



# Florida Onsite Sewage Nitrogen Reduction Strategies Study

Task B.7

## **B-HS7 Field System Monitoring Report No. 2**

### **Progress Report**

April 2014

442-27-001

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In association with:



**AET**  
Applied Environmental Technology

**Otis Environmental  
Consultants, LLC**

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## **TASK B.7 PROGRESS REPORT**

### **B-HS7 Field System Monitoring Report No. 2**

#### **Prepared for:**

Florida Department of Health  
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Bureau of Environmental Health  
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FDOH Contract CORCL

**April 2014**

#### **Prepared by:**

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### **1.0 Background**

Task B of the Florida Onsite Sewage Nitrogen Reduction Strategies Study (FOSNRS) includes performing field experiments to critically evaluate the performance of nitrogen removal technologies that were identified in FOSNRS Task A.9 and pilot tested in Task A.26. To meet this objective, full scale treatment systems are being installed at various residential sites in Florida and monitored over an extended timeframe under actual onsite conditions. The Task B Quality Assurance Project Plan (Task B.5) documents the objectives, monitoring framework, sample frequency and duration, and analytical methods to be used at the home sites. This report documents the second sample event of the passive nitrogen reduction system at a home site B-HS7 in Marion County, Florida.

### **2.0 Purpose**

This monitoring report documents data collected from the second B-HS7 monitoring and sampling event conducted on March 20, 2014. This monitoring event consisted of conducting flow measurements from the household water use meter and the treatment system internal water meters, recording electricity use, monitoring of field parameters, collection of water samples from twenty-one points in the treatment system, and chemical analyses of water samples by a NELAC certified laboratory.

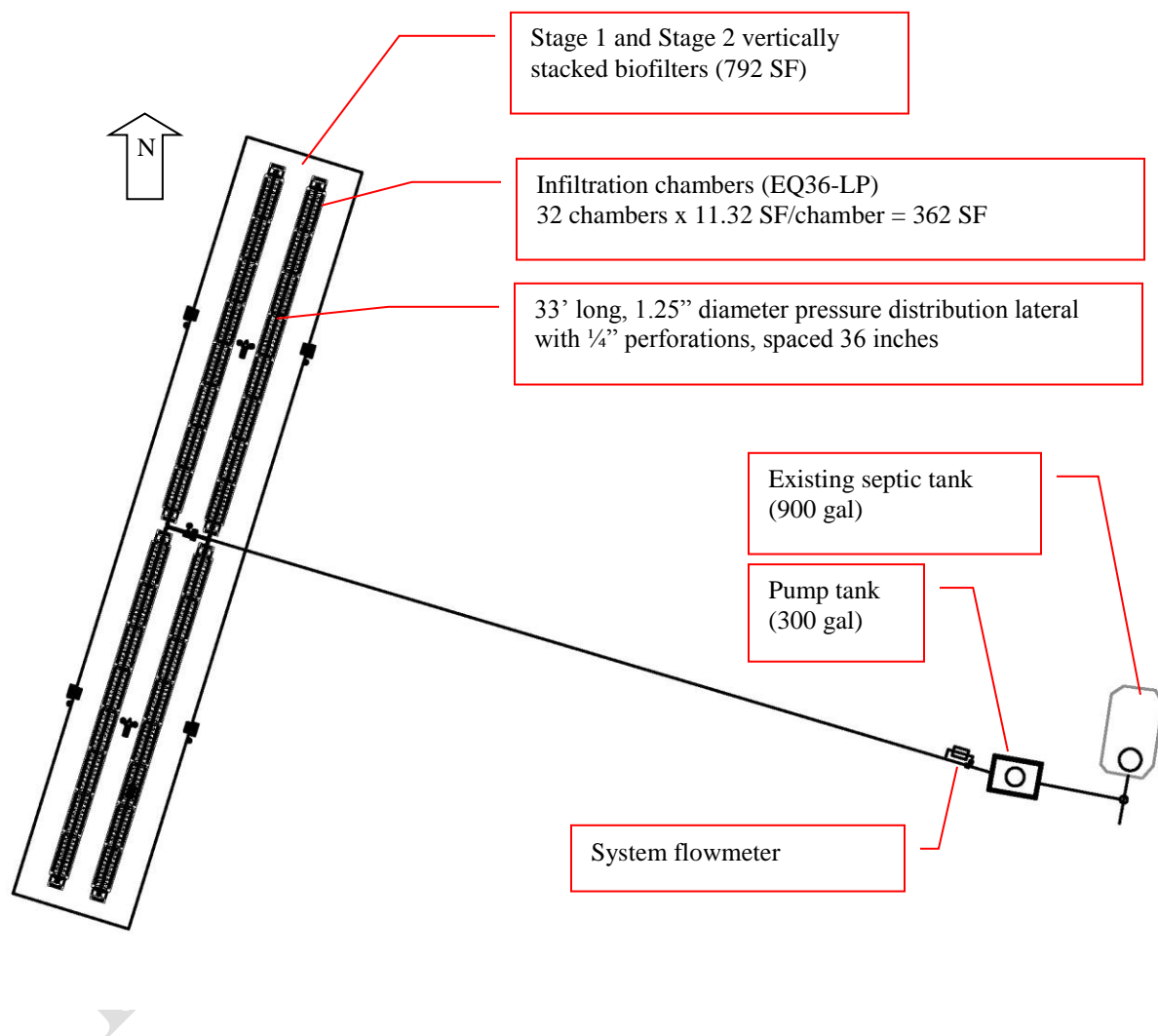
### **3.0 Materials and Methods**

#### **3.1 Project Site**

The B-HS7 field site is located in Marion County, FL. The nitrogen reducing onsite treatment system for the single family residence was installed in November 2013. Design and construction details were presented previously in the Task B.6 document. Figure 1 is a system schematic showing the system components and layout of the installation. A flow schematic of the system is shown in Figure 2. The B-HS7 system consists of a 300 gallon concrete pump tank, low-pressure distribution network, and an in-ground Stage 1 nitrification biofilter directly over a lined Stage 2 denitrification biofilter.

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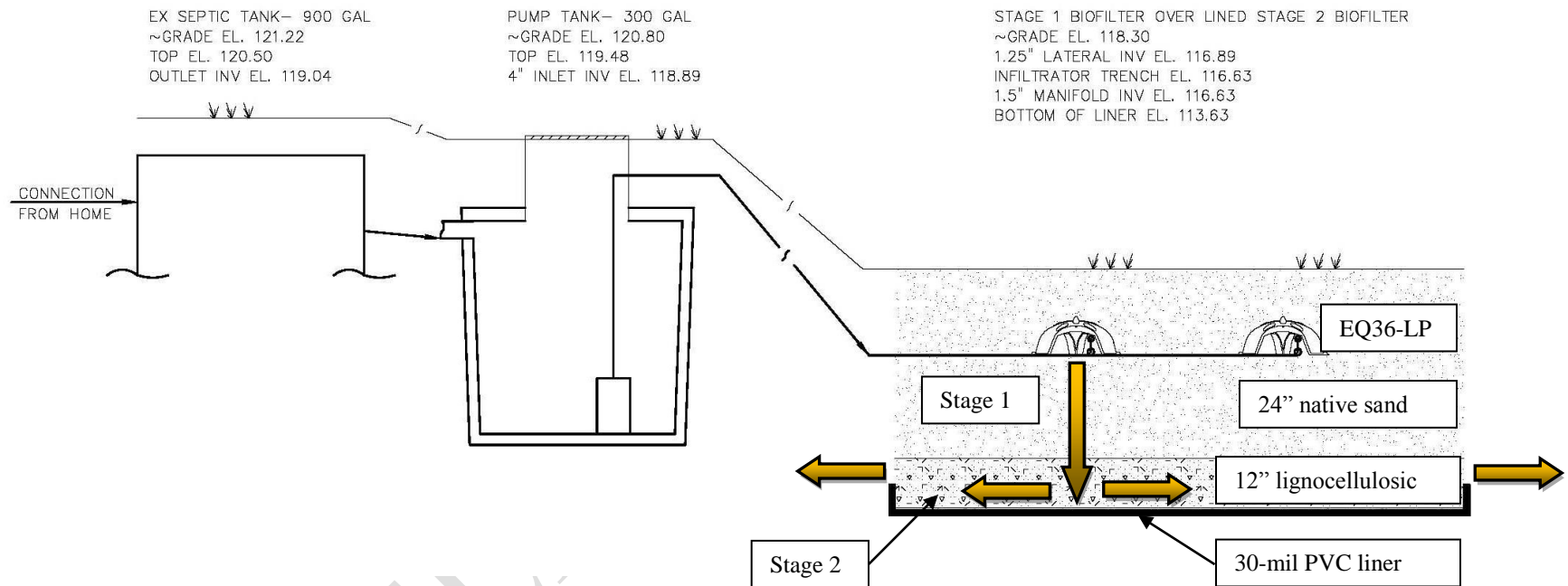
The existing 900 gallon dual chamber septic tank will continue to provide primary treatment for the new PNRS system. The treated effluent is discharged into the soil around the perimeter of the liner.



**Figure 1**  
**Plan view of B-HS7 System Layout**

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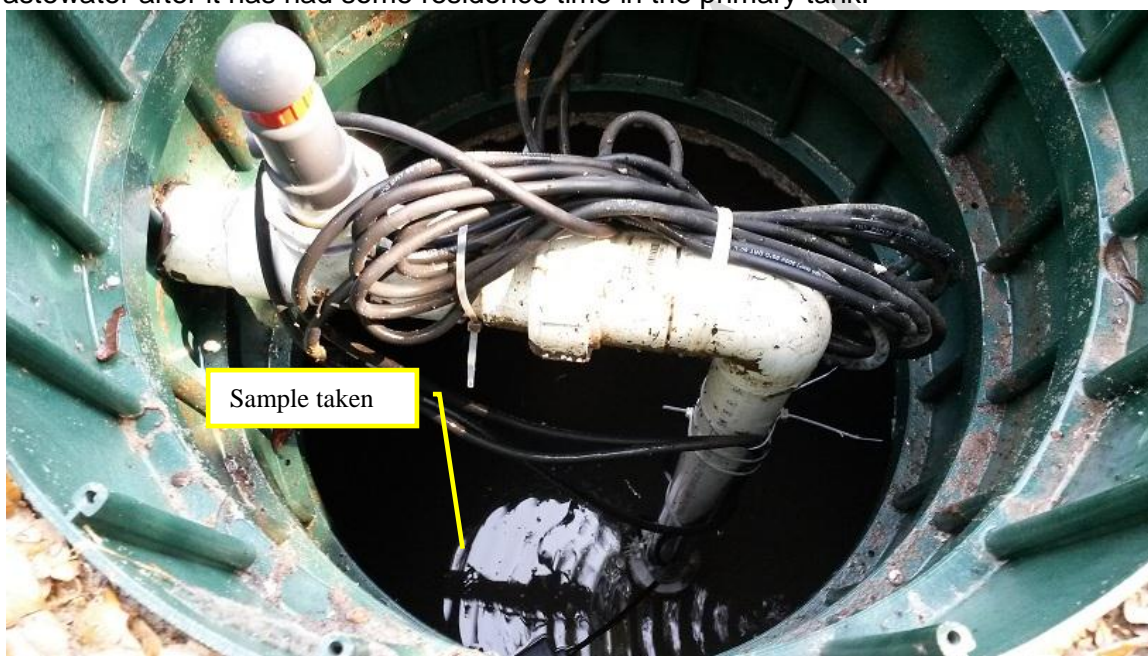


**Figure 2**  
**Flow Schematic of B-HS7 PNRS Installed in Marion County**

### 3.3 Monitoring and Sample Locations and Identification

The monitoring points for this sample event are shown in Figure 3. The monitoring points used for treatment evaluation across a cross section in the southwest side of treatment area are shown in Figure 4.

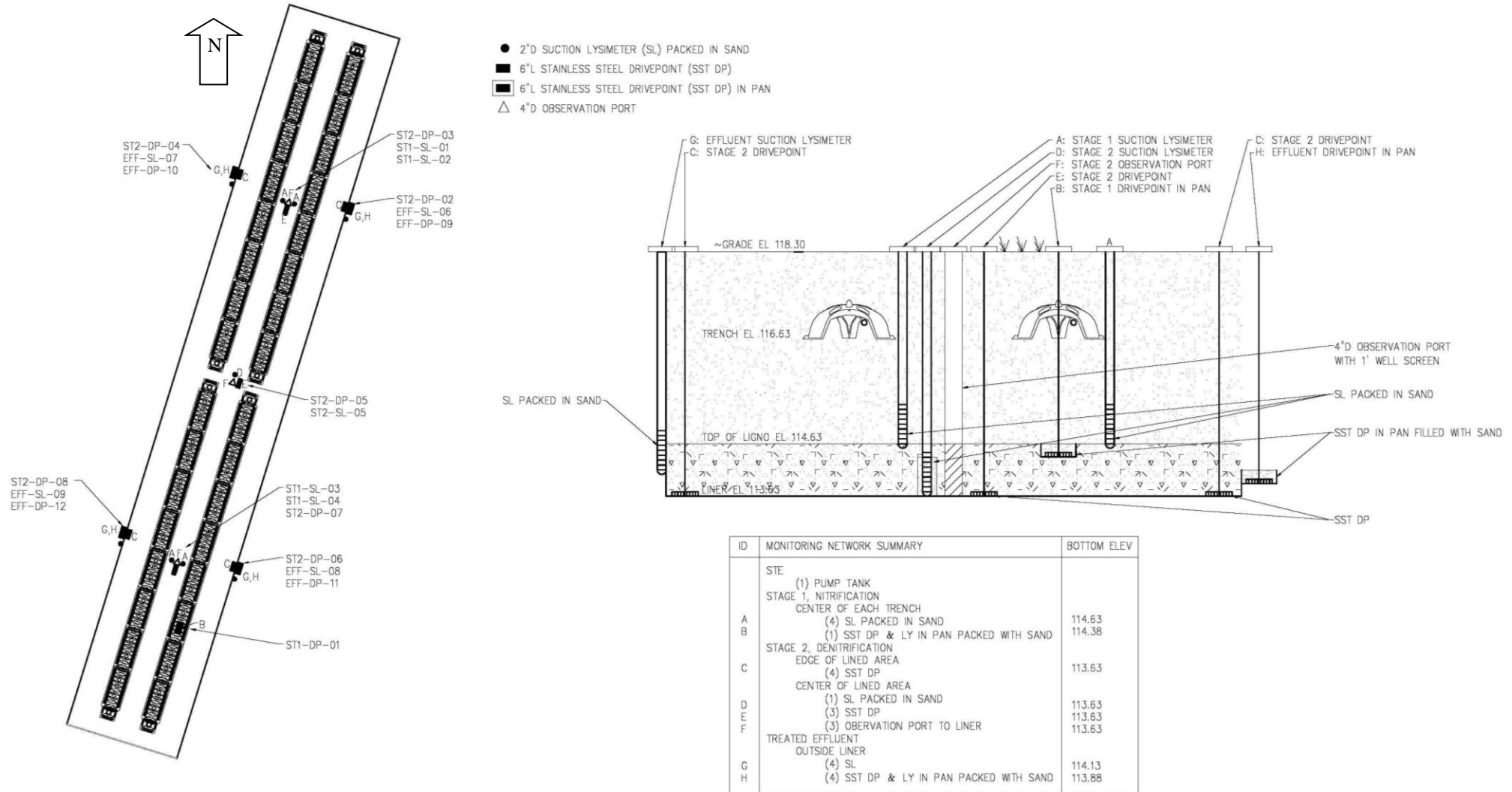
**Primary Effluent:** Household wastewater enters the 1<sup>st</sup> chamber of the primary tank and exits the second chamber as septic tank effluent through an effluent screen. Screened effluent is directed to the pump tank which contains the pump and float switches. The first monitoring point, B-HS7-STE, is the effluent sampled approximately 1.5 feet below the surface of the pump tank (Figure 5), which is referred to as primary effluent or septic tank effluent (STE). Samples from monitoring point B-HS7-STE are the whole household wastewater after it has had some residence time in the primary tank.



**Figure 5**  
**Pump Tank (B-HS7-STE sample)**

**Stage 1 Effluent:** Pump tank contents are discharged through a low-pressure distribution network installed inside Infiltrator EQ36-LP™ chambers. The low-pressure distribution network consists of a central manifold design with (4) 33-foot long, 1.25-inch diameter perforated laterals installed along the top of the 24-inch native sand media (unsaturated Stage 1 biofilter). In the Stage 1 biofilter, wastewater percolates downward

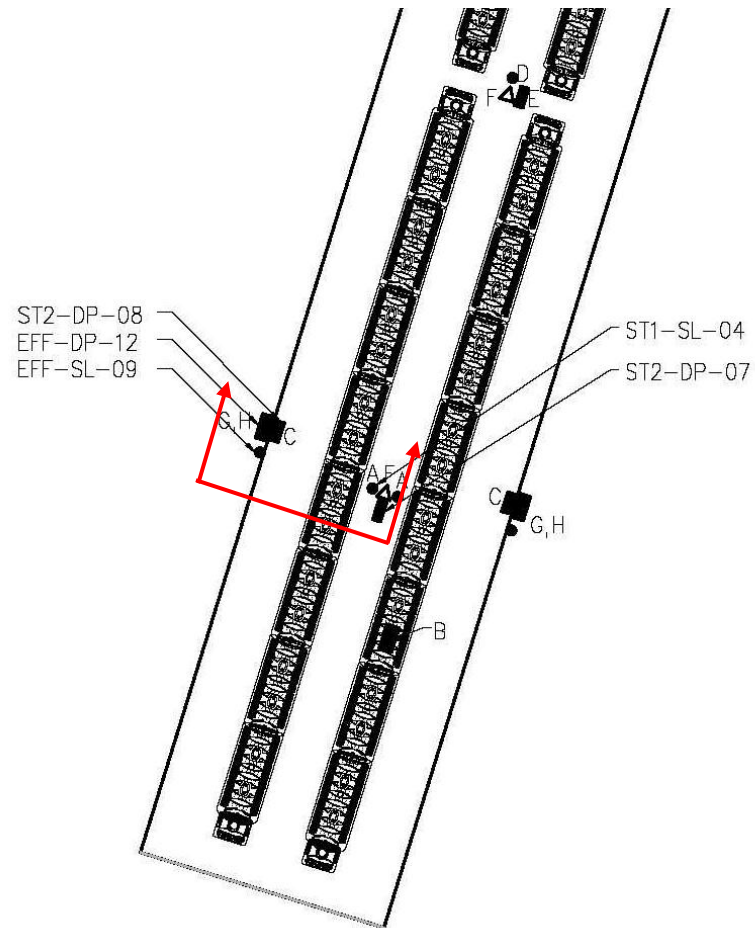
through the unsaturated native sand media where nitrification occurs. Ceramic cup suction lysimeters (BHS7-ST1-SL-01, BHS7-ST1-SL-02, BHS7-ST1-SL-03, and BHS7-ST1-SL-04) were installed with the cup at the bottom of the native sand layer to represent water quality after downward passage through the sand layer (see Figure 6). In addition, one stainless steel drivepoint (BHS7-ST1-DP-01) was installed in a shallow pan at the bottom of the native sand layer (see Figure 7). The Stage 1 monitoring point in the treatment evaluation cross section is BHS7-ST1-SL-04, which is located in the center of the south end of the lined area.



