Onondaga County, New York

CSO 018 Constructed Wetlands Treatment System

Groundwater Monitoring Work Plan

Prepared for

New York State Department of Environmental Conservation

Prepared jointly by

Onondaga County Department of WATER ENVIRONMENT PROTECTION and CH2MHILL

November 2014

Revision 1

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SECTION 1

Objectives

Sampling staff will oversee groundwater sampling and other monitoring-related activities. The following will be the primary objectives of the groundwater monitoring work plan:

1. Collect and analyze groundwater samples for the parameters required under the State Pollutant Discharge Elimination System (SPDES) Permit (Permit Number NY 002 7081), in accordance with 6 NYCRR Part 703 – NYS Groundwater Standards.
2. Document the SPDES Permit required reports and the procedures for developing them.

SECTION 2

Sampling Responsibilities and Project Organization

Sampling and reporting staff will be collecting samples and recording other monitoring data. . Sampling and reporting staff will vary between SUNY ESF, under the direction of Richard Smardon, Ph.D., CH2M HILL, and the Onondaga County Department of Water Environment Protection (OCDWEP). The OCDWEP laboratory will be analyzing the samples in accordance with standard testing procedures (NYCRR Part 703 – NYS Groundwater Standards). Table 2-1 summarizes the sampling and monitoring-related activities for the project site and lists the responsible party for each activity.

TABLE 2-1
Preliminary Sampling Activity List with Associated Responsibilities

Activity	Routine	Frequency	Responsibility
Sampling	Collect samples per SPDES Permit and Deliver to OCDWEP Lab for Analysis	Quarterly	Sampling Staff
Monitoring Well Water Levels/Contour Mapping	Measure water level	Monthly	Sampling Staff
Lab Analysis	Analyze samples per SPDES Permit	Quarterly	OCDWEP Lab

SECTION 3

Sampling

3.1 Monitoring Well Locations

In accordance with the SPDES Permit, quarterly groundwater samples and water level monitoring will occur at the monitoring wells (MWs) listed below. A map of the location of the monitoring wells is included in Appendix A.

- MW-A
- MW-B
- MW-C
- MW-D
- MW-5

Note that the SPDES permit lists MW-6 on the opposite side of Harbor Brook, as shown in Appendix A, as an additional sampling location; however, after a brush fire occurred in 2012, this monitoring well could no longer be located and therefore, will not be sampled. If the New York State Department of Environmental Conservation (NYSDEC) requires that a new monitoring well be installed, that well will be added to the above list.

If initial groundwater sampling indicates that MW-A does not meet NYSDEC groundwater standards, one additional groundwater MW will be installed farther upgradient. The proposed location of the additional MW is shown in Appendix A, if required.

3.2 Parameter Sampling and Water Level Monitoring

Samples will be collected quarterly from the above monitoring wells for the parameters specified in the SPDES Permit, as shown in Table 3-1. The intent of the groundwater sampling is to determine whether the constructed wetland treatment system has affected the ambient groundwater quality.

TABLE 3-1
SPDES Permit Groundwater Sampling Parameters

Parameter	NYSDEC Part 703 Class GA Standard	Standard Unit
Water Levels	-	ft
Total Dissolved Solids (TDS)	500	mg/L
Sulfate	250,000	µg/L
pH	6.5-8.5	pH units
Hardness (as $CaCO_3$)	-	mg/L $CaCO_3$
Specific Conductivity	-	µohms/cm
Turbidity	5	NTU
Ammonia and Ammonium as N	2,000	µg/L
Chloride	250,000	µg/L
Nitrite as N	1,000	µg/L
Nitrate as N	10,000	µg/L
Sum of Nitrate and Nitrite	10,000	µg/L
Fecal Coliform	-	CFU/100mL
Total Coliform	50	CFU/100mL
Water Levels	-	Monthly Measurement

Pre-construction and pre-operational monitoring results are included in Appendix B. Note that the pre-construction monitoring well data includes numbered wells that were removed during construction of the facility. The lettered wells included with the pre-operational monitoring well data are the new wells installed during construction of the facility. After the facility is put into operation, operational baseline groundwater sampling will be completed for the parameters listed in Table 3-2 and submitted to the NYSDEC. If the NYSDEC requires the parameters in Table 3-2 to be sampled quarterly after the baseline sampling results have been reviewed, these parameters will be added to Table 3-1 and sampled accordingly.

TABLE 3-2
Baseline Groundwater Sampling Parameters

Parameter[1]	NYSDEC Part 703 Class GA Standard	Standard Unit
Aluminum	2,000	µg/L
Chromium (hexavalent)	50	µg/L
Arsenic	25	µg/L
Cadmium	5	µg/L
Copper	200	µg/L
Iron	300	µg/L
Lead	25	µg/L
Manganese	300	µg/L
Sum of Iron and Manganese	500	µg/L
Mercury (EPA Method 1631[2])	0.7	µg/L
Nickel	100	µg/L
Selenium	10	µg/L
Zinc	5	µg/L

[1] Each parameter will be analyzed for their "Total Form", i.e., including dissolved form.
[2] EPA Method 1631 requires EPA Method 1669 sampling protocol, which will be followed during sampling procedures.

SECTION 4

Sampling Procedures

Groundwater sampling and MW water level monitoring will be completed in accordance with the NYSDEC Quality Assurance Project Plan to Evaluate the Groundwater Resources of NYS, Version 1.9 (2011) as follows.

Sampling Equipment

1. Pre-cleaned Teflon tubing
2. Peristaltic Pump
3. Coli Sampler
4. YSI 660/6600 or equivalent probe
5. Teflon bucket (for sonde use)
6. LaMotte Test Kits for Cl_2 and pH
7. Sulfuric Acid
8. Sodium Thiosulfate
9. Ice packs/Cooler

Bottles

1. 1-L white plastic pre-cleaned
2. 1-L white plastic pre-cleaned
3. 125-ml sterile plastic

Sampling Procedure

1. Tubing will be run into the MW in which water has equilibrated prior to sampling. The opposite end of the tubing will be run into the Teflon bucket.
2. A calibrated field probe will be inserted into the bucket and used to measure pH and specific conductivity.
3. The pump will be used to pump water into the bucket at a slow rate to allow the sensors to react (approximately 100 to 250 mL/minute).
4. Once pH and specific conductivity readings have stabilized, measurements will be recorded and sampling for the required parameters will begin.
5. Samples will be preserved of in accordance with OCDWEP's *Environmental Lab Field Preservation Guide* (Appendix C).
6. Samples will then be transported to OCDWEP's lab for analysis and appropriate chain of custody (COC) forms will be kept (Appendix D).

SECTION 5

Field Data Collection QA/QC

All field data collection quality assurance/quality control (QA/QC) protocols have been adapted for use in this monitoring program from the 2009 ambient monitoring program (AMP) annual report.

5.1 Field Duplicates

One field duplicate will be collected during every sampling event for each parameter being tested. Therefore, if three parameters are being tested at three locations at the study site, a total of 12 samples should be taken. This provides a check on sampling equipment and precision techniques. It is impossible to take true field duplicates for automated samples (EPA, 1992). Therefore, field duplicates will be used primarily to assess the accuracy of grab samples.

5.2 Equipment Rinseate Blanks

Equipment rinseate blanks will be obtained of the sample compositing churn before every field visit. The churn should be rinsed with deionized (DI) water and the water collected as a separate sample and analyzed for all parameters. This should be done prior to the collection of additional samples from the project site.

Automated in situ chemical oxidation (ISCO) samplers will be fed with 2 liters of DI water to be tested as a rinseate blank prior to programming for each storm event.

5.3 Sample Containers

Sample bottles will be acid washed and rinsed with DI water at OCDWEP laboratory facilities after field use.

5.4 Sample Labeling

All sample bottles will be labeled with the time, date, analytes to be tested, pH if known, and any field preservation techniques employed.

5.5 Chain of Custody

Chain of Custody (COC) forms should be filled out for every sample taken during a field visit (see example COC form in Appendix D). Forms should include sample type, container types, details on preservation techniques, and analysis to be performed, in addition to project personnel who had handled the bottles in the field. COC forms will be submitted to the OCDWEP laboratory when samples are delivered for testing. OCDWEP staff will be responsible for filing the original and scanning a digital copy. Care will be taken to either print COC forms on waterproof “Rite in the Rain” paper or provide other adequate protections so that field notes can be taken during storm events.

5.6 Field Equipment Calibration

Detailed protocol for calibration and maintenance for the YSI Sonde can be found in the 2009 AMP. A summary field calibration checklist is as follows:

1. Calibration is typically performed the morning before use (and no more than 24-hours before use).
2. If dissolved oxygen (DO) membrane is replaced, the unit must be allowed to stabilize overnight.
3. Temperature calibration is set by factory and does not require frequent calibration.
4. DO membranes should be checked and replaced as needed after each use.
5. The pH reference probe and temperature probes should be cleaned with 1:1 hydrochloric acid (HCl) and a cotton swab after each use.

6. The pH probe calibration solution should be replaced daily.
7. For long-term storage, sondes are stored in a clean, dry space in a case.
8. For short-term storage, sondes are stored in a calibration cup of tap water.
9. Watertight connectors are lubricated when necessary in order to ensure a waterproof connection.

5.7 Health, Safety, and Training

Considering the Harbor Brook Wetland Treatment System will be capturing combined sewage, health and safety for field staff is an important concern. All field personnel will be supplied with pertinent personal protective equipment (PPE), consistent with the requirements of OCDWEP sample collection field staff. A list of the required equipment with winter modifications is supplied in Appendix E. All samples will be taken, handled, and preserved with disposable nitrile gloves. Chemical splash goggles will be worn during sample preservation.

To maintain consistency with the OCDWEP, all field personnel associated with the Harbor Brook CSO 018 Wetland Treatment System will receive field training from OCDWEP staff apropos to “gray infrastructure” wastewater treatment facilities. Additionally, the NYS Environmental Laboratory Approval Program (ELAP) Certification Manual requires that all field staff that collect “analyze immediate” parameters in the field such as pH, temperature, or chlorine residual, undergo training as specified under Item 249. To this end, OCDWEP hosts annual ELAP certified “pH Training,” which all field staff will be required to attend. Lighting installations will be maintained onsite if night visits are necessary. A minimum of two staff members will accompany each other on field visits that occur at night or during inclement weather.

SECTION 6

Analytical Protocols

This section describes the lab protocols that will be used for water sample analysis. OCDWEP will conduct water sample analyses for analytes discussed in this monitoring and sampling program. The OCDWEP laboratory is a participating member of the New York State Health ELAP. All methodologies used by OCDWEP are therefore approved by NYS. The following section details the QA/QC protocols used by OCDWEP to maintain NYS approved laboratory standards. As the OCDWEP lab will be performing virtually all analyses associated with this monitoring plan, the following section is directly excerpted from the 2009 AMP. Omissions have only been made to remove discussion of analytes or equipment not relevant to this monitoring plan. Table 6-1 summarizes analytical methodologies for all analytes of interest.

TABLE 6-1
Analytical Procedures for Water Quality Analysis

Parameter	Code	Methods	Minimum reportable limit (mg/L unless otherwise noted)
Biological Oxygen Demand 5-day (BOD_5)	BOD_5	1: (5210 B)	3.0
Total Suspended Solids (TSS)	TSS	1: (2540 D)	2.5
Settleable Solids	SS	1: (2540 F)	0.10-1.0 (mL/L)
Oil and Grease	O&G	1: (5520)	3.0
Chlorine, Total Residual	CL	1: (4500)	0.04
Total Kjeldahl Nitrogen (TKN)	TKN	2: (10-107-06-2)	0.15
Ammonia (NH_3)	NH_3	2: (10-107-6-1B)	0.03
Total Phosphorus (Manual) (TP)	TP	1: (4500-P E-99)	0.003
Fecal Coliform	FCOLI-MF	1: (9222 D)	10 (cells/100 ml)

1: Indicates Standard Methods (20th edition)
2: Indicates Lachat Instruments QuickChem Methods: Approved for use by USEPA- NYSDOH- ELAP

6.1 Chemicals and Reagents

Reagent grade water at the OCDWEP environmental laboratory consists of DI water purified by means of mixed bed deionization. The processed water is required to attain a minimum resistivity of 10 mSiemen. A final pass through another mixed bed deionization filter at point of use maintains the highest quality possible (18 mS output). Actual Conductivity is determined daily. The date, conductivity at 25°C, and analyst's initials are recorded in a tabular format in a bound notebook.

To monitor the quality of reagent grade water for bacteriological use, the tests tabulated in Table 6-2 are performed.

TABLE 6-2
Reagent Grade Water Tests

Parameter	Frequency	Acceptable
Free Residual Chlorine	Monthly	None acceptable
Standard Plate Count	Monthly	<500 colonies/ml
Heavy Metals (Pb, Cd, Cu, Cr, Ni, Zn)	Yearly	<0.05 mg/l per metal <0.1 mg/l total
Suitability Test	Yearly	Ratio between 0.8-3.0

6.2 Reagents

Only American Chemical Society (ACS) grade or better chemicals are used. Chemicals are discarded within manufacturer's expiration date or 3 years, whichever comes first. Date of receipt is recorded on each container.

6.3 Standard Solutions/Titrants

Anhydrous reagent chemicals are oven dried at 100-105°C for at least 2 hours. Standard solutions or titrants not prepared from a primary standard are standardized against a primary standard at the frequency specified by the method or every 6 months if no frequency is specified. Standard solutions or titrants are not kept longer than 1 year. The date prepared and the expiration date appear on the container, along with title of standard or titrant, concentration, and preparer's initials. In a bound notebook, the preparation date, title of solution, concentration, manufacturer and lot number of reagent grade chemical(s) used, quantity prepared, expiration date, preparer's signature and, if appropriate, drying times and temperatures, tare and net weight, citation of preparation of primary standard, standardization titers and calculations are recorded.

6.4 Bench or Shelf Reagents

These are non-standardized solutions prepared by laboratory personnel. All of the pertinent information listed for standard solutions is recorded on both bottle label and in a bound notebook.

6.5 Calculations and Charts

A laboratory control chart will be constructed on the basis of at least 20 reference samples. Warning and control limits will be maintained based on standard OCDWEP laboratory calculations. Calculations for control and warning limits, percent recovery, surrogate standards, and duplicate analysis can be found in the quality assurance project plan (QAPP) of the 2009 AMP.

6.6 Laboratory Equipment

Analytical Balance

Analytical balances are serviced and calibrated internally by a qualified service organization once per year and a dated certification sticker is provided.

Analytical balances are checked daily in two ranges with Class S weights. The ranges selected reflect the routine use of the balance. For example, the analytical balance used principally for evaporating dishes and aluminum dishes would need Class S weights having target values of bracketing the expected weights of the dishes. The date, target reading, actual reading, and analyst's initials are recorded in a bound notebook.

pH Meter

pH meters are calibrated daily using standard buffers and a two-point calibration. This consists of creating a slope using standard pH buffers of pH 4.0 and 10.0. The slope is then checked using a standard buffer of pH

7.0, with an acceptable reading of +/- 0.05 pH units. The date, pH buffer target values, set points, actual readings, and analyst's initials are recorded in a tabular format in a bound notebook.

Conductivity Meter and Cell

The conductivity cell constant is determined annually using a 0.01-M potassium chloride solution. The date, resistance readings, average resistance, temperature, calculations, and analyst's initials are recorded in a bound notebook.

The conductivity meter and cell is calibrated daily with a 0.001 M potassium chloride solution. An acceptable reading is +/- 20 percent of target value. The date, target value, actual reading, temperature, and analyst's initials are recorded in a tabular format in a bound notebook.

Thermometers

The OCDWEP environmental laboratory possesses a National Institute of Standardized Temperature (NIST) traceable, factory-certified thermometer, which is checked at the various temperatures mandated by a variety of analytical requirements. Correction factors and adjustments to correction factors, new correction factors, and analyst's initials are recorded in a tabular format in a bound notebook.

Each working thermometer has a dedicated use, and is calibrated annually at the temperature of interest using the NBS thermometer. The date, thermometer designation, calibration temperature, correction factor, and the analyst's initials are recorded in a bound notebook.

Refrigerators

Laboratory refrigerators maintain a temperature of 1° to 5°C. These temperatures are checked once daily. A NIST-certified thermometer with 1°C graduations is used. The date, times, temperature readings, and analyst's initials are recorded in tabular format in a bound notebook.

BOD Incubators

The BOD Incubator maintains a temperature of 20°, +/- 1°C. Temperature readings are taken twice per day. This thermometer has graduations of 0.2°C. The same data is recorded as for refrigerators.

Ovens

Ovens are maintained at the target temperature of interest during use. Temperatures are checked at the beginning and end of each use. A dedicated thermometer with graduations of 1°C is used. The date, target temperature, time and temperature at the start and end of each cycle, oven use, and analysts' initials are recorded in a tabular format in a bound format.

Automated Ion Analyzer, Atomic Absorption Spectrophotometer, Inductively Coupled Plasma (ICP) Spectrophotometer

For instruments at this level of sophistication, the procedures for ensuring correct analytical results are too lengthy for this manual, and the USEPA/ELAP instructions should be followed for specific information. Good general laboratory procedures (GLP) are followed in the daily operation of this instrument; including, but not limited to:

1. Daily calibration for each analyte of interest.
2. Instrument blank for each analyte.
3. Method blank, duplicates, spikes, reference, and check standards are used daily for each analyte.

6.7 Laboratory Quality Control Documentation Requirements

A summary of analyte-specific protocols can be found in Table 6-3.

TABLE 6-3
OCDWEP Laboratory Quality Control by Parameter

Parameter	QC Measure required	Frequency
Biological Oxygen Demand 5-day (BOD_5)	Reference sample chart	Every 10th sample or monthly if less than 10 samples per month are analyzed
TKN, NH_3, NO_3, TP	Reference sample chart	Every 10th sample or monthly if less than 10 samples per month are analyzed
	Spiked sample chart	Every 20th sample or monthly if less than 20 samples per month are analyzed
	Duplicates tabulation	On positive samples only, a minimum of 10% of all samples

6.7.1 Standard Curves

Standard curves are prepared as specified in QA/QC manuals. All standard curves are dated and labeled with method, analyte, standard concentrations, and instrument responses.

A best-fit, straight line is drawn on graphed curves: the axis is labeled. The correlation coefficient is calculated. An acceptable correlation coefficient is 0.995 or greater.

Instrument response for samples is less than the highest standard. The lowest standard is near the detection limit.

If a specific method does not provide guidance in the preparation of a standard curve, the following guidelines are followed. For manual colorimetric methods, a blank and five standards that lie on the linear portion of the curve are used. A new curve is prepared each time an analysis is run. At each use, the curve is checked with a blank and a high standard. The high standard selected is greater than the expected sample concentrations. For automated colorimetric methods, a blank and a minimum of five standards are used. A new curve is prepared for each run. Instrument response is checked with a QC reference sample after each 10 samples. Low level standards are freshly prepared for each run.

6.7.2 Method Blank

A method blank consists of laboratory-pure water, which is processed and analyzed as if it were a sample. A method blank is run daily or with each batch of samples. Samples are related to the method blank by means of a date or batch identifier. Where applicable, the blank is calculated as a sample and a tabulation of blank results for each analyte with the date run and its appropriate acceptance criteria is maintained. Acceptance criteria for a method blank is a result less than the Minimum Reportable Limit (MRL) only.

6.7.3 Instrument Blank

An instrument blank consists of laboratory water, which is analyzed without adding reagents, filtering, etc. It is used for instrument set-up and no readings are recorded.

6.7.4 Trip Blank (special)

Trip blanks are required when analyzing volatile compounds in water. A trip blank is a sample of laboratory-pure water contained in a sample bottle appropriate to the analyte to be determined. Trip blanks are present but unopened at the sampling site and shipped to the laboratory with the environmental samples taken. A trip blank is included with samples collected at each sampling site. The trip blank is analyzed only when samples from a specific sampling site are positive for the analyte of interest. If reportable levels of the analyses of interest are demonstrated to have contaminated the field blank, re-sampling is required.

6.7.5 Reference Sample

A reference sample is prepared by spiking a known amount of analyte into an appropriate solvent. The concentrate or quality control sample is preferably obtained from an external source. When necessary, a sample prepared in-house is prepared independently of the calibration standard. A reference sample is analyzed with every tenth sample or monthly samples if fewer than ten samples per month are analyzed. Environmental samples are tied to the reference standard by means of a date or batch identifier.

Data generated by the analysis of reference standard are used to construct a control chart and control limits established. Instructions for constructing a control chart and computing limits are to be found later in this section.

Should a result fall outside the control limits, the analysis is out of control and immediate action is taken to determine the cause of the outlying result. Data generated on the same day as the outlying result are regarded as unreliable and the analyses repeated after corrective action has been taken and the procedure is back in control.

A new control chart with freshly computed control limits is generated annually. The last 20 reference standard data points for the previous year are used to compute the new control limits.

6.7.6 Spiked Recovery

Spiked recovery for an environmental sample is determined by dividing the sample into two aliquots. The first aliquot is analyzed as usual. The second aliquot is spiked with a known concentration of the analyte of interest. The spike should be approximately 10 times the method's standard deviation (at the level of interest). A spiked environmental sample is analyzed when appropriate at a frequency of 1 spiked sample for every 20 samples or 1 spiked sample per month if fewer than 20 samples per month are analyzed. Samples are related to the spiked recovery date by means of a date or batch identifier.

Data generated by the analysis of spiked samples are used to calculate the percent recovery. The percent recovery data is used to construct a control chart and tabulation and limits established.

A new control chart of tabulation, the analysis is regarded as out of control and immediate action is taken to determine the cause of the outlying result. Data generated on the same day as the outlying result are regarded as unreliable and the analysis repeated after corrective action has been taken and the procedure is back in control. A new control chart or tabulation with freshly computed limits is generated annually. The last 20 data points for the previous year are used to compute the new limits.

6.7.7 Duplicate Analysis

A duplicate analysis is required only when a sample yields a positive result. A minimum of 10 percent of all positive samples for a given analyte is analyzed in duplicate. The range between the duplicates is tabulated and acceptance limits established. Instructions for the tabulation and the computation of limits are to be found later in this section.

A new tabulation with a freshly computed acceptance limit is generated annually. The last 20 data points for the previous year are used to compute the acceptable control limits.

6.7.8 External QA/QC

In as much as the OCDWEP laboratory is a NYSDOH-ELAP-certified laboratory, it is also National Environmental Laboratory Accreditation Conference (NELAC)-certified, and is obligated to follow all of the criteria for maintaining this certification under the auspices of the ELAP program. Part of this program consists of a biannual inspection by a NYS Laboratory Inspector, who spends one or more days at each facility checking all aspects of the operation. In addition, performance evaluations are conducted twice per year. This consists of unknown samples sent to the laboratory to be analyzed and the results reported back to ELAP. The laboratory is required to submit results for each parameter that we are certified for, including bacteriology, metals, nutrients, etc.

The USEPA also uses the results from this program to satisfy the requirements of the SPDES permit program that regulates the various wastewater treatment plants in the OCDWEP system.

6.7.9 Internal QA/QC

In addition to the above, the OCDWEP laboratory conducts an internal QA/QC program consisting of unknowns that are generated periodically by the WEP staff and given to technicians as “typical” samples, occurring without the analysts' knowledge. The object of this is to ensure that “typical” samples are analyzed using the same care as the “official” samples.

SECTION 7

Data Validation and Reporting

7.1 Data Review and Validation

Data will be reviewed for technical defensibility and usability. The former assesses the accuracy and precision of lab measurement. The latter assesses weather the dataset is robust enough to meet monitoring program objectives.

Technical defensibility review includes:

1. Internal laboratory quality control: blanks, spikes, replicates, and standard curves
2. Review of COC forms
3. Determination as to whether samples were processes within their maximum allowable holding timeframe

Usability review includes:

1. Charge balance of major cations and anions (if available from conventional samples)
2. Results of field duplicates
3. Statistical evaluation of dataset (outliers, etc.)

