



# Florida Onsite Sewage Nitrogen Reduction Strategies Study

Task B.7

## **B-HS4 Field System Monitoring Report No. 1**

### **Progress Report**

October 2013

442-27-001

**HAZEN AND SAWYER**  
Environmental Engineers & Scientists

In association with:



**AET**  
Applied Environmental Technology

**Otis Environmental  
Consultants, LLC**

# **Florida Onsite Sewage Nitrogen Reduction Strategies Study**

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

### **B-HS4 Field System Monitoring Report No. 1**

#### **Prepared for:**

Florida Department of Health  
Division of Disease Control and Health Protection  
Bureau of Environmental Health  
Onsite Sewage Programs  
4042 Bald Cypress Way Bin #A-08  
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FDOH Contract CORCL

**October 2013**

#### **Prepared by:**

**HAZEN AND SAWYER**  
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## **B-HS4 Field System Monitoring Report No. 1**

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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 PNRS II. 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 first sample event of the passive nitrogen reduction system at home site B-HS4 in Seminole County, Florida.

### **2.0 Purpose**

This monitoring report documents data collected from the first B-HS4 monitoring and sampling event conducted on September 30, 2013 (Day 83). This monitoring event consisted of collecting flow measurements from the household water use meter, recording electricity use, monitoring of field parameters, collection of water samples from four points in the treatment system, and sample analyses by a NELAC certified laboratory.

### **3.0 Materials and Methods**

#### **3.1 Project Site**

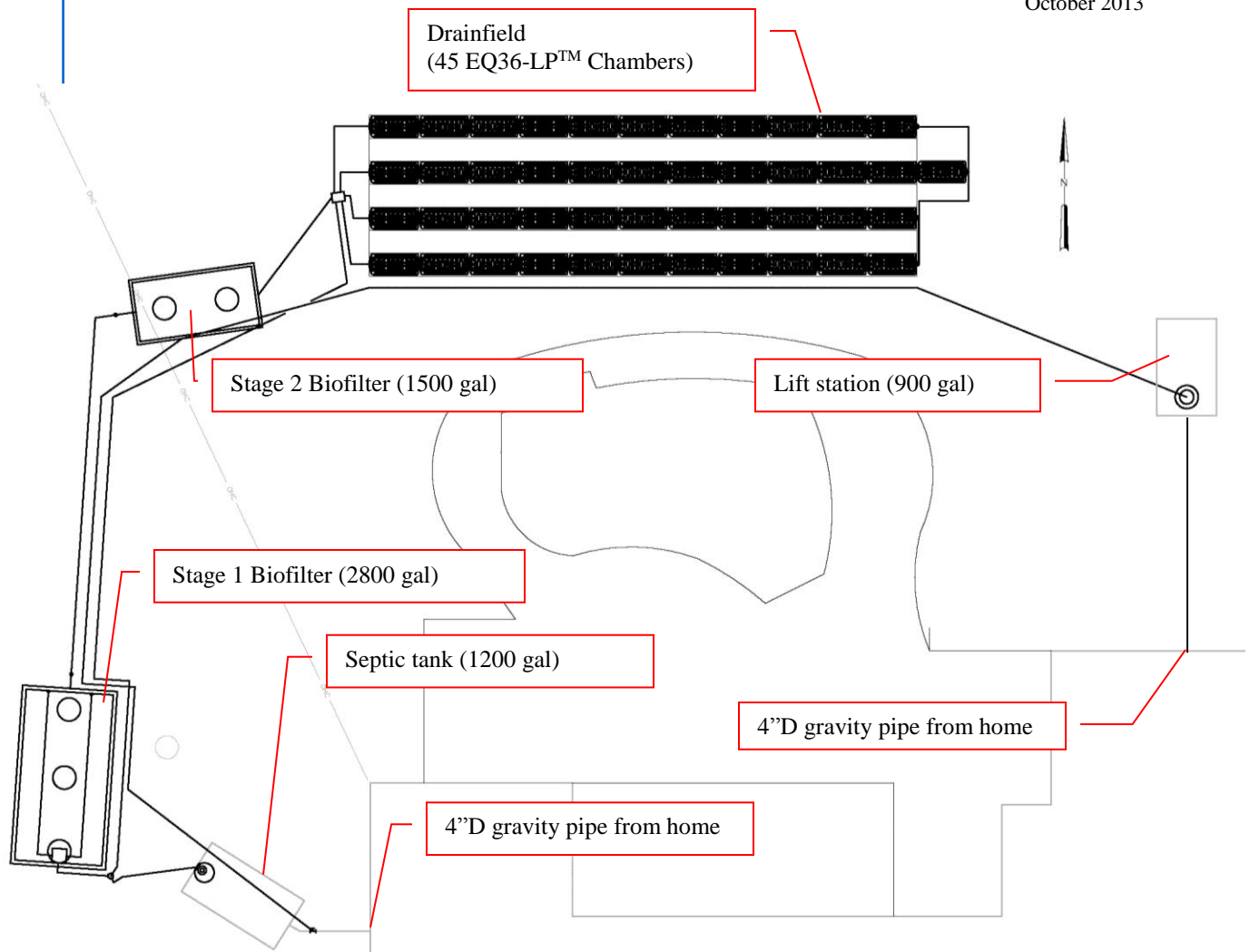
The B-HS4 field site is located in Seminole County, FL. The nitrogen reducing onsite treatment system for the single family residence was installed in June 2013. Design and construction details were presented previously in the Task B.6 document. Figure 1 is a system schematic showing the system components and layout of the installation. A flow schematic of the system is shown in Figure 2. The property had two existing onsite sewage treatment and disposal systems. The existing 1,200 gallon concrete septic tank, located on the west side of the property, continues to provide primary treatment for the PNRS system. The existing 900 gallon septic tank, located on the northeast side of the property, was converted to a lift station, and pumps the raw sewage from that system to

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the head end of the new gravity flow PNRS. All subsequent flow is by gravity. The passive nitrogen reduction system consists of an addition of two tanks and a new drainfield to the existing permitted systems. The B-HS4 tankage includes a 2,800 gallon concrete Stage 1 unsaturated media biofilter and 1,500 gallon two chamber concrete Stage 2 saturated media biofilter. Based on measured average wastewater flow and tank volumes, there is over a ten day transit time through the treatment system prior to dispersal. The denitrified treated effluent is discharged into the soil via the new drainfield (EQ36-LP™ chambers).

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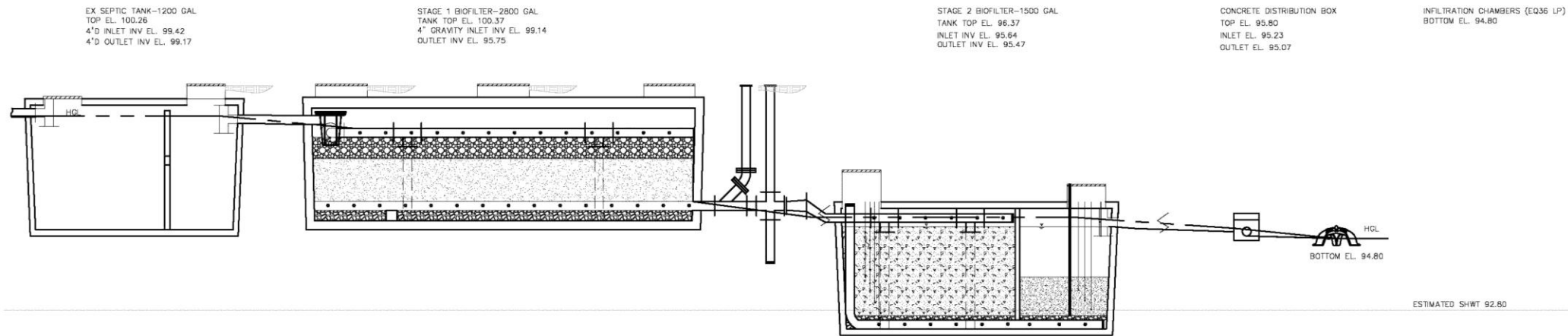
October 2013