**Figure 3**  
**B-HS7 Sample and Monitoring Locations**



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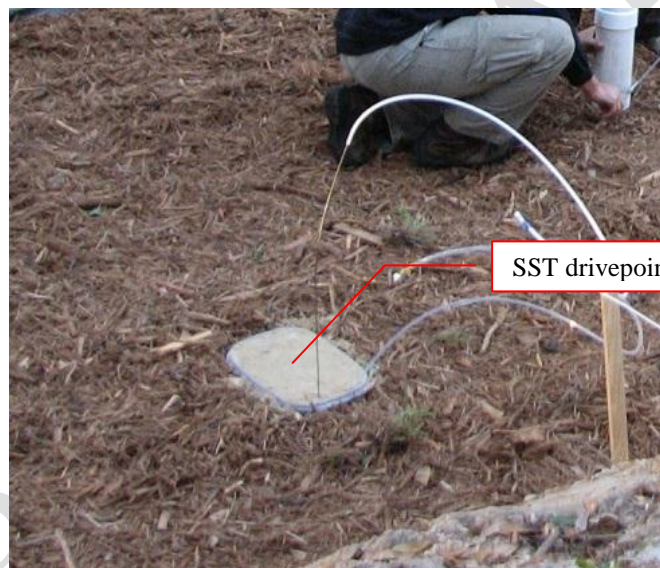
**Figure 4**  
**B-HS7 Treatment Evaluation Cross Section**



Suction lysimeter installed  
with cup located at bottom of  
native sand layer

**Figure 6**

**Stage 1 biofilter effluent sample taken from suction lysimeter (BHS7-ST1-SL samples)**



SST drivepoint in pan

**Figure 7**

**Stage 1 biofilter effluent sample taken from drivepoint in pan  
(BHS7-ST1-DP-01 sample)**

**Stage 2 Effluent:** Directly below the 24-inch native sand Stage 1 biofilter is a 12-inch layer of lignocellulosic media as a supplemental carbon source for denitrification (Stage 2 biofilter), a blended urban waste wood from Wood Resource Recovery, Ocala, FL. The new Stage 2 biofilter treatment area was prepared with a 30 mil PVC liner installed below the lignocellulosic media. The liner was installed with a 6 inch lip around the outside perimeter. Therefore, approximately 6-inches of the lignocellulosic media is sat-

urated, promoting oxygen depletion and denitrification of the nitrified effluent. At the bottom of the Stage 2 biofilter lignocellulosic media, directly above the liner, stainless steel drivepoint samplers were installed (see Figure 8) including: BHS7-ST2-DP-02, BHS7-ST2-DP-03, BHS7-ST2-DP-04, BHS7-ST2-DP-05, BHS7-ST2-DP-06, BHS7-ST2-DP-07, and BHS7-ST2-DP-08. In addition, one suction lysimeter (BHS7-ST2-SL-05) was installed with the cup at the bottom of the lignocellulosic layer to represent water quality just after downward passage through the lignocellulosic layer (see Figure 9). The Stage 2 monitoring points in the treatment evaluation cross section are BHS7-ST2-DP-07 (which is located in the center of the south end of the lined area) and BHS7-ST2-DP-08 (which is located on the southwest edge of the lined area).



**Figure 8**

**Stage 2 biofilter effluent sample taken from drivepoint (BHS7-ST2-DP samples)**

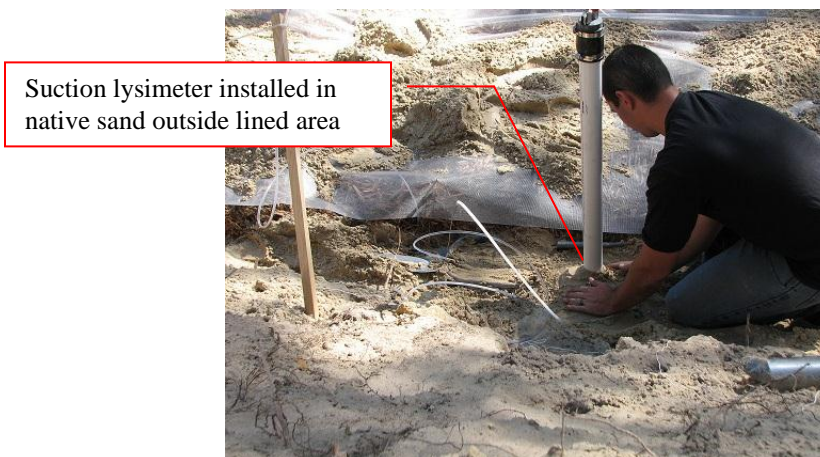
Suction lysimeter installed with cup at bottom of lignocellulosic layer



**Figure 9**

**Stage 2 biofilter effluent sample taken from suction lysimeter (BHS7-ST2-SL-05)**

**Perimeter Monitoring Points:** The treated effluent is discharged into the soil surrounding the perimeter of the lined area. Ceramic cup suction lysimeters (BHS7-EFF-SL-06, BHS7-EFF-SL-07, BHS7-EFF-SL-08, and BHS7-EFF-SL-09) were installed around the perimeter of the liner, with the bottom of the cup approximately 6-inches below the lip of the liner within the native sand (see Figure 10) to represent treated effluent. In addition, stainless steel drivepoints (BHS7-EFF-DP-09, BHS7-EFF-DP-10, BHS7-EFF-DP-11, BHS7-EFF-DP-12) were installed in shallow pans adjacent to the lip of the liner (see Figure 11). The treated effluent monitoring points in the treatment evaluation cross section are BHS7-EFF-SL-09 and BHS7-EFF-DP-12, which are located adjacent to the southwest lined area.



**Figure 10**  
**Treated effluent sample taken from suction lysimeter (BHS7-EFF-SL samples)**



**Figure 11**  
**Treated effluent sample taken from drivepoint in pan (BHS7-EFF-DP samples)**



### 3.4 Operational Monitoring

Start-up of the system occurred on November 19, 2013 (Experimental Day 0). However, during the Thanksgiving holiday, the homeowners projected having between thirty and forty additional people staying at the home. Therefore, since this was so soon after start-up, on November 26, 2013, the Bull Run™ diversion valve was flipped so that all the wastewater flow was diverted to the old drainfield. The diversion valve was flipped back to the PNRS system on December 2, 2014. Shortly thereafter, the homeowners planned a holiday party with a projected eighty people in attendance. Therefore on December 6, 2013, the diversion valve was flipped again so that all the wastewater flow was diverted to the old drainfield. The diversion valve was flipped back to the PNRS system on December 9, 2013, and the PNRS system has operated continually since that date.

The second formal sampling event was conducted March 20, 2014 (Experimental Day 121). For this second formal sampling event, the water meter for the house and treatment system flow meters were read and recorded on March 20, 2014. The household water meter is located on the potable water line from the onsite well prior to entering the household plumbing. The water meter does not include the irrigation water use. Therefore, the water meter reading should be indicative of the wastewater flow to the system.

The PNRS treatment system flow meter (Figure 12) is located on the pump tank discharge line and records the cumulative flow in gallons pumped from the pump chamber to the low-pressure distribution network.

Three observation ports are installed along the centerline of the Stage 2 biofilter lined area (north, center and south). The observation ports are 4-inch diameter well screens that were installed with the bottom positioned on the liner. Therefore, the water level within the lined area is able to be monitored within the observation ports.



**Figure 12**  
**PNRS system flow meter**

### **3.5 Energy Consumption**

Energy consumption was monitored using an electrical meter installed between the main power box for the house and the control panel. The electrical meter records the cumulative power usage of the system in kilowatt-hours. The power usage of the system is primarily due to the single pump in the pump tank. There are no chemicals added to the system. However, the Stage 2 biofilter media (lignocellulosic) is “reactive” media which will be consumed during operation. The Stage 2 biofilter was initially filled with 12 inches of lignocellulosic media, which ostensibly will last for many years without replenishment or replacement.

### **3.6 Water Quality Sample Collection and Analyses**

The second formal sample event (Sample Event No. 2), which is the subject of this report, was conducted on March 20, 2014 (Experimental Day 121). A full suite of influent, intermediate and effluent water quality samples were collected from the system for water quality analysis. Samples were collected at each of the monitoring points described in Section 3.2. A peristaltic pump was used to collect samples and route them directly into analysis-specific containers after sufficient flushing of the tubing had occurred. Field parameters were then recorded.

In addition, equipment blank (B-HS2-EB) sample and a potable water sample from the onsite well were taken. The equipment blank was collected by pumping deionized water through the cleaned pump tubing. The potable well water sample was collected from a

hose bib on the house near the system. These samples were then analyzed for the same parameters as the monitoring samples.

The analysis-specific containers were supplied by the analytical laboratory and contained appropriate preservatives. The analysis-specific containers were labeled, placed in coolers and transported on ice to the analytical laboratories. Each sample container was secured in packing material as appropriate to prevent damage and spills, and was recorded on chain-of-custody forms supplied by the laboratory. Chain of custody forms, provided in Appendix A, were used to document the transfer of samples from field personnel to the analytical laboratory.

Field parameters were measured using portable electronic probes and included temperature (Temp), dissolved oxygen (DO), oxidation-reduction potential (ORP), pH, and specific conductance. The field parameters were measured by placing the analytical probes in a container overflowing with sample water. The influent, intermediate, and effluent samples were analyzed by the laboratory for: total alkalinity, chemical oxygen demand (COD), total Kjeldahl nitrogen (TKN-N), ammonia nitrogen (NH<sub>3</sub>-N), nitrate nitrogen (NO<sub>3</sub>-N), nitrite nitrogen (NO<sub>2</sub>-N), total phosphorus (TP), orthophosphate (Ortho P), total suspended solids (TSS), volatile suspended solids (VSS), total organic carbon (TOC), fecal coliform (fecal), and E.coli. All analyses were performed by independent and fully NELAC certified analytical laboratory (Southern Analytical Laboratory). Table 1 lists the analytical parameters, analytical methods, and detection limits for laboratory analyses.

**Table 1**  
**Analytical Parameters, Method of Analysis, and Detection Limits**

<b>Analytical Parameter</b>	<b>Method of Analysis</b>	<b>Method Detection Limit (mg/L)</b>
Total Alkalinity as CaCO <sub>3</sub>	SM 2320B	2 mg/L
Chemical Oxygen Demand (COD)	EPA 410.4	10 mg/L
Total Kjeldahl Nitrogen (TKN-N)	EPA 351.2	0.05 mg/L
Ammonia Nitrogen (NH <sub>3</sub> -N)	EPA 350.1	0.005 mg/L
Nitrate Nitrogen (NO <sub>3</sub> -N)	EPA 300.0	0.01 mg/L
Nitrite Nitrogen (NO <sub>2</sub> -N)	EPA 300.0	0.01 mg/L
Nitrate+Nitrite Nitrogen (NOX-N)	EPA 300.0	0.02 mg/L
Total Phosphorus (TP)	SM 4500P-E	0.01 mg/L
Orthophosphate as P (Ortho P)	EPA 300.0	0.01 mg/L
Carbonaceous Biological Oxygen Demand (CBOD <sub>5</sub> )	SM5210B	2 mg/L
Total Suspended Solids (TSS)	SM 2540D	1 mg/L
Volatile Suspended Solids (VSS)	SM 2540E	1 mg/L
Chloride	EPA 300.0	0.50 mg/L
Fecal Coliform (fecal)	SM9222D	2 ct/100mL
E.coli	SM9223B	2 ct/100mL

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## 4.0 Results and Discussion

### 4.1 Operational Monitoring

Table 2 provides a summary of the household water use since the household water meter installation on October 15, 2013. The treatment system flow meter readings for the B-HS7 field site are also summarized in Table 2. The operation and maintenance log which includes actions taken since start-up is provided in Appendix B.

**Table 2**  
**Summary of Flowmeters**

Date and Time Read	Household Water Meter Reading	Average Daily Household Flow between readings	PNRS Flow Meter Reading	Average Daily PNRS Flow between readings
	Cumulative Volume (gallons)	gallons/day	Cumulative Volume (gallons)	gallons/day
10/15/2013 13:51	2.9	XX		
10/23/2013 12:20	1,186.9	149.2		
11/14/2013 8:50	3,602.5	110.5		
11/15/2013 14:40	3,800.0	158.9		
11/19/2013 14:18	4,997.5	300.5	652.0	PNRS Start-up
11/26/2013 10:30	7,901.4	424.4	2,480.0	267.2
12/2/2013 9:45	9,148.6	209.0	2,480.0	0.0
12/6/2013 9:00	10,470.4	333.1	3,134.0	164.8
12/10/2013 10:00	11,218.9	185.2	3,302.0	41.6
12/12/2013 9:00	11,519.1	153.3	3,635.0	170.0
1/3/2014 10:50	14,722.0	145.1	6,774.0	142.2
1/17/2014 10:00	16,940.8	158.9	8,621.0	132.3
1/20/2014 12:37	17,483.4	174.5	9,134.0	165.0
3/5/2014 12:00	26,166.5	197.5	11,575.0	55.5
3/13/2014 13:30	27,382.4	150.8	12,609.0	128.2
3/19/2014 11:30	28,122.6	125.1	13,167.5	94.4
3/20/2014 12:30	28,281.8	152.8	13,318.0	144.5
Average since start-up to March 20, 2014		192.6		104.7

As discussed in Section 3.4, there were two periods during the holidays when the wastewater was diverted to the old drainfield. This is probably the reason for the difference in flow when comparing the household water meter and PNRS flow meter readings. From PNRS system installation through March 20, 2014, the household water use average was 192.6 gallons per day with periods of higher and lower flows (Table 2).



The average pumped flow to the PNRS system was 104.7 gallons per day from start-up through March 20, 2014.

An additional water input to consider for evaluation of the system treatment performance is precipitation. A weather station was installed at the site on the roof of the home on January 6, 2014. Data from this weather station is available from the homeowner. Recorded meteorological data is provided in Appendix C, Table C.1. Table 3 provides daily precipitation totals leading up to and during the sample event.

**Table 3**  
**Precipitation Data Daily Totals Measured**  
**March 1, 2014 through March 20, 2014**  
**Sample Event No. 2**

Date	Precipitation (inches)
March 1, 2014	0.00
March 2, 2014	0.00
March 3, 2014	0.00
March 4, 2014	0.00
March 5, 2014	0.00
March 6, 2014	0.61
March 7, 2014	0.01
March 8, 2014	0.00
March 9, 2014	0.00
March 10, 2014	0.00
March 11, 2014	0.00
March 12, 2014	0.42
March 13, 2014	0.00
March 14, 2014	0.00
March 15, 2014	0.00
March 16, 2014	0.00
March 17, 2014	2.66
March 18, 2014	0.08
March 19, 2014	0.00
March 20, 2014	0.00

As discussed in Section 3.4, three observation ports are installed along the centerline of the Stage 2 biofilter lined area (north, center and south). The observation port measurements are summarized in Table 4 which indicate that the monitored liner water level is continuously below the overflow elevation (114.03 ft). During this sample event, the water elevation ranged between 3.3 and 4.3 inches below the overflow elevation.

**Table 4**  
**Liner Water Level within Observation Ports**

Date Read	North Observation Port water elevation		Center Observation Port water elevation		South Observation Port water elevation		Range
	Water elevation (ft)	Depth below overflow (in)	Water elevation (ft)	Depth below overflow (in)	Water elevation (ft)	Depth below overflow (in)	
11/26/2014	113.65	4.6	113.70	4.0	113.69	4.1	4.0-4.6
12/2/2014	113.60	5.2	113.63	4.8	113.59	5.3	4.8-5.3
12/6/2014	113.64	4.7	113.67	4.3	113.64	4.7	4.3-4.7
12/12/2014	113.65	4.5	113.67	4.4	113.59	5.3	4.4-5.3
1/3/2014	113.67	4.3	113.69	4.1	113.61	5.0	4.1-5.0
1/17/2014	113.67	4.3	113.73	3.6	113.65	4.5	3.6-4.5
3/20/2014	113.67	4.3	113.73	3.6	113.76	3.3	3.3-4.3

Overflow elevation is 114.03 ft which is 6 inches above the liner.

## 4.2 Energy Consumption

Energy consumption is monitored using an electrical meter installed between the main power box for the house and the control panel to record cumulative power usage of the pump in kilowatt-hours. The recorded electrical use for the system is summarized in Table 5.