7.1.1 Precision

Comparison of duplicate samples will provide a metric of reproducibility, following from the relative percent difference method between the two samples (NYSDEC, 2011):

$$RPD = \frac{(c_1 - c_2)\,x\,100\%}{(c_1 + c_2)/2}$$

Where: *RPD* = relative percent difference
c1 = larger of the two observed values
c2 = smaller of the two observed values

7.1.2 Accuracy

Quantification of matrix spikes, laboratory blanks, and reference standards will provide metrics of accuracy. For matrix spikes, percent recovery will be calculated as follows (NYSDEC, 2011):

$$\%R = 100\%\,x\left(\frac{S - U}{C_{sa}}\right)$$

Where: *%R* = percent recovery
S = measured concentration in spiked aliquot
U = measured concentration in unspiked aliquot
Csa = actual concentration of spike added

When a standard reference material is used:

$$\%R = 100\% \, x \left(\frac{C_m}{C_{srm}} \right)$$

Where: *%R* = percent recovery
Cm = measured concentration of SRM
Csrm = actual concentration of SRM

7.2 Reporting and Documentation

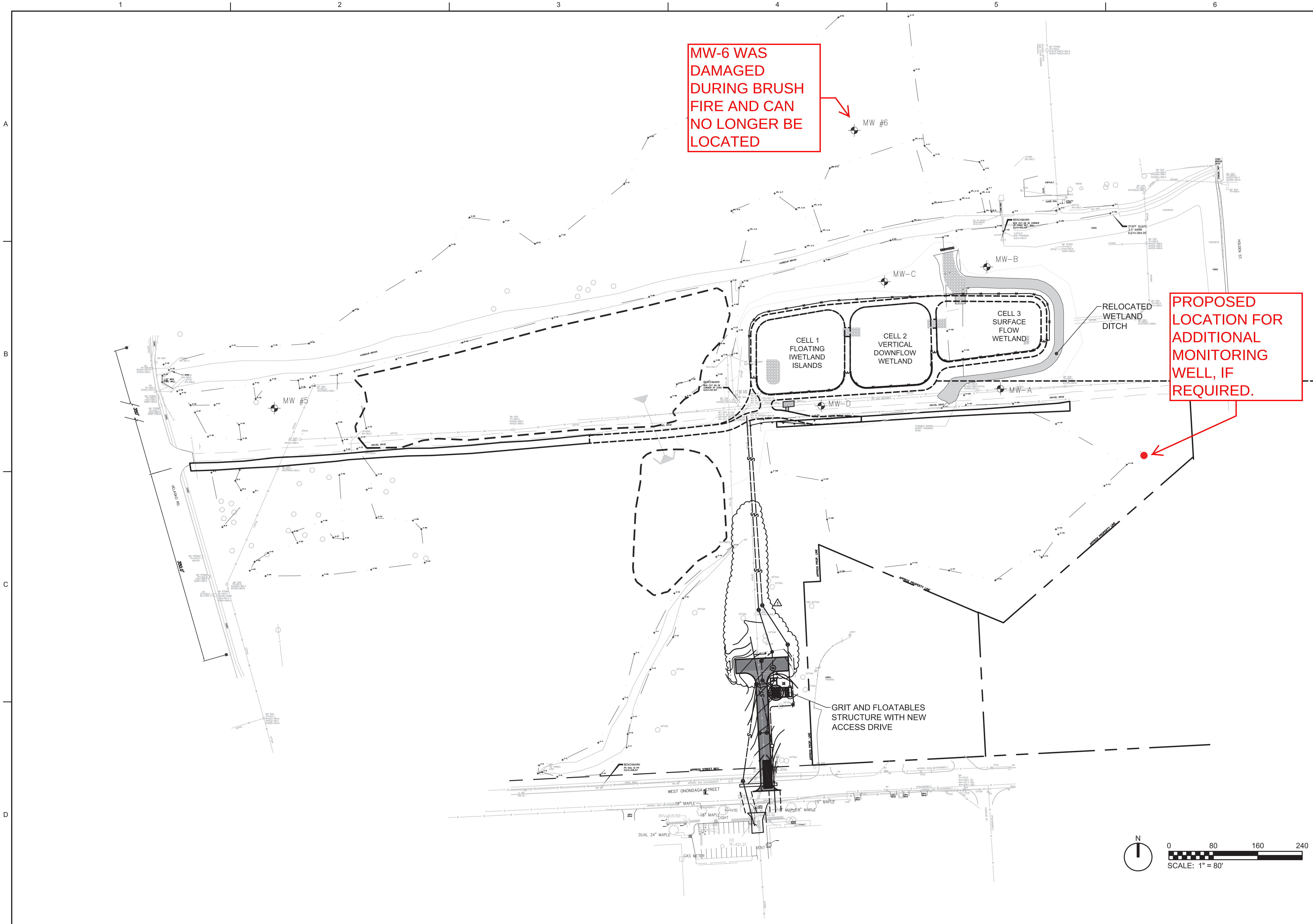
7.2.1 Field and Laboratory Data

Laboratory data is stored both on the Laboratory Information Management System (LIMS) and on paper copy to be filed at OCDWEP. The OCDWEP lab will transmit this data to the State University of New York College of Environmental Science and Forestry (SUNY ESF) after the analyses for each CSO event are completed.

Semi-annual reports will be submitted to the NYSDEC that include the following information:

- Site map of wetland cells and location of monitoring wells.
- Quarterly sampling results.
- Analysis and evaluation of sampling results with comparisons to 6 NYCRR Part 703 – NYS Groundwater Standards and the Division of Water Technical and Operational Guidance Series (1.1.1) for Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations.
- Assessment of the impacts of the constructed wetlands pilot treatment facility to groundwater quality and discussion of the comprehensive hydrogeologic study of the site.
- Analysis of trends in concentration of the tested groundwater parameters.
- Boring logs, well construction logs and field notes.
- Suggestions to alleviate the impacts on the groundwater quality, if required.

APPENDIX A
Monitoring Well and Wetland Cell Location Map


MW-6 WAS DAMAGED DURING BRUSH FIRE AND CAN NO LONGER BE LOCATED
MW #6
MW-B
MW-C
CELL 3 SURFACE FLOW WETLAND
CELL 2 VERTICAL DOWNFLOW WETLAND
CELL 1 FLOATING WETLAND ISLANDS
RELOCATED WETLAND DITCH
PROPOSED LOCATION FOR ADDITIONAL MONITORING WELL, IF REQUIRED.
MW-A
MW-D
MW #5
GRIT AND FLOATABLES STRUCTURE WITH NEW ACCESS DRIVE
WEST ONONDAGA STREET
N
0
80
160
240
SCALE: 1" = 80'

NO.	DSGN	DR	CHK	APVD
0	SKB	JRH	RND	MEH

CH2MHILL
CHA
430 E. GENESEE STREET, SUITE 400
SYRACUSE, NY 13202
PH (315) 345-1400 - FAX (315) 451-7270
EB 0000072 AA 001992

HARBOR BROOK CSO 018
CONSTRUCTED WETLANDS
CITY OF SYRACUSE
ONONDAGA COUNTY, NEW YORK

MONITORING WELL LOCATION PLAN

1" = 80'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE MARCH 12, 2012
PROJ 19217
DWG C-1002_MW-DRAWING
SHEET

APPENDIX B
Pre-Construction and Pre-Operational Groundwater Sampling Results

1. Introduction

This technical memorandum summarizes pre-construction monitoring activities at the site of the proposed Harbor Brook CSO 018 treatment wetland pilot system. From October to December 2011, SUNY-ESF, under the direction of Richard Smardon, Ph.D., monitored CSO 018 for target pollutants (TSS, BOD_5, TKN, TP, fecal coliform) and flow. Additionally, study site groundwater monitoring wells were sampled for water table levels, target pollutants, and other salient environmental parameters. Our key findings are summarized in this TM and include the raw data as an appendix. This memorandum will be expanded into a full report after we conclude our pre-construction monitoring program in the summer of 2012.

2. Approach

Following preliminary site visits with Onondaga County Department of Water Environment Protection (WEP) in September, WEP staff flushed sediment from CSO 018 in order to facilitate equipment installation. On October 4, 2011, with the aid WEP staff, we installed an American Sigma 950 A/V Bubbler and 42" band downpipe from the CSO 018 overflow weir. Due to unexpected on-site vandalism, an automated sampler was not installed as had been intended. Separate grab samples were taken at the overflow weir during CSO events to assess target pollutant and fecal coliform concentrations, respectively. We concluded CSO monitoring on December 15, 2011.

CHA staff collected groundwater table elevation data between June 15th and October 28th using in-situ Level TROLL 700 devices. On November 17th we took a synoptic survey of groundwater quality from monitoring wells 1-3, 5, and 6. Dr. Myron Mitchell (SUNY-ESF) provided precipitation data from a tipping bucket gage located in Upper Onondaga Park, approximately 1 mile from the study area (Appendix).

All sample collection, preservation, and processing QA/QC information is included in the project Quality Assurance Project Plan (QAPP). All water sample quality parameters were analyzed by the WEP except for fecal coliform bacteria, which was analyzed by Certified Environmental Services (Syracuse, NY).

3. Results

3.1 CSO Event Analysis

We monitored two overflow events at CSO 018 in the fall of 2011 (Table 1, Figures 1 and 2). A backflow surcharge occurred into the CSO preceding the second monitored event, as evidenced by negative flow velocities recorded in-pipe (Figure 2). Some discrepancy between rainfall and flow data may be due to the location of the weather station with respect to the sewershed of CSO 018.

Table 1. Hydraulic parameters for CSO 18 discharge events, Fall 2011

Event	Storm Event Precipitation				Combined Sewer Overflow			Outfall Surcharge		
	Duration (hr:min)	Total Precipitation (inches)	Peak Intensity (in/hr)	Average Intensity (in/hr)	Duration (hr:min)	Peak Flow (cfs)	Overflow Volume (MG)	Duration (hr:min)	Peak Flow (cfs)	Surcharge Volume (MG)
PC #1	1:15	0.28	0.68	0.28	0:10	12.6	0.028	N/A	N/A	N/A
PC #2	4:30	1.1	1.12	0.21	0:40	11.9	0.07	0:10	-9.3	0.021

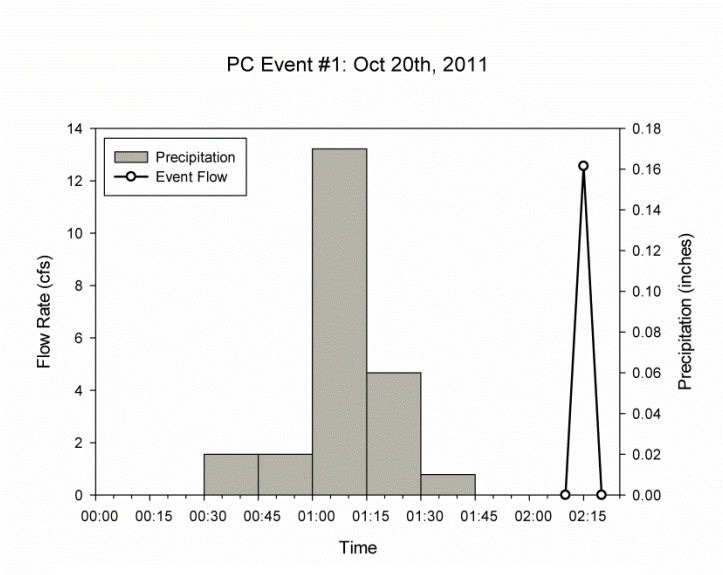


Figure 1. Precipitation and CSO hydrograph for pre-construction event #1

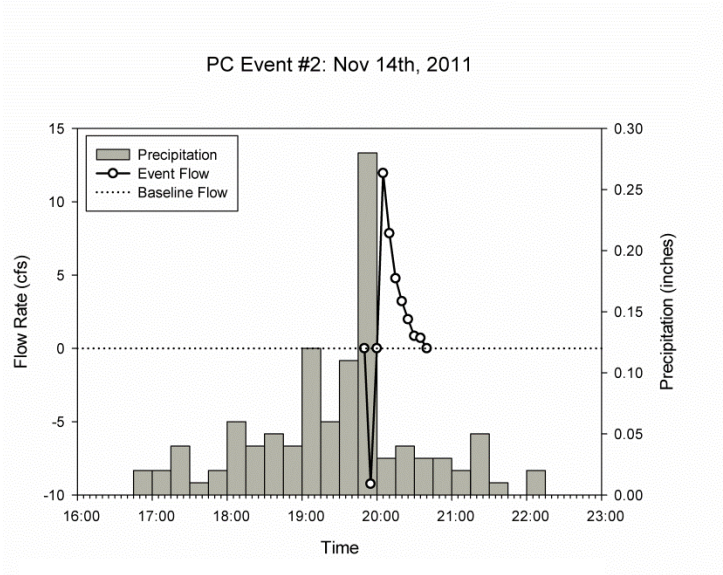


Figure 2. Precipitation and CSO hydrograph for pre-construction event #2

3.2 Water Quality Assessment

We took grab samples for target pollutants at the peak of PC Event #1 and the tailing end of the hydrograph of PC Event #2. Total suspended solids (TSS), total Kjeldahl nitrogen (TKN) and fecal coliform concentrations were within the range previously reported for CSO 018 (Footnote 1 in Table 2). Biochemical oxygen demand (BOD_5) and total phosphorous (TP) concentrations were higher than previously reported, but within at least an order of magnitude in similarity (Table 2). TSS, total nitrogen (TN), and TP had a positive correlation with flow, but more data is necessary to better determine the exact relationship (Figure 3).

CSO sample nitrogen content was on average 90% TKN and 10% NO_2/NO_3-N. Ammonia (NH_3-N) and organic nitrogen made up approximately 25% and 75% of the TKN pool, respectively. This signifies that the bulk of nitrogen discharged in the CSO stream is in the form of dissolved or particulate organic matter.

Table 2. Target pollutant concentration value ranges measured at the study site

Water Quality Parameter	CSO 018 (previously reported)[1]	CSO 018 (Fall 2011)	Harbor Brook Groundwater Wells (Fall 2011)
TSS (mg/L)	100	73 - 167	<4 - 122
BOD_5 (mg/L)	30	37 - 41	<15
TKN (mg/L)	4.14	3.99 - 7.80	0.27 - 1.93
TP (mg/L)	0.78	0.92 - 2.17	0.024 - 0.132
Fecal Coliform (cfu/100 ml)	$(430) \times 10^3$	$(268 - 590) \times 10^3$	<200 - 200

[1] Based on SUNY-ESF report "Creating Stormwater Treatment Wetlands for Harbor Brook, Syracuse, New York: An Urban Ecosystem Educational Partnership – Part II of the CNY Watershed Project."

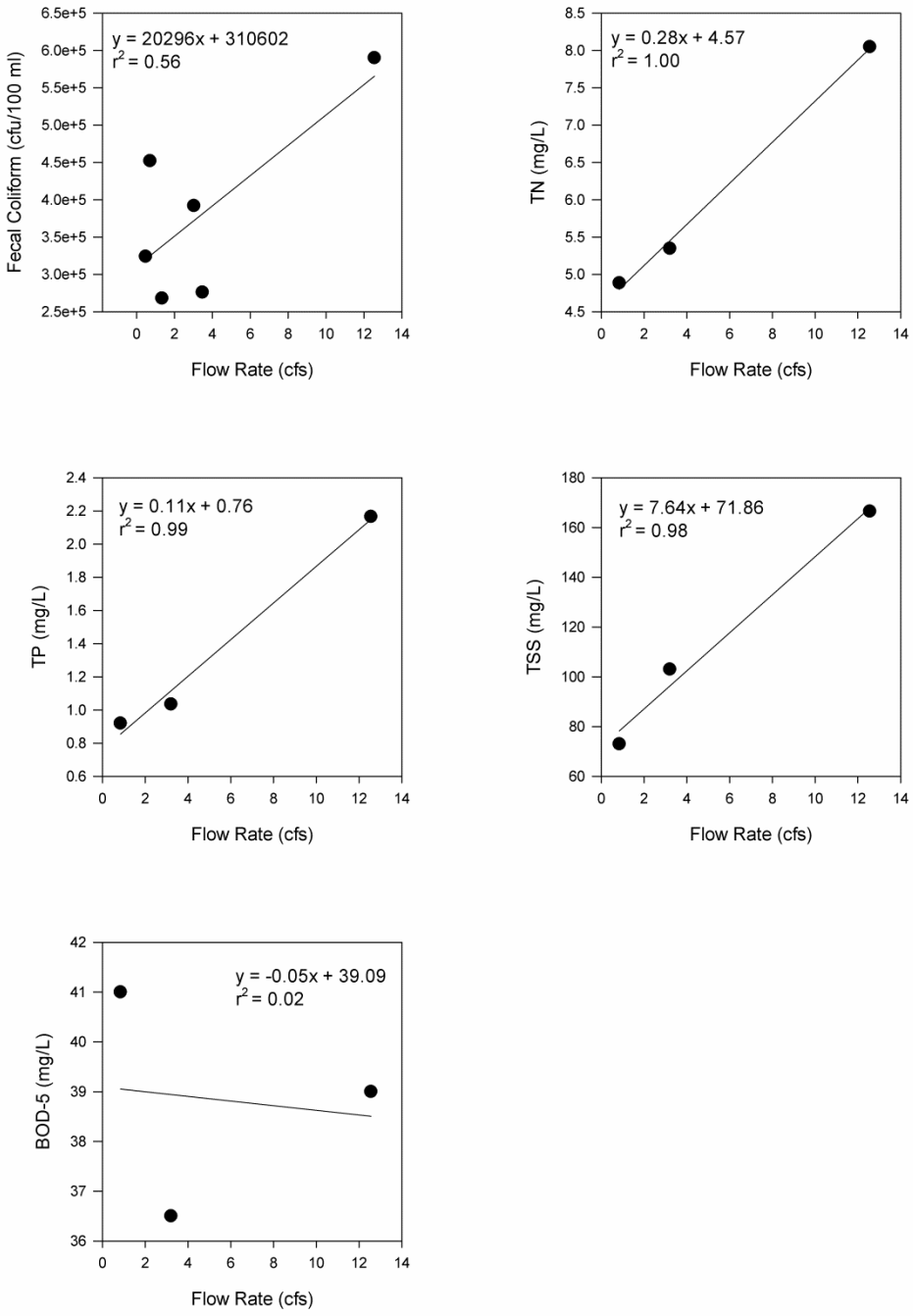


Figure 3. Pre-construction CSO event target pollutant concentrations graphed against flow

3.3 Groundwater Evaluation

Groundwater samples all had concentrations of target pollutants well under the range we measured in CSO 018 discharge (Table 2), with the exception of Well 5, site of the closed landfill, which had a higher concentration of TSS (122 mg/L). We observed a reddish-orange particulate while pumping water from Well 5, which were likely oxidized iron compounds from landfill leachate, though further metals analysis would be required to confirm this. The area surrounding Well 5 is some distance west of the proposed wetland project site and with groundwater flow traveling north, this source of TSS is not expected to impact the wetland system.

Due to the high specific conductance of the samples from Well 6, we analyzed for major ions as a quality control measure. Well 6 had elevated concentrations of sodium and chloride, which were balanced at close to 1:1 molar ratio, suggesting that halite (NaCl) is the potential source of the higher conductivities. Since Well 6 is located downslope from Grand Avenue (directly to the north of the study area), it is reasonable to assume that the groundwater in this part of the study area has been impacted by road salt from urban non-point runoff. However, this source of chloride is not expected to impact the wetland operation or water quality since it is located on the opposite side of the brook from the wetland system and is likely to daylight at Harbor Brook.

Fecal coliform (method detection limit of 200 cfu/100 ml) was detected in samples taken from Wells 1 and 2 (Figure 4). 200 cfu/100 ml is the regulatory limit for fecal coliform bacteria in ground and surface waters in New York State. Well 2 also had a concentration of NO_2/NO_3–N on par with that measured in CSO 018 discharge (0.77 mg/L). The Rowland Trunk Sewer runs parallel to Wells 1 and 2, and may be the source of the elevated coliform and
NO_2/NO_3-N in these wells.

Water table levels at Wells 1-3 were generally higher than Harbor Brook stage between June and October 2011, indicating that during much of the year, Harbor Brook is a gaining stream and groundwater moves in a northerly direction through the study area and into the brook. The water table at Well 3 dropped below Harbor Brook stage height during the driest part of the year, between mid-July and early August. Under these conditions, a localized flow reversal may occur where groundwater exchange occurs between Harbor Brook and the hyporheic zone (Figure 5).

Figure 4. Study site map showing location of groundwater monitoring wells and USGS gaging station 0424011 (adapted from well location map provided by CHA)

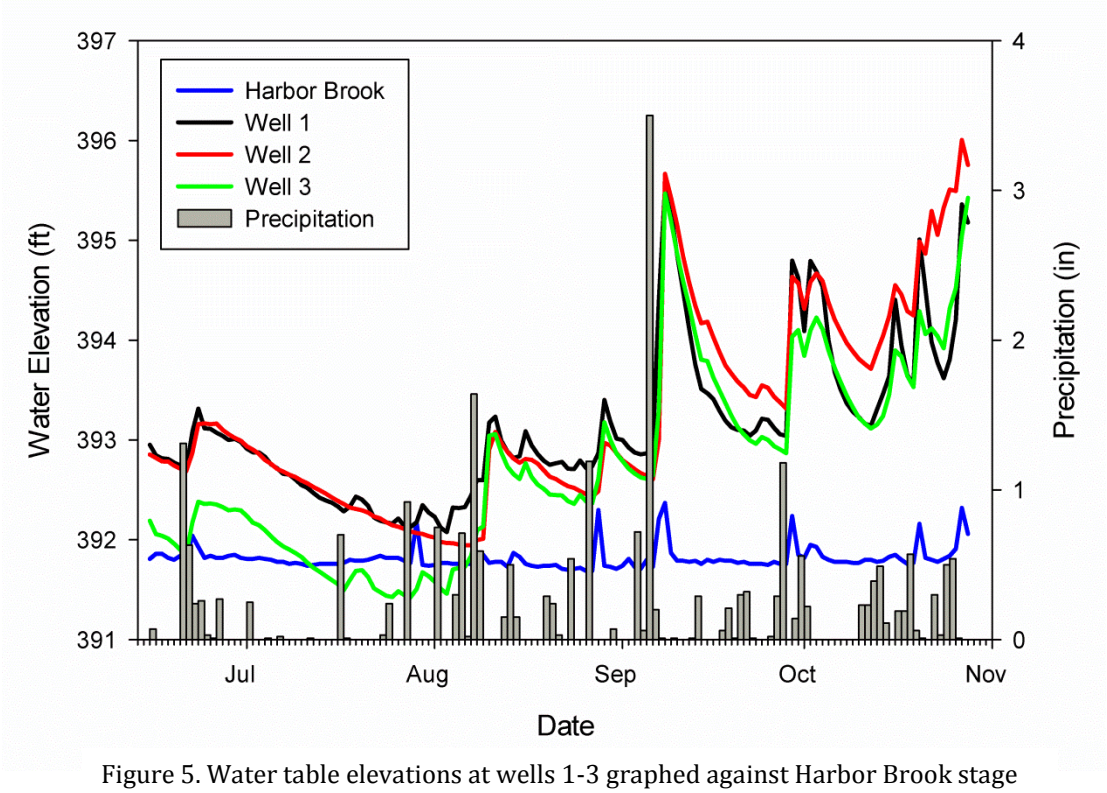


Figure 5. Water table elevations at wells 1-3 graphed against Harbor Brook stage and daily precipitation amount totals between June 15th and Oct 28th, 2011 (relative to NAVD 88); Harbor Brook stage data for USGS Gaging Station 04240100 courtesy of USGS

4. Summary

We were able to successfully flow-meter and sample two CSO events in the fall of 2011. We tabulated storm event, CSO overflow and surcharge hydraulic parameters. Our results show that CSO water quality is within or near the range of previously reported values. Groundwater quality on-site is well below the range of that found in CSO discharge, except at Wells 2 and 5 which had respective levels of TSS and NO_2/NO_3 on par with the range measured in CSO 018 effluent samples. Relatively high concentrations of sodium and chloride were detected in Well 6, a probable result of urban roadway runoff. Wells 1 and 2 in the south-eastern portion of the study area had detectable levels of fecal coliform bacteria. Groundwater moves in a northerly direction through the study site and into Harbor Brook during much of the year.

