2	3.0	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1615088-06E	Plastic 250ml unpreserved w/No H	A	N/A	3.0	Y	Absent	ALK-T-2320(14)
L1615088-06F	Plastic 250ml HNO3 preserved	A	<2	3.0	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)
L1615088-06G	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-07A	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-07B	Vial H2SO4 preserved	A	N/A	3.0	Y	Absent	DOC-5310(28)
L1615088-07C	Plastic 500ml unpreserved	A	8	3.0	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2),PH-4500(.01)
L1615088-07D	Plastic 500ml H2SO4 preserved	A	<2	3.0	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1615088-07E	Plastic 250ml unpreserved w/No H	A	N/A	3.0	Y	Absent	ALK-T-2320(14)
L1615088-07F	Plastic 250ml HNO3 preserved	A	<2	3.0	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)

\*Values in parentheses indicate holding time in days

**Project Name:** EPA-PRB-SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615088  
**Report Date:** 05/26/16

## GLOSSARY

### Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

### Footnotes

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### Terms

**Total:** With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

**Analytical Method:** Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### Data Qualifiers

- A** - Spectra identified as "Aldol Condensation Product".
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

**Report Format:** DU Report with 'J' Qualifiers



**Project Name:** EPA-PRB-SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615088  
**Report Date:** 05/26/16

#### **Data Qualifiers**

- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.
- J** - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- ND** - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

**Project Name:** EPA-PRB-SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615088  
**Report Date:** 05/26/16

## REFERENCES

- 1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.
- 44 Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993.
- 107 Alpha Analytical - In-house calculation method.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



## Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

### Westborough Facility

**EPA 524.2:** 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, m/p-xylene, o-xylene  
**EPA 624:** 2-Butanone (MEK), 1,4-Dioxane, tert-Amylmethyl Ether, tert-Butyl Alcohol, m/p-xylene, o-xylene  
**EPA 625:** Aniline, Benzoic Acid, Benzyl Alcohol, 4-Chloroaniline, 3-Methylphenol, 4-Methylphenol.  
**EPA 1010A:** NPW: Ignitability  
**EPA 6010C:** NPW: Strontium; SCM: Strontium  
**EPA 8151A:** NPW: 2,4-DB, Dicamba, Dichloroprop, MCPA, MCPP; SCM: 2,4-DB, Dichloroprop, MCPA, MCPP  
**EPA 8260C:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene, Isopropanol; SCM: Iodomethane (methyl iodide), Methyl methacrylate (soil); 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.  
**EPA 8270D:** NPW: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine; SCM: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine.  
**EPA 9010:** NPW: Amenable Cyanide Distillation, Total Cyanide Distillation  
**EPA 9038:** NPW: Sulfate  
**EPA 9050A:** NPW: Specific Conductance  
**EPA 9056:** NPW: Chloride, Nitrate, Sulfate  
**EPA 9065:** NPW: Phenols  
**EPA 9251:** NPW: Chloride  
**SM3500:** NPW: Ferrous Iron  
**SM4500:** NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO<sub>2</sub>, NO<sub>3</sub>.  
**SM5310C:** DW: Dissolved Organic Carbon

### Mansfield Facility

**EPA 8270D:** NPW: Biphenyl; SCM: Biphenyl, Caprolactam  
**EPA 8270D-SIM Isotope Dilution:** SCM: 1,4-Dioxane  
**SM 2540D:** TSS  
**SM2540G:** SCM: Percent Solids  
**EPA 1631E:** SCM: Mercury  
**EPA 7474:** SCM: Mercury  
**EPA 8081B:** NPW and SCM: Mirex, Hexachlorobenzene.  
**EPA 8082A:** NPW: PCB: 1, 5, 31, 87, 101, 110, 141, 151, 153, 180, 183, 187.  
**EPA 8270-SIM:** NPW and SCM: Alkylated PAHs.  
**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene, n-Butylbenzene, n-Propylbenzene, sec-Butylbenzene, tert-Butylbenzene.  
**Biological Tissue Matrix:** **8270D-SIM; 3050B; 3051A; 7471B; 8081B; 8082A; 6020A:** Lead; **8270D:** bis(2-ethylhexyl)phthalate, Butylbenzylphthalate, Diethyl phthalate, Dimethyl phthalate, Di-n-butyl phthalate, Di-n-octyl phthalate, Fluoranthene, Pentachlorophenol.

The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:

### Drinking Water

**EPA 200.8:** Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, Ti; **EPA 200.7:** Ba, Be, Ca, Cd, Cr, Cu, Na; **EPA 245.1:** Mercury;  
**EPA 300.0:** Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**  
**EPA 332:** Perchlorate.  
**Microbiology:** **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

### Non-Potable Water

**EPA 200.8:** Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, Ti, Zn;  
**EPA 200.7:** Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, Ti, Tl, V, Zn;  
**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH, EPA 350.1:** Ammonia-N, **LCHAT 10-107-06-1-B:** Ammonia-N, **SM4500NO3-F,**  
**EPA 353.2:** Nitrate-N, **SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**  
**EPA 624:** Volatile Halocarbons & Aromatics,  
**EPA 608:** Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs  
**EPA 625:** SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.  
**Microbiology:** **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF.**

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

# CHAIN OF CUSTODY

PAGE 1 OF 1



1 Westford Circle  
Westford, MA 01581  
Tel: 508-638-8220

120 Pioneer Blvd  
Wareham, MA 02556  
Tel: 508-421-8207

Date Rec'd in Lab: **5-18-16**

ALPHA Job #: **L1615088**

Project Information

Project Name: **OPK PRS - Strawson**

Project Location: **Falmouth, MA**

Project #: **WV-1009**

Project Manager: **Danna Taylor**

ALPHA Quote #: \_\_\_\_\_

Report Information - Data Deliverables

ACEs  EMAIL  Same as Client info PO #:

Billing Information

Same as Client info PO #:

**Client Information**

Client: **Webbvision LLC**

Address: **401 Great Rd  
Acton, MA**

Phone: **978-498-2916**

Email: **d.taylor@webbvision.com**

Additional Project Information:

**Regulatory Requirements & Project Information Requirements**

Yes  No MA MCP Analytical Methods  Yes  No CT RCP Analytical Methods

Yes  No Matrix Spike Required on this SDGT (Required for MCP inorganics)

Yes  No GPH Standards (Info Required for Metals & EPH with Targets)

Yes  No NPDES RCP

Other State Fed Program: \_\_\_\_\_

**Turn-Around Time**

Standard  RUSH  Expedited  \_\_\_\_\_

Date Due: \_\_\_\_\_

**ANALYSIS**

VOC:  GENS  SV  SAJ

SVOC:  ANI  PAH

METALS:  CRP 13  CRP 14  CRP 15

PHOS:  CRP 16  CRP 17  CRP 18

PH:  Ranges & Targets  Ranges Only

TPH:  Ranges & Targets  Ranges Only

THP:  Ranges Only  Ranges Only

*Diss. Fe, Mn, As, P*

*Diss. Organic Carbon*

*Total Nitrogen*

*Total Phosphorus*

*Ammonia*

**SAMPLE INFO**

Location:  Field  Lab to do

Preservation:  Lab to do

Sample Comments: \_\_\_\_\_

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials	ANALYSIS										Sample Comments						
		Date	Time			VOC	SVOC	METALS	PHOS	PH	TPH	THP	Diss. Fe	Diss. Mn	Diss. As		Diss. P	Diss. Organic Carbon	Total Nitrogen	Total Phosphorus	Ammonia	
15088-01	✓ PZ-2A	5-18-16	11:25	H <sub>2</sub> O	SW	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
02	✓ PZ-2A deep	"	11:30	"	SW	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
03	✓ PZ-2B	"	13:15	"	SW	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
04	✓ PZ-2C	"	14:05	"	SW	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
05	✓ PZ-2D	"	14:50	"	SW	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
06	✓ PZ-2E	"	15:25	"	SW	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
07	✓ PZ-1A	"	15:40	"	DT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	<del>PZ-1B</del>	<del>1A</del>	<del>16:20</del>	<del>"</del>	<del>DT</del>																	

**Container Type**

A+ Plastic  
A- Amber glass  
U- Uril  
G- Glass  
B- Barium cup  
C- Can  
D- Jar  
E- Bottle  
F- BOD Bottle

**Preservative**

A- None  
B- HCl  
C- HNO<sub>3</sub>  
D- H<sub>2</sub>SO<sub>4</sub>  
E- NaOH  
F- NaOH  
G- NaOH  
H - NaOH  
I - Acetic Acid  
J - HCl  
K - In Acetic  
L - Other

**Container Type**

Preservative

**Relinquished By:** *[Signature]*

**Date/Time:** *5-18-16 12:15*

**Received By:** *[Signature]*

**Date/Time:** *5-18-16 12:15*

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO 21-21 (rev. 12-Mar-02)



## ANALYTICAL REPORT

Lab Number:	L1615084
Client:	Watervision, LLC 454 Court Street Suite 304 Portsmouth, NH 03801
ATTN:	Danna Truslow
Phone:	(603) 766-6670
Project Name:	EPA-PRB- SHOREWOOD
Project Number:	WV-1009
Report Date:	05/26/16

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), VA (460195), MD (348), IL (200077), NC (666), TX (T104704476), DOD (L2217), USDA (Permit #P-330-11-00240).

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Eight Walkup Drive, Westborough, MA 01581-1019  
508-898-9220 (Fax) 508-898-9193 800-624-9220 - [www.alphalab.com](http://www.alphalab.com)



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

<b>Alpha Sample ID</b>	<b>Client ID</b>	<b>Matrix</b>	<b>Sample Location</b>	<b>Collection Date/Time</b>	<b>Receive Date</b>
L1615084-01	4-14 BK	WATER	FALMOUTH, MA	05/18/16 12:05	05/18/16
L1615084-02	4-14 W	WATER	FALMOUTH, MA	05/18/16 12:15	05/18/16
L1615084-03	4-10 P	WATER	FALMOUTH, MA	05/18/16 11:25	05/18/16
L1615084-04	04 BUT	WATER	FALMOUTH, MA	05/18/16 10:20	05/18/16
L1615084-05	4-13 BU	WATER	FALMOUTH, MA	05/18/16 11:55	05/18/16
L1615084-06	MTER 4-02 GNT	WATER	FALMOUTH, MA	05/18/16 10:05	05/18/16
L1615084-07	4-03 RT	WATER	FALMOUTH, MA	05/18/16 10:10	05/18/16
L1615084-08	4-05 BUT	WATER	FALMOUTH, MA	05/18/16 10:35	05/18/16
L1615084-09	4-01 PT	WATER	FALMOUTH, MA	05/18/16 09:45	05/18/16
L1615084-10	4-12-R	WATER	FALMOUTH, MA	05/18/16 11:45	05/18/16
L1615084-11	04-11-GN	WATER	FALMOUTH, MA	05/18/16 11:35	05/18/16
L1615084-12	4-08-GY	WATER	FALMOUTH, MA	05/18/16 11:00	05/18/16
L1615084-13	4-09-Y	WATER	FALMOUTH, MA	05/18/16 11:15	05/18/16
L1615084-14	4-07-O	WATER	FALMOUTH, MA	05/18/16 10:55	05/18/16
L1615084-15	4-06-WT	WATER	FALMOUTH, MA	05/18/16 10:45	05/18/16

**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

### Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

#### HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

### Case Narrative (continued)

#### Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

#### Dissolved Metals

The WG895979-4 MS recoveries, performed on L1615084-01, are outside the acceptance criteria for arsenic (133%) and manganese (126%). A post digestion spike was performed and was within acceptance criteria.

#### Dissolved Organic Carbon

L1615084-06: The sample has an elevated detection limit due to the dilution required by the sample matrix.

#### Nitrogen, Total Kjeldahl

L1615084-08, -14, and -15: The sample has elevated detection limits due to the dilution required by the sample matrix.

#### Dissolved Organic Carbon

The samples were field filtered; a filter blank was not received.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:

 Cristin Walker

Title: Technical Director/Representative

Date: 05/26/16

## METALS

**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

Lab ID: L1615084-01  
 Client ID: 4-14 BK  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 12:05  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
-----------	--------	-----------	-------	----	-----	--------------------	------------------	------------------	----------------	----------------------	---------

**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	0.0031	J	mg/l	0.0050	0.0020	1	05/20/16 04:12	05/24/16 19:51	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	05/20/16 04:12	05/24/16 19:51	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.0765		mg/l	0.0100	0.0020	1	05/20/16 04:12	05/24/16 19:51	EPA 3005A	1,6010C	PS



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

Lab ID: L1615084-02  
 Client ID: 4-14 W  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 12:15  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	0.0032	J	mg/l	0.0050	0.0020	1	05/20/16 04:12	05/24/16 22:20	EPA 3005A	1,6010C	PS
Iron, Dissolved	2.0		mg/l	0.050	0.020	1	05/20/16 04:12	05/24/16 22:20	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.306		mg/l	0.0100	0.0020	1	05/20/16 04:12	05/24/16 22:20	EPA 3005A	1,6010C	PS



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

Lab ID: L1615084-03  
 Client ID: 4-10 P  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 11:25  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	05/20/16 04:12	05/24/16 22:24	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	05/20/16 04:12	05/24/16 22:24	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.0327		mg/l	0.0100	0.0020	1	05/20/16 04:12	05/24/16 22:24	EPA 3005A	1,6010C	PS



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

Lab ID: L1615084-04  
 Client ID: 04 BUT  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 10:20  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	0.0031	J	mg/l	0.0050	0.0020	1	05/20/16 04:12	05/24/16 22:28	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	05/20/16 04:12	05/24/16 22:28	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.0421		mg/l	0.0100	0.0020	1	05/20/16 04:12	05/24/16 22:28	EPA 3005A	1,6010C	PS



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

Lab ID: L1615084-05  
 Client ID: 4-13 BU  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 11:55  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	0.0024	J	mg/l	0.0050	0.0020	1	05/20/16 04:12	05/24/16 22:33	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	05/20/16 04:12	05/24/16 22:33	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.534		mg/l	0.0100	0.0020	1	05/20/16 04:12	05/24/16 22:33	EPA 3005A	1,6010C	PS



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

Lab ID: L1615084-06  
 Client ID: MTER 4-02 GNT  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 10:05  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	05/20/16 04:12	05/24/16 22:37	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	05/20/16 04:12	05/24/16 22:37	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.0080	J	mg/l	0.0100	0.0020	1	05/20/16 04:12	05/24/16 22:37	EPA 3005A	1,6010C	PS



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

Lab ID: L1615084-07  
 Client ID: 4-03 RT  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 10:10  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	05/20/16 04:12	05/24/16 22:41	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	05/20/16 04:12	05/24/16 22:41	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.0031	J	mg/l	0.0100	0.0020	1	05/20/16 04:12	05/24/16 22:41	EPA 3005A	1,6010C	PS



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

Lab ID: L1615084-08  
 Client ID: 4-05 BUT  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 10:35  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	0.0026	J	mg/l	0.0050	0.0020	1	05/20/16 04:12	05/24/16 22:47	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	05/20/16 04:12	05/24/16 22:47	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.436		mg/l	0.0100	0.0020	1	05/20/16 04:12	05/24/16 22:47	EPA 3005A	1,6010C	PS



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

Lab ID: L1615084-09  
 Client ID: 4-01 PT  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 09:45  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	0.0043	J	mg/l	0.0050	0.0020	1	05/20/16 04:12	05/24/16 23:13	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	05/20/16 04:12	05/24/16 23:13	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.0229		mg/l	0.0100	0.0020	1	05/20/16 04:12	05/24/16 23:13	EPA 3005A	1,6010C	PS



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

Lab ID: L1615084-10  
 Client ID: 4-12-R  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 11:45  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	05/20/16 04:12	05/24/16 23:17	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	05/20/16 04:12	05/24/16 23:17	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.291		mg/l	0.0100	0.0020	1	05/20/16 04:12	05/24/16 23:17	EPA 3005A	1,6010C	PS



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

Lab ID: L1615084-11  
 Client ID: 04-11-GN  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 11:35  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	05/20/16 04:12	05/24/16 23:22	EPA 3005A	1,6010C	PS
Iron, Dissolved	0.99		mg/l	0.050	0.020	1	05/20/16 04:12	05/24/16 23:22	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.0230		mg/l	0.0100	0.0020	1	05/20/16 04:12	05/24/16 23:22	EPA 3005A	1,6010C	PS



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

Lab ID: L1615084-12  
 Client ID: 4-08-GY  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 11:00  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	0.0030	J	mg/l	0.0050	0.0020	1	05/20/16 04:12	05/24/16 23:28	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	05/20/16 04:12	05/24/16 23:28	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.294		mg/l	0.0100	0.0020	1	05/20/16 04:12	05/24/16 23:28	EPA 3005A	1,6010C	PS



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

Lab ID: L1615084-13  
 Client ID: 4-09-Y  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 11:15  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	05/20/16 04:12	05/24/16 23:32	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	05/20/16 04:12	05/24/16 23:32	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.0841		mg/l	0.0100	0.0020	1	05/20/16 04:12	05/24/16 23:32	EPA 3005A	1,6010C	PS



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

Lab ID: L1615084-14  
 Client ID: 4-07-O  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 10:55  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	0.0104		mg/l	0.0050	0.0020	1	05/20/16 04:12	05/24/16 23:37	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	05/20/16 04:12	05/24/16 23:37	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.353		mg/l	0.0100	0.0020	1	05/20/16 04:12	05/24/16 23:37	EPA 3005A	1,6010C	PS



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

Lab ID: L1615084-15  
 Client ID: 4-06-WT  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 05/18/16 10:45  
 Date Received: 05/18/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	0.0034	J	mg/l	0.0050	0.0020	1	05/20/16 04:12	05/24/16 23:45	EPA 3005A	1,6010C	PS
Iron, Dissolved	0.091		mg/l	0.050	0.020	1	05/20/16 04:12	05/24/16 23:45	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.472		mg/l	0.0100	0.0020	1	05/20/16 04:12	05/24/16 23:45	EPA 3005A	1,6010C	PS



Project Name: EPA-PRB- SHOREWOOD

Lab Number: L1615084

Project Number: WV-1009

Report Date: 05/26/16

## Method Blank Analysis Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01-15 Batch: WG895979-1										
Arsenic, Dissolved	0.0020	J	mg/l	0.0050	0.0020	1	05/20/16 04:12	05/24/16 19:42	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	05/20/16 04:12	05/24/16 19:42	1,6010C	PS
Manganese, Dissolved	ND		mg/l	0.0100	0.0020	1	05/20/16 04:12	05/24/16 19:42	1,6010C	PS

### Prep Information

Digestion Method: EPA 3005A

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** EPA-PRB- SHOREWOOD

**Project Number:** WV-1009

**Lab Number:** L1615084

**Report Date:** 05/26/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01-15 Batch: WG895979-2								
Arsenic, Dissolved	100		-		80-120	-		
Iron, Dissolved	100		-		80-120	-		
Manganese, Dissolved	96		-		80-120	-		

**Matrix Spike Analysis**  
Batch Quality Control

**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

<b>Parameter</b>	<b>Native Sample</b>	<b>MS Added</b>	<b>MS Found</b>	<b>MS %Recovery</b>	<b>Qual</b>	<b>MSD Found</b>	<b>MSD %Recovery</b>	<b>Qual</b>	<b>Recovery Limits</b>	<b>RPD</b>	<b>Qual</b>	<b>RPD Limits</b>
Dissolved Metals - Mansfield Lab Associated sample(s): 01-15 QC Batch ID: WG895979-4 QC Sample: L1615084-01 Client ID: 4-14 BK												
Arsenic, Dissolved	0.0031J	0.12	0.160	<b>133</b>	Q	-	-		75-125	-		20
Iron, Dissolved	ND	1	1.2	<b>120</b>		-	-		75-125	-		20
Manganese, Dissolved	0.0765	0.5	0.706	<b>126</b>	Q	-	-		75-125	-		20

## Lab Duplicate Analysis

Batch Quality Control

**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01-15 QC Batch ID: WG895979-3 QC Sample: L1615084-01 Client ID: 4-14 BK						
Arsenic, Dissolved	0.0031J	0.0032J	mg/l	NC		20
Iron, Dissolved	ND	ND	mg/l	NC		20
Manganese, Dissolved	0.0765	0.0732	mg/l	4		20

