



# Florida Onsite Sewage Nitrogen Reduction Strategies Study

Task B.7

## **B-HS2 Field System Monitoring Report No. 7**

### **Progress Report**

December 2013

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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-HS2 Field System Monitoring Report No. 7**

#### **Prepared for:**

Florida Department of Health  
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**December 2013**

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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 seventh sample event of the passive nitrogen reduction system at a home site B-HS2 in Hillsborough County, Florida.

### **2.0 Purpose**

This monitoring report documents data collected from the seventh B-HS2 monitoring and sampling event conducted on December 5, 2013. This monitoring event consisted of collecting 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 fifteen points in the treatment system, and sample analyses by a NELAC certified laboratory.

### **3.0 Materials and Methods**

#### **3.1 Project Site**

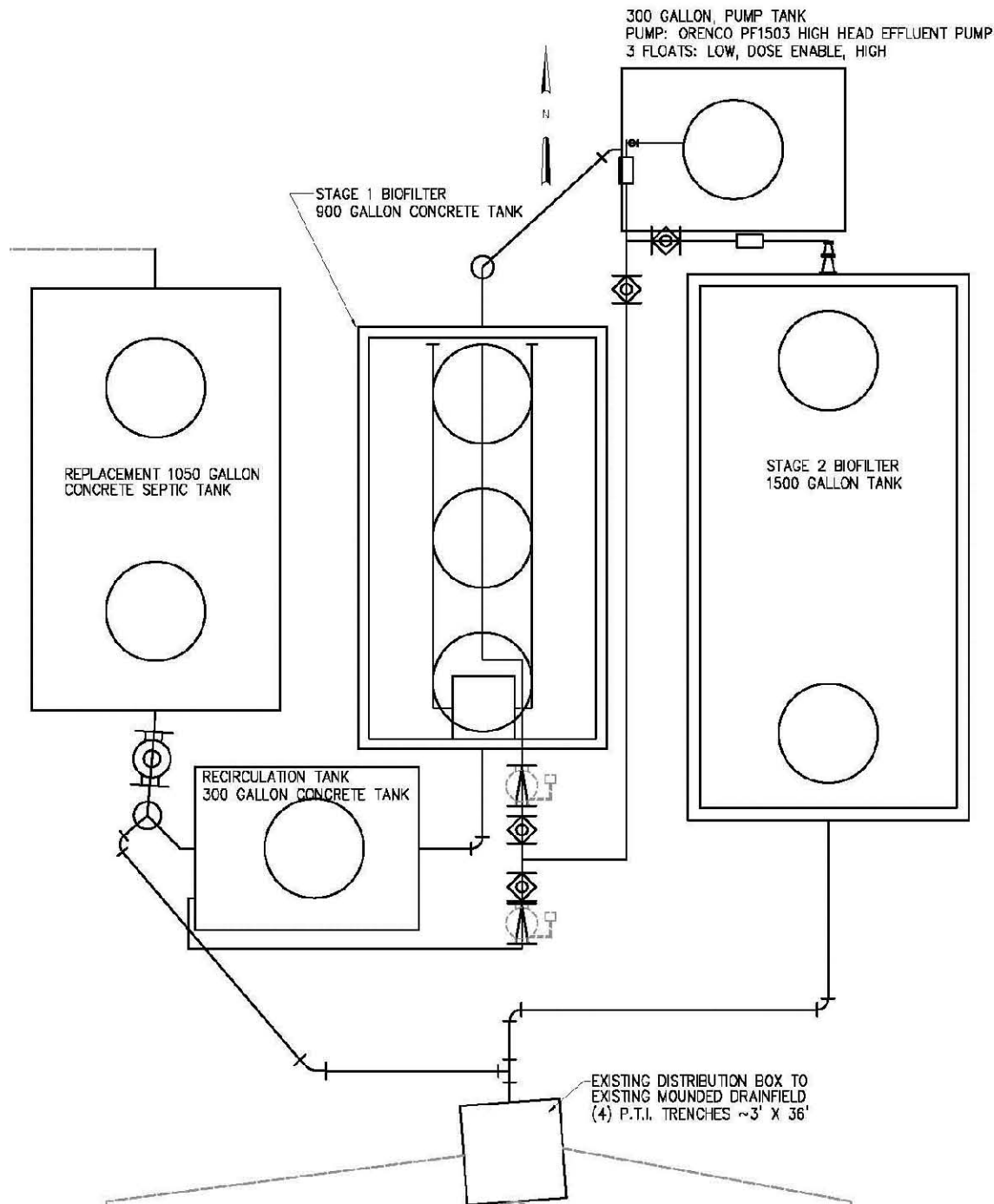
The B-HS2 field site is located in Hillsborough County, FL. The nitrogen reducing onsite treatment system for the single family residence was installed in September 2012. Design and construction details were presented previously in the Task B.6 document. Figure 1 is a system schematic showing the system components and layout of the installation. A flow schematic of the system is shown in Figure 2. The B-HS2 system tankage consists of a 1,050 gallon two chamber concrete primary tank; 300 gallon concrete recirculation tank; 900 gallon concrete Stage 1 unsaturated media biofilter; 300

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gallon concrete pump tank; 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 existing mounded drainfield (P.T.I.<sup>TM</sup> bundles).

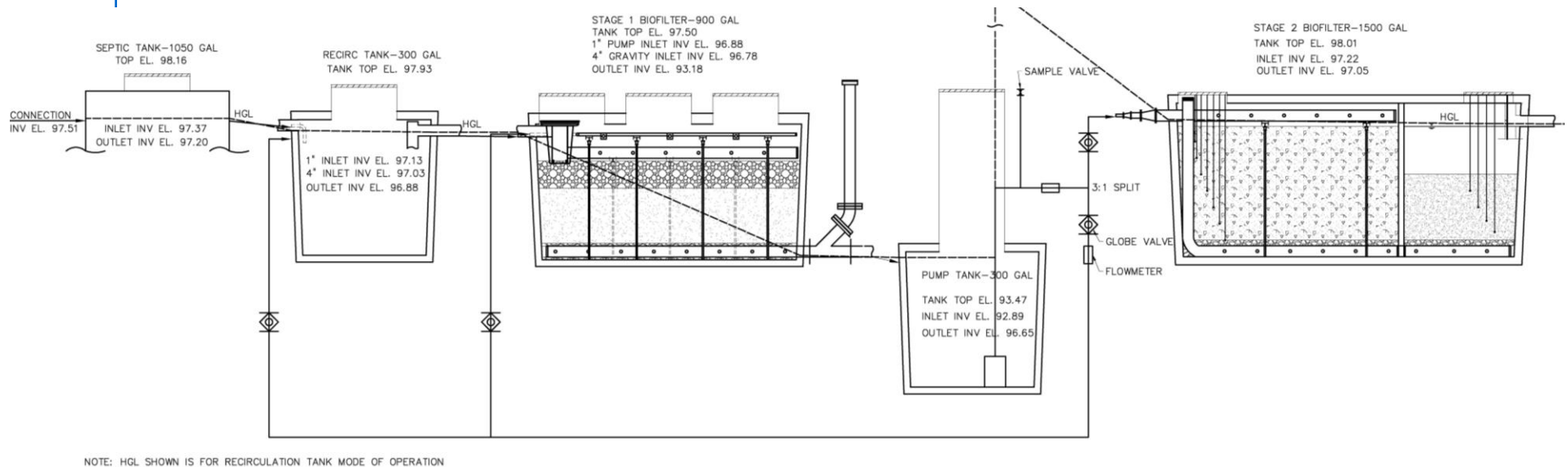
### **3.2 PNRS System Modification**

As recommended in the fifth sample event report, the recirculation mode of operation was modified prior to the sixth sample event. The pump tank discharge is split via two throttling globe valves which allow for a portion of the Stage 1 biofilter effluent to be sent back for recirculation with the rest proceeding to the Stage 2 biofilter. The system was designed with two recirculation modes of operation. The first option (which was initially tested) is to have the recirculated effluent return to the recirculation tank for mixing with incoming septic tank effluent. Following the fifth sample event, the recirculation mode of operation was modified to test the second option. In the second option, recirculated effluent does not pass through the recirculation tank, but is dispersed by three spray nozzles directly to the top of the Stage 1 biofilter along with recirculation tank effluent (STE).