Appendix

Appendix 1. Water quality data for CSO event samples

Sample ID	Date	Time Start	Time Stop	Type	Q (cfs)	pH (lab)	Conductance (uS/cm)
PC 1	10/20/2011	2:15 AM	2:20 AM	Composite	12.56	7.36	141
PC 1-DUP	10/20/2011	2:15 AM	2:20 AM	Composite	12.56	7.33	141
PC 1-AVE	10/20/2011	2:15 AM	2:20 AM	Composite	12.56	7.35	141
PC 2a	11/14/2011	8:19 AM	8:21 PM	Composite	3.21	7.40	295
PC 2a-DUP	11/14/2011	8:19 AM	8:21 PM	Composite	3.21	7.30	267
PC 2a-AVE	11/14/2011	8:19 AM	8:21 PM	Composite	3.21	7.35	281
PC 2b	11/14/2011	8:28 AM	8:31 PM	Composite	0.84	7.50	343

Sample ID	TSS (mg/L)	BOD-5 (mg/L)	NH3-N (mg/L)	NO2+NO3-N (mg/L)	TKN (mg/L)	TN (mg/L)	TP (mg/L)
PC 1	200*	41**	0.465	0.250	4.59	4.84	1.35*
PC 1-DUP	133*	37	0.577	0.255	11	11.25	2.98*
PC 1-AVE	167*	39**	0.521	0.253	7.80	8.05	2.17*
PC 2a	100	35	0.802	0.744	4.46	5.20	0.99
PC 2a-DUP	106	38	0.801	0.750	4.74	5.49	1.08
PC 2a-AVE	103	37	0.802	0.747	4.6	5.35	1.04
PC 2b	73	41	0.938	0.895	3.99	4.89	0.92

*Exceeded WEP QA/QC Criteria for Field Duplicates (Value Considered an Estimate)
** Exceeded WEP Lab QA/QC Protocol (Value Considered an Estimate)

Sample ID	Date	Time	Sample Type	Fecal Coliform (cfu/100 ml)
PC1 FC1	10/20/2011	2:20 AM	Discrete Grab	590000
PC2 FC1	11/14/2011	8:19 PM	Discrete Grab	276000
PC2 FC2	11/14/2011	8:21 PM	Discrete Grab	392000
PC2 FC3	11/14/2011	8:28 PM	Discrete Grab	268000
PC2 FC4	11/14/2011	8:35 PM	Discrete Grab	452000
PC2 FC5	11/14/2011	9:30 PM	Discrete Grab	324000
			Geo Mean:	**368534**

Appendix 2. Water quality data for study site groundwater survey, 11/16/11

Sample ID	Temp (deg C)	pH (lab)	Conductance (uS/cm)	TSS (mg/L)	BOD_5 (mg/L)
Well 1	11.6	7.4	658	27	<15
Well 2	11.8	7.2	1179	31	<15
Well 3	11.5	7.0	1140	17	<15
Well 5	11.4	7.1	1751	135	<15
Well 5 - DUP	11.4	7.1	1811	108	<15
Well 5 - Ave	11.4	7.1	1781	122	<15
Well 6	11.3	6.8	2650	<4	<15

Sample ID	NH3-N (mg/L)	NO2+NO3-N (mg/L)	TKN (mg/L)	TN (mg/L)	TP (mg/L)
Well 1	0.555	0.114	1.31	1.424	0.132
Well 2	0.169	0.77	0.76	1.53	0.042
Well 3	0.895	0.027	1.93	1.957	0.076
Well 5	0.16	<.01	0.5	0.5	0.044
Well 5 - DUP	0.119	<.01	0.42	0.42	0.068
Well 5 - Ave	0.1395	<.01	0.46	0.46	0.056
Well 6	0.06	0.015	0.27	0.285	0.024

Sample ID	Ca (mg/L)	Mg (mg/L)	Na (mg/L)	K (mg/L)	Cl (mg/L)	ALK-T (mg/L)	SO4 (mg/L)	TIC (mg/L)	Charge Balance
Well 1	94.9	13	27.4	3.71	14.3	270	54.5	66.9	0.63%
Well 2	185	21.5	56	4.15	35.6	330	234	80.5	7.44%
Well 3	210	21.3	17.4	1.32	37	470	78.4	113	7.30%
Well 5	187	22.9	160	2.3	248	340	239	75.3	3.32%
Well 5 - DUP	184	23	177	2.21	234	340	228	76.4	3.30%
Well 5 - Ave	185.5	22.95	168.5	2.255	241	340	233.5	75.85	3.31%
Well 6	300	64.7	208	1.48	375	510	377	113	2.31%

Sample ID	F. Coli - LAB (fcu/100 ml)	F. Coli - Colilert (fcu/100 ml)	Total Coli - Colilert (tcu/100 ml)
Well 1	200	100	4670
Well 2	200	100	1680
Well 3	<200	<100	100
Well 5	<200	100	300
Well 6	<200	<100	410

Appendix 3. Map showing location of weather station in relation to study area

November 3, 2014

Mr. Sean Skehan, Construction Manager
CH2M Hill
430 E. Genesee Street
Syracuse, New York 13202

RE: Groundwater Monitoring Summary- Pre-operational Baseline Monitoring
Harbor Brook CSO 018 Constructed Wetland Treatment System
CHA Project No.: 19217
Revised Final Report

Dear Sean:

CHA completed the pre-operational baseline round of groundwater monitoring for the Harbor Brook CSO 018 constructed wetlands site, located in the City of Syracuse, Onondaga County, New York during the months of September and December 2013. This letter provides a summary of the groundwater sampling performed and the associated results.

Sampling Effort

CHA performed the first round of groundwater monitoring on September 19-20, 2013 with a second round of sampling to collect additional parameters on December 19, 2013. CHA collected groundwater samples from five (5) of the six (6) on-site monitoring wells. Monitoring well MW-6 was installed during the site investigation phase of the project back in January 2011. Since that time the area was subject to a brushfire which we believe may have impacted the well. Despite a good faith effort by CHA staff to locate monitoring well MW-6 using GPS units, it was unable to be located. This well is located approximately 200 feet north of Harbor Brook and it is anticipated that due to the location of this well, which is hydrologically separated from the constructed wetlands treatment system, the water quality at MW-6 would have no significant correlation to the constructed wetlands treatment system.

Prior to collecting a groundwater sample from each well, CHA measured the depth to water in the wells to calculate the necessary purge volumes. The wells were then purged using a Solinst 410 peristaltic pump with dedicated tubing for each well. CHA purged approximately three well volumes from each well in an effort to reduce sample turbidity and stabilize water quality parameters prior to sampling. The purged water was discharged onto the adjacent ground surfaces.

During purging, CHA monitored redox potential, conductivity, pH, turbidity, temperature, and dissolved oxygen of the groundwater using a Horiba U-10 water quality meter. The sampling effort was documented on well sampling logs, which are included in Attachment A. A fresh pair of disposable latex gloves was donned by CHA personnel prior to the collection of each water sample. After the samples were collected, CHA packed the samples on ice and transported them under appropriate chain of custody procedures to the

appropriate laboratories. In accordance with the draft SPDES permit and CHA's Groundwater Monitoring Plan for the site, the samples were analyzed for ammonia, ammonium, total dissolved solids, sulfate, pH, specific conductivity, turbidity, chloride, nitrite, nitrate, fecal and total coliforms, and total cyanide. Additionally, the total forms of each the following metals were analyzed: aluminum, chromium, arsenic, cadmium, copper, iron, lead, manganese, mercury (EPA Method 1631), nickel, selenium, and zinc. The parameters were analyzed according to 6 NYCRR Part 703 – NYS Groundwater Standards.

CHA purged the five (5) wells on September 19, 2013 and collected samples for analysis for all parameters except total coliform and fecal coliform analysis. CHA returned to the site on September 20th and collected a second set of groundwater samples to be analyzed for fecal coliform and total coliform. The coliform samples were collected separately due to short holding times. The samples collected on September 19, 2013 and December 19, 2013 were transmitted to TestAmerica Analytical Laboratories Inc., in Amherst, New York. The total coliform and fecal coliform samples collected on September 20, 2013 were transmitted to Microbac Laboratories in Cortland, New York for analysis.

Sample Results

Tables 1 and 2 summarize the sample results for this monitoring event of wells MW-A through MW-D and MW-5. As outlined in the permit (NY0027081) the groundwater results were compared to NYSDEC Part 703 Groundwater Standards. The complete laboratory data packages are included in Attachment B.

Table 1: Groundwater Monitoring Results

		Sample Name	MW-A	MW-B	MW-C	MW-D	MW-5
		Sample Date	9/19/2013	9/19/2013	9/19/2013	9/19/2013	9/19/2013
Parameter	CAS RN	NYSDEC Part 703 Class GA Water Quality Standards	Unit					
Chloride	16887-00-6	250	mg/l	177	72.9	90.4	81	302
Cyanide	57-12-5	0.2	mg/l	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
pH	pH	6.5-8.5	ph units	7.22 HF	7.54 HF	7.51 HF	7.48 HF	7.65 HF
Specific Conductance	SC	-	umhos/cm	2680	2210	1410	1760	1740
Sulfate	14808-79-8	250	mg/l	743	95.9	161	370	182
Total Dissolved Solids	TDS	500	mg/l	1950	1450	840	1150	1080
Turbidity	TURB	5	NTU	89.8	57.2	33.4	83.7	38.8
Aluminum (Fume Or Dust)*	7429-90-5	2	mg/l	0.29	0.2 U	0.2 U	0.33	0.39
Arsenic	7440-38-2	0.025	mg/l	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cadmium	7440-43-9	0.005	mg/l	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chromium	7440-47-3	0.05	mg/l	0.004 U	0.012	0.004 U	0.004 U	0.004 U
Copper	7440-50-8	0.2	mg/l	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Iron	7439-89-6	0.3	mg/l	9.6	2.7	5.5	6.3	2.1
Lead	7439-92-1	0.025	mg/l	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Manganese	7439-96-5	0.3	mg/l	0.93	0.28	0.38	0.84	0.04
Mercury	7439-97-6	700	ng/l	4.8	2	2.9	4.9	1.7
Nickel	7440-02-0	0.1	mg/l	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Nitrate as N	14797-55-8-N	10	mg/l	0.05 U	0.05 U	0.05 U	0.056	0.05 U
Nitrite as N	14797-65-0-N	1	mg/l	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Selenium	7782-49-2	0.01	mg/l	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U
Zinc*	7440-66-6	5	mg/l	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Fecal Coliform+	NA	-	CFU/100 ml	<4	<4	4	4	< 10
Total Coliform+	NA	50	CFU/100 ml	1600	> 1600	> 1600	132	>1600
				MW-A	MW-B	MW-C	MW-D	MW-5
				12/19/2013	12/19/2013	12/19/2013	12/19/2013	12/19/2013
Ammonia	7661-44-7	2	mg/l	10.8	5.30	0.92	1.80	0.02 U
Ammonium as N^	NA	2	mg/l	10.8	5.30	0.92	1.80	0.02 U

Notes: *Part 703 Standard units were converted to match laboratory data units.*

U- compound not detected, HF- field parameter, analyzed outside of the hold time

+- coliform results are estimated

**- based on GW effluent standards*

^ Ammonium calculated by subtracting the unionized ammonia from the ionized ammonia.

In this case based on field temperature and pH, the calculated unionized ammonia was negligible for all samples.

Table 2: Groundwater Monitoring Results- µg/l

			Sample Name	MW-A	MW-B	MW-C	MW-D	MW-5
			Sample Date	9/19/2013	9/19/2013	9/19/2013	9/19/2013	9/19/2013
Parameter	CAS RN	NYSDEC Part 703 Class GA Water Quality Standards	Unit					
Chloride	16887-00-6	250,000	µg/l	177,000	72,900	90,400	81,000	302,000
Cyanide	57-12-5	200	µg/l	10 U	10 U	10 U	10 U	10 U
pH	pH	6.5-8.5	ph units	7.22 HF	7.54 HF	7.51 HF	7.48 HF	7.65 HF
Specific Conductance	SC	-	umhos/cm	2,680	2,210	1,410	1,760	1,740
Sulfate	14808-79-8	250,000	µg/l	743,000	95,900	161,000	370,000	182,000
Total Dissolved Solids	TDS	500	mg/l	1950	1450	840	1,150	1,080
Turbidity	TURB	5	NTU	89.8	57.2	33.4	83.7	38.8
Aluminum (Fume Or Dust)*	7429-90-5	2,000	µg/l	290	200 U	200 U	330	390
Arsenic	7440-38-2	25	µg/l	10 U	10 U	10 U	10 U	10 U
Cadmium	7440-43-9	5	µg/l	1 U	1 U	1 U	1 U	1 U
Chromium	7440-47-3	50	µg/l	4 U	12	4 U	4 U	4 U
Copper	7440-50-8	200	µg/l	10 U	10 U	10 U	10 U	10 U
Iron	7439-89-6	300	µg/l	9,600	2,700	5,500	6,300	2,100
Lead	7439-92-1	25	µg/l	5 U	5 U	5 U	5 U	5 U
Manganese	7439-96-5	300	µg/l	930	280	380	840	40
Mercury	7439-97-6	0.7	µg/l	0.0048	0.002	0.0029	0.0049	0.0017
Nickel	7440-02-0	100	µg/l	10 U	10 U	10 U	10 U	10 U
Nitrate as N	14797-55-8-N	10,000	µg/l	50 U	50 U	50 U	56	50 U
Nitrite as N	14797-65-0-N	1,000	µg/l	50 U	50 U	50 U	50 U	50 U
Selenium	7782-49-2	10	µg/l	15 U	15 U	15 U	15 U	15 U
Zinc*	7440-66-6	5	µg/l	10 U	10 U	10 U	10 U	10 U
Fecal Coliform+	NA	-	CFU/100 ml	<4	<4	4	4	< 10
Total Coliform+	NA	50	CFU/100 ml	1600	> 1600	> 1600	132	>1600
				MW-A	MW-B	MW-C	MW-D	MW-5
				12/19/2013	12/19/2013	12/19/2013	12/19/2013	12/19/2013
Ammonia	7661-44-7	2,000	ug/l	10,800	5,300	920	1,800	20 U
Ammonium as N^	NA	2,000	ug/l	10,800	5,300	920	1,800	20 U

Notes: *Laboratory data was converted to match Part 703 Standard units*

U- compound not detected, HF- field parameter, analyzed outside of the hold time

+- coliform results are estimated

**- based on GW effluent standards*

^ Ammonium calculated by subtracting the unionized ammonia from the ionized ammonia.

In this case based on field temperature and pH, the calculated unionized ammonia was negligible for all samples.

Several compounds were noted at concentrations exceeding the applicable NYSDEC standards, including chloride (MW-5), sulfate (MW-A, MW-D), ammonia and ammonium (MW-A, MW-B), manganese (MW-A, MW-C, MW-D) and iron, total dissolved solids, turbidity and total coliform in all five (5) monitoring wells. It is noted that the monitoring wells were installed as piezometers and were not formally developed as a traditional groundwater monitoring well would be, and this likely contributed to the elevated turbidity levels.

This first round of monitoring is meant to serve as a pre-operational baseline sampling event for future monitoring events. Future monitoring events will be compared to the analytical results from the September/December 2013 monitoring event as a way to monitor impacts of the constructed wetlands treatment system on local groundwater quality.

Future Work

Based on the draft SDPES permit special condition #8; "if MW-A does not meet groundwater standards, one additional groundwater monitoring well shall be placed into service further up gradient". We have identified a proposed location for the additional monitoring well on the attached site plan for consideration.
Once the Pilot Treatment System is brought on line, quarterly groundwater sampling will be required.

If you have any questions, please do not hesitate to call us at (315) 471-3920.

Very truly yours,

Kathryn E Merrick

Kathryn E. Merrick,
Scientist III

Michael Hollowood P.E.
Vice President

KM/bc
Attachments
V:\Projects\ANY\K2\19217\Reports\Groundwater Monitoring\Dec 2013\19217 Nov 2014_Transmittal_Rev3.doc

Attachment A
Well Sampling Logs

CHA	**Well Sampling/ Development Log**	**Sample/Well Designation:** MW-A
Project Name: Harbor Brook CSO 018 Constructed Wetlands		Logged By: K. Flood/ S.Gilbert
Project Location: Syracuse, NY		Date: 9/19/13
Project Number: 19217		Screen Length:

Purge Information:

(1) Depth to Bottom of Well: 11.13 ft. (from TOR)
(2) Depth to Water: 5.59 ft. (from TOR)
(3) Column of Water: 5.54 ft. [(1) – (2)]
(4) Well Riser Diameter: 2 in.
(5) Volume Conversion: 0.163 gal./ft. (see below)
(6) 1 Well Volume: 0.90 gal. [(3) x (5)]

Method of Purging: ☐ WaTerra ☐ Bailer ☐ Submersible ☒ Other: peristaltic pump

Volume Conversion: (gal./ft.)
2" = 0.163 4" = 0.653 6" = 1.469 8" 2.611 10" = 4.08

Field Analysis:

Volume Purged (gal.)	1	2	3							
Time	1405	1410	1415							
ORP/EH (mV)	-57	-67	-101							
pH	6.67	6.54	6.67							
Cond. (MS/CM)	2.79	2.97	2.85							
Turbidity (NTU)	19.0	10.9	7.60							
D.O. (mg/L)	2.86	2.10	2.81							
Temperature (°C)	22.72	21.72	20.36							

Total Volume Purged: 3 gal. Total Purge Time: 12 mins

Sampling Information:

Sampling Method: grab

No. of Bottles: 8

Sampling Time: 1420

Sample Analyses: various metals, wet chemistry, total/fecal coliforms (sampled 9/20)

Comments:

CHA	**Well Sampling/ Development Log**	**Sample/Well Designation:** MW-B
Project Name: Harbor Brook CSO 018 Constructed Wetlands		Logged By: K. Flood/S. Gilbert
Project Location: Syracuse, NY		Date: 9/19/13
Project Number: 19217		Screen Length:

Purge Information:

(1) Depth to Bottom of Well: 10.89 ft. (from TOR)
(2) Depth to Water: 5.55 ft. (from TOR)
(3) Column of Water: 5.34 ft. [(1) – (2)]
(4) Well Riser Diameter: 2 in.
(5) Volume Conversion: 0.163 gal./ft. (see below)
(6) 1 Well Volume: 0.87 gal. [(3) x (5)]

Method of Purging: ☐ WaTerra ☐ Bailer ☐ Submersible ☒ Other: peristaltic pump

Volume Conversion: (gal./ft.)
2" = 0.163 4" = 0.653 6" = 1.469 8" 2.611 10" = 4.08

Field Analysis:

Volume Purged (gal.)	1	1.75	2.6							
Time	1325	1334	1342							
ORP/EH (mV)	-90	-99	-108							
pH	6.98	6.93	6.91							
Cond. (MS/CM)	2.27	2.31	2.27							
Turbidity (NTU)	10.8	3.1	4.4							
D.O. (mg/L)	2.05	1.60	0.87							
Temperature (°C)	22.37	21.00	21.48							

Total Volume Purged: 2.6 gal. Total Purge Time: 20 mins

Sampling Information:

Sampling Method: grab

No. of Bottles: 8

Sampling Time: _____

Sample Analyses: various metals, wet chemistry, total/fecal coliforms (sampled 9/20)

Comments:

CHA	**Well Sampling/ Development Log**	**Sample/Well Designation:** MW-C
Project Name: Harbor Brook CSO 018 Constructed Wetlands		Logged By: K. Flood/S. Gilbert
Project Location: Syracuse, NY		Date: 9/19/13
Project Number: 19217		Screen Length:

Purge Information:

(1) Depth to Bottom of Well: 10.72 ft. (from TOR)
(2) Depth to Water: 6.45 ft. (from TOR)
(3) Column of Water: 4.27 ft. [(1) – (2)]
(4) Well Riser Diameter: 2 in.
(5) Volume Conversion: 0.163 gal./ft. (see below)
(6) 1 Well Volume: 0.696 gal. [(3) x (5)]

Method of Purging: ☐ WaTerra ☐ Bailer ☐ Submersible ☒ Other: peristaltic pump

Volume Conversion: (gal./ft.)
2" = 0.163 4" = 0.653 6" = 1.469 8" 2.611 10" = 4.08

Field Analysis:

Volume Purged (gal.)	0.75	1.5	2.25							
Time	1250	1255	1258							
ORP/EH (mV)	-70	-73	-73							
pH	7.05	6.82	6.76							
Cond. (MS/CM)	1.37	1.40	1.40							
Turbidity (NTU)	21.2	4.5	4.9							
D.O. (mg/L)	1.66	0.79	4.33							
Temperature (°C)	20.99	19.26	18.71							

Total Volume Purged: 2.25 gal. Total Purge Time: 10 mins

Sampling Information:

Sampling Method: grab

No. of Bottles: 8

Sampling Time: 1305

Sample Analyses: various metals, wet chemistry, total/fecal coliforms (sampled 9/20)

Comments:

- purge water slightly brown

CHA	**Well Sampling/ Development Log**	**Sample/Well Designation:** MW-D
Project Name: Harbor Brook CSO 018 Constructed Wetlands		Logged By: K. Flood/S. Gilbert
Project Location: Syracuse, NY		Date: 9/19/13
Project Number: 19217		Screen Length:

Purge Information:

(1) Depth to Bottom of Well: 11.3 ft. (from TOR)
(2) Depth to Water: 7.67 ft. (from TOR)
(3) Column of Water: 3.63 ft. [(1) – (2)]
(4) Well Riser Diameter: 2 in.
(5) Volume Conversion: 0.163 gal./ft. (see below)
(6) 1 Well Volume: 0.59 gal. [(3) x (5)]

Method of Purging: ☐ WaTerra ☐ Bailer ☐ Submersible ☒ Other: peristaltic pump

Volume Conversion: (gal./ft.)
2" = 0.163 4" = 0.653 6" = 1.469 8" 2.611 10" = 4.08

Field Analysis:

Volume Purged (gal.)	1	2	3							
Time	1205	1210	1214							
ORP/EH (mV)	-90	-99	-111							
pH	6.91	6.85	6.85							
Cond. (MS/CM)	1.49	1.82	1.89							
Turbidity (NTU)	9.4	3.0	65.2							
D.O. (mg/L)	2.49	4.57	4.83							
Temperature (°C)	25.62	23.64	23.28							

Total Volume Purged: 3 gal. Total Purge Time: 10 mins

Sampling Information:

Sampling Method: grab

No. of Bottles: 8

Sampling Time: 1225

Sample Analyses: various metals, wet chemistry, total/fecal coliforms (sampled 9/20)

Comments:

- well dry at 2.5 gallons, allowed to recharge before sampling

CHA	**Well Sampling/ Development Log**	**Sample/Well Designation:** MW-5
Project Name: Harbor Brook CSO 018 Constructed Wetlands		Logged By: K. Flood/S. Gilbert
Project Location: Syracuse, NY		Date: 9/19/13
Project Number: 19217		Screen Length:

Purge Information:

(1) Depth to Bottom of Well: 8.60 ft. (from TOC)
(2) Depth to Water: 3.52 ft. (from TOC)
(3) Column of Water: 5.08 ft. [(1) – (2)]
(4) Well Riser Diameter: 2 in.
(5) Volume Conversion: 0.163 gal./ft. (see below)
(6) 1 Well Volume: 0.828 gal. [(3) x (5)]

Method of Purging: ☐ WaTerra ☐ Bailer ☐ Submersible ☒ Other: peristaltic pump

Volume Conversion: (gal./ft.)
2" = 0.163 4" = 0.653 6" = 1.469 8" 2.611 10" = 4.08

Field Analysis:

Volume Purged (gal.)	1	2	3							
Time	845	854	903							
ORP/EH (mV)	-57	-49	-58							
pH	7.40	7.26	7.03							
Cond. (MS/CM)	7.86	1.77	1.75							
Turbidity (NTU)	454	73.5	165							
D.O. (mg/L)	2.16	1.78	2.01							
Temperature (°C)	15.26	15.97	16.78							

Total Volume Purged: 3 gal. Total Purge Time: 20 mins

Sampling Information:

Sampling Method: grab

No. of Bottles: 8

Sampling Time: 0910

Sample Analyses: various metals, wet chemistry, total/fecal coliforms (sampled 9/20)