# **INORGANICS & MISCELLANEOUS**

**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615084-01  
**Client ID:** 4-14 BK  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 12:05  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	0.41		mg/l	0.10	0.019	1	-	05/19/16 00:10	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.41		mg/l	0.10	0.019	1	-	05/19/16 00:10	44,353.2	MR
Total Nitrogen	0.41		mg/l	0.30	0.30	1	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	0.151	J	mg/l	0.300	0.066	1	05/19/16 19:00	05/20/16 21:52	121,4500N-C	AT
Dissolved Organic Carbon	0.55	J	mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615084-02  
**Client ID:** 4-14 W  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 12:15  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	0.87		mg/l	0.10	0.019	1	-	05/19/16 00:11	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.87		mg/l	0.10	0.019	1	-	05/19/16 00:11	44,353.2	MR
Total Nitrogen	0.87		mg/l	0.30	0.30	1	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	0.199	J	mg/l	0.300	0.066	1	05/19/16 19:00	05/20/16 21:53	121,4500N-C	AT
Dissolved Organic Carbon	0.47	J	mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615084-03  
**Client ID:** 4-10 P  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 11:25  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	0.14		mg/l	0.10	0.019	1	-	05/19/16 00:12	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.14		mg/l	0.10	0.019	1	-	05/19/16 00:12	44,353.2	MR
Total Nitrogen	ND		mg/l	0.30	0.30	1	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	0.253	J	mg/l	0.300	0.066	1	05/19/16 19:00	05/20/16 21:55	121,4500N-C	AT
Dissolved Organic Carbon	2.4		mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615084-04  
**Client ID:** 04 BUT  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 10:20  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	9.3		mg/l	0.50	0.094	5	-	05/19/16 00:47	44,353.2	MR
Nitrogen, Nitrate/Nitrite	9.3		mg/l	0.50	0.094	5	-	05/19/16 00:47	44,353.2	MR
Total Nitrogen	9.3		mg/l	0.48	0.48	1.6	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	0.122	J	mg/l	0.300	0.066	1	05/19/16 19:00	05/20/16 21:56	121,4500N-C	AT
Dissolved Organic Carbon	0.82	J	mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615084-05  
**Client ID:** 4-13 BU  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 11:55  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	1.5		mg/l	0.10	0.019	1	-	05/19/16 00:49	44,353.2	MR
Nitrogen, Nitrate/Nitrite	1.5		mg/l	0.10	0.019	1	-	05/19/16 00:49	44,353.2	MR
Total Nitrogen	1.5		mg/l	0.30	0.30	1	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.300	0.066	1	05/19/16 19:00	05/20/16 21:57	121,4500N-C	AT
Dissolved Organic Carbon	0.58	J	mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615084-06  
**Client ID:** MTER 4-02 GNT  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 10:05  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	5.4		mg/l	0.10	0.019	1	-	05/19/16 00:23	44,353.2	MR
Nitrogen, Nitrate/Nitrite	5.4		mg/l	0.10	0.019	1	-	05/19/16 00:23	44,353.2	MR
Total Nitrogen	5.4		mg/l	0.30	0.30	1	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	0.084	J	mg/l	0.300	0.066	1	05/19/16 19:00	05/20/16 22:00	121,4500N-C	AT
Dissolved Organic Carbon	1.5	J	mg/l	2.0	0.24	2	05/19/16 08:16	05/19/16 08:16	121,5310C	DW



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615084-07  
**Client ID:** 4-03 RT  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 10:10  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	5.1		mg/l	0.10	0.019	1	-	05/19/16 00:57	44,353.2	MR
Nitrogen, Nitrate/Nitrite	5.1		mg/l	0.10	0.019	1	-	05/19/16 00:57	44,353.2	MR
Total Nitrogen	5.1		mg/l	0.30	0.30	1	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	0.070	J	mg/l	0.300	0.066	1	05/19/16 19:00	05/20/16 22:01	121,4500N-C	AT
Dissolved Organic Carbon	1.2		mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615084-08  
**Client ID:** 4-05 BUT  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 10:35  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	13.		mg/l	0.50	0.094	5	-	05/19/16 00:59	44,353.2	MR
Nitrogen, Nitrate/Nitrite	13.		mg/l	0.50	0.094	5	-	05/19/16 00:59	44,353.2	MR
Total Nitrogen	13.		mg/l	1.5	1.5	5	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	1.50	0.330	5	05/19/16 19:00	05/20/16 22:02	121,4500N-C	AT
Dissolved Organic Carbon	0.97	J	mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615084-09  
**Client ID:** 4-01 PT  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 09:45  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	4.1		mg/l	0.10	0.019	1	-	05/19/16 01:01	44,353.2	MR
Nitrogen, Nitrate/Nitrite	4.1		mg/l	0.10	0.019	1	-	05/19/16 01:01	44,353.2	MR
Total Nitrogen	4.1		mg/l	0.30	0.30	1	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	0.114	J	mg/l	0.300	0.066	1	05/19/16 19:00	05/20/16 22:03	121,4500N-C	AT
Dissolved Organic Carbon	1.6		mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615084-10  
**Client ID:** 4-12-R  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 11:45  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	0.66		mg/l	0.10	0.019	1	-	05/19/16 00:34	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.66		mg/l	0.10	0.019	1	-	05/19/16 00:34	44,353.2	MR
Total Nitrogen	0.66		mg/l	0.30	0.30	1	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	0.096	J	mg/l	0.300	0.066	1	05/19/16 19:00	05/20/16 22:04	121,4500N-C	AT
Dissolved Organic Carbon	1.1		mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615084-11  
**Client ID:** 04-11-GN  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 11:35  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	ND		mg/l	0.10	0.019	1	-	05/19/16 00:36	44,353.2	MR
Nitrogen, Nitrate/Nitrite	ND		mg/l	0.10	0.019	1	-	05/19/16 00:36	44,353.2	MR
Total Nitrogen	ND		mg/l	0.30	0.30	1	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	0.170	J	mg/l	0.300	0.066	1	05/19/16 19:00	05/20/16 22:05	121,4500N-C	AT
Dissolved Organic Carbon	1.5		mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615084-12  
**Client ID:** 4-08-GY  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 11:00  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	4.9		mg/l	0.10	0.019	1	-	05/19/16 00:37	44,353.2	MR
Nitrogen, Nitrate/Nitrite	4.9		mg/l	0.10	0.019	1	-	05/19/16 00:37	44,353.2	MR
Total Nitrogen	4.9		mg/l	0.30	0.30	1	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.300	0.066	1	05/19/16 19:00	05/20/16 22:05	121,4500N-C	AT
Dissolved Organic Carbon	1.4		mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615084-13  
**Client ID:** 4-09-Y  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 11:15  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	3.6		mg/l	0.10	0.019	1	-	05/19/16 00:38	44,353.2	MR
Nitrogen, Nitrate/Nitrite	3.6		mg/l	0.10	0.019	1	-	05/19/16 00:38	44,353.2	MR
Total Nitrogen	3.6		mg/l	0.30	0.30	1	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	0.161	J	mg/l	0.300	0.066	1	05/19/16 19:00	05/20/16 22:06	121,4500N-C	AT
Dissolved Organic Carbon	3.1		mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615084-14  
**Client ID:** 4-07-O  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 10:55  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	9.7		mg/l	0.50	0.094	5	-	05/19/16 01:03	44,353.2	MR
Nitrogen, Nitrate/Nitrite	9.7		mg/l	0.50	0.094	5	-	05/19/16 01:03	44,353.2	MR
Total Nitrogen	9.7		mg/l	0.60	0.60	2	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.600	0.132	2	05/19/16 19:00	05/20/16 22:07	121,4500N-C	AT
Dissolved Organic Carbon	0.99	J	mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**SAMPLE RESULTS**

**Lab ID:** L1615084-15  
**Client ID:** 4-06-WT  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 05/18/16 10:45  
**Date Received:** 05/18/16  
**Field Prep:** Field Filtered  
(Dissolved Metals)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	14.		mg/l	0.50	0.094	5	-	05/19/16 01:06	44,353.2	MR
Nitrogen, Nitrate/Nitrite	14.		mg/l	0.50	0.094	5	-	05/19/16 01:06	44,353.2	MR
Total Nitrogen	14.		mg/l	1.5	1.5	5	-	05/24/16 15:48	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	1.50	0.330	5	05/19/16 19:00	05/20/16 22:08	121,4500N-C	AT
Dissolved Organic Carbon	1.1		mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

**Method Blank Analysis**  
**Batch Quality Control**

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 11-15 Batch: WG895498-1										
Nitrogen, Nitrate	ND		mg/l	0.10	0.019	1	-	05/18/16 23:27	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 11-15 Batch: WG895501-1										
Nitrogen, Nitrate/Nitrite	ND		mg/l	0.10	0.019	1	-	05/18/16 23:27	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-10 Batch: WG895508-1										
Nitrogen, Nitrate	ND		mg/l	0.10	0.019	1	-	05/19/16 00:18	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-10 Batch: WG895509-1										
Nitrogen, Nitrate/Nitrite	ND		mg/l	0.10	0.019	1	-	05/19/16 00:18	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-15 Batch: WG895574-1										
Dissolved Organic Carbon	ND		mg/l	1.0	0.12	1	05/19/16 08:16	05/19/16 08:16	121,5310C	DW
General Chemistry - Westborough Lab for sample(s): 01-15 Batch: WG895903-1										
Nitrogen, Total Kjeldahl	0.080	J	mg/l	0.300	0.022	1	05/19/16 19:00	05/20/16 21:49	121,4500N-C	AT

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
General Chemistry - Westborough Lab Associated sample(s): 11-15 Batch: WG895498-2								
Nitrogen, Nitrate	100		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 11-15 Batch: WG895501-2								
Nitrogen, Nitrate/Nitrite	100		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-10 Batch: WG895508-2								
Nitrogen, Nitrate	98		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-10 Batch: WG895509-2								
Nitrogen, Nitrate/Nitrite	98		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-15 Batch: WG895574-2								
Dissolved Organic Carbon	91		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-15 Batch: WG895903-2								
Nitrogen, Total Kjeldahl	103		-		78-122	-		

**Matrix Spike Analysis**  
**Batch Quality Control**

**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	RPD Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 11-15 QC Batch ID: WG895498-4 QC Sample: L1615111-01 Client ID: MS Sample												
Nitrogen, Nitrate	3.4	4	7.4	100	-	-	-	-	83-113	-	-	6
General Chemistry - Westborough Lab Associated sample(s): 11-15 QC Batch ID: WG895501-4 QC Sample: L1615111-01 Client ID: MS Sample												
Nitrogen, Nitrate/Nitrite	3.4	4	7.4	100	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG895508-4 QC Sample: L1615084-06 Client ID: MTER 4-02 GNT												
Nitrogen, Nitrate	5.4	4	9.1	92	-	-	-	-	83-113	-	-	6
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG895509-4 QC Sample: L1615084-06 Client ID: MTER 4-02 GNT												
Nitrogen, Nitrate/Nitrite	5.4	4	9.1	92	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-15 QC Batch ID: WG895574-4 QC Sample: L1615084-02 Client ID: 4-14 W												
Dissolved Organic Carbon	0.47J	4	4.6	116	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-15 QC Batch ID: WG895903-4 QC Sample: L1615084-02 Client ID: 4-14 W												
Nitrogen, Total Kjeldahl	0.199J	8	7.32	92	-	-	-	-	77-111	-	-	24

## Lab Duplicate Analysis

Batch Quality Control

**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 11-15 QC Batch ID: WG895498-3 QC Sample: L1615111-01 Client ID: DUP Sample						
Nitrogen, Nitrate	3.4	3.4	mg/l	0		6
General Chemistry - Westborough Lab Associated sample(s): 11-15 QC Batch ID: WG895501-3 QC Sample: L1615111-01 Client ID: DUP Sample						
Nitrogen, Nitrate/Nitrite	3.4	3.4	mg/l	0		20
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG895508-3 QC Sample: L1615084-06 Client ID: MTER 4-02 GNT						
Nitrogen, Nitrate	5.4	5.4	mg/l	0		6
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG895509-3 QC Sample: L1615084-06 Client ID: MTER 4-02 GNT						
Nitrogen, Nitrate/Nitrite	5.4	5.4	mg/l	0		20
General Chemistry - Westborough Lab Associated sample(s): 01-15 QC Batch ID: WG895574-3 QC Sample: L1615084-01 Client ID: 4-14 BK						
Dissolved Organic Carbon	0.55J	0.57J	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-15 QC Batch ID: WG895903-3 QC Sample: L1615084-02 Client ID: 4-14 W						
Nitrogen, Total Kjeldahl	0.199J	0.102J	mg/l	NC		24

Project Name: EPA-PRB- SHOREWOOD

Lab Number: L1615084

Project Number: WV-1009

Report Date: 05/26/16

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

## Cooler Information Custody Seal

## Cooler

A Absent

## Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1615084-01A	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-01B	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-01C	Plastic 60ml unpreserved	A	7	3.2	Y	Absent	NO3-353(2)
L1615084-01D	Plastic 250ml H2SO4 preserved	A	<2	3.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1615084-01F	Plastic 250ml HNO3 preserved	A	<2	3.2	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1615084-01G	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-02A	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-02B	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-02C	Plastic 60ml unpreserved	A	7	3.2	Y	Absent	NO3-353(2)
L1615084-02D	Plastic 250ml H2SO4 preserved	A	<2	3.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1615084-02F	Plastic 250ml HNO3 preserved	A	<2	3.2	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1615084-02G	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-03A	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-03B	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-03C	Plastic 60ml unpreserved	A	7	3.2	Y	Absent	NO3-353(2)
L1615084-03D	Plastic 250ml H2SO4 preserved	A	<2	3.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1615084-03F	Plastic 250ml HNO3 preserved	A	<2	3.2	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1615084-03G	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-04A	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-04B	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-04C	Plastic 60ml unpreserved	A	7	3.2	Y	Absent	NO3-353(2)
L1615084-04D	Plastic 250ml H2SO4 preserved	A	<2	3.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1615084-04F	Plastic 250ml HNO3 preserved	A	<2	3.2	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1615084-04G	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-05A	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-05B	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)

\*Values in parentheses indicate holding time in days



Project Name: EPA-PRB- SHOREWOOD

Project Number: WV-1009

Lab Number: L1615084

Report Date: 05/26/16

## Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1615084-05C	Plastic 60ml unpreserved	A	7	3.2	Y	Absent	NO3-353(2)
L1615084-05D	Plastic 250ml H2SO4 preserved	A	<2	3.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1615084-05F	Plastic 250ml HNO3 preserved	A	<2	3.2	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1615084-05G	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-06A	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-06B	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-06C	Plastic 60ml unpreserved	A	7	3.2	Y	Absent	NO3-353(2)
L1615084-06D	Plastic 250ml H2SO4 preserved	A	<2	3.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1615084-06F	Plastic 250ml HNO3 preserved	A	<2	3.2	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1615084-06G	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-07A	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-07B	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-07C	Plastic 60ml unpreserved	A	7	3.2	Y	Absent	NO3-353(2)
L1615084-07D	Plastic 250ml H2SO4 preserved	A	<2	3.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1615084-07F	Plastic 250ml HNO3 preserved	A	<2	3.2	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1615084-07G	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-08A	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-08B	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-08C	Plastic 60ml unpreserved	A	7	3.2	Y	Absent	NO3-353(2)
L1615084-08D	Plastic 250ml H2SO4 preserved	A	<2	3.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1615084-08F	Plastic 250ml HNO3 preserved	A	<2	3.2	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1615084-08G	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-09A	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-09B	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-09C	Plastic 60ml unpreserved	A	7	3.2	Y	Absent	NO3-353(2)
L1615084-09D	Plastic 250ml H2SO4 preserved	A	<2	3.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1615084-09F	Plastic 250ml HNO3 preserved	A	<2	3.2	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1615084-09G	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-10A	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-10B	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-10C	Plastic 60ml unpreserved	A	7	3.2	Y	Absent	NO3-353(2)

\*Values in parentheses indicate holding time in days

Project Name: EPA-PRB- SHOREWOOD

Project Number: WV-1009

Lab Number: L1615084

Report Date: 05/26/16

## Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1615084-10D	Plastic 250ml H2SO4 preserved	A	<2	3.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1615084-10F	Plastic 250ml HNO3 preserved	A	<2	3.2	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1615084-10G	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-11A	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-11B	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-11C	Plastic 60ml unpreserved	A	7	3.2	Y	Absent	NO3-353(2)
L1615084-11D	Plastic 250ml H2SO4 preserved	A	<2	3.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1615084-11F	Plastic 250ml HNO3 preserved	A	<2	3.2	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1615084-11G	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-12A	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-12B	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-12C	Plastic 60ml unpreserved	A	7	3.2	Y	Absent	NO3-353(2)
L1615084-12D	Plastic 250ml H2SO4 preserved	A	<2	3.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1615084-12F	Plastic 250ml HNO3 preserved	A	<2	3.2	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1615084-12G	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-13A	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-13B	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-13C	Plastic 60ml unpreserved	A	7	3.2	Y	Absent	NO3-353(2)
L1615084-13D	Plastic 250ml H2SO4 preserved	A	<2	3.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1615084-13F	Plastic 250ml HNO3 preserved	A	<2	3.2	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1615084-13G	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-14A	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-14B	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-14C	Plastic 60ml unpreserved	A	7	3.2	Y	Absent	NO3-353(2)
L1615084-14D	Plastic 250ml H2SO4 preserved	A	<2	3.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1615084-14F	Plastic 250ml HNO3 preserved	A	<2	3.2	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1615084-14G	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-15A	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-15B	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)
L1615084-15C	Plastic 60ml unpreserved	A	7	3.2	Y	Absent	NO3-353(2)
L1615084-15D	Plastic 250ml H2SO4 preserved	A	<2	3.2	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)

\*Values in parentheses indicate holding time in days



**Project Name:** EPA-PRB- SHOREWOOD**Project Number:** WV-1009**Lab Number:** L1615084**Report Date:** 05/26/16**Container Information**

<b>Container ID</b>	<b>Container Type</b>	<b>Cooler</b>	<b>pH</b>	<b>Temp deg C</b>	<b>Pres</b>	<b>Seal</b>	<b>Analysis(*)</b>
L1615084-15F	Plastic 250ml HNO3 preserved	A	<2	3.2	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1615084-15G	Vial H2SO4 preserved	A	N/A	3.2	Y	Absent	DOC-5310(28)

\*Values in parentheses indicate holding time in days

**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

## GLOSSARY

### Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

### Footnotes

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### Terms

**Total:** With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

**Analytical Method:** Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### Data Qualifiers

- A** - Spectra identified as "Aldol Condensation Product".
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

**Report Format:** DU Report with 'J' Qualifiers



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

#### **Data Qualifiers**

- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.
- J** - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- ND** - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

Report Format: DU Report with 'J' Qualifiers



**Project Name:** EPA-PRB- SHOREWOOD  
**Project Number:** WV-1009

**Lab Number:** L1615084  
**Report Date:** 05/26/16

## REFERENCES

- 1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.
- 44 Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993.
- 107 Alpha Analytical - In-house calculation method.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



## Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

### Westborough Facility

**EPA 524.2:** 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, m/p-xylene, o-xylene

**EPA 624:** 2-Butanone (MEK), 1,4-Dioxane, tert-Amylmethyl Ether, tert-Butyl Alcohol, m/p-xylene, o-xylene

**EPA 625:** Aniline, Benzoic Acid, Benzyl Alcohol, 4-Chloroaniline, 3-Methylphenol, 4-Methylphenol.

**EPA 1010A:** NPW: Ignitability

**EPA 6010C:** NPW: Strontium; SCM: Strontium

**EPA 8151A:** NPW: 2,4-DB, Dicamba, Dichloroprop, MCPA, MCPP; SCM: 2,4-DB, Dichloroprop, MCPA, MCPP

**EPA 8260C:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene, Isopropanol; SCM: Iodomethane (methyl iodide), Methyl methacrylate (soil); 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.

**EPA 8270D:** NPW: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine; SCM: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine.

**EPA 9010:** NPW: Amenable Cyanide Distillation, Total Cyanide Distillation

**EPA 9038:** NPW: Sulfate

**EPA 9050A:** NPW: Specific Conductance

**EPA 9056:** NPW: Chloride, Nitrate, Sulfate

**EPA 9065:** NPW: Phenols

**EPA 9251:** NPW: Chloride

**SM3500:** NPW: Ferrous Iron

**SM4500:** NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO<sub>2</sub>, NO<sub>3</sub>.

**SM5310C:** DW: Dissolved Organic Carbon

### Mansfield Facility

**EPA 8270D:** NPW: Biphenyl; SCM: Biphenyl, Caprolactam

**EPA 8270D-SIM Isotope Dilution:** SCM: 1,4-Dioxane

**SM 2540D:** TSS

**SM2540G:** SCM: Percent Solids

**EPA 1631E:** SCM: Mercury

**EPA 7474:** SCM: Mercury

**EPA 8081B:** NPW and SCM: Mirex, Hexachlorobenzene.

**EPA 8082A:** NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.

**EPA 8270-SIM:** NPW and SCM: Alkylated PAHs.

**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene,

3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene, n-Butylbenzene, n-Propylbenzene, sec-Butylbenzene, tert-Butylbenzene.