**Figure 1**  
**Plan view of B-HS2 System Layout**

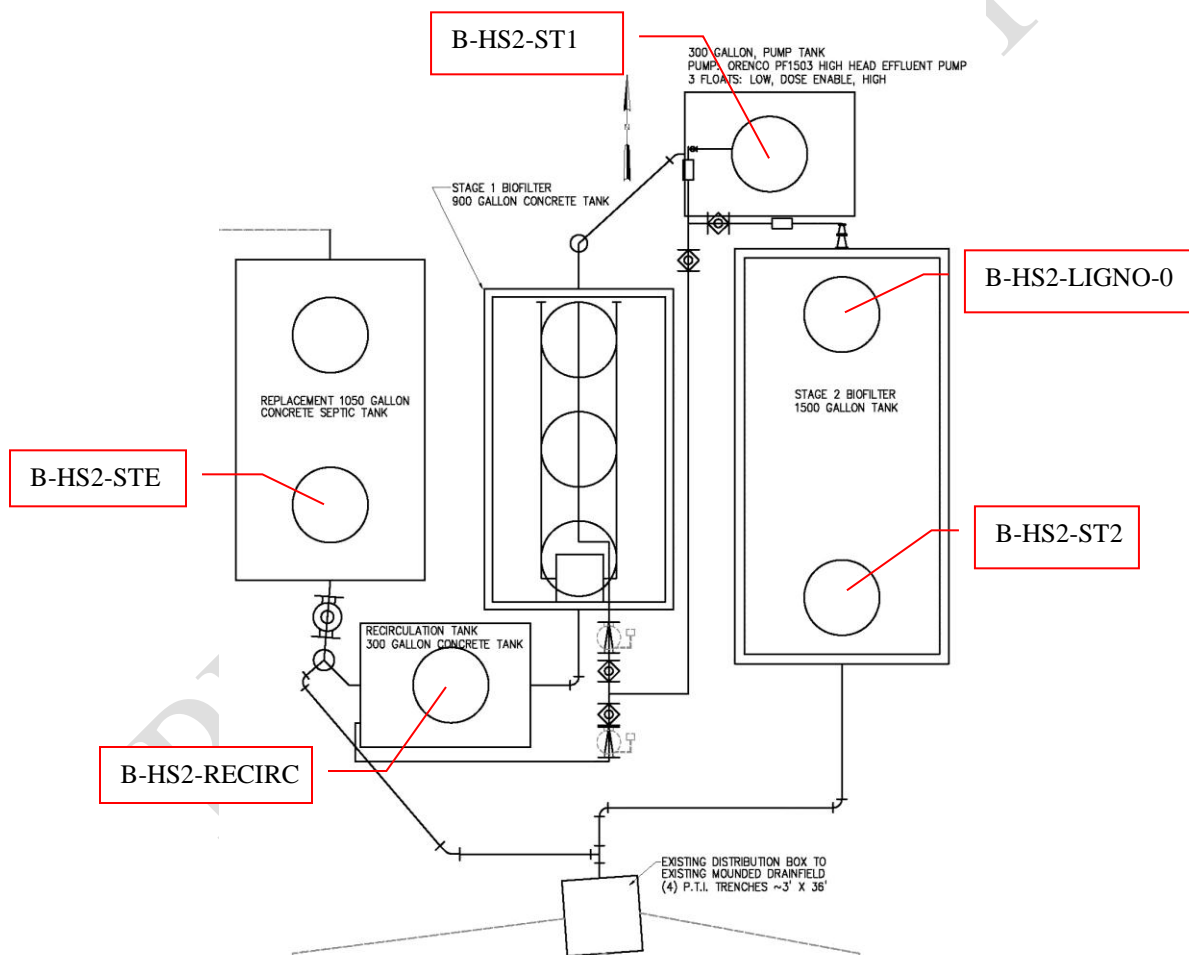
December 2013



**Figure 2**  
**Flow Schematic of B-HS2 PNRS installed in Hillsborough County**

### 3.3 Monitoring and Sample Locations and Identification

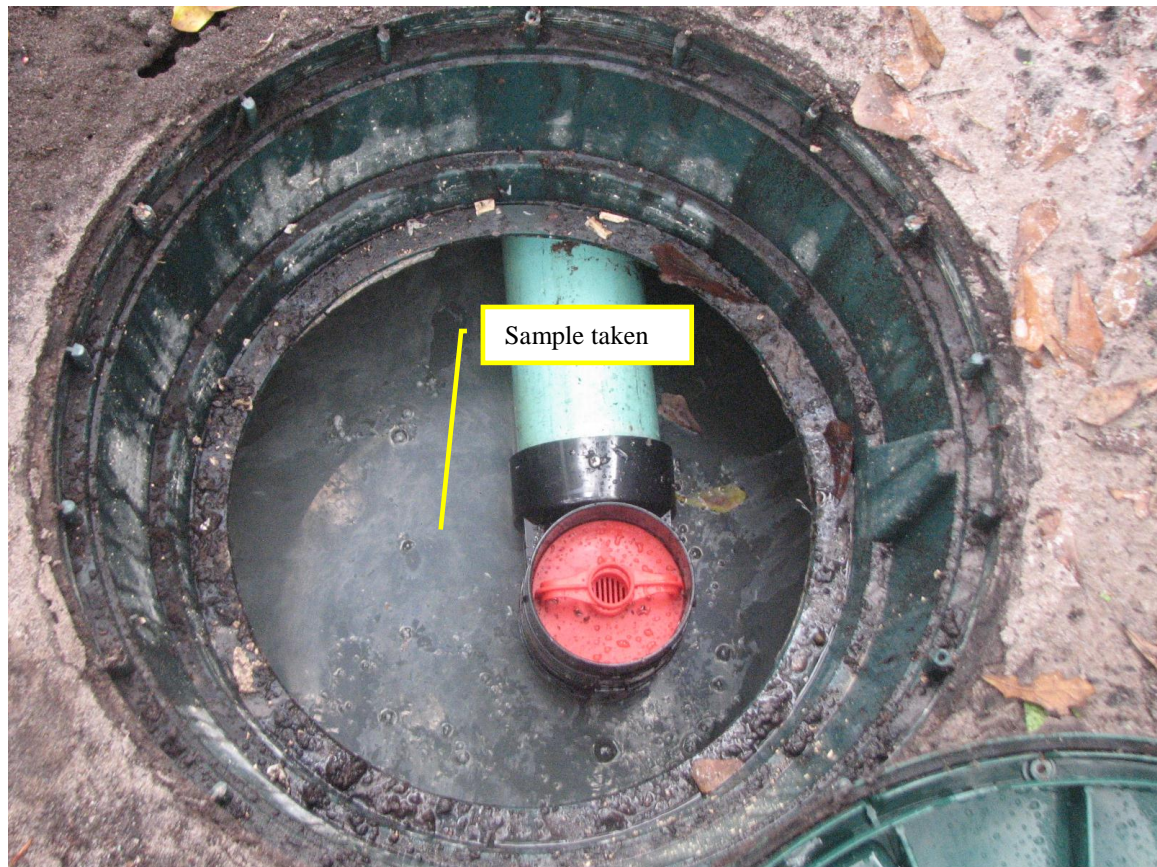
The five primary monitoring points for this sample event are shown in Figure 3. Household wastewater enters the 1<sup>st</sup> chamber of the primary tank and exits the second chamber as septic tank effluent through an effluent screen into the recirculation tank. The first primary monitoring point, B-HS2-STE, is the effluent sampled approximately 1.5 feet below the surface of the second chamber of the primary tank (Figure 4), which is referred to as primary effluent or septic tank effluent (STE). Samples from monitoring point B-HS2-STE are the whole household wastewater after it has had some residence time in the primary tank.