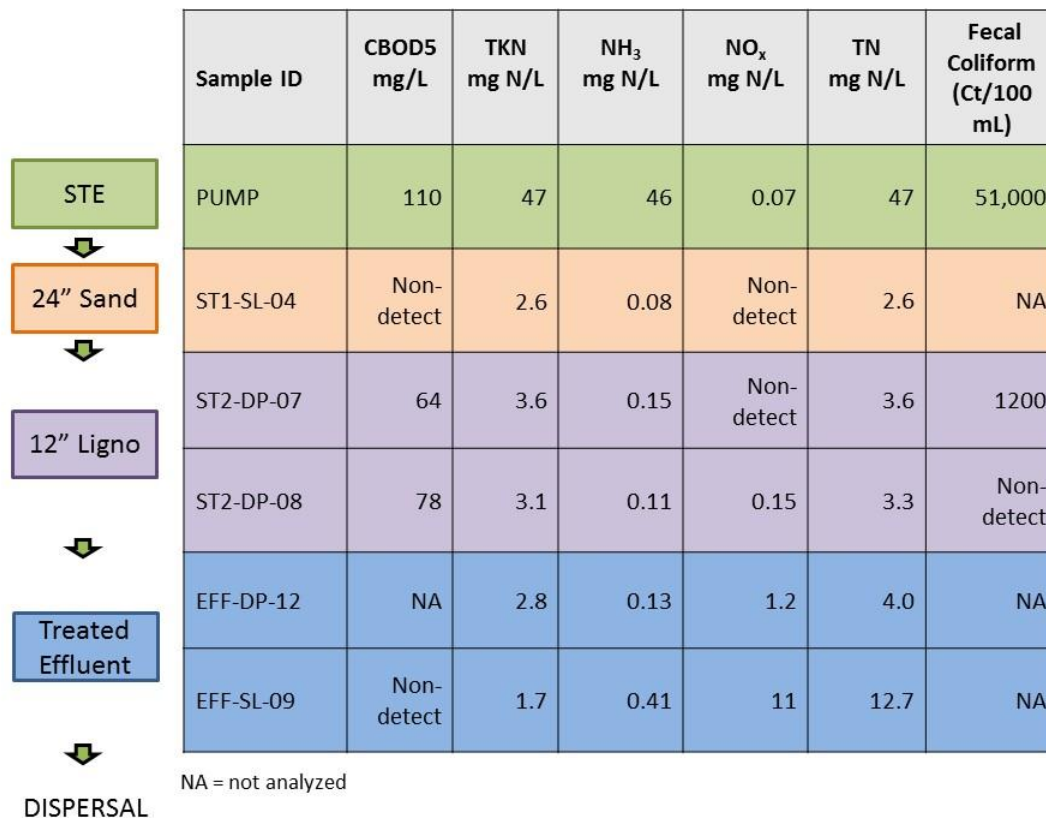
**Table 5**  
**Summary of System Electrical Use**

Date and Time Read	Electrical Meter Reading	Average Daily Electrical Use	Average Electrical Use per Gallon Treated
	Cumulative (kWh)	(kWh/day)	(kWh/ 1000 gal)
11/19/2013 14:18	0.2	0.03	PNRS Start-up
11/26/2013 10:30	0.6	0.06	0.219
12/2/2013 9:45	0.6	0.00	No flow
12/6/2013 9:00	0.8	0.05	0.306
12/10/2013 10:00	0.8	0.00	0.000
12/12/2013 9:00	0.9	0.05	0.300
1/3/2014 10:50	1.7	0.04	0.255
1/17/2014 10:00	2.3	0.04	0.325
1/20/2014 12:37	2.4	0.03	0.195
3/5/2014 12:00	3.1	0.02	0.287
3/13/2014 13:30	3.5	0.05	0.387
3/19/2014 11:30	3.7	0.03	0.358
3/20/2014 12:30	3.7	0.00	0.000
Total average start-up to 3/20/14		0.03	0.276

The total average electrical use through March 20, 2014 was 0.03 kWh per day. The average electrical use per 1,000 gallons treated since start-up was 0.276 kWh per 1,000 gallons treated, and this parameter has been fairly stable since start-up.

### 4.3 Water Quality

Water quality results for the second sampling event (Sample Event No.1) are listed in Table 6. A summary of the water quality data collected to date for the test system is presented in Table 7. Nitrogen results for the treatment evaluation cross section displayed in Figure 4 are graphically displayed in Figure 13. The laboratory report containing the raw analytical data is included in Appendix A. The following discussion summarizes the water quality analytical results for Sample Event No. 2. The performance of the various system components was compared by considering the changes through treatment of nitrogen species (TKN, NH<sub>3</sub>-N, and NO<sub>x</sub>-N), as well as supporting water quality parameters.



**Figure 13**  
**Graphical Representation of Nitrogen Results**

**Septic Tank Effluent (STE) Quality:** The water quality characteristics of STE collected in Sample Event 2 were within the typical range generally expected for domestic STE. The measured STE total nitrogen (TN) concentration was 47 mg/L, which is within the range that has been typically reported for Florida single family residence STE.

**Stage 1 Effluent (native sand):** The sample points considered representative of Stage 1 effluent included: BHS7-ST1-SL-01, BHS7-ST1-SL-02, BHS7-ST1-SL-03, and BHS7-ST1-SL-04, and BHS7-ST1-DP-01. Based on these samples, the Stage 1 effluent mean NH<sub>3</sub>-N level was 0.08 ± 0.03 mg/L with a mean DO level at 4.9 ± 0.3 mg/L in the Stage 1 effluent (Table 6). These results indicate significant nitrification of the effluent by the Stage 1 media biofilter. The Stage 1 effluent mean NO<sub>x</sub>-N concentration was 3.2 ± 7.2 mg/L (n=5).



**Stage 2 Biofilter Effluent (lignocellulosic):** The sample points considered representative of Stage 2 biofilter lignocellulosic media effluent included: BHS7-ST2-DP-02, BHS7-ST2-DP-03, BHS7-ST2-DP-04, BHS7-ST2-DP-05, BHS7-ST2-DP-06, BHS7-ST2-DP-07, BHS7-ST2-DP-08, and BHS7-ST2-SL-05. Based on these samples, the Stage 2 effluent mean  $\text{NO}_x\text{-N}$  concentration was  $0.7 \pm 1.7$  mg/L with a mean DO level at  $0.3 \pm 0.4$  mg/L. The Stage 2 system produced a highly reducing environment and achieved nearly complete  $\text{NO}_x\text{-N}$  reduction. The mean total nitrogen (TN) concentration was  $4.1 \pm 1.6$  mg/L. The effluent mean  $\text{CBOD}_5$  was  $71 \pm 10$  mg/L, an increase over the Stage 1 effluent value due to the lignocellulosic material.

**Perimeter Monitoring Points:** The sample points considered representative of treated effluent included: BHS7-EFF-SL-06, BHS7-EFF-SL-07, BHS7-EFF-SL-08, BHS7-EFF-SL-09, BHS7-EFF-DP-09, BHS7-EFF-DP-10, BHS7-EFF-DP-11, and BHS7-EFF-DP-12. Based on these samples, the treated effluent mean TN was  $14 \pm 7.6$  mg/L of which mean TKN was  $2.1 \pm 0.7$  and mean  $\text{NO}_x\text{-N}$  was  $11.9 \pm 7.7$  mg/L.

**Equipment Blank (EB):** The equipment blank (EB) was collected by pumping deionized water through the cleaned pump tubing. This sample was then analyzed for the same parameters as the monitoring samples. As expected, all parameters measured were at or below the method detection limit.

**Well water (TAP):** The well water (TAP) was collected from a hose bib on the house from the onsite well. This sample was then analyzed for the same parameters as the monitoring samples.

**Table 6**  
**Water Quality Analytical Results**

Sample ID	Sample Date/Time	Temp (°C)	pH	Specific Conductance (uS/cm)	DO (mg/L)	ORP (mV)	Total Alkalinity (mg/L)	TSS (mg/L)	VSS (mg/L)	CBOD <sub>5</sub> (mg/L)	COD (mg/L)	TN (mg/L N) <sup>1</sup>	TKN (mg/L N)	Organic N (mg/L N) <sup>2</sup>	NH <sub>3</sub> -N (mg/L N)	NO <sub>3</sub> -N (mg/L N)	NO <sub>2</sub> -N (mg/L N)	NO <sub>x</sub> (mg/L N)	TIN (mg/L N) <sup>3</sup>	TP (mg/L)	Ortho P (mg/L P)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)	Chloride (mg/L)
BHS7-PUMP	3/20/14 12:05	20.3	7.20	1909	0.09	-233.5	280	35	32	110	220	47.07	47	1	46	0.07	0.01	0.07	46.07	6.2	3.9	51000	10000	300
BHS7-PUMP-DUP	3/20/14 12:10	20.3	7.20	1909	0.09	-233.5	280	37	32	120	240	50.08	50	3	47	0.08	0.01	0.08	47.08	6.1	3.9	54000	24000	310
BHS7-ST1-SL-01	3/20/14 11:12	20.9	5.32	1077	5.01	135.5						18.2	2.2	2.07	0.13	16	0.01	16	16.13					
BHS7-ST1-SL-02	3/20/14 11:00	20.5	5.07	1213	4.44	129.6						1.32	1.3	1.253	0.047	0.01	0.01	0.02	0.067					
BHS7-ST1-SL-03	3/20/14 10:48	19.3	5.49	1348	4.95	115.2						2.22	2.2	2.119	0.081	0.01	0.01	0.02	0.101					
BHS7-ST1-DP-01	3/20/14 10:30	18.9	5.04	1079	5.05	87.2						1.62	1.6	1.518	0.082	0.01	0.01	0.02	0.102					
BHS7-ST1-SL-04	3/20/14 10:40	19.1	5.41	635	4.91	106.9	31	4	4	2	47	2.62	2.6	2.521	0.079	0.01	0.01	0.02	0.099	0.097	0.01			190
BHS7-ST2-DP-02	3/20/14 8:57	19.0	6.01	1471	0.12	-76.2						5.08	4.8	3.88	0.92	0.28	0.01	0.28	1.2					
BHS7-ST2-DP-03	3/20/14 8:57	20.3	6.05	1549	0.62	-109.6						3.66	3.4	3.25	0.15	0.26	0.01	0.26	0.41					
BHS7-ST2-DP-03-DUP	3/20/14 9:05	20.3	6.05	1549	0.62	-109.6						3.55	3.3	3.16	0.14	0.25	0.01	0.25	0.39					
BHS7-ST2-DP-04	3/20/14 9:26	20.3	6.10	1563	0.08	-152.8						2.82	2.8	2.707	0.093	0.01	0.01	0.02	0.113					
BHS7-ST2-DP-05	3/20/14 9:40	20.7	6.05	1536	0.08	-147.6						2.22	2.2	2.09	0.11	0.01	0.01	0.02	0.13					
BHS7-ST2-SL-05	3/20/14 11:25	22.5	5.94	1125	1.2	55.2						7.2	2.3	2.19	0.11	4.9	0.01	4.9	5.01					
BHS7-ST2-DP-06	3/20/14 9:50	20.1	6.08	1554	0.06	-120.4						4.94	4.8	4.6	0.2	0.14	0.01	0.14	0.34					
BHS7-ST2-DP-06-DUP	3/20/14 9:55	20.1	6.08	1554	0.06	-120.4						4.52	4.4	4.21	0.19	0.12	0.01	0.12	0.31					
BHS7-ST2-DP-07	3/20/14 9:58	20.5	6.14	1636	0.13	-117.3	200	11	9	64	370	3.62	3.6	3.45	0.15	0.01	0.01	0.02	0.17	12	9.5	1200	10	310
BHS7-ST2-DP-08	3/20/14 10:08	20.2	6.09	1600	0.08	-161	200	16	13	78	330	3.25	3.1	2.99	0.11	0.15	0.01	0.15	0.26	15	11	1	2	320
BHS7-EFF-SL-06	3/20/14 11:15	21.1	5.64	563	5.74	142.4						18.7	1.7	1.5	0.2	17	0.01	17	17.2					
BHS7-EFF-DP-09	3/20/14 9:03	17.7	6.06	431	6.36	131.5						7.2	2.5	1.59	0.91	4.7	0.01	4.7	5.61					
BHS7-EFF-SL-07	3/20/14 11:20	21.4	5.27	367	6.34	145.8						9.5	1.2	0.99	0.21	8.3	0.01	8.3	8.51					
BHS7-EFF-DP-10	3/20/14 9:18	19.2	6.18	1620	7.18	143.6						23	3	2.88	0.12	20	0.01	20	20.12					
BHS7-EFF-SL-08	3/20/14 10:53	19.3	6.25	1347	6.31	114.2						22.8	1.8	1.722	0.078	21	0.01	21	21.078					
BHS7-EFF-SL-09	3/20/14 10:33	19.1	5.78	269	6.1	53.9	11	1	1	2	33	12.7	1.7	1.29	0.41	11	0.01	11	11.41	0.29	0.24			8.6
BHS7-EFF-DP-12	3/20/14 10:15	19.4	6.2	1309	5.01	-36.3						4	2.8	2.67	0.13	1.2	0.01	1.2	1.33					
BHS7-TAP	3/20/14 11:43	22.7	7.28	173.9	5.83	45.3	78	3	3	2	10	0.27	0.05	0.041	0.009	0.13	0.09	0.22	0.229	0.17	0.15	1	2	3.4
BHS7-EB	3/20/14 11:50	22.6	7.08	2.26	7.79	43.1	2	1	1	2	10	0.07	0.05	0.041	0.009	0.01	0.01	0.02	0.029	0.01	0.01	1	2	0.05

Notes:

<sup>1</sup>Total Nitrogen (TN) is a calculated value equal to the sum of TKN and NO<sub>x</sub>.

<sup>2</sup>Organic Nitrogen (ON) is a calculated value equal to the difference of TKN and NH<sub>3</sub>.

<sup>3</sup>Total Inorganic Nitrogen (TIN) is a calculated value equal to the sum of NH<sub>3</sub> and NO<sub>x</sub>.

Gray-shaded data points indicate values below method detection level (mdl), mdl value used for statistical analyses.

Yellow-shaded data points indicate the reported value is between the laboratory method detection limit and the laboratory practical quantitation limit, value used for statistical analysis.

**Table 7**  
**Summary of Water Quality Analytical Results**

Sample ID		Temp (°C)	pH	Specific Conductance (uS/cm)	DO (mg/L)	ORP (mV)	Total Alkalinity (mg/L)	TSS (mg/L)	VSS (mg/L)	CBOD <sub>5</sub> (mg/L)	COD (mg/L)	TN (mg/L N) <sup>1</sup>	TKN (mg/L N)	Organic N (mg/L N) <sup>2</sup>	NH <sub>3</sub> -N (mg/L N)	NO <sub>3</sub> -N (mg/L N)	NO <sub>2</sub> -N (mg/L N)	NOx (mg/L N)	TIN (mg/L N) <sup>3</sup>	TP (mg/L)	Ortho P (mg/L P)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)	Cl (mg/L)
BHS7-PUMP	n	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	MEAN	19.45	7.42	1984.5	0.17	-164.4	295	35.5	32.5	94	170	49.045	49	1	48	0.04	0.01	0.045	48.045	6.4	4.65	41500	5190	415
	STD. DEV.	1.20	0.30	106.77	0.11	97.79	21.21	0.71	0.71	22.63	70.71	2.79	2.83	0.00	2.83	0.04	0.00	0.04	2.79	0.28	1.06	#####	6802.37	162.63
	MIN	18.6	7.2	1909	0.09	-233.5	280	35	32	78	120	47.07	47	1	46	0.01	0.01	0.02	46.07	6.2	3.9	32000	380	300
	MAX	20.3	7.63	2060	0.25	-95.2	310	36	33	110	220	51.02	51	1	50	0.07	0.01	0.07	50.02	6.6	5.4	51000	10000	530
BHS7-ST1-SL-01	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	18.20	5.47	1498.00	5.33	132.20						29.40	3.40	2.39	1.02	26.00	0.01	26.00	27.02					
	STD. DEV.	3.82	0.21	595.38	0.45	4.67						15.84	1.70	0.45	1.25	14.14	0.00	14.14	15.39					
	MIN	15.5	5.32	1077	5.01	128.9						18.2	2.2	2.07	0.13	16	0.01	16	16.13					
	MAX	20.9	5.62	1919	5.65	135.5						40.6	4.6	2.7	1.9	36	0.01	36	37.9					
BHS7-ST1-SL-02	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	17.95	5.17	1404	5.14	141.85						27.26	1.75	1.5515	0.1985	25.505	0.01	25.51	25.7085					
	STD. DEV.	3.61	0.13	270.11	0.99	17.32						36.68	0.64	0.42	0.21	36.06	0.00	36.05	36.26					
	MIN	15.4	5.07	1213	4.44	129.6						1.32	1.3	1.253	0.047	0.01	0.01	0.02	0.067					
	MAX	20.5	5.26	1595	5.84	154.1						53.2	2.2	1.85	0.35	51	0.01	51	51.35					
BHS7-ST1-SL-03	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	17.55	5.68	1683.00	5.64	142.90						25.16	4.65	2.66	1.99	18.01	2.16	20.51	22.50					
	STD. DEV.	2.47	0.27	473.76	0.98	39.17						32.44	3.46	0.76	2.70	25.45	3.03	28.98	31.68					
	MIN	15.8	5.49	1348	4.95	115.2						2.22	2.2	2.119	0.081	0.01	0.01	0.02	0.101					
	MAX	19.3	5.87	2018	6.33	170.6						48.1	7.1	3.2	3.9	36	4.3	41	44.9					
BHS7-ST1-DP-01	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	17.85	5.08	1556.5	5.21	138.95						27.56	5.05	3.309	1.741	22.505	0.01	22.51	24.251					
	STD. DEV.	1.48	0.06	675.29	0.23	73.19						36.68	4.88	2.53	2.35	31.81	0.00	31.81	34.15					
	MIN	16.8	5.04	1079	5.05	87.2						1.62	1.6	1.518	0.082	0.01	0.01	0.02	0.102					
	MAX	18.9	5.12	2034	5.37	190.7						53.5	8.5	5.1	3.4	45	0.01	45	48.4					
BHS7-ST1-SL-04	n	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1
	MEAN	17.20	5.61	1284.00	5.10	132.65	31.00	3.50	3.50	2.00	31.00	26.66	6.15	3.66	2.49	20.51	0.01	20.51	23.00	0.07	0.01	10.00	2.00	380.0
	STD. DEV.	2.69	0.28	917.82	0.26	36.42		0.71	0.71	0.00	22.63	34.00	5.02	1.61	3.41	28.98	0.00	28.98	32.39	0.04	0.00			
	MIN	15.3	5.41	635	4.91	106.9	31	3	3	2	15	2.62	2.6	2.521	0.079	0.01	0.01	0.02	0.099	0.04	0.01	10	2	380.0
	MAX	19.1	5.8	1933	5.28	158.4	31	4	4	2	47	50.7	9.7	4.8	4.9	41	0.01	41	45.9	0.097	0.01	10	2	380.0