**Biological Tissue Matrix:** **8270D-SIM; 3050B; 3051A; 7471B; 8081B; 8082A; 6020A:** Lead; **8270D:** bis(2-ethylhexyl)phthalate, Butylbenzylphthalate, Diethyl phthalate, Dimethyl phthalate, Di-n-butyl phthalate, Di-n-octyl phthalate, Fluoranthene, Pentachlorophenol.

The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:

### Drinking Water

**EPA 200.8:** Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7:** Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;

**EPA 300.0:** Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1,**

**SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**

**EPA 332:** Perchlorate.

**Microbiology:** **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

### Non-Potable Water

**EPA 200.8:** Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;

**EPA 200.7:** Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;

**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH, EPA**

**350.1:** Ammonia-N, **LCHAT 10-107-06-1-B:** Ammonia-N, **SM4500NO3-F,**

**EPA 353.2:** Nitrate-N, **SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D,**

**EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**

**EPA 624:** Volatile Halocarbons & Aromatics,

**EPA 608:** Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

**EPA 625:** SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

**Microbiology:** **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF.**

For a complete listing of analytes and methods, please contact your Alpha Project Manager.





# CHAIN OF CUSTODY

PAGE 2 OF 2

Date Rec'd in Lab: 5-18-16

ALPHA Job #: L1615084

**Client Information**  
 Client: INTERVISION LLC  
 Address: 491 GREAT RD  
 ACTON, MA  
 Phone: 603-498-2916  
 Email: j.tuslan@intervisionllc.com

**Project Information**  
 Project Name: CRA PROS SUPERFUND  
 Project Location: FAIRHAVEN, MA  
 Project #: WV-1009  
 Project Manager: Deanna Tuslan  
 ALPHA Quote #

**Report Information - Data Deliverables**  
 GAGE  EMAIL  Same as Client Info  PO #

**Turn-Around Time**  
 Standard  RUSH (see contract for details)  
 Date Due:

**Regulatory Requirements & Project Information Requirements**  
 Yes  No MA MCP Analytical Methods  Yes  No CT MCP Analytical Methods  
 Yes  No Matrix Spike Required on this SDG? (Required for MCP Inorganics)  
 Yes  No GWT Standards (Info Required for Metals & EPA with Targets)  
 Yes  No NFOES RGP  
 Other State/Fed Program

Additional Project Information:

**ANALYSIS**

VOC:  CENE  SO4  SO4 2  
 SVOC:  ABE  PAH  
 METALS:  MET 13  MCP 14  LROP 15  
 EPA:  RCRA  RCRA 6  PPT 13  
 IRI:  Ranges & Targets  Ranges Only  
 C:  POP  Ranges & Targets  Ranges Only  
 TIR:  Dioxin Only  PCDD/Fs

*Handwritten notes:*  
 Diss to Mn - As  
 Diss to Pb - Cd  
 Total Nitrogen  
 NH3

**SAMPLE INFO**  
 Filtration:  Field  Lab to do  
 Preservation:  Lab to do

Sample Comments

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
15084-11	06-11-15N	5-18-16	11:35 AM	H2O	DT
12	4-08-64	"	11:00	"	"
13	4-09-4	"	11:15	"	"
14	4-07-0	"	10:55	"	"
15	4-06-10T	"	10:45	"	"

**Container Type**  
 B1 Plastic  
 A1 Amber glass  
 U- Uril  
 O- Orisk  
 B- Bacteria cup  
 C- Culer  
 D- Other  
 S1 Stainless  
 S- SDD Series

**Preservative**  
 B1 None  
 B1 HCl  
 C1 HNO3  
 H1 H2SO4  
 S1 NaOH  
 S1 NaOCl  
 S1 NaOBr  
 H1 NaOH  
 H1 H2SO4  
 H1 HNO3  
 H1 HCl  
 H1 H2O2  
 H1 Other

Container Type  
 Preservative

Requested By: [Signature] Date/Time: 5-18-16  
 Received By: [Signature] Date/Time: 5-18-16

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side. FORM NO 15-01 (rev. 12-09-2012)



## ANALYTICAL REPORT

Lab Number:	L1619230
Client:	Watervision, LLC 454 Court Street Suite 304 Portsmouth, NH 03801
ATTN:	Danna Truslow
Phone:	(603) 766-6670
Project Name:	EPA SHOREWOOD PRB
Project Number:	WV-1009
Report Date:	06/29/16

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Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), VA (460195), MD (348), IL (200077), NC (666), TX (T104704476), DOD (L2217), USDA (Permit #P-330-11-00240).

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Eight Walkup Drive, Westborough, MA 01581-1019  
508-898-9220 (Fax) 508-898-9193 800-624-9220 - [www.alphalab.com](http://www.alphalab.com)



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619230  
**Report Date:** 06/29/16

<b>Alpha Sample ID</b>	<b>Client ID</b>	<b>Matrix</b>	<b>Sample Location</b>	<b>Collection Date/Time</b>	<b>Receive Date</b>
L1619230-01	PZ-2E	WATER	FALMOUTH, MA	06/22/16 14:15	06/22/16
L1619230-02	PZ-2C	WATER	FALMOUTH, MA	06/22/16 13:05	06/22/16
L1619230-03	SW-102	WATER	FALMOUTH, MA	06/22/16 14:55	06/22/16
L1619230-04	PZ-2D	WATER	FALMOUTH, MA	06/22/16 13:40	06/22/16
L1619230-05	PZ-2B	WATER	FALMOUTH, MA	06/22/16 12:20	06/22/16
L1619230-06	PZ-2A	WATER	FALMOUTH, MA	06/22/16 11:20	06/22/16

**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619230  
**Report Date:** 06/29/16

### Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

#### HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619230  
**Report Date:** 06/29/16

### Case Narrative (continued)

#### Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

#### Nitrogen, Ammonia

L1619230-01: The sample has an elevated detection limit due to limited sample volume available for analysis.

#### Dissolved Organic Carbon

The samples were field filtered; a filter blank was not received.

#### Nitrogen, Total Kjeldahl

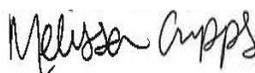
L1619230-04: The sample has an elevated detection limit due to the dilution required by the sample matrix.

#### Nitrogen, Nitrate

The WG906744-3 Laboratory Duplicate RPD (8%), performed on L1619230-03, is above the acceptance criteria; however, the sample and duplicate results are less than five times the reporting limit. Therefore, the RPD is valid.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:

 Melissa Cripps

Title: Technical Director/Representative

Date: 06/29/16

## METALS

**Project Name:** EPA SHOREWOOD PRB**Lab Number:** L1619230**Project Number:** WV-1009**Report Date:** 06/29/16**SAMPLE RESULTS**

Lab ID: L1619230-01

Date Collected: 06/22/16 14:15

Client ID: PZ-2E

Date Received: 06/22/16

Sample Location: FALMOUTH, MA

Field Prep: Field Filtered

Matrix: Water

(Dissolved  
Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 10:00	EPA 3005A	1,6010C	JH
Boron, Dissolved	0.0338		mg/l	0.0300	0.0070	1	06/28/16 14:20	06/29/16 10:00	EPA 3005A	1,6010C	JH
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 10:00	EPA 3005A	1,6010C	JH
Manganese, Dissolved	0.0095	J	mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 10:00	EPA 3005A	1,6010C	JH



**Project Name:** EPA SHOREWOOD PRB**Lab Number:** L1619230**Project Number:** WV-1009**Report Date:** 06/29/16**SAMPLE RESULTS**

Lab ID: L1619230-02  
 Client ID: PZ-2C  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/22/16 13:05  
 Date Received: 06/22/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 11:12	EPA 3005A	1,6010C	JH
Boron, Dissolved	0.0193	J	mg/l	0.0300	0.0070	1	06/28/16 14:20	06/29/16 11:12	EPA 3005A	1,6010C	JH
Iron, Dissolved	0.031	J	mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 11:12	EPA 3005A	1,6010C	JH
Manganese, Dissolved	0.0493		mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 11:12	EPA 3005A	1,6010C	JH



**Project Name:** EPA SHOREWOOD PRB**Lab Number:** L1619230**Project Number:** WV-1009**Report Date:** 06/29/16**SAMPLE RESULTS**

Lab ID: L1619230-03  
 Client ID: SW-102  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/22/16 14:55  
 Date Received: 06/22/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 11:16	EPA 3005A	1,6010C	JH
Boron, Dissolved	0.0157	J	mg/l	0.0300	0.0070	1	06/28/16 14:20	06/29/16 11:16	EPA 3005A	1,6010C	JH
Iron, Dissolved	0.13		mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 11:16	EPA 3005A	1,6010C	JH
Manganese, Dissolved	0.0101		mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 11:16	EPA 3005A	1,6010C	JH



**Project Name:** EPA SHOREWOOD PRB**Lab Number:** L1619230**Project Number:** WV-1009**Report Date:** 06/29/16**SAMPLE RESULTS**

Lab ID: L1619230-04  
 Client ID: PZ-2D  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/22/16 13:40  
 Date Received: 06/22/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	0.0050		mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 11:20	EPA 3005A	1,6010C	JH
Boron, Dissolved	0.0115	J	mg/l	0.0300	0.0070	1	06/28/16 14:20	06/29/16 11:20	EPA 3005A	1,6010C	JH
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 11:20	EPA 3005A	1,6010C	JH
Manganese, Dissolved	0.115		mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 11:20	EPA 3005A	1,6010C	JH



**Project Name:** EPA SHOREWOOD PRB**Lab Number:** L1619230**Project Number:** WV-1009**Report Date:** 06/29/16**SAMPLE RESULTS**

Lab ID: L1619230-05  
 Client ID: PZ-2B  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/22/16 12:20  
 Date Received: 06/22/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 11:33	EPA 3005A	1,6010C	JH
Boron, Dissolved	0.0144	J	mg/l	0.0300	0.0070	1	06/28/16 14:20	06/29/16 11:33	EPA 3005A	1,6010C	JH
Iron, Dissolved	0.092		mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 11:33	EPA 3005A	1,6010C	JH
Manganese, Dissolved	0.0193		mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 11:33	EPA 3005A	1,6010C	JH



**Project Name:** EPA SHOREWOOD PRB**Lab Number:** L1619230**Project Number:** WV-1009**Report Date:** 06/29/16**SAMPLE RESULTS**

Lab ID: L1619230-06  
 Client ID: PZ-2A  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/22/16 11:20  
 Date Received: 06/22/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 11:37	EPA 3005A	1,6010C	JH
Boron, Dissolved	0.0110	J	mg/l	0.0300	0.0070	1	06/28/16 14:20	06/29/16 11:37	EPA 3005A	1,6010C	JH
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 11:37	EPA 3005A	1,6010C	JH
Manganese, Dissolved	0.0091	J	mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 11:37	EPA 3005A	1,6010C	JH



Project Name: EPA SHOREWOOD PRB

Lab Number: L1619230

Project Number: WV-1009

Report Date: 06/29/16

## Method Blank Analysis Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01-06 Batch: WG908440-1									
Arsenic, Dissolved	ND	mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 09:51	1,6010C	JH
Boron, Dissolved	ND	mg/l	0.0300	0.0070	1	06/28/16 14:20	06/29/16 09:51	1,6010C	JH
Iron, Dissolved	ND	mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 09:51	1,6010C	JH
Manganese, Dissolved	ND	mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 09:51	1,6010C	JH

### Prep Information

Digestion Method: EPA 3005A

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** EPA SHOREWOOD PRB

**Project Number:** WV-1009

**Lab Number:** L1619230

**Report Date:** 06/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01-06 Batch: WG908440-2								
Arsenic, Dissolved	103		-		80-120	-		
Boron, Dissolved	102		-		80-120	-		
Iron, Dissolved	93		-		80-120	-		
Manganese, Dissolved	98		-		80-120	-		

**Matrix Spike Analysis**  
Batch Quality Control

Project Name: EPA SHOREWOOD PRB

Lab Number: L1619230

Project Number: WV-1009

Report Date: 06/29/16

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	RPD Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01-06 QC Batch ID: WG908440-4 QC Sample: L1619230-01 Client ID: PZ-2E												
Arsenic, Dissolved	ND	0.12	0.111	92	-	-	-	-	75-125	-	-	20
Boron, Dissolved	0.0338	1	0.946	91	-	-	-	-	75-125	-	-	20
Iron, Dissolved	ND	1	0.83	83	-	-	-	-	75-125	-	-	20
Manganese, Dissolved	0.0095J	0.5	0.443	89	-	-	-	-	75-125	-	-	20

## Lab Duplicate Analysis

Batch Quality Control

Project Name: EPA SHOREWOOD PRB

Project Number: WV-1009

Lab Number: L1619230

Report Date: 06/29/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01-06 QC Batch ID: WG908440-3 QC Sample: L1619230-01 Client ID: PZ-2E						
Arsenic, Dissolved	ND	ND	mg/l	NC		20
Boron, Dissolved	0.0338	0.0319	mg/l	6		20
Iron, Dissolved	ND	ND	mg/l	NC		20
Manganese, Dissolved	0.0095J	0.0090J	mg/l	NC		20

# **INORGANICS & MISCELLANEOUS**

**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619230  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

**Lab ID:** L1619230-01  
**Client ID:** PZ-2E  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/22/16 14:15  
**Date Received:** 06/22/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	8.10		mg CaCO3/L	2.00	NA	1	-	06/23/16 09:45	121,2320B	AW
Nitrogen, Ammonia	ND		mg/l	0.150	0.057	2	06/23/16 09:29	06/23/16 21:37	44,350.1	AT
Nitrogen, Nitrite	ND		mg/l	0.050	0.010	1	-	06/22/16 22:19	44,353.2	MR
Nitrogen, Nitrate	5.6		mg/l	0.10	0.019	1	-	06/22/16 22:19	44,353.2	MR
Nitrogen, Nitrate/Nitrite	5.6		mg/l	0.10	0.019	1	-	06/22/16 22:19	44,353.2	MR
Total Nitrogen	5.6		mg/l	0.30	0.30	1	-	06/29/16 10:40	107,-	JO
Nitrogen, Total Kjeldahl	0.090	J	mg/l	0.300	0.066	1	06/25/16 05:49	06/28/16 19:30	121,4500N-C	AT
Phosphorus, Orthophosphate	0.010		mg/l	0.005	0.001	1	-	06/22/16 22:41	121,4500P-E	MR
Dissolved Organic Carbon	0.81	J	mg/l	1.0	0.12	1	06/23/16 07:25	06/23/16 07:25	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	46.8		mg/l	0.500	0.054	1	-	06/23/16 20:55	44,300.0	AU
Sulfate	10.7		mg/l	1.00	0.150	1	-	06/23/16 20:55	44,300.0	AU



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619230  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

**Lab ID:** L1619230-02  
**Client ID:** PZ-2C  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/22/16 13:05  
**Date Received:** 06/22/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	19.3		mg CaCO3/L	2.00	NA	1	-	06/23/16 09:45	121,2320B	AW
Nitrogen, Ammonia	0.047	J	mg/l	0.075	0.028	1	06/23/16 09:29	06/23/16 21:38	44,350.1	AT
Nitrogen, Nitrite	0.042	J	mg/l	0.050	0.010	1	-	06/22/16 22:25	44,353.2	MR
Nitrogen, Nitrate	1.8		mg/l	0.10	0.019	1	-	06/22/16 22:25	44,353.2	MR
Nitrogen, Nitrate/Nitrite	1.8		mg/l	0.10	0.019	1	-	06/22/16 22:25	44,353.2	MR
Total Nitrogen	2.2		mg/l	0.30	0.30	1	-	06/29/16 10:40	107,-	JO
Nitrogen, Total Kjeldahl	0.366		mg/l	0.300	0.066	1	06/25/16 05:49	06/28/16 19:31	121,4500N-C	AT
Phosphorus, Orthophosphate	0.012		mg/l	0.005	0.001	1	-	06/22/16 22:41	121,4500P-E	MR
Dissolved Organic Carbon	2.4		mg/l	1.0	0.12	1	06/23/16 07:25	06/23/16 07:25	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	12.5		mg/l	0.500	0.054	1	-	06/23/16 21:07	44,300.0	AU
Sulfate	8.20		mg/l	1.00	0.150	1	-	06/23/16 21:07	44,300.0	AU



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619230  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

**Lab ID:** L1619230-03  
**Client ID:** SW-102  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/22/16 14:55  
**Date Received:** 06/22/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	19.2		mg CaCO3/L	2.00	NA	1	-	06/23/16 09:45	121,2320B	AW
Nitrogen, Ammonia	ND		mg/l	0.075	0.028	1	06/23/16 09:29	06/23/16 21:39	44,350.1	AT
Nitrogen, Nitrite	ND		mg/l	0.050	0.010	1	-	06/22/16 22:26	44,353.2	MR
Nitrogen, Nitrate	0.13		mg/l	0.10	0.019	1	-	06/22/16 22:26	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.13		mg/l	0.10	0.019	1	-	06/22/16 22:26	44,353.2	MR
Total Nitrogen	ND		mg/l	0.30	0.30	1	-	06/29/16 10:40	107,-	JO
Nitrogen, Total Kjeldahl	0.242	J	mg/l	0.300	0.066	1	06/25/16 05:49	06/28/16 19:32	121,4500N-C	AT
Phosphorus, Orthophosphate	0.009		mg/l	0.005	0.001	1	-	06/22/16 22:43	121,4500P-E	MR
Dissolved Organic Carbon	3.0		mg/l	1.0	0.12	1	06/23/16 07:25	06/23/16 07:25	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	7.64		mg/l	0.500	0.054	1	-	06/23/16 21:19	44,300.0	AU
Sulfate	5.41		mg/l	1.00	0.150	1	-	06/23/16 21:19	44,300.0	AU



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619230  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

**Lab ID:** L1619230-04  
**Client ID:** PZ-2D  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/22/16 13:40  
**Date Received:** 06/22/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	ND		mg CaCO3/L	2.00	NA	1	-	06/23/16 09:45	121,2320B	AW
Nitrogen, Ammonia	ND		mg/l	0.075	0.028	1	06/23/16 09:29	06/23/16 21:40	44,350.1	AT
Nitrogen, Nitrite	ND		mg/l	0.050	0.010	1	-	06/22/16 22:32	44,353.2	MR
Nitrogen, Nitrate	8.6		mg/l	0.50	0.094	5	-	06/22/16 23:41	44,353.2	MR
Nitrogen, Nitrate/Nitrite	8.6		mg/l	0.50	0.094	5	-	06/22/16 23:41	44,353.2	MR
Total Nitrogen	8.6		mg/l	0.60	0.60	2	-	06/29/16 10:40	107,-	JO
Nitrogen, Total Kjeldahl	0.165	J	mg/l	0.600	0.132	2	06/26/16 01:06	06/28/16 20:38	121,4500N-C	AT
Phosphorus, Orthophosphate	0.009		mg/l	0.005	0.001	1	-	06/22/16 22:43	121,4500P-E	MR
Dissolved Organic Carbon	1.0		mg/l	1.0	0.12	1	06/23/16 07:25	06/23/16 07:25	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	15.3		mg/l	0.500	0.054	1	-	06/23/16 21:31	44,300.0	AU
Sulfate	12.0		mg/l	1.00	0.150	1	-	06/23/16 21:31	44,300.0	AU



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619230  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

**Lab ID:** L1619230-05  
**Client ID:** PZ-2B  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/22/16 12:20  
**Date Received:** 06/22/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	5.40		mg CaCO3/L	2.00	NA	1	-	06/23/16 09:45	121,2320B	AW
Nitrogen, Ammonia	0.029	J	mg/l	0.075	0.028	1	06/23/16 09:29	06/23/16 21:41	44,350.1	AT
Nitrogen, Nitrite	ND		mg/l	0.050	0.010	1	-	06/22/16 22:34	44,353.2	MR
Nitrogen, Nitrate	0.30		mg/l	0.10	0.019	1	-	06/22/16 23:42	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.30		mg/l	0.10	0.019	1	-	06/22/16 23:42	44,353.2	MR
Total Nitrogen	0.30		mg/l	0.30	0.30	1	-	06/29/16 10:40	107,-	JO
Nitrogen, Total Kjeldahl	0.116	J	mg/l	0.300	0.066	1	06/26/16 01:06	06/28/16 20:39	121,4500N-C	AT
Phosphorus, Orthophosphate	0.013		mg/l	0.005	0.001	1	-	06/22/16 22:43	121,4500P-E	MR
Dissolved Organic Carbon	0.56	J	mg/l	1.0	0.12	1	06/23/16 07:25	06/23/16 07:25	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	13.0		mg/l	0.500	0.054	1	-	06/23/16 22:31	44,300.0	AU
Sulfate	10.7		mg/l	1.00	0.150	1	-	06/23/16 22:31	44,300.0	AU