**Figure 3**  
**B-HS2 Sample and Monitoring Locations**

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**Figure 4**  
**Second chamber of Primary Tank (B-HS2-STE sample)**

Following the modification to the recirculation mode of operation, the recirculation tank only receives septic tank effluent. Therefore, the recirculation tank currently provides additional residence time for STE, before it enters the Stage 1 biofilter. The second primary monitoring point, B-HS2-RECIRC, represents the household wastewater after passage through the septic tank and recirculation tank.

Recirculation tank effluent is 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 pump tank (which contains the pump and float switches). The third primary monitoring point, B-HS2-ST1, is the Stage 1 effluent sampled approximately 1.5 feet below the surface of the pump tank (Figure 5).





**Figure 5**  
**Stage 1 effluent sample taken in pump tank (B-HS2-ST1 sample)**

The pump tank discharge is split via two throttling globe valves which allow for a portion of the Stage 1 biofilter effluent to be sent back for recirculation with the rest proceeding to the Stage 2 biofilter. The system was designed with two recirculation modes of operation. The first option (which was initially tested) is to have the recirculated effluent return to the recirculation tank for mixing with incoming septic tank effluent. The second option is to have the recirculated effluent return to the top of the Stage 1 biofilter, dispersed by three spray nozzles (which is currently being tested). 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 6-inch increments for vertical profiling throughout the lignocellulosic media. The fourth primary sampling point is a stainless steel sampler positioned at the bottom of the lignocellulosic media (B-HS2-LIGNO-0). Six inches above B-HS2-LIGNO-0 is another stainless steel drivepoint sampler B-HS2-LIGNO-6, and so forth (B-HS2-LIGNO-12, B-HS2-LIGNO-18, B-HS2-LIGNO-24, B-HS2-LIGNO-30, and B-HS2-LIGNO-36). The B-HS2-LIGNO-0 sample represents the lignocellulosic media effluent (Figure 6).

A collection pipe along the bottom transfers the first chamber (lignocellulosic media) effluent to the second chamber, which contains 24-inches of elemental sulfur mixed with oyster shell media. Similar to the lignocellulosic media chamber, stainless steel samplers are positioned to create a vertical profile. B-HS2-SULFUR-3 is positioned 3-inches above the bottom of the sulfur media. B-HS2-SULFUR-7, B-HS2-SULFUR-12 and B-HS2-SULFUR-18, are placed 7, 12 and 18-inches above the bottom of the sulfur media, respectively. The fifth primary sampling point, B-HS2-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 existing soil infiltration system, or drainfield (Figure 7).



**Figure 6**  
**First chamber of Stage 2 biofilter (B-HS2-LIGNO-0 sample)**



**Figure 7**  
**Second chamber of Stage 2 biofilter (B-HS2-ST2 sample)**



### 3.4 Operational Monitoring

Start-up of the system occurred on September 25, 2012 (Experimental Day 0) and the system has operated continually since that date. For this sixth formal sampling event, the water meter for the house and the treatment system flow meters were read and recorded on October 7, 2013 (Experimental Day 377). As previously discussed, the pump tank discharge is split via two throttling globe valves which allow for a portion of the Stage 1 biofilter effluent to be sent back for recirculation with the rest proceeding to the Stage 2 biofilter. The combined flow meter is located on the pump tank discharge line prior to the split, and records the cumulative flow in gallons pumped from the pump chamber. Therefore the measurement of the combined flow meter includes both the forward wastewater flow from the household and the recirculation flow. The Stage 2 flow meter is located following the split on the line from the pump tank to the Stage 2 biofilter and records the cumulative forward flow in gallons pumped to the Stage 2 biofilter. The control panel includes telemetry where reports are generated regarding alarms, pump cycles, and other information using a Vericomm control panel system.

### 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 recirculation pump in the pump chamber, although a small amount of power is used by the control panel itself. 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 24 inches of sulfur media, which ostensibly will last for many years without replenishment or replacement.

### 3.6 Water Quality Sample Collection and Analyses

A full suite of influent, intermediate and effluent water quality samples from the system were collected for the seventh formal sample event on December 5, 2013 for water quality analysis. Samples were collected at each of the fifteen monitoring points described in Section 3.2: B-HS2-STE, B-HS2-DBOX, B-HS2-PUMP, B-HS2-LIGNO-36, B-HS2-LIGNO-30, B-HS2-LIGNO-24, B-HS2-LIGNO-18, B-HS2-LIGNO-12, B-HS2-LIGNO-6, B-HS2-LIGNO-0, B-HS2-SULFUR-3, B-HS2-SULFUR-7, B-HS2-SULFUR-12, B-HS2-SULFUR-18 and B-HS2-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.

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In addition, equipment blank (B-HS2-EB) sample was taken. The equipment blank was collected by pumping deionized water through the cleaned pump tubing. 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 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)	SM 2540E	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	2 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 water meter installation on March 6, 2012. The treatment system flow meter readings and corresponding recirculation ratio for the B-HS2 field site are summarized in Table 3. The operation and maintenance log which includes actions taken since start-up is provided in Appendix B. Summary tables of the Vericomm PLC recorded data are provided in Appendix C. These include daily and cumulative pump runtime and system alarms that are used to check general pump operation and performance.

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

Date	Cumulative Volume (gallons)	Average Daily Household Flow between readings, Q (gpd)
3/6/2012	7,790	INSTALLED
4/3/2012	11,490	132
5/1/2012	14,960	124
6/5/2012	19,560	131
7/3/2012	23,120	127
8/7/2012	26,730	103
9/4/2012	29,800	110
10/2/2012	33,240	123
11/6/2012	36,510	93
12/4/2012	40,080	128
1/1/13	43,240	113
2/5/13	47,741	129
3/5/2013	50,000	81
4/16/2013	54,010	95
5/7/2013	55,940	92
5/28/2013	57,620	80
6/11/2013	58,620	71
7/24/2013	62,422	88
8/7/2013	63,964	109
9/7/2013	66,830	94
10/7/2013	69,070	73
11/5/2013	71,600	89
11/27/2013	73,925	106
12/3/2013	75,360	239
12/5/2013	75,674	157
Total average start-up to 12/5/13		106

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**Table 3**  
**Summary of System Flow**