Comments:

- purge water very turbid

CHA	**Well Sampling/ Development Log**	**Sample/Well Designation:** MW-A
Project Name: Harbor Brook CSO 018 Constructed Wetlands		Logged By: S. Gilbert
Project Location: Syracuse, NY		Date: 12/19/2013
Project Number: 19217		Screen Length:

Purge Information:

(1) Depth to Bottom of Well: 11.13 ft. (from TOC)
(2) Depth to Water: 5.29 ft. (from TOC)
(3) Column of Water: 5.84 ft. [(1) – (2)]
(4) Well Riser Diameter: 2 in.
(5) Volume Conversion: 0.163 gal./ft. (see below)
(6) 1 Well Volume: 0.95 gal. [(3) x (5)]

Method of Purging: ☐ WaTerra ☐ Bailer ☐ Submersible ☒ Other: Peri Pump

Volume Conversion: (gal./ft.)
2" = 0.163 4" = 0.653 6" = 1.469 8" 2.611 10" = 4.08

Field Analysis:

Volume Purged (gal.)	1.0	1.0	1.0							
Time	1410	1414	1419							
ORP/EH (mV)	-51	-54	-60							
pH	6.85	6.67	6.52							
Cond. (MS/CM)	2.58	2.64	2.75							
Turbidity (NTU)	59.8	12.4	6.8							
D.O. (mg/L)	13.01	8.38	3.26							
Temperature (°C)	7.19	8.39	8.07							

Total Volume Purged: 3.0 gal. Total Purge Time: 14 minutes

Sampling Information:

Sampling Method: grab

No. of Bottles: 1

Sampling Time: 1420

Sample Analyses: Ammonia & Ammonium

Comments:

CHA	**Well Sampling/ Development Log**	**Sample/Well Designation:** MW-B
Project Name: Harbor Brook CSO 018 Constructed Wetlands		Logged By: S. Gilbert
Project Location: Syracuse, NY		Date: 12/19/2013
Project Number: 19217		Screen Length:

Purge Information:

(1) Depth to Bottom of Well: 10.89 ft. (from TOC)
(2) Depth to Water: 5.31 ft. (from TOC)
(3) Column of Water: 5.58 ft. [(1) – (2)]
(4) Well Riser Diameter: 2 in.
(5) Volume Conversion: 0.163 gal./ft. (see below)
(6) 1 Well Volume: 0.91 gal. [(3) x (5)]

Method of Purging: ☐ WaTerra ☐ Bailer ☐ Submersible ☒ Other: peri pump

Volume Conversion: (gal./ft.)
2" = 0.163 4" = 0.653 6" = 1.469 8" 2.611 10" = 4.08

Field Analysis:

Volume Purged (gal.)	1.0	1.0	1.0							
Time	1029	1033	1037							
ORP/EH (mV)	-46	-66	-71							
pH	6.65	6.74	6.61							
Cond. (MS/CM)	1.85	1.99	1.92							
Turbidity (NTU)	50.2	13.5	8.4							
D.O. (mg/L)	11.79	3.95	3.20							
Temperature (°C)	4.97	4.69	7.63							

Total Volume Purged: 3.0 gal. Total Purge Time: 14 minutes

Sampling Information:

Sampling Method: grab

No. of Bottles: 1

Sampling Time: 1040

Sample Analyses: Ammonia, Ammonium

Comments:

CHA	**Well Sampling/ Development Log**	**Sample/Well Designation:** MW-C
Project Name: Harbor Brook CSO 018 Constructed Wetlands		Logged By: S. Gilbert
Project Location: Syracuse, NY		Date: 12/19/2013
Project Number: 19217		Screen Length:

Purge Information:

(1) Depth to Bottom of Well: 10.72 ft. (from TOC)
(2) Depth to Water: 5.54 ft. (from TOC)
(3) Column of Water: 5.18 ft. [(1) – (2)]
(4) Well Riser Diameter: 2 in.
(5) Volume Conversion: 0.163 gal./ft. (see below)
(6) 1 Well Volume: 0.84 gal. [(3) x (5)]

Method of Purging: ☐ WaTerra ☐ Bailer ☐ Submersible ☒ Other: peri pump

Volume Conversion: (gal./ft.)
2" = 0.163 4" = 0.653 6" = 1.469 8" 2.611 10" = 4.08

Field Analysis:

Volume Purged (gal.)	1.25	0.75	0.75							
Time	952	957	1000							
ORP/EH (mV)	-24	-57	-70							
pH	7.15	6.84	6.65							
Cond. (MS/CM)	1.32	1.29	1.25							
Turbidity (NTU)	40.4	9.3	34.8							
D.O. (mg/L)	5.88	1.96	11.45							
Temperature (°C)	6.52	7.88	8.06							

Total Volume Purged: 2.75 gal. Total Purge Time: 13 minutes

Sampling Information:

Sampling Method: grab

No. of Bottles: 1

Sampling Time: 1003

Sample Analyses: Ammonia, Ammonium

Comments:

CHA	**Well Sampling/ Development Log**	**Sample/Well Designation:** MW-D
Project Name: Harbor Brook CSO 018 Constructed Wetlands		Logged By: S. Gilbert
Project Location: Syracuse, NY		Date: 12/19/2013
Project Number: 19217		Screen Length:

Purge Information:

(1) Depth to Bottom of Well: 11.3 ft. (from TOC)
(2) Depth to Water: 7.79 ft. (from TOC)
(3) Column of Water: 3.51 ft. [(1) – (2)]
(4) Well Riser Diameter: 2 in.
(5) Volume Conversion: 0.163 gal./ft. (see below)
(6) 1 Well Volume: 0.57 gal. [(3) x (5)]

Method of Purging: ☐ WaTerra ☐ Bailer ☐ Submersible ☒ Other: peri pump

Volume Conversion: (gal./ft.)
2" = 0.163 4" = 0.653 6" = 1.469 8" 2.611 10" = 4.08

Field Analysis:

Volume Purged (gal.)	0.75	1.0	0.75							
Time	1436	1440	1445							
ORP/EH (mV)	-97	-68	-69							
pH	7.43	7.13	6.72							
Cond. (MS/CM)	0.973	0.901	1.51							
Turbidity (NTU)	15.1	8.8	4.1							
D.O. (mg/L)	8.35	5.28	10.99							
Temperature (°C)	7.55	7.57	9.19							

Total Volume Purged: 2.5 gal. Total Purge Time: 15 minutes

Sampling Information:

Sampling Method: grab

No. of Bottles: 1

Sampling Time: 1446

Sample Analyses: Ammonia, Ammonium

Comments:

CHA	**Well Sampling/ Development Log**	**Sample/Well Designation:** MW-5
Project Name: Harbor Brook CSO 018 Constructed Wetlands		Logged By: S. Gilbert
Project Location: Syracuse, NY		Date: 12/19/2013
Project Number: 19217		Screen Length:

Purge Information:

(1) Depth to Bottom of Well: 8.60 ft. (from TOC)
(2) Depth to Water: 3.27 ft. (from TOC)
(3) Column of Water: 5.33 ft. [(1) – (2)]
(4) Well Riser Diameter: 2 in.
(5) Volume Conversion: 0.163 gal./ft. (see below)
(6) 1 Well Volume: 0.87 gal. [(3) x (5)]

Method of Purging: ☐ WaTerra ☐ Bailer ☐ Submersible ☒ Other: Peri pump

Volume Conversion: (gal./ft.)
2" = 0.163 4" = 0.653 6" = 1.469 8" 2.611 10" = 4.08

Field Analysis:

Volume Purged (gal.)	1.0	2.0	3.0							
Time	910	916	920							
ORP/EH (mV)	-36	-87	-83							
pH	6.73	6.81	6.83							
Cond. (MS/CM)	1.62	1.50	1.47							
Turbidity (NTU)	257	382	115							
D.O. (mg/L)	6.03	3.40	3.38							
Temperature (°C)	3.71	5.56	5.67							

Total Volume Purged: 3.0 gal. Total Purge Time: 10 minutes

Sampling Information:

Sampling Method: grab

No. of Bottles: 1

Sampling Time: 922

Sample Analyses: Ammonia, Ammonium

Comments: Dark brown/black murky start

Attachment B
Laboratory Data Packages

Microbac Laboratories, Inc.
New York Division
3821 Buck Drive
Cortland, New York 13045
Phone: 607-753-3403

1/28/14

Work Order Number: 1342080

Certificate of Results

CLOUGH, HARBOUR & ASSOCIATES
Kathyrn Flood
441 S. Salina Street, # 290
Syracuse, NY 13202

Contact: Kathyrn Flood
Project Name: 19217.9446
Date Received: September 20, 2013
Time Received: 1:30 pm

Analytical Testing Parameters

Client Sample ID: **MW-A**
Lab Sample ID: **1342080-01**

Collection Date: **9/20/2013**
Collection Time: **8:45 am**
Collected By: KF-Client

MICROBIOLOGY

Parameter	CAS	DF	Result	Units	PQL	Qualifier	Method	Analyzed	Analyst
Fecal Coliforms	NA	4	Est <4	CFU/100 ml	4.0		SM 9222D	9/20/2013 1545	JME
Total Coliform		20	Est 1600	CFU/100 ml	20		SM 9222B	9/20/2013 1545	JME
E. coli	NA	20	Est 1200	CFU/100 ml	20		SM 9222B	9/20/2013 1545	JME

Analytical Testing Parameters

Client Sample ID: **MW-B**
Lab Sample ID: **1342080-02**

Collection Date: **9/20/2013**
Collection Time: **8:35 am**
Collected By: KF-Client

MICROBIOLOGY

Parameter	CAS	DF	Result	Units	PQL	Qualifier	Method	Analyzed	Analyst
Fecal Coliforms	NA	4	Est <4	CFU/100 ml	4.0		SM 9222D	9/20/2013 1545	JME
Total Coliform		20	**Est >1600**	CFU/100 ml	20		SM 9222B	9/20/2013 1545	JME
E. coli	NA	20	Est <20	CFU/100 ml	20		SM 9222B	9/20/2013 1545	JME

Analytical Testing Parameters

Client Sample ID: **MW-C**
Lab Sample ID: **1342080-03**

Collection Date: **9/20/2013**
Collection Time: **8:25 am**
Collected By: KF-Client

MICROBIOLOGY

Parameter	CAS	DF	Result	Units	PQL	Qualifier	Method	Analyzed	Analyst
Fecal Coliforms	NA	4	Est 4	CFU/100 ml	4.0		SM 9222D	9/20/2013 1545	JME
Total Coliform		20	**Est >1600**	CFU/100 ml	20		SM 9222B	9/20/2013 1545	JME
E. coli	NA	20	Est <20	CFU/100 ml	20		SM 9222B	9/20/2013 1545	JME

Analytical Testing Parameters

Client Sample ID: **MW-D**
Lab Sample ID: **1342080-04**

Collection Date: **9/20/2013**
Collection Time: **8:15 am**
Collected By: KF-Client

Revision #1. Updated result for -05 Coliform

Microbac Laboratories, Inc.
New York Division
3821 Buck Drive
Cortland, New York 13045
Phone: 607-753-3403

1/28/14

Work Order Number: 1342080

Certificate of Results

MICROBIOLOGY

Parameter	CAS	DF	Result	Units	PQL	Qualifier	Method	Analyzed	Analyst
Fecal Coliforms	NA	4	Est <4	CFU/100 ml	4.0		SM 9222D	9/20/2013 1545	JME
Total Coliform		20	Est 132	CFU/100 ml	20		SM 9222B	9/20/2013 1545	JME
E. coli	NA	20	Est <20	CFU/100 ml	20		SM 9222B	9/20/2013 1545	JME

Analytical Testing Parameters

Client Sample ID: **MW-5**
Lab Sample ID: **1342080-05**

Collection Date: **9/20/2013**
Collection Time: **9:05 am**
Collected By: KF-Client

MICROBIOLOGY

Parameter	CAS	DF	Result	Units	PQL	Qualifier	Method	Analyzed	Analyst
Fecal Coliforms	NA	10	Est <10	CFU/100 ml	10		SM 9222D	9/20/2013 1545	JME
Total Coliform		20	**Est >1600**	CFU/100 ml	20		SM 9222B	9/20/2013 1545	JME
E. coli	NA	20	Est <100	CFU/100 ml	20		SM 9222B	9/20/2013 1545	JME

Laboratory Certifications:

Below is a list of certifications maintained by Microbac Laboratories, Inc. New York Division. All data included in this report has been reviewed for and meets all project specific and quality control requirements of the applicable accreditation, unless otherwise noted. A complete list of individual analytes pursuant to each certification below is available upon request.

- NYELAP # 10795
- EPA # NY00935
- PADEP # 68-01385
- Connecticut #PH-0331
- New Hampshire #2985
- NYS Ag & Markets #36-142

Qualifiers and Definitions:

- **CAS:** Chemical Abstract Series identification for the analyte.
- **DF:** "1" indicates that there was no dilution. Any other number indicates that the sample was diluted by that factor.
- **PQL:** The **Practical Quantitation Limit**, which is defined as the lowest quantitation level of an analyte that can be readily achived within the specified limits of precision and accuracy of an alaytical method during routine laboratory operating conditions. The value may be raised depending on the characteristics or behavior of the target analyte.
- **Units:** The units of measure for the analysis. Ug/L (ppb) and mg/L (ppm) are for liquid samples. Ug/kg (ppb) and mg/kg (ppm) are for solid wet-based results while ug/kg-dry and mg/kg-dry are for solid-dry-based results.

Revision #1. Updated result for -05 Coliform

Microbac Laboratories, Inc.
New York Division
3821 Buck Drive
Cortland, New York 13045
Phone: 607-753-3403

1/28/14

Work Order Number: 1342080

Certificate of Results

Report Comments:

The analytical results for your samples are presented on the enclosed laboratory report(s). The data and information on this report and other accompanying documents represent on the sample(s) analyzed. In accordance with NYSDOH-ELAP and NELAC regulations, we are required to notify you of any aspects of the analysis that did not comply with these regulations. Any data qualifiers are noted directly on the laboratory report. The Laboratory also maintains a "Sample Receipt Checklist" and the submitted "Chain of Custody" form in its files that are available on request.

The pagination at the bottom of the narrative and reports indicates the total number of pages in the client submittal. No duplication of this report should be done without duplication of the entire package, including cover letter and narrative if present.

Thank you for the opportunity to provide these analytical services. Please contact Pamela Davis, Client Services Manager, with questions on the analysis.

Reviewed and Approved By: **Date Reviewed and Approved:**

Jennifer M. Walker

1/28/2014

Jennifer Walker
Quality Assurance Officer

For any feedback concerning our services, please contact Peter Indick, the Managing Director at 607.753.3403. You may also contact both James Nokes, President at president@microbac.com and Sean Hyde, Chief Operating Officer at sean.hyde@microbac.com.

Please help us in meeting our Go Green initiative by selecting to have reports and invoices submitted via email only. Please contact nyresults@microbac.com to set up email reporting and invoicing options.

Revision #1. Updated result for -05 Coliform

3821 Buck Drive
Cortland NY 13045
Phone:(607)753-3403 Fax:(607)753-3415
NY #10795, EPA #NY00935

Microbac Laboratories, Inc.
CHAIN OF CUSTODY

Client Information		Billing/Invoice:
Name:	Clough, Harbour & Associates	
Address:	441 S. Salina Street	
	Syracuse, NY 13202	
Contact:	Katie Flood	
Phone:	315-471-3290	
Project:	19217.9446	
Quote ID:		PO#:

Rush TAT Bus. Days: <2 2-5 5-7 7-10 Date Req.:

Carbon Copy: Yes

Email Results: (Yes) ~~Kflood06@gmail.com~~ Kflood@cha companies.com

Fax Results: Yes

Sample Information						Analysis Requested									Receiving Info (Lab Use Only)
	Description/Location	Date	Time	Initial	Matrix Type	Total Coliform - MF	Fecal Coliform								
1	MW - A	9/20/2013	845	KF	WW Grab	Plastic	Plastic								Ice: (YES) NO
2	MW - B	"	835	KF	WW Grab	100ml	100ml								Cooler: (YES) NO
3	MW - C	"	825	KF	WW Grab	Nathio	Nathio								Sample Temp: 3.0
4	MW - D	"	815	KF	WW Grab	Number of Containers for Analysis Requested									Cooler Seal: YES NO
5	MW - 5	"	0905	KF	WW Grab	1	1								Pickup: YES NO
6						1	1								Dropoff: C W
7						1	1								Accepted? YES NO
8						1	1								Container Material
															Container Size(in Ml)
															Preservative
															Comments/Field Data

	Print Name and Company	Signature	Date/Time
Sampled:	Kathryn Flood	Kathryn Flood	9/20/13 12:20
ceived:	PEER Jell / MC		9/20/13 1325
ceived:			9/20/13 13:30
ceived:			

Comments

Microbac Laboratories (MNY) may be unable to perform a portion of the requested testing in which case we will subcontract the analysis to another accredited laboratory.
By signing this document you are attesting that you have been informed by MNY of the intent to subcontract and are in agreement with this action.

1342080

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: 480-52356-1
Client Project/Site: Harbor Brook Site - Groundwater Monitori

For:
CHA Inc
441 South Salina Street
Syracuse, New York 13202

Attn: Katie E Flood

Christina M Dosier

Authorized for release by:
12/31/2013 4:57:50 PM
Christina Dosier, Project Mgmt. Assistant
christina.dosier@testamericainc.com

Designee for

Peggy Gray-Erdmann, Project Manager II
(716)504-9829
peggy.gray-erdmann@testamericainc.com

Table of Contents

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-52356-1

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
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)

Job ID: 480-52356-1

Laboratory: TestAmerica Buffalo

Narrative

Job Narrative
480-52356-1

Comments
No additional comments.

Receipt
The samples were received on 12/20/2013 2:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.6º C.

General Chemistry
No analytical or quality issues were noted.

Detection Summary

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-52356-1

Client Sample ID: MW-A — Lab Sample ID: 480-52356-1

Analyte	Result	Qualifier	NONE	NONE	Unit	Dil Fac	D	Method	Prep Type
Field pH	6.52				SU	1		Field Sampling	Total/NA
Field Temperature	8.07				Degrees C	1		Field Sampling	Total/NA

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Ammonia	10.8		0.20		mg/L	10		350.1	Total/NA
Ammonium as N	10.8		0.020		mg/L	1		SM 8010F NH4	Total/NA

Client Sample ID: MW-B — Lab Sample ID: 480-52356-2

Analyte	Result	Qualifier	NONE	NONE	Unit	Dil Fac	D	Method	Prep Type
Field pH	6.61				SU	1		Field Sampling	Total/NA
Field Temperature	7.63				Degrees C	1		Field Sampling	Total/NA

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Ammonia	5.3		0.10		mg/L	5		350.1	Total/NA
Ammonium as N	5.3		0.020		mg/L	1		SM 8010F NH4	Total/NA

Client Sample ID: MW-D — Lab Sample ID: 480-52356-3

Analyte	Result	Qualifier	NONE	NONE	Unit	Dil Fac	D	Method	Prep Type
Field pH	6.72				SU	1		Field Sampling	Total/NA
Field Temperature	9.19				Degrees C	1		Field Sampling	Total/NA

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Ammonia	1.8		0.020		mg/L	1		350.1	Total/NA
Ammonium as N	1.8		0.020		mg/L	1		SM 8010F NH4	Total/NA

Client Sample ID: MW-5 — Lab Sample ID: 480-52356-4

Analyte	Result	Qualifier	NONE	NONE	Unit	Dil Fac	D	Method	Prep Type
Field pH	6.83				SU	1		Field Sampling	Total/NA
Field Temperature	5.67				Degrees C	1		Field Sampling	Total/NA

Client Sample ID: MW-C — Lab Sample ID: 480-52356-5

Analyte	Result	Qualifier	NONE	NONE	Unit	Dil Fac	D	Method	Prep Type
Field pH	6.65				SU	1		Field Sampling	Total/NA
Field Temperature	8.06				Degrees C	1		Field Sampling	Total/NA

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Ammonia	0.92		0.020		mg/L	1		350.1	Total/NA
Ammonium as N	0.92		0.020		mg/L	1		SM 8010F NH4	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: MW-A

Lab Sample ID: 480-52356-1
Date Collected: 12/19/13 14:20
Matrix: Water
Date Received: 12/20/13 02:00

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	10.8		0.20		mg/L			12/20/13 15:57	10
Ammonium as N	10.8		0.020		mg/L			12/20/13 15:57	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Field pH	6.52				SU			12/19/13 14:20	1
Field Temperature	8.07				Degrees C			12/19/13 14:20	1

Client Sample ID: MW-B

Lab Sample ID: 480-52356-2
Date Collected: 12/19/13 10:40
Matrix: Water
Date Received: 12/20/13 02:00

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	5.3		0.10		mg/L			12/20/13 15:58	5
Ammonium as N	5.3		0.020		mg/L			12/20/13 15:58	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Field pH	6.61				SU			12/19/13 10:40	1
Field Temperature	7.63				Degrees C			12/19/13 10:40	1

Client Sample ID: MW-D

Lab Sample ID: 480-52356-3
Date Collected: 12/19/13 14:46
Matrix: Water
Date Received: 12/20/13 02:00

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	1.8		0.020		mg/L			12/20/13 14:47	1
Ammonium as N	1.8		0.020		mg/L			12/20/13 14:47	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Field pH	6.72				SU			12/19/13 14:46	1
Field Temperature	9.19				Degrees C			12/19/13 14:46	1

Client Sample ID: MW-5

Lab Sample ID: 480-52356-4
Date Collected: 12/19/13 09:22
Matrix: Water
Date Received: 12/20/13 02:00

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020		mg/L			12/20/13 14:48	1
Ammonium as N	ND		0.020		mg/L			12/20/13 14:48	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Field pH	6.83				SU			12/19/13 09:22	1
Field Temperature	5.67				Degrees C			12/19/13 09:22	1

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-52356-1

Client Sample ID: MW-C
Date Collected: 12/19/13 10:03
Date Received: 12/20/13 02:00

Lab Sample ID: 480-52356-5
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	0.92		0.020		mg/L			12/20/13 14:49	1
Ammonium as N	0.92		0.020		mg/L			12/20/13 14:49	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	NONE	NONE	Unit	D	Prepared	Analyzed	Dil Fac
Field pH	6.65				SU			12/19/13 10:03	1
Field Temperature	8.06				Degrees C			12/19/13 10:03	1

Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: MB 480-158886/147
Matrix: Water
Analysis Batch: 158886

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		mg/L			12/20/13 15:55	1

Lab Sample ID: MB 480-158886/27
Matrix: Water
Analysis Batch: 158886

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		mg/L			12/20/13 13:58	1

Lab Sample ID: MB 480-158886/51
Matrix: Water
Analysis Batch: 158886

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		mg/L			12/20/13 14:21	1

Lab Sample ID: MB 480-158886/75
Matrix: Water
Analysis Batch: 158886

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		mg/L			12/20/13 14:45	1

Lab Sample ID: MB 480-158886/99
Matrix: Water
Analysis Batch: 158886

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		mg/L			12/20/13 15:08	1

Lab Sample ID: LCS 480-158886/100
Matrix: Water
Analysis Batch: 158886

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	1.03		mg/L		103	90 - 110

Lab Sample ID: LCS 480-158886/148
Matrix: Water
Analysis Batch: 158886

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	1.01		mg/L		101	90 - 110

Lab Sample ID: LCS 480-158886/28
Matrix: Water
Analysis Batch: 158886

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	1.01		mg/L		101	90 - 110

QC Sample Results

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-52356-1

Lab Sample ID: LCS 480-158886/52
Matrix: Water
Analysis Batch: 158886

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	1.00		mg/L		100	90 - 110

Lab Sample ID: LCS 480-158886/76
Matrix: Water
Analysis Batch: 158886

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	1.01		mg/L		101	90 - 110

General Chemistry

Analysis Batch: 158886

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-52356-1	MW-A	Total/NA	Water	350.1	
480-52356-2	MW-B	Total/NA	Water	350.1	
480-52356-3	MW-D	Total/NA	Water	350.1	
480-52356-4	MW-5	Total/NA	Water	350.1	
480-52356-5	MW-C	Total/NA	Water	350.1	
LCS 480-158886/100	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-158886/148	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-158886/28	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-158886/52	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-158886/76	Lab Control Sample	Total/NA	Water	350.1	
MB 480-158886/147	Method Blank	Total/NA	Water	350.1	
MB 480-158886/27	Method Blank	Total/NA	Water	350.1	
MB 480-158886/51	Method Blank	Total/NA	Water	350.1	
MB 480-158886/75	Method Blank	Total/NA	Water	350.1	
MB 480-158886/99	Method Blank	Total/NA	Water	350.1	