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619230  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

**Lab ID:** L1619230-06  
**Client ID:** PZ-2A  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/22/16 11:20  
**Date Received:** 06/22/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Alkalinity, Total	8.70		mg CaCO3/L	2.00	NA	1	-	06/23/16 09:45	121,2320B	AW
Nitrogen, Ammonia	ND		mg/l	0.075	0.028	1	06/23/16 09:29	06/23/16 21:42	44,350.1	AT
Nitrogen, Nitrite	ND		mg/l	0.050	0.010	1	-	06/22/16 22:35	44,353.2	MR
Nitrogen, Nitrate	0.46		mg/l	0.10	0.019	1	-	06/22/16 22:35	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.46		mg/l	0.10	0.019	1	-	06/22/16 22:35	44,353.2	MR
Total Nitrogen	0.46		mg/l	0.30	0.30	1	-	06/29/16 10:40	107,-	JO
Nitrogen, Total Kjeldahl	0.135	J	mg/l	0.300	0.066	1	06/26/16 01:06	06/28/16 20:40	121,4500N-C	AT
Phosphorus, Orthophosphate	0.031		mg/l	0.005	0.001	1	-	06/22/16 22:44	121,4500P-E	MR
Dissolved Organic Carbon	0.39	J	mg/l	1.0	0.12	1	06/23/16 07:25	06/23/16 07:25	121,5310C	DW
<b>Anions by Ion Chromatography - Westborough Lab</b>										
Chloride	13.7		mg/l	0.500	0.054	1	-	06/23/16 22:43	44,300.0	AU
Sulfate	8.78		mg/l	1.00	0.150	1	-	06/23/16 22:43	44,300.0	AU



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619230  
**Report Date:** 06/29/16

**Method Blank Analysis  
Batch Quality Control**

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-06 Batch: WG906744-1										
Nitrogen, Nitrate	ND		mg/l	0.10	0.019	1	-	06/22/16 21:39	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-06 Batch: WG906745-1										
Nitrogen, Nitrate/Nitrite	ND		mg/l	0.10	0.019	1	-	06/22/16 21:39	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-06 Batch: WG906746-1										
Nitrogen, Nitrite	ND		mg/l	0.050	0.010	1	-	06/22/16 21:42	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-06 Batch: WG906785-1										
Phosphorus, Orthophosphate	ND		mg/l	0.005	0.001	1	-	06/22/16 22:37	121,4500P-E	MR
General Chemistry - Westborough Lab for sample(s): 01-06 Batch: WG906862-1										
Nitrogen, Ammonia	ND		mg/l	0.075	0.028	1	06/23/16 09:29	06/23/16 21:15	44,350.1	AT
General Chemistry - Westborough Lab for sample(s): 01-06 Batch: WG906922-1										
Dissolved Organic Carbon	ND		mg/l	1.0	0.12	1	06/23/16 07:25	06/23/16 07:25	121,5310C	DW
General Chemistry - Westborough Lab for sample(s): 01-06 Batch: WG906951-1										
Alkalinity, Total	ND		mg CaCO3/L	2.00	NA	1	-	06/23/16 09:45	121,2320B	AW
Anions by Ion Chromatography - Westborough Lab for sample(s): 01-06 Batch: WG907549-1										
Sulfate	ND		mg/l	1.00	0.150	1	-	06/23/16 17:31	44,300.0	AU
Anions by Ion Chromatography - Westborough Lab for sample(s): 01-06 Batch: WG907549-1										
Chloride	ND		mg/l	0.500	0.054	1	-	06/23/16 17:31	44,300.0	AU
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG907610-1										
Nitrogen, Total Kjeldahl	0.066	J	mg/l	0.300	0.022	1	06/25/16 05:49	06/28/16 19:19	121,4500N-C	AT
General Chemistry - Westborough Lab for sample(s): 04-06 Batch: WG907743-1										
Nitrogen, Total Kjeldahl	0.066	J	mg/l	0.300	0.022	1	06/26/16 01:06	06/28/16 20:35	121,4500N-C	AT

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** EPA SHOREWOOD PRB

**Project Number:** WV-1009

**Lab Number:** L1619230

**Report Date:** 06/29/16

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
General Chemistry - Westborough Lab Associated sample(s): 01-06 Batch: WG906744-2								
Nitrogen, Nitrate	98		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-06 Batch: WG906745-2								
Nitrogen, Nitrate/Nitrite	98		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-06 Batch: WG906746-2								
Nitrogen, Nitrite	98		-		90-110	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-06 Batch: WG906785-2								
Phosphorus, Orthophosphate	100		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-06 Batch: WG906862-2								
Nitrogen, Ammonia	92		-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-06 Batch: WG906922-2								
Dissolved Organic Carbon	92		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-06 Batch: WG906951-2								
Alkalinity, Total	103		-		90-110	-		10

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** EPA SHOREWOOD PRB

**Project Number:** WV-1009

**Lab Number:** L1619230

**Report Date:** 06/29/16

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-06 Batch: WG907549-2					
Chloride	104	-	90-110	-	
Sulfate	107	-	90-110	-	
General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG907610-2					
Nitrogen, Total Kjeldahl	104	-	78-122	-	
General Chemistry - Westborough Lab Associated sample(s): 04-06 Batch: WG907743-2					
Nitrogen, Total Kjeldahl	97	-	78-122	-	

### Matrix Spike Analysis Batch Quality Control

Project Name: EPA SHOREWOOD PRB

Lab Number: L1619230

Project Number: WV-1009

Report Date: 06/29/16

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG906744-4 QC Sample: L1619230-03 Client ID: SW-102												
Nitrogen, Nitrate	0.13	4	4.0	97	-	-	-	-	83-113	-	-	6
General Chemistry - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG906745-4 QC Sample: L1619230-03 Client ID: SW-102												
Nitrogen, Nitrate/Nitrite	0.13	4	4.0	97	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG906746-4 QC Sample: L1619230-03 Client ID: SW-102												
Nitrogen, Nitrite	ND	4	3.9	98	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG906785-4 QC Sample: L1619169-03 Client ID: MS Sample												
Phosphorus, Orthophosphate	0.031	0.5	0.526	99	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG906862-4 QC Sample: L1618065-14 Client ID: MS Sample												
Nitrogen, Ammonia	0.079	4	3.75	92	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG906922-4 QC Sample: L1619223-02 Client ID: MS Sample												
Dissolved Organic Carbon	0.71J	4	4.9	123	Q	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG906951-4 QC Sample: L1618469-06 Client ID: MS Sample												
Alkalinity, Total	398.	100	491	93	-	-	-	-	86-116	-	-	10
Anions by Ion Chromatography - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG907549-3 WG907549-4 QC Sample: L1619284-02 Client ID: MS Sample												
Chloride	9.48	4	12.7	80	-	13.3	95	-	40-151	5	-	18
Sulfate	7.45	8	14.5	88	-	15.7	103	-	60-140	8	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG907610-4 QC Sample: L1619169-01 Client ID: MS Sample												
Nitrogen, Total Kjeldahl	0.165J	8	8.03	100	-	-	-	-	77-111	-	-	24

**Matrix Spike Analysis**  
Batch Quality Control

**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619230  
**Report Date:** 06/29/16

<b>Parameter</b>	<b>Native Sample</b>	<b>MS Added</b>	<b>MS Found</b>	<b>MS %Recovery</b>	<b>MSD Found</b>	<b>MSD %Recovery</b>	<b>Recovery Limits</b>	<b>RPD</b>	<b>RPD Limits</b>
General Chemistry - Westborough Lab Associated sample(s): 04-06 QC Batch ID: WG907743-4 QC Sample: L1619230-06 Client ID: PZ-2A									
Nitrogen, Total Kjeldahl	0.135J	8	7.67	96	-	-	77-111	-	24

## Lab Duplicate Analysis

Batch Quality Control

**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619230  
**Report Date:** 06/29/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG906744-3 QC Sample: L1619230-03 Client ID: SW-102						
Nitrogen, Nitrate	0.13	0.12	mg/l	8	Q	6
General Chemistry - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG906745-3 QC Sample: L1619230-03 Client ID: SW-102						
Nitrogen, Nitrate/Nitrite	0.13	0.12	mg/l	8		20
General Chemistry - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG906746-3 QC Sample: L1619230-03 Client ID: SW-102						
Nitrogen, Nitrite	ND	ND	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG906785-3 QC Sample: L1619169-01 Client ID: DUP Sample						
Phosphorus, Orthophosphate	0.009	0.010	mg/l	11		20
General Chemistry - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG906862-3 QC Sample: L1618065-14 Client ID: DUP Sample						
Nitrogen, Ammonia	0.079	0.081	mg/l	2		20
General Chemistry - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG906922-3 QC Sample: L1619223-03 Client ID: DUP Sample						
Dissolved Organic Carbon	3.8	4.0	mg/l	5		20
General Chemistry - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG906951-3 QC Sample: L1618469-06 Client ID: DUP Sample						
Alkalinity, Total	398.	395	mg CaCO3/L	1		10
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG907610-3 QC Sample: L1619169-01 Client ID: DUP Sample						
Nitrogen, Total Kjeldahl	0.165J	0.239J	mg/l	NC		24
General Chemistry - Westborough Lab Associated sample(s): 04-06 QC Batch ID: WG907743-3 QC Sample: L1619230-06 Client ID: PZ-2A						
Nitrogen, Total Kjeldahl	0.135J	0.126J	mg/l	NC		24

Project Name: EPA SHOREWOOD PRB

Lab Number: L1619230

Project Number: WV-1009

Report Date: 06/29/16

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

## Cooler Information Custody Seal

Cooler

B Absent

## Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1619230-01A	Vial H2SO4 preserved	B	N/A	2.9	Y	Absent	DOC-5310(28)
L1619230-01B	Vial H2SO4 preserved	B	N/A	2.9	Y	Absent	DOC-5310(28)
L1619230-01C	Plastic 500ml unpreserved	B	7	2.9	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2)
L1619230-01D	Plastic 500ml H2SO4 preserved	B	<2	2.9	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1619230-01E	Plastic 250ml unpreserved w/No H	B	N/A	2.9	Y	Absent	ALK-T-2320(14)
L1619230-01F	Plastic 250ml HNO3 preserved	B	<2	2.9	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)
L1619230-02A	Vial H2SO4 preserved	B	N/A	2.9	Y	Absent	DOC-5310(28)
L1619230-02B	Vial H2SO4 preserved	B	N/A	2.9	Y	Absent	DOC-5310(28)
L1619230-02C	Plastic 500ml unpreserved	B	7	2.9	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2)
L1619230-02D	Plastic 500ml H2SO4 preserved	B	<2	2.9	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1619230-02E	Plastic 250ml unpreserved w/No H	B	N/A	2.9	Y	Absent	ALK-T-2320(14)
L1619230-02F	Plastic 250ml HNO3 preserved	B	<2	2.9	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)
L1619230-03A	Vial H2SO4 preserved	B	N/A	2.9	Y	Absent	DOC-5310(28)
L1619230-03B	Vial H2SO4 preserved	B	N/A	2.9	Y	Absent	DOC-5310(28)
L1619230-03C	Plastic 500ml unpreserved	B	7	2.9	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2)
L1619230-03D	Plastic 500ml H2SO4 preserved	B	<2	2.9	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1619230-03E	Plastic 250ml unpreserved w/No H	B	N/A	2.9	Y	Absent	ALK-T-2320(14)
L1619230-03F	Plastic 250ml HNO3 preserved	B	<2	2.9	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)
L1619230-04A	Vial H2SO4 preserved	B	N/A	2.9	Y	Absent	DOC-5310(28)
L1619230-04B	Vial H2SO4 preserved	B	N/A	2.9	Y	Absent	DOC-5310(28)
L1619230-04C	Plastic 500ml unpreserved	B	7	2.9	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2)

\*Values in parentheses indicate holding time in days

**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619230  
**Report Date:** 06/29/16

### Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1619230-04D	Plastic 500ml H2SO4 preserved	B	<2	2.9	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1619230-04E	Plastic 250ml unpreserved w/No H	B	N/A	2.9	Y	Absent	ALK-T-2320(14)
L1619230-04F	Plastic 250ml HNO3 preserved	B	<2	2.9	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)
L1619230-05A	Vial H2SO4 preserved	B	N/A	2.9	Y	Absent	DOC-5310(28)
L1619230-05B	Vial H2SO4 preserved	B	N/A	2.9	Y	Absent	DOC-5310(28)
L1619230-05C	Plastic 500ml unpreserved	B	7	2.9	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2)
L1619230-05D	Plastic 500ml H2SO4 preserved	B	<2	2.9	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1619230-05E	Plastic 250ml unpreserved w/No H	B	N/A	2.9	Y	Absent	ALK-T-2320(14)
L1619230-05F	Plastic 250ml HNO3 preserved	B	<2	2.9	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)
L1619230-06A	Vial H2SO4 preserved	B	N/A	2.9	Y	Absent	DOC-5310(28)
L1619230-06B	Vial H2SO4 preserved	B	N/A	2.9	Y	Absent	DOC-5310(28)
L1619230-06C	Plastic 500ml unpreserved	B	7	2.9	Y	Absent	OPHOS-4500(2),SO4-300(28),CL-300(28),NO2-353(2),NO3-353(2)
L1619230-06D	Plastic 500ml H2SO4 preserved	B	<2	2.9	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28),NH3-350(28)
L1619230-06E	Plastic 250ml unpreserved w/No H	B	N/A	2.9	Y	Absent	ALK-T-2320(14)
L1619230-06F	Plastic 250ml HNO3 preserved	B	<2	2.9	Y	Absent	B-SI(180),FE-SI(180),AS-SI(180),MN-SI(180)

\*Values in parentheses indicate holding time in days

**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619230  
**Report Date:** 06/29/16

## GLOSSARY

### Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

### Footnotes

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### Terms

**Total:** With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

**Analytical Method:** Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### Data Qualifiers

- A** - Spectra identified as "Aldol Condensation Product".
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the

**Report Format:** DU Report with 'J' Qualifiers



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619230  
**Report Date:** 06/29/16

#### Data Qualifiers

- reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
  - D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
  - E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
  - G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
  - H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
  - I** - The lower value for the two columns has been reported due to obvious interference.
  - M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
  - NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
  - P** - The RPD between the results for the two columns exceeds the method-specified criteria.
  - Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
  - R** - Analytical results are from sample re-analysis.
  - RE** - Analytical results are from sample re-extraction.
  - S** - Analytical results are from modified screening analysis.
  - J** - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
  - ND** - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619230  
**Report Date:** 06/29/16

## REFERENCES

- 1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.
- 44 Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993.
- 107 Alpha Analytical - In-house calculation method.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



## Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

### Westborough Facility

**EPA 524.2:** 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, m/p-xylene, o-xylene

**EPA 624:** 2-Butanone (MEK), 1,4-Dioxane, tert-Amylmethyl Ether, tert-Butyl Alcohol, m/p-xylene, o-xylene

**EPA 625:** Aniline, Benzoic Acid, Benzyl Alcohol, 4-Chloroaniline, 3-Methylphenol, 4-Methylphenol.

**EPA 1010A:** NPW: Ignitability

**EPA 6010C:** NPW: Strontium; SCM: Strontium

**EPA 8151A:** NPW: 2,4-DB, Dicamba, Dichloroprop, MCPA, MCPP; SCM: 2,4-DB, Dichloroprop, MCPA, MCPP

**EPA 8260C:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene, Isopropanol; SCM: Iodomethane (methyl iodide), Methyl methacrylate (soil); 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.

**EPA 8270D:** NPW: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine; SCM: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine.

**EPA 9010:** NPW: Amenable Cyanide Distillation, Total Cyanide Distillation

**EPA 9038:** NPW: Sulfate

**EPA 9050A:** NPW: Specific Conductance

**EPA 9056:** NPW: Chloride, Nitrate, Sulfate

**EPA 9065:** NPW: Phenols

**EPA 9251:** NPW: Chloride

**SM3500:** NPW: Ferrous Iron

**SM4500:** NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO<sub>2</sub>, NO<sub>3</sub>.

**SM5310C:** DW: Dissolved Organic Carbon

### Mansfield Facility

**EPA 8270D:** NPW: Biphenyl; SCM: Biphenyl, Caprolactam

**EPA 8270D-SIM Isotope Dilution:** SCM: 1,4-Dioxane

**SM 2540D:** TSS

**SM2540G:** SCM: Percent Solids

**EPA 1631E:** SCM: Mercury

**EPA 7474:** SCM: Mercury

**EPA 8081B:** NPW and SCM: Mirex, Hexachlorobenzene.

**EPA 8082A:** NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.

**EPA 8270-SIM:** NPW and SCM: Alkylated PAHs.

**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene,

3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene, n-Butylbenzene, n-Propylbenzene, sec-Butylbenzene, tert-Butylbenzene.

**Biological Tissue Matrix:** **8270D-SIM; 3050B; 3051A; 7471B; 8081B; 8082A; 6020A:** Lead; **8270D:** bis(2-ethylhexyl)phthalate, Butylbenzylphthalate, Diethyl phthalate, Dimethyl phthalate, Di-n-butyl phthalate, Di-n-octyl phthalate, Fluoranthene, Pentachlorophenol.

The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:

### Drinking Water

**EPA 200.8:** Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7:** Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;

**EPA 300.0:** Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1,**

**SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**

**EPA 332:** Perchlorate.

**Microbiology:** **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

### Non-Potable Water

**EPA 200.8:** Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;

**EPA 200.7:** Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;

**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH, EPA**

**350.1:** Ammonia-N, **LCHAT 10-107-06-1-B:** Ammonia-N, **SM4500NO3-F,**

**EPA 353.2:** Nitrate-N, **SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D,**

**EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**

**EPA 624:** Volatile Halocarbons & Aromatics,

**EPA 608:** Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

**EPA 625:** SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

**Microbiology:** **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF.**

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

## CHAIN OF CUSTODY



**ALPHA**  
LABORATORY

4 Park Drive  
Mendon, MA 01952  
Tel: 508-539-8200

100 Parker Blvd  
Mendon, MA 01954  
Tel: 508-532-3300

Date Rec'd in Lab: **6/22/16**

ALPHA Job #: **L1619230**

Page \_\_\_\_\_ of \_\_\_\_\_

Project Information	Report Information - Data Deliverables	Billing Information	
Project Name: <b>EPA Shorewood PRB</b>	<input checked="" type="checkbox"/> ADEs <input checked="" type="checkbox"/> EMAIL	<input checked="" type="checkbox"/> Same as Client info	PO #
Client Information	Regulatory Requirements & Project Information Requirements		
Client: <b>WaterVision LLC</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No MA MCP Analytical Methods <input type="checkbox"/> Yes <input type="checkbox"/> No CT RCP Analytical Methods <input type="checkbox"/> Yes <input type="checkbox"/> No Matrix Spike Required on the SDG? (Required for MCP-Inorganics) <input type="checkbox"/> Yes <input type="checkbox"/> No CRT Standards (Info Required for Metals & EPA with Targeted) <input type="checkbox"/> Yes <input type="checkbox"/> No NPDES-RSP <input type="checkbox"/> Other Data Fed Program _____ Criteria _____		
Address: <b>481 Great Rd Acton, MA</b>	Project Location: <b>Falmouth, MA</b>	Project #: <b>WV10009</b>	Project Manager: <b>Danna Truslow</b>
Phone: <b>603 498 2916</b>	ALPHA Quote #:	Turn-Around Time	
Email: <b>dtruslow@watervisionllc.com</b>	<input type="checkbox"/> Standard <input type="checkbox"/> RUSH (only without preparation)	Date Due:	
Additional Project Information:	<p><b>ANALYSIS</b></p> <p>VOC: <input type="checkbox"/> BULK <input type="checkbox"/> SW <input type="checkbox"/> BULK</p> <p>SVOC: <input type="checkbox"/> SW <input type="checkbox"/> BULK</p> <p>METALS: <input type="checkbox"/> SW <input type="checkbox"/> BULK</p> <p>METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> MCP 15</p> <p>GRE: <input type="checkbox"/> PCBs <input type="checkbox"/> PCBs <input type="checkbox"/> PCBs</p> <p>PH: <input type="checkbox"/> Targets &amp; Targets <input type="checkbox"/> Targets Only</p> <p>TOC: <input type="checkbox"/> TOC <input type="checkbox"/> TOC</p> <p><b>Dissoived As Fe Mn &amp; Cu</b></p> <p><b>DOC</b></p> <p><b>ALK - T-2320</b></p> <p><b>SO4, Cl, NO3, NO2, OPHOS</b></p> <p><b>Total B-Hogen Calc, NH3</b></p>		
		<p><b>SAMPLE INFO</b></p> <p>Filter: <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Lab to do</p> <p>Preservator: <input type="checkbox"/> Lab to do</p>	

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials	ANALYSIS					Sample Comments	
		Date	Time			VOC	SVOC	METALS	GRE	PH		TOC
19230-01	PZ-2c	6/22	14:15	Water	SL	<input checked="" type="checkbox"/>						
02	PZ-2C	6/22	13:05	Water	DT	<input checked="" type="checkbox"/>						
03	SW-102	6/22	14:55	Water	SL	<input checked="" type="checkbox"/>						
04	PZ-2d	6/22	13:40	Water	DT	<input checked="" type="checkbox"/>						
05	PZ-2b	6/22	12:20	Water	DT	<input checked="" type="checkbox"/>						
06	PZ-2a	6/22	11:20	Water	DT	<input checked="" type="checkbox"/>						

**Container Type**

Plastic  
 Amber glass  
 Vial  
 Beakers cup  
 Cup  
 Jar  
 Bottle  
 BOD Bottle

**Preservative**

None  
 HCl  
 HNO3  
 H2SO4  
 NaOH  
 Na2CO3  
 Na2S2O8  
 Ascorbic Acid  
 H2O2  
 Zn Acetate  
 Other

**Container Type**

**Preservative**

Requested By	Date/Time	Received By	Date/Time
<i>[Signature]</i>	6/22/16 1:55 PM	<i>[Signature]</i>	6/22/16 1:55 PM

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO 01-01 rev. 11-09-2012



## ANALYTICAL REPORT

Lab Number:	L1619223
Client:	Watervision, LLC 454 Court Street Suite 304 Portsmouth, NH 03801
ATTN:	Danna Truslow
Phone:	(603) 766-6670
Project Name:	EPA SHOREWOOD PRB
Project Number:	WV-1009
Report Date:	06/29/16

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), VA (460195), MD (348), IL (200077), NC (666), TX (T104704476), DOD (L2217), USDA (Permit #P-330-11-00240).