Date and Time Read	Combined Pumped Flow, Q+R Water Meter Reading	Average Daily Combined, Q+R Flow	Stage 2, Q Flow Meter Reading	Average Daily Stage 2, Q Flow	Average Daily, R Flow	Average Recycle Ratio
	Cumulative Volume (gallons)	Gallons/day	Cumulative Volume (gallons)	Gallons/Day	Gallons/Day	Recycle: Forward Flow
Recirculation mode of operation: to recirculation tank						
9/25/2012 11:00	351.9	Installed	102.2	Installed		
9/27/2012 9:45	570.5	Valves set	149.5	Valves set		
10/5/2012 8:07	3,898.3	419.5	880.6	92.2	327.4	3.55
10/11/2012 7:55	7,888.5	525.6	1,716.6	112.5	413.0	3.67
10/23/2012 9:00	15,092.9	559.2	3,228.2	118.6	440.7	3.72
10/30/2012 14:30	18,090.1	527.7	3,904.7	113.1	414.6	3.67
11/13/2012 14:00	22,944.4	474.3	5,007.3	103.0	371.3	3.61
12/3/2012 8:00	35,555.0	522.7	7,886.8	115.6	407.1	3.52
1/3/2013 8:00	51,563.3	520.7	11,542.3	116.3	404.4	3.48
2/5/2013 8:23	72,069.0	546.0	16,185.3	122.5	423.6	3.46
2/27/2013 11:00	81,937.3	531.6	18,441.6	119.5	412.1	3.45
4/16/13 10:15	105,376.0	521.4	23,809.3	117.7	403.7	3.43
6/4/13 7:30	126,085.7	502.2	28,513.7	113.5	388.7	3.43
7/8/2013 8:30	140,549.5	493.0	31,800.5	111.5	381.5	3.42
7/24/2013 8:39	145,987.7	484.8	33,032.0	109.6	375.2	3.42
8/7/2013 7:45	152,531.6	484.1	34,570.7	109.7	374.4	3.41
Average through 8/7/13		508.1		112.5	395.5	3.52:1
Recirculation mode of operation: to Stage 1 sprayers						
8/7/2013 13:04	152,720.1		34,616.4			
9/6/2013 9:15	163,910.2	375.0	37,404.3	93.4	281.6	3.01
10/7/2013 10:10	174,601.7	359.4	40,102.7	90.1	269.3	2.99
11/27/2013 9:40	195,934.7	386.3	45,595.0	98.1	288.2	2.94
12/3/2013 11:37	201,887.3	416.9	47,181.4	106.5	310.3	2.91
12/5/2013 8:50	203,129.2	420.7	47,518.9	107.7	313.0	2.91
Average through 12/5/13		391.7		99.2	292.5	2.95:1
Total average start-up to 12/5/13		477.4		109.0	368.4	3.37:1

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The two throttling globe valves control the fraction of Stage 1 effluent that is recirculated and the fraction sent to the Stage 2 biofilter. As previously discussed, the recirculation mode of operation was modified following the fifth sample event. The globe valves were set so that 3 parts went back to the Stage 1 sprayers and 1 part went to the Stage 2 tank (3:1 recycle ratio). From start-up to December 5, 2013, the household flow average was 106 gallons per day with periods of higher and lower flows (Table 2). The average combined pumped flow (recirculation and forward flow to the Stage 2 biofilter) following the modification to the recirculation mode of operation was 391.7 gallons per day, and the average forward flow to the Stage 2 biofilter was 99.2 gallons per day. Therefore, the average recirculation flow was 292.5 gallons per day, with a corresponding average recirculation ratio of 2.95:1 following the modification to the recirculation mode of operation.

#### **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 4.

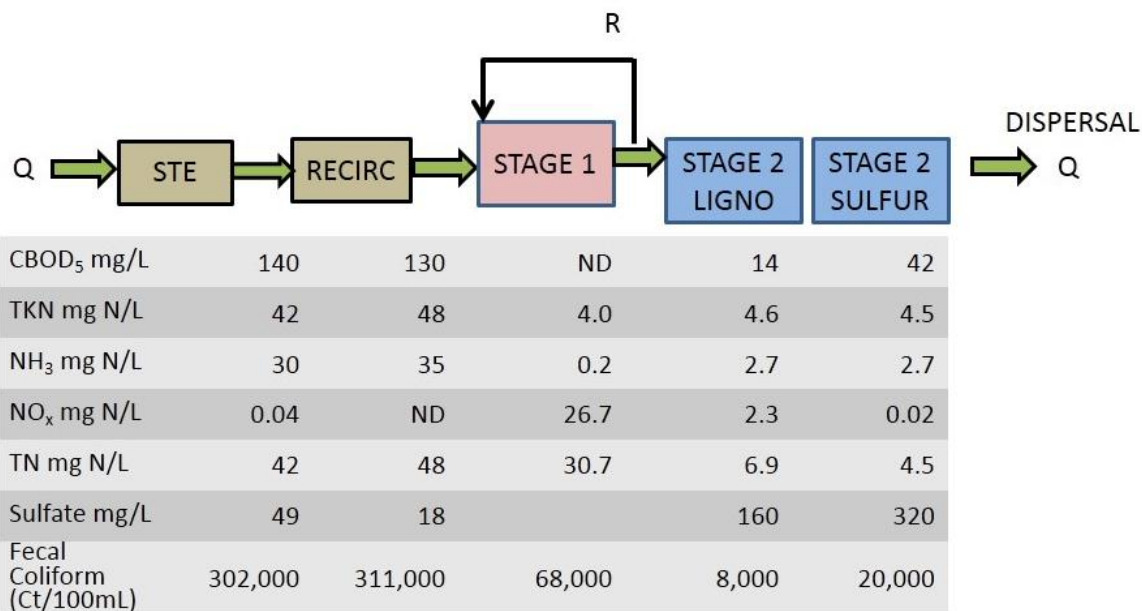
**Table 4**  
**Summary of System Electrical Use**

Date and Time Read	Electrical Meter Reading	Average Daily Electrical Use	Average Electrical Use per Gallon Treated
	Cumulative (kWh)	(kWh/day)	(kWh/gal)
Recirculation mode of operation: to recirculation tank			
9/25/2012 11:05	0.2	Installed	
9/27/2012 9:58	0.3	Start-up	
10/5/2012 8:07	2.6	0.29	0.0031
10/11/2012 7:55	5.0	0.40	0.0036
10/23/2012 9:00	9.5	0.37	0.0032
10/30/2012 14:30	11.8	0.32	0.0028
11/13/2012 14:00	14.8	0.21	0.0021
12/3/2012 8:00	22.8	0.41	0.0035
1/3/2013 8:00	33.0	0.33	0.0028
2/5/2013 7:45	45.5	0.38	0.0031
2/27/2013 11:00	51.5	0.27	0.0023
4/16/2013 10:15	65.8	0.30	0.0025
6/4/2013 9:00	78.3	0.26	0.0023
7/8/2013 8:30	86.9	0.25	0.0023
7/24/2013 8:39	90.2	0.21	0.0019
8/7/2013 7:45	94.1	0.28	0.0025
Recirculation mode of operation: to Stage 1 sprayers			
9/6/2013 9:15	101.2	0.24	0.0025
10/7/2013 10:10	107.8	0.21	0.0024
11/27/2013 9:40	121.2	0.26	0.0027
12/3/2013 11:37	124.8	0.59	0.0056
12/5/2013 8:50	125.6	0.42	0.0039
Average to 12/5/13		0.35	0.0034
Total average start-up to 12/5/13		0.32	0.0029

The total average electrical use through December 5, 2013 was 0.35 kWh per day. The average electrical use per gallon treated since start-up was 0.0029 kWh per gallon treated, and this parameter has been fairly stable since start-up.

### 4.3 Water Quality

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. The nitrogen results are graphically displayed in Figure 8. Water quality analytical results for Sample Event No. 7 are listed in Table 5. A summary of the water quality data collected to date for the test system is presented in Table 6. The laboratory report containing the raw analytical data is included in Appendix A.



**Figure 8**  
**Graphical Representation of Nitrogen Results**

**Septic Tank Effluent (STE) Quality:** The water quality characteristics of STE collected in Sample Event 7 were within the typical range generally expected for domestic STE. The measured STE total nitrogen (TN) concentration was 42 mg/L, which is within the range that has been typically reported for Florida single family residence STE.