**Table 7 (continued)**  
**Summary of Water Quality Analytical Results**

Sample ID		Temp (°C)	pH	Specific Conductance (uS/cm)	DO (mg/L)	ORP (mV)	Total Alkalinity (mg/L)	TSS (mg/L)	VSS (mg/L)	CBOD <sub>5</sub> (mg/L)	COD (mg/L)	TN (mg/L N) <sup>1</sup>	TKN (mg/L N)	Organic N (mg/L N) <sup>2</sup>	NH <sub>3</sub> -N (mg/L N)	NO <sub>3</sub> -N (mg/L N)	NO <sub>2</sub> -N (mg/L N)	NOx (mg/L N)	TIN (mg/L N) <sup>3</sup>	TP (mg/L)	Ortho P (mg/L P)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)	Cl (mg/L)
BHS7-ST2-DP-02	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	19.25	6	1732.5	0.115	24.7						10.74	10.4	9.725	0.675	0.34	0.055	0.34	1.015					
	STD. DEV.	0.35	0.01	369.82	0.01	142.69						8.00	7.92	8.27	0.35	0.08	0.06	0.08	0.26					
	MIN	19	5.99	1471	0.11	-76.2						5.08	4.8	3.88	0.43	0.28	0.01	0.28	0.83					
	MAX	19.5	6.01	1994	0.12	125.6						16.4	16	15.57	0.92	0.4	0.1	0.4	1.2					
BHS7-ST2-DP-03	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	19.90	6.01	1808.50	0.38	7.90						4.59	4.45	4.31	0.15	0.14	0.01	0.14	0.29					
	STD. DEV.	0.57	0.06	366.99	0.35	166.17						1.32	1.48	1.49	0.01	0.18	0.00	0.17	0.18					
	MIN	19.5	5.96	1549	0.13	-109.6						3.66	3.4	3.25	0.14	0.01	0.01	0.02	0.16					
	MAX	20.3	6.05	2068	0.62	125.4						5.52	5.5	5.36	0.15	0.26	0.01	0.26	0.41					
BHS7-ST2-DP-04	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	19.8	6.02	1828.5	0.08	-5.45						3.77	3.75	3.663	0.087	0.01	0.01	0.02	0.107					
	STD. DEV.	0.71	0.11	375.47	0.00	208.38						1.34	1.34	1.35	0.01	0.00	0.00	0.00	0.01					
	MIN	19.3	5.94	1563	0.08	-152.8						2.82	2.8	2.707	0.081	0.01	0.01	0.02	0.101					
	MAX	20.3	6.1	2094	0.08	141.9						4.72	4.7	4.619	0.093	0.01	0.01	0.02	0.113					
BHS7-ST2-DP-05	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	20.00	6.13	1834.50	0.13	-14.10						2.75	2.70	2.62	0.08	0.04	0.01	0.05	0.13					
	STD. DEV.	0.99	0.11	422.14	0.07	188.80						0.74	0.71	0.75	0.04	0.04	0.00	0.04	0.00					
	MIN	19.3	6.05	1536	0.08	-147.6						2.22	2.2	2.09	0.055	0.01	0.01	0.02	0.125					
	MAX	20.7	6.2	2133	0.18	119.4						3.27	3.2	3.145	0.11	0.07	0.01	0.07	0.13					
BHS7-ST2-SL-05	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	19.25	6.02	1585.5	2.3	97.2						8.8	3.45	3.362	0.088	5.35	0.01	5.35	5.438					
	STD. DEV.	4.60	0.11	651.25	1.56	59.40						2.26	1.63	1.66	0.03	0.64	0.00	0.64	0.61					
	MIN	16	5.94	1125	1.2	55.2						7.2	2.3	2.19	0.066	4.9	0.01	4.9	5.01					
	MAX	22.5	6.1	2046	3.4	139.2						10.4	4.6	4.534	0.11	5.8	0.01	5.8	5.866					
BHS7-ST2-DP-06	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	20.00	6.36	12177.00	0.07	-30.15						6.43	6.35	6.18	0.17	0.08	0.01	0.08	0.25					
	STD. DEV.	0.14	0.39	15023.19	0.01	127.63						2.11	2.19	2.23	0.04	0.09	0.00	0.08	0.13					
	MIN	19.9	6.08	1554	0.06	-120.4						4.94	4.8	4.6	0.14	0.01	0.01	0.02	0.16					
	MAX	20.1	6.63	22800	0.08	60.1						7.92	7.9	7.76	0.2	0.14	0.01	0.14	0.34					
BHS7-ST2-DP-07	n	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
	MEAN	20.2	6.26	12568	0.115	-23.9	205	19	13	42	375	5.42	5.4	5.26	0.14	0.01	0.01	0.02	0.16	36	22.25	600.5	6	470
	STD. DEV.	0.42	0.17	15460.18	0.02	132.09	7.07	11.31	5.66	31.11	7.07	2.55	2.55	2.56	0.01	0.00	0.00	0.00	0.01	33.94	18.03	847.82	5.66	
	MIN	19.9	6.14	1636	0.1	-117.3	200	11	9	20	370	3.62	3.6	3.45	0.13	0.01	0.01	0.02	0.15	12	9.5	1	2	470
	MAX	20.5	6.38	23500	0.13	69.5	210	27	17	64	380	7.22	7.2	7.07	0.15	0.01	0.01	0.02	0.17	60	35	1200	10	470
BHS7-ST2-DP-08	n	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
	MEAN	19.30	6.11	1835.00	0.12	-48.60	200.00	12.00	10.50	48.50	715.00	3.99	3.90	3.80	0.10	0.08	0.01	0.09	0.19	26.00	15.50	1.00	2.00	460
	STD. DEV.	1.27	0.02	332.34	0.05	158.96	0.00	5.66	3.54	41.72	544.47	1.04	1.13	1.14	0.01	0.10	0.00	0.09	0.10	15.56	6.36	0.00	0.00	
	MIN	18.4	6.09	1600	0.08	-161	200	8	8	19	330	3.25	3.1	2.99	0.092	0.01	0.01	0.02	0.112	15	11	1	2	460
	MAX	20.2	6.12	2070	0.15	63.8	200	16	13	78	1100	4.72	4.7	4.608	0.11	0.15	0.01	0.15	0.26	37	20	1	2	460



**Table 7 (continued)**  
**Summary of Water Quality Analytical Results**

Sample ID		Temp (°C)	pH	Specific Conductance (uS/cm)	DO (mg/L)	ORP (mV)	Total Alkalinity (mg/L)	TSS (mg/L)	VSS (mg/L)	CBOD <sub>5</sub> (mg/L)	COD (mg/L)	TN (mg/L N) <sup>1</sup>	TKN (mg/L N)	Organic N (mg/L N) <sup>2</sup>	NH <sub>3</sub> -N (mg/L N)	NO <sub>3</sub> -N (mg/L N)	NO <sub>2</sub> -N (mg/L N)	NOx (mg/L N)	TIN (mg/L N) <sup>3</sup>	TP (mg/L)	Ortho P (mg/L P)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)	Cl (mg/L)
BHS7-EFF-SL-06	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	16.75	5.66	516	5.72	133.25						21.3	2.8	2.669	0.131	18.5	0.01	18.5	18.631					
	STD. DEV.	6.15	0.02	66.47	0.03	12.94						3.68	1.56	1.65	0.10	2.12	0.00	2.12	2.02					
	MIN	12.4	5.64	469	5.7	124.1						18.7	1.7	1.5	0.062	17	0.01	17	17.2					
	MAX	21.1	5.67	563	5.74	142.4						23.9	3.9	3.838	0.2	20	0.01	20	20.062					
BHS7-EFF-DP-09	n	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
	MEAN	17.7	6.06	431	6.36	131.5						7.2	2.5	1.59	0.91	4.7	0.01	4.7	5.61					
	STD. DEV.																							
	MIN	17.7	6.06	431	6.36	131.5						7.2	2.5	1.59	0.91	4.7	0.01	4.7	5.61					
	MAX	17.7	6.06	431	6.36	131.5						7.2	2.5	1.59	0.91	4.7	0.01	4.7	5.61					
BHS7-EFF-SL-07	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	18.45	4.94	602	6.545	155.3						25.05	1.4	1.2905	0.1095	23.65	0.01	23.65	23.7595					
	STD. DEV.	4.17	0.47	332.34	0.29	13.44						21.99	0.28	0.42	0.14	21.71	0.00	21.71	21.57					
	MIN	15.5	4.61	367	6.34	145.8						9.5	1.2	0.99	0.009	8.3	0.01	8.3	8.51					
	MAX	21.4	5.27	837	6.75	164.8						40.6	1.6	1.591	0.21	39	0.01	39	39.009					
BHS7-EFF-DP-10	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	16.25	5.96	1418.5	6.935	144.45						30.25	2.75	2.6575	0.0925	27.5	0.01	27.5	27.5925					
	STD. DEV.	4.17	0.31	284.96	0.35	1.20						10.25	0.35	0.31	0.04	10.61	0.00	10.61	10.57					
	MIN	13.3	5.74	1217	6.69	143.6						23	2.5	2.435	0.065	20	0.01	20	20.12					
	MAX	19.2	6.18	1620	7.18	145.3						37.5	3	2.88	0.12	35	0.01	35	35.065					
BHS7-EFF-SL-08	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	17.55	5.7	1534.5	6.435	140.7						34.4	2.9	2.421	0.479	31.5	0.01	31.5	31.979					
	STD. DEV.	2.47	0.78	265.17	0.18	37.48						16.40	1.56	0.99	0.57	14.85	0.00	14.85	15.42					
	MIN	15.8	5.15	1347	6.31	114.2						22.8	1.8	1.722	0.078	21	0.01	21	21.078					
	MAX	19.3	6.25	1722	6.56	167.2						46	4	3.12	0.88	42	0.01	42	42.88					
BHS7-EFF-SL-09	n	2	2	2	2	2	1	2	2	2	2	1	1	1	2	2	2	2	2	2	2	0	0	1
	MEAN	17.75	5.96	529	5.715	100.25	11	1	1	2	21.5	12.7	1.7	1.29	0.315	25.5	0.01	25.5	25.815	0.153	0.125			83
	STD. DEV.	1.91	0.25	367.70	0.54	65.55		0.00	0.00	0.00	16.26				0.13	20.51	0.00	20.51	20.37	0.19	0.16			
	MIN	16.4	5.78	269	5.33	53.9	11	1	1	2	10	12.7	1.7	1.29	0.22	11	0.01	11	11.41	0.016	0.01			83
	MAX	19.1	6.14	789	6.1	146.6	11	1	1	2	33	12.7	1.7	1.29	0.41	40	0.01	40	40.22	0.29	0.24			83
BHS7-EFF-DP-12	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	18.3	6.23	1573	4.52	34.15						6.4	3.7	3.57	0.13	2.7	0.01	2.7	2.83					
	STD. DEV.	1.56	0.04	373.35	0.69	99.63						3.39	1.27	1.27	0.00	2.12	0.00	2.12	2.12					
	MIN	17.2	6.2	1309	4.03	-36.3						4	2.8	2.67	0.13	1.2	0.01	1.2	1.33					
	MAX	19.4	6.25	1837	5.01	104.6						8.8	4.6	4.47	0.13	4.2	0.01	4.2	4.33					

Notes:

<sup>1</sup>Total Nitrogen (TN) is a calculated value equal to the sum of TKN and NO<sub>x</sub>.

<sup>2</sup>Organic Nitrogen (ON) is a calculated value equal to the difference of TKN and NH<sub>3</sub>.

<sup>3</sup>Total Inorganic Nitrogen (TIN) is a calculated value equal to the sum of NH<sub>3</sub> and NO<sub>x</sub>.

Gray-shaded data points indicate values below method detection level (mdl), mdl value used for statistical analyses.

Yellow-shaded data points indicate the reported value is between the laboratory method detection limit and the laboratory practical quantitation limit, value used for statistical analysis.



## 5.0 B-HS7 Sample Event No. 2: Summary and Recommendations

### 5.1 Summary

The Sample Event No. 2 results indicate that:

- Septic tank effluent (STE) quality is characteristic of typical household STE quality. The total nitrogen concentration of 47 mg/L is within the range of values typically reported for Florida single family residence STE.
- The Stage 1 biofilter converted most of the ammonia N to oxidized nitrogen; mean effluent values contained  $2.0 \pm 0.5$  mg/L TKN, of which  $0.08 \pm 0.03$  mg/L was ammonia.
- The Stage 2 biofilter produced a reducing environment and mean effluent  $\text{NO}_x\text{-N}$  was  $0.7 \pm 1.7$  mg N/L.
- The total nitrogen concentration in the perimeter monitoring points surrounding the total treatment system was  $14.0 \pm 7.6$  mg/L of which mean TKN was  $2.1 \pm 0.7$  and mean  $\text{NO}_x\text{-N}$  was  $11.9 \pm 7.7$  mg/L. It is still unclear why the perimeter monitoring points show an increase in  $\text{NO}_x\text{-N}$  relative to the Stage 2 points; however, it appears to be decreasing (Sample Event No. 1 perimeter monitoring results indicated mean  $\text{NO}_x\text{-N}$  was  $30.9 \pm 13.8$  mg/L). Since the observation port measurements indicated that the liner water level was between 3.3 and 4.3 inches below the overflow elevation, at the time of sampling, the water sampled by the perimeter points is likely not water recently discharged off the liner.

### 5.2 Recommendations

In Sample Event 2, the unsaturated Stage 1 and 2 biofilters exhibited better nitrification and denitrification performance, respectively, as compared to Sample Event No. 1. However, the perimeter monitoring point samples continue to show high total nitrogen in the effluent mostly comprised of  $\text{NO}_x\text{-N}$ , and it continues to appear possible that these sample points may not be representative of effluent from the system. Continued observation and sampling should provide additional insight to system performance.

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## **Appendix A: Laboratory Report**

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PRELIMINARY

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**Hazen and Sawyer**  
**10002 Princess Palm Ave, Suite 200**  
**Tampa, FL 33619**

**April 9, 2014**  
**Work Order: 1402743**

## Laboratory Report

Project Name		B-HS7 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS7-PUMP						
Matrix		Wastewater						
SAL Sample Number		1402743-01						
Date/Time Collected		03/20/14 12:05						
Collected by		Client						
Date/Time Received		03/20/14 14:45						
<b><u>Client Provided Field Data</u></b>								
pH		7.20						
Temperature		20.3 °C						
Conductivity		1909 umhos						
Dissolved Oxygen		0.09 mg/L						
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	46	EPA 350.1	2.0	0.47		03/28/14 10:14	50
Carbonaceous BOD	mg/L	110	SM 5210B	2	2	03/21/14 13:17	03/26/14 10:26	1
Chemical Oxygen Demand	mg/L	220	EPA 410.4	25	10	03/24/14 10:30	03/24/14 15:00	1
Chloride	mg/L	300	EPA 300.0	2.0	0.50		03/26/14 22:45	10
Nitrate (as N)	mg/L	0.07	EPA 300.0	0.04	0.01		03/21/14 15:39	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 15:39	1
Orthophosphate as P	mg/L	3.9	EPA 300.0	0.040	0.010		03/21/14 15:39	1
Phosphorous - Total as P	mg/L	6.2	SM 4500P-E	2.0	0.50	03/26/14 09:53	04/02/14 13:46	50
Total Alkalinity	mg/L	280	SM 2320B	8.0	2.0		03/25/14 16:34	1
Total Kjeldahl Nitrogen	mg/L	47	EPA 351.2	1.9	0.48	03/26/14 09:53	03/31/14 15:10	9.62
Total Suspended Solids	mg/L	35	SM 2540D	1	1	03/25/14 15:06	03/26/14 16:53	1
Volatile Suspended Solids	mg/L	32	EPA 160.4	1	1	03/25/14 15:06	03/26/14 16:53	1
Nitrate+Nitrite (N)	mg/L	0.07 I	EPA 300.0	0.08	0.02		03/21/14 15:39	1
<b><u>Microbiology</u></b>								
E. Coli	MPN/100 mL	10,000	SM 9223B	2.0	2.0	03/20/14 15:23	03/21/14 10:45	1
Fecal Coliforms	CFU/100 ml	51,000	SM 9222D	1	1	03/20/14 15:06	03/21/14 14:04	1

Sample Description **BHS7-PUMP-DUP**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-02**  
 Date/Time Collected **03/20/14 12:10**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

**Client Provided Field Data**

pH 7.20  
 Temperature 20.3 °C  
 Conductivity 1909 umhos  
 Dissolved Oxygen 0.09 mg/L

**Inorganics**

Ammonia as N	mg/L	47	EPA 350.1	2.0	0.47		03/28/14 10:15	50
Carbonaceous BOD	mg/L	120	SM 5210B	2	2	03/21/14 13:17	03/26/14 10:26	1

**Hazen and Sawyer**  
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**April 9, 2014**  
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## Laboratory Report