Analysis Batch: 160050

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-52356-1	MW-A	Total/NA	Water	SM 8010F NH4	
480-52356-2	MW-B	Total/NA	Water	SM 8010F NH4	
480-52356-3	MW-D	Total/NA	Water	SM 8010F NH4	
480-52356-4	MW-5	Total/NA	Water	SM 8010F NH4	
480-52356-5	MW-C	Total/NA	Water	SM 8010F NH4	

Field Service / Mobile Lab

Analysis Batch: 158843

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-52356-1	MW-A	Total/NA	Water	Field Sampling	
480-52356-2	MW-B	Total/NA	Water	Field Sampling	
480-52356-3	MW-D	Total/NA	Water	Field Sampling	
480-52356-4	MW-5	Total/NA	Water	Field Sampling	
480-52356-5	MW-C	Total/NA	Water	Field Sampling	

Lab Chronicle

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-52356-1

Client Sample ID: MW-A
Lab Sample ID: 480-52356-1
Date Collected: 12/19/13 14:20
Matrix: Water
Date Received: 12/20/13 02:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	350.1		10	158886	12/20/13 15:57	RS	TAL BUF
Total/NA	Analysis	SM 8010F NH4		1	160050	12/20/13 15:57	KMF	TAL BUF
Total/NA	Analysis	Field Sampling		1	158843	12/19/13 14:20	FLD	TAL BUF

Client Sample ID: MW-B
Lab Sample ID: 480-52356-2
Date Collected: 12/19/13 10:40
Matrix: Water
Date Received: 12/20/13 02:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	350.1		5	158886	12/20/13 15:58	RS	TAL BUF
Total/NA	Analysis	SM 8010F NH4		1	160050	12/20/13 15:58	KMF	TAL BUF
Total/NA	Analysis	Field Sampling		1	158843	12/19/13 10:40	FLD	TAL BUF

Client Sample ID: MW-D
Lab Sample ID: 480-52356-3
Date Collected: 12/19/13 14:46
Matrix: Water
Date Received: 12/20/13 02:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	350.1		1	158886	12/20/13 14:47	RS	TAL BUF
Total/NA	Analysis	SM 8010F NH4		1	160050	12/20/13 14:47	KMF	TAL BUF
Total/NA	Analysis	Field Sampling		1	158843	12/19/13 14:46	FLD	TAL BUF

Client Sample ID: MW-5
Lab Sample ID: 480-52356-4
Date Collected: 12/19/13 09:22
Matrix: Water
Date Received: 12/20/13 02:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	350.1		1	158886	12/20/13 14:48	RS	TAL BUF
Total/NA	Analysis	SM 8010F NH4		1	160050	12/20/13 14:48	KMF	TAL BUF
Total/NA	Analysis	Field Sampling		1	158843	12/19/13 09:22	FLD	TAL BUF

Client Sample ID: MW-C
Lab Sample ID: 480-52356-5
Date Collected: 12/19/13 10:03
Matrix: Water
Date Received: 12/20/13 02:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	350.1		1	158886	12/20/13 14:49	RS	TAL BUF
Total/NA	Analysis	SM 8010F NH4		1	160050	12/20/13 14:49	KMF	TAL BUF
Total/NA	Analysis	Field Sampling		1	158843	12/19/13 10:03	FLD	TAL BUF

Lab Chronicle

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-52356-1

Laboratory References:

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

Certification Summary

Client: CHA Inc
TestAmerica Job ID: 480-52356-1
Project/Site: Harbor Brook Site - Groundwater Monitori

Laboratory: TestAmerica Buffalo

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arkansas DEQ	State Program	6	88-0686	07-06-14
California	NELAP	9	1169CA	09-30-14
Connecticut	State Program	1	PH-0568	09-30-14
Florida	NELAP	4	E87672	06-30-14
Georgia	State Program	4	N/A	03-31-14
Illinois	NELAP	5	200003	09-30-14
Iowa	State Program	7	374	03-01-15
Kansas	NELAP	7	E-10187	01-31-14
Kentucky	State Program	4	90029	12-31-13 *
Kentucky (UST)	State Program	4	30	04-01-14
Louisiana	NELAP	6	02031	06-30-14
Maine	State Program	1	NY00044	12-04-14
Maryland	State Program	3	294	03-31-14
Massachusetts	State Program	1	M-NY044	06-30-14
Michigan	State Program	5	9937	04-01-14
Minnesota	NELAP	5	036-999-337	12-31-13 *
New Hampshire	NELAP	1	2337	11-17-14
New Jersey	NELAP	2	NY455	06-30-14
New York	NELAP	2	10026	04-01-14
North Dakota	State Program	8	R-176	03-31-14
Oklahoma	State Program	6	9421	08-31-14
Oregon	NELAP	10	NY200003	06-09-14
Pennsylvania	NELAP	3	68-00281	07-31-14
Rhode Island	State Program	1	LAO00328	12-31-13 *
Tennessee	State Program	4	TN02970	04-01-14
Texas	NELAP	6	T104704412-11-2	07-31-14
USDA	Federal		P330-11-00386	11-22-14
Virginia	NELAP	3	460185	09-14-14
Washington	State Program	10	C784	02-10-14
West Virginia DEP	State Program	3	252	12-31-13 *
Wisconsin	State Program	5	998310390	08-31-14

* Expired certification is currently pending renewal and is considered valid.

Method Summary

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-52356-1

Method	Method Description	Protocol	Laboratory
350.1	Nitrogen, Ammonia	MCAWW	TAL BUF
SM 8010F NH4	Ammonia, Unionized	SM	TAL BUF
Field Sampling	Field Sampling	EPA	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",

Laboratory References:

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

Sample Summary

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-52356-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-52356-1	MW-A	Water	12/19/13 14:20	12/20/13 02:00
480-52356-2	MW-B	Water	12/19/13 10:40	12/20/13 02:00
480-52356-3	MW-D	Water	12/19/13 14:46	12/20/13 02:00
480-52356-4	MW-5	Water	12/19/13 09:22	12/20/13 02:00
480-52356-5	MW-C	Water	12/19/13 10:03	12/20/13 02:00

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: S. Gilbert	Lab PM: Gray-Erdmann, Peggy J	Carrier Tracking No(s):	COC No: 480-42440-11524.1
Client Contact: Katie Flood	Phone: 3154713920	E-Mail: peggy.gray-erdmann@testamericainc.com		Page: Page 1 of 1
Company: CHA Inc				Job #:

Address: 441 South Salina Street	Due Date Requested:	Analysis Requested	Preservation Codes:
City: Syracuse	TAT Requested (days): 5 day		A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
State, Zip: NY, 13202			
Phone:	PO #: Purchase Order Requested		
Email: kflood@chacompanies.com	WO #:		
Project Name: Harbor Brook Site - Groundwater Monitori	Project #: 48008515		
Site:	SSOW#:		

480-52356 Chain of Custody

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	350.1 - Ammonia	FieldSampling - pH,Temp,	Total Number	Special Instructions/Note:
			Preservation Code:				S	N		
MW-A	12/19/13	1420	G	Water			X			pH: 6.52 Temp 8.07°C
MW-B	12/19/13	1040	G	Water			X			pH: 6.61 Temp: 7.63
~~MW-C~~	12/19/13	1003	G	~~Water~~			X			~~pH: 8.66 Temp: 7.54°C~~
MW-D	12/19/13	1446	G	Water			X			pH: 6.72 Temp: 9.19°C
MW-5	12/19/13	922	G	Water			X			~~pH: 6.79~~ ~~Temp 4.96°C~~
~~MW-5~~	~~12/19/13~~	~~922~~	~~G~~	~~water~~						pH: 6.83 Temp 5.67°C
MW-C	12/19/13	1003	G	Water						pH: 6.65 Temp 8.08°C

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1	Samantha Gilbert	12/19/2013 1610	CHA		12-19-13 1615	
2		12-19-13 1900			12.20-13 0200	
3		Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 2.6 IR

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12/31/2013

Login Sample Receipt Checklist

Client: CHA Inc

Job Number: 480-52356-1

Login Number: 52356

List Source: TestAmerica Buffalo

List Number: 1

Creator: Wienke, Robert K

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.	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	CHA
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	N/A	
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: 480-46186-1
Client Project/Site: Harbor Brook Site - Groundwater Monitori

For:
CHA Inc
441 South Salina Street
Syracuse, New York 13202

Attn: Katie E Flood

Authorized for release by:
10/4/2013 12:04:59 PM
John Stadler, Project Administrator
john.stadler@testamericainc.com

Designee for

Peggy Gray-Erdmann, Project Manager II
(716)691-2600
peggy.gray-erdmann@testamericainc.com

Table of Contents

Definitions/Glossary

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-46186-1

Qualifiers

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is 4 times greater than the matrix spike concentration; therefore, control limits are not applicable.
F	MS/MSD Recovery and/or RPD exceeds the control limits

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes

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
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)

Job ID: 480-46186-1

Laboratory: TestAmerica Buffalo

Narrative

Job Narrative
480-46186-1

Comments
No additional comments.

Receipt
The samples were received on 9/20/2013 2:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.4° C.

Metals
Method(s) 200.7 Rev 4.4: The recovery of Post Spike, (480-46186-1 PDS), in batch 480-140181 exhibited a result outside the quality control limits for total arsenic. However, the Serial Dilution of this sample was compliant. Therefore, no corrective action was necessary

Method(s) 200.7 Rev 4.4: The Matrix Spike / Matrix Spike Duplicate ((480-46186-1 MS), (480-46186-1 MSD)) precision for batch 480-140181 was outside control limits for total zinc. Non-homogeneity of the sample matrix is suspected. The associated Laboratory Control Sample met acceptance criteria, therefore, no corrective action was necessary.

No other analytical or quality issues were noted.

General Chemistry
Method(s) SM 2540C: Due to the matrix, the initial volume(s) used for the following sample(s) deviated from the standard procedure: MW-A (480-46186-1), MW-B (480-46186-2), MW-C (480-46186-3), MW-D (480-46186-4). The reporting limits (RLs) have been adjusted proportionately.

Method(s) SM 2540C: Due to the matrix, the initial volume(s) used for the following sample(s) deviated from the standard procedure: MW-5 (480-46186-5). The reporting limits (RLs) have been adjusted proportionately.

Method(s) SM 4500 H+ B: This analysis is normally performed in the field and has a method-defined holding time of 15 minutes. The following sample(s) has been qualified with the "HF" flag to indicate analysis was performed in the laboratory outside the 15 minute timeframe: MW-5 (480-46186-5), MW-A (480-46186-1), MW-B (480-46186-2), MW-C (480-46186-3), MW-D (480-46186-4)

No other analytical or quality issues were noted.

Detection Summary

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-46186-1

Client Sample ID: MW-A — Lab Sample ID: 480-46186-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mercury	4.8		0.50		ng/L	1		1631E	Total/NA
Aluminum	0.29		0.20		mg/L	1		200.7 Rev 4.4	Total/NA
Iron	9.6		0.050		mg/L	1		200.7 Rev 4.4	Total/NA
Manganese	0.93		0.0030		mg/L	1		200.7 Rev 4.4	Total/NA
Sulfate	743		125		mg/L	25		D516-90, 02	Total/NA
Total Dissolved Solids	1950		20.0		mg/L	1		SM 2540C	Total/NA
Chloride	177		5.0		mg/L	5		SM 4500 Cl- E	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Specific Conductance	2680		1.00		umhos/cm	1		120.1	Total/NA
Turbidity	89.8		1.00		NTU	1		180.1	Total/NA
pH	7.22	HF	0.100		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-B — Lab Sample ID: 480-46186-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mercury	2.0		0.50		ng/L	1		1631E	Total/NA
Chromium	0.012		0.0040		mg/L	1		200.7 Rev 4.4	Total/NA
Iron	2.7		0.050		mg/L	1		200.7 Rev 4.4	Total/NA
Manganese	0.28		0.0030		mg/L	1		200.7 Rev 4.4	Total/NA
Sulfate	95.9		50.0		mg/L	10		D516-90, 02	Total/NA
Total Dissolved Solids	1450		20.0		mg/L	1		SM 2540C	Total/NA
Chloride	72.9		5.0		mg/L	5		SM 4500 Cl- E	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Specific Conductance	2210		1.00		umhos/cm	1		120.1	Total/NA
Turbidity	57.2		1.00		NTU	1		180.1	Total/NA
pH	7.54	HF	0.100		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-C — Lab Sample ID: 480-46186-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mercury	2.9		0.50		ng/L	1		1631E	Total/NA
Iron	5.5		0.050		mg/L	1		200.7 Rev 4.4	Total/NA
Manganese	0.38		0.0030		mg/L	1		200.7 Rev 4.4	Total/NA
Sulfate	161		50.0		mg/L	10		D516-90, 02	Total/NA
Total Dissolved Solids	840		20.0		mg/L	1		SM 2540C	Total/NA
Chloride	90.4		5.0		mg/L	5		SM 4500 Cl- E	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Specific Conductance	1410		1.00		umhos/cm	1		120.1	Total/NA
Turbidity	33.4		1.00		NTU	1		180.1	Total/NA
pH	7.51	HF	0.100		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-D — Lab Sample ID: 480-46186-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mercury	4.9		0.50		ng/L	1		1631E	Total/NA
Aluminum	0.33		0.20		mg/L	1		200.7 Rev 4.4	Total/NA
Iron	6.3		0.050		mg/L	1		200.7 Rev 4.4	Total/NA
Manganese	0.84		0.0030		mg/L	1		200.7 Rev 4.4	Total/NA
Sulfate	370		75.0		mg/L	15		D516-90, 02	Total/NA
Nitrate as N	0.056		0.050		mg/L	1		Nitrate by calc	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Buffalo

Client Sample ID: MW-D (Continued)

Lab Sample ID: 480-46186-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Total Dissolved Solids	1150		20.0		mg/L	1		SM 2540C	Total/NA
Chloride	81.0		5.0		mg/L	5		SM 4500 Cl- E	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Specific Conductance	1760		1.00		umhos/cm	1		120.1	Total/NA
Turbidity	83.7		1.00		NTU	1		180.1	Total/NA
pH	7.48	HF	0.100		SU	1		SM 4500 H+ B	Total/NA

Client Sample ID: MW-5

Lab Sample ID: 480-46186-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mercury	1.7		0.50		ng/L	1		1631E	Total/NA
Aluminum	0.39		0.20		mg/L	1		200.7 Rev 4.4	Total/NA
Iron	2.1		0.050		mg/L	1		200.7 Rev 4.4	Total/NA
Manganese	0.040		0.0030		mg/L	1		200.7 Rev 4.4	Total/NA
Sulfate	182		50.0		mg/L	10		D516-90, 02	Total/NA
Total Dissolved Solids	1080		20.0		mg/L	1		SM 2540C	Total/NA
Chloride	302		10.0		mg/L	10		SM 4500 Cl- E	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Specific Conductance	1740		1.00		umhos/cm	1		120.1	Total/NA
Turbidity	38.8		1.00		NTU	1		180.1	Total/NA
pH	7.65	HF	0.100		SU	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: MW-A

Lab Sample ID: 480-46186-1

Date Collected: 09/19/13 14:20

Matrix: Water

Date Received: 09/20/13 02:00

Method: 1631E - Mercury, Low Level (CVAFS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**4.8**		0.50		ng/L		10/01/13 17:08	10/02/13 12:00	1

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**0.29**		0.20		mg/L		09/20/13 09:00	09/20/13 17:09	1
Arsenic	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:09	1
Cadmium	ND		0.0010		mg/L		09/20/13 09:00	09/20/13 17:09	1
Chromium	ND		0.0040		mg/L		09/20/13 09:00	09/20/13 17:09	1
Copper	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:09	1
Iron	**9.6**		0.050		mg/L		09/20/13 09:00	09/20/13 17:09	1
Lead	ND		0.0050		mg/L		09/20/13 09:00	09/20/13 17:09	1
Manganese	**0.93**		0.0030		mg/L		09/20/13 09:00	09/20/13 17:09	1
Nickel	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:09	1
Selenium	ND		0.015		mg/L		09/20/13 09:00	09/20/13 17:09	1
Zinc	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:09	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrite as N	ND		0.050		mg/L			09/20/13 06:37	1
Cyanide, Total	ND		0.010		mg/L		09/24/13 17:06	09/24/13 20:20	1
Sulfate	**743**		125		mg/L			09/25/13 05:27	25
Nitrate as N	ND		0.050		mg/L			09/20/13 06:37	1
Total Dissolved Solids	**1950**		20.0		mg/L			09/20/13 16:29	1
Chloride	**177**		5.0		mg/L			09/25/13 04:45	5

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	**2680**		1.00		umhos/cm			09/20/13 12:14	1
Turbidity	**89.8**		1.00		NTU			09/20/13 05:05	1
pH	**7.22**	**HF**	0.100		SU			09/20/13 20:41	1

Client Sample ID: MW-B

Lab Sample ID: 480-46186-2

Date Collected: 09/19/13 13:50

Matrix: Water

Date Received: 09/20/13 02:00

Method: 1631E - Mercury, Low Level (CVAFS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**2.0**		0.50		ng/L		10/01/13 17:08	10/02/13 12:04	1

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.20		mg/L		09/20/13 09:00	09/20/13 17:20	1
Arsenic	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:20	1
Cadmium	ND		0.0010		mg/L		09/20/13 09:00	09/20/13 17:20	1
Chromium	**0.012**		0.0040		mg/L		09/20/13 09:00	09/20/13 17:20	1
Copper	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:20	1
Iron	**2.7**		0.050		mg/L		09/20/13 09:00	09/20/13 17:20	1
Lead	ND		0.0050		mg/L		09/20/13 09:00	09/20/13 17:20	1
Manganese	**0.28**		0.0030		mg/L		09/20/13 09:00	09/20/13 17:20	1
Nickel	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:20	1
Selenium	ND		0.015		mg/L		09/20/13 09:00	09/20/13 17:20	1
Zinc	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:20	1

Client Sample ID: MW-B

Lab Sample ID: 480-46186-2

Date Collected: 09/19/13 13:50

Matrix: Water

Date Received: 09/20/13 02:00

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrite as N	ND		0.050		mg/L			09/20/13 06:38	1
Cyanide, Total	ND		0.010		mg/L		09/24/13 17:06	09/24/13 20:21	1
Sulfate	**95.9**		50.0		mg/L			09/25/13 19:04	10
Nitrate as N	ND		0.050		mg/L			09/20/13 06:38	1
Total Dissolved Solids	**1450**		20.0		mg/L			09/20/13 16:31	1
Chloride	**72.9**		5.0		mg/L			09/25/13 16:39	5

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	**2210**		1.00		umhos/cm			09/20/13 12:15	1
Turbidity	**57.2**		1.00		NTU			09/20/13 05:05	1
pH	**7.54**	**HF**	0.100		SU			09/20/13 20:45	1

Client Sample ID: MW-C

Lab Sample ID: 480-46186-3

Date Collected: 09/19/13 13:05

Matrix: Water

Date Received: 09/20/13 02:00

Method: 1631E - Mercury, Low Level (CVAFS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**2.9**		0.50		ng/L		10/01/13 17:08	10/02/13 12:08	1

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.20		mg/L		09/20/13 09:00	09/20/13 17:25	1
Arsenic	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:25	1
Cadmium	ND		0.0010		mg/L		09/20/13 09:00	09/20/13 17:25	1
Chromium	ND		0.0040		mg/L		09/20/13 09:00	09/20/13 17:25	1
Copper	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:25	1
Iron	**5.5**		0.050		mg/L		09/20/13 09:00	09/20/13 17:25	1
Lead	ND		0.0050		mg/L		09/20/13 09:00	09/20/13 17:25	1
Manganese	**0.38**		0.0030		mg/L		09/20/13 09:00	09/20/13 17:25	1
Nickel	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:25	1
Selenium	ND		0.015		mg/L		09/20/13 09:00	09/20/13 17:25	1
Zinc	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:25	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrite as N	ND		0.050		mg/L			09/20/13 06:39	1
Cyanide, Total	ND		0.010		mg/L		09/24/13 17:06	09/24/13 20:24	1
Sulfate	**161**		50.0		mg/L			09/25/13 19:04	10
Nitrate as N	ND		0.050		mg/L			09/20/13 06:39	1
Total Dissolved Solids	**840**		20.0		mg/L			09/20/13 16:32	1
Chloride	**90.4**		5.0		mg/L			09/25/13 16:39	5

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	**1410**		1.00		umhos/cm			09/20/13 12:17	1
Turbidity	**33.4**		1.00		NTU			09/20/13 05:05	1
pH	**7.51**	**HF**	0.100		SU			09/20/13 20:49	1

Client Sample ID: MW-D

Lab Sample ID: 480-46186-4

Date Collected: 09/19/13 12:25

Matrix: Water

Date Received: 09/20/13 02:00

Method: 1631E - Mercury, Low Level (CVAFS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**4.9**		0.50		ng/L		10/01/13 17:08	10/02/13 12:12	1

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**0.33**		0.20		mg/L		09/20/13 09:00	09/20/13 17:27	1
Arsenic	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:27	1
Cadmium	ND		0.0010		mg/L		09/20/13 09:00	09/20/13 17:27	1
Chromium	ND		0.0040		mg/L		09/20/13 09:00	09/20/13 17:27	1
Copper	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:27	1
Iron	**6.3**		0.050		mg/L		09/20/13 09:00	09/20/13 17:27	1
Lead	ND		0.0050		mg/L		09/20/13 09:00	09/20/13 17:27	1
Manganese	**0.84**		0.0030		mg/L		09/20/13 09:00	09/20/13 17:27	1
Nickel	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:27	1
Selenium	ND		0.015		mg/L		09/20/13 09:00	09/20/13 17:27	1
Zinc	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:27	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrite as N	ND		0.050		mg/L			09/20/13 07:16	1
Cyanide, Total	ND		0.010		mg/L		09/24/13 17:06	09/24/13 20:26	1
Sulfate	**370**		75.0		mg/L			09/25/13 17:37	15
Nitrate as N	**0.056**		0.050		mg/L			09/20/13 06:40	1
Total Dissolved Solids	**1150**		20.0		mg/L			09/20/13 16:33	1
Chloride	**81.0**		5.0		mg/L			09/25/13 16:32	5

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	**1760**		1.00		umhos/cm			09/20/13 12:20	1
Turbidity	**83.7**		1.00		NTU			09/20/13 05:05	1
pH	**7.48**	**HF**	0.100		SU			09/20/13 20:52	1

Client Sample ID: MW-5

Lab Sample ID: 480-46186-5

Date Collected: 09/19/13 09:10

Matrix: Water

Date Received: 09/20/13 02:00

Method: 1631E - Mercury, Low Level (CVAFS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	**1.7**		0.50		ng/L		10/01/13 17:08	10/02/13 12:16	1

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**0.39**		0.20		mg/L		09/20/13 09:00	09/20/13 17:29	1
Arsenic	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:29	1
Cadmium	ND		0.0010		mg/L		09/20/13 09:00	09/20/13 17:29	1
Chromium	ND		0.0040		mg/L		09/20/13 09:00	09/20/13 17:29	1
Copper	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:29	1
Iron	**2.1**		0.050		mg/L		09/20/13 09:00	09/20/13 17:29	1
Lead	ND		0.0050		mg/L		09/20/13 09:00	09/20/13 17:29	1
Manganese	**0.040**		0.0030		mg/L		09/20/13 09:00	09/20/13 17:29	1
Nickel	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:29	1
Selenium	ND		0.015		mg/L		09/20/13 09:00	09/20/13 17:29	1
Zinc	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:29	1

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-46186-1

Client Sample ID: MW-5
Date Collected: 09/19/13 09:10
Date Received: 09/20/13 02:00