**Recirculation Tank (RECIRC):** As previously discussed, following the modification to the recirculation mode of operation, the recirculation tank only receives septic tank effluent. Therefore, the recirculation tank currently provides some additional residence time

for the STE, but doesn't necessarily provide additional treatment of the wastewater. As expected, the recirculation tank sample collected compared similarly to the STE sample. The measured total nitrogen (TN) concentration was 48 mg/L.

**Stage 1 Effluent (ST1):** The Stage 1 effluent  $\text{NH}_3\text{-N}$  levels was 0.2 mg/L with a DO level at 3.83 mg/L in the Stage 1 effluent (Table 5). The Stage 1 effluent TSS and  $\text{CBOD}_5$  concentrations were below the method detection limit of 1 mg/L. The Stage 1 effluent  $\text{NO}_x\text{-N}$  was 27 mg/L. These results indicate pre-denitrification (approximately 27% reduction of STE nitrogen) was occurring as the effluent was recirculated back to the Stage 1 biofilter. The Stage 1 biofilter showed fairly complete nitrification with an effluent  $\text{NH}_3\text{-N}$  concentration of 0.2 mg/L and TKN of 4.0 mg/L.

**Stage 2 Biofilter Effluent (LIGNO-0 and ST2):** Effluent  $\text{NO}_x\text{-N}$  from the Stage 2 biofilter monitoring point was below the method detection limit of 0.02 mg/L. The low  $\text{NO}_x\text{-N}$  was accompanied by a measured 0.07 mg/L DO and -346.0 mV ORP. The lignocellulosic media effluent  $\text{NO}_x\text{-N}$  was 2.3 mg/L. The Stage 2 system produced a highly reducing environment and achieved essentially complete  $\text{NO}_x\text{-N}$  reduction. Final total nitrogen (TN) in the treatment system effluent was 4.5 mg/L. The Stage 2 biofilter lignocellulosic media effluent  $\text{CBOD}_5$  was 14 mg/L and the sulfur media effluent was 42 mg/L, increases in  $\text{CBOD}_5$  and TN have been reported previously for lignocellulosic denitrification. The Stage 2 effluent sulfate concentration was 320 mg/L.

As previously discussed in Section 3.2, Sample Event 7 also included Stage 2 biofilter profile samples. As depicted in Figure 9, the unsaturated Stage 1 biofilter effluent is pumped to the top of the first chamber of the Stage 2 biofilter which contains lignocellulosic media. The effluent flows downward through the lignocellulosic media, moves laterally in a perforated 4-inch pipe through the baffle wall to the bottom of the second chamber, and upward through the sulfur media mixture in the second chamber. The nitrogen results at the various depths of the Stage 2 biofilter are graphically displayed in Figure 9. Each stainless steel drivepoint sampler was assigned a unique identification indicating the depth (in inches) the sampler was placed above the bottom of the media. For example LIGNO-36 is a stainless steel drivepoint sampler located at 36 inches above the bottom of the lignocellulosic media. Profiles show that  $\text{NO}_x\text{-N}$  decreased consistently with passage through the lignocellulosic media, and  $\text{NO}_x\text{-N}$  reduction in the up-flow sulfur biofilter was substantially complete at 3 inches.

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FROM PUMP	TKN	NH3-N	NOX-N			TKN	NH3-N	NOX-N
Influent	4.0	0.2	27		Effluent	4.5	2.7	0.02
LIGNO-36	4.9	2.5	21					
LIGNO-30	4.9	2.8	18					
LIGNO-24	6.7	3.8	9.5					
LIGNO-18	4.3	1.2	7.4		SULFUR-18	5.3	3.5	0.02
LIGNO-12	4.4	1.1	3.7		SULFUR-12	4.9	2.0	0.02
LIGNO-6	4.2	1.9	0.2		SULFUR-7	5.2	3.2	0.05
LIGNO-0	4.6	2.7	2.3		SULFUR-3	4.9	3.2	0.04

**Figure 9**  
**Graphical Representation of Stage 2 Biofilter Profile Nitrogen Results**

**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.

Table 5  
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)	NOx (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)	Chloride
BHS2-STE	12/5/13 10:45	25.7	7.00	1248	0.03	-390.9	500	10	10	140	240	42.04	42	12	30	0.04	0.01	0.04	30.04	9.6	2.1	49	16	31	302,000	240,000	56	
BHS2-STE-FILTERED	12/5/13 10:45	25.7	7.00	1248	0.03	-390.9				70		45.03	45	16	29	0.03	0.01	0.03	29.03									
BHS2-RECIRC	12/5/13 10:25	24.5	6.87	1292	0.06	-382.5	530	10	9	130	230	48.02	48	13	35	0.01	0.01	0.02	35.02	4.7	1.6	18	41	74	311,000	240,000	53	
BHS2-ST1	12/5/13 9:50	23.9	6.54	1197	3.83	-19.0	200	1	1	2	15	30.65	4	3.8	0.2	26	0.65	27	26.85	7.4	2.2				68,000	3,200	13	
BHS2-ST1-DUP	12/5/13 9:55	23.9	6.54	1197	3.83	-19.0	200	1	1	2	15	30.75	4.1	3.91	0.19	26	0.65	27	26.84	7.7	2.2				7,000	5,600	12	
BHS2-ST1-FILTERED	12/5/13 9:50	23.9	6.54	1197	3.83	-19.0				2		32.85	6.2	4.4	1.8	26	0.65	27	28.45									
BHS2-LIGNO-36	12/5/13 9:40	23.7	6.55	1180	0.14	-274.7						25.91	4.9	2.4	2.5	21	0.01	21	23.51			200						
BHS2-LIGNO-30	12/5/13 9:30	23.7	6.61	1177	0.15	-278.7						22.91	4.9	2.1	2.8	18	0.01	18	20.81			210						
BHS2-LIGNO-24	12/5/13 9:20	23.8	6.66	1154	0.12	-297.7						16.21	6.7	2.9	3.8	9.5	0.01	9.5	13.31			190						
BHS2-LIGNO-18	12/5/13 9:09	23.6	6.66	1127	0.10	-299.4						11.67	4.3	3.1	1.2	7	0.37	7.4	8.57			180						
BHS2-LIGNO-12	12/5/13 8:54	23.4	6.65	1129	0.13	-319.2						8.11	4.4	3.3	1.1	3.4	0.31	3.7	4.81			190						
BHS2-LIGNO-6	12/5/13 8:42	23.3	6.67	1126	0.14	-314.6						4.44	4.2	2.3	1.9	0.24	0.01	0.24	2.14			150						
BHS2-LIGNO-0	12/5/13 8:25	22.8	6.70	1125	0.07	-323.7	330	8	8	14	45	6.86	4.6	1.9	2.7	1.9	0.36	2.3	4.96	3.4	2	160	1.9	2.9	8,000	7,800	15	
BHS2-LIGNO-0-FILTERED	12/5/13 8:25	22.8	6.70	1125	0.07	-323.7				2		7.86	6	3.4	2.6	1.5	0.36	1.86	4.46									
BHS2-SULFUR-3	12/5/13 9:20	23.3	6.47	1194	0.11	-358.1						4.94	4.9	1.7	3.2	0.04	0.01	0.04	3.24			180						
BHS2-SULFUR-7	12/5/13 9:10	23.1	6.45	1216	0.13	-358.1						5.25	5.2	2	3.2	0.05	0.01	0.05	3.25			200						
BHS2-SULFUR-12	12/5/13 9:00	23.2	6.38	1231	0.11	-364.5						4.92	4.9	2.9	2	0.01	0.01	0.02	2.02			250						
BHS2-SULFUR-18	12/5/13 8:40	23.3	6.50	1296	0.11	-365.1						5.32	5.3	1.8	3.5	0.01	0.01	0.02	3.52			240						
BHS2-ST2	12/5/13 8:20	22.6	6.27	1250	0.07	-346.0	330	1	1	42	100	4.52	4.5	1.8	2.7	0.01	0.01	0.02	2.72	3.3	1.7	320	5.7	6.8	20,000	9,600	17	43
BHS2-ST2-FILTERED	12/5/13 8:20	22.6	6.27	1250	0.07	-346.0				34		6.72	6.7	3	3.7	0.01	0.01	0.02	3.72			250						
BHS2-EB	12/5/13 11:00	27.5	6.87	3.06	9.90	-42.3	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	1.6	0.01	0.1	1	2	0.11	

<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>.

SAL = Southern Analytical Laboratories; BENCHMARK = Benchmark EnviroAnalytical Inc.

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.

Too many colonies were present. The numeric value represents the filtration volume.

Results based on colony counts outside the ideal range.

Recirculation mode = to Stage 1 sprayers

**Table 6**  
**Summary of Water Quality Data**

Sample ID	Statistical Parameter	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)	Sulfate (mg/L)	Hydrogen Sulfide (mg/L)	Sulfide (mg/L)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)	TOC (mg/L)	
Septic tank effluent (STE)	n	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	5	
	MEAN	24.5	7.3	1,353	0.2	-372.1	572.9	97.6	27.3	109.7	290.0	49.9	49.9	8.3	41.6	0.1	0.01	0.06	41.6	9.7	3.2	83.7	14.2	46.3	129,732	128,276	50	
	STD. DEV.	3.0	0.0	65.5	0.2	13.8	278.8	191.8	16.2	24.8	103.9	5.9	5.9	6.9	7.9	0.04	0.00	0.04	8.0	5.6	1.3	41.8	3.2	14.7	544,513	408,439	21	
	MIN	18.8	7.0	1,248	0.0	-392.5	410	10	10	73	150	42.0	42.0	1.0	30.0	0.01	0.01	0.02	30.0	4.8	0.7	31	10	26	800	2,420	31	
	MAX	27.8	7.6	1,425	0.6	-360.0	1200	532	58	140	430	56.1	56.0	18.0	53.0	0.13	0.01	0.13	53.1	18.0	4.3	150	17	65	1,600,000	1,200,000	82	
Recirculation tank (DBOX)	n	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	0	0	0	5	5	4
	MEAN	23.2	7.0	1,218	1.0	-127.9	286.0	20.6	16.0	25.2	69.6	18.9	12.8	3.8	9.0	5.5	1.1	6.1	15.1	6.0	2.3				38,350	34,064	19.3	
	STD. DEV.	3.79	0.2	32.1	0.78	43.18	18.17	11.22	13.78	31.87	40.88	5.26	2.84	1.76	1.86	5.97	1.26	6.34	4.61	3.95	1.09				337,381		8.4	
	MIN	17.4	6.8	1,173	0.1	-181.8	270.0	12.0	6.0	2.0	10	14.4	8.8	0.7	7.1	0.01	0.01	0.02	11.0	3.7	1.1				1,000	2,420	11.0	
	MAX	27.7	7.2	1,245	1.8	-71.2	310.0	40.0	40	77	110	26.0	16.0	5.0	11.0	14.0	2.8	14.0	21.1	13.0	3.6				790,000	345,000	31.0	
Stage 1 effluent (ST1 and PUMP)	n	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	0	0	0	7	7	5	
	MEAN	23.3	6.8	1,216	3.8	-57.1	221.4	19.7	9.4	12.0	19.9	24.4	3.3	2.5	0.7	20.8	0.3	21.1	21.9	6.0	1.8				365	167	12.5	
	STD. DEV.	3.5	0.0	45.1	1.4	89.5	21.9	26.5	12.1	16.2	10.1	9.8	1.6	0.9	1.3	10.3	0.3	10.2	9.4	3.1	0.7				25,431	1,876	3.1	
	MIN	16.1	6.5	1,137	2.0	-180.0	190.0	1.0	1.0	2.0	10.0	12.5	1.6	1.3	0.1	6.3	0.01	6.3	9.9	3.5	0.7				6	2	8.3	
	MAX	26.9	7.1	1,267	5.7	50.8	250.0	68	35	45	36	41.6	6.2	3.8	3.6	38.0	0.8	38.0	38.2	12.0	2.6				68,000	4,611	17.0	
Stage 2 lignocellulosic effluent (LIGNO-0)	n	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	7	7	7	4	
	MEAN	23.2	6.9	1,186	0.4	-323.2	375.7	8.0	7.7	41.1	100.7	3.3	2.9	1.3	1.6	0.34	0.06	0.40	2.0	5.2	2.1	158.0	10.1	22.7	67.9	32	17.8	
	STD. DEV.	2.7	0.0	46.3	0.3	34.1	50.9	10.0	10.1	27.7	56.7	2.1	1.6	0.4	1.3	0.70	0.13	0.83	1.7	3.5	0.7	44.1	7.1	15.2	2973.8	2910.9	2.6	
	MIN	18.7	6.7	1,125	0.1	-362.1	290.0	1.0	1.0	14.0	45	1.5	1.5	1.0	0.4	0.01	0.01	0.02	0.4	2.6	0.7	86.0	1.9	2.9	10.0	1.0	15.0	
	MAX	26.7	7.1	1,230	0.8	-276.9	440.0	30	30	96	220	6.9	4.6	1.9	3.3	1.9	0.36	2.3	5.0	12.0	2.7	220	19	40	8,000	7800	20	
Stage 2 sulfur effluent (ST2)	n	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	7	7	7	5	
	MEAN	23.0	6.8	1,213	0.1	-319.7	335.7	5.1	3.3	70.0	154	3.3	3.3	1.3	2.0	0.01	0.01	0.02	2.0	4.9	2.3	210	23.6	42.7	97.03	37.29	21.0	
	STD. DEV.	3.2	0.0	64.8	0.1	54.5	62.9	5.1	2.6	33.1	88	2.2	2.2	0.3	1.9	0.00	0.00	0.00	1.9	3.0	1.1	53.5	14.0	28.0	7526.65	3609.38	2.9	
	MIN	16.5	6.3	1,134	0.1	-372.0	220.0	1.0	1.0	32.0	10	1.4	1.4	0.9	0.4	0.01	0.01	0.02	0.4	2.4	0.9	170	6	7	10	1	17.0	
	MAX	26.1	7.1	1,303	0.2	-218.8	410.0	15.0	8.0	110	260	6.5	6.5	1.8	5.0	0.01	0.01	0.02	5.0	11.0	4.1	320	40	83	20000	9600	25.0	
FB-TAP (potable water)	n	5	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	4	5	4	4	
	MEAN	23.5	7.5	827	4.6	22.2	155.0	5.8	4.8	2.5	15.0	0.5	0.3	0.2	0.03	0.2	0.01	0.2	0.3	0.02	0.02	246	0.01	0.1	2		5.5	
	STD. DEV.	3.4	0.4	9.5	1.2	91.7	5.8	4.0	4.1	1.0	3.5	0.2	0.2	0.1	0.04	0.1	0.00	0.1	0.1	0.01	0.01	20.7	0.01	0.1	4.5		2.0	
	MIN	18.3	7.1	812	2.8	-113.0	150.0	1.0	1.0	2.0	10.0	0.3	0.1	0.1	0.01	0.1	0.01	0.1	0.1	0.01	0.01	230	0.01	0.0	1		3.1	
	MAX	27.6	8.0	835	5.7	86.9	160.0	10.0	10.0	4.0	18.0	0.7	0.4	0.4	0.09	0.4	0.01	0.4	0.4	0.03	0.03	280	0.02	0.2	10		8.0	
Equipment blank (EB)	n	7	7	7	7	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	7	7	7	5	
	MEAN	24.0	7.7	201	7.3	-60.5	2.1	1.9	1.4	2.9	10.6	0.1	0.1	0.0	0.01	0.01	0.01	0.02	0.03	0.01	0.01	0.40	0.01	0.10	6.12	2	0.3	
	STD. DEV.	4.80	0.5	525.6	3.30	167.63	0.15	2.27	1.13	1.57	1.51	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.53	0.00	0.05	10.36	3.36	0.2	
	MIN	14.2	6.9	1.56	0.1	-392.5	2.0	1.0	1.0	2.0	10.0	0.1	0.1	0.0	0.01	0.01	0.01	0.02	0.03	0.01	0.01	0.20	0.01	0.01	1	1	0.1	
	MAX	27.7	8.2	1,393	9.9	58.7	2.4	7.0	4.0	6.0	14.0	0.1	0.1	0.1	0.01	0.01	0.01	0.02	0.03	0.02	0.01	1.60	0.01	0.20	32.0	10	0.5	

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.

Too many colonies were present. The numeric value represents the filtration volume.

Results based on colony counts outside the ideal range.

## **5.0 B-HS2 Sample Event No. 7: Summary and Recommendations**

### **5.1 Summary**

The results of the seventh sampling event indicate that the system continues to operate well and perform consistently. The Sample Event No. 7 results indicate that:

- Septic tank effluent (STE) quality is characteristic of typical household STE quality. The total nitrogen concentration of 42 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 4.0 mg/L TKN, of which 0.20 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 0.01 mg N/L.
- The total nitrogen concentration in the final effluent from the total treatment system was 4.5 mg/L, an approximately 89% reduction from STE.





## **Appendix A: Laboratory Report**

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PRELIMINARY

o:\44237-001\Wpdocs\Report\Draft

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

**December 26, 2013**  
**Work Order: 1313004**

## Laboratory Report

Project Name		B-HS2 SE#7						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-STE						
Matrix		Wastewater						
SAL Sample Number		1313004-01						
Date/Time Collected		12/05/13 10:45						
Collected by		Josefin Hirst						
Date/Time Received		12/05/13 12:30						
<b><u>Client Provided Field Data</u></b>								
pH		7.0						
Temperature		25.7 °C						
Conductivity		1248 umhos						
Dissolved Oxygen		0.03 mg/L						
<b><u>Inorganics</u></b>								
Hydrogen Sulfide (Unionized)	mg/L	16	SM 4550SF	0.04	0.01		12/10/13 11:00	1
Ammonia as N	mg/L	30	EPA 350.1	0.80	0.19		12/09/13 13:51	20
Carbonaceous BOD	mg/L	140	SM 5210B	2	2	12/07/13 09:00	12/12/13 08:41	1
Chemical Oxygen Demand	mg/L	240	EPA 410.4	25	10	12/09/13 13:30	12/09/13 17:00	1
Nitrate (as N)	mg/L	0.04	EPA 300.0	0.04	0.01		12/06/13 06:17	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 06:17	1
Orthophosphate as P	mg/L	2.1	EPA 300.0	0.040	0.010		12/06/13 06:17	1
Phosphorous - Total as P	mg/L	9.6	SM 4500P-E	0.40	0.10	12/06/13 10:06	12/12/13 10:19	10
Sulfate	mg/L	49	EPA 300.0	0.60	0.20		12/06/13 06:17	1
Sulfide	mg/L	31	SM 4500SF	0.40	0.10		12/10/13 11:00	1
Total Alkalinity	mg/L	500	SM 2320B	8.0	2.0		12/09/13 14:18	1
Total Kjeldahl Nitrogen	mg/L	42	EPA 351.2	0.20	0.05	12/05/13 16:46	12/09/13 11:07	20.83
Total Organic Carbon	mg/L	56	SM 5310B	1.0	0.060		12/09/13 10:53	1
Total Suspended Solids	mg/L	10	SM 2540D	1	1	12/05/13 14:39	12/10/13 10:53	1
Volatile Suspended Solids	mg/L	10	EPA 160.4	1	1	12/05/13 14:39	12/10/13 10:53	1
Nitrate+Nitrite (N)	mg/L	0.04 I	EPA 300.0	0.08	0.02		12/06/13 06:17	1
<b><u>Microbiology</u></b>								
E. Coli	MPN/100 mL	240,000	SM 9223B	2.0	2.0	12/05/13 13:33	12/06/13 10:02	1
Fecal Coliforms	CFU/100 ml	302,000	SM 9222D	1	1	12/05/13 13:31	12/06/13 12:53	1

Sample Description **BHS2-STE-FILTERED**  
 Matrix **Wastewater**  
 SAL Sample Number **1313004-02**  
 Date/Time Collected **12/05/13 10:45**  
 Collected by **Josefin Hirst**  
 Date/Time Received **12/05/13 12:30**

**Client Provided Field Data**

pH 7.0  
 Temperature 25.7 °C  
 Conductivity 1248 umhos  
 Dissolved Oxygen 0.03 mg/L

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

**December 26, 2013**  
**Work Order: 1313004**

## Laboratory Report

Project Name		B-HS2 SE#7						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-STE-FILTERED						
Matrix		Wastewater						
SAL Sample Number		1313004-02						
Date/Time Collected		12/05/13 10:45						
Collected by		Josefin Hirst						
Date/Time Received		12/05/13 12:30						
<u>Client Provided Field Data</u>								
pH		7.0						
Temperature		25.7 °C						
Conductivity		1248 umhos						
Dissolved Oxygen		0.03 mg/L						
<u>Inorganic, Dissolved</u>								
Ammonia as N	mg/L	29	EPA 350.1	0.80	0.19		12/13/13 11:45	20
Carbonaceous BOD	mg/L	70	SM 5210B	2	2	12/06/13 09:25	12/11/13 08:44	1
Nitrate (as N)	mg/L	0.03 I	EPA 300.0	0.04	0.01		12/06/13 16:56	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 16:56	1
Total Kjeldahl Nitrogen	mg/L	45	EPA 351.2	0.20	0.050	12/09/13 16:46	12/16/13 14:58	20.83
Nitrate+Nitrite (N)	mg/L	0.03 I	EPA 300.0	0.08	0.02		12/06/13 16:56	1
Lab filtration for diss. analytes							12/05/13 14:25	

Sample Description **BHS2-ST1**  
 Matrix **Wastewater**  
 SAL Sample Number **1313004-03**  
 Date/Time Collected **12/05/13 09:50**  
 Collected by **Josefin Hirst**  
 Date/Time Received **12/05/13 12:30**

**Client Provided Field Data**

pH 6.54  
 Temperature 23.9 °C  
 Conductivity 1197 umhos  
 Dissolved Oxygen 3.83 mg/L

**Inorganics**

Ammonia as N	mg/L	0.20	EPA 350.1	0.040	0.009		12/09/13 13:53	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	12/06/13 09:00	12/11/13 08:44	1
Chemical Oxygen Demand	mg/L	15 I	EPA 410.4	25	10	12/09/13 13:30	12/09/13 17:00	1
Nitrate (as N)	mg/L	26	EPA 300.0	0.40	0.10		12/06/13 17:05	10
Nitrite (as N)	mg/L	0.65	EPA 300.0	0.04	0.01		12/06/13 17:05	1
Orthophosphate as P	mg/L	2.2	EPA 300.0	0.040	0.010		12/06/13 17:05	1
Phosphorous - Total as P	mg/L	7.4	SM 4500P-E	0.40	0.10	12/06/13 10:06	12/12/13 11:11	10
Total Alkalinity	mg/L	200	SM 2320B	8.0	2.0		12/09/13 14:25	1
Total Kjeldahl Nitrogen	mg/L	4.0	EPA 351.2	0.20	0.05	12/09/13 16:45	12/11/13 14:54	1
Total Organic Carbon	mg/L	13	SM 5310B	1.0	0.060		12/09/13 10:53	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	12/09/13 12:03	12/11/13 11:44	1

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

**December 26, 2013**  
**Work Order: 1313004**

## Laboratory Report

Project Name		B-HS2 SE#7						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-ST1						
Matrix		Wastewater						
SAL Sample Number		1313004-03						
Date/Time Collected		12/05/13 09:50						
Collected by		Josefin Hirst						
Date/Time Received		12/05/13 12:30						
<u>Client Provided Field Data</u>								
pH		6.54						
Temperature		23.9 °C						
Conductivity		1197 umhos						
Dissolved Oxygen		3.83 mg/L						
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	12/09/13 12:03	12/11/13 11:44	1
Nitrate+Nitrite (N)	mg/L	27	EPA 300.0	0.44	0.11		12/06/13 17:05	10
<u>Microbiology</u>								
E. Coli	MPN/100 mL	3,200	SM 9223B	2.0	2.0	12/05/13 13:33	12/06/13 10:02	1
Fecal Coliforms	CFU/100 ml	68,000	SM 9222D	1	1	12/05/13 13:31	12/06/13 12:53	1

Sample Description **BHS2-ST1-DUP**  
 Matrix **Wastewater**  
 SAL Sample Number **1313004-04**  
 Date/Time Collected **12/05/13 09:55**  
 Collected by **Josefin Hirst**  
 Date/Time Received **12/05/13 12:30**

**Client Provided Field Data**

pH 6.54  
 Temperature 23.9 °C  
 Conductivity 1197 umhos  
 Dissolved Oxygen 3.83 mg/L

**Inorganics**

Ammonia as N	mg/L	0.19	EPA 350.1	0.040	0.009		12/09/13 13:55	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	12/07/13 09:00	12/12/13 08:41	1
Chemical Oxygen Demand	mg/L	15 I	EPA 410.4	25	10	12/09/13 13:30	12/09/13 17:00	1
Nitrate (as N)	mg/L	26	EPA 300.0	0.40	0.10		12/06/13 17:43	10
Nitrite (as N)	mg/L	0.65	EPA 300.0	0.04	0.01		12/06/13 17:43	1
Orthophosphate as P	mg/L	2.2	EPA 300.0	0.040	0.010		12/06/13 17:43	1
Phosphorous - Total as P	mg/L	7.7	SM 4500P-E	0.40	0.10	12/06/13 10:06	12/12/13 11:12	10
Total Alkalinity	mg/L	200	SM 2320B	8.0	2.0		12/09/13 14:32	1
Total Kjeldahl Nitrogen	mg/L	4.1	EPA 351.2	0.20	0.05	12/09/13 16:45	12/11/13 14:56	1
Total Organic Carbon	mg/L	12	SM 5310B	1.0	0.060		12/09/13 10:53	1
Total Suspended Solids	mg/L	1	SM 2540D	1	1	12/09/13 12:03	12/11/13 11:44	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	12/09/13 12:03	12/11/13 11:44	1
Nitrate+Nitrite (N)	mg/L	27	EPA 300.0	0.44	0.11		12/06/13 17:43	10

**Microbiology**

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**December 26, 2013**  
**Work Order: 1313004**

## Laboratory Report

Project Name		B-HS2 SE#7						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		<b>BHS2-ST1-DUP</b>						
Matrix		<b>Wastewater</b>						
SAL Sample Number		<b>1313004-04</b>						
Date/Time Collected		<b>12/05/13 09:55</b>						
Collected by		<b>Josefin Hirst</b>						
Date/Time Received		<b>12/05/13 12:30</b>						

### Client Provided Field Data

pH		6.54						
Temperature		23.9 °C						
Conductivity		1197 umhos						
Dissolved Oxygen		3.83 mg/L						
E. Coli	MPN/100 mL	5,600	SM 9223B	2.0	2.0	12/05/13 13:33	12/06/13 10:02	1
Fecal Coliforms	CFU/100 ml	7,000	SM 9222D	1	1	12/05/13 13:31	12/06/13 12:53	1

Sample Description		<b>BHS2-ST1-FILTERED</b>						
Matrix		<b>Wastewater</b>						
SAL Sample Number		<b>1313004-05</b>						
Date/Time Collected		<b>12/05/13 09:50</b>						
Collected by		<b>Josefin Hirst</b>						
Date/Time Received		<b>12/05/13 12:30</b>						

### Client Provided Field Data

pH		6.54						
Temperature		23.9 °C						
Conductivity		1197 umhos						
Dissolved Oxygen		3.83 mg/L						
<b><u>Inorganic, Dissolved</u></b>								
Ammonia as N	mg/L	1.8	EPA 350.1	0.040	0.009		12/13/13 10:29	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	12/06/13 09:25	12/11/13 08:44	1
Nitrate (as N)	mg/L	26	EPA 300.0	0.04	0.01		12/06/13 17:52	1
Nitrite (as N)	mg/L	0.65	EPA 300.0	0.04	0.01		12/06/13 17:52	1
Total Kjeldahl Nitrogen	mg/L	6.2	EPA 351.2	0.20	0.050	12/09/13 16:46	12/16/13 14:59	5
Nitrate+Nitrite (N)	mg/L	27	EPA 300.0	0.08	0.02		12/06/13 17:52	1
Lab filtration for diss. analytes							12/05/13 14:25	

Sample Description		<b>BHS2-LIGNO-36</b>						
Matrix		<b>Wastewater</b>						
SAL Sample Number		<b>1313004-06</b>						
Date/Time Collected		<b>12/05/13 09:40</b>						
Collected by		<b>Josefin Hirst</b>						
Date/Time Received		<b>12/05/13 12:30</b>						

### Client Provided Field Data

pH		6.55						
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**Tampa, FL 33619**

**December 26, 2013**  
**Work Order: 1313004**

## Laboratory Report

Project Name		B-HS2 SE#7						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		<b>BHS2-LIGNO-36</b>						
Matrix		<b>Wastewater</b>						
SAL Sample Number		<b>1313004-06</b>						
Date/Time Collected		<b>12/05/13 09:40</b>						
Collected by		<b>Josefin Hirst</b>						
Date/Time Received		<b>12/05/13 12:30</b>						

### Client Provided Field Data

pH	6.55
Temperature	23.7 °C
Conductivity	1180 umhos
Dissolved Oxygen	0.17 mg/L

### Inorganics

Ammonia as N	mg/L	2.5	EPA 350.1	0.080	0.019		12/09/13 13:56	2
Nitrate (as N)	mg/L	21	EPA 300.0	0.40	0.10		12/06/13 18:02	10
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 18:02	1
Sulfate	mg/L	200	EPA 300.0	6.0	2.0		12/11/13 22:43	10
Total Kjeldahl Nitrogen	mg/L	4.9	EPA 351.2	0.20	0.05	12/09/13 16:45	12/11/13 14:58	1
Nitrate+Nitrite (N)	mg/L	21	EPA 300.0	0.44	0.11		12/06/13 18:02	10

Sample Description	<b>BHS2-LIGNO-30</b>
Matrix	<b>Wastewater</b>
SAL Sample Number	<b>1313004-07</b>
Date/Time Collected	<b>12/05/13 09:30</b>
Collected by	<b>Josefin Hirst</b>
Date/Time Received	<b>12/05/13 12:30</b>

### Client Provided Field Data

pH