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Eight Walkup Drive, Westborough, MA 01581-1019  
508-898-9220 (Fax) 508-898-9193 800-624-9220 - [www.alphalab.com](http://www.alphalab.com)



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

<b>Alpha Sample ID</b>	<b>Client ID</b>	<b>Matrix</b>	<b>Sample Location</b>	<b>Collection Date/Time</b>	<b>Receive Date</b>
L1619223-01	MTER 9C	WATER	FALMOUTH, MA	06/21/16 17:18	06/22/16
L1619223-02	MTER 9D	WATER	FALMOUTH, MA	06/21/16 17:45	06/22/16
L1619223-03	MTER 6F	WATER	FALMOUTH, MA	06/22/16 12:50	06/22/16
L1619223-04	MTER 6E	WATER	FALMOUTH, MA	06/22/16 12:35	06/22/16
L1619223-05	MTER 6D	WATER	FALMOUTH, MA	06/22/16 11:25	06/22/16
L1619223-06	MTER 6D (DUP)	WATER	FALMOUTH, MA	06/22/16 11:30	06/22/16
L1619223-07	MTER 6C	WATER	FALMOUTH, MA	06/22/16 10:30	06/22/16
L1619223-08	MTER 6B	WATER	FALMOUTH, MA	06/22/16 09:55	06/22/16
L1619223-09	MTER 6A	WATER	FALMOUTH, MA	06/22/16 08:55	06/22/16
L1619223-10	MTER 10	WATER	FALMOUTH, MA	06/22/16 14:30	06/22/16

**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

### Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

#### HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

### Case Narrative (continued)

#### Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

#### Nitrogen, Total Kjeldahl

L1619223-01, -02, -04, -05, and -06: The sample has an elevated detection limit due to the dilution required by the sample matrix.

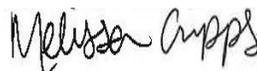
#### Dissolved Organic Carbon

The samples were field filtered; a filter blank was not received.

L1619223-04: The sample has an elevated detection limit due to the dilution required by the sample matrix. The WG906922-4 MS recovery (123%), performed on L1619223-02, is outside the acceptance criteria; however, the associated LCS recovery is within criteria. No further action was taken.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:

 Melissa Cripps

Title: Technical Director/Representative

Date: 06/29/16

## METALS

**Project Name:** EPA SHOREWOOD PRB**Lab Number:** L1619223**Project Number:** WV-1009**Report Date:** 06/29/16**SAMPLE RESULTS**

Lab ID: L1619223-01

Date Collected: 06/21/16 17:18

Client ID: MTER 9C

Date Received: 06/22/16

Sample Location: FALMOUTH, MA

Field Prep: Field Filtered

Matrix: Water

(Dissolved  
Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	0.0024	J	mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 10:16	EPA 3005A	1,6010C	JH
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 10:16	EPA 3005A	1,6010C	JH
Manganese, Dissolved	0.159		mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 10:16	EPA 3005A	1,6010C	JH



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

Lab ID: L1619223-02  
 Client ID: MTER 9D  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/21/16 17:45  
 Date Received: 06/22/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	0.0023	J	mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 10:21	EPA 3005A	1,6010C	JH
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 10:21	EPA 3005A	1,6010C	JH
Manganese, Dissolved	0.157		mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 10:21	EPA 3005A	1,6010C	JH



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

Lab ID: L1619223-03  
 Client ID: MTER 6F  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/22/16 12:50  
 Date Received: 06/22/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
-----------	--------	-----------	-------	----	-----	-----------------	---------------	---------------	-------------	-------------------	---------

**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 10:25	EPA 3005A	1,6010C	JH
Iron, Dissolved	0.075		mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 10:25	EPA 3005A	1,6010C	JH
Manganese, Dissolved	0.0136		mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 10:25	EPA 3005A	1,6010C	JH



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

Lab ID: L1619223-04  
 Client ID: MTER 6E  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/22/16 12:35  
 Date Received: 06/22/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 10:42	EPA 3005A	1,6010C	JH
Iron, Dissolved	0.021	J	mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 10:42	EPA 3005A	1,6010C	JH
Manganese, Dissolved	0.0096	J	mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 10:42	EPA 3005A	1,6010C	JH



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

Lab ID: L1619223-05  
 Client ID: MTER 6D  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/22/16 11:25  
 Date Received: 06/22/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 10:46	EPA 3005A	1,6010C	JH
Iron, Dissolved	0.026	J	mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 10:46	EPA 3005A	1,6010C	JH
Manganese, Dissolved	0.0880		mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 10:46	EPA 3005A	1,6010C	JH



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

Lab ID: L1619223-06  
 Client ID: MTER 6D (DUP)  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/22/16 11:30  
 Date Received: 06/22/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 10:50	EPA 3005A	1,6010C	JH
Iron, Dissolved	0.036	J	mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 10:50	EPA 3005A	1,6010C	JH
Manganese, Dissolved	0.0976		mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 10:50	EPA 3005A	1,6010C	JH



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

Lab ID: L1619223-07  
 Client ID: MTER 6C  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/22/16 10:30  
 Date Received: 06/22/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 10:55	EPA 3005A	1,6010C	JH
Iron, Dissolved	0.059		mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 10:55	EPA 3005A	1,6010C	JH
Manganese, Dissolved	0.0611		mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 10:55	EPA 3005A	1,6010C	JH



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

Lab ID: L1619223-08  
 Client ID: MTER 6B  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/22/16 09:55  
 Date Received: 06/22/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 10:59	EPA 3005A	1,6010C	JH
Iron, Dissolved	0.27		mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 10:59	EPA 3005A	1,6010C	JH
Manganese, Dissolved	0.244		mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 10:59	EPA 3005A	1,6010C	JH



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

Lab ID: L1619223-09  
 Client ID: MTER 6A  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/22/16 08:55  
 Date Received: 06/22/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 11:03	EPA 3005A	1,6010C	JH
Iron, Dissolved	0.25		mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 11:03	EPA 3005A	1,6010C	JH
Manganese, Dissolved	0.105		mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 11:03	EPA 3005A	1,6010C	JH



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

Lab ID: L1619223-10  
 Client ID: MTER 10  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/22/16 14:30  
 Date Received: 06/22/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 11:07	EPA 3005A	1,6010C	JH
Iron, Dissolved	0.023	J	mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 11:07	EPA 3005A	1,6010C	JH
Manganese, Dissolved	0.0477		mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 11:07	EPA 3005A	1,6010C	JH



Project Name: EPA SHOREWOOD PRB

Lab Number: L1619223

Project Number: WV-1009

Report Date: 06/29/16

## Method Blank Analysis Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01-10 Batch: WG908440-1									
Arsenic, Dissolved	ND	mg/l	0.0050	0.0020	1	06/28/16 14:20	06/29/16 09:51	1,6010C	JH
Iron, Dissolved	ND	mg/l	0.050	0.020	1	06/28/16 14:20	06/29/16 09:51	1,6010C	JH
Manganese, Dissolved	ND	mg/l	0.0100	0.0020	1	06/28/16 14:20	06/29/16 09:51	1,6010C	JH

### Prep Information

Digestion Method: EPA 3005A

## Lab Control Sample Analysis

Batch Quality Control

**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01-10 Batch: WG908440-2								
Arsenic, Dissolved	103		-		80-120	-		
Iron, Dissolved	93		-		80-120	-		
Manganese, Dissolved	98		-		80-120	-		

**Matrix Spike Analysis**  
Batch Quality Control

**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

<b>Parameter</b>	<b>Native Sample</b>	<b>MS Added</b>	<b>MS Found</b>	<b>MS %Recovery</b>	<b>MSD Qual</b>	<b>MSD Found</b>	<b>MSD %Recovery</b>	<b>MSD Qual</b>	<b>Recovery Limits</b>	<b>RPD</b>	<b>RPD Qual</b>	<b>RPD Limits</b>
Dissolved Metals - Mansfield Lab Associated sample(s): 01-10 QC Batch ID: WG908440-4 QC Sample: L1619230-01 Client ID: MS Sample												
Arsenic, Dissolved	ND	0.12	0.111	92	-	-	-	-	75-125	-	-	20
Iron, Dissolved	ND	1	0.83	83	-	-	-	-	75-125	-	-	20
Manganese, Dissolved	0.0095J	0.5	0.443	89	-	-	-	-	75-125	-	-	20

## Lab Duplicate Analysis

Batch Quality Control

Project Name: EPA SHOREWOOD PRB

Project Number: WV-1009

Lab Number: L1619223

Report Date: 06/29/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01-10 QC Batch ID: WG908440-3 QC Sample: L1619230-01 Client ID: DUP Sample						
Arsenic, Dissolved	ND	ND	mg/l	NC		20
Iron, Dissolved	ND	ND	mg/l	NC		20
Manganese, Dissolved	0.0095J	0.0090J	mg/l	NC		20

# **INORGANICS & MISCELLANEOUS**

**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

**Lab ID:** L1619223-01  
**Client ID:** MTER 9C  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 17:18  
**Date Received:** 06/22/16  
**Field Prep:** Field Filtered  
(Dissolved Metals &  
DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
pH (H)	4.5		SU	-	NA	1	-	06/22/16 20:55	121,4500H+-B	AS
Nitrogen, Nitrate	14.		mg/l	0.50	0.094	5	-	06/22/16 23:45	44,353.2	MR
Nitrogen, Nitrate/Nitrite	14.		mg/l	0.50	0.094	5	-	06/22/16 23:45	44,353.2	MR
Total Nitrogen	14.		mg/l	1.5	1.5	5	-	06/29/16 10:40	107,-	JO
Nitrogen, Total Kjeldahl	0.872	J	mg/l	1.50	0.330	5	06/28/16 19:00	06/28/16 23:49	121,4500N-C	AT
Dissolved Organic Carbon	0.72	J	mg/l	1.0	0.12	1	06/23/16 07:25	06/23/16 07:25	121,5310C	DW



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

**Lab ID:** L1619223-02  
**Client ID:** MTER 9D  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 17:45  
**Date Received:** 06/22/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
pH (H)	4.5		SU	-	NA	1	-	06/22/16 20:55	121,4500H+-B	AS
Nitrogen, Nitrate	14.		mg/l	0.50	0.094	5	-	06/22/16 23:50	44,353.2	MR
Nitrogen, Nitrate/Nitrite	14.		mg/l	0.50	0.094	5	-	06/22/16 23:50	44,353.2	MR
Total Nitrogen	14.		mg/l	1.5	1.5	5	-	06/29/16 10:40	107,-	JO
Nitrogen, Total Kjeldahl	0.458	J	mg/l	1.50	0.330	5	06/28/16 19:00	06/28/16 23:50	121,4500N-C	AT
Dissolved Organic Carbon	0.71	J	mg/l	1.0	0.12	1	06/23/16 07:25	06/23/16 07:25	121,5310C	DW



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

**Lab ID:** L1619223-03  
**Client ID:** MTER 6F  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/22/16 12:50  
**Date Received:** 06/22/16  
**Field Prep:** Field Filtered  
(Dissolved Metals &  
DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	1.4		mg/l	0.10	0.019	1	-	06/22/16 23:52	44,353.2	MR
Nitrogen, Nitrate/Nitrite	1.4		mg/l	0.10	0.019	1	-	06/22/16 23:52	44,353.2	MR
Total Nitrogen	1.8		mg/l	0.30	0.30	1	-	06/29/16 10:40	107,-	JO
Nitrogen, Total Kjeldahl	0.353		mg/l	0.300	0.066	1	06/28/16 19:00	06/28/16 23:51	121,4500N-C	AT
Dissolved Organic Carbon	3.8		mg/l	1.0	0.12	1	06/23/16 07:25	06/23/16 07:25	121,5310C	DW



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

**Lab ID:** L1619223-04  
**Client ID:** MTER 6E  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/22/16 12:35  
**Date Received:** 06/22/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	6.6		mg/l	0.10	0.019	1	-	06/22/16 22:50	44,353.2	MR
Nitrogen, Nitrate/Nitrite	6.6		mg/l	0.10	0.019	1	-	06/22/16 22:50	44,353.2	MR
Total Nitrogen	6.6		mg/l	0.60	0.60	2	-	06/29/16 10:40	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.600	0.132	2	06/28/16 19:00	06/28/16 23:52	121,4500N-C	AT
Dissolved Organic Carbon	1.3	J	mg/l	2.0	0.24	2	06/23/16 07:25	06/23/16 07:25	121,5310C	DW



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

**Lab ID:** L1619223-05  
**Client ID:** MTER 6D  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/22/16 11:25  
**Date Received:** 06/22/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	6.9		mg/l	0.10	0.019	1	-	06/22/16 22:51	44,353.2	MR
Nitrogen, Nitrate/Nitrite	6.9		mg/l	0.10	0.019	1	-	06/22/16 22:51	44,353.2	MR
Total Nitrogen	6.9		mg/l	0.60	0.60	2	-	06/29/16 10:40	107,-	JO
Nitrogen, Total Kjeldahl	0.143	J	mg/l	0.600	0.132	2	06/28/16 19:00	06/28/16 23:52	121,4500N-C	AT
Dissolved Organic Carbon	0.84	J	mg/l	1.0	0.12	1	06/23/16 07:25	06/23/16 07:25	121,5310C	DW



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

**Lab ID:** L1619223-06  
**Client ID:** MTER 6D (DUP)  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/22/16 11:30  
**Date Received:** 06/22/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	6.9		mg/l	0.10	0.019	1	-	06/22/16 22:53	44,353.2	MR
Nitrogen, Nitrate/Nitrite	6.9		mg/l	0.10	0.019	1	-	06/22/16 22:53	44,353.2	MR
Total Nitrogen	6.9		mg/l	0.60	0.60	2	-	06/29/16 10:40	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.600	0.132	2	06/28/16 19:00	06/28/16 23:53	121,4500N-C	AT
Dissolved Organic Carbon	1.2		mg/l	1.0	0.12	1	06/23/16 07:25	06/23/16 07:25	121,5310C	DW



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

**Lab ID:** L1619223-07  
**Client ID:** MTER 6C  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/22/16 10:30  
**Date Received:** 06/22/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	2.8		mg/l	0.10	0.019	1	-	06/22/16 22:54	44,353.2	MR
Nitrogen, Nitrate/Nitrite	2.8		mg/l	0.10	0.019	1	-	06/22/16 22:54	44,353.2	MR
Total Nitrogen	2.8		mg/l	0.30	0.30	1	-	06/29/16 10:40	107,-	JO
Nitrogen, Total Kjeldahl	0.150	J	mg/l	0.300	0.066	1	06/28/16 19:00	06/28/16 23:54	121,4500N-C	AT
Dissolved Organic Carbon	1.9		mg/l	1.0	0.12	1	06/23/16 07:25	06/23/16 07:25	121,5310C	DW



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

**Lab ID:** L1619223-08  
**Client ID:** MTER 6B  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/22/16 09:55  
**Date Received:** 06/22/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	1.7		mg/l	0.10	0.019	1	-	06/22/16 22:55	44,353.2	MR
Nitrogen, Nitrate/Nitrite	1.7		mg/l	0.10	0.019	1	-	06/22/16 22:55	44,353.2	MR
Total Nitrogen	1.7		mg/l	0.30	0.30	1	-	06/29/16 10:40	107,-	JO
Nitrogen, Total Kjeldahl	0.122	J	mg/l	0.300	0.066	1	06/28/16 19:00	06/28/16 23:55	121,4500N-C	AT
Dissolved Organic Carbon	0.89	J	mg/l	1.0	0.12	1	06/23/16 07:25	06/23/16 07:25	121,5310C	DW



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

**Lab ID:** L1619223-09  
**Client ID:** MTER 6A  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/22/16 08:55  
**Date Received:** 06/22/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
pH (H)	5.6		SU	-	NA	1	-	06/22/16 20:55	121,4500H+-B	AS
Nitrogen, Nitrate	1.5		mg/l	0.10	0.019	1	-	06/22/16 22:56	44,353.2	MR
Nitrogen, Nitrate/Nitrite	1.5		mg/l	0.10	0.019	1	-	06/22/16 22:56	44,353.2	MR
Total Nitrogen	1.5		mg/l	0.30	0.30	1	-	06/29/16 10:40	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.300	0.066	1	06/28/16 19:00	06/28/16 23:56	121,4500N-C	AT
Dissolved Organic Carbon	0.44	J	mg/l	1.0	0.12	1	06/23/16 07:25	06/23/16 07:25	121,5310C	DW



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

**SAMPLE RESULTS**

**Lab ID:** L1619223-10  
**Client ID:** MTER 10  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/22/16 14:30  
**Date Received:** 06/22/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	5.7		mg/l	0.10	0.019	1	-	06/22/16 23:02	44,353.2	MR
Nitrogen, Nitrate/Nitrite	5.7		mg/l	0.10	0.019	1	-	06/22/16 23:02	44,353.2	MR
Total Nitrogen	6.0		mg/l	0.30	0.30	1	-	06/29/16 10:40	107,-	JO
Nitrogen, Total Kjeldahl	0.334		mg/l	0.300	0.066	1	06/28/16 19:00	06/28/16 23:57	121,4500N-C	AT
Dissolved Organic Carbon	3.2		mg/l	2.0	0.24	2	06/23/16 07:25	06/23/16 07:25	121,5310C	DW



Project Name: EPA SHOREWOOD PRB

Lab Number: L1619223

Project Number: WV-1009

Report Date: 06/29/16

**Method Blank Analysis  
Batch Quality Control**

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-10 Batch: WG906747-1										
Nitrogen, Nitrate	ND		mg/l	0.10	0.019	1	-	06/22/16 21:45	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-10 Batch: WG906748-1										
Nitrogen, Nitrate/Nitrite	ND		mg/l	0.10	0.019	1	-	06/22/16 21:45	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-10 Batch: WG906922-1										
Dissolved Organic Carbon	ND		mg/l	1.0	0.12	1	06/23/16 07:25	06/23/16 07:25	121,5310C	DW
General Chemistry - Westborough Lab for sample(s): 01-10 Batch: WG908538-1										
Nitrogen, Total Kjeldahl	0.073	J	mg/l	0.300	0.022	1	06/28/16 19:00	06/28/16 23:19	121,4500N-C	AT