Project Name		B-HS7 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS7-PUMP-DUP						
Matrix		Wastewater						
SAL Sample Number		1402743-02						
Date/Time Collected		03/20/14 12:10						
Collected by		Client						
Date/Time Received		03/20/14 14:45						
Chemical Oxygen Demand	mg/L	240	EPA 410.4	25	10	03/24/14 10:30	03/24/14 15:00	1
Chloride	mg/L	310	EPA 300.0	2.0	0.50		03/26/14 22:55	10
Nitrate (as N)	mg/L	0.08	EPA 300.0	0.04	0.01		03/21/14 15:59	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 15:59	1
Orthophosphate as P	mg/L	3.9	EPA 300.0	0.040	0.010		03/21/14 15:59	1
Phosphorous - Total as P	mg/L	6.1	SM 4500P-E	2.0	0.50	03/26/14 09:53	04/02/14 13:47	50
Total Alkalinity	mg/L	280	SM 2320B	8.0	2.0		03/25/14 16:42	1
Total Kjeldahl Nitrogen	mg/L	50	EPA 351.2	1.9	0.48	03/26/14 09:53	03/31/14 15:30	9.62
Total Suspended Solids	mg/L	37	SM 2540D	1	1	03/25/14 15:06	03/26/14 16:53	1
Volatile Suspended Solids	mg/L	32	EPA 160.4	1	1	03/25/14 15:06	03/26/14 16:53	1
Nitrate+Nitrite (N)	mg/L	0.08	EPA 300.0	0.08	0.02		03/21/14 15:59	1
<b><u>Microbiology</u></b>								
E. Coli	MPN/100 mL	24,000	SM 9223B	2.0	2.0	03/20/14 15:23	03/21/14 10:45	1
Fecal Coliforms	CFU/100 ml	54,000	SM 9222D	1	1	03/20/14 15:06	03/21/14 14:04	1
Sample Description		BHS7-ST1-SL-01						
Matrix		Wastewater						
SAL Sample Number		1402743-03						
Date/Time Collected		03/20/14 11:12						
Collected by		Client						
Date/Time Received		03/20/14 14:45						
<b><u>Client Provided Field Data</u></b>								
pH		5.32						
Temperature		20.9 °C						
Conductivity		1077 umhos						
Dissolved Oxygen		5.01 mg/L						
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	0.13	EPA 350.1	0.040	0.009		03/27/14 10:22	1
Nitrate (as N)	mg/L	16	EPA 300.0	0.40	0.10		03/21/14 16:20	10
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 16:20	1
Total Kjeldahl Nitrogen	mg/L	2.2	EPA 351.2	0.20	0.05	03/26/14 09:53	03/31/14 13:47	1
Nitrate+Nitrite (N)	mg/L	16	EPA 300.0	0.44	0.11		03/21/14 16:20	10

**Hazen and Sawyer**  
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**April 9, 2014**  
**Work Order: 1402743**

## Laboratory Report

Project Name		B-HS7 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution

Sample Description **BHS7-ST1-SL-02**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-04**  
 Date/Time Collected **03/20/14 11:00**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

### Client Provided Field Data

pH 5.07  
 Temperature 20.5 °C  
 Conductivity 1213 umhos  
 Dissolved Oxygen 4.44 mg/L

### Inorganics

Ammonia as N	mg/L	0.047 U	EPA 350.1	0.20	0.047		03/27/14 11:45	5
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 16:41	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 16:41	1
Total Kjeldahl Nitrogen	mg/L	1.3	EPA 351.2	0.20	0.05	03/26/14 09:53	03/31/14 13:49	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		03/21/14 16:41	1

Sample Description **BHS7-ST1-SL-03**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-05**  
 Date/Time Collected **03/20/14 10:48**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

### Client Provided Field Data

pH 5.49  
 Temperature 19.3 °C  
 Conductivity 1348 umhos  
 Dissolved Oxygen 4.95 mg/L

### Inorganics

Ammonia as N	mg/L	0.081 I	EPA 350.1	0.20	0.047		03/27/14 11:47	5
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 16:50	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 16:50	1
Total Kjeldahl Nitrogen	mg/L	2.2	EPA 351.2	0.20	0.05	03/26/14 09:53	03/31/14 13:50	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		03/21/14 16:50	1

Sample Description **BHS7-ST1-DP-01**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-06**  
 Date/Time Collected **03/20/14 10:30**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**



**Hazen and Sawyer**  
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**April 9, 2014**  
**Work Order: 1402743**

## Laboratory Report

Project Name		B-HS7 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS7-ST1-DP-01						
Matrix		Wastewater						
SAL Sample Number		1402743-06						
Date/Time Collected		03/20/14 10:30						
Collected by		Client						
Date/Time Received		03/20/14 14:45						
<b><u>Client Provided Field Data</u></b>								
pH		5.04						
Temperature		18.9 °C						
Conductivity		1079 umhos						
Dissolved Oxygen		5.05 mg/L						
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	0.082	EPA 350.1	0.040	0.009		03/27/14 10:29	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 17:03	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 17:03	1
Total Kjeldahl Nitrogen	mg/L	1.6	EPA 351.2	0.20	0.05	03/26/14 09:53	03/31/14 13:52	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		03/21/14 17:03	1
Sample Description		BHS7-ST1-SL-04						
Matrix		Wastewater						
SAL Sample Number		1402743-07						
Date/Time Collected		03/20/14 10:40						
Collected by		Client						
Date/Time Received		03/20/14 14:45						
<b><u>Client Provided Field Data</u></b>								
pH		5.41						
Temperature		19.1 °C						
Conductivity		635 umhos						
Dissolved Oxygen		4.91 mg/L						
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	0.079	EPA 350.1	0.040	0.009		03/27/14 10:31	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	03/21/14 13:17	03/26/14 10:26	1
Chemical Oxygen Demand	mg/L	47	EPA 410.4	25	10	03/24/14 10:30	03/24/14 15:00	1
Chloride	mg/L	190	EPA 300.0	2.0	0.50		03/26/14 23:04	10
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 17:17	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 17:17	1
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		03/21/14 17:17	1
Phosphorous - Total as P	mg/L	0.097	SM 4500P-E	0.040	0.010	03/26/14 09:53	04/02/14 13:48	1
Total Alkalinity	mg/L	31	SM 2320B	8.0	2.0		04/03/14 08:27	1
Total Kjeldahl Nitrogen	mg/L	2.6	EPA 351.2	0.20	0.05	03/26/14 09:53	03/31/14 13:54	1
Total Suspended Solids	mg/L	4	SM 2540D	1	1	03/25/14 15:06	03/26/14 16:53	1
Volatile Suspended Solids	mg/L	4	EPA 160.4	1	1	03/25/14 15:06	03/26/14 16:53	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		03/21/14 17:17	1

**Hazen and Sawyer**  
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**April 9, 2014**  
**Work Order: 1402743**

## Laboratory Report

Project Name		B-HS7 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution

Sample Description **BHS7-ST2-DP-02**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-08**  
 Date/Time Collected **03/20/14 08:57**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

### Client Provided Field Data

pH 6.01  
 Temperature 19.0 °C  
 Conductivity 1471 umhos  
 Dissolved Oxygen 0.12 mg/L

### Inorganics

Ammonia as N	mg/L	0.92	EPA 350.1	0.040	0.009		03/27/14 10:33	1
Nitrate (as N)	mg/L	0.28	EPA 300.0	0.04	0.01		03/21/14 17:30	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 17:30	1
Total Kjeldahl Nitrogen	mg/L	4.8	EPA 351.2	0.20	0.05	03/26/14 09:53	03/31/14 13:55	1
Nitrate+Nitrite (N)	mg/L	0.28	EPA 300.0	0.08	0.02		03/21/14 17:30	1

Sample Description **BHS7-ST2-DP-03**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-09**  
 Date/Time Collected **03/20/14 08:57**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

### Client Provided Field Data

pH 6.05  
 Temperature 20.3 °C  
 Conductivity 1549 umhos  
 Dissolved Oxygen 0.62 mg/L

### Inorganics

Ammonia as N	mg/L	0.15	EPA 350.1	0.040	0.009		03/24/14 09:36	1
Nitrate (as N)	mg/L	0.26	EPA 300.0	0.04	0.01		03/21/14 17:39	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 17:39	1
Total Kjeldahl Nitrogen	mg/L	3.4	EPA 351.2	0.20	0.05	03/26/14 09:53	04/04/14 09:47	1
Nitrate+Nitrite (N)	mg/L	0.26	EPA 300.0	0.08	0.02		03/21/14 17:39	1

Sample Description **BHS7-ST2-DP-03-DUP**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-10**  
 Date/Time Collected **03/20/14 09:05**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

**Hazen and Sawyer**  
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**Tampa, FL 33619**

**April 9, 2014**  
**Work Order: 1402743**

## Laboratory Report

Project Name		B-HS7 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution

Sample Description **BHS7-ST2-DP-03-DUP**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-10**  
 Date/Time Collected **03/20/14 09:05**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

### Client Provided Field Data

pH 6.05  
 Temperature 20.3 °C  
 Conductivity 1549 umhos  
 Dissolved Oxygen 0.62 mg/L

### Inorganics

Ammonia as N	mg/L	0.14	EPA 350.1	0.040	0.009		03/24/14 09:38	1
Nitrate (as N)	mg/L	0.25	EPA 300.0	0.04	0.01		03/21/14 18:17	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 18:17	1
Total Kjeldahl Nitrogen	mg/L	3.3	EPA 351.2	0.20	0.05	03/26/14 09:53	03/31/14 14:05	1
Nitrate+Nitrite (N)	mg/L	0.25	EPA 300.0	0.08	0.02		03/21/14 18:17	1

Sample Description **BHS7-ST2-DP-04**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-11**  
 Date/Time Collected **03/20/14 09:26**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

### Client Provided Field Data

pH 6.10  
 Temperature 20.3 °C  
 Conductivity 1563 umhos  
 Dissolved Oxygen 0.08 mg/L

### Inorganics

Ammonia as N	mg/L	0.093	EPA 350.1	0.040	0.009		03/24/14 09:40	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 18:26	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 18:26	1
Total Kjeldahl Nitrogen	mg/L	2.8	EPA 351.2	0.20	0.05	04/02/14 16:58	04/04/14 12:21	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		03/21/14 18:26	1

Sample Description **BHS7-ST2-DP-05**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-12**  
 Date/Time Collected **03/20/14 09:40**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

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**April 9, 2014**  
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## Laboratory Report

Project Name		B-HS7 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution

Sample Description **BHS7-ST2-DP-05**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-12**  
 Date/Time Collected **03/20/14 09:40**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

### Client Provided Field Data

pH 6.05  
 Temperature 20.7 °C  
 Conductivity 1536 umhos  
 Dissolved Oxygen 0.08 mg/L

### Inorganics

Ammonia as N	mg/L	0.11	EPA 350.1	0.040	0.009		03/24/14 09:42	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 18:35	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 18:35	1
Total Kjeldahl Nitrogen	mg/L	2.2	EPA 351.2	0.20	0.05	03/31/14 10:20	04/03/14 12:03	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		03/21/14 18:35	1

Sample Description **BHS7-ST2-SL-05**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-13**  
 Date/Time Collected **03/20/14 11:25**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

### Client Provided Field Data

pH 5.94  
 Temperature 22.5 °C  
 Conductivity 1125 umhos  
 Dissolved Oxygen 1.20 mg/L

### Inorganics

Ammonia as N	mg/L	0.11	EPA 350.1	0.040	0.009		03/24/14 09:44	1
Nitrate (as N)	mg/L	4.9	EPA 300.0	0.04	0.01		03/21/14 18:45	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 18:45	1
Total Kjeldahl Nitrogen	mg/L	2.3	EPA 351.2	0.20	0.05	03/31/14 10:20	04/03/14 12:04	1
Nitrate+Nitrite (N)	mg/L	4.9	EPA 300.0	0.08	0.02		03/21/14 18:45	1

Sample Description **BHS7-ST2-DP-06**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-14**  
 Date/Time Collected **03/20/14 09:50**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

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## Laboratory Report

Project Name		B-HS7 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution

Sample Description **BHS7-ST2-DP-06**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-14**  
 Date/Time Collected **03/20/14 09:50**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

### Client Provided Field Data

pH 6.08  
 Temperature 20.1 °C  
 Conductivity 1554 umhos  
 Dissolved Oxygen 0.06 mg/L

### Inorganics

Ammonia as N	mg/L	0.20	EPA 350.1	0.040	0.009		03/24/14 12:46	1
Nitrate (as N)	mg/L	0.14	EPA 300.0	0.04	0.01		03/21/14 18:54	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 18:54	1
Total Kjeldahl Nitrogen	mg/L	4.8	EPA 351.2	2.0	0.50	03/31/14 10:20	04/03/14 12:05	10
Nitrate+Nitrite (N)	mg/L	0.14	EPA 300.0	0.08	0.02		03/21/14 18:54	1

Sample Description **BHS7-ST2-DP-06-DUP**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-15**  
 Date/Time Collected **03/20/14 09:55**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

### Client Provided Field Data

pH 6.08  
 Temperature 20.1 °C  
 Conductivity 1554 umhos  
 Dissolved Oxygen 0.06 mg/L

### Inorganics

Ammonia as N	mg/L	0.19	EPA 350.1	0.040	0.009		03/24/14 12:47	1
Nitrate (as N)	mg/L	0.12	EPA 300.0	0.04	0.01		03/21/14 19:04	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 19:04	1
Total Kjeldahl Nitrogen	mg/L	4.4	EPA 351.2	2.0	0.50	03/31/14 10:20	04/03/14 12:06	10
Nitrate+Nitrite (N)	mg/L	0.12	EPA 300.0	0.08	0.02		03/21/14 19:04	1

Sample Description **BHS7-ST2-DP-07**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-16**  
 Date/Time Collected **03/20/14 09:58**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**



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## Laboratory Report

Project Name		B-HS7 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS7-ST2-DP-07						
Matrix		Wastewater						
SAL Sample Number		1402743-16						
Date/Time Collected		03/20/14 09:58						
Collected by		Client						
Date/Time Received		03/20/14 14:45						
<b><u>Client Provided Field Data</u></b>								
pH		6.14						
Temperature		20.5 °C						
Conductivity		1636 umhos						
Dissolved Oxygen		0.13 mg/L						
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	0.15	EPA 350.1	0.040	0.009		03/24/14 09:50	1
Carbonaceous BOD	mg/L	64	SM 5210B	2	2	03/21/14 13:17	03/26/14 10:26	1
Chemical Oxygen Demand	mg/L	370	EPA 410.4	25	10	03/24/14 10:30	03/24/14 15:00	1
Chloride	mg/L	310	EPA 300.0	2.0	0.50		03/26/14 23:14	10
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 19:13	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 19:13	1
Orthophosphate as P	mg/L	9.5 Q	SM 4500P-E	0.40	0.12		04/05/14 10:40	10
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		03/21/14 19:13	1
Phosphorous - Total as P	mg/L	12	SM 4500P-E	0.40	0.10	03/31/14 10:20	04/03/14 12:07	10
Total Alkalinity	mg/L	200	SM 2320B	8.0	2.0		04/03/14 08:36	1
Total Kjeldahl Nitrogen	mg/L	3.6	EPA 351.2	2.0	0.50	03/31/14 10:20	04/03/14 12:07	10
Total Suspended Solids	mg/L	11	SM 2540D	1	1	03/25/14 15:06	03/26/14 16:53	1
Volatile Suspended Solids	mg/L	9	EPA 160.4	1	1	03/25/14 15:06	03/26/14 16:53	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		03/21/14 19:13	1
<b><u>Microbiology</u></b>								
E. Coli	MPN/100 mL	10	SM 9223B	2.0	2.0	03/20/14 15:23	03/21/14 10:45	1
Fecal Coliforms	CFU/100 ml	1,200	SM 9222D	1	1	03/20/14 15:06	03/21/14 14:04	1

Sample Description **BHS7-ST2-DP-08**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-17**  
 Date/Time Collected **03/20/14 10:08**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

**Client Provided Field Data**

pH 6.09  
 Temperature 20.2 °C  
 Conductivity 1600 umhos  
 Dissolved Oxygen 0.08 mg/L

**Inorganics**

Ammonia as N	mg/L	0.11	EPA 350.1	0.040	0.009	03/24/14 10:01	1
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## Laboratory Report

Project Name		B-HS7 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS7-ST2-DP-08						
Matrix		Wastewater						
SAL Sample Number		1402743-17						
Date/Time Collected		03/20/14 10:08						
Collected by		Client						
Date/Time Received		03/20/14 14:45						
Carbonaceous BOD	mg/L	78	SM 5210B	2	2	03/21/14 13:17	03/26/14 10:26	1
Chemical Oxygen Demand	mg/L	330	EPA 410.4	25	10	03/24/14 10:30	03/24/14 15:00	1
Chloride	mg/L	320	EPA 300.0	2.0	0.50		03/26/14 23:23	10
Nitrate (as N)	mg/L	0.15	EPA 300.0	0.04	0.01		03/21/14 19:22	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 19:22	1
Orthophosphate as P	mg/L	11 Q	SM 4500P-E	0.40	0.12		04/05/14 10:56	10
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		03/21/14 19:22	1
Phosphorous - Total as P	mg/L	15	SM 4500P-E	0.40	0.10	03/31/14 10:20	04/03/14 12:08	10
Total Alkalinity	mg/L	200	SM 2320B	8.0	2.0		03/28/14 09:49	1
Total Kjeldahl Nitrogen	mg/L	3.1	EPA 351.2	1.0	0.25	03/31/14 10:20	04/03/14 12:08	5
Total Suspended Solids	mg/L	16	SM 2540D	1	1	03/25/14 15:06	03/26/14 16:53	1
Volatile Suspended Solids	mg/L	13	EPA 160.4	1	1	03/25/14 15:06	03/26/14 16:53	1
Nitrate+Nitrite (N)	mg/L	0.15	EPA 300.0	0.08	0.02		03/21/14 19:22	1
<b>Microbiology</b>								
E. Coli	MPN/100 mL	2.0 U	SM 9223B	2.0	2.0	03/20/14 15:23	03/21/14 10:45	1
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	03/20/14 15:06	03/21/14 14:04	1

Sample Description		BHS7-EFF-SL-06						
Matrix		Wastewater						
SAL Sample Number		1402743-18						
Date/Time Collected		03/20/14 11:15						
Collected by		Client						
Date/Time Received		03/20/14 14:45						

### Client Provided Field Data

pH	5.64
Temperature	21.1 °C
Conductivity	563 umhos
Dissolved Oxygen	5.74 mg/L

### Inorganics

Ammonia as N	mg/L	0.20	EPA 350.1	0.20	0.047		03/24/14 14:08	5
Nitrate (as N)	mg/L	17	EPA 300.0	0.40	0.10		03/21/14 19:32	10
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 19:32	1
Total Kjeldahl Nitrogen	mg/L	1.7	EPA 351.2	0.20	0.05	03/31/14 10:05	03/31/14 11:02	1
Nitrate+Nitrite (N)	mg/L	17	EPA 300.0	0.44	0.11		03/21/14 19:32	10

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## Laboratory Report

Project Name		B-HS7 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		<b>BHS7-EFF-DP-09</b>						
Matrix		<b>Wastewater</b>						
SAL Sample Number		<b>1402743-19</b>						
Date/Time Collected		<b>03/20/14 09:03</b>						
Collected by		<b>Client</b>						
Date/Time Received		<b>03/20/14 14:45</b>						

### Client Provided Field Data

pH 6.06  
 Temperature 17.7 °C  
 Conductivity 431 umhos  
 Dissolved Oxygen 6.36 mg/L