Lab Sample ID: 480-46186-5
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrite as N	ND		0.050		mg/L			09/20/13 06:41	1
Cyanide, Total	ND		0.010		mg/L		09/24/13 17:06	09/24/13 20:26	1
Sulfate	**182**		50.0		mg/L			09/23/13 06:37	10
Nitrate as N	ND		0.050		mg/L			09/20/13 06:41	1
Total Dissolved Solids	**1080**		20.0		mg/L			09/23/13 18:44	1
Chloride	**302**		10.0		mg/L			09/23/13 07:05	10

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	**1740**		1.00		umhos/cm			09/20/13 12:21	1
Turbidity	**38.8**		1.00		NTU			09/20/13 05:05	1
pH	**7.65**	**HF**	0.100		SU			09/20/13 20:56	1

Method: 1631E - Mercury, Low Level (CVAFS)

Lab Sample ID: MB 240-103733/1-A
Matrix: Water
Analysis Batch: 103874

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 103733

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.50		ng/L		10/01/13 17:08	10/02/13 11:08	1

Lab Sample ID: LCS 240-103733/2-A
Matrix: Water
Analysis Batch: 103874

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 103733

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	5.00	5.41		ng/L		108	77 - 123

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 480-140181/1-A
Matrix: Water
Analysis Batch: 140581

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 140181

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.20		mg/L		09/20/13 09:00	09/20/13 17:00	1
Arsenic	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:00	1
Cadmium	ND		0.0010		mg/L		09/20/13 09:00	09/20/13 17:00	1
Chromium	ND		0.0040		mg/L		09/20/13 09:00	09/20/13 17:00	1
Copper	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:00	1
Iron	ND		0.050		mg/L		09/20/13 09:00	09/20/13 17:00	1
Lead	ND		0.0050		mg/L		09/20/13 09:00	09/20/13 17:00	1
Manganese	ND		0.0030		mg/L		09/20/13 09:00	09/20/13 17:00	1
Nickel	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:00	1
Selenium	ND		0.015		mg/L		09/20/13 09:00	09/20/13 17:00	1
Zinc	ND		0.010		mg/L		09/20/13 09:00	09/20/13 17:00	1

Lab Sample ID: LCS 480-140181/2-A
Matrix: Water
Analysis Batch: 140581

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 140181

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	10.0	10.34		mg/L		103	85 - 115
Arsenic	0.200	0.202		mg/L		101	85 - 115
Cadmium	0.200	0.201		mg/L		100	85 - 115
Chromium	0.200	0.198		mg/L		99	85 - 115
Copper	0.200	0.197		mg/L		99	85 - 115
Iron	10.0	9.80		mg/L		98	85 - 115
Lead	0.200	0.191		mg/L		95	85 - 115
Manganese	0.200	0.195		mg/L		98	85 - 115
Nickel	0.200	0.192		mg/L		96	85 - 115
Selenium	0.200	0.205		mg/L		102	85 - 115
Zinc	0.200	0.194		mg/L		97	85 - 115

Method: 200.7 Rev 4.4 - Metals (ICP) (Continued)

Lab Sample ID: 480-46186-1 MS
Matrix: Water
Analysis Batch: 140581

Client Sample ID: MW-A
Prep Type: Total/NA
Prep Batch: 140181

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	0.29		10.0	10.88		mg/L		106	70 - 130
Arsenic	ND		0.200	0.224		mg/L		112	70 - 130
Cadmium	ND		0.200	0.216		mg/L		108	70 - 130
Chromium	ND		0.200	0.207		mg/L		103	70 - 130
Copper	ND		0.200	0.209		mg/L		105	70 - 130
Iron	9.6		10.0	19.54		mg/L		99	70 - 130
Lead	ND		0.200	0.211		mg/L		104	70 - 130
Manganese	0.93		0.200	1.12	4	mg/L		98	70 - 130
Nickel	ND		0.200	0.209		mg/L		103	70 - 130
Selenium	ND		0.200	0.210		mg/L		105	70 - 130
Zinc	ND		0.200	0.262		mg/L		130	70 - 130

Lab Sample ID: 480-46186-1 MSD
Matrix: Water
Analysis Batch: 140581

Client Sample ID: MW-A
Prep Type: Total/NA
Prep Batch: 140181

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	0.29		10.0	10.77		mg/L		105	70 - 130	1	20
Arsenic	ND		0.200	0.219		mg/L		110	70 - 130	2	20
Cadmium	ND		0.200	0.213		mg/L		107	70 - 130	2	20
Chromium	ND		0.200	0.203		mg/L		100	70 - 130	2	20
Copper	ND		0.200	0.206		mg/L		103	70 - 130	2	20
Iron	9.6		10.0	19.30		mg/L		97	70 - 130	1	20
Lead	ND		0.200	0.204		mg/L		101	70 - 130	3	20
Manganese	0.93		0.200	1.12	4	mg/L		95	70 - 130	0	20
Nickel	ND		0.200	0.206		mg/L		102	70 - 130	1	20
Selenium	ND		0.200	0.206		mg/L		103	70 - 130	2	20
Zinc	ND		0.200	0.198	F	mg/L		98	70 - 130	28	20

Lab Sample ID: 480-46186-2 MS
Matrix: Water
Analysis Batch: 140581

Client Sample ID: MW-B
Prep Type: Total/NA
Prep Batch: 140181

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	ND		10.0	10.20		mg/L		101	70 - 130
Arsenic	ND		0.200	0.177		mg/L		89	70 - 130
Cadmium	ND		0.200	0.174		mg/L		87	70 - 130
Chromium	0.012		0.200	0.167		mg/L		77	70 - 130
Copper	ND		0.200	0.166		mg/L		83	70 - 130
Iron	2.7		10.0	10.64		mg/L		79	70 - 130
Lead	ND		0.200	0.169		mg/L		85	70 - 130
Manganese	0.28		0.200	0.435		mg/L		75	70 - 130
Nickel	ND		0.200	0.167		mg/L		84	70 - 130
Selenium	ND		0.200	0.170		mg/L		85	70 - 130
Zinc	ND		0.200	0.163		mg/L		81	70 - 130

Method: 180.1 - Turbidity, Nephelometric

Lab Sample ID: MB 480-140169/3
Matrix: Water
Analysis Batch: 140169

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

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	ND		1.00		NTU			09/20/13 05:05	1

Lab Sample ID: 480-46186-5 DU
Matrix: Water
Analysis Batch: 140169

Client Sample ID: MW-5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Turbidity	38.8		40.80		NTU		5	20

Method: 353.2 - Nitrogen, Nitrite

Lab Sample ID: MB 480-140173/3
Matrix: Water
Analysis Batch: 140173

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		mg/L			09/20/13 07:03	1

Lab Sample ID: LCS 480-140173/4
Matrix: Water
Analysis Batch: 140173

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	1.42		mg/L		95	90 - 110

Method: 9012A - Cyanide, Total and/or Amenable

Lab Sample ID: MB 480-140945/1-A
Matrix: Water
Analysis Batch: 140958

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 140945

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	ND		0.010		mg/L		09/24/13 17:06	09/24/13 20:13	1

Lab Sample ID: LCS 480-140945/2-A
Matrix: Water
Analysis Batch: 140958

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 140945

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	0.250	0.241		mg/L		96	90 - 110

Lab Sample ID: 480-46186-3 MS
Matrix: Water
Analysis Batch: 140958

Client Sample ID: MW-C
Prep Type: Total/NA
Prep Batch: 140945

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	ND		0.100	0.0939		mg/L		94	90 - 110

Method: 9012A - Cyanide, Total and/or Amenable (Continued)

Lab Sample ID: 480-46186-5 DU — **Client Sample ID: MW-5**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 140958 — **Prep Batch: 140945**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Cyanide, Total	ND		ND		mg/L		NC	15

Method: D516-90, 02 - Sulfate

Lab Sample ID: MB 480-140539/43 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 140539

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		5.0		mg/L			09/23/13 05:28	1

Lab Sample ID: MB 480-140539/7 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 140539

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		5.0		mg/L			09/23/13 02:48	1

Lab Sample ID: LCS 480-140539/42 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 140539

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	30.0	30.88		mg/L		103	90 - 110

Lab Sample ID: LCS 480-140539/6 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 140539

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	30.0	31.94		mg/L		106	90 - 110

Lab Sample ID: MB 480-140977/37 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 140977

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		5.0		mg/L			09/25/13 03:03	1

Lab Sample ID: MB 480-140977/56 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 140977

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		5.0		mg/L			09/25/13 04:32	1

Method: D516-90, 02 - Sulfate (Continued)

Lab Sample ID: LCS 480-140977/36
Matrix: Water
Analysis Batch: 140977

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	30.0	31.84		mg/L		106	90 - 110

Lab Sample ID: LCS 480-140977/55
Matrix: Water
Analysis Batch: 140977

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	30.0	32.21		mg/L		107	90 - 110

Lab Sample ID: MB 480-141200/22
Matrix: Water
Analysis Batch: 141200

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		5.0		mg/L			09/25/13 17:32	1

Lab Sample ID: MB 480-141200/44
Matrix: Water
Analysis Batch: 141200

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		5.0		mg/L			09/25/13 18:39	1

Lab Sample ID: MB 480-141200/81
Matrix: Water
Analysis Batch: 141200

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		5.0		mg/L			09/25/13 21:39	1

Lab Sample ID: LCS 480-141200/21
Matrix: Water
Analysis Batch: 141200

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	30.0	29.79		mg/L		99	90 - 110

Lab Sample ID: LCS 480-141200/43
Matrix: Water
Analysis Batch: 141200

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	30.0	30.09		mg/L		100	90 - 110

Lab Sample ID: LCS 480-141200/80
Matrix: Water
Analysis Batch: 141200

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	30.0	30.76		mg/L		103	90 - 110

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 480-140384/1
Matrix: Water
Analysis Batch: 140384

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10.0		mg/L			09/20/13 16:27	1

Lab Sample ID: LCS 480-140384/2
Matrix: Water
Analysis Batch: 140384

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	502	487.0		mg/L		97	85 - 115

Lab Sample ID: MB 480-140711/1
Matrix: Water
Analysis Batch: 140711

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10.0		mg/L			09/23/13 18:40	1

Lab Sample ID: LCS 480-140711/2
Matrix: Water
Analysis Batch: 140711

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	502	499.0		mg/L		99	85 - 115

Method: SM 4500 Cl- E - Chloride, Total

Lab Sample ID: MB 480-140540/46
Matrix: Water
Analysis Batch: 140540

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0		mg/L			09/23/13 05:36	1

Lab Sample ID: MB 480-140540/67
Matrix: Water
Analysis Batch: 140540

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0		mg/L			09/23/13 06:44	1

Lab Sample ID: LCS 480-140540/45
Matrix: Water
Analysis Batch: 140540

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	25.0	26.93		mg/L		108	90 - 110

Method: SM 4500 Cl- E - Chloride, Total (Continued)

Lab Sample ID: LCS 480-140540/66
Matrix: Water
Analysis Batch: 140540

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	25.0	26.74		mg/L		107	90 - 110

Lab Sample ID: MB 480-140975/33
Matrix: Water
Analysis Batch: 140975

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0		mg/L			09/25/13 03:08	1

Lab Sample ID: MB 480-140975/54
Matrix: Water
Analysis Batch: 140975

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0		mg/L			09/25/13 04:30	1

Lab Sample ID: LCS 480-140975/32
Matrix: Water
Analysis Batch: 140975

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	25.0	26.87		mg/L		107	90 - 110

Lab Sample ID: LCS 480-140975/53
Matrix: Water
Analysis Batch: 140975

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	25.0	26.95		mg/L		108	90 - 110

Lab Sample ID: MB 480-141199/26
Matrix: Water
Analysis Batch: 141199

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0		mg/L			09/25/13 17:43	1

Lab Sample ID: MB 480-141199/7
Matrix: Water
Analysis Batch: 141199

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.0		mg/L			09/25/13 16:07	1

Lab Sample ID: LCS 480-141199/25
Matrix: Water
Analysis Batch: 141199

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	25.0	27.25		mg/L		109	90 - 110

Lab Sample ID: LCS 480-141199/6
Matrix: Water
Analysis Batch: 141199

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	25.0	27.20		mg/L		109	90 - 110

Method: SM 4500 H+ B - pH

Lab Sample ID: LCS 480-140433/1
Matrix: Water
Analysis Batch: 140433

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	6.990		SU		100	99 - 101

Metals

Prep Batch: 103733

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-1	MW-A	Total/NA	Water	1631E	
480-46186-2	MW-B	Total/NA	Water	1631E	
480-46186-3	MW-C	Total/NA	Water	1631E	
480-46186-4	MW-D	Total/NA	Water	1631E	
480-46186-5	MW-5	Total/NA	Water	1631E	
LCS 240-103733/2-A	Lab Control Sample	Total/NA	Water	1631E	
MB 240-103733/1-A	Method Blank	Total/NA	Water	1631E	

Analysis Batch: 103874

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-1	MW-A	Total/NA	Water	1631E	103733
480-46186-2	MW-B	Total/NA	Water	1631E	103733
480-46186-3	MW-C	Total/NA	Water	1631E	103733
480-46186-4	MW-D	Total/NA	Water	1631E	103733
480-46186-5	MW-5	Total/NA	Water	1631E	103733
LCS 240-103733/2-A	Lab Control Sample	Total/NA	Water	1631E	103733
MB 240-103733/1-A	Method Blank	Total/NA	Water	1631E	103733

Prep Batch: 140181

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-1	MW-A	Total/NA	Water	200.7	
480-46186-1 MS	MW-A	Total/NA	Water	200.7	
480-46186-1 MSD	MW-A	Total/NA	Water	200.7	
480-46186-2	MW-B	Total/NA	Water	200.7	
480-46186-2 MS	MW-B	Total/NA	Water	200.7	
480-46186-3	MW-C	Total/NA	Water	200.7	
480-46186-4	MW-D	Total/NA	Water	200.7	
480-46186-5	MW-5	Total/NA	Water	200.7	
LCS 480-140181/2-A	Lab Control Sample	Total/NA	Water	200.7	
MB 480-140181/1-A	Method Blank	Total/NA	Water	200.7	

Analysis Batch: 140581

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-1	MW-A	Total/NA	Water	200.7 Rev 4.4	140181
480-46186-1 MS	MW-A	Total/NA	Water	200.7 Rev 4.4	140181
480-46186-1 MSD	MW-A	Total/NA	Water	200.7 Rev 4.4	140181
480-46186-2	MW-B	Total/NA	Water	200.7 Rev 4.4	140181
480-46186-2 MS	MW-B	Total/NA	Water	200.7 Rev 4.4	140181
480-46186-3	MW-C	Total/NA	Water	200.7 Rev 4.4	140181
480-46186-4	MW-D	Total/NA	Water	200.7 Rev 4.4	140181
480-46186-5	MW-5	Total/NA	Water	200.7 Rev 4.4	140181
LCS 480-140181/2-A	Lab Control Sample	Total/NA	Water	200.7 Rev 4.4	140181
MB 480-140181/1-A	Method Blank	Total/NA	Water	200.7 Rev 4.4	140181

General Chemistry

Analysis Batch: 140169

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-1	MW-A	Total/NA	Water	180.1	
480-46186-2	MW-B	Total/NA	Water	180.1	

General Chemistry (Continued)

Analysis Batch: 140169 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-3	MW-C	Total/NA	Water	180.1	
480-46186-4	MW-D	Total/NA	Water	180.1	
480-46186-5	MW-5	Total/NA	Water	180.1	
480-46186-5 DU	MW-5	Total/NA	Water	180.1	
LCS 480-140169/4	Lab Control Sample	Total/NA	Water	180.1	
MB 480-140169/3	Method Blank	Total/NA	Water	180.1	

Analysis Batch: 140173

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-4	MW-D	Total/NA	Water	353.2	
LCS 480-140173/4	Lab Control Sample	Total/NA	Water	353.2	
MB 480-140173/3	Method Blank	Total/NA	Water	353.2	

Analysis Batch: 140317

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-1	MW-A	Total/NA	Water	120.1	
480-46186-2	MW-B	Total/NA	Water	120.1	
480-46186-3	MW-C	Total/NA	Water	120.1	
480-46186-4	MW-D	Total/NA	Water	120.1	
480-46186-5	MW-5	Total/NA	Water	120.1	
LCS 480-140317/23	Lab Control Sample	Total/NA	Water	120.1	

Analysis Batch: 140384

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-1	MW-A	Total/NA	Water	SM 2540C	
480-46186-2	MW-B	Total/NA	Water	SM 2540C	
480-46186-3	MW-C	Total/NA	Water	SM 2540C	
480-46186-4	MW-D	Total/NA	Water	SM 2540C	
LCS 480-140384/2	Lab Control Sample	Total/NA	Water	SM 2540C	
MB 480-140384/1	Method Blank	Total/NA	Water	SM 2540C	

Analysis Batch: 140433

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-1	MW-A	Total/NA	Water	SM 4500 H+ B	
480-46186-2	MW-B	Total/NA	Water	SM 4500 H+ B	
480-46186-3	MW-C	Total/NA	Water	SM 4500 H+ B	
480-46186-4	MW-D	Total/NA	Water	SM 4500 H+ B	
480-46186-5	MW-5	Total/NA	Water	SM 4500 H+ B	
LCS 480-140433/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	

Analysis Batch: 140442

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-1	MW-A	Total/NA	Water	Nitrate by calc	
480-46186-2	MW-B	Total/NA	Water	Nitrate by calc	
480-46186-3	MW-C	Total/NA	Water	Nitrate by calc	
480-46186-4	MW-D	Total/NA	Water	Nitrate by calc	
480-46186-5	MW-5	Total/NA	Water	Nitrate by calc	

Analysis Batch: 140444

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-1	MW-A	Total/NA	Water	353.2	

General Chemistry (Continued)

Analysis Batch: 140444 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-2	MW-B	Total/NA	Water	353.2	
480-46186-3	MW-C	Total/NA	Water	353.2	
480-46186-5	MW-5	Total/NA	Water	353.2	

Analysis Batch: 140539

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-5	MW-5	Total/NA	Water	D516-90, 02	
LCS 480-140539/42	Lab Control Sample	Total/NA	Water	D516-90, 02	
LCS 480-140539/6	Lab Control Sample	Total/NA	Water	D516-90, 02	
MB 480-140539/43	Method Blank	Total/NA	Water	D516-90, 02	
MB 480-140539/7	Method Blank	Total/NA	Water	D516-90, 02	

Analysis Batch: 140540

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-5	MW-5	Total/NA	Water	SM 4500 Cl- E	
LCS 480-140540/45	Lab Control Sample	Total/NA	Water	SM 4500 Cl- E	
LCS 480-140540/66	Lab Control Sample	Total/NA	Water	SM 4500 Cl- E	
MB 480-140540/46	Method Blank	Total/NA	Water	SM 4500 Cl- E	
MB 480-140540/67	Method Blank	Total/NA	Water	SM 4500 Cl- E	

Analysis Batch: 140711

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-5	MW-5	Total/NA	Water	SM 2540C	
LCS 480-140711/2	Lab Control Sample	Total/NA	Water	SM 2540C	
MB 480-140711/1	Method Blank	Total/NA	Water	SM 2540C	

Prep Batch: 140945

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-1	MW-A	Total/NA	Water	9012A	
480-46186-2	MW-B	Total/NA	Water	9012A	
480-46186-3	MW-C	Total/NA	Water	9012A	
480-46186-3 MS	MW-C	Total/NA	Water	9012A	
480-46186-4	MW-D	Total/NA	Water	9012A	
480-46186-5	MW-5	Total/NA	Water	9012A	
480-46186-5 DU	MW-5	Total/NA	Water	9012A	
LCS 480-140945/2-A	Lab Control Sample	Total/NA	Water	9012A	
MB 480-140945/1-A	Method Blank	Total/NA	Water	9012A	

Analysis Batch: 140958

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-1	MW-A	Total/NA	Water	9012A	140945
480-46186-2	MW-B	Total/NA	Water	9012A	140945
480-46186-3	MW-C	Total/NA	Water	9012A	140945
480-46186-3 MS	MW-C	Total/NA	Water	9012A	140945
480-46186-4	MW-D	Total/NA	Water	9012A	140945
480-46186-5	MW-5	Total/NA	Water	9012A	140945
480-46186-5 DU	MW-5	Total/NA	Water	9012A	140945
LCS 480-140945/2-A	Lab Control Sample	Total/NA	Water	9012A	140945
MB 480-140945/1-A	Method Blank	Total/NA	Water	9012A	140945

General Chemistry (Continued)

Analysis Batch: 140975

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-1	MW-A	Total/NA	Water	SM 4500 Cl- E	
LCS 480-140975/32	Lab Control Sample	Total/NA	Water	SM 4500 Cl- E	
LCS 480-140975/53	Lab Control Sample	Total/NA	Water	SM 4500 Cl- E	
MB 480-140975/33	Method Blank	Total/NA	Water	SM 4500 Cl- E	
MB 480-140975/54	Method Blank	Total/NA	Water	SM 4500 Cl- E	

Analysis Batch: 140977

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-1	MW-A	Total/NA	Water	D516-90, 02	
LCS 480-140977/36	Lab Control Sample	Total/NA	Water	D516-90, 02	
LCS 480-140977/55	Lab Control Sample	Total/NA	Water	D516-90, 02	
MB 480-140977/37	Method Blank	Total/NA	Water	D516-90, 02	
MB 480-140977/56	Method Blank	Total/NA	Water	D516-90, 02	

Analysis Batch: 141199

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-2	MW-B	Total/NA	Water	SM 4500 Cl- E	
480-46186-3	MW-C	Total/NA	Water	SM 4500 Cl- E	
480-46186-4	MW-D	Total/NA	Water	SM 4500 Cl- E	
LCS 480-141199/25	Lab Control Sample	Total/NA	Water	SM 4500 Cl- E	
LCS 480-141199/6	Lab Control Sample	Total/NA	Water	SM 4500 Cl- E	
MB 480-141199/26	Method Blank	Total/NA	Water	SM 4500 Cl- E	
MB 480-141199/7	Method Blank	Total/NA	Water	SM 4500 Cl- E	

Analysis Batch: 141200

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-46186-2	MW-B	Total/NA	Water	D516-90, 02	
480-46186-3	MW-C	Total/NA	Water	D516-90, 02	
480-46186-4	MW-D	Total/NA	Water	D516-90, 02	
LCS 480-141200/21	Lab Control Sample	Total/NA	Water	D516-90, 02	
LCS 480-141200/43	Lab Control Sample	Total/NA	Water	D516-90, 02	
LCS 480-141200/80	Lab Control Sample	Total/NA	Water	D516-90, 02	
MB 480-141200/22	Method Blank	Total/NA	Water	D516-90, 02	
MB 480-141200/44	Method Blank	Total/NA	Water	D516-90, 02	
MB 480-141200/81	Method Blank	Total/NA	Water	D516-90, 02	

Lab Chronicle

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-46186-1

Client Sample ID: MW-A

Lab Sample ID: 480-46186-1

Date Collected: 09/19/13 14:20

Matrix: Water

Date Received: 09/20/13 02:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1631E			103733	10/01/13 17:08	DSH	TAL CAN
Total/NA	Analysis	1631E		1	103874	10/02/13 12:00	DSH	TAL CAN
Total/NA	Prep	200.7			140181	09/20/13 09:00	NMD2	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	140581	09/20/13 17:09	LMH	TAL BUF
Total/NA	Analysis	180.1		1	140169	09/20/13 05:05	RMB	TAL BUF
Total/NA	Analysis	120.1		1	140317	09/20/13 12:14	LMK	TAL BUF
Total/NA	Analysis	SM 2540C		1	140384	09/20/13 16:29	KS	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	140433	09/20/13 20:41	KS	TAL BUF
Total/NA	Analysis	Nitrate by calc		1	140442	09/20/13 06:37	RMB	TAL BUF
Total/NA	Analysis	353.2		1	140444	09/20/13 06:37	RMB	TAL BUF
Total/NA	Prep	9012A			140945	09/24/13 17:06	NCH	TAL BUF
Total/NA	Analysis	9012A		1	140958	09/24/13 20:20	JME	TAL BUF
Total/NA	Analysis	SM 4500 Cl- E		5	140975	09/25/13 04:45	NCH	TAL BUF
Total/NA	Analysis	D516-90, 02		25	140977	09/25/13 05:27	NCH	TAL BUF