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** EPA SHOREWOOD PRB

**Project Number:** WV-1009

**Lab Number:** L1619223

**Report Date:** 06/29/16

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
General Chemistry - Westborough Lab Associated sample(s): 01-10 Batch: WG906747-2								
Nitrogen, Nitrate	96		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-10 Batch: WG906748-2								
Nitrogen, Nitrate/Nitrite	96		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-02,09 Batch: WG906769-1								
pH	100		-		99-101	-		5
General Chemistry - Westborough Lab Associated sample(s): 01-10 Batch: WG906922-2								
Dissolved Organic Carbon	92		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-10 Batch: WG908538-2								
Nitrogen, Total Kjeldahl	101		-		78-122	-		

### Matrix Spike Analysis Batch Quality Control

**Project Name:** EPA SHOREWOOD PRB

**Lab Number:** L1619223

**Project Number:** WV-1009

**Report Date:** 06/29/16

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	RPD Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG906747-4 QC Sample: L1619223-01 Client ID: MTER 9C												
Nitrogen, Nitrate	14.	4	18	100		-	-		83-113	-		6
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG906748-4 QC Sample: L1619223-01 Client ID: MTER 9C												
Nitrogen, Nitrate/Nitrite	14.	4	18	100		-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG906922-4 QC Sample: L1619223-02 Client ID: MTER 9D												
Dissolved Organic Carbon	0.71J	4	4.9	123	Q	-	-		80-120	-		20
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG908538-4 QC Sample: L1618480-01 Client ID: MS Sample												
Nitrogen, Total Kjeldahl	1.69	8	9.15	93		-	-		77-111	-		24

## Lab Duplicate Analysis

Batch Quality Control

Project Name: EPA SHOREWOOD PRB

Project Number: WV-1009

Lab Number: L1619223

Report Date: 06/29/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG906747-3 QC Sample: L1619223-01 Client ID: MTER 9C						
Nitrogen, Nitrate	14.	14	mg/l	0		6
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG906748-3 QC Sample: L1619223-01 Client ID: MTER 9C						
Nitrogen, Nitrate/Nitrite	14.	14	mg/l	0		20
General Chemistry - Westborough Lab Associated sample(s): 01-02,09 QC Batch ID: WG906769-2 QC Sample: L1619209-01 Client ID: DUP Sample						
pH	8.8	8.7	SU	1		5
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG906922-3 QC Sample: L1619223-03 Client ID: MTER 6F						
Dissolved Organic Carbon	3.8	4.0	mg/l	5		20
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG908538-3 QC Sample: L1618480-01 Client ID: DUP Sample						
Nitrogen, Total Kjeldahl	1.69	1.96	mg/l	15		24

**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619223  
**Report Date:** 06/29/16

### Sample Receipt and Container Information

Were project specific reporting limits specified? YES

#### Cooler Information Custody Seal

##### Cooler

A Absent

#### Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1619223-01A	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-01B	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-01C	Plastic 120ml H2SO4 preserved	A	<2	3.8	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619223-01D	Plastic 250ml HNO3 preserved	A	<2	3.8	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619223-01E	Plastic 60ml unpreserved	A	7	3.8	Y	Absent	NO3-353(2),PH-4500(.01)
L1619223-02A	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-02B	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-02C	Plastic 120ml H2SO4 preserved	A	<2	3.8	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619223-02D	Plastic 250ml HNO3 preserved	A	<2	3.8	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619223-02E	Plastic 60ml unpreserved	A	8	3.8	Y	Absent	NO3-353(2),PH-4500(.01)
L1619223-03A	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-03B	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-03C	Plastic 120ml H2SO4 preserved	A	<2	3.8	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619223-03D	Plastic 250ml HNO3 preserved	A	<2	3.8	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619223-03E	Plastic 60ml unpreserved	A	8	3.8	Y	Absent	NO3-353(2)
L1619223-04A	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-04B	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-04C	Plastic 120ml H2SO4 preserved	A	<2	3.8	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619223-04D	Plastic 250ml HNO3 preserved	A	<2	3.8	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619223-04E	Plastic 60ml unpreserved	A	8	3.8	Y	Absent	NO3-353(2)
L1619223-05A	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-05B	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-05C	Plastic 120ml H2SO4 preserved	A	<2	3.8	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619223-05D	Plastic 250ml HNO3 preserved	A	<2	3.8	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619223-05E	Plastic 60ml unpreserved	A	8	3.8	Y	Absent	NO3-353(2)

\*Values in parentheses indicate holding time in days

Project Name: EPA SHOREWOOD PRB

Project Number: WV-1009

Lab Number: L1619223

Report Date: 06/29/16

## Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1619223-06A	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-06B	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-06C	Plastic 120ml H2SO4 preserved	A	<2	3.8	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619223-06D	Plastic 250ml HNO3 preserved	A	<2	3.8	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619223-06E	Plastic 60ml unpreserved	A	8	3.8	Y	Absent	NO3-353(2)
L1619223-07A	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-07B	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-07C	Plastic 120ml H2SO4 preserved	A	<2	3.8	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619223-07D	Plastic 250ml HNO3 preserved	A	<2	3.8	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619223-07E	Plastic 60ml unpreserved	A	8	3.8	Y	Absent	NO3-353(2)
L1619223-08A	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-08B	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-08C	Plastic 120ml H2SO4 preserved	A	<2	3.8	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619223-08D	Plastic 250ml HNO3 preserved	A	<2	3.8	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619223-08E	Plastic 60ml unpreserved	A	8	3.8	Y	Absent	NO3-353(2)
L1619223-09A	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-09B	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-09C	Plastic 120ml H2SO4 preserved	A	<2	3.8	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619223-09D	Plastic 250ml HNO3 preserved	A	<2	3.8	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619223-09E	Plastic 60ml unpreserved	A	8	3.8	Y	Absent	NO3-353(2),PH-4500(.01)
L1619223-10A	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-10B	Vial H2SO4 preserved	A	N/A	3.8	Y	Absent	DOC-5310(28)
L1619223-10C	Plastic 120ml H2SO4 preserved	A	<2	3.8	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619223-10D	Plastic 250ml HNO3 preserved	A	<2	3.8	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619223-10E	Plastic 60ml unpreserved	A	8	3.8	Y	Absent	NO3-353(2)

\*Values in parentheses indicate holding time in days



**Project Name:** EPA SHOREWOOD PRB  
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## GLOSSARY

### Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

### Footnotes

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### Terms

**Total:** With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

**Analytical Method:** Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### Data Qualifiers

- A** - Spectra identified as "Aldol Condensation Product".
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the

**Report Format:** DU Report with 'J' Qualifiers



**Project Name:** EPA SHOREWOOD PRB  
**Project Number:** WV-1009

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#### Data Qualifiers

- reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
  - D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
  - E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
  - G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
  - H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
  - I** - The lower value for the two columns has been reported due to obvious interference.
  - M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
  - NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
  - P** - The RPD between the results for the two columns exceeds the method-specified criteria.
  - Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
  - R** - Analytical results are from sample re-analysis.
  - RE** - Analytical results are from sample re-extraction.
  - S** - Analytical results are from modified screening analysis.
  - J** - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
  - ND** - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

**Project Name:** EPA SHOREWOOD PRB  
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**Lab Number:** L1619223  
**Report Date:** 06/29/16

## REFERENCES

- 1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.
- 44 Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993.
- 107 Alpha Analytical - In-house calculation method.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



## Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

### Westborough Facility

**EPA 524.2:** 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, m/p-xylene, o-xylene  
**EPA 624:** 2-Butanone (MEK), 1,4-Dioxane, tert-Amylmethyl Ether, tert-Butyl Alcohol, m/p-xylene, o-xylene  
**EPA 625:** Aniline, Benzoic Acid, Benzyl Alcohol, 4-Chloroaniline, 3-Methylphenol, 4-Methylphenol.  
**EPA 1010A:** NPW: Ignitability  
**EPA 6010C:** NPW: Strontium; SCM: Strontium  
**EPA 8151A:** NPW: 2,4-DB, Dicamba, Dichloroprop, MCPA, MCPP; SCM: 2,4-DB, Dichloroprop, MCPA, MCPP  
**EPA 8260C:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene, Isopropanol; SCM: Iodomethane (methyl iodide), Methyl methacrylate (soil); 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.  
**EPA 8270D:** NPW: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine; SCM: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine.  
**EPA 9010:** NPW: Amenable Cyanide Distillation, Total Cyanide Distillation  
**EPA 9038:** NPW: Sulfate  
**EPA 9050A:** NPW: Specific Conductance  
**EPA 9056:** NPW: Chloride, Nitrate, Sulfate  
**EPA 9065:** NPW: Phenols  
**EPA 9251:** NPW: Chloride  
**SM3500:** NPW: Ferrous Iron  
**SM4500:** NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO<sub>2</sub>, NO<sub>3</sub>.  
**SM5310C:** DW: Dissolved Organic Carbon

### Mansfield Facility

**EPA 8270D:** NPW: Biphenyl; SCM: Biphenyl, Caprolactam  
**EPA 8270D-SIM Isotope Dilution:** SCM: 1,4-Dioxane  
**SM 2540D:** TSS  
**SM2540G:** SCM: Percent Solids  
**EPA 1631E:** SCM: Mercury  
**EPA 7474:** SCM: Mercury  
**EPA 8081B:** NPW and SCM: Mirex, Hexachlorobenzene.  
**EPA 8082A:** NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.  
**EPA 8270-SIM:** NPW and SCM: Alkylated PAHs.  
**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene, n-Butylbenzene, n-Propylbenzene, sec-Butylbenzene, tert-Butylbenzene.  
**Biological Tissue Matrix:** **8270D-SIM; 3050B; 3051A; 7471B; 8081B; 8082A; 6020A:** Lead; **8270D:** bis(2-ethylhexyl)phthalate, Butylbenzylphthalate, Diethyl phthalate, Dimethyl phthalate, Di-n-butyl phthalate, Di-n-octyl phthalate, Fluoranthene, Pentachlorophenol.

The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:

### Drinking Water

**EPA 200.8:** Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7:** Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;  
**EPA 300.0:** Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**  
**EPA 332:** Perchlorate.  
**Microbiology:** **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

### Non-Potable Water

**EPA 200.8:** Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;  
**EPA 200.7:** Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;  
**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH, EPA 350.1:** Ammonia-N, **LACHAT 10-107-06-1-B:** Ammonia-N, **SM4500NO3-F,**  
**EPA 353.2:** Nitrate-N, **SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**  
**EPA 624:** Volatile Halocarbons & Aromatics,  
**EPA 608:** Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs  
**EPA 625:** SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.  
**Microbiology:** **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF.**

For a complete listing of analytes and methods, please contact your Alpha Project Manager.





## ANALYTICAL REPORT

Lab Number:	L1619060
Client:	Watervision, LLC 454 Court Street Suite 304 Portsmouth, NH 03801
ATTN:	Danna Truslow
Phone:	(603) 766-6670
Project Name:	EPA-SHOREWOOD PRB
Project Number:	WV-1009
Report Date:	06/28/16

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Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), VA (460195), MD (348), IL (200077), NC (666), TX (T104704476), DOD (L2217), USDA (Permit #P-330-11-00240).

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Eight Walkup Drive, Westborough, MA 01581-1019  
508-898-9220 (Fax) 508-898-9193 800-624-9220 - [www.alphalab.com](http://www.alphalab.com)



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

<b>Alpha Sample ID</b>	<b>Client ID</b>	<b>Matrix</b>	<b>Sample Location</b>	<b>Collection Date/Time</b>	<b>Receive Date</b>
L1619060-01	MTER-4-01-PT	WATER	FALMOUTH, MA	06/21/16 09:45	06/21/16
L1619060-02	MTER-4-03-RT	WATER	FALMOUTH, MA	06/21/16 10:05	06/21/16
L1619060-03	MTER-4-02-GNT	WATER	FALMOUTH, MA	06/21/16 09:53	06/21/16
L1619060-04	MTER-4-04-BUT	WATER	FALMOUTH, MA	06/21/16 10:20	06/21/16
L1619060-05	MTER-4-05-BKT	WATER	FALMOUTH, MA	06/21/16 10:45	06/21/16
L1619060-06	MTER-4-06-WT	WATER	FALMOUTH, MA	06/21/16 10:55	06/21/16
L1619060-07	MTER-4-07-O	WATER	FALMOUTH, MA	06/21/16 11:00	06/21/16
L1619060-08	MTER-4-08-GY	WATER	FALMOUTH, MA	06/21/16 11:10	06/21/16
L1619060-09	MTER-4-09-Y	WATER	FALMOUTH, MA	06/21/16 11:25	06/21/16
L1619060-10	MTER-4-10-P	WATER	FALMOUTH, MA	06/21/16 11:35	06/21/16
L1619060-11	MTER-04-11-GN	WATER	FALMOUTH, MA	06/21/16 11:43	06/21/16
L1619060-12	MTER-04-12-R	WATER	FALMOUTH, MA	06/21/16 11:53	06/21/16
L1619060-13	MTER-04-13-BU	WATER	FALMOUTH, MA	06/21/16 12:08	06/21/16
L1619060-14	MTER-04-14-BK	WATER	FALMOUTH, MA	06/21/16 12:20	06/21/16
L1619060-15	MTER-04-15-W	WATER	FALMOUTH, MA	06/21/16 12:30	06/21/16
L1619060-16	MTER-9A	WATER	FALMOUTH, MA	06/21/16 14:40	06/21/16
L1619060-17	MTER-9A (DUP)	WATER	FALMOUTH, MA	06/21/16 14:45	06/21/16
L1619060-18	MTER-9B	WATER	FALMOUTH, MA	06/21/16 15:34	06/21/16

**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

### Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

#### HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

### Case Narrative (continued)

#### Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

#### Dissolved Organic Carbon

L1619060-01: The sample has an elevated detection limit due to the dilution required by the sample matrix.

#### Nitrogen, Total Kjeldahl

L1619060-01 through -08: The sample has an elevated detection limit due to the dilution required by the sample matrix.

#### Dissolved Organic Carbon

The samples were field filtered; a filter blank was not received.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:

 Lura L Troy

Title: Technical Director/Representative

Date: 06/28/16

## METALS

**Project Name:** EPA-SHOREWOOD PRB**Lab Number:** L1619060**Project Number:** WV-1009**Report Date:** 06/28/16**SAMPLE RESULTS**

Lab ID: L1619060-01

Date Collected: 06/21/16 09:45

Client ID: MTER-4-01-PT

Date Received: 06/21/16

Sample Location: FALMOUTH, MA

Field Prep: Field Filtered

Matrix: Water

(Dissolved  
Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	0.0023	J	mg/l	0.0050	0.0020	1	06/24/16 12:40	06/25/16 00:33	EPA 3005A	1,6010C	FB
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/24/16 12:40	06/25/16 00:33	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.0470		mg/l	0.0100	0.0020	1	06/24/16 12:40	06/25/16 00:33	EPA 3005A	1,6010C	FB



**Project Name:** EPA-SHOREWOOD PRB**Lab Number:** L1619060**Project Number:** WV-1009**Report Date:** 06/28/16**SAMPLE RESULTS**

Lab ID: L1619060-02  
 Client ID: MTER-4-03-RT  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/21/16 10:05  
 Date Received: 06/21/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/24/16 12:40	06/25/16 00:38	EPA 3005A	1,6010C	FB
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/24/16 12:40	06/25/16 00:38	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.0090	J	mg/l	0.0100	0.0020	1	06/24/16 12:40	06/25/16 00:38	EPA 3005A	1,6010C	FB



**Project Name:** EPA-SHOREWOOD PRB**Lab Number:** L1619060**Project Number:** WV-1009**Report Date:** 06/28/16**SAMPLE RESULTS**

Lab ID: L1619060-03

Date Collected: 06/21/16 09:53

Client ID: MTER-4-02-GNT

Date Received: 06/21/16

Sample Location: FALMOUTH, MA

Field Prep: Field Filtered

Matrix: Water

(Dissolved  
Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	0.0028	J	mg/l	0.0050	0.0020	1	06/24/16 12:40	06/25/16 00:42	EPA 3005A	1,6010C	FB
Iron, Dissolved	0.028	J	mg/l	0.050	0.020	1	06/24/16 12:40	06/25/16 00:42	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.0174		mg/l	0.0100	0.0020	1	06/24/16 12:40	06/25/16 00:42	EPA 3005A	1,6010C	FB



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

Lab ID: L1619060-04  
 Client ID: MTER-4-04-BUT  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/21/16 10:20  
 Date Received: 06/21/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	0.0021	J	mg/l	0.0050	0.0020	1	06/24/16 12:40	06/24/16 21:10	EPA 3005A	1,6010C	FB
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/24/16 12:40	06/24/16 21:10	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.0516		mg/l	0.0100	0.0020	1	06/24/16 12:40	06/24/16 21:10	EPA 3005A	1,6010C	FB



Project Name: EPA-SHOREWOOD PRB

Lab Number: L1619060

Project Number: WV-1009

Report Date: 06/28/16

## SAMPLE RESULTS

Lab ID: L1619060-05  
 Client ID: MTER-4-05-BKT  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/21/16 10:45  
 Date Received: 06/21/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	0.0025	J	mg/l	0.0050	0.0020	1	06/24/16 12:40	06/24/16 21:15	EPA 3005A	1,6010C	FB
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/24/16 12:40	06/24/16 21:15	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.348		mg/l	0.0100	0.0020	1	06/24/16 12:40	06/24/16 21:15	EPA 3005A	1,6010C	FB



**Project Name:** EPA-SHOREWOOD PRB**Lab Number:** L1619060**Project Number:** WV-1009**Report Date:** 06/28/16**SAMPLE RESULTS**

Lab ID: L1619060-06  
 Client ID: MTER-4-06-WT  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/21/16 10:55  
 Date Received: 06/21/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	0.0026	J	mg/l	0.0050	0.0020	1	06/24/16 12:40	06/24/16 21:19	EPA 3005A	1,6010C	FB
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/24/16 12:40	06/24/16 21:19	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.341		mg/l	0.0100	0.0020	1	06/24/16 12:40	06/24/16 21:19	EPA 3005A	1,6010C	FB



**Project Name:** EPA-SHOREWOOD PRB**Lab Number:** L1619060**Project Number:** WV-1009**Report Date:** 06/28/16**SAMPLE RESULTS**

Lab ID: L1619060-07  
 Client ID: MTER-4-07-O  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/21/16 11:00  
 Date Received: 06/21/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	0.0044	J	mg/l	0.0050	0.0020	1	06/24/16 12:40	06/24/16 21:23	EPA 3005A	1,6010C	FB
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/24/16 12:40	06/24/16 21:23	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.188		mg/l	0.0100	0.0020	1	06/24/16 12:40	06/24/16 21:23	EPA 3005A	1,6010C	FB



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

Lab ID: L1619060-08  
 Client ID: MTER-4-08-GY  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/21/16 11:10  
 Date Received: 06/21/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/24/16 12:40	06/24/16 21:27	EPA 3005A	1,6010C	FB
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/24/16 12:40	06/24/16 21:27	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.384		mg/l	0.0100	0.0020	1	06/24/16 12:40	06/24/16 21:27	EPA 3005A	1,6010C	FB



**Project Name:** EPA-SHOREWOOD PRB**Lab Number:** L1619060**Project Number:** WV-1009**Report Date:** 06/28/16**SAMPLE RESULTS**

Lab ID: L1619060-09  
 Client ID: MTER-4-09-Y  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/21/16 11:25  
 Date Received: 06/21/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/24/16 12:40	06/24/16 21:32	EPA 3005A	1,6010C	FB
Iron, Dissolved	0.031	J	mg/l	0.050	0.020	1	06/24/16 12:40	06/24/16 21:32	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.0751		mg/l	0.0100	0.0020	1	06/24/16 12:40	06/24/16 21:32	EPA 3005A	1,6010C	FB



**Project Name:** EPA-SHOREWOOD PRB**Lab Number:** L1619060**Project Number:** WV-1009**Report Date:** 06/28/16**SAMPLE RESULTS**

Lab ID: L1619060-10  
 Client ID: MTER-4-10-P  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/21/16 11:35  
 Date Received: 06/21/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	0.0031	J	mg/l	0.0050	0.0020	1	06/24/16 12:40	06/24/16 21:36	EPA 3005A	1,6010C	FB
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/24/16 12:40	06/24/16 21:36	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.0346		mg/l	0.0100	0.0020	1	06/24/16 12:40	06/24/16 21:36	EPA 3005A	1,6010C	FB