### Inorganics

Ammonia as N	mg/L	0.91	EPA 350.1	0.80	0.19		03/24/14 15:21	20
Nitrate (as N)	mg/L	4.7	EPA 300.0	0.04	0.01		03/21/14 19:41	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 19:41	1
Total Kjeldahl Nitrogen	mg/L	2.5	EPA 351.2	0.40	0.10	03/31/14 10:05	03/31/14 11:18	1.98
Nitrate+Nitrite (N)	mg/L	4.7	EPA 300.0	0.08	0.02		03/21/14 19:41	1

Sample Description **BHS7-EFF-SL-07**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-20**  
 Date/Time Collected **03/20/14 11:20**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

### Client Provided Field Data

pH 5.27  
 Temperature 21.4 °C  
 Conductivity 367 umhos  
 Dissolved Oxygen 6.34 mg/L

### Inorganics

Ammonia as N	mg/L	0.21	EPA 350.1	0.20	0.047		03/24/14 14:11	5
Nitrate (as N)	mg/L	8.3	EPA 300.0	0.04	0.01		03/21/14 20:47	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 20:47	1
Total Kjeldahl Nitrogen	mg/L	1.2	EPA 351.2	0.20	0.05		03/31/14 10:05	1
Nitrate+Nitrite (N)	mg/L	8.3	EPA 300.0	0.08	0.02		03/21/14 20:47	1

Sample Description **BHS7-EFF-DP-10**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-21**  
 Date/Time Collected **03/20/14 09:18**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

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## Laboratory Report

Project Name		B-HS7 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		<b>BHS7-EFF-DP-10</b>						
Matrix		<b>Wastewater</b>						
SAL Sample Number		<b>1402743-21</b>						
Date/Time Collected		<b>03/20/14 09:18</b>						
Collected by		<b>Client</b>						
Date/Time Received		<b>03/20/14 14:45</b>						

### Client Provided Field Data

pH 6.18  
 Temperature 19.2 °C  
 Conductivity 1620 umhos  
 Dissolved Oxygen 7.18 mg/L

### Inorganics

Ammonia as N	mg/L	0.12	EPA 350.1	0.040	0.009		03/24/14 12:09	1
Nitrate (as N)	mg/L	20	EPA 300.0	0.40	0.10		03/21/14 20:56	10
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 20:56	1
Total Kjeldahl Nitrogen	mg/L	3.0	EPA 351.2	0.20	0.05	03/31/14 10:05	03/31/14 10:07	1
Nitrate+Nitrite (N)	mg/L	20	EPA 300.0	0.44	0.11		03/21/14 20:56	10

Sample Description **BHS7-EFF-SL-08**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-22**  
 Date/Time Collected **03/20/14 10:53**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

### Client Provided Field Data

pH 6.25  
 Temperature 19.3 °C  
 Conductivity 1347 umhos  
 Dissolved Oxygen 6.31 mg/L

### Inorganics

Ammonia as N	mg/L	0.078	EPA 350.1	0.040	0.009		03/24/14 10:11	1
Nitrate (as N)	mg/L	21	EPA 300.0	0.40	0.10		03/21/14 21:05	10
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 21:05	1
Total Kjeldahl Nitrogen	mg/L	1.8	EPA 351.2	0.20	0.05	03/31/14 10:20	04/03/14 12:09	1
Nitrate+Nitrite (N)	mg/L	21	EPA 300.0	0.44	0.11		03/21/14 21:05	10

Sample Description **BHS7-EFF-SL-09**  
 Matrix **Wastewater**  
 SAL Sample Number **1402743-24**  
 Date/Time Collected **03/20/14 10:33**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

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## Laboratory Report

Project Name		B-HS7 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS7-EFF-SL-09						
Matrix		Wastewater						
SAL Sample Number		1402743-24						
Date/Time Collected		03/20/14 10:33						
Collected by		Client						
Date/Time Received		03/20/14 14:45						
<b><u>Client Provided Field Data</u></b>								
pH		5.78						
Temperature		19.1 °C						
Conductivity		269 umhos						
Dissolved Oxygen		6.10 mg/L						
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	0.41	EPA 350.1	0.040	0.009		03/24/14 11:04	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	03/21/14 13:17	03/26/14 10:26	1
Chemical Oxygen Demand	mg/L	33	EPA 410.4	25	10	03/24/14 10:30	03/24/14 15:00	1
Chloride	mg/L	8.6	EPA 300.0	0.20	0.050		03/21/14 21:15	1
Nitrate (as N)	mg/L	11	EPA 300.0	0.04	0.01		03/21/14 21:15	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 21:15	1
Orthophosphate as P	mg/L	0.24	EPA 300.0	0.040	0.010		03/21/14 21:15	1
Phosphorous - Total as P	mg/L	0.29	SM 4500P-E	0.040	0.010	03/31/14 10:20	04/03/14 12:10	1
Total Alkalinity	mg/L	11	SM 2320B	8.0	2.0		04/03/14 08:40	1
Total Kjeldahl Nitrogen	mg/L	1.7	EPA 351.2	0.20	0.05	03/31/14 10:20	04/03/14 12:10	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	03/25/14 15:06	03/26/14 16:53	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	03/25/14 15:06	03/26/14 16:53	1
Nitrate+Nitrite (N)	mg/L	11	EPA 300.0	0.08	0.02		03/21/14 21:15	1
Sample Description		BHS7-EFF-DP-12						
Matrix		Wastewater						
SAL Sample Number		1402743-25						
Date/Time Collected		03/20/14 10:15						
Collected by		Client						
Date/Time Received		03/20/14 14:45						
<b><u>Client Provided Field Data</u></b>								
pH		6.20						
Temperature		19.4 °C						
Conductivity		1309 umhos						
Dissolved Oxygen		5.01 mg/L						
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	0.13	EPA 350.1	0.040	0.009		03/24/14 12:11	1
Nitrate (as N)	mg/L	1.2	EPA 300.0	0.04	0.01		03/21/14 21:24	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 21:24	1
Total Kjeldahl Nitrogen	mg/L	2.8	EPA 351.2	0.20	0.05	03/31/14 10:05	03/31/14 10:09	1
Nitrate+Nitrite (N)	mg/L	1.2	EPA 300.0	0.08	0.02		03/21/14 21:24	1



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## Laboratory Report

Project Name		B-HS7 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS7-TAP						
Matrix		Drinking Water						
SAL Sample Number		1402743-26						
Date/Time Collected		03/20/14 11:43						
Collected by		Client						
Date/Time Received		03/20/14 14:45						
<b><u>Client Provided Field Data</u></b>								
pH		7.28						
Temperature		22.7 °C						
Conductivity		174 umhos						
Dissolved Oxygen		5.83 mg/L						
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		03/24/14 12:12	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	03/21/14 13:17	03/26/14 10:26	1
Chemical Oxygen Demand	mg/L	10 U	EPA 410.4	25	10	03/24/14 10:30	03/24/14 15:00	1
Chloride	mg/L	3.4	EPA 300.0	0.20	0.050		03/21/14 21:34	1
Nitrate (as N)	mg/L	0.13	EPA 300.0	0.04	0.01		03/21/14 21:34	1
Nitrite (as N)	mg/L	0.09	EPA 300.0	0.04	0.01		03/21/14 21:34	1
Orthophosphate as P	mg/L	0.15	EPA 300.0	0.040	0.010		03/21/14 21:34	1
Phosphorous - Total as P	mg/L	0.17	SM 4500P-E	0.040	0.010	03/24/14 16:18	04/02/14 13:14	1
Total Alkalinity	mg/L	78	SM 2320B	8.0	2.0		04/03/14 08:45	1
Total Kjeldahl Nitrogen	mg/L	0.05 U	EPA 351.2	0.20	0.05	03/31/14 10:05	03/31/14 11:44	1
Total Suspended Solids	mg/L	3	SM 2540D	1	1	03/25/14 15:06	03/26/14 16:53	1
Volatile Suspended Solids	mg/L	3	EPA 160.4	1	1	03/25/14 15:06	03/26/14 16:53	1
Nitrate+Nitrite (N)	mg/L	0.22	EPA 300.0	0.08	0.02		03/21/14 21:34	1
<b><u>Microbiology</u></b>								
E. Coli	MPN/100 mL	2.0 U	SM 9223B	2.0	2.0	03/20/14 15:23	03/21/14 10:45	1
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	03/20/14 15:06	03/21/14 14:04	1

Sample Description **BHS7-EB**  
 Matrix **Reagent Water**  
 SAL Sample Number **1402743-27**  
 Date/Time Collected **03/20/14 11:50**  
 Collected by **Client**  
 Date/Time Received **03/20/14 14:45**

**Client Provided Field Data**

pH 7.08  
 Temperature 22.6 °C  
 Conductivity 2.3 umhos  
 Dissolved Oxygen 7.79 mg/L

**Inorganics**

Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		03/24/14 12:14	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	03/21/14 13:17	03/26/14 10:26	1

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**Tampa, FL 33619**

**April 9, 2014**  
**Work Order: 1402743**

## Laboratory Report

Project Name		B-HS7 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS7-EB						
Matrix		Reagent Water						
SAL Sample Number		1402743-27						
Date/Time Collected		03/20/14 11:50						
Collected by		Client						
Date/Time Received		03/20/14 14:45						
Chemical Oxygen Demand	mg/L	10 U	EPA 410.4	25	10	04/02/14 12:10	04/02/14 15:35	1
Chloride	mg/L	0.050 U	EPA 300.0	0.20	0.050		03/21/14 22:30	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 22:30	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		03/21/14 22:30	1
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		03/21/14 22:30	1
Phosphorous - Total as P	mg/L	0.010 U	SM 4500P-E	0.040	0.010	03/24/14 16:18	04/02/14 13:15	1
Total Alkalinity	mg/L	2.0 U	SM 2320B	8.0	2.0		03/28/14 09:53	1
Total Kjeldahl Nitrogen	mg/L	0.05 U	EPA 351.2	0.20	0.05	03/31/14 10:05	03/31/14 11:20	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	03/25/14 15:06	03/26/14 16:53	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	03/25/14 15:06	03/26/14 16:53	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		03/21/14 22:30	1
<b><u>Microbiology</u></b>								
E. Coli	MPN/100 mL	2.0 U	SM 9223B	2.0	2.0	03/20/14 15:23	03/21/14 10:45	1
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	03/20/14 15:06	03/21/14 14:04	1

**SOUTHERN ANALYTICAL LABORATORIES, INC.**

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April 9, 2014

Work Order: 1402743

**Inorganics - Quality Control**

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BC42035 - COD prep</b>										
<b>Blank (BC42035-BLK1)</b>					Prepared & Analyzed: 03/24/14					
Chemical Oxygen Demand	10 U	25	10	mg/L						
<b>LCS (BC42035-BS1)</b>					Prepared & Analyzed: 03/24/14					
Chemical Oxygen Demand	54	25	10	mg/L	50		108	90-110		
<b>Matrix Spike (BC42035-MS1)</b>					<b>Source: 1402743-26</b>		Prepared & Analyzed: 03/24/14			
Chemical Oxygen Demand	50	25	10	mg/L	50	ND	100	85-115		
<b>Matrix Spike Dup (BC42035-MSD1)</b>					<b>Source: 1402743-26</b>		Prepared & Analyzed: 03/24/14			
Chemical Oxygen Demand	47	25	10	mg/L	50	ND	94	85-115	6	32
<b>Batch BC42113 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BC42113-BLK1)</b>					Prepared & Analyzed: 03/21/14					
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Orthophosphate as P	0.010 U	0.040	0.010	mg/L						
Surrogate: Dichloroacetate	1.03			mg/L	1.0		103	90-115		
Surrogate: Dichloroacetate	1.03			mg/L	1.0		103	90-115		
Surrogate: Dichloroacetate	1.03			mg/L	1.0		103	90-115		
<b>LCS (BC42113-BS1)</b>					Prepared & Analyzed: 03/21/14					
Nitrite (as N)	1.37	0.04	0.01	mg/L	1.4		98	85-115		
Nitrate (as N)	1.61	0.04	0.01	mg/L	1.7		95	85-115		
Orthophosphate as P	0.927	0.040	0.010	mg/L	0.90		103	85-115		
Surrogate: Dichloroacetate	1.07			mg/L	1.0		107	90-115		
Surrogate: Dichloroacetate	1.07			mg/L	1.0		107	90-115		
Surrogate: Dichloroacetate	1.07			mg/L	1.0		107	90-115		

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April 9, 2014  
Work Order: 1402743

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BC42113 - Ion Chromatography 300.0 Prep</b>										
<b>LCS Dup (BC42113-BSD1)</b>					Prepared & Analyzed: 03/21/14					
Nitrite (as N)	1.36	0.04	0.01	mg/L	1.4		97	85-115	1	200
Orthophosphate as P	0.895	0.040	0.010	mg/L	0.90		99	85-115	4	200
Nitrate (as N)	1.60	0.04	0.01	mg/L	1.7		94	85-115	0.6	200
Surrogate: Dichloroacetate	1.04			mg/L	1.0		104	90-115		
Surrogate: Dichloroacetate	1.04			mg/L	1.0		104	90-115		
Surrogate: Dichloroacetate	1.04			mg/L	1.0		104	90-115		
<b>Matrix Spike (BC42113-MS1)</b>					<b>Source: 1402743-09</b>		Prepared & Analyzed: 03/24/14			
Nitrate (as N)	1.80	0.04	0.01	mg/L	1.7	0.258	91	85-115		
Nitrite (as N)	0.01 U,J6	0.04	0.01	mg/L	1.4	ND		85-115		
Orthophosphate as P	1.99	0.040	0.010	mg/L	0.90	1.07	103	85-115		
Surrogate: Dichloroacetate	0.990			mg/L	1.0		99	90-115		
Surrogate: Dichloroacetate	0.990			mg/L	1.0		99	90-115		
Surrogate: Dichloroacetate	0.990			mg/L	1.0		99	90-115		
<b>Matrix Spike (BC42113-MS2)</b>					<b>Source: 1402743-19</b>		Prepared & Analyzed: 03/21/14			
Nitrate (as N)	6.52	0.04	0.01	mg/L	1.7	4.68	108	85-115		
Nitrite (as N)	1.39	0.04	0.01	mg/L	1.4	ND	99	85-115		
Orthophosphate as P	0.010 U,L	0.040	0.010	mg/L	0.90	11.7	NR	85-115		
Surrogate: Dichloroacetate	1.02			mg/L	1.0		102	90-115		
Surrogate: Dichloroacetate	1.02			mg/L	1.0		102	90-115		
Surrogate: Dichloroacetate	1.02			mg/L	1.0		102	90-115		
<b>Batch BC42114 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BC42114-BLK1)</b>					Prepared & Analyzed: 03/21/14					
Orthophosphate as P	0.010 U	0.040	0.010	mg/L						
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Chloride	0.050 U	0.20	0.050	mg/L						
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Surrogate: Dichloroacetate	1.02			mg/L	1.0		102	90-115		
Surrogate: Dichloroacetate	1.02			mg/L	1.0		102	90-115		
Surrogate: Dichloroacetate	1.02			mg/L	1.0		102	90-115		
Surrogate: Dichloroacetate	1.02			mg/L	1.0		102	90-115		

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April 9, 2014

Work Order: 1402743

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BC42114 - Ion Chromatography 300.0 Prep</b>										
<b>LCS (BC42114-BS1)</b>					Prepared & Analyzed: 03/21/14					
Orthophosphate as P	0.939	0.040	0.010	mg/L	0.90		104	85-115		
Nitrite (as N)	1.36	0.04	0.01	mg/L	1.4		97	85-115		
Nitrate (as N)	1.63	0.04	0.01	mg/L	1.7		96	85-115		
Chloride	2.85	0.20	0.050	mg/L	3.0		95	85-115		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
<b>LCS Dup (BC42114-BS1)</b>					Prepared & Analyzed: 03/21/14					
Orthophosphate as P	0.940	0.040	0.010	mg/L	0.90		104	85-115	0.1	200
Chloride	2.86	0.20	0.050	mg/L	3.0		95	85-115	0.2	200
Nitrite (as N)	1.37	0.04	0.01	mg/L	1.4		98	85-115	0.2	200
Nitrate (as N)	1.63	0.04	0.01	mg/L	1.7		96	85-115	0	200
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
<b>Matrix Spike (BC42114-MS1)</b>					<b>Source: 1402743-26</b>		Prepared & Analyzed: 03/21/14			
Orthophosphate as P	0.974	0.040	0.010	mg/L	0.90	0.154	91	85-115		
Chloride	6.39	0.20	0.050	mg/L	3.0	3.44	98	80-120		
Nitrate (as N)	1.73	0.04	0.01	mg/L	1.7	0.134	94	85-115		
Nitrite (as N)	1.38	0.04	0.01	mg/L	1.4	0.0890	92	85-115		
Surrogate: Dichloroacetate	1.03			mg/L	1.0		103	90-115		
Surrogate: Dichloroacetate	1.03			mg/L	1.0		103	90-115		
Surrogate: Dichloroacetate	1.03			mg/L	1.0		103	90-115		
Surrogate: Dichloroacetate	1.03			mg/L	1.0		103	90-115		

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April 9, 2014  
Work Order: 1402743

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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### Batch BC42114 - Ion Chromatography 300.0 Prep

Matrix Spike (BC42114-MS2)		Source: 1402819-09			Prepared & Analyzed: 03/21/14					
Nitrate (as N)	17.2	0.40	0.10	mg/L	17	1.17	94	85-115		
Orthophosphate as P	9.16	0.40	0.10	mg/L	9.0	1.05	90	85-115		
Chloride	117	2.0	0.50	mg/L	30	83.8	110	80-120		
Nitrite (as N)	14.3	0.40	0.10	mg/L	14	ND	102	85-115		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		

### Batch BC42118 - BOD

Blank (BC42118-BLK1)		Prepared: 03/21/14 Analyzed: 03/26/14								
Carbonaceous BOD	2 U	2	2	mg/L						
LCS (BC42118-BS1)		Prepared: 03/21/14 Analyzed: 03/26/14								
Carbonaceous BOD	190	2	2	mg/L	200		95	85-115		
LCS Dup (BC42118-BSD1)		Prepared: 03/21/14 Analyzed: 03/26/14								
Carbonaceous BOD	184	2	2	mg/L	200		92	85-115	3	200
Duplicate (BC42118-DUP1)		Source: 1402995-01 Prepared: 03/21/14 Analyzed: 03/26/14								
Carbonaceous BOD	110	2	2	mg/L		110			4	25