**Figure 1**  
**Plan view of B-HS4 system layout**

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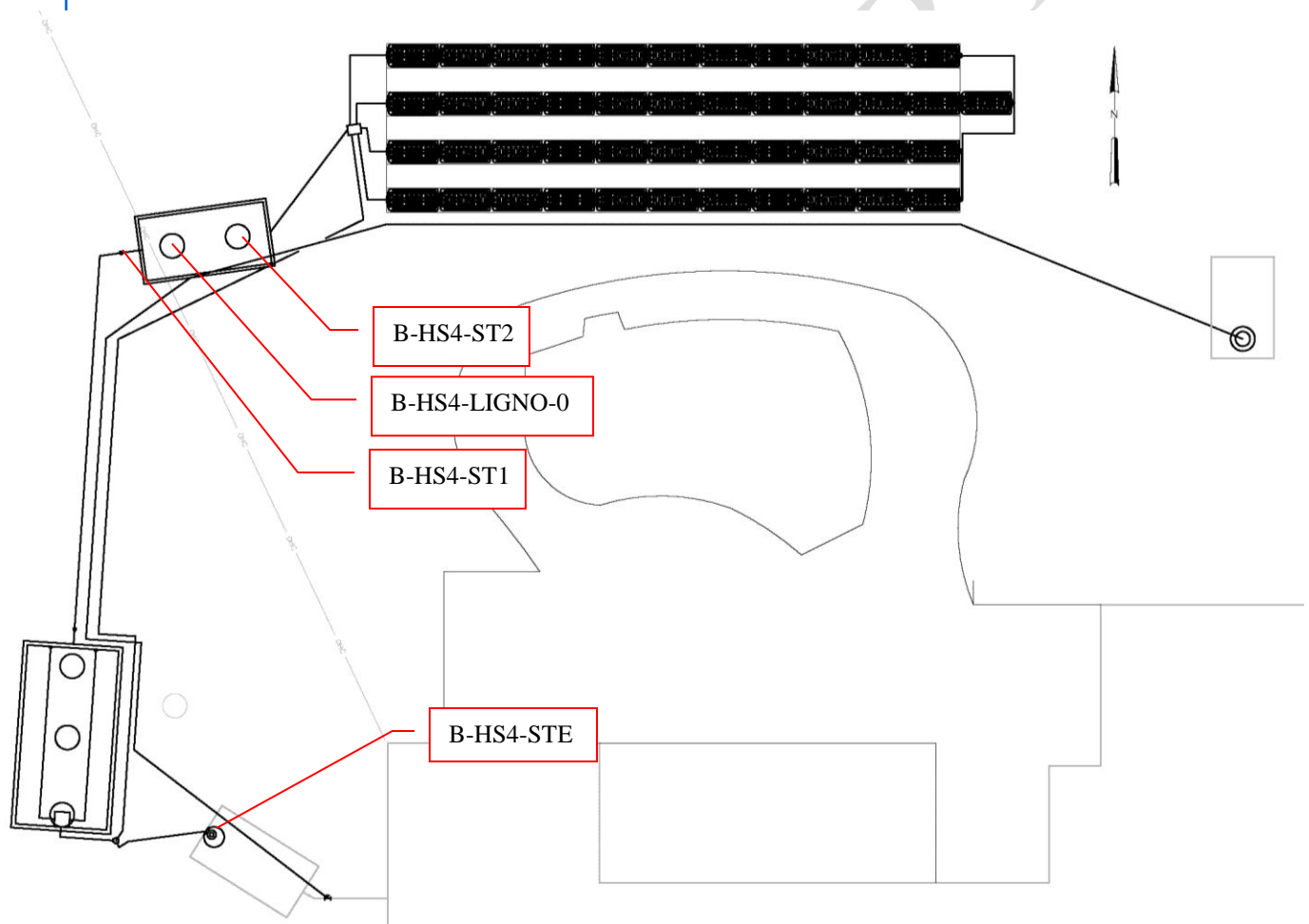
October 2013



**Figure 2**  
**Flow Schematic of B-HS4 PNRS**

### 3.2 Monitoring and Sample Locations and Identification

The four primary monitoring points for the B-HS4 system are shown in Figure 3. Household wastewater enters the primary tank and exits as septic tank effluent through an effluent screen into the Stage 1 biofilter. The first primary monitoring point, B-HS4-STE, is the effluent sampled approximately 1.5 feet below the surface of the primary tank before the effluent filter (Figure 4), which is referred to as primary effluent or septic tank effluent (STE). The lift station wastewater is pumped into the inlet side of the primary tank; therefore, samples from monitoring point B-HS4-STE are representative of the whole household wastewater. The B-HS4-STE sample represents the influent to the remainder of the onsite nitrogen reduction system.



**Figure 3**  
**B-HS4 Sample and Monitoring Locations**



**Figure 4**  
**Primary Tank (B-HS4-STE sample)**

The primary tank contents are discharged by gravity to a distribution box, located inside the Stage 1 biofilter, which splits the flow between two perforated distribution pipes along the top of the unsaturated Stage 1 biofilter media. In the Stage 1 biofilter, wastewater percolates downward through the unsaturated expanded clay media where nitrification occurs. Stage 1 biofilter effluent flows into the Stage 2 biofilter by gravity. The second primary sampling point (B-HS4-ST1) is taken from a sample port in the gravity pipe connecting the Stage 1 biofilter outlet to the Stage 2 biofilter inlet representing the Stage 1 biofilter effluent.

Effluent from the unsaturated (Stage 1) media tank enters the saturated denitrification (Stage 2) biofilter into a standing water column lying above the media in the first chamber (lignocellulosic media), flows downward through the media, moves laterally in a



perforated 4-inch pipe through the baffle wall to the bottom of the second chamber, and upward through the media in the second chamber (elemental sulfur and oyster shell).

The first chamber of the Stage 2 biofilter contains 42-inches of lignocellulosic media. Stainless steel samplers are positioned at 12-inch increments for vertical profiling throughout the lignocellulosic media. The third primary sampling point is a stainless steel sampler positioned at the bottom of the lignocellulosic media (B-HS4-LIGNO-0) with tubing to the surface. The B-HS4-LIGNO-0 sample represents the lignocellulosic media effluent (Figure 5).



**Figure 5**  
**First chamber of Stage 2 biofilter (B-HS4-LIGNO-0" sample)**

A collection pipe along the bottom transfers the first chamber (lignocellulosic media) effluent to the second chamber, which contains 18-inches of elemental sulfur mixed with oyster shell media. The fourth primary sampling point, B-HS4-ST2, is the second chamber of the Stage 2 biofilter effluent which is sampled approximately 1 foot below the surface of the effluent baffle tee. This sample location is after passage through the sulfur media; it is the final effluent from the treatment system prior to being discharged to the soil infiltration system, or drainfield (Figure 6).



**Figure 6**  
**Second chamber of Stage 2 biofilter (B-HS4-ST2 sample)**

### 3.3 Operational Monitoring

Start-up of the system occurred on July 9, 2013 (Experimental Day 0). Preliminary sampling for several key parameters was conducted July 29, 2013 (Experimental Day 20) to evaluate start-up performance. It was noted during sampling that the incoming lift station wastewater flow into the primary tank was causing mixing in the primary tank and the carryover of solids into the Stage 1 biofilter d-box. Therefore, the PNRS system was bypassed on August 15, 2013. On September 5, 2013 a smaller (less horsepower) pump was installed in the lift station with a mechanical float switch to cause the lift station to dose less volume but more frequent doses to the primary tank which resulted in less mixing within the primary tank. The PNRS system has operated continually since that date. The first formal sampling event was conducted September 30, 2013 (Experimental Day 83). For this first formal sampling event, Sample Event No. 1, the water meter for the house was read and recorded on September 30, 2013. 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.

### 3.4 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 lift station pump installed within the second chamber of the lift station. There are no chemicals added to the system. However, the Stage 2 biofilter media (lignocellulosic and sulfur) are “reactive” media which will be consumed during operation. The Stage 2 biofilter was initially filled with 42 inches of lignocellulosic media and 18 inches of sulfur and oyster shell mixture media, which ostensibly will last for many years without replenishment or replacement.

### 3.5 Water Quality Sample Collection and Analyses

Preliminary start-up sampling was conducted on July 29, 2013 (Experimental Day 20) and consisted of monitoring the nitrogen transformation through the system. A full suite of influent, intermediate and effluent water quality samples from the system were collected for the first formal sample event on September 30, 2013 for water quality analysis. Samples were collected at each of the four monitoring points described in Section 3.2: B-HS4-STE, B-HS4-ST1, B-HS4-LIGNO-0 and B-HS4-ST2. 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, a potable water sample was collected (B-HS4-WELL) by filling sample containers with potable water (from the onsite well) from a hose bib located near the system. This sample was 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 ( $\text{NH}_3\text{-N}$ ), nitrate nitrogen ( $\text{NO}_3\text{-N}$ ), nitrite nitrogen ( $\text{NO}_2\text{-N}$ ), total phosphorus (TP), orthophosphate (Ortho P), total suspended solids (TSS), volatile suspended solids (VSS), total organic carbon (TOC), fecal coliform (fecal), and E.coli. The influent and sulfur media samples included sulfate, sulfide, and hydrogen sulfide (unionized). All analyses were performed by an 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 Solids (TS)	EPA 160.3	.01 % by wt
Total Suspended Solids (TSS)	SM 2540D	1 mg/L
Volatile Suspended Solids (VSS)	EPA 160.4	1 mg/L
Total Organic Carbon (TOC)	SM5310B	0.06 mg/L
Sulfate	EPA 300.0	2.0 mg/L
Sulfide	SM 4500SF	0.10 mg/L
Hydrogen Sulfide (unionized)	SM 4550SF	0.01 mg/L
Fecal Coliform (fecal)	SM9222D	1 ct/100mL
E.coli	SM9223B	2 ct/100mL

## 4.0 Results and Discussion

### 4.1 Operational Monitoring

Table 2 provides a summary of the household water use since the water meter installation on February 8, 2013. The operation and maintenance log which includes actions taken since start-up is provided in Appendix B.

**Table 2**  
**Summary of Household Water Use**

Date	Cumulative Volume (gallons)	Average Daily Household Flow, Q (gpd)
2/8/2013 13:45	0.0	INSTALLED
2/21/2013 11:25	4,391.0	340.3
2/28/2013 12:00	6,292.5	270.7
6/7/2013 8:00	34,417.4	284.6
6/14/2013 8:00	36,179.5	251.7
6/20/2013 12:40	37,981.2	290.9
7/17/2013 14:30	45,422.8	274.8
7/23/2013 13:32	47,051.9	273.4
7/29/2013 11:25	48,658.8	271.8
8/6/2013 12:15	50,922.9	281.8
8/12/2013 10:24	52,614.2	285.6
8/15/2013 8:20	53,328.4	245.1
8/27/2013 10:20	56,550.0	266.6
9/5/2013 9:59	58,748.1	244.6
9/30/2013 13:15	65,633.7	273.9
Total average through 9/30/13		275.4

From start-up through September 30, 2013, the household water use average was 275 gallons per day with periods of higher and lower flows (Table 2).

## 4.2 Energy Consumption

Energy consumption is monitored using an electrical meter installed between the main power box for the house and the lift station pump outlet to record cumulative power usage of the pump in kilowatt-hours. The recorded electrical use for the system is summarized in Table 3.

**Table 3**  
**Summary of System Electrical Use**

<b>Date and Time Read</b>	<b>Electrical Meter Reading</b>	<b>Average Daily Electrical Use</b>
	Cumulative (kWh)	(kWh/day)
6/20/2013 14:00		Installed
7/9/2013 15:45	0.3	Start Up
7/17/2013 10:41	0.5	0.026
7/23/2013 13:34	0.6	0.016
7/29/2013 11:30	0.8	0.034
8/6/2013 11:42	0.9	0.012
8/12/2013 10:24	1.2	0.050
8/15/2013 8:20	1.3	0.034
8/27/2013 10:20	1.8	0.041
9/5/2013 9:59	2.2	0.045
9/30/2013 13:15	5.8	0.143
Total average through 9/30/13		0.045

The total average electrical use through September 30, 2013 was 0.045 kWh per day.

### 4.3 Water Quality

Water quality analytical results and raw analytical data for the preliminary start-up sampling conducted on July 29, 2013 (Experimental Day 20) are included in Appendix A. Water quality analytical results, for the preliminary start-up sample event are listed in Table A.1. The nitrogen results for the preliminary monitoring are graphically displayed in Figure 7.

Water quality analytical results, for Sample Event No.1 are listed in Table 4 and nitrogen results are graphically displayed in Figure 8. The laboratory report containing the raw analytical data is included in Appendix A. The following discussion summarizes the water quality analytical results. The performance of the various system components was compared by considering the changes through treatment of nitrogen species (TKN-N,  $\text{NH}_3\text{-N}$ , and  $\text{NO}_x\text{-N}$ ), as well as supporting water quality parameters.



**Figure 7**  
**Graphical Representation of Nitrogen Results**  
**Preliminary Sample Event July 29, 2013 (Experimental Day 20)**





**Figure 8**  
**Graphical Representation of Nitrogen Results**  
**Sample Event No. 1 September 30, 2013 (Experimental Day 83)**

**Septic Tank Effluent (STE) Quality:** The water quality characteristics of STE collected in Sample Event 1 were within the typical range generally expected for domestic STE. The measured STE total nitrogen (TN) concentration was 87 mg/L, which is within the range that has been typically reported for Florida single family residence STE.

**Stage 1 Effluent (ST1):** The Stage 1 effluent NH<sub>3</sub>-N levels was 0.38 mg/L with a DO level at 3.9 mg/L in the Stage 1 effluent (Table 4). The Stage 1 effluent TSS concentration was 3 mg/L and CBOD<sub>5</sub> was 5 mg/L. The Stage 1 effluent NO<sub>x</sub>-N was 48 mg/L. The Stage 1 biofilter showed fairly complete nitrification with an effluent NH<sub>3</sub>-N concentration of 0.38 mg/L and TKN of 6.9 mg/L.

**Stage 2 Biofilter Effluent (LIGNO-0" and ST2):** Effluent NO<sub>x</sub>-N from the Stage 2 biofilter monitoring point was below the method detection limit of 0.02 mg/L. The low NO<sub>x</sub>-N was accompanied by a measured 0.18 mg/L DO and -273 mV ORP. The lignocellulosic media effluent NO<sub>x</sub>-N was 4.6 mg/L. The Stage 2 system produced a highly reducing environment and achieved essentially complete NO<sub>x</sub>-N reduction. Final total nitrogen (TN) in the treatment system effluent was 1.3 mg/L. The Stage 2 biofilter lignocellulosic media effluent CBOD<sub>5</sub> was below the method detection limit and the sulfur media effluent was 3 mg/L. The Stage 2 effluent sulfate concentration was 35 mg/L, which was approximately 32 mg/L higher than the STE.

**Well:** One tap water sample was collected by filling sample containers with tap water from a hose bib near the system. The home water supply is obtained from an onsite well. The onsite well water NO<sub>x</sub>-N was 1.4 mg/L, TKN was 0.18 mg/L, total phosphorus was 0.49 mg/L and sulfate was 8.7 mg/L.

**Table 4**  
**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)	Sulfate (mg/L)	Hydrogen Sulfide (mg/L)	Sulfide (mg/L)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)	TOC (mg/L)
BHS4-STE	9/30/2013 1:25:00 PM	27.8	6.52	1271	0.15	-304.9	450	54	54	92	130	87.14	87	23	64	0.14	0.01	0.14	64.14	14	0.01	3.1	4.2	5.7	23000	16000	64
BHS4-ST1	9/30/2013 1:00:00 PM	27.6	6.76	1363	3.85	33.9	290	3	3	5	10	54.9	6.9	6.52	0.38	48	0.01	48	48.38	1.8	1.5				100	41	13
BHS4-LIGNO-0	9/30/2013 12:50:00 PM	27.5	6.71	1247	2.16	-219.1	450	2	2	2	30	8.0	3.4	2.43	0.97	4.6	0.01	4.6	5.57	0.57	0.2				30	10	17
BHS4-ST2	9/30/2013 12:30:00 PM	27.1	6.61	1277	0.18	-273.4	480	2	2	3	41	1.32	1.3	0.4	0.9	0.01	0.01	0.02	0.92	0.7	0.32	35	1.8	2.6	1	2	18
BHS4-WELL	9/30/2013 1:15:00 PM	27.9	7.32	529	5.1	101.3	150	1	1	2	10	1.58	0.18	0.159	0.021	1.4	0.01	1.4	1.421	0.49	0.2	8.7	0.13	0.41	1	2	2.1

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-HS4 Sample Event No. 1: Summary and Recommendations**

### **5.1 Summary**

The results of the first sampling event indicate that the system is operating well and no adjustments are recommended at this time. The Sample Event No. 1 results indicate that:

- Septic tank effluent (STE) quality is characteristic of typical household STE quality. The total nitrogen concentration of 87 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; effluent contained 6.9 mg/L TKN, of which 0.38 mg/L was ammonia.
- The Stage 2 biofilter produced a reducing environment and effluent NO<sub>x</sub>-N was below the method detection limit of 0.02 mg N/L.
- The total nitrogen concentration in the final effluent from the total treatment system was 1.32 mg/L, an approximately 98% reduction from STE.

### **5.2 Recommendations**

No operational adjustments are recommended at this time, and continued sampling should provide additional insight to system performance.





## **Appendix A: Laboratory Report**

PRELIMINARY

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**Table A.1**  
**Preliminary Start-up Sampling Results**

Sample ID	Sample Date/Time	Temp (°C)	pH	Specific Conductance (uS/cm)	DO (mg/L)	ORP (mV)	TSS (mg/L)	CBOD <sub>5</sub> (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>	Sulfate (mg/L)	Hydrogen Sulfide (mg/L)
BHS4-STE	7/29/2013 11:50	29.9	6.85	1262	0.12	-309.2	178	240	40.02	40	13	27	0.01	0.01	0.02	27.02	0.2	4.1
BHS4-Stage 1	7/29/2013 11:35	28	6.99	1352	2.33	60.5			51	25	4	21	26	0.01	26	47		
BHS4-Stage 2 Ligno	7/29/2013 11:40	27.6	6.72	1285	1.29	-199.8	7	50	28.02	28	5	23	0.01	0.01	0.02	23.02		
BHS4-Stage 2 Sulfur	7/29/2013 11:45	28.2	6.65	1426	2.40	-331.0			26.02	26	5	21	0.01	0.01	0.02	21.02	21	24
BHS4-TAP	7/29/2013 11:30	26.4	7.60	475	4.95	49.0			0.79	0.12	0.043	0.077	0.67	0.01	0.67	0.747	7.2	

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.

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

**August 26, 2013**  
**Work Order: 1307318**

## Laboratory Report

Project Name		B-HS4 Preliminary SE#1						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution

Sample Description **STE**  
 Matrix **Wastewater**  
 SAL Sample Number **1307318-01**  
 Date/Time Collected **07/29/13 11:50**  
 Collected by **Sean Schmidt**  
 Date/Time Received **07/29/13 14:10**

### Client Provided Field Data

pH 6.85  
 Temperature 29.9 °C  
 Conductivity 1262 umhos  
 Dissolved Oxygen 0.12 mg/L

### Inorganics

Hydrogen Sulfide (Unionized)	mg/L	4.1	SM 4550SF	0.04	0.01		07/30/13 11:15	1
Ammonia as N	mg/L	27	EPA 350.1	2.0	0.47		08/14/13 09:11	50
Carbonaceous BOD	mg/L	240	SM 5210B	2	2	07/29/13 14:34	08/03/13 10:01	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		07/31/13 02:18	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		07/31/13 02:18	1
Sulfate	mg/L	0.20 U	EPA 300.0	0.60	0.20		07/31/13 02:18	1
Sulfide	mg/L	7.3	SM 4500SF	0.40	0.10		07/30/13 11:15	1
Total Kjeldahl Nitrogen	mg/L	40	EPA 351.2	0.20	0.05	08/16/13 08:55	08/19/13 16:57	41.67
Total Suspended Solids	mg/L	178	SM 2540D	1	1	07/30/13 09:22	07/31/13 08:43	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		07/31/13 02:18	1

Sample Description **Stage 1**  
 Matrix **Wastewater**  
 SAL Sample Number **1307318-02**  
 Date/Time Collected **07/29/13 11:35**  
 Collected by **Sean Schmidt**  
 Date/Time Received **07/29/13 14:10**

### Client Provided Field Data

pH 6.99  
 Temperature 28.0 °C  
 Conductivity 1352 umhos  
 Dissolved Oxygen 2.33 mg/L

### Inorganics

Ammonia as N	mg/L	21	EPA 350.1	0.80	0.19		08/14/13 08:38	20
Nitrate (as N)	mg/L	26	EPA 300.0	0.04	0.01		07/31/13 02:28	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		07/31/13 02:28	1
Total Kjeldahl Nitrogen	mg/L	25	EPA 351.2	0.20	0.05	08/16/13 08:55	08/19/13 15:23	9.62
Nitrate+Nitrite (N)	mg/L	26	EPA 300.0	0.08	0.02		07/31/13 02:28	1

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

**August 26, 2013**  
**Work Order: 1307318**

## Laboratory Report

Project Name		B-HS4 Preliminary SE#1						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution

Sample Description **Stage 2 - LIGNO**  
 Matrix **Wastewater**  
 SAL Sample Number **1307318-03**  
 Date/Time Collected **07/29/13 11:40**  
 Collected by **Sean Schmidt**  
 Date/Time Received **07/29/13 14:10**

### Client Provided Field Data

pH 6.72  
 Temperature 27.6 °C  
 Conductivity 1285 umhos  
 Dissolved Oxygen 1.29 mg/L

### Inorganics

Ammonia as N	mg/L	23	EPA 350.1	0.80	0.19		08/22/13 16:38	20
Carbonaceous BOD	mg/L	50	SM 5210B	2	2	07/29/13 14:34	08/03/13 10:01	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		07/31/13 02:37	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		07/31/13 02:37	1
Total Kjeldahl Nitrogen	mg/L	28	EPA 351.2	0.20	0.05	08/16/13 08:55	08/19/13 15:24	9.62
Total Suspended Solids	mg/L	7	SM 2540D	1	1	07/30/13 09:22	07/31/13 08:43	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		07/31/13 02:37	1

Sample Description **Stage 2 - SULFUR**  
 Matrix **Wastewater**  
 SAL Sample Number **1307318-04**  
 Date/Time Collected **07/29/13 11:45**  
 Collected by **Sean Schmidt**  
 Date/Time Received **07/29/13 14:10**

### Client Provided Field Data

pH 6.65  
 Temperature 28.2 °C  
 Conductivity 1426 umhos  
 Dissolved Oxygen 2.40 mg/L

### Inorganics

Hydrogen Sulfide (Unionized)	mg/L	24	SM 4550SF	0.04	0.01		07/30/13 11:15	1
Ammonia as N	mg/L	21	EPA 350.1	0.80	0.19		08/22/13 16:40	20
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		07/31/13 03:43	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		07/31/13 03:43	1
Sulfate	mg/L	21	EPA 300.0	0.60	0.20		07/31/13 03:43	1
Sulfide	mg/L	36	SM 4500SF	0.40	0.10		07/30/13 11:15	1
Total Kjeldahl Nitrogen	mg/L	26	EPA 351.2	0.20	0.05	08/16/13 08:55	08/19/13 15:26	9.62
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		07/31/13 03:43	1

Hazen and Sawyer  
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Tampa, FL 33619

August 26, 2013  
Work Order: 1307318

**Laboratory Report**

Project Name		B-HS4 Preliminary SE#1						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		Tap						
Matrix		Drinking Water						
SAL Sample Number		1307318-05						
Date/Time Collected		07/29/13 11:30						
Collected by		Sean Schmidt						
Date/Time Received		07/29/13 14:10						
<b><u>Client Provided Field Data</u></b>								
pH		7.10						
Temperature		26.4 °C						
Conductivity		475 umhos						
Dissolved Oxygen		4.95 mg/L						
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	0.077	EPA 350.1	0.040	0.009		08/22/13 16:41	1
Nitrate (as N)	mg/L	0.67	EPA 300.0	0.04	0.01		07/30/13 03:52	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		07/30/13 03:52	1
Sulfate	mg/L	7.2	EPA 300.0	0.60	0.20		07/30/13 03:52	1
Total Kjeldahl Nitrogen	mg/L	0.12 I	EPA 351.2	0.20	0.05	08/16/13 08:55	08/20/13 15:24	1
Nitrate+Nitrite (N)	mg/L	0.67	EPA 300.0	0.08	0.02		07/30/13 03:52	1

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August 26, 2013  
Work Order: 1307318

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BG32927 - BOD</b>										
<b>Blank (BG32927-BLK1)</b>					Prepared: 07/29/13 Analyzed: 08/03/13					
Carbonaceous BOD	2 U	2	2	mg/L						
<b>LCS (BG32927-BS1)</b>					Prepared: 07/29/13 Analyzed: 08/03/13					
Carbonaceous BOD	197	2	2	mg/L	200		99	85-115		
<b>LCS Dup (BG32927-BSD1)</b>					Prepared: 07/29/13 Analyzed: 08/03/13					
Carbonaceous BOD	210	2	2	mg/L	200		105	85-115	6	200
<b>Duplicate (BG32927-DUP1)</b>					Prepared: 07/29/13 Analyzed: 08/03/13					
Carbonaceous BOD	110	2	2	mg/L		110			0.7	25
<b>Batch BG33006 - TSS prep</b>										
<b>Blank (BG33006-BLK1)</b>					Prepared: 07/30/13 Analyzed: 07/31/13					
Total Suspended Solids	1 U	1	1	mg/L						
<b>LCS (BG33006-BS1)</b>					Prepared: 07/30/13 Analyzed: 07/31/13					
Total Suspended Solids	44.5	1	1	mg/L	50		89	85-115		
<b>Duplicate (BG33006-DUP1)</b>					Prepared: 07/30/13 Analyzed: 07/31/13					
Total Suspended Solids	66.0	1	1	mg/L		65.0			2	30
<b>Batch BG33019 - Sulfide prep</b>										
<b>Blank (BG33019-BLK1)</b>					Prepared & Analyzed: 07/30/13					
Sulfide	0.10 U	0.40	0.10	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 BG33019 - Sulfide prep</b>										
<b>LCS (BG33019-BS1)</b>					Prepared & Analyzed: 07/30/13					
Sulfide	5.15	0.40	0.10	mg/L	5.0		103	85-115		
<b>Matrix Spike (BG33019-MS1)</b>					Source: 1307621-01 Prepared & Analyzed: 07/30/13					
Sulfide	4.95	0.40	0.10	mg/L	5.0	ND	99	85-115		
<b>Matrix Spike Dup (BG33019-MSD1)</b>					Source: 1307621-01 Prepared & Analyzed: 07/30/13					
Sulfide	4.95	0.40	0.10	mg/L	5.0	ND	99	85-115	0	14
<b>Batch BG33024 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BG33024-BLK1)</b>					Prepared & Analyzed: 07/30/13					
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Sulfate	0.20 U	0.60	0.20	mg/L						
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Surrogate: Dichloroacetate	0.952			mg/L	1.0		95	90-115		
Surrogate: Dichloroacetate	0.952			mg/L	1.0		95	90-115		
Surrogate: Dichloroacetate	0.952			mg/L	1.0		95	90-115		
<b>LCS (BG33024-BS1)</b>					Prepared & Analyzed: 07/30/13					
Nitrate (as N)	1.68	0.04	0.01	mg/L	1.7		99	85-115		
Sulfate	8.82	0.60	0.20	mg/L	9.0		98	85-115		
Nitrite (as N)	1.51	0.04	0.01	mg/L	1.4		108	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>LCS Dup (BG33024-BSD1)</b>					Prepared & Analyzed: 07/30/13					
Nitrite (as N)	1.52	0.04	0.01	mg/L	1.4		108	85-115	0.3	200
Nitrate (as N)	1.70	0.04	0.01	mg/L	1.7		100	85-115	1	200
Sulfate	8.92	0.60	0.20	mg/L	9.0		99	85-115	1	200
Surrogate: Dichloroacetate	0.944			mg/L	1.0		94	90-115		
Surrogate: Dichloroacetate	0.944			mg/L	1.0		94	90-115		
Surrogate: Dichloroacetate	0.944			mg/L	1.0		94	90-115		

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## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch BG33024 - Ion Chromatography 300.0 Prep**

Matrix Spike (BG33024-MS1)		Source: 1307730-06			Prepared & Analyzed: 07/31/13					
Nitrite (as N)	1.78	0.04	0.01	mg/L	1.4	0.334	103	85-115		
Nitrate (as N)	1.92	0.04	0.01	mg/L	1.7	0.228	100	85-115		
Sulfate	90.0 L	0.60	0.20	mg/L	9.0	103	NR	85-115		
Surrogate: Dichloroacetate	0.910			mg/L	1.0		91	90-115		
Surrogate: Dichloroacetate	0.910			mg/L	1.0		91	90-115		
Surrogate: Dichloroacetate	0.910			mg/L	1.0		91	90-115		
Matrix Spike (BG33024-MS2)		Source: 1307318-03			Prepared & Analyzed: 07/31/13					
Nitrate (as N)	1.78	0.04	0.01	mg/L	1.7	ND	105	85-115		
Sulfate	16.5	0.60	0.20	mg/L	9.0	8.04	94	85-115		
Nitrite (as N)	1.51	0.04	0.01	mg/L	1.4	ND	108	85-115		
Surrogate: Dichloroacetate	1.09			mg/L	1.0		109	90-115		
Surrogate: Dichloroacetate	1.09			mg/L	1.0		109	90-115		
Surrogate: Dichloroacetate	1.09			mg/L	1.0		109	90-115		

**Batch BG33027 - Ion Chromatography 300.0 Prep**

Blank (BG33027-BLK1)		Prepared & Analyzed: 07/30/13								
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Sulfate	0.20 U	0.60	0.20	mg/L						
Surrogate: Dichloroacetate	0.959			mg/L	1.0		96	90-115		
Surrogate: Dichloroacetate	0.959			mg/L	1.0		96	90-115		
Surrogate: Dichloroacetate	0.959			mg/L	1.0		96	90-115		
LCS (BG33027-BS1)		Prepared & Analyzed: 07/30/13								
Nitrite (as N)	1.45	0.04	0.01	mg/L	1.4		104	85-115		
Sulfate	8.57	0.60	0.20	mg/L	9.0		95	85-115		
Nitrate (as N)	1.64	0.04	0.01	mg/L	1.7		96	85-115		
Surrogate: Dichloroacetate	1.00			mg/L	1.0		100	90-115		
Surrogate: Dichloroacetate	1.00			mg/L	1.0		100	90-115		
Surrogate: Dichloroacetate	1.00			mg/L	1.0		100	90-115		

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August 26, 2013  
Work Order: 1307318

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BG33027 - Ion Chromatography 300.0 Prep</b>										
<b>LCS Dup (BG33027-BSD1)</b>					Prepared & Analyzed: 07/30/13					
Sulfate	8.66	0.60	0.20	mg/L	9.0		96	85-115	1	200
Nitrite (as N)	1.48	0.04	0.01	mg/L	1.4		106	85-115	2	200
Nitrate (as N)	1.62	0.04	0.01	mg/L	1.7		95	85-115	0.7	200
Surrogate: Dichloroacetate	0.941			mg/L	1.0		94	90-115		
Surrogate: Dichloroacetate	0.941			mg/L	1.0		94	90-115		
Surrogate: Dichloroacetate	0.941			mg/L	1.0		94	90-115		
<b>Matrix Spike (BG33027-MS1)</b>					<b>Source: 1306665-04</b>		Prepared & Analyzed: 07/30/13			
Nitrite (as N)	1.52	0.04	0.01	mg/L	1.4	0.0160	108	85-115		
Nitrate (as N)	1.68	0.04	0.01	mg/L	1.7	ND	99	85-115		
Sulfate	8.79	0.60	0.20	mg/L	9.0	ND	98	85-115		
Surrogate: Dichloroacetate	0.911			mg/L	1.0		91	90-115		
Surrogate: Dichloroacetate	0.911			mg/L	1.0		91	90-115		
Surrogate: Dichloroacetate	0.911			mg/L	1.0		91	90-115		
<b>Batch BH31303 - Ammonia by SEAL</b>										
<b>Blank (BH31303-BLK1)</b>					Prepared & Analyzed: 08/13/13					
Ammonia as N	0.009 U	0.040	0.009	mg/L						
<b>LCS (BH31303-BS1)</b>					Prepared & Analyzed: 08/13/13					
Ammonia as N	0.50	0.040	0.009	mg/L	0.50		99	90-110		
<b>Matrix Spike (BH31303-MS1)</b>					<b>Source: 1307314-05</b>		Prepared & Analyzed: 08/14/13			
Ammonia as N	0.52	0.040	0.009	mg/L	0.50	0.049	95	90-110		
<b>Matrix Spike Dup (BH31303-MSD1)</b>					<b>Source: 1307314-05</b>		Prepared & Analyzed: 08/14/13			
Ammonia as N	0.51	0.040	0.009	mg/L	0.50	0.049	93	90-110	2	10

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August 26, 2013  
Work Order: 1307318

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BH31605 - Digestion for TKN by EPA 351.2</b>										
<b>Blank (BH31605-BLK1)</b>					Prepared: 08/16/13 Analyzed: 08/19/13					
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
<b>LCS (BH31605-BS1)</b>					Prepared: 08/16/13 Analyzed: 08/19/13					
Total Kjeldahl Nitrogen	2.51	0.20	0.05	mg/L	2.5		99	90-110		
<b>Matrix Spike (BH31605-MS1)</b>					Source: 1308252-02 Prepared: 08/16/13 Analyzed: 08/19/13					
Total Kjeldahl Nitrogen	3.17	0.20	0.05	mg/L	2.5	0.662	99	90-110		
<b>Matrix Spike (BH31605-MS2)</b>					Source: 1308293-07 Prepared: 08/16/13 Analyzed: 08/19/13					
Total Kjeldahl Nitrogen	2.57	0.20	0.05	mg/L	2.5	0.277	91	90-110		
<b>Matrix Spike Dup (BH31605-MSD1)</b>					Source: 1308252-02 Prepared: 08/16/13 Analyzed: 08/19/13					
Total Kjeldahl Nitrogen	3.32	0.20	0.05	mg/L	2.5	0.662	105	90-110	5	20
<b>Matrix Spike Dup (BH31605-MSD2)</b>					Source: 1308293-07 Prepared: 08/16/13 Analyzed: 08/19/13					
Total Kjeldahl Nitrogen	2.72	0.20	0.05	mg/L	2.5	0.277	96	90-110	6	20
<b>Batch BH32207 - Ammonia by SEAL</b>										
<b>Blank (BH32207-BLK1)</b>					Prepared & Analyzed: 08/22/13					
Ammonia as N	0.009 U	0.040	0.009	mg/L						
<b>LCS (BH32207-BS1)</b>					Prepared & Analyzed: 08/22/13					
Ammonia as N	0.51	0.040	0.009	mg/L	0.50		102	90-110		
<b>Matrix Spike (BH32207-MS1)</b>					Source: 1307318-05 Prepared & Analyzed: 08/23/13					
Ammonia as N	0.54	0.040	0.009	mg/L	0.50	0.077	94	90-110		

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August 26, 2013  
Work Order: 1307318

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BH32207 - Ammonia by SEAL</b>										
<b>Matrix Spike (BH32207-MS2)</b>		<b>Source: 1308183-07</b>			Prepared & Analyzed: 08/22/13					
Ammonia as N	0.50	0.040	0.009	mg/L	0.50	0.026	94	90-110		
<b>Matrix Spike Dup (BH32207-MSD1)</b>		<b>Source: 1307318-05</b>			Prepared & Analyzed: 08/23/13					
Ammonia as N	0.55	0.040	0.009	mg/L	0.50	0.077	95	90-110	1	10
<b>Matrix Spike Dup (BH32207-MSD2)</b>		<b>Source: 1308183-07</b>			Prepared & Analyzed: 08/22/13					
Ammonia as N	0.53	0.040	0.009	mg/L	0.50	0.026	100	90-110	6	10

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**August 26, 2013**  
**Work Order: 1307318**

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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.

L Off-scale high. Result exceeded highest calibration standard.

Questions regarding this report should be directed to :

Kathryn Nordmark  
Telephone (813) 855-1844 FAX (813) 855-2218  
Kathryn@southernanalyticalabs.com





### Chain of Custody

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

**October 16, 2013**  
**Work Order: 1308839**

## Laboratory Report

**Project Name** **B-HS4 SE#1**

Sample Description **BHS4-STE**  
 Matrix **Wastewater**  
 SAL Sample Number **1308839-01**  
 Date/Time Collected **09/30/13 13:25**  
 Collected by **Josefin Hirst**  
 Date/Time Received **09/30/13 16:04**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	64	EPA 350.1	2.0	0.47		10/02/13 14:06	50
Carbonaceous BOD	mg/L	92	SM 5210B	2	2	09/30/13 16:35	10/05/13 13:43	1
Chemical Oxygen Demand	mg/L	130	EPA 410.4	25	10	10/14/13 08:32	10/14/13 13:00	1
Hydrogen Sulfide (Unionized)	mg/L	4.2	SM 4550SF	0.04	0.01	10/07/13 09:00	10/07/13 11:15	1
Nitrate (as N)	mg/L	0.14	EPA 300.0	0.04	0.01		10/01/13 20:57	1
Nitrate+Nitrite (N)	mg/L	0.14	EPA 300.0	0.08	0.02		10/01/13 20:57	1
Nitrite (as N)	mg/L	0.01 u	EPA 300.0	0.04	0.01		10/01/13 20:57	1
Orthophosphate as P	mg/L	0.010 u	EPA 300.0	0.040	0.010		10/01/13 20:57	1
Phosphorous - Total as P	mg/L	14	SM 4500P-E	0.80	0.20	10/01/13 11:35	10/04/13 10:30	20
Sulfate	mg/L	3.1	EPA 300.0	0.60	0.20		10/01/13 20:57	1
Sulfide	mg/L	5.7	SM 4500SF	0.40	0.10		10/07/13 11:15	1
Total Alkalinity	mg/L	450	SM 2320B	8.0	2.0		10/10/13 14:32	1
Total Kjeldahl Nitrogen	mg/L	87	EPA 351.2	0.20	0.05	10/03/13 11:30	10/11/13 11:44	20.83
Total Organic Carbon	mg/L	64	SM 5310B	1.0	0.060		10/02/13 09:45	1
Total Suspended Solids	mg/L	54	SM 2540D	1	1	10/01/13 11:29	10/04/13 08:49	1
Volatile Suspended Solids	mg/L	54	EPA 160.4	1	1	10/01/13 11:29	10/04/13 08:49	1
<b><u>Microbiology</u></b>								
E. Coli	MPN/100 mL	16,000	SM 9223B	2.0	2.0	09/30/13 17:25	10/01/13 11:25	1
Fecal Coliforms	CFU/100 ml	23,000	SM 9222D	1	1	09/30/13 17:16	10/01/13 15:16	1

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**Tampa, FL 33619**

**October 16, 2013**  
**Work Order: 1308839**

## Laboratory Report

**Project Name** **B-HS4 SE#1**

Sample Description **BHS4-ST1**  
 Matrix **Wastewater**  
 SAL Sample Number **1308839-02**  
 Date/Time Collected **09/30/13 13:00**  
 Collected by **Josefin Hirst**  
 Date/Time Received **09/30/13 16:04**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	0.38	EPA 350.1	0.040	0.009		10/02/13 12:50	1
Carbonaceous BOD	mg/L	5	SM 5210B	2	2	09/30/13 16:35	10/05/13 13:43	1
Chemical Oxygen Demand	mg/L	10 U	EPA 410.4	25	10	10/14/13 08:32	10/14/13 13:00	1
Nitrate (as N)	mg/L	48	EPA 300.0	0.04	0.01		10/01/13 21:06	1
Nitrate+Nitrite (N)	mg/L	48	EPA 300.0	0.08	0.02		10/01/13 21:06	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		10/01/13 21:06	1
Orthophosphate as P	mg/L	1.5	EPA 300.0	0.040	0.010		10/01/13 21:06	1
Phosphorous - Total as P	mg/L	1.8	SM 4500P-E	0.040	0.010	10/01/13 11:35	10/04/13 10:31	1
Total Alkalinity	mg/L	290	SM 2320B	8.0	2.0		10/10/13 14:39	1
Total Kjeldahl Nitrogen	mg/L	6.9	EPA 351.2	0.20	0.05	10/03/13 11:30	10/11/13 12:37	1.98
Total Organic Carbon	mg/L	13	SM 5310B	1.0	0.060		10/02/13 09:45	1
Total Suspended Solids	mg/L	3	SM 2540D	1	1	10/01/13 11:29	10/04/13 08:49	1
Volatile Suspended Solids	mg/L	3	EPA 160.4	1	1	10/01/13 11:29	10/04/13 08:49	1
<b><u>Microbiology</u></b>								
E. Coli	MPN/100 mL	41	SM 9223B	2.0	2.0	09/30/13 17:25	10/01/13 11:25	1
Fecal Coliforms	CFU/100 ml	100	SM 9222D	1	1	09/30/13 17:16	10/01/13 15:16	1

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

**October 16, 2013**  
**Work Order: 1308839**

## Laboratory Report

Project Name		B-HS4 SE#1						
Sample Description		BHS4-LIGNO-0						
Matrix		Wastewater						
SAL Sample Number		1308839-03						
Date/Time Collected		09/30/13 12:50						
Collected by		Josefin Hirst						
Date/Time Received		09/30/13 16:04						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
<u>Inorganics</u>								
Ammonia as N	mg/L	0.97	EPA 350.1	0.040	0.009		10/02/13 12:52	1
Carbonaceous BOD	mg/L	2 u	SM 5210B	2	2	09/30/13 16:35	10/05/13 13:43	1
Chemical Oxygen Demand	mg/L	30	EPA 410.4	25	10	10/14/13 08:33	10/15/13 09:59	1
Nitrate (as N)	mg/L	4.6	EPA 300.0	0.04	0.01		10/01/13 21:15	1
Nitrate+Nitrite (N)	mg/L	4.6	EPA 300.0	0.08	0.02		10/01/13 21:15	1
Nitrite (as N)	mg/L	0.01 u	EPA 300.0	0.04	0.01		10/01/13 21:15	1
Orthophosphate as P	mg/L	0.20	EPA 300.0	0.040	0.010		10/01/13 21:15	1
Phosphorous - Total as P	mg/L	0.57	SM 4500P-E	0.040	0.010	10/01/13 11:35	10/04/13 10:33	1
Total Alkalinity	mg/L	450	SM 2320B	8.0	2.0	10/10/13 14:45	10/10/13 14:56	1
Total Kjeldahl Nitrogen	mg/L	3.4	EPA 351.2	0.20	0.05	10/03/13 11:30	10/11/13 11:47	1
Total Organic Carbon	mg/L	17	SM 5310B	1.0	0.060		10/02/13 09:45	1
Total Suspended Solids	mg/L	2	SM 2540D	1	1	10/01/13 11:29	10/04/13 08:49	1
Volatile Suspended Solids	mg/L	2	EPA 160.4	1	1	10/01/13 11:29	10/04/13 08:49	1
<u>Microbiology</u>								
E. Coli	MPN/100 mL	10	SM 9223B	2.0	2.0	09/30/13 17:25	10/01/13 11:25	1
Fecal Coliforms	CFU/100 ml	30	SM 9222D	1	1	09/30/13 17:16	10/01/13 15:16	1

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**October 16, 2013**  
**Work Order: 1308839**

## Laboratory Report

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<b>Project Name</b>	<b>B-HS4 SE#1</b>
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Sample Description	<b>BHS4-ST2</b>
Matrix	<b>Wastewater</b>
SAL Sample Number	<b>1308839-04</b>
Date/Time Collected	<b>09/30/13 12:30</b>
Collected by	<b>Josefin Hirst</b>
Date/Time Received	<b>09/30/13 16:04</b>

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Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	0.90	EPA 350.1	0.040	0.009		10/02/13 12:54	1
Carbonaceous BOD	mg/L	3	SM 5210B	2	2	09/30/13 16:35	10/05/13 13:43	1
Chemical Oxygen Demand	mg/L	41	EPA 410.4	25	10	10/14/13 08:33	10/15/13 09:59	1
Hydrogen Sulfide (Unionized)	mg/L	1.8	SM 4550SF	0.04	0.01	10/07/13 09:00	10/07/13 11:15	1
Nitrate (as N)	mg/L	0.01 u	EPA 300.0	0.04	0.01		10/01/13 21:25	1
Nitrate+Nitrite (N)	mg/L	0.02 u	EPA 300.0	0.08	0.02		10/01/13 21:25	1
Nitrite (as N)	mg/L	0.01 u	EPA 300.0	0.04	0.01		10/01/13 21:25	1
Orthophosphate as P	mg/L	0.32	EPA 300.0	0.040	0.010		10/01/13 21:25	1
Phosphorous - Total as P	mg/L	0.70	SM 4500P-E	0.040	0.010	10/01/13 11:35	10/04/13 10:34	1
Sulfate	mg/L	35	EPA 300.0	0.60	0.20		10/01/13 21:25	1
Sulfide	mg/L	2.6	SM 4500SF	0.40	0.10		10/07/13 11:15	1
Total Alkalinity	mg/L	480	SM 2320B	8.0	2.0		10/10/13 15:07	1
Total Kjeldahl Nitrogen	mg/L	1.3	EPA 351.2	0.20	0.05	10/03/13 11:30	10/11/13 11:49	1
Total Organic Carbon	mg/L	18	SM 5310B	1.0	0.060		10/02/13 09:45	1
Total Suspended Solids	mg/L	2	SM 2540D	1	1	10/01/13 11:29	10/04/13 08:49	1
Volatile Suspended Solids	mg/L	2	EPA 160.4	1	1	10/01/13 11:29	10/04/13 08:49	1
<b><u>Microbiology</u></b>								
E. Coli	MPN/100 mL	2.0 u	SM 9223B	2.0	2.0	09/30/13 17:25	10/01/13 11:25	1
Fecal Coliforms	CFU/100 ml	1 u	SM 9222D	1	1	09/30/13 17:16	10/01/13 15:16	1

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**October 16, 2013**  
**Work Order: 1308839**

## Laboratory Report

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<b>Project Name</b>	<b>B-HS4 SE#1</b>
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Sample Description	<b>BHS4-WELL</b>
Matrix	<b>Groundwater</b>
SAL Sample Number	<b>1308839-05</b>
Date/Time Collected	<b>09/30/13 13:15</b>
Collected by	<b>Josefin Hirst</b>
Date/Time Received	<b>09/30/13 16:04</b>

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Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	0.021 I	EPA 350.1	0.040	0.009		10/02/13 12:56	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	09/30/13 16:35	10/05/13 13:43	1
Chemical Oxygen Demand	mg/L	10 U	EPA 410.4	25	10	10/14/13 08:33	10/15/13 09:59	1
Hydrogen Sulfide (Unionized)	mg/L	0.13	SM 4550SF	0.04	0.01	10/07/13 09:00	10/07/13 11:15	1
Nitrate (as N)	mg/L	1.4	EPA 300.0	0.04	0.01		10/01/13 22:02	1
Nitrate+Nitrite (N)	mg/L	1.4	EPA 300.0	0.08	0.02		10/01/13 22:02	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		10/01/13 22:02	1
Orthophosphate as P	mg/L	0.20	EPA 300.0	0.040	0.010		10/01/13 22:02	1
Phosphorous - Total as P	mg/L	0.49	SM 4500P-E	0.040	0.010	10/01/13 11:35	10/04/13 11:21	1
Sulfate	mg/L	8.7	EPA 300.0	0.60	0.20		10/01/13 22:02	1
Sulfide	mg/L	0.41	SM 4500SF	0.40	0.10		10/07/13 11:15	1
Total Alkalinity	mg/L	150	SM 2320B	8.0	2.0		10/14/13 12:11	1
Total Kjeldahl Nitrogen	mg/L	0.18 I	EPA 351.2	0.20	0.05	10/03/13 11:30	10/11/13 11:50	1
Total Organic Carbon	mg/L	2.1	SM 5310B	1.0	0.060		10/02/13 09:45	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	10/01/13 11:29	10/04/13 08:49	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	10/01/13 11:29	10/04/13 08:49	1
<b><u>Microbiology</u></b>								
E. Coli	MPN/100 mL	2.0 U	SM 9223B	2.0	2.0	09/30/13 17:25	10/01/13 11:25	1
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	09/30/13 17:16	10/01/13 15:16	1



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Tampa, FL 33619

October 16, 2013  
Work Order: 1308839

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BI33016 - BOD</b>										
<b>Blank (BI33016-BLK1)</b>					Prepared: 09/30/13 Analyzed: 10/05/13					
Carbonaceous BOD	2 U	2	2	mg/L						
<b>Blank (BI33016-BLK2)</b>					Prepared: 09/30/13 Analyzed: 10/05/13					
Carbonaceous BOD	2 U	2	2	mg/L						
<b>LCS (BI33016-BS1)</b>					Prepared: 09/30/13 Analyzed: 10/05/13					
Carbonaceous BOD	208	2	2	mg/L	200		104	85-115		
<b>LCS (BI33016-BS2)</b>					Prepared: 09/30/13 Analyzed: 10/05/13					
Carbonaceous BOD	210	2	2	mg/L	200		105	85-115		
<b>LCS Dup (BI33016-BSD1)</b>					Prepared: 09/30/13 Analyzed: 10/05/13					
Carbonaceous BOD	205	2	2	mg/L	200		103	85-115	2	200
<b>LCS Dup (BI33016-BSD2)</b>					Prepared: 09/30/13 Analyzed: 10/05/13					
Carbonaceous BOD	207	2	2	mg/L	200		103	85-115	2	200
<b>Duplicate (BI33016-DUP1)</b>					Source: 1310335-03 Prepared: 09/30/13 Analyzed: 10/05/13					
Carbonaceous BOD	110	2	2	mg/L		110			1	25
<b>Duplicate (BI33016-DUP2)</b>					Source: 1308839-01 Prepared: 09/30/13 Analyzed: 10/05/13					
Carbonaceous BOD	95	2	2	mg/L		92			3	25
<b>Batch BJ30108 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BJ30108-BLK1)</b>					Prepared & Analyzed: 10/01/13					
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Orthophosphate as P	0.010 U	0.040	0.010	mg/L						
Sulfate	0.20 U	0.60	0.20	mg/L						
Surrogate: Dichloroacetate		Result: 0.917		mg/L	1.0		92	90-115		
Surrogate: Dichloroacetate		Result: 0.917		mg/L	1.0		92	90-115		
Surrogate: Dichloroacetate		Result: 0.917		mg/L	1.0		92	90-115		
Surrogate: Dichloroacetate		Result: 0.917		mg/L	1.0		92	90-115		

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October 16, 2013  
Work Order: 1308839

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BJ30108 - Ion Chromatography 300.0 Prep</b>										
<b>LCS (BJ30108-BS1)</b>					Prepared & Analyzed: 10/01/13					
Sulfate	9.05	0.60	0.20	mg/L	9.0		101	85-115		
Orthophosphate as P	0.845	0.040	0.010	mg/L	0.90		94	85-115		
Nitrite (as N)	1.43	0.04	0.01	mg/L	1.4		102	85-115		
Nitrate (as N)	1.71	0.04	0.01	mg/L	1.7		101	85-115		
Surrogate: Dichloroacetate	Result: 0.966			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	Result: 0.966			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	Result: 0.966			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	Result: 0.966			mg/L	1.0		97	90-115		
<b>LCS Dup (BJ30108-BSD1)</b>					Prepared & Analyzed: 10/01/13					
Sulfate	9.07	0.60	0.20	mg/L	9.0		101	85-115	0.2	200
Nitrate (as N)	1.72	0.04	0.01	mg/L	1.7		101	85-115	0.2	200
Nitrite (as N)	1.44	0.04	0.01	mg/L	1.4		103	85-115	0.7	200
Orthophosphate as P	0.856	0.040	0.010	mg/L	0.90		95	85-115	1	200
Surrogate: Dichloroacetate	Result: 0.949			mg/L	1.0		95	90-115		
Surrogate: Dichloroacetate	Result: 0.949			mg/L	1.0		95	90-115		
Surrogate: Dichloroacetate	Result: 0.949			mg/L	1.0		95	90-115		
Surrogate: Dichloroacetate	Result: 0.949			mg/L	1.0		95	90-115		
<b>Matrix Spike (BJ30108-MS1)</b>					Source: 1308839-04		Prepared & Analyzed: 10/01/13			
Nitrate (as N)	1.68	0.04	0.01	mg/L	1.7	ND	99	85-115		
Sulfate	44.1	0.60	0.20	mg/L	9.0	35.4	97	85-115		
Orthophosphate as P	1.20	0.040	0.010	mg/L	0.90	0.322	98	85-115		
Nitrite (as N)	1.53	0.04	0.01	mg/L	1.4	ND	109	85-115		
Surrogate: Dichloroacetate	Result: 0.936			mg/L	1.0		94	90-115		
Surrogate: Dichloroacetate	Result: 0.936			mg/L	1.0		94	90-115		
Surrogate: Dichloroacetate	Result: 0.936			mg/L	1.0		94	90-115		
Surrogate: Dichloroacetate	Result: 0.936			mg/L	1.0		94	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 BJ30108 - Ion Chromatography 300.0 Prep</b>										
<b>Matrix Spike (BJ30108-MS2)</b>		<b>Source: 1309410-04</b>			Prepared & Analyzed: 10/01/13					
Nitrite (as N)	14.7	0.40	0.10	mg/L	14		105	85-115		
Orthophosphate as P	8.28	0.40	0.10	mg/L	9.0		92	85-115		
Nitrate (as N)	16.9	0.40	0.10	mg/L	17	0.205	98	85-115		
Sulfate	172	6.0	2.0	mg/L	90	81.6	100	85-115		
Surrogate: Dichloroacetate		Result: 0.958		mg/L	1.0		96	90-115		
Surrogate: Dichloroacetate		Result: 0.958		mg/L	1.0		96	90-115		
Surrogate: Dichloroacetate		Result: 0.958		mg/L	1.0		96	90-115		
Surrogate: Dichloroacetate		Result: 0.958		mg/L	1.0		96	90-115		
<b>Batch BJ30111 - Ammonia by SEAL</b>										
<b>Blank (BJ30111-BLK1)</b>		Prepared & Analyzed: 10/02/13								
Ammonia as N	0.009 U	0.040	0.009	mg/L						
<b>LCS (BJ30111-BS1)</b>		Prepared & Analyzed: 10/02/13								
Ammonia as N	0.55	0.040	0.009	mg/L	0.50		110	90-110		
<b>Matrix Spike (BJ30111-MS1)</b>		<b>Source: 1308838-16</b>			Prepared & Analyzed: 10/02/13					
Ammonia as N	0.54	0.040	0.009	mg/L	0.50	ND	109	90-110		
<b>Matrix Spike (BJ30111-MS2)</b>		<b>Source: 1310458-01</b>			Prepared & Analyzed: 10/02/13					
Ammonia as N	0.51	0.040	0.009	mg/L	0.50	ND	101	90-110		
<b>Matrix Spike Dup (BJ30111-MSD1)</b>		<b>Source: 1308838-16</b>			Prepared & Analyzed: 10/02/13					
Ammonia as N	0.50	0.040	0.009	mg/L	0.50	ND	99	90-110	9	10
<b>Matrix Spike Dup (BJ30111-MSD2)</b>		<b>Source: 1310458-01</b>			Prepared & Analyzed: 10/02/13					
Ammonia as N	0.50	0.040	0.009	mg/L	0.50	ND	100	90-110	1	10

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October 16, 2013  
Work Order: 1308839

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BJ30121 - VSS Prep</b>										
<b>Blank (BJ30121-BLK1)</b>					Prepared: 10/01/13 Analyzed: 10/04/13					
Total Suspended Solids	1 U	1	1	mg/L						
Volatile Suspended Solids	1 U	1		mg/L						
<b>LCS (BJ30121-BS1)</b>					Prepared: 10/01/13 Analyzed: 10/04/13					
Total Suspended Solids	50.0	1	1	mg/L	50		100	85-115		
<b>Duplicate (BJ30121-DUP1)</b>					<b>Source: 1308838-01</b>		Prepared: 10/01/13 Analyzed: 10/04/13			
Total Suspended Solids	17.0	1	1	mg/L		16.0			6	30
Volatile Suspended Solids	16.0	1		mg/L		15.0			6	20
<b>Batch BJ30123 - Digestion for TP by EPA 365.2/SM4500PE</b>										
<b>Blank (BJ30123-BLK1)</b>					Prepared: 10/01/13 Analyzed: 10/04/13					
Phosphorous - Total as P	0.010 U	0.040	0.010	mg/L						
<b>LCS (BJ30123-BS1)</b>					Prepared: 10/01/13 Analyzed: 10/04/13					
Phosphorous - Total as P	0.859	0.040	0.010	mg/L	0.80		107	90-110		
<b>Matrix Spike (BJ30123-MS1)</b>					<b>Source: 1308838-17</b>		Prepared: 10/01/13 Analyzed: 10/04/13			
Phosphorous - Total as P	0.946	0.040	0.010	mg/L	1.0	ND	95	90-110		
<b>Matrix Spike (BJ30123-MS2)</b>					<b>Source: 1310368-02</b>		Prepared: 10/01/13 Analyzed: 10/04/13			
Phosphorous - Total as P	0.998	0.040	0.010	mg/L	1.0	0.0598	94	90-110		
<b>Matrix Spike Dup (BJ30123-MSD1)</b>					<b>Source: 1308838-17</b>		Prepared: 10/01/13 Analyzed: 10/04/13			
Phosphorous - Total as P	1.00	0.040	0.010	mg/L	1.0	ND	100	90-110	5	25

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## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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### Batch BJ30123 - Digestion for TP by EPA 365.2/SM4500PE

<b>Matrix Spike Dup (BJ30123-MSD2)</b>		<b>Source: 1310368-02</b>			Prepared: 10/01/13 Analyzed: 10/04/13					
Phosphorous - Total as P	1.11	0.040	0.010	mg/L	1.0	0.0598	105	90-110	10	25

### Batch BJ30135 - TOC prep

Blank (BJ30135-BLK1)					Prepared & Analyzed: 10/02/13					
Total Organic Carbon	0.060 U	1.0	0.060	mg/L						
LCS (BJ30135-BS1)					Prepared & Analyzed: 10/02/13					
Total Organic Carbon	10.6	1.0	0.060	mg/L	10	106	90-110			
Matrix Spike (BJ30135-MS1)		Source: 1308839-05			Prepared & Analyzed: 10/02/13					
Total Organic Carbon	12.1	1.0	0.060	mg/L	10	2.10	100	85-115		
Matrix Spike Dup (BJ30135-MSD1)		Source: 1308839-05			Prepared & Analyzed: 10/02/13					
Total Organic Carbon	12.7	1.0	0.060	mg/L	10	2.10	106	85-115	5	10

### Batch BJ30313 - Digestion for TKN by EPA 351.2

Blank (BJ30313-BLK1)					Prepared: 10/03/13 Analyzed: 10/11/13			
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L				
LCS (BJ30313-BS1)					Prepared: 10/03/13 Analyzed: 10/11/13			
Total Kjeldahl Nitrogen	2.49	0.20	0.05	mg/L	2.5	98	90-110	
Matrix Spike (BJ30313-MS1)		Source: 1308838-17			Prepared: 10/03/13 Analyzed: 10/11/13			
Total Kjeldahl Nitrogen	2.38	0.20	0.05	mg/L	2.5	ND	94	90-110



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Tampa, FL 33619

October 16, 2013  
Work Order: 1308839

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BJ30313 - Digestion for TKN by EPA 351.2										
Matrix Spike (BJ30313-MS2)		Source: 1310676-02			Prepared: 10/03/13 Analyzed: 10/11/13					
Total Kjeldahl Nitrogen	3.47	0.20	0.05	mg/L	2.5	0.808	105	90-110		
Matrix Spike Dup (BJ30313-MSD1)		Source: 1308838-17			Prepared: 10/03/13 Analyzed: 10/11/13					
Total Kjeldahl Nitrogen	2.56	0.20	0.05	mg/L	2.5	ND	101	90-110	7	20
Matrix Spike Dup (BJ30313-MSD2)		Source: 1310676-02			Prepared: 10/03/13 Analyzed: 10/11/13					
Total Kjeldahl Nitrogen	3.45	0.20	0.05	mg/L	2.5	0.808	104	90-110	0.5	20
Batch BJ30727 - Sulfide prep										
Blank (BJ30727-BLK1)					Prepared & Analyzed: 10/07/13					
Sulfide	0.10 U	0.40	0.10	mg/L						
LCS (BJ30727-BS1)					Prepared & Analyzed: 10/07/13					
Sulfide	4.88	0.40	0.10	mg/L	5.0		98	85-115		
Matrix Spike (BJ30727-MS1)		Source: 1308838-17			Prepared & Analyzed: 10/07/13					
Sulfide	4.88	0.40	0.10	mg/L	5.0	0.200	94	85-115		
Matrix Spike Dup (BJ30727-MSD1)		Source: 1308838-17			Prepared & Analyzed: 10/07/13					
Sulfide	4.88	0.40	0.10	mg/L	5.0	0.200	94	85-115	0	14
Batch BJ30807 - alkalinity										
Blank (BJ30807-BLK1)					Prepared & Analyzed: 10/08/13					
Total Alkalinity	2.0 U	8.0	2.0	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 BJ30807 - alkalinity</b>										
<b>Blank (BJ30807-BLK2)</b>					Prepared & Analyzed: 10/10/13					
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
<b>LCS (BJ30807-BS1)</b>					Prepared & Analyzed: 10/08/13					
Total Alkalinity	120	8.0	2.0	mg/L	120		96	90-110		
<b>LCS (BJ30807-BS2)</b>					Prepared & Analyzed: 10/10/13					
Total Alkalinity	120	8.0	2.0	mg/L	120		96	90-110		
<b>Matrix Spike (BJ30807-MS1)</b>					<b>Source: 1310638-01</b>		Prepared & Analyzed: 10/08/13			
Total Alkalinity	520 L2	8.0	2.0	mg/L	120	430	76	80-120		
<b>Matrix Spike (BJ30807-MS2)</b>					<b>Source: 1308838-15</b>		Prepared & Analyzed: 10/10/13			
Total Alkalinity	230	8.0	2.0	mg/L	120	110	91	80-120		
<b>Matrix Spike (BJ30807-MS3)</b>					<b>Source: 1308838-12</b>		Prepared & Analyzed: 10/10/13			
Total Alkalinity	200	8.0	2.0	mg/L	120	93	88	80-120		
<b>Matrix Spike Dup (BJ30807-MSD1)</b>					<b>Source: 1310638-01</b>		Prepared & Analyzed: 10/08/13			
Total Alkalinity	520 L2	8.0	2.0	mg/L	120	430	73	80-120	0.6	26
<b>Matrix Spike Dup (BJ30807-MSD2)</b>					<b>Source: 1308838-15</b>		Prepared & Analyzed: 10/10/13			
Total Alkalinity	230	8.0	2.0	mg/L	120	110	90	80-120	0.5	26
<b>Matrix Spike Dup (BJ30807-MSD3)</b>					<b>Source: 1308838-12</b>		Prepared & Analyzed: 10/10/13			
Total Alkalinity	200	8.0	2.0	mg/L	120	93	88	80-120	0.2	26
<b>Batch BJ31138 - alkalinity</b>										
<b>Blank (BJ31138-BLK1)</b>					Prepared & Analyzed: 10/14/13					
Total Alkalinity	2.0 U	8.0	2.0	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 BJ31138 - alkalinity</b>										
<b>Blank (BJ31138-BLK2)</b>					Prepared & Analyzed: 10/14/13					
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
<b>LCS (BJ31138-BS1)</b>					Prepared & Analyzed: 10/14/13					
Total Alkalinity	120	8.0	2.0	mg/L	120		97	90-110		
<b>LCS (BJ31138-BS2)</b>					Prepared & Analyzed: 10/14/13					
Total Alkalinity	120	8.0	2.0	mg/L	120		96	90-110		
<b>LCS (BJ31138-BS3)</b>					Prepared & Analyzed: 10/15/13					
Total Alkalinity	140	8.0	2.0	mg/L	120		108	90-110		
<b>Matrix Spike (BJ31138-MS1)</b>					<b>Source: 1310910-01</b>		Prepared & Analyzed: 10/15/13			
Total Alkalinity	200	8.0	2.0	mg/L	120	66	109	80-120		
<b>Matrix Spike (BJ31138-MS2)</b>					<b>Source: 1310756-03</b>		Prepared & Analyzed: 10/15/13			
Total Alkalinity	260	8.0	2.0	mg/L	120	140	97	80-120		
<b>Matrix Spike Dup (BJ31138-MSD1)</b>					<b>Source: 1310910-01</b>		Prepared & Analyzed: 10/15/13			
Total Alkalinity	200	8.0	2.0	mg/L	120	66	108	80-120	0.5	26
<b>Matrix Spike Dup (BJ31138-MSD2)</b>					<b>Source: 1310756-03</b>		Prepared & Analyzed: 10/15/13			
Total Alkalinity	260	8.0	2.0	mg/L	120	140	95	80-120	0.7	26
<b>Batch BJ31406 - COD prep</b>										
<b>Blank (BJ31406-BLK1)</b>					Prepared & Analyzed: 10/14/13					
Chemical Oxygen Demand	10 U	25	10	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 BJ31406 - COD prep</b>										
<b>LCS (BJ31406-BS1)</b>					Prepared & Analyzed: 10/14/13					
Chemical Oxygen Demand	45	25	10	mg/L	50		90	90-110		
<b>Matrix Spike (BJ31406-MS1)</b>					Source: 1308838-04 Prepared & Analyzed: 10/14/13					
Chemical Oxygen Demand	54	25	10	mg/L	50	ND	108	85-115		
<b>Matrix Spike Dup (BJ31406-MSD1)</b>					Source: 1308838-04 Prepared & Analyzed: 10/14/13					
Chemical Oxygen Demand	50	25	10	mg/L	50	ND	100	85-115	8	32
<b>Batch BJ31407 - COD prep</b>										
<b>Blank (BJ31407-BLK1)</b>					Prepared: 10/14/13 Analyzed: 10/15/13					
Chemical Oxygen Demand	10 U	25	10	mg/L						
<b>LCS (BJ31407-BS1)</b>					Prepared: 10/14/13 Analyzed: 10/15/13					
Chemical Oxygen Demand	48	25	10	mg/L	50		96	90-110		
<b>Matrix Spike (BJ31407-MS1)</b>					Source: 1308839-03 Prepared: 10/14/13 Analyzed: 10/15/13					
Chemical Oxygen Demand	87	25	10	mg/L	50	30	114	85-115		
<b>Matrix Spike Dup (BJ31407-MSD1)</b>					Source: 1308839-03 Prepared: 10/14/13 Analyzed: 10/15/13					
Chemical Oxygen Demand	78	25	10	mg/L	50	30	96	85-115	11	32

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## Microbiology - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BJ30105 - FC-MF</b>										
<b>Blank (BJ30105-BLK1)</b>					Prepared: 09/30/13 Analyzed: 10/01/13					
Fecal Coliforms	1 U	1	1	CFU/100 ml						
<b>Duplicate (BJ30105-DUP1)</b>					<b>Source: 1310372-01</b> Prepared: 09/30/13 Analyzed: 10/01/13					
Fecal Coliforms	1 U	1	1	CFU/100 ml		ND				200
<b>Duplicate (BJ30105-DUP2)</b>					<b>Source: 1310373-01</b> Prepared: 09/30/13 Analyzed: 10/01/13					
Fecal Coliforms	1 U	1	1	CFU/100 ml		ND				200

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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.

L2 Analyte level in sample invalidated Matrix Spike.

Questions regarding this report should be directed to :

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

### Chain of Custody





## Appendix B: Operation & Maintenance Log

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

Date	Description
6/19/2013	Construction - Stage 1 and Stage 2 tank installed
6/20/2013	Construction - drainfield installed
6/21/2013	Construction - electrical work
7/9/2013	System Start-up
	Bull run valve switched from drainfield to Stage 1 biofilter
7/17/2013	System check
7/23/2013	Construction - sod installation
7/29/2013	Preliminary sampling event
8/6/2013	System check
	Back-up in STE tank, water level above outlet effluent screen
8/12/2013	Back-up in STE tank again
	Removed filter screen
	Lift station pump causing lots of mixing in STE tank
	Shortened float swing on lift station pump to reduce pump runtime
	Lots of solids in Stage 1 Biofilter
	During lift station pump dose, ponding in Stage 1 biofilter
8/15/2013	Bull run valve switched to drainfield
9/5/2013	Lift station pump replaced with smaller pump
	Smaller pump installed in second chamber of old septic tank
	Switched bull run valve to PNRS system
9/10/2013	System check
9/30/2013	Sample Event No. 1

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