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

Lab ID: L1619060-11  
 Client ID: MTER-04-11-GN  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/21/16 11:43  
 Date Received: 06/21/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
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**Dissolved Metals - Mansfield Lab**

Arsenic, Dissolved	0.0027	J	mg/l	0.0050	0.0020	1	06/24/16 12:40	06/24/16 21:40	EPA 3005A	1,6010C	FB
Iron, Dissolved	1.1		mg/l	0.050	0.020	1	06/24/16 12:40	06/24/16 21:40	EPA 3005A	1,6010C	FB
Manganese, Dissolved	0.0227		mg/l	0.0100	0.0020	1	06/24/16 12:40	06/24/16 21:40	EPA 3005A	1,6010C	FB



**Project Name:** EPA-SHOREWOOD PRB**Lab Number:** L1619060**Project Number:** WV-1009**Report Date:** 06/28/16**SAMPLE RESULTS**

Lab ID: L1619060-12  
 Client ID: MTER-04-12-R  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/21/16 11:53  
 Date Received: 06/21/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/27/16 14:15	06/27/16 20:38	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/27/16 14:15	06/27/16 20:38	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.320		mg/l	0.0100	0.0020	1	06/27/16 14:15	06/27/16 20:38	EPA 3005A	1,6010C	PS



**Project Name:** EPA-SHOREWOOD PRB**Lab Number:** L1619060**Project Number:** WV-1009**Report Date:** 06/28/16**SAMPLE RESULTS**

Lab ID: L1619060-13

Date Collected: 06/21/16 12:08

Client ID: MTER-04-13-BU

Date Received: 06/21/16

Sample Location: FALMOUTH, MA

Field Prep: Field Filtered

Matrix: Water

(Dissolved  
Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/27/16 14:15	06/27/16 20:42	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/27/16 14:15	06/27/16 20:42	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.738		mg/l	0.0100	0.0020	1	06/27/16 14:15	06/27/16 20:42	EPA 3005A	1,6010C	PS



**Project Name:** EPA-SHOREWOOD PRB**Lab Number:** L1619060**Project Number:** WV-1009**Report Date:** 06/28/16**SAMPLE RESULTS**

Lab ID: L1619060-14  
 Client ID: MTER-04-14-BK  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/21/16 12:20  
 Date Received: 06/21/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/27/16 14:15	06/27/16 20:46	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/27/16 14:15	06/27/16 20:46	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.0662		mg/l	0.0100	0.0020	1	06/27/16 14:15	06/27/16 20:46	EPA 3005A	1,6010C	PS



**Project Name:** EPA-SHOREWOOD PRB**Lab Number:** L1619060**Project Number:** WV-1009**Report Date:** 06/28/16**SAMPLE RESULTS**

Lab ID: L1619060-15  
 Client ID: MTER-04-15-W  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/21/16 12:30  
 Date Received: 06/21/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/27/16 14:15	06/27/16 21:03	EPA 3005A	1,6010C	PS
Iron, Dissolved	1.5		mg/l	0.050	0.020	1	06/27/16 14:15	06/27/16 21:03	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.302		mg/l	0.0100	0.0020	1	06/27/16 14:15	06/27/16 21:03	EPA 3005A	1,6010C	PS



**Project Name:** EPA-SHOREWOOD PRB**Lab Number:** L1619060**Project Number:** WV-1009**Report Date:** 06/28/16**SAMPLE RESULTS**

Lab ID: L1619060-16  
 Client ID: MTER-9A  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/21/16 14:40  
 Date Received: 06/21/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/27/16 14:15	06/27/16 21:08	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/27/16 14:15	06/27/16 21:08	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.0121		mg/l	0.0100	0.0020	1	06/27/16 14:15	06/27/16 21:08	EPA 3005A	1,6010C	PS



**Project Name:** EPA-SHOREWOOD PRB**Lab Number:** L1619060**Project Number:** WV-1009**Report Date:** 06/28/16**SAMPLE RESULTS**

Lab ID: L1619060-17  
 Client ID: MTER-9A (DUP)  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/21/16 14:45  
 Date Received: 06/21/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/27/16 14:15	06/27/16 21:12	EPA 3005A	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/27/16 14:15	06/27/16 21:12	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.0119		mg/l	0.0100	0.0020	1	06/27/16 14:15	06/27/16 21:12	EPA 3005A	1,6010C	PS



Project Name: EPA-SHOREWOOD PRB

Lab Number: L1619060

Project Number: WV-1009

Report Date: 06/28/16

## SAMPLE RESULTS

Lab ID: L1619060-18  
 Client ID: MTER-9B  
 Sample Location: FALMOUTH, MA  
 Matrix: Water

Date Collected: 06/21/16 15:34  
 Date Received: 06/21/16  
 Field Prep: Field Filtered  
 (Dissolved  
 Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>Dissolved Metals - Mansfield Lab</b>											
Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/27/16 14:15	06/27/16 21:16	EPA 3005A	1,6010C	PS
Iron, Dissolved	0.025	J	mg/l	0.050	0.020	1	06/27/16 14:15	06/27/16 21:16	EPA 3005A	1,6010C	PS
Manganese, Dissolved	0.0338		mg/l	0.0100	0.0020	1	06/27/16 14:15	06/27/16 21:16	EPA 3005A	1,6010C	PS



Project Name: EPA-SHOREWOOD PRB

Lab Number: L1619060

Project Number: WV-1009

Report Date: 06/28/16

## Method Blank Analysis Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 01-11 Batch: WG907431-1										
Arsenic, Dissolved	0.0020	J	mg/l	0.0050	0.0020	1	06/24/16 12:40	06/24/16 23:16	1,6010C	FB
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/24/16 12:40	06/24/16 23:16	1,6010C	FB
Manganese, Dissolved	ND		mg/l	0.0100	0.0020	1	06/24/16 12:40	06/24/16 23:16	1,6010C	FB

### Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Dissolved Metals - Mansfield Lab for sample(s): 12-18 Batch: WG908039-1										
Arsenic, Dissolved	ND		mg/l	0.0050	0.0020	1	06/27/16 14:15	06/27/16 20:12	1,6010C	PS
Iron, Dissolved	ND		mg/l	0.050	0.020	1	06/27/16 14:15	06/27/16 20:12	1,6010C	PS
Manganese, Dissolved	ND		mg/l	0.0100	0.0020	1	06/27/16 14:15	06/27/16 20:12	1,6010C	PS

### Prep Information

Digestion Method: EPA 3005A

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** EPA-SHOREWOOD PRB

**Project Number:** WV-1009

**Lab Number:** L1619060

**Report Date:** 06/28/16

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01-11 Batch: WG907431-2								
Arsenic, Dissolved	108		-		80-120	-		
Iron, Dissolved	94		-		80-120	-		
Manganese, Dissolved	94		-		80-120	-		
Dissolved Metals - Mansfield Lab Associated sample(s): 12-18 Batch: WG908039-2								
Arsenic, Dissolved	108		-		80-120	-		
Iron, Dissolved	90		-		80-120	-		
Manganese, Dissolved	99		-		80-120	-		

### Matrix Spike Analysis Batch Quality Control

**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01-11 QC Batch ID: WG907431-4 QC Sample: L1618304-03 Client ID: MS Sample												
Arsenic, Dissolved	0.0020J	0.12	0.139	116		-	-		75-125	-		20
Iron, Dissolved	4.7	1	5.4	70	Q	-	-		75-125	-		20
Manganese, Dissolved	0.360	0.5	0.835	95		-	-		75-125	-		20
Dissolved Metals - Mansfield Lab Associated sample(s): 12-18 QC Batch ID: WG908039-3 WG908039-4 QC Sample: L1619269-01 Client ID: MS Sample												
Arsenic, Dissolved	ND	0.12	0.130	108		0.128	107		75-125	2		20
Iron, Dissolved	ND	1	0.94	94		0.93	93		75-125	1		20
Manganese, Dissolved	ND	0.5	0.497	99		0.482	96		75-125	3		20

## Lab Duplicate Analysis

Batch Quality Control

Project Name: EPA-SHOREWOOD PRB

Project Number: WV-1009

Lab Number: L1619060

Report Date: 06/28/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Dissolved Metals - Mansfield Lab Associated sample(s): 01-11 QC Batch ID: WG907431-3 QC Sample: L1618304-03 Client ID: DUP Sample						
Arsenic, Dissolved	0.0020J	0.0043J	mg/l	NC		20

# **INORGANICS & MISCELLANEOUS**

**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-01  
**Client ID:** MTER-4-01-PT  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 09:45  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	5.3		mg/l	0.10	0.019	1	-	06/21/16 23:37	44,353.2	MR
Nitrogen, Nitrate/Nitrite	5.3		mg/l	0.10	0.019	1	-	06/21/16 23:37	44,353.2	MR
Total Nitrogen	5.3		mg/l	0.60	0.60	2	-	06/24/16 10:38	107,-	JO
Nitrogen, Total Kjeldahl	0.179	J	mg/l	0.600	0.132	2	06/23/16 08:29	06/23/16 20:51	121,4500N-C	AT
Dissolved Organic Carbon	1.5	J	mg/l	2.0	0.24	2	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-02  
**Client ID:** MTER-4-03-RT  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 10:05  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	5.4		mg/l	0.10	0.019	1	-	06/22/16 01:24	44,353.2	MR
Nitrogen, Nitrate/Nitrite	5.4		mg/l	0.10	0.019	1	-	06/22/16 01:24	44,353.2	MR
Total Nitrogen	5.4		mg/l	0.60	0.60	2	-	06/24/16 10:38	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.600	0.132	2	06/23/16 08:29	06/23/16 20:52	121,4500N-C	AT
Dissolved Organic Carbon	0.94	J	mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-03  
**Client ID:** MTER-4-02-GNT  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 09:53  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	4.6		mg/l	0.10	0.019	1	-	06/21/16 23:42	44,353.2	MR
Nitrogen, Nitrate/Nitrite	4.6		mg/l	0.10	0.019	1	-	06/21/16 23:42	44,353.2	MR
Total Nitrogen	4.6		mg/l	0.60	0.60	2	-	06/24/16 10:38	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.600	0.132	2	06/23/16 08:29	06/23/16 20:53	121,4500N-C	AT
Dissolved Organic Carbon	1.2		mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-04  
**Client ID:** MTER-4-04-BUT  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 10:20  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	8.2		mg/l	0.50	0.094	5	-	06/22/16 01:26	44,353.2	MR
Nitrogen, Nitrate/Nitrite	8.2		mg/l	0.50	0.094	5	-	06/22/16 01:26	44,353.2	MR
Total Nitrogen	8.2		mg/l	0.60	0.60	2	-	06/24/16 10:38	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.600	0.132	2	06/23/16 08:29	06/23/16 21:00	121,4500N-C	AT
Dissolved Organic Carbon	0.84	J	mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-05  
**Client ID:** MTER-4-05-BKT  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 10:45  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	14.		mg/l	0.50	0.094	5	-	06/22/16 01:29	44,353.2	MR
Nitrogen, Nitrate/Nitrite	14.		mg/l	0.50	0.094	5	-	06/22/16 01:29	44,353.2	MR
Total Nitrogen	14.		mg/l	1.5	1.5	5	-	06/24/16 10:38	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	1.50	0.330	5	06/23/16 08:29	06/23/16 21:01	121,4500N-C	AT
Dissolved Organic Carbon	0.90	J	mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-06  
**Client ID:** MTER-4-06-WT  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 10:55  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	14.		mg/l	0.50	0.094	5	-	06/22/16 01:36	44,353.2	MR
Nitrogen, Nitrate/Nitrite	14.		mg/l	0.50	0.094	5	-	06/22/16 01:36	44,353.2	MR
Total Nitrogen	14.		mg/l	1.5	1.5	5	-	06/24/16 10:38	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	1.50	0.330	5	06/23/16 08:29	06/23/16 21:02	121,4500N-C	AT
Dissolved Organic Carbon	1.3		mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-07  
**Client ID:** MTER-4-07-O  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 11:00  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	11.		mg/l	0.50	0.094	5	-	06/22/16 01:38	44,353.2	MR
Nitrogen, Nitrate/Nitrite	11.		mg/l	0.50	0.094	5	-	06/22/16 01:38	44,353.2	MR
Total Nitrogen	11.		mg/l	1.5	1.5	5	-	06/24/16 10:38	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	1.50	0.330	5	06/23/16 08:29	06/23/16 21:03	121,4500N-C	AT
Dissolved Organic Carbon	1.0		mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-08  
**Client ID:** MTER-4-08-GY  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 11:10  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	5.2		mg/l	0.10	0.019	1	-	06/22/16 01:40	44,353.2	MR
Nitrogen, Nitrate/Nitrite	5.2		mg/l	0.10	0.019	1	-	06/22/16 01:40	44,353.2	MR
Total Nitrogen	5.2		mg/l	0.60	0.60	2	-	06/27/16 11:14	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.600	0.132	2	06/23/16 08:29	06/23/16 21:04	121,4500N-C	AT
Dissolved Organic Carbon	1.3		mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-09  
**Client ID:** MTER-4-09-Y  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 11:25  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	1.6		mg/l	0.10	0.019	1	-	06/21/16 23:54	44,353.2	MR
Nitrogen, Nitrate/Nitrite	1.6		mg/l	0.10	0.019	1	-	06/21/16 23:54	44,353.2	MR
Total Nitrogen	1.6		mg/l	0.30	0.30	1	-	06/27/16 11:14	107,-	JO
Nitrogen, Total Kjeldahl	0.272	J	mg/l	0.300	0.066	1	06/23/16 08:29	06/23/16 21:05	121,4500N-C	AT
Dissolved Organic Carbon	3.8		mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-10  
**Client ID:** MTER-4-10-P  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 11:35  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	0.028	J	mg/l	0.10	0.019	1	-	06/21/16 23:55	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.028	J	mg/l	0.10	0.019	1	-	06/21/16 23:55	44,353.2	MR
Total Nitrogen	ND		mg/l	0.30	0.30	1	-	06/27/16 11:14	107,-	JO
Nitrogen, Total Kjeldahl	0.223	J	mg/l	0.300	0.066	1	06/23/16 08:29	06/23/16 21:08	121,4500N-C	AT
Dissolved Organic Carbon	2.0		mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-11  
**Client ID:** MTER-04-11-GN  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 11:43  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	0.021	J	mg/l	0.10	0.019	1	-	06/21/16 23:56	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.021	J	mg/l	0.10	0.019	1	-	06/21/16 23:56	44,353.2	MR
Total Nitrogen	0.30		mg/l	0.30	0.30	1	-	06/27/16 11:14	107,-	JO
Nitrogen, Total Kjeldahl	0.301		mg/l	0.300	0.066	1	06/23/16 08:29	06/23/16 21:09	121,4500N-C	AT
Dissolved Organic Carbon	1.5		mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-12  
**Client ID:** MTER-04-12-R  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 11:53  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	0.67		mg/l	0.10	0.019	1	-	06/22/16 00:04	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.67		mg/l	0.10	0.019	1	-	06/22/16 00:04	44,353.2	MR
Total Nitrogen	0.67		mg/l	0.30	0.30	1	-	06/27/16 11:14	107,-	JO
Nitrogen, Total Kjeldahl	0.192	J	mg/l	0.300	0.066	1	06/23/16 08:29	06/23/16 21:10	121,4500N-C	AT
Dissolved Organic Carbon	0.79	J	mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-13  
**Client ID:** MTER-04-13-BU  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 12:08  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	3.4		mg/l	0.10	0.019	1	-	06/22/16 00:05	44,353.2	MR
Nitrogen, Nitrate/Nitrite	3.4		mg/l	0.10	0.019	1	-	06/22/16 00:05	44,353.2	MR
Total Nitrogen	3.4		mg/l	0.30	0.30	1	-	06/27/16 11:14	107,-	JO
Nitrogen, Total Kjeldahl	0.069	J	mg/l	0.300	0.066	1	06/23/16 18:00	06/24/16 22:51	121,4500N-C	AT
Dissolved Organic Carbon	0.72	J	mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-14  
**Client ID:** MTER-04-14-BK  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 12:20  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	0.50		mg/l	0.10	0.019	1	-	06/22/16 00:07	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.50		mg/l	0.10	0.019	1	-	06/22/16 00:07	44,353.2	MR
Total Nitrogen	0.50		mg/l	0.30	0.30	1	-	06/27/16 11:14	107,-	JO
Nitrogen, Total Kjeldahl	0.184	J	mg/l	0.300	0.066	1	06/23/16 18:00	06/24/16 22:51	121,4500N-C	AT
Dissolved Organic Carbon	0.81	J	mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-15  
**Client ID:** MTER-04-15-W  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 12:30  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	0.89		mg/l	0.10	0.019	1	-	06/22/16 00:08	44,353.2	MR
Nitrogen, Nitrate/Nitrite	0.89		mg/l	0.10	0.019	1	-	06/22/16 00:08	44,353.2	MR
Total Nitrogen	0.89		mg/l	0.30	0.30	1	-	06/27/16 11:14	107,-	JO
Nitrogen, Total Kjeldahl	0.233	J	mg/l	0.300	0.066	1	06/23/16 18:00	06/24/16 22:52	121,4500N-C	AT
Dissolved Organic Carbon	0.55	J	mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-16  
**Client ID:** MTER-9A  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 14:40  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals &  
DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	2.2		mg/l	0.10	0.019	1	-	06/22/16 00:09	44,353.2	MR
Nitrogen, Nitrate/Nitrite	2.2		mg/l	0.10	0.019	1	-	06/22/16 00:09	44,353.2	MR
Total Nitrogen	2.2		mg/l	0.30	0.30	1	-	06/27/16 11:14	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.300	0.066	1	06/23/16 18:00	06/24/16 22:53	121,4500N-C	AT
Dissolved Organic Carbon	0.59	J	mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-17  
**Client ID:** MTER-9A (DUP)  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 14:45  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals &  
DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	2.2		mg/l	0.10	0.019	1	-	06/22/16 00:10	44,353.2	MR
Nitrogen, Nitrate/Nitrite	2.2		mg/l	0.10	0.019	1	-	06/22/16 00:10	44,353.2	MR
Total Nitrogen	2.2		mg/l	0.30	0.30	1	-	06/27/16 11:14	107,-	JO
Nitrogen, Total Kjeldahl	ND		mg/l	0.300	0.066	1	06/23/16 18:00	06/24/16 22:54	121,4500N-C	AT
Dissolved Organic Carbon	0.47	J	mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**SAMPLE RESULTS**

**Lab ID:** L1619060-18  
**Client ID:** MTER-9B  
**Sample Location:** FALMOUTH, MA  
**Matrix:** Water

**Date Collected:** 06/21/16 15:34  
**Date Received:** 06/21/16  
**Field Prep:** Field Filtered  
(Dissolved Metals & DOC)

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
<b>General Chemistry - Westborough Lab</b>										
Nitrogen, Nitrate	3.1		mg/l	0.10	0.019	1	-	06/22/16 00:12	44,353.2	MR
Nitrogen, Nitrate/Nitrite	3.1		mg/l	0.10	0.019	1	-	06/22/16 00:12	44,353.2	MR
Total Nitrogen	3.1		mg/l	0.30	0.30	1	-	06/27/16 11:14	107,-	JO
Nitrogen, Total Kjeldahl	0.104	J	mg/l	0.300	0.066	1	06/23/16 18:00	06/24/16 22:55	121,4500N-C	AT
Dissolved Organic Carbon	0.64	J	mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

**Method Blank Analysis**  
**Batch Quality Control**

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 01-10 Batch: WG906331-1										
Nitrogen, Nitrate	ND		mg/l	0.10	0.019	1	-	06/21/16 23:14	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-10 Batch: WG906332-1										
Nitrogen, Nitrate/Nitrite	ND		mg/l	0.10	0.019	1	-	06/21/16 23:14	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 11-18 Batch: WG906333-1										
Nitrogen, Nitrate	ND		mg/l	0.10	0.019	1	-	06/21/16 23:16	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 11-18 Batch: WG906334-1										
Nitrogen, Nitrate/Nitrite	ND		mg/l	0.10	0.019	1	-	06/21/16 23:16	44,353.2	MR
General Chemistry - Westborough Lab for sample(s): 01-18 Batch: WG906418-1										
Dissolved Organic Carbon	ND		mg/l	1.0	0.12	1	06/22/16 07:28	06/22/16 07:28	121,5310C	DW
General Chemistry - Westborough Lab for sample(s): 01-12 Batch: WG906860-1										
Nitrogen, Total Kjeldahl	0.129	J	mg/l	0.300	0.022	1	06/23/16 08:29	06/23/16 20:48	121,4500N-C	AT
General Chemistry - Westborough Lab for sample(s): 13-18 Batch: WG907142-1										
Nitrogen, Total Kjeldahl	0.094	J	mg/l	0.300	0.022	1	06/23/16 18:00	06/24/16 22:39	121,4500N-C	AT