### Batch BC42401 - Ammonia by SEAL

Blank (BC42401-BLK1)		Prepared & Analyzed: 03/24/14								
Ammonia as N	0.009 U	0.040	0.009	mg/L						



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**April 9, 2014**  
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**Inorganics - Quality Control**

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BC42401 - Ammonia by SEAL</b>										
<b>LCS (BC42401-BS1)</b>					Prepared & Analyzed: 03/24/14					
Ammonia as N	0.51	0.040	0.009	mg/L	0.50		101	90-110		
<b>Matrix Spike (BC42401-MS1)</b>					Source: 1402743-26 Prepared & Analyzed: 03/24/14					
Ammonia as N	0.51	0.040	0.009	mg/L	0.50	ND	101	90-110		
<b>Matrix Spike (BC42401-MS2)</b>					Source: 1402743-27 Prepared & Analyzed: 03/24/14					
Ammonia as N	0.50	0.040	0.009	mg/L	0.50	ND	99	90-110		
<b>Matrix Spike Dup (BC42401-MSD1)</b>					Source: 1402743-26 Prepared & Analyzed: 03/24/14					
Ammonia as N	0.49	0.040	0.009	mg/L	0.50	ND	98	90-110	3	10
<b>Matrix Spike Dup (BC42401-MSD2)</b>					Source: 1402743-27 Prepared & Analyzed: 03/24/14					
Ammonia as N	0.49	0.040	0.009	mg/L	0.50	ND	98	90-110	0.9	10
<b>Batch BC42428 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BC42428-BLK1)</b>					Prepared & Analyzed: 03/25/14					
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Surrogate: Dichloroacetate	0.967			mg/L	1.0		97	90-115		
<b>LCS (BC42428-BS1)</b>					Prepared & Analyzed: 03/24/14					
Nitrate (as N)	1.68	0.04	0.01	mg/L	1.7		99	85-115		
Surrogate: Dichloroacetate	1.02			mg/L	1.0		102	90-115		
<b>LCS Dup (BC42428-BSD1)</b>					Prepared & Analyzed: 03/25/14					
Nitrate (as N)	1.70	0.04	0.01	mg/L	1.7		100	85-115	1	200
Surrogate: Dichloroacetate	1.02			mg/L	1.0		102	90-115		

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## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BC42428 - Ion Chromatography 300.0 Prep</b>										
<b>Matrix Spike (BC42428-MS1)</b>		<b>Source: 1402613-03</b>			Prepared & Analyzed: 03/24/14					
Nitrate (as N)	51.1	0.40	0.10	mg/L	17	31.2	117	85-115		
Surrogate: Dichloroacetate	0.963			mg/L	1.0		96	90-115		
<b>Matrix Spike (BC42428-MS2)</b>		<b>Source: 1402893-02</b>			Prepared & Analyzed: 03/25/14					
Nitrate (as N)	16.0	0.40	0.10	mg/L	17	0.240	93	85-115		
Surrogate: Dichloroacetate	1.00			mg/L	1.0		100	90-115		
<b>Batch BC42439 - Digestion for TP and TKN</b>										
<b>Blank (BC42439-BLK1)</b>		Prepared: 03/24/14 Analyzed: 04/02/14								
Phosphorous - Total as P	0.010 U	0.040	0.010	mg/L						
<b>LCS (BC42439-BS1)</b>		Prepared: 03/24/14 Analyzed: 04/02/14								
Phosphorous - Total as P	0.470	0.040	0.010	mg/L	0.50		94	90-110		
<b>Matrix Spike (BC42439-MS1)</b>		<b>Source: 1402743-26</b>			Prepared: 03/24/14 Analyzed: 04/02/14					
Phosphorous - Total as P	0.647	0.040	0.010	mg/L	0.50	0.170	95	90-110		
<b>Matrix Spike (BC42439-MS2)</b>		<b>Source: 1402743-27</b>			Prepared: 03/24/14 Analyzed: 04/02/14					
Phosphorous - Total as P	0.474	0.040	0.010	mg/L	0.50	ND	95	90-110		
<b>Matrix Spike Dup (BC42439-MSD1)</b>		<b>Source: 1402743-26</b>			Prepared: 03/24/14 Analyzed: 04/02/14					
Phosphorous - Total as P	0.637	0.040	0.010	mg/L	0.50	0.170	93	90-110	2	25
<b>Matrix Spike Dup (BC42439-MSD2)</b>		<b>Source: 1402743-27</b>			Prepared: 03/24/14 Analyzed: 04/02/14					
Phosphorous - Total as P	0.472	0.040	0.010	mg/L	0.50	ND	94	90-110	0.4	25

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## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BC42512 - alkalinity</b>										
<b>Blank (BC42512-BLK1)</b>					Prepared & Analyzed: 03/25/14					
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
<b>LCS (BC42512-BS1)</b>					Prepared & Analyzed: 03/25/14					
Total Alkalinity	120	8.0	2.0	mg/L	120		97	90-110		
<b>Matrix Spike (BC42512-MS1)</b>					<b>Source: 1402721-07</b>		Prepared & Analyzed: 03/25/14			
Total Alkalinity	120	8.0	2.0	mg/L	120	ND	98	80-120		
<b>Matrix Spike Dup (BC42512-MSD1)</b>					<b>Source: 1402721-07</b>		Prepared & Analyzed: 03/25/14			
Total Alkalinity	130	8.0	2.0	mg/L	120	ND	101	80-120	3	26
<b>Batch BC42523 - TSS prep</b>										
<b>Blank (BC42523-BLK1)</b>					Prepared: 03/25/14 Analyzed: 03/26/14					
Volatile Suspended Solids	1 U	1		mg/L						
Total Suspended Solids	1 U	1	1	mg/L						
<b>LCS (BC42523-BS1)</b>					Prepared: 03/25/14 Analyzed: 03/26/14					
Total Suspended Solids	57.0	1	1	mg/L	50		114	85-115		
<b>Duplicate (BC42523-DUP1)</b>					<b>Source: 1402743-07</b>		Prepared: 03/25/14 Analyzed: 03/26/14			
Volatile Suspended Solids	3.50	1		mg/L		3.50			0	20
Total Suspended Solids	3.50	1	1	mg/L		3.50			0	30
<b>Batch BC42610 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BC42610-BLK1)</b>					Prepared & Analyzed: 03/27/14					
Chloride	0.0830 I	0.20	0.050	mg/L						
Surrogate: Dichloroacetate	1.04			mg/L	1.0		104	90-115		

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## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BC42610 - Ion Chromatography 300.0 Prep</b>										
<b>LCS (BC42610-BS1)</b>					Prepared & Analyzed: 03/26/14					
Chloride	3.06	0.20	0.050	mg/L	3.0		102	85-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
<b>LCS Dup (BC42610-BSD1)</b>					Prepared & Analyzed: 03/26/14					
Chloride	3.04	0.20	0.050	mg/L	3.0		101	85-115	0.8	200
Surrogate: Dichloroacetate	1.10			mg/L	1.0		110	90-115		
<b>Matrix Spike (BC42610-MS1)</b>					<b>Source: 1403099-09</b>		Prepared & Analyzed: 03/26/14			
Chloride	30.0 L	0.20	0.050	mg/L	3.0	82.1	NR	80-120		
Surrogate: Dichloroacetate	0.909			mg/L	1.0		91	90-115		
<b>Matrix Spike (BC42610-MS2)</b>					<b>Source: 1403079-01</b>		Prepared & Analyzed: 03/26/14			
Chloride	35.9	0.20	0.050	mg/L	3.0	33.1	94	80-120		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
<b>Batch BC42611 - Digestion for TP and TKN</b>										
<b>Blank (BC42611-BLK1)</b>					Prepared: 03/26/14 Analyzed: 03/31/14					
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
Phosphorous - Total as P	0.010 U	0.040	0.010	mg/L						
<b>LCS (BC42611-BS1)</b>					Prepared: 03/26/14 Analyzed: 03/31/14					
Total Kjeldahl Nitrogen	0.992	0.20	0.05	mg/L	1.0		99	90-110		
Phosphorous - Total as P	0.479	0.040	0.010	mg/L	0.50		96	90-110		
<b>Matrix Spike (BC42611-MS1)</b>					<b>Source: 1403033-01</b>		Prepared: 03/26/14 Analyzed: 04/02/14			
Phosphorous - Total as P	0.582	0.040	0.010	mg/L	0.50	0.110	94	90-110		
Total Kjeldahl Nitrogen	1.97	0.20	0.05	mg/L	1.0	1.02	95	90-110		

# SOUTHERN ANALYTICAL LABORATORIES, INC.

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Hazen and Sawyer  
10002 Princess Palm Ave, Suite 200  
Tampa, FL 33619

April 9, 2014  
Work Order: 1402743

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BC42611 - Digestion for TP and TKN</b>										
<b>Matrix Spike (BC42611-MS2)</b>		<b>Source: 1403114-01</b>			Prepared: 03/26/14 Analyzed: 03/31/14					
Total Kjeldahl Nitrogen	2.06	0.20	0.05	mg/L	1.0	0.881	118	90-110		
Phosphorous - Total as P	0.548	0.040	0.010	mg/L	0.50	0.0385	102	90-110		
<b>Matrix Spike Dup (BC42611-MSD1)</b>		<b>Source: 1403033-01</b>			Prepared: 03/26/14 Analyzed: 03/31/14					
Total Kjeldahl Nitrogen	2.01	0.20	0.05	mg/L	1.0	1.02	100	90-110	2	20
Phosphorous - Total as P	0.646	0.040	0.010	mg/L	0.50	0.110	107	90-110	10	25
<b>Matrix Spike Dup (BC42611-MSD2)</b>		<b>Source: 1403114-01</b>			Prepared: 03/26/14 Analyzed: 04/02/14					
Phosphorous - Total as P	0.548	0.040	0.010	mg/L	0.50	0.0385	102	90-110	0.1	25
Total Kjeldahl Nitrogen	1.86	0.20	0.05	mg/L	1.0	0.881	98	90-110	10	20
<b>Batch BC42701 - Ammonia by SEAL</b>										
<b>Blank (BC42701-BLK1)</b>		Prepared & Analyzed: 03/27/14								
Ammonia as N	0.009 U	0.040	0.009	mg/L						
<b>LCS (BC42701-BS1)</b>		Prepared & Analyzed: 03/27/14								
Ammonia as N	0.52	0.040	0.009	mg/L	0.50		105	90-110		
<b>Matrix Spike (BC42701-MS1)</b>		<b>Source: 1403044-07</b>			Prepared & Analyzed: 03/27/14					
Ammonia as N	0.54	0.040	0.009	mg/L	0.50	0.053	97	90-110		
<b>Matrix Spike (BC42701-MS2)</b>		<b>Source: 1403092-07</b>			Prepared & Analyzed: 03/27/14					
Ammonia as N	0.55	0.040	0.009	mg/L	0.50	0.083	93	90-110		
<b>Matrix Spike Dup (BC42701-MSD1)</b>		<b>Source: 1403044-07</b>			Prepared & Analyzed: 03/27/14					
Ammonia as N	0.55	0.040	0.009	mg/L	0.50	0.053	99	90-110	2	10

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## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BC42701 - Ammonia by SEAL										
Matrix Spike Dup (BC42701-MSD2)		Source: 1403092-07			Prepared & Analyzed: 03/27/14					
Ammonia as N	0.56	0.040	0.009	mg/L	0.50	0.083	95	90-110	1	10
Batch BC42702 - Ammonia by SEAL										
Blank (BC42702-BLK1)				Prepared & Analyzed: 03/27/14						
Ammonia as N	0.009 U	0.040	0.009	mg/L						
LCS (BC42702-BS1)				Prepared & Analyzed: 03/27/14						
Ammonia as N	0.54	0.040	0.009	mg/L	0.50		109	90-110		
Matrix Spike (BC42702-MS1)		Source: 1403148-01			Prepared & Analyzed: 03/27/14					
Ammonia as N	0.50	0.040	0.009	mg/L	0.50	ND	100	90-110		
Matrix Spike Dup (BC42702-MSD1)		Source: 1403148-01			Prepared & Analyzed: 03/27/14					
Ammonia as N	0.52	0.040	0.009	mg/L	0.50	ND	104	90-110	3	10
Batch BC42803 - alkalinity										
Blank (BC42803-BLK1)				Prepared & Analyzed: 03/28/14						
Total Alkalinity	2.1 I	8.0	2.0	mg/L						
LCS (BC42803-BS1)				Prepared & Analyzed: 03/28/14						
Total Alkalinity	130	8.0	2.0	mg/L	120		101	90-110		
Matrix Spike (BC42803-MS1)		Source: 1403193-02			Prepared & Analyzed: 03/28/14					
Total Alkalinity	260	8.0	2.0	mg/L	120	150	91	80-120		



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April 9, 2014  
Work Order: 1402743

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BC42803 - alkalinity</b>										
<b>Matrix Spike Dup (BC42803-MSD1)</b>		<b>Source: 1403193-02</b>			Prepared & Analyzed: 03/28/14					
Total Alkalinity	270	8.0	2.0	mg/L	120	150	96	80-120	2	26
<b>Batch BC43107 - Digestion for TKN by EPA 351.2</b>										
<b>Blank (BC43107-BLK1)</b>					Prepared & Analyzed: 03/31/14					
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
<b>LCS (BC43107-BS1)</b>					Prepared & Analyzed: 03/31/14					
Total Kjeldahl Nitrogen	1.08	0.20	0.05	mg/L	1.0		108	90-110		
<b>Matrix Spike (BC43107-MS1)</b>		<b>Source: 1402743-26</b>			Prepared & Analyzed: 03/31/14					
Total Kjeldahl Nitrogen	0.957	0.20	0.05	mg/L	1.0	ND	96	90-110		
<b>Matrix Spike (BC43107-MS2)</b>		<b>Source: 1402743-27</b>			Prepared & Analyzed: 03/31/14					
Total Kjeldahl Nitrogen	0.950	0.20	0.05	mg/L	1.0	ND	95	90-110		
<b>Matrix Spike Dup (BC43107-MSD1)</b>		<b>Source: 1402743-26</b>			Prepared & Analyzed: 03/31/14					
Total Kjeldahl Nitrogen	0.922	0.20	0.05	mg/L	1.0	ND	92	90-110	4	20
<b>Matrix Spike Dup (BC43107-MSD2)</b>		<b>Source: 1402743-27</b>			Prepared & Analyzed: 03/31/14					
Total Kjeldahl Nitrogen	0.959	0.20	0.05	mg/L	1.0	ND	96	90-110	0.9	20
<b>Batch BC43110 - Digestion for TP and TKN</b>										
<b>Blank (BC43110-BLK1)</b>					Prepared: 03/31/14 Analyzed: 04/03/14					
Phosphorous - Total as P	0.010 U	0.040	0.010	mg/L						
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						

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## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BC43110 - Digestion for TP and TKN</b>										
<b>LCS (BC43110-BS1)</b>					Prepared: 03/31/14 Analyzed: 04/03/14					
Total Kjeldahl Nitrogen	1.02	0.20	0.05	mg/L	1.0		102	90-110		
Phosphorous - Total as P	0.511	0.040	0.010	mg/L	0.50		102	90-110		
<b>Matrix Spike (BC43110-MS1)</b>					Source: 1403189-02 Prepared: 03/31/14 Analyzed: 04/03/14					
Total Kjeldahl Nitrogen	1.47	0.20	0.05	mg/L	1.0	0.592	88	90-110		
Phosphorous - Total as P	0.531	0.040	0.010	mg/L	0.50	0.0493	96	90-110		
<b>Matrix Spike Dup (BC43110-MSD1)</b>					Source: 1403189-02 Prepared: 03/31/14 Analyzed: 04/03/14					
Phosphorous - Total as P	0.514	0.040	0.010	mg/L	0.50	0.0493	93	90-110	3	25
Total Kjeldahl Nitrogen	1.62	0.20	0.05	mg/L	1.0	0.592	103	90-110	10	20
<b>Batch BD40202 - COD prep</b>										
<b>Blank (BD40202-BLK1)</b>					Prepared & Analyzed: 04/02/14					
Chemical Oxygen Demand	10 U	25	10	mg/L						
<b>LCS (BD40202-BS1)</b>					Prepared & Analyzed: 04/02/14					
Chemical Oxygen Demand	54	25	10	mg/L	50		108	90-110		
<b>Matrix Spike (BD40202-MS1)</b>					Source: 1402743-27 Prepared: 04/02/14 Analyzed: 04/02/14					
Chemical Oxygen Demand	49	25	10	mg/L	50	ND	98	85-115		
<b>Matrix Spike Dup (BD40202-MSD1)</b>					Source: 1402743-27 Prepared: 04/02/14 Analyzed: 04/02/14					
Chemical Oxygen Demand	52	25	10	mg/L	50	ND	104	85-115	6	32
<b>Batch BD40232 - Digestion for TP and TKN</b>										
<b>Blank (BD40232-BLK1)</b>					Prepared: 04/02/14 Analyzed: 04/04/14					
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						

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## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BD40232 - Digestion for TP and TKN</b>										
<b>LCS (BD40232-BS1)</b>					Prepared: 04/02/14 Analyzed: 04/04/14					
Total Kjeldahl Nitrogen	0.905	0.20	0.05	mg/L	1.0		91	90-110		
<b>Matrix Spike (BD40232-MS1)</b>					Source: 1403253-07 Prepared: 04/02/14 Analyzed: 04/04/14					
Total Kjeldahl Nitrogen	1.68	0.20	0.05	mg/L	1.0	0.622	106	90-110		
<b>Matrix Spike (BD40232-MS2)</b>					Source: 1403274-02 Prepared: 04/02/14 Analyzed: 04/04/14					
Total Kjeldahl Nitrogen	1.62	0.20	0.05	mg/L	1.0	0.686	93	90-110		
<b>Matrix Spike Dup (BD40232-MSD1)</b>					Source: 1403253-07 Prepared: 04/02/14 Analyzed: 04/04/14					
Total Kjeldahl Nitrogen	1.57	0.20	0.05	mg/L	1.0	0.622	95	90-110	6	20
<b>Matrix Spike Dup (BD40232-MSD2)</b>					Source: 1403274-02 Prepared: 04/02/14 Analyzed: 04/04/14					
Total Kjeldahl Nitrogen	1.74	0.20	0.05	mg/L	1.0	0.686	106	90-110	8	20
<b>Batch BD40301 - alkalinity</b>										
<b>Blank (BD40301-BLK1)</b>					Prepared & Analyzed: 04/03/14					
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
<b>LCS (BD40301-BS1)</b>					Prepared & Analyzed: 04/03/14					
Total Alkalinity	130	8.0	2.0	mg/L	120		101	90-110		
<b>Batch BD40423 - Ortho phosphorus SM4500P-E by seal</b>										
<b>Blank (BD40423-BLK1)</b>					Prepared & Analyzed: 04/05/14					
Orthophosphate as P	0.012 U	0.040	0.012	mg/L						

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April 9, 2014  
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## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BD40423 - Ortho phosphorus SM4500P-E by seal</b>										
<b>LCS (BD40423-BS1)</b>					Prepared & Analyzed: 04/05/14					
Orthophosphate as P	0.768	0.040	0.012	mg/L	0.80		96	90-110		
<b>Matrix Spike (BD40423-MS1)</b>					Source: 1403477-01 Prepared & Analyzed: 04/05/14					
Orthophosphate as P	1.07	0.040	0.012	mg/L	1.0	0.0590	101	90-110		
<b>Matrix Spike Dup (BD40423-MSD1)</b>					Source: 1403477-01 Prepared & Analyzed: 04/05/14					
Orthophosphate as P	1.04	0.040	0.012	mg/L	1.0	0.0590	98	90-110	2	20

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## Microbiology - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BC42029 - FC-MF</b>										
<b>Blank (BC42029-BLK1)</b>					Prepared: 03/20/14 Analyzed: 03/21/14					
Fecal Coliforms	1 U	1	1	CFU/100 ml						
<b>Duplicate (BC42029-DUP1)</b>					Source: 1402985-02 Prepared: 03/20/14 Analyzed: 03/21/14					
Fecal Coliforms	1 U	1	1	CFU/100 ml		ND				200

**Hazen and Sawyer****10002 Princess Palm Ave, Suite 200****Tampa, FL 33619****April 9, 2014****Work Order: 1402743**

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**\* Qualifiers, Notes and Definitions**

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Results followed by a "U" indicate that the sample was analyzed but the compound was not detected. Results followed by "I" indicate that the reported value is between the laboratory method detection limits and the laboratory practical quantitation limit.