Client Sample ID: MW-B

Lab Sample ID: 480-46186-2

Date Collected: 09/19/13 13:50

Matrix: Water

Date Received: 09/20/13 02:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1631E			103733	10/01/13 17:08	DSH	TAL CAN
Total/NA	Analysis	1631E		1	103874	10/02/13 12:04	DSH	TAL CAN
Total/NA	Prep	200.7			140181	09/20/13 09:00	NMD2	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	140581	09/20/13 17:20	LMH	TAL BUF
Total/NA	Analysis	180.1		1	140169	09/20/13 05:05	RMB	TAL BUF
Total/NA	Analysis	120.1		1	140317	09/20/13 12:15	LMK	TAL BUF
Total/NA	Analysis	SM 2540C		1	140384	09/20/13 16:31	KS	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	140433	09/20/13 20:45	KS	TAL BUF
Total/NA	Analysis	Nitrate by calc		1	140442	09/20/13 06:38	RMB	TAL BUF
Total/NA	Analysis	353.2		1	140444	09/20/13 06:38	RMB	TAL BUF
Total/NA	Prep	9012A			140945	09/24/13 17:06	NCH	TAL BUF
Total/NA	Analysis	9012A		1	140958	09/24/13 20:21	JME	TAL BUF
Total/NA	Analysis	SM 4500 Cl- E		5	141199	09/25/13 16:39	RMB	TAL BUF
Total/NA	Analysis	D516-90, 02		10	141200	09/25/13 19:04	RMB	TAL BUF

Client Sample ID: MW-C

Lab Sample ID: 480-46186-3

Date Collected: 09/19/13 13:05

Matrix: Water

Date Received: 09/20/13 02:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1631E			103733	10/01/13 17:08	DSH	TAL CAN

Lab Chronicle

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-46186-1

Client Sample ID: MW-C

Date Collected: 09/19/13 13:05
Date Received: 09/20/13 02:00

Lab Sample ID: 480-46186-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	1631E		1	103874	10/02/13 12:08	DSH	TAL CAN
Total/NA	Prep	200.7			140181	09/20/13 09:00	NMD2	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	140581	09/20/13 17:25	LMH	TAL BUF
Total/NA	Analysis	180.1		1	140169	09/20/13 05:05	RMB	TAL BUF
Total/NA	Analysis	120.1		1	140317	09/20/13 12:17	LMK	TAL BUF
Total/NA	Analysis	SM 2540C		1	140384	09/20/13 16:32	KS	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	140433	09/20/13 20:49	KS	TAL BUF
Total/NA	Analysis	Nitrate by calc		1	140442	09/20/13 06:39	RMB	TAL BUF
Total/NA	Analysis	353.2		1	140444	09/20/13 06:39	RMB	TAL BUF
Total/NA	Prep	9012A			140945	09/24/13 17:06	NCH	TAL BUF
Total/NA	Analysis	9012A		1	140958	09/24/13 20:24	JME	TAL BUF
Total/NA	Analysis	SM 4500 Cl- E		5	141199	09/25/13 16:39	RMB	TAL BUF
Total/NA	Analysis	D516-90, 02		10	141200	09/25/13 19:04	RMB	TAL BUF

Client Sample ID: MW-D

Date Collected: 09/19/13 12:25
Date Received: 09/20/13 02:00

Lab Sample ID: 480-46186-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1631E			103733	10/01/13 17:08	DSH	TAL CAN
Total/NA	Analysis	1631E		1	103874	10/02/13 12:12	DSH	TAL CAN
Total/NA	Prep	200.7			140181	09/20/13 09:00	NMD2	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	140581	09/20/13 17:27	LMH	TAL BUF
Total/NA	Analysis	180.1		1	140169	09/20/13 05:05	RMB	TAL BUF
Total/NA	Analysis	353.2		1	140173	09/20/13 07:16	RMB	TAL BUF
Total/NA	Analysis	120.1		1	140317	09/20/13 12:20	LMK	TAL BUF
Total/NA	Analysis	SM 2540C		1	140384	09/20/13 16:33	KS	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	140433	09/20/13 20:52	KS	TAL BUF
Total/NA	Analysis	Nitrate by calc		1	140442	09/20/13 06:40	RMB	TAL BUF
Total/NA	Prep	9012A			140945	09/24/13 17:06	NCH	TAL BUF
Total/NA	Analysis	9012A		1	140958	09/24/13 20:26	JME	TAL BUF
Total/NA	Analysis	SM 4500 Cl- E		5	141199	09/25/13 16:32	RMB	TAL BUF
Total/NA	Analysis	D516-90, 02		15	141200	09/25/13 17:37	RMB	TAL BUF

Client Sample ID: MW-5

Date Collected: 09/19/13 09:10
Date Received: 09/20/13 02:00

Lab Sample ID: 480-46186-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	1631E			103733	10/01/13 17:08	DSH	TAL CAN
Total/NA	Analysis	1631E		1	103874	10/02/13 12:16	DSH	TAL CAN

Lab Chronicle

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-46186-1

Client Sample ID: MW-5
Date Collected: 09/19/13 09:10
Date Received: 09/20/13 02:00

Lab Sample ID: 480-46186-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.7			140181	09/20/13 09:00	NMD2	TAL BUF
Total/NA	Analysis	200.7 Rev 4.4		1	140581	09/20/13 17:29	LMH	TAL BUF
Total/NA	Analysis	180.1		1	140169	09/20/13 05:05	RMB	TAL BUF
Total/NA	Analysis	120.1		1	140317	09/20/13 12:21	LMK	TAL BUF
Total/NA	Analysis	SM 4500 H+ B		1	140433	09/20/13 20:56	KS	TAL BUF
Total/NA	Analysis	Nitrate by calc		1	140442	09/20/13 06:41	RMB	TAL BUF
Total/NA	Analysis	353.2		1	140444	09/20/13 06:41	RMB	TAL BUF
Total/NA	Analysis	D516-90, 02		10	140539	09/23/13 06:37	RMB	TAL BUF
Total/NA	Analysis	SM 4500 Cl- E		10	140540	09/23/13 07:05	RMB	TAL BUF
Total/NA	Analysis	SM 2540C		1	140711	09/23/13 18:44	KS	TAL BUF
Total/NA	Prep	9012A			140945	09/24/13 17:06	NCH	TAL BUF
Total/NA	Analysis	9012A		1	140958	09/24/13 20:26	JME	TAL BUF

Laboratory References:

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

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Certification Summary

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-46186-1

Laboratory: TestAmerica Buffalo

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arkansas DEQ	State Program	6	88-0686	11-06-13
California	NELAP	9	1169CA	10-30-13
Connecticut	State Program	1	PH-0568	09-30-14
Florida	NELAP	4	E87672	06-30-14
Georgia	State Program	4	N/A	03-31-14
Illinois	NELAP	5	200003	10-30-13
Iowa	State Program	7	374	03-15-15
Kansas	NELAP	7	E-10187	01-31-14
Kentucky	State Program	4	90029	12-31-13
Kentucky (UST)	State Program	4	30	04-01-14
Louisiana	NELAP	6	02031	06-30-14
Maine	State Program	1	NY00044	12-04-14
Maryland	State Program	3	294	03-31-14
Massachusetts	State Program	1	M-NY044	06-30-14
Michigan	State Program	5	9937	04-01-14
Minnesota	NELAP	5	036-999-337	12-31-13
New Hampshire	NELAP	1	2973	09-11-14
New Jersey	NELAP	2	NY455	06-30-14
New York	NELAP	2	10026	04-01-14
North Dakota	State Program	8	R-176	03-31-14
Oklahoma	State Program	6	9421	08-31-14
Oregon	NELAP	10	NY200003	06-09-14
Pennsylvania	NELAP	3	68-00281	07-31-14
Rhode Island	State Program	1	LAO00328	12-31-13
Tennessee	State Program	4	TN02970	04-01-14
Texas	NELAP	6	T104704412-11-2	07-31-14
USDA	Federal		P330-11-00386	11-22-14
Virginia	NELAP	3	460185	09-14-14
Washington	State Program	10	C784	02-10-14
West Virginia DEP	State Program	3	252	12-31-13
Wisconsin	State Program	5	998310390	08-31-14

Laboratory: TestAmerica Canton

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	NELAP	9	01144CA	06-30-14
Connecticut	State Program	1	PH-0590	12-31-13
Florida	NELAP	4	E87225	06-30-14
Georgia	State Program	4	N/A	06-30-14
Illinois	NELAP	5	200004	07-31-14 *
Kansas	NELAP	7	E-10336	01-31-14
Kentucky	State Program	4	58	06-30-14
L-A-B	DoD ELAP		L2315	07-18-16
Nevada	State Program	9	OH-000482008A	07-31-14
New Jersey	NELAP	2	OH001	06-30-14
New York	NELAP	2	10975	04-01-14
Ohio VAP	State Program	5	CL0024	01-19-14
Pennsylvania	NELAP	3	68-00340	08-31-14 *
Texas	NELAP	6		08-31-14 *

* Expired certification is currently pending renewal and is considered valid.

Certification Summary

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-46186-1

Laboratory: TestAmerica Canton (Continued)

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
USDA	Federal		P330-11-00328	08-26-14
Virginia	NELAP	3	460175	09-14-14
Washington	State Program	10	C971	01-12-14
Wisconsin	State Program	5	999518190	08-31-14

Method Summary

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-46186-1

Method	Method Description	Protocol	Laboratory
1631E	Mercury, Low Level (CVAFS)	EPA	TAL CAN
200.7 Rev 4.4	Metals (ICP)	EPA	TAL BUF
120.1	Conductivity, Specific Conductance	MCAWW	TAL BUF
180.1	Turbidity, Nephelometric	MCAWW	TAL BUF
353.2	Nitrogen, Nitrite	MCAWW	TAL BUF
9012A	Cyanide, Total and/or Amenable	SW846	TAL BUF
D516-90, 02	Sulfate	ASTM	TAL BUF
Nitrate by calc	Nitrogen, Nitrate-Nitrite	SM	TAL BUF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL BUF
SM 4500 Cl- E	Chloride, Total	SM	TAL BUF
SM 4500 H+ B	pH	SM	TAL BUF

Protocol References:

ASTM = ASTM International

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

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Sample Summary

Client: CHA Inc
Project/Site: Harbor Brook Site - Groundwater Monitori

TestAmerica Job ID: 480-46186-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-46186-1	MW-A	Water	09/19/13 14:20	09/20/13 02:00
480-46186-2	MW-B	Water	09/19/13 13:50	09/20/13 02:00
480-46186-3	MW-C	Water	09/19/13 13:05	09/20/13 02:00
480-46186-4	MW-D	Water	09/19/13 12:25	09/20/13 02:00
480-46186-5	MW-5	Water	09/19/13 09:10	09/20/13 02:00

Chain of Custody Record

TestAmerica

Client Information			
Client Contact: Katie Flood	Sampler: Flood / Gilbert	Lab PM: Gray-Erdmann, Peggy J	Carrier Tracking No(s):
Company: CHA Inc	Phone: 315 471-3920	E-Mail: peggy.gray-erdmann@testamericainc.com	COC No: 480-39441-10422.1
Address: 441 South Salina Street	Due Date Requested:		Page: Page 1 of 1
City: Syracuse	TAT Requested (days): Standard (sooner if lab schedule allows)		Job #:
State, Zip: NY, 13202	PO #: Purchase Order Requested		
Phone: 315 471 3920	WO #:		
Email: kflood@chacompanies.com	Project #: 48008515		
Project Name: Harbor Brook Site - Groundwater Monitori	SSOW#:		
Site:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date (Time)	Sample Time (Date)	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	1631E - Mercury	200.7 - (MOD) Local Method	2540C_Calcd - Total Dissolved Solids	9012A - Cyanide, Total	120.1, 180.1, 353.2, 353.2_Nitrite, D516, Nitrate_Calc, SM4500_Cl_E, SM4500_H+	Total Number of containers	Special Instructions/Note:
			Preservation Code:		X	X	N	D	N	B	N	X	
MW-A	1420	9/19/13	G	Water									There are some
MW-B	1350	9/19/13	G	Water									filled bottles
MW-C	1305	9/19/13	G	Water									preserved w/ H2SO4
MW-D	1225	9/19/13	G	Water									they were included
MW-5	0910	9/19/13	G	Water									w/bottles by accident.
~~MW-6~~ NOT SAMPLED		~~9/19/13~~	~~G~~	~~Water~~									
													can be discarded.

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ________ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements: 1631s to Canton from Syracuse. -RE

Empty Kit Relinquished by: | Date: | Time: | Method of Shipment:

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Kathryn Flood	9/19/13 1533	CHA	R. English	9-19-13, 15:35	SYR
R English	9-19-13, 19:00	SYR	[signature]	9-20-13 0200	TAL

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks: 3.4 #1

Login Sample Receipt Checklist

Client: CHA Inc

Job Number: 480-46186-1

Login Number: 46186

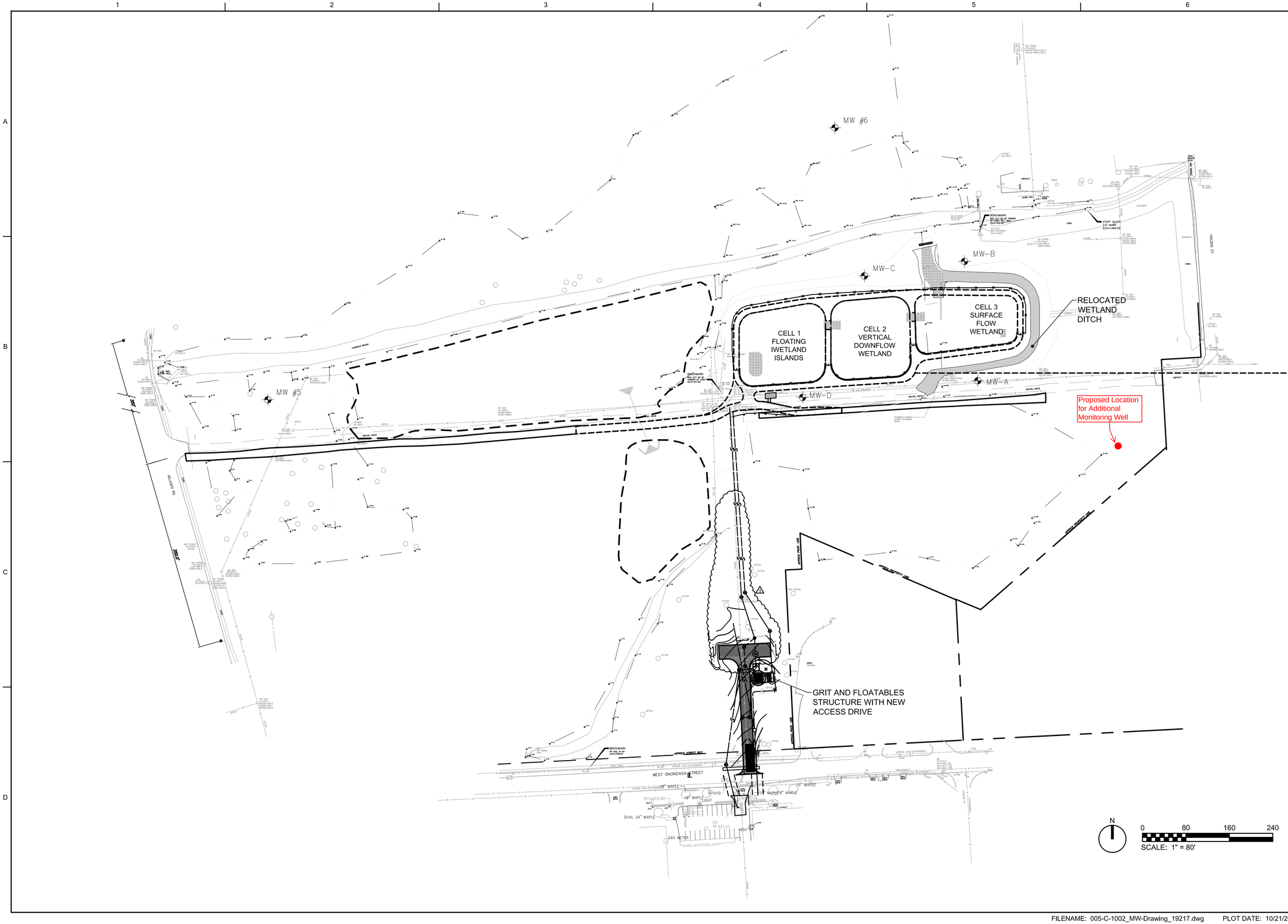
List Source: TestAmerica Buffalo

List Number: 1

Creator: Wienke, Robert K

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.	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	CHA
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	N/A	
Chlorine Residual checked.	N/A	

Attachment C
Site Plan



430 E. GENESEE STREET, SUITE 400
SYRACUSE, NY 13202
PH (315) 345-1400 FAX (315) 451-7270
EB 0000072 AA 001992

HARBOR BROOK CSO 018
CONSTRUCTED WETLANDS
CITY OF SYRACUSE
ONONDAGA COUNTY, NEW YORK

MONITORING WELL LOCATION PLAN

NO.	DSGN	DR	CHK	APVD
0	SKB	JRH	RND	MEH

1" = 80'

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE MARCH 12, 2012
PROJ 19217
DWG C-1002_MW-DRAWING
SHEET

FILENAME: 005-C-1002_MW-Drawing_19217.dwg PLOT DATE: 10/21/2013 PLOT TIME: 4:55:53 PM

APPENDIX C
OCDWEP Environmental Laboratory Field Preservation Guide

WATER ENVIRONMENT PROTECTION LABORATORY

OCDWEP Environmental Laboratory
FIELD PRESERVATION GUIDE

All samples

Cool to <=6^0 C in a cooler (with ice) or refrigerator after preservation

1. General acid preservations

a. METALS SAMPLES - add conc. Trace metal grade Nitric Acid (HNO_3) to adjust the pH range to 1.5 - 2.0. In the case of foaming samples, fill sample container half way, then preserve slowly until sample attains proper pH. Sample Container: see Appendix A. **NOTE 1: No acid is required for bio-solids samples. NOTE 2: For samples which reactive violently from acid addition, such as some sludge samples, document on the C of C and deliver to the laboratory within 24 hrs of collection.**

b. PHENOLS – All phenol samples must be checked for the presence of oxidizers using KI starch paper prior to acidification with Sulfuric Acid. When the paper stays white, add Sulfuric Acid (H_2SO_4) to adjust the pH range to 1.5 - 2.0. Sample Container: see Appendix A.

1. Test with DPD kit, if oxidizer is present, add ascorbic acid, a few crystals at a time, until sample produces no color and then add **0.06g** more.
2. Add Sulfuric Acid to adjust the pH range to 1.5 – 2.0.

c. OIL & GREASE - add conc. Sulfuric Acid (H_2SO_4) to adjust the pH range to 1.5 - 2.0. Sample Container: see Appendix A. ***Specific Instructions for O&G see Appendix B.***

2. Specific analytes

a. CYANIDES --all forms. Sample Container: see Appendix A.

1. Test with DPD kit, if oxidizer is present, add ascorbic acid, a few crystals at a time, until sample produces no color and then add **0.06g** more.
2. Add 10N NaOH to adjust the pH range to 12.0 - 12.5

b. NH3/TKN/TP - Sample Container: see Appendix A. Leave approximately 2.5cm air-space to facilitate mixing of the sample.

1. Determine Cl_2 residual with Hach Pocket Colorimeter Kit – if none is detected, proceed to step #3
2. Add 30% Sodium Thiosulfate dropwise; 1drop/1ppm Cl_2, then add 1 drop excess
3. Add Sulfuric Acid (H_2SO_4) to adjust the pH range to 1.5 - 2.0

Example: Cl_2 measures 2.5ppm - add 4 drops Sodium Thiosulfate - then (H_2SO_4) to pH 1.5 - 2.0

4. If color or turbidity interferes with Cl_2 res. measurement: generally add 2 drops Sodium Thiosulfate, more if high Cl_2 is suspected. Good judgement must be used so that excessive amounts are not added.

Note: In all cases, Cl_2 res. measurement must be attempted and recorded.

c. TP (Total Phosphorus): Sample Container: see Appendix A.
Add Sulfuric acid (H_2SO_4) to adjust pH range to 1.5 – 2.0

Revision Change: Corrected Appendix D and added 2 locations for small O&G jars on page 9 of this guide.

d. SRP (ORTHO-PHOSPHATE): sample must be filtered on site ASAP. Sample Container: see Appendix A. **Leave approximately 2.5cm airspace to facilitate mixing of the sample.**

1. Collect sample in a DI rinsed container
2. Place a previously washed 0.45um filter into filter apparatus
3. Filter sample into the SRP container (125ml plastic) leaving a small airspace
4. Discard filter and rinse apparatus

NOTE: When sample turbidity prevents using one filter to fill container; remove clogged filter, replace with another washed filter and continue filtration. Under extreme conditions, sample may be pre-filtered using a washed glass-microfiber filter, and filtered into a clean container before final filtration with a 0.45um filter.

e. TDP (TOTAL DISSOLVED PHOSPHOROUS) Sample is filtered on site ASAP (see **SRP**) Sample Container: see Appendix A. After filtration, add H_2SO_4 to adjust the pH range to 1.5 - 2.0 (approximately 0.5ml –because sample cannot be pH stripped)

f. TOC (TOTAL ORGANIC CARBON) Sample Container: see Appendix A. Sample is preserved with Phosphoric acid (H_3PO_4) or Sulfuric Acid (H_2SO_4) to adjust the pH range to 1.5 - 2.0. (Not generally preserved in the field by ELS personnel)

g. SULFIDES-TOTAL: Sample Container: see Appendix A.

1. Add 2 mL Zinc Acetate to 250 mL-glass bottle before adding sample
2. Fill with sample (exclude all air bubbles)
3. Add 1 – 2 mL 10N NaOH to adjust sample pH > 9.

h. SULFIDES-DISSOLVED:

1. Add 2 mL 10N NaOH to a clean, empty 1L glass jar, then fill with sample.
2. Immediately add 3 mL 70% Aluminum Chloride ($AlCl_3$) solution.
3. Secure top and shake vigorously, (floc will form) let settle for 15min.
4. Carefully pour off clear supernatant (Do not shake or agitate after settling) into a 250 mL glass bottle with cone insert in cover, excluding all air bubbles.
5. Preserve the clear supernatant sample per Total Sulfides procedures (see above).
6. Discard the floc.

i. HEX-CHROMIUM: Sample Container: see Appendix A. No chemical additions required, cool to <=6° C. Leave approximately 2.5cm airspace. Holding time is <24 hrs – deliver to lab as soon as possible for processing. **Note: in all cases, add chemicals until the proper pH is attained. Any anomalies make a notation on the chain of custody.**

3. ORGANICS (Containers provided by Contract Lab)

a. AKS (EPA 8015) - Add a few grains of sodium thiosulfate to each vial before filling. Ensure no trapped air bubbles when capping vials. Cool to <=6° C

b. PCB'S/PESTICIDES - No chemical additions required, cool to <=6° C

c. PHTHALATES - No chemical additions required, cool to <=6° C

d. 601/602 (EPA 624) - Add a few grains of sodium thiosulfate to sample container, half-fill with sample, add 2 drops 50% HCl and finish filling vial. Ensure no trapped air bubbles when capping vial. Cool to <=6° C.

Revision Change: Corrected Appendix D and added 2 locations for small O&G jars on page 9 of this guide.

4. CONVENTIONALS

No chemical additions required, cool to <=6^0 C. Sample Container: see Appendix A.

5. SPECIAL CONTAINER SAMPLES

These samples do not require chemical additions but need extra care

a. **FLASHPOINT** - no air bubbles present, cool to 4^{0}C. Sample Container: see Appendix A.

b. **T-ALKALINITY** - no air bubbles present, cool to 4^{0}C. Sample Container: see Appendix A.