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
General Chemistry - Westborough Lab Associated sample(s): 01-10 Batch: WG906331-2								
Nitrogen, Nitrate	100		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-10 Batch: WG906332-2								
Nitrogen, Nitrate/Nitrite	100		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 11-18 Batch: WG906333-2								
Nitrogen, Nitrate	100		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 11-18 Batch: WG906334-2								
Nitrogen, Nitrate/Nitrite	100		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-18 Batch: WG906418-2								
Dissolved Organic Carbon	95		-		90-110	-		
General Chemistry - Westborough Lab Associated sample(s): 01-12 Batch: WG906860-2								
Nitrogen, Total Kjeldahl	96		-		78-122	-		
General Chemistry - Westborough Lab Associated sample(s): 13-18 Batch: WG907142-2								
Nitrogen, Total Kjeldahl	92		-		78-122	-		



### Matrix Spike Analysis Batch Quality Control

**Project Name:** EPA-SHOREWOOD PRB

**Lab Number:** L1619060

**Project Number:** WV-1009

**Report Date:** 06/28/16

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	RPD Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG906331-4 QC Sample: L1619060-01 Client ID: MTER-4-01-PT												
Nitrogen, Nitrate	5.3	4	9.3	100	-	-	-	-	83-113	-	-	6
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG906332-4 QC Sample: L1619060-01 Client ID: MTER-4-01-PT												
Nitrogen, Nitrate/Nitrite	5.3	4	9.3	100	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 11-18 QC Batch ID: WG906333-4 QC Sample: L1619060-11 Client ID: MTER-04-11-GN												
Nitrogen, Nitrate	0.021J	4	4.0	100	-	-	-	-	83-113	-	-	6
General Chemistry - Westborough Lab Associated sample(s): 11-18 QC Batch ID: WG906334-4 QC Sample: L1619060-11 Client ID: MTER-04-11-GN												
Nitrogen, Nitrate/Nitrite	0.021J	4	4.0	100	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-18 QC Batch ID: WG906418-4 QC Sample: L1619060-03 Client ID: MTER-4-02-GNT												
Dissolved Organic Carbon	1.2	4	5.3	102	-	-	-	-	80-120	-	-	20
General Chemistry - Westborough Lab Associated sample(s): 01-12 QC Batch ID: WG906860-4 QC Sample: L1619005-01 Client ID: MS Sample												
Nitrogen, Total Kjeldahl	0.765	8	6.90	77	-	-	-	-	77-111	-	-	24
General Chemistry - Westborough Lab Associated sample(s): 13-18 QC Batch ID: WG907142-4 QC Sample: L1618240-01 Client ID: MS Sample												
Nitrogen, Total Kjeldahl	0.825	8	8.18	92	-	-	-	-	77-111	-	-	24

## Lab Duplicate Analysis

Batch Quality Control

**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG906331-3 QC Sample: L1619060-01 Client ID: MTER-4-01-PT						
Nitrogen, Nitrate	5.3	5.3	mg/l	0		6
General Chemistry - Westborough Lab Associated sample(s): 01-10 QC Batch ID: WG906332-3 QC Sample: L1619060-01 Client ID: MTER-4-01-PT						
Nitrogen, Nitrate/Nitrite	5.3	5.3	mg/l	0		20
General Chemistry - Westborough Lab Associated sample(s): 11-18 QC Batch ID: WG906333-3 QC Sample: L1619060-11 Client ID: MTER-04-11-GN						
Nitrogen, Nitrate	0.021J	0.023J	mg/l	NC		6
General Chemistry - Westborough Lab Associated sample(s): 11-18 QC Batch ID: WG906334-3 QC Sample: L1619060-11 Client ID: MTER-04-11-GN						
Nitrogen, Nitrate/Nitrite	0.021J	0.023J	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-18 QC Batch ID: WG906418-3 QC Sample: L1619060-02 Client ID: MTER-4-03-RT						
Dissolved Organic Carbon	0.94J	0.95J	mg/l	NC		20
General Chemistry - Westborough Lab Associated sample(s): 01-12 QC Batch ID: WG906860-3 QC Sample: L1619005-01 Client ID: DUP Sample						
Nitrogen, Total Kjeldahl	0.765	0.658	mg/l	15		24
General Chemistry - Westborough Lab Associated sample(s): 13-18 QC Batch ID: WG907142-3 QC Sample: L1618240-01 Client ID: DUP Sample						
Nitrogen, Total Kjeldahl	0.825	0.849	mg/l	3		24

Project Name: EPA-SHOREWOOD PRB

Lab Number: L1619060

Project Number: WV-1009

Report Date: 06/28/16

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

## Cooler Information Custody Seal

## Cooler

A Absent

## Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1619060-01A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-01B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-01C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-01D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-01E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)
L1619060-02A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-02B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-02C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-02D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-02E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)
L1619060-03A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-03B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-03C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-03D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-03E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)
L1619060-04A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-04B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-04C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-04D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-04E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)
L1619060-05A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-05B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-05C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-05D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-05E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)

\*Values in parentheses indicate holding time in days

Project Name: EPA-SHOREWOOD PRB

Lab Number: L1619060

Project Number: WV-1009

Report Date: 06/28/16

## Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1619060-06A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-06B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-06C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-06D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-06E	Plastic 60ml unpreserved	A	7	2.5	Y	Absent	NO3-353(2)
L1619060-07A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-07B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-07C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-07D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-07E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)
L1619060-08A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-08B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-08C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-08D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-08E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)
L1619060-09A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-09B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-09C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-09D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-09E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)
L1619060-10A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-10B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-10C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-10D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-10E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)
L1619060-11A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-11B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-11C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-11D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-11E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)
L1619060-12A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)

\*Values in parentheses indicate holding time in days



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

### Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1619060-12B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-12C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-12D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-12E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)
L1619060-13A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-13B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-13C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-13D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-13E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)
L1619060-14A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-14B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-14C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-14D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-14E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)
L1619060-15A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-15B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-15C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-15D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-15E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)
L1619060-16A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-16B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-16C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-16D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-16E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)
L1619060-17A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-17B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-17C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-17D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-17E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)
L1619060-18A	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)
L1619060-18B	Vial H2SO4 preserved	A	N/A	2.5	Y	Absent	DOC-5310(28)

\*Values in parentheses indicate holding time in days

**Project Name:** EPA-SHOREWOOD PRB**Project Number:** WV-1009**Lab Number:** L1619060**Report Date:** 06/28/16**Container Information**

<b>Container ID</b>	<b>Container Type</b>	<b>Cooler</b>	<b>pH</b>	<b>Temp deg C</b>	<b>Pres</b>	<b>Seal</b>	<b>Analysis(*)</b>
L1619060-18C	Plastic 120ml H2SO4 preserved	A	<2	2.5	Y	Absent	TKN-4500(28),NO3/NO2-353(28),TNITROGEN(28)
L1619060-18D	Plastic 250ml HNO3 preserved	A	<2	2.5	Y	Absent	FE-SI(180),AS-SI(180),MN-SI(180)
L1619060-18E	Plastic 60ml unpreserved	A	8	2.5	Y	Absent	NO3-353(2)

\*Values in parentheses indicate holding time in days

**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

## GLOSSARY

### Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

### Footnotes

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### Terms

**Total:** With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

**Analytical Method:** Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### Data Qualifiers

- A** - Spectra identified as "Aldol Condensation Product".
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the

**Report Format:** DU Report with 'J' Qualifiers



**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

#### Data Qualifiers

- reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
  - D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
  - E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
  - G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
  - H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
  - I** - The lower value for the two columns has been reported due to obvious interference.
  - M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
  - NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
  - P** - The RPD between the results for the two columns exceeds the method-specified criteria.
  - Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
  - R** - Analytical results are from sample re-analysis.
  - RE** - Analytical results are from sample re-extraction.
  - S** - Analytical results are from modified screening analysis.
  - J** - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
  - ND** - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

**Project Name:** EPA-SHOREWOOD PRB  
**Project Number:** WV-1009

**Lab Number:** L1619060  
**Report Date:** 06/28/16

## REFERENCES

- 1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.
- 44 Methods for the Determination of Inorganic Substances in Environmental Samples, EPA/600/R-93/100, August 1993.
- 107 Alpha Analytical - In-house calculation method.
- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



## Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

### Westborough Facility

**EPA 524.2:** 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, m/p-xylene, o-xylene  
**EPA 624:** 2-Butanone (MEK), 1,4-Dioxane, tert-Amylmethyl Ether, tert-Butyl Alcohol, m/p-xylene, o-xylene  
**EPA 625:** Aniline, Benzoic Acid, Benzyl Alcohol, 4-Chloroaniline, 3-Methylphenol, 4-Methylphenol.  
**EPA 1010A:** NPW: Ignitability  
**EPA 6010C:** NPW: Strontium; SCM: Strontium  
**EPA 8151A:** NPW: 2,4-DB, Dicamba, Dichloroprop, MCPA, MCPP; SCM: 2,4-DB, Dichloroprop, MCPA, MCPP  
**EPA 8260C:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene, Isopropanol; SCM: Iodomethane (methyl iodide), Methyl methacrylate (soil); 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.  
**EPA 8270D:** NPW: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine; SCM: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine.  
**EPA 9010:** NPW: Amenable Cyanide Distillation, Total Cyanide Distillation  
**EPA 9038:** NPW: Sulfate  
**EPA 9050A:** NPW: Specific Conductance  
**EPA 9056:** NPW: Chloride, Nitrate, Sulfate  
**EPA 9065:** NPW: Phenols  
**EPA 9251:** NPW: Chloride  
**SM3500:** NPW: Ferrous Iron  
**SM4500:** NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO<sub>2</sub>, NO<sub>3</sub>.  
**SM5310C:** DW: Dissolved Organic Carbon

### Mansfield Facility

**EPA 8270D:** NPW: Biphenyl; SCM: Biphenyl, Caprolactam  
**EPA 8270D-SIM Isotope Dilution:** SCM: 1,4-Dioxane  
**SM 2540D:** TSS  
**SM2540G:** SCM: Percent Solids  
**EPA 1631E:** SCM: Mercury  
**EPA 7474:** SCM: Mercury  
**EPA 8081B:** NPW and SCM: Mirex, Hexachlorobenzene.  
**EPA 8082A:** NPW: PCB: 1, 5, 31, 87, 101, 110, 141, 151, 153, 180, 183, 187.  
**EPA 8270-SIM:** NPW and SCM: Alkylated PAHs.  
**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene, n-Butylbenzene, n-Propylbenzene, sec-Butylbenzene, tert-Butylbenzene.  
**Biological Tissue Matrix:** **8270D-SIM; 3050B; 3051A; 7471B; 8081B; 8082A; 6020A:** Lead; **8270D:** bis(2-ethylhexyl)phthalate, Butylbenzylphthalate, Diethyl phthalate, Dimethyl phthalate, Di-n-butyl phthalate, Di-n-octyl phthalate, Fluoranthene, Pentachlorophenol.

The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:

### Drinking Water

**EPA 200.8:** Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Ni, Se, Ti; **EPA 200.7:** Ba, Be, Ca, Cd, Cr, Cu, Na; **EPA 245.1:** Mercury;  
**EPA 300.0:** Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**  
**EPA 332:** Perchlorate.  
**Microbiology:** **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

### Non-Potable Water

**EPA 200.8:** Al, Sb, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, Ti, Zn;  
**EPA 200.7:** Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, Ti, Tl, V, Zn;  
**EPA 245.1, SM4500H, B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH, EPA 350.1:** Ammonia-N, **LACHAT 10-107-06-1-B:** Ammonia-N, **SM4500NO3-F,**  
**EPA 353.2:** Nitrate-N, **SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**  
**EPA 624:** Volatile Halocarbons & Aromatics,  
**EPA 608:** Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs  
**EPA 625:** SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.  
**Microbiology:** **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF.**

For a complete listing of analytes and methods, please contact your Alpha Project Manager.



# CHAIN OF CUSTODY *inc 1-2*

Date Rec'd in Lab: *6/21/16*

ALPHA Job #: *L1619060*

5 Wakea Drive  
Northford, MA 01551  
Tel: 508-896-8222

100 Parkside Blvd  
Methuen, MA 02846  
Tel: 978-687-3333

### Project Information

Project Name: *CPH - Shoreline MPA*  
Project Location: *570 PARKSIDE, MA*  
Project #: *WN-1009*  
Project Manager: *Danna Trusler*  
ALPHA Quote #:

### Report Information - Data Deliverables

*DATA* *EMAIL*

### Billing Information

Same as Client Info  PO #

### Client Information

Client: *WATERVISION LLC*  
Address: *401 GREAT RD  
ACTON, MA  
MA-01726-2916*  
Phone: *978-498-2916*  
Email: *dtrusler@watervisionsllc.com*

### Turn-Around Time

STANDARD  RUSH and commercial options

Date Due:

### Regulatory Requirements & Project Information Requirements

Yes  No MA MDP Analytical Methods  Yes  No CT RCP Analytical Methods  
 Yes  No Matrix Spike Required on Six SDG? (Required for MCP Inorganics)  
 Yes  No GWT Standards (Info Required for Metals & CPH with Targets)  
 Yes  No NPDES ROP  
 Other State (Fed) Program

### Additional Project Information:

*\* MTR NOT ON BOTTLES LABEL FOR MAJOR 4 SAMPLE POINTS*

ANALYSIS		Dissolved for Metals Dissolved for As No 3 Total N	SAMPLE INFO <input checked="" type="checkbox"/> Lab to do Preservation <input type="checkbox"/> Lab to do Sample Comments
VOC: <input type="checkbox"/> SWP <input type="checkbox"/> SWX <input type="checkbox"/> IDE2	INOC: <input type="checkbox"/> AMN <input type="checkbox"/> PAH		
METALS: <input type="checkbox"/> SDG 13 <input type="checkbox"/> SDG 14 <input type="checkbox"/> SDG 15	EM: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only		
METALS: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	TR: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only		
TR: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	TR: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only		
TR: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	TR: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only		
TR: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	TR: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only		
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TR: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	TR: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only		
TR: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only	TR: <input type="checkbox"/> Ranges & Targets <input type="checkbox"/> Ranges Only		

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
<i>19060-01</i>	<i>✓ MTR-4-01-PTL</i>	<i>6/21/16</i>	<i>9:45</i>	<i>H2O</i>	<i>DT</i>
<i>02</i>	<i>✓ MTR-4-03-RT</i>	<i>"</i>	<i>9:55</i>		<i>DT</i>
<i>03</i>	<i>✓ MTR-4-02-GNT</i>	<i>"</i>	<i>10:00</i>		
<i>04</i>	<i>✓ MTR-4-04-BXT</i>	<i>"</i>	<i>10:20</i>		
<i>05</i>	<i>✓ MTR-4-05-BXT</i>	<i>"</i>	<i>10:45</i>		
<i>06</i>	<i>✓ MTR-4-06-WT</i>	<i>"</i>	<i>10:55</i>		
<i>07</i>	<i>✓ MTR-4-07-0</i>	<i>"</i>	<i>11:00</i>		
<i>08</i>	<i>✓ MTR-4-08-GY</i>	<i>"</i>	<i>11:10</i>		
<i>09</i>	<i>✓ MTR-4-09-Y</i>	<i>"</i>	<i>11:25</i>		
<i>10</i>	<i>✓ MTR-4-10-P</i>	<i>"</i>	<i>11:35</i>		

- Container Type  
 P= Plastic  
 A= Amber glass  
 V= Vial  
 G= Glass  
 B= Burette cap  
 C= Curb  
 O= Other  
 S= Source  
 W= WCD Sample
- Preservative  
 A= None  
 B= HCl  
 C= HNO3  
 D= H2SO4  
 E= NaOH  
 F= MeOH  
 G= NaOH  
 H= NaOH  
 I= Acetic Acid  
 J= H2O2  
 K= Di Acetic  
 L= Other

Container Type  
 Preservative

Released By: *[Signature]* Date/Time: *6/21/16 15:20*  
 Received By: *[Signature]* Date/Time: *6/21/16 16:05*

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.  
 FORM NO 21-01 Rev. 13-Mar-2012



# CHAIN OF CUSTODY *no 202*

Date Rec'd in Lab: *6/21/16*

ALPHA Job #: *L169060*

8 Park Ave  
Woburn, MA 01897  
Tel: 978-866-8222

200 Fuller Blvd  
Marshall, MA 01946  
Tel: 978-866-8222

### Project Information

Project Name: *EDM-Sumnerwood PWS*  
 Project Location: *Falmouth, MA*  
 Project #: *10V-1009*  
 Project Manager: *Banica Trish*  
 ALPHA Quote #:

### Report Information - Data Deliverables

Report: *FINAL*

### Billing Information

Same as Client info  PO #

### Client Information

Client: *WATERVISION LLC*  
 Address: *481 GREAT RD  
ACTON, MA*  
 Phone: *508-498-2916*  
 Email: *trish@watervisionllc.com*

### Turn-Around Time

Standard  RUSH (any additional fees assessed)

Date Due:

### Regulatory Requirements & Project Information Requirements

Yes  No MR MCP Analytical Methods  Yes  No CT RCP Analytical Methods  
 Yes  No Matrix Spike Required on this SOG? (Required for MCP Inorganics)  
 Yes  No GWT Standards (Info Required for Metals & EPA with Targets)  
 Yes  No NPDES RGP  
 Other State/Fed Program

### Additional Project Information:

ANALYSIS		SAMPLE INFO
POC: <input type="checkbox"/> DRUGS <input type="checkbox"/> SW <input type="checkbox"/> BSLP	<p><i>Dissolved Fe Metals</i> <i>Dissolved Fe Catalyst</i> <i>No3</i> <i>TotFe N</i></p>	<input checked="" type="checkbox"/> Field <input type="checkbox"/> Lab to do Preservation <input type="checkbox"/> Lab to do
PROC: <input type="checkbox"/> AME <input type="checkbox"/> PAN		<p>Sample Comments</p>
METALS: <input type="checkbox"/> MCP 13 <input type="checkbox"/> MCP 14 <input type="checkbox"/> C/ROP 12		
METALS: <input type="checkbox"/> DRUGS <input type="checkbox"/> C/DRUGS <input type="checkbox"/> C/PHG		
SW: <input type="checkbox"/> DRUGS & Targets <input type="checkbox"/> Targets Only		
SW: <input type="checkbox"/> PCB <input type="checkbox"/> PCBST		
SW: <input type="checkbox"/> DRUGS Only <input type="checkbox"/> Targets Only		

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler Initials
		Date	Time		
<i>19060-11</i>	<i>MTR-04-11-QN</i>	<i>6-21-16</i>	<i>11:43</i>	<i>H2O</i>	<i>DT</i>
<i>12</i>	<i>MTR-04-12-R</i>	<i>4</i>	<i>11:53</i>		
<i>13</i>	<i>MTR-04-13-BN</i>	<i>4</i>	<i>12:08</i>		
<i>14</i>	<i>MTR-04-14-BK</i>	<i>4</i>	<i>12:20</i>		
<i>15</i>	<i>MTR-04-15-W</i>	<i>11</i>	<i>12:30</i>		
<i>16</i>	<i>MTR-9a</i>	<i>11</i>	<i>14:46</i>		
<i>17</i>	<i>MTR-9a (dup)</i>	<i>11</i>	<i>19:45</i>		
<i>18</i>	<i>MTR-9b</i>	<i>11</i>	<i>15:39</i>		

Container Type:  Plastic  Amber glass  Vial  Glass  Washed cap  C-Clubs  Other  Swirler  800 Bottle

Preservative:  None  HCl  HNO3  H2SO4  H2O2  H2O2/HCl  H2O2/HNO3  H2O2/H2SO4  H2O2/HCl/HNO3  H2O2/HCl/HNO3/H2SO4  H2O2/HCl/HNO3/H2SO4/HF  H2O2/HCl/HNO3/H2SO4/HF/HFIP  Other

Container Type:  Plastic  Glass

Preservative:  None  HCl  HNO3  H2SO4  H2O2  H2O2/HCl  H2O2/HNO3  H2O2/H2SO4  H2O2/HCl/HNO3  H2O2/HCl/HNO3/H2SO4  H2O2/HCl/HNO3/H2SO4/HF  H2O2/HCl/HNO3/H2SO4/HF/HFIP  Other

Released By: *[Signature]* Date/Time: *6-21-16 16:30*

Received By: *[Signature]* Date/Time: *6/21/16 18:05*

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.  
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