A statement of estimated uncertainty of test results is available upon request.

For methods marked with \*\*, all QC criteria have been met for this method which is equivalent to a SAL certified method.

Test results in this report meet all the requirements of the NELAC standards. Any applicable qualifiers are shown below.

- Q Sample held beyond the accepted holding time.  
L Off-scale high. Result exceeded highest calibration standard.  
J6 The sample matrix interfered with the ability to make any accurate determination.

Questions regarding this report should be directed to :

Kathryn Nordmark

Telephone (813) 855-1844 FAX (813) 855-2218

Kathryn@southernanalyticallabs.com

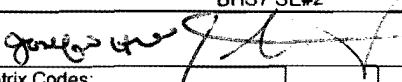




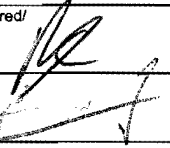
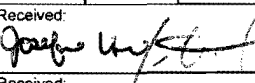
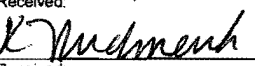
## SOUTHERN ANALYTICAL LABORATORIES, INC.

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SAL Project No. 1402743

Client Name		Hazen and Sawyer		Josefin Hirst													
Project Name / Location		BHS7 SE#2															
Samplers: (Signature)				PARAMETER / CONTAINER DESCRIPTION													
Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water		Date	Time	Matrix	Composite	Grab	125mLP, Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> FC-MF, FC-QT	500mLP, Cool Total Alkalinity, TSS, VSS, CBOD, NOx, Cl, OP	125mLP, H <sub>2</sub> SO <sub>4</sub> COD, TKN, NH <sub>3</sub> , TP	125mLP, H <sub>2</sub> SO <sub>4</sub> TKN, NH <sub>3</sub>	500mLP, Cool NOx	125mLP, Cool NOx	Field pH	Field Temperature	Field Conductivity	Field DO	No. of Containers (Total per each location)
SAL Use Only Sample No.	Sample Description																
01	BHS7-PUMP	3/10/14	12:05	WW		X	4	2	1				7.20	20.3	1909	0.09	
02	BHS7-PUMP-DUP		12:10	WW		X	4	2	1				7.20	20.3	1909	0.09	
03	BHS7-ST1-SL-01		11:12	WW		X				1	1		5.32	20.9	1077	5.01	
04	BHS7-ST1-SL-02		11:00	WW		X				1	1		5.07	20.5	1213	4.44	
05	BHS7-ST1-SL-03		10:48	WW		X				1	1		5.49	19.3	1348	4.95	
06	BHS7-ST1-DP-01		10:30	WW		X				1		1	5.04	18.9	1079	5.05	
07	BHS7-ST1-SL-04		10:40	WW		X		2	1				5.41	19.1	635	4.91	
08	BHS7-ST2-DP-02		8:57	WW		X				1	1		6.01	19.0	1171	0.12	
09	BHS7-ST2-DP-03		8:57	WW		X				1	1		6.05	20.3	1549	0.62	
10	BHS7-ST2-DP-03-DUP		9:05	WW		X				1	1		6.05	20.3	1549	0.62	
11	BHS7-ST2-DP-04		9:26	WW		X				1	1		6.10	20.3	1563	0.08	
12	BHS7-ST2-DP-05		9:40	WW		X				1	1		6.05	20.7	1536	0.08	

Containers Prepared/ Relinquished: 	Date/Time: 3-17-14 12:00	Received: 	Date/Time: 3-18-14 12:00	Seal intact? Y N <input checked="" type="radio"/> NA Samples intact upon arrival? <input checked="" type="radio"/> N NA Received on ice? Temp: <input type="text"/> <input checked="" type="radio"/> N NA Proper preservatives indicated? <input checked="" type="radio"/> N NA Rec'd within holding time? <input checked="" type="radio"/> N NA Volatiles rec'd w/out headspace? Y N <input checked="" type="radio"/> NA Proper containers used? <input checked="" type="radio"/> N NA	Instructions / Remarks:     <div style="text-align: right; font-size: 1.5em;">1402743</div>
Relinquished:	Date/Time: 3/14/14	Received: 	Date/Time: 3/20/14		
Relinquished:	Date/Time:	Received:	Date/Time:		
Relinquished:	Date/Time:	Received:	Date/Time:		
Relinquished:	Date/Time:	Received:	Date/Time:		

Client Name										Hazen and Sawyer										Josefin Hirst									
Project Name / Location																													
BHS7 SE#2																													
Samplers: (Signature) <i>[Signature]</i>															PARAMETER / CONTAINER DESCRIPTION														
Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water																													
SAL Use Only Sample No.																													
Sample Description															Date Time Matrix Composite Grab 125mLP, Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> FC-MF, FC-QT 500mLP, Cool Total Alkalinity, TSS, VSS, CBOD, NO <sub>x</sub> , Cl <sub>2</sub> OP 125mLP, H <sub>2</sub> SO <sub>4</sub> COD, TKN, NH <sub>3</sub> , TP 125mLP, H <sub>2</sub> SO <sub>4</sub> TKN, NH <sub>3</sub> 500mLP, Cool NO <sub>x</sub> 125mLP, Cool NO <sub>x</sub> Field pH Field Temperature Field Conductivity Field DO No. of Containers (Total per each location)														
13 BHS7-ST2-SL-05															3/20/14 11:25 WW X 1 1 5.94 22.5 1125 1.20														
14 BHS7-ST2-DP-06															9:50 WW X 1 1 6.08 20.1 1554 0.06														
15 BHS7-ST2-DP-06-DUP															9:55 WW X 1 1 6.08 20.1 1554 0.06														
16 BHS7-ST2-DP-07															9:58 WW X 4 2 1 6.14 20.5 1636 0.13														
17 BHS7-ST2-DP-08															10:08 WW X 4 2 1 6.09 20.2 1600 0.08														
18 BHS7-EFF-SL-06															11:15 WW X 1 1 5.64 21.1 563 5.74														
19 BHS7-EFF-DP-09															9:03 WW X 1 1 6.04 17.7 431 6.36														
20 BHS7-EFF-SL-07															11:20 WW X 1 1 5.27 21.4 367 6.34														
21 BHS7-EFF-DP-10															9:18 WW X 1 1 6.18 19.2 2620 7.18														
22 BHS7-EFF-SL-08															10:53 WW X 1 1 6.25 19.3 1347 6.31														
23 BHS7-EFF-DP-11															10:00 WW X 1 1 6.00 21.0 367 6.34														
24 BHS7-EFF-SL-09															10:33 WW X 2 1 5.78 19.1 267 6.10														
Containers Prepared/Relinquished:															Date/Time: 3-17-14 12:00 Received: <i>[Signature]</i> Date/Time: 3-18-14 12:00 Relinquished: <i>[Signature]</i> Date/Time: 3-20-14 14:45 Received: <i>[Signature]</i> Date/Time: 3-20-14 Relinquished: Date/Time: Received: Date/Time: Relinquished: Date/Time: Received: Date/Time: Relinquished: Date/Time: Received: Date/Time:														
Seal intact? Y N NA Samples intact upon arrival? Y N NA Received on ice? Temp _____ Y N NA Proper preservatives indicated? Y N NA Rec'd w/in holding time? Y N NA Volatiles rec'd w/out headspace? Y N NA Proper containers used? Y N NA															Instructions / Remarks:          1402743														

Chain of Custody.xls  
Rev Date 11/19/01



## Appendix B: Operation & Maintenance Log

**Table B.1**  
**Operation and Maintenance Log**

Date	Description
11/13/2013	Construction - Pump tank, liner and lignocellulosic media installed
11/14/2013	Construction - Pump, feed line, laterals, infiltrator chambers installed, wet pressure test
11/15/2013	Construction - final grading, hay and seed applied
11/18/2013	Construction - electrician finished electrical work
11/19/2013	System Start-up
	Bull run valve (BRV) switched from old drainfield to PNRS system
11/26/2013	System check
	Flipped BRV to old drainfield for Thanksgiving holiday ~ 30-40 people staying at the house
12/2/2013	System check
	Flipped BRV back to PNRS system
12/6/2013	System check
	Flipped BRV to old drainfield for holiday party ~ 80 people attending
12/9/2013	Homeowner flipped BRV back to PNRS system
12/10/2013	System check
	Preparation for preliminary sample event
12/12/2013	Preliminary sample event No. 1
1/3/2014	System check
1/17/2014	Preparation for Sample Event No. 1
1/20/2014	Sample Event No. 1
3/5/2014	System check
3/13/2014	System check
3/19/2014	Preparation for Sample Event No. 2
3/20/2014	Sample Event No. 2

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## Appendix C: Weather Station Data

**Table C.1**  
**Weather Data**

MONTHLY CLIMATOLOGICAL SUMMARY for FEB 2014										
DAY	RAIN (in)	MEAN TEMP (F)	HIGH TEMP (F)	TIME	LOW TEMP (F)	TIME	AVG. WIND SPEED (mph)	HIGH WIND SPEED (mph)	TIME	WIND DIR
1	0.02	65.1	80.2	4:30p	54.7	12:30a	0.3	10.0	3:00p	SSW
2	0.00	69.4	86.1	4:30p	61.1	6:00a	0.3	10.0	6:30p	ENE
3	0.00	71.0	85.9	4:30p	63.0	12:00m	0.4	8.0	2:00p	SW
4	0.00	70.1	86.3	3:00p	58.8	6:30a	0.4	9.0	2:30p	SSW
5	0.01	72.3	83.3	2:30p	68.1	12:00m	1.4	12.0	3:00p	SW
6	0.47	54.9	68.1	12:30a	45.9	9:30p	2.2	14.0	9:00p	NNW
7	0.03	50.3	53.1	4:30p	46.9	12:30a	2.3	16.0	8:00p	NNW
8	1.30	52.5	55.4	5:30p	48.1	12:00m	1.1	13.0	8:30a	NNW
9	0.01	54.8	71.9	4:30p	43.5	4:30a	0.9	12.0	12:00p	NNW
10	0.00	56.6	76.2	4:30p	42.5	6:30a	0.4	9.0	2:00p	NW
11	0.00	60.6	82.7	2:30p	45.4	6:30a	1.1	14.0	6:30p	NE
12	0.62	58.5	74.5	1:00p	52.9	6:30a	1.5	15.0	5:00p	SSW
13	0.01	50.6	61.7	2:00a	36.8	12:00m	2.8	22.0	10:30a	SW
14	0.00	50.2	67.6	5:00p	35.6	6:30a	0.8	10.0	1:30p	SW
15	0.02	55.9	69.4	2:30p	42.6	12:00m	1.9	15.0	7:00a	SW
16	0.00	53.1	73.7	3:30p	36.3	7:30a	0.5	10.0	10:30a	NNW
17	0.00	56.8	80.1	4:30p	38.1	6:30a	0.4	7.0	10:00a	SW
18	0.00	62.8	83.1	4:00p	43.4	4:00a	0.3	8.0	3:00p	SW
19	0.00	67.2	85.7	5:00p	53.2	3:30a	0.7	11.0	12:30p	SW
20	0.00	69.5	87.2	3:30p	53.9	5:30a	1.1	15.0	12:00p	SSW
21	1.28	68.8	78.5	2:00p	63.2	2:00a	0.9	19.0	3:30p	SSW
22	0.00	67.1	78.6	3:00p	57.6	12:00m	0.8	11.0	4:00p	NE
23	0.00	66.5	83.5	2:00p	56.8	2:00a	0.9	16.0	3:30p	SW
24	0.00	64.8	70.4	11:00a	60.4	10:30p	0.3	8.0	2:30p	NNW
25	0.00	66.7	82.6	4:30p	56.7	5:00a	0.5	6.0	11:30a	SW
26	1.12	60.0	64.2	12:30p	55.1	3:00a	0.2	9.0	2:30p	SSW
27	0.02	52.7	61.2	1:00a	46.9	8:30a	1.3	14.0	1:30a	NW
28	0.00	54.2	70.7	3:30p	40.1	6:00a	0.9	12.0	4:00p	NW
Total	4.91									

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**Table C.1**  
**Weather Station Data (continued)**

MONTHLY CLIMATOLOGICAL SUMMARY for MARCH 2014										
DAY	RAIN (in)	MEAN TEMP (F)	HIGH TEMP (F)	TIME	LOW TEMP (F)	TIME	AVG. WIND SPEED (mph)	HIGH WIND SPEED (mph)	TIME	WIND DIR
1	0.00	57.0	75.6	5:00p	45.3	4:00a	0.7	09.0	8:30a	NW
2	0.00	64.3	82.5	4:30p	50.8	6:30a	0.8	12.0	2:30p	NE
3	0.00	67.1	82.1	4:00p	52.3	6:30a	2.0	17.0	2:00p	SW
4	0.00	62.4	71.6	4:30p	52.1	10:30p	1.8	12.0	9:00a	NE
5	0.00	56.0	65.2	3:30p	52.1	4:30a	1.9	13.0	7:30p	NE
6	0.61	59.2	69.3	4:30p	53.0	12:30a	1.4	13.0	4:00a	NN
7	0.01	50.3	54.8	3:30p	44.8	12:00m	1.2	10.0	11:00a	NW
8	0.00	54.8	72.7	3:30p	39.7	4:00a	0.9	11.0	1:30p	NW
9	0.00	62.5	80.7	3:30p	45.9	5:00a	0.6	08.0	4:30p	SW
10	0.00	64.2	81.8	4:30p	48.5	7:30a	0.8	08.0	12:30p	SW
11	0.00	66.1	83.3	5:00p	52.0	7:00a	0.6	08.0	1:00p	SW
12	0.42	69.4	80.7	2:00p	62.4	12:00m	3.2	19.0	3:30p	SW
13	0.00	56.8	69.0	5:30p	43.5	12:00m	2.3	20.0	4:30a	NW
14	0.00	58.2	78.1	3:30p	38.6	7:30a	0.9	12.0	3:00p	SS
15	0.00	64.9	83.4	4:30p	47.7	8:00a	0.6	08.0	12:00p	E
16	0.00	71.3	86.9	4:00p	57.2	6:00a	2.3	21.0	11:00a	SS
17	2.66	66.8	71.4	12:30a	62.2	9:00p	0.9	17.0	2:00p	SW
18	0.08	64.7	75.9	5:30p	56.9	12:00m	1.2	15.0	3:00a	NW
19	0.00	63.8	79.6	4:30p	55.3	12:00m	0.7	08.0	1:30p	NE
20	0.00	65.9	84.1	5:00p	54.0	2:30a	0.7	09.0	10:30a	N
21	0.00	68.5	86.0	5:30p	55.0	5:30a	0.9	11.0	7:30p	EN
22	0.00	71.6	86.1	3:30p	62.0	5:30a	1.5	13.0	1:00p	SW
23	0.00	69.5	82.0	4:30p	58.0	4:30a	1.1	12.0	5:00p	SW
24	0.00	64.2	69.6	4:00p	59.1	12:00m	2.1	13.0	10:00a	NN
25	0.00	64.2	78.5	3:30p	55.1	12:00m	1.8	16.0	2:30p	SW
26	0.00	51.4	64.4	4:30p	39.9	7:30a	2.1	18.0	9:30a	NW
27	0.00	57.6	72.6	5:30p	40.8	2:30a	0.6	11.0	4:00p	EN
28	0.03	69.5	82.7	2:30p	58.7	2:30a	1.0	17.0	1:30p	SS
29	2.09	68.9	74.1	6:00p	64.4	12:00m	1.9	15.0	6:30a	SS
30	0.00	62.8	76.5	5:30p	50.1	12:00m	1.3	12.0	5:00a	SW
31	0.00	61.4	82.2	3:00p	46.3	8:00a	0.4	08.0	3:30p	SW
Total	5.90									

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