6. WINKLER DISSOLVED OXYGEN

Add 1 mL Manganous Sulfate solution and 1ml Alkaline-Iodide-Azide reagent beneath the surface of sample. Do not add air bubbles to the sample. Cap bottle tightly and invert twelve times. Cool to 4^{0}C. Sample Container: see Appendix A.

7. Low level Mercury (EPA Method 1631) for all SPDES permit-related mercury monitoring.

These **GRAB** samples must be collected using the EPA method 1669 "Sampling Guidance" protocols of "**dirty hands / clean hands**" including double bagging.

a. Polyethylene sample bottles must **not** be used. Glass pre-cleaned disposable bottles that are already double bagged must be used.
b. Preservation is **not** done in the field. Rather the laboratory will preserve the samples within 48hrs of collection with 1% high purity HCl acid in a controlled environment.
c. Sample delivery requires the mercury samples to be stored in separate coolers from those used for all other analyses.
d. Discrete samplers have been found to contaminate samples and therefore, they should be avoided when possible.
e. A field blank and field duplicate should be collected during each sampling event.

Revision Change: Corrected Appendix D and added 2 locations for small O&G jars on page 9 of this guide.

PROCEDURE FOR COLLECTION OF BACTERIOLOGICAL SAMPLES

1. Where possible, collect sample from effluent overflow (in cascade).

2. Two sterile must be used. Sample Container: see Appendix A.

3. Fill the first sterile container from the source.

4. Fill the second container from the first container, *leaving a small (approximately 2.5 cm.) airspace* to enable sample to be shaken. Determine Cl_2 res. with Hach Pocket Colorimeter Kit and note on bottle. Do not rinse out the Sterile Sample Container. Note: All forms of chlorine must be measured at regional treatment facilities on site since these tests must be performed within 15 minutes of sample collection.

5. The second sterile container is the sample to be delivered for analysis. Sample must be delivered within ***6 Hours of collection. This will provide the lab a maximum of 2 hours to process.***

NOTE: Sample bottles must not be immersed in water from melting ice during transit. Use water tight containers if necessary to prevent this from occurring.

PROCEDURE FOR FIELD ANALYSIS OF CHLORINE AT RTF'S (NEW)

1. Collect sample from effluent overflow (in cascade).

2. Using "Standard Methods 4500-Cl G" determine the following concentrations using the DPD colorimetric method;
- *Using one of the HACH Pocket Colorimeters, take a 25 mL sample and add a DPD free chlorine tab, mix, and immediately read / record the result for Free "Residual" Chlorine (reading A).*
- *Add 2 very small crystals (0.1 grams) of KI, mix and immediately read / record the result (reading B).*
- *Add several additional crystals (0.25 grams) of KI, mix and wait two minutes. Then read / record the result (reading C).*

3. Calculate the concentration as follows;
- ***Total Residual Chlorine** is equal to (reading A)*
- ***Monochloramine** is equal to (reading B-A).*
- ***Total Dichloramine** is equal to (reading C-B)*
- ***Chloramines** is equal to (reading C-A)*
- ***Total Chlorine** is equal to (reading C)*

4. See Append D for a copy of a spreadsheet for the chlorine calculations.

Revision Change: Corrected Appendix D and added 2 locations for small O&G jars on page 9 of this guide.

PROCEDURE FOR FIELD MEASUREMENT OF pH

1. Calibrate pH meter immediately prior to use (see calibration procedure)

2. Rinse electrode with DI water, then pre-rinse with sample

3. If not using an ATC probe, determine temperature of sample and set meter accordingly

4. Place electrode into sample and wait for reading to stabilize. Record date, time sample was taken, time pH was measured, result, and signature of analyst.

5. Rinse electrode with DI water and place into storage solution

pH METER CALIBRATION

1. Remove electrode from storage solution, rinse with DI water, then remove excess by gently shaking electrode or very carefully blotting dry with labwipe. (Do not wipe electrode. This can set up a static charge and affect subsequent readings)

2. If not using an ATC probe, set meter to buffer temperature

3. Place the electrode into pH 4 buffer and calibrate.

4. Remove electrode, rinse with DI water, dry (see above), place into pH 10 buffer and calibrate.

5. Remove electrode, rinse with DI water, dry (see above), and place into pH 7 buffer. This value must be within 0.05 pH units of 7.00. If not, buffers must be discarded and meter recalibrated with freshly made buffers. If value is still out of range, electrode and meter must be checked for accuracy by the laboratory before any further pH measurements are taken. If reading for pH 7 buffer is within range, equipment is ready for use. Record date, time, pH 4 and 10 buffer checks, reading of pH 7 buffer, and analysts' initials.

Revision Change: Corrected Appendix D and added 2 locations for small O&G jars on page 9 of this guide.

2008 Onondaga Lake & Tributary
ZOOPLANKTON, PHYTOPLANKTON AND CHLOROPHYLL

A.) ZOOPLANKTON

Onondaga Lake Samples:

1. 0-15 Meter Net Haul
2. Upper Mixed Layer (UML)

Sample Containers: (2) 1000 mL plastic bottle
(4) 500 mL containers of 95% Ethanol / Alka Seltzer

Preservation: Pour the entire sample into the 1000-mL plastic jar and rinse any residual into the jar with wash bottle. Place a quarter tablet of Alka-Seltzer into the jar and wait for zooplankton to stop. Add 70% by volume of 95% reagent grade non-denatured ethanol (more ethanol is better). Example: 150-ml sample requires 350-mL ethanol. Repeat the procedure for the sample to be collected at the UML depth.

B.) PHYTOPLANKTON

Onondaga Lake Samples:

1. UML Composite

Sample Container: 500 mL plastic bottle

Preservation: Preserve the sample with enough Lugols Solution to turn the sample iodine color (maroon in color), approximately 5 to 7 mL per 100 mL of sample,

C.) CHLOROPHYLL-A

Onondaga Lake Samples:

1. UML
2. Photic Zone (2 x Secchi Depth)

Tributary Samples:

1. Onondaga Lake Outlet at Long Branch Road – 2 feet
2. Onondaga Lake Outlet at Long Branch Road – 12 feet

Sample Containers: (2) 2 liter Amber Bottles

Preservation: Cool to <=6° C

Revision Change: Corrected Appendix D and added 2 locations for small O&G jars on page 9 of this guide.

APPENDIX A
Approved Sample Container List

Metals:
i. 500 mL or 1 L container for liquids
ii. 120 mL specimen cup, 1L glass, or 500 mL wide-mouth glass jar for Biosolids, Waste Haulers, or Sludges
iii. 250 mL pre-cleaned glass bottle, doubled bagged for low level mercury.

Phenols:
1 L Amber glass with Teflon-lined cover *(Large)*
8 oz. glass with Teflon-lined cover (Small)

***The following sites have been determined to require the 1 L amber jars** at all times:*

Source	*Ind Code*	*Industry*	*Ind Code*
Metro Effluent	*789*	*Baldwinsville Effluent*	*618*
RockTenn-Solvay Mills	*163*	*RockTenn-Southern Container*	*102*

Oil & Grease:
Clear straight-sided, 1 L or 250 mL glass bottle —HEXANE RINSED—with Teflon-lined plain plastic cover. DO NOT USE PLASTIC COVERS WITH A FOAM LINING. DO NOT PUT A TEFLON LINER OVER A FOAM LINER.

Cyanide:
Half-gallon, 1 Liter or 250 mL Plastic container

NH3/TKN/TP:
1liter plastic container or 120 mL Specimen cup

TP (Total Phosphorus):
1liter plastic container or 120 mL Specimen cup

SRP (ORTHO-PHOSPHATE):
125 mL screw-top plastic Erlenmeyer

TDP (TOTAL DISSOLVED PHOSPHATE):
125 mL screw-top plastic Erlenmeyer

TOC (TOTAL ORGANIC CARBON):
Half-gallon plastic container

SULFIDES-TOTAL:
250 mL glass bottle with cone insert in cap

HEX-CHROMIUM:
1 liter plastic container

CONVENTIONAL:

Revision Change: Corrected Appendix D and added 2 locations for small O&G jars on page 9 of this guide.

Half Gal., Gallon Plastic container; Clear 1Liter Glass container for Waste haulers, *and cold cream jar or sample cups for solid or semi-solid samples.*

FLASHPOINT:
250 mL glass bottle with cone insert in cap.

T-ALKALINITY:
500 mL plastic bottle with cone insert in cap

WINKLER DISSOLVED OXYGEN:
300 mL glass BOD bottle

BACTERIA SAMPLING:
125 mL plastic- sterilized, 250 mL plastic- sterilized

PHYTOPLANKTON:
500 mL plastic bottle

DREISSENID VELIGERS:
1000 mL wide-mouth plastic bottle

ZOOPLNKTON:
1000 mL plastic bottle

CHLOROPHYLL AND PHAEOPHYTIN: Two-Liter brown plastic bottle

Revision Change: Corrected Appendix D and added 2 locations for small O&G jars on page 9 of this guide.

WATER ENVIRONMENT PROTECTION LABORATORY

FROM: Mark Fowkes; Quality Control Officer
DATE: ***Tuesday, September 3, 2013***
SUBJECT: Oil & Grease Samples

The standard recommended sample size for an Oil & Grease analysis is 1 Liter (1000mL). Some sampling points are small pipes which necessitate utilizing a smaller than normal sample container. These containers are slid down these pipes to collect a sample. Therefore, field services have two types of sampling containers for the collection of oil and grease. A quart clear glass jar and a 250 mL clear glass jar.

All jars are labeled "O & G" and have been prepared specifically for the collection of Oil & Grease samples. Any other type of similar container lacking the "O & G" label can not be used. The bottle labels and chain of custody should indicate '1QtOG' for the 1 Quart Oil & Grease glass jar **or** "SmOG" for the 250 mL Oil & Grease glass jar. The standard operating procedure will be as follows:

1. Unless otherwise stated, the one quart jar is to be used for most sampling locations.
2. Two jars are to be used per sample.
3. One jar is labeled 'O & G' and one is labeled 'O & G Test'. As per regulations, the 'test' jar is used to determine the amount of acid to be added to obtain a pH of 2.0 or less.
4. The sample is obtained and split into each jar.
5. As per the SOP, after the proper pH is obtained in the 'test' jar, the same quantity of sulfuric acid is to be added to the 'O & G' jar.
6. Both jars are to be delivered to the laboratory.
7. The laboratory will analyze the sample and dispose of the jars in an appropriate manner.
8. In the event that the site does not allow for the one quart jar to be used, or the sample has high solids content, then a 250 mL jar may be substituted. To date, the **following sites have been determined to require the 250 mL jars** at all times:

Industry	Ind Code	Industry	Ind Code
Ameripride	586	Inficon MH #2 & #3	591
Anaren MH#2	267	Kilian	33
Armstrong Molding MH #1	489	Lockheed Martin MH #1 & #2	154
API	118	***Metallico***	***130***
Bell Pak MH #1	530	Muench-Kreuzer Candle	298
Bitzer Scroll #1	301	New Process Gear	10
Byrne Dairy	62	Oberdofer	39
Carrier MH#1 & #2	8	Packaging Corp of America	103
Cintas	340	Plainville Turkey Farms	69
Cargill	485	Sandy's Bumper Mart MH #1	183
Cathedral Candle	296	Solvay Paperboard	163
Clinton's Ditch #1	447	Solvents & Petroleum	280
Diverse Foods	348	Southern Container	102
Empire Expo	17	Specialized Packaging Radisson	426
Empire State	105	***Steri Pharma***	***515***
Feldmeirer	270	Syracuse Hancock Airport	80
G.A. Braun, Inc.	201	Syracuse Newspapers	190
G.C Hanford MH#1	115	Syracuse Packaging MH #4	499
General Chemical MH#1	563	Terrells	15
Giovanni Food Co., Inc. MH#1	71	Ultra Dairy	63
G & L Davis, MH #1	350	Unifirst MH#1	355

Revision Change: Corrected Appendix D and added 2 locations for small O&G jars on page 9 of this guide.

APPENDIX B
OIL & GREASE – METHOD 1664A -- SPECIFIC INSTRUCTIONS

1. All O&G samples must be collected in a Hexane-rinsed, straight-sided, 1L or 250 mL glass bottle, with a plain plastic (Teflon-lined) cover. These bottles are to be used ONLY for O&G samples.

2. Sample bottles must not be pre-rinsed with sample before collection.

3. Two sample bottles will be needed for each sample, (1) bottle for testing pH and (1) bottle for final sample. Determining the amount of H_2SO_4 to be added to the sample to reach a pH of 1.5 – 2.0 (verified by approved methodology) is done as follows:

a. Fill both 1L bottles with approx. the same amount of sample; DO NOT FILL ABOVE THE START OF THE THREADS ON THE JARS.

b. Adjust the pH of one bottle to <2 with H_2SO_4, record the # of mL of H_2SO_4 used on COC and initial sample may then be discarded.

c. Add the same # of mL H_2SO_4 to the second sample bottle, cool to <=6^0 C and deliver to Lab.

Note: At no time is an electrode or pH paper to be inserted into the final sample container

Additional samples are to be collected for QA/QC requirements. Per the following frequency:

i. For every five (5) O&G samples that are collected, at an industrial site an **additional** two (2) O&G samples will be collected at one of those industrial sites for a total of three (3) samples collected for delivery to the Lab. The fourth sample (pH test sample) can be discarded and the empty bottle returned to the Lab. The specific sites and days of collection will be determined in advance and placed on the Weekly Schedule. This selection is based on the ability to collect all of the necessary samples – if low flow or other impediment to reliable sample collection is present, another site should be chosen.

Note: *If it's necessary to deliver the test sample to the Lab, please clearly label the bottle as 'test sample' to avoid confusion.*

ii. Note number of final sample bottles collected on the COC (SOP).

iii. Samples are cooled to <=6^o C after preservation

By-Pass

All of the procedures required for Industrial O&G sample collection also apply to By-Pass events with the following exception:

The QA/QC sample requirement of two extra sample bottles will be collected on the first sample event of a By-Pass. This means a total of three (3) final sample bottles will be delivered to the Lab. Again, the fourth sample is for testing and may be discarded.

Revision Change: Corrected Appendix D and added 2 locations for small O&G jars on page 9 of this guide.

APPENDIX C
PHENOL – FIELD DUPLICATE - SAMPLING INSTRUCTIONS

The primary focus of taking field duplicates is to evaluate sampling variability and analytical precision. A set of field duplicates is normally obtained by taken a well mixed, homogenized sample and splitting it into two fractions. Each fraction is then preserved as required by the protocol established for the method. For phenol grab samples, a single ~~one Liter amber~~ glass container with a Teflon lined cover is normally used. These glass ~~amber~~ bottles are further identified by a label with "Phenol" inscribed to help ensure they have been properly cleaned and prepared prior to sampling. When collection also includes taking field duplicates, the process will first involve collection as though a single grab sample is being taken. The phenol sample is then shaken and mixed well to create a homogenized mixture. The sample is then split into two fractions by pouring it into two separate phenol containers followed by the appropriate preservation outlined within this guide.

While most duplicate grab samples are collected in this manner it should be noted that some fractions should not be taken as split samples (such as organics and low level Hg). For samples that may experience a loss of analyte from the homogenization process or where sample volume may make the homogenization process impractical, two separate samples should be collected as closely together chronologically and spatially as possible.

Phenol Duplicate Collection Process:

1. Three clean ~~amber~~ glass containers with Teflon caps are required. All containers should have a "Phenol" label.
2. At the sampling site, collect a single grab sample into one glass container filling it at least half full.
3. Shake and mix the sample well before splitting and pouring contents into the other two glass amber jars.
4. Preserve with concentrated H_2SO_4 (sulfuric Acid) to a pH of < 2 and cool to <= 6° C.
5. Make sure to identify on the sample label that one of the bottles is a duplicate.

Revision Change: Corrected Appendix D and added 2 locations for small O&G jars on page 9 of this guide.

APPENDIX D
FIELD CHLORINE CALCULATIONS FOR RTF - INSTRUCTIONS

The metro permit includes monitoring requirements for the regional treatment facilities. These include Hiawatha and Midland where the permit states that during overflow events, total residual chlorine must be measured every four hours during the discharge. In additional, the permit states that the County must use Chlorine by DPD Colorimetric Method - Standard Methods (4500-Cl G) to measure for total residual (free) chlorine and also for the following four additional analytes: Monochloramine, Chloramines, Total Chloramine, and Total Chlorine. The field spreadsheet below is designed to help facilitate the calculations and input of these results into the laboratory's database for reporting purposes.

Using "Standard Methods 4500-Cl G" determine the following concentrations using the DPD colorimetric method;

- Using one of the HACH Pocket Colorimeters, take a 25 mL sample and add a DPD free chlorine tab, mix, and immediately read / record the result for Free "Residual" Chlorine (reading A).
- Add 2 very small crystals (0.1 grams) of KI, mix and immediately read / record the result (reading B).
- Add several additional crystals (0.25 grams) of KI, mix and wait two minutes. Then read / record the result (reading C).

Calculate the concentration as follows;

- **Total Residual Chlorine** is equal to (reading A)
- **Monochloramine** is equal to (reading B-A).
- **Total Dichloramine** is equal to (reading C-B)
- **Chloramines** is equal to (reading C-A)
- **Total Chlorine** is equal to (reading C)

Analyte	Description	Reading	Result (mg/L)
Total Chlorine Residual (reading A)	take a 25 mL sample and add a DPD free chlorine tab, mix, and immediately read / record the result for Free "Residual" Chlorine. (reading A)		
(reading B)	Add 2 very small crystals (0.1 grams) of KI, mix and immediately read / record the result (reading B)		
Total Chlorine (reading C)	Add several additional crystals (0.25 grams) of KI, mix and wait two minutes. Then read / record the result (reading C)		
Monochloramine		(reading B-A)	
Chloramines		(reading C-A)	
~~*Total Chloramine*~~ *Total Dichloramine*		(reading C-B)	

Revision Change: Corrected Appendix D and added 2 locations for small O&G jars on page 9 of this guide.

APPENDIX D
Example Chain of Custody Form

CHAIN OF CUSTODY RECORD

Sample #

ONONDAGA COUNTY DEPARTMENT OF WATER ENVIRONMENT PROTECTION
Engineering and Laboratory Services Division
(Revision: Feb 2014 – COC_62002Dbaseportraitmod.DOC)

Project Name	
IC/FC #	
Sewer#/WCode	
Invoice#	
DEC Permit	
Req. By	

Origin of Sample (i.e., Name of Industry, Treatment Plant, Hauler, etc.)

CATEGORY: Treatment Plant | AMP IND TP WHC SPECIAL QA/QC

LABORATORY NAME: **HC**

Start Date	End Date	Pickup Date	Start Time	End Time	Samp Type	Bottle #	Container Type	Initial	Preserved YES	Preserved NO	SAMPLE NOTES (Lab) Receipt Temp

Bottles/Comp		**Aliquot/Bottle**		**Sample Interval**		**Sampler ID**		**Refrig/Iced**	
Preservation Checklist	Oxidizer Present?		Oxidizer Removed?		PreKit#		**Field pH**		
	Yes	**No**	**Yes**	**No**	Initials		**Chlorine Residual**		
NH3-N							**Meter#**		
TKN							**Flow**	**Yes / No**	
Phenol									
Color Interference?			**If yes, added [ ] drops Na Thio**						

MATRIX:	Remarks (sample / collection details):	**Bypass Samples**	
Solid		Total Residual Chlorine	
WasteWater		Monochloramine	
SurWater		Total Dichloramine	
PotWater		Chloramine	
		Total Chlorine	

SPLIT WITH (Name/Title/Date):

Floatables	Present / Absent	**If present than attach Floatables Description Form to the Chain of Custody**

PARAMETERS AS LISTED IN ANNUAL SCHEDULE? YES NO → If NO, List Parameters below for all samples:

Lab Comments:

CHAIN OF CUSTODY (Signature, Date of Possession)
1.
2.
3.
4.

Attachments included? YES / NO If yes, list pages: Page ____ of ____.

APPENDIX E
OCDWEP Personal Protective Equipment (PPE) Requirements

OCDWEP-ETS Wastewater Technician Field Staff Personal Protective Equipment Requirements

Job Activity	Hazards												Personal Protective Equipment																									
	Electrical	Falls	Airborne Particles	Foot Injury	Hand Injury	Potentially Harmful Dust	Head Injury	Sun Exposure/Radiation	Chemical Exposure	Hearing/Noise	Harmful Gases	Drowning	Hypothermia	Apron	ANZI Z87 Safety Glasses	Chemical Splash Goggles	Dust Mask	Face Shield	Gloves	Hard Hat	Hearing Protection	Lanyards/Harness	Air Monitor	Floor Fall Protection	Safety Shoes	Safety Vest (Class II)	Safety Vest (Class III)	Class III Rain suit	Ventilation	Life Jackets	First Aid Kit	Waders	Mustang Exposure Suit	Sunscreen	Tyvek Suit	Other
General ETS Sample Collection		X	X	X	X	X	X		X	X	X				X	XP	A	A	X	P	P	S	P,S	S	X	S	S	S			X					
General ETS Sample Preservation			X		X	X			X		X				X	XP	A	A	X				A						X		X					
Lake/River/Tributary- Sampling																																						
By Boat		X		X	X			X	X	X		X	X		X	XP	S	A	X		S			X	X						X	X	S		Av		
Wading (Day)		X		X	X		X	X	X			X	X		X	XP	S	A	X	S		S			X	X					X	X	X		Av		
Wading (Night - Dry Weather)		X		X	X		X	X	X			X	X		X	XP	S	A	X	S		S			X		X				X	X					
Wading (Night - Wet Weather)		X		X	X		X	X	X			X	X		X	XP	S	A	X	S		S			X			X			X	X					
Crane Use (Day)		X		X	X		X	X	X			X	X		X	XP	S	A	X	S		S			X	X					X	X			Av		
Crane Use (Night - Dry Weather)		X		X	X		X	X	X			X	X		X	XP	S	A	X	S		S			X		X					X					
Crane Use (Night - Wet Weather)		X		X	X		X	X	X			X	X		X	XP	S	A	X	S		S			X			X				X					
Wintertime- Lake/River																																						
Tributary		X		X	X		X	X	X			X	X		X	XP		A	X					X		X					X	X	X	X	Av		
Boat		X		X	X		X	X	X			X	X		X	XP		A	X		S	S		X							X	X	X	X	Av		
Ice		X		X	X		X	X	X			X	X		X	XP		A	X					X							X	X	X	X	Av		Refer to SOP.
Electrofishing																																						
Boat	X	X							X	X		X	X	X	X	XP		A	X		X	X			X						X	X						Linesman gloves
Tributary/Backpack	X	X						X	X			X	X	X	X	XP		A	X						X							X			Av		
Larval Trawls		X		X	X			X	X	X		X	X	X	X	XP		A	X		X			X	X						X	X	X		Av		
Macroinvertebrate																																						
Tributary		X						X	X			X		X	X	XP		A	X			X			X							X	X		Av		
Lake		X		X	X			X	X			X		X	X	XP		A	X						X						X	X			Av		
Juvenile Seines		X						X	X			X		X	X	XP		A	X			X			X							X	X		Av		
Nesting Survey		X						X				X										X		X	X						X	X	X		Av		Polarized glasses
Zebra Mussel (Lake and River)		X		X	X			X	X			X		X	X	XP		A	X			X										X	X		Av		
Macrophyte Collection		X						X	X			X		X	X	XP		A	X			X		X							X	X	X		Av		
YSI Sonde Replacement at USGS Sites		X		X	X		X	X				X			X				X			X		X							X	X		Av		
Mooring and YSI Buoy Deployment		X		X	X			X				X	X			XP		Av	X			X		X	X							X	X	X	Av		
Mooring and YSI Buoy Removal		X		X	X		X	X	X			X	X	X	X	XP		Av	X	X		X		X	X							X	X	X	Av	Av	

Key For PPE : X - Required, **XP** - Required during preservation, **P** - Required in Posted Areas/Operations (Including Industries), **A** - As Recommended by Applicable MSDS, **S** - Refer to Supervisor and SOP, **Av** - Available for Use.

Please Take Notice: This is a summary of PPE equipment for various ETS Field Staff activities, and does not supersede any SOP requirements. If you have trouble locating a specific SOP, please contact your immediate supervisor.

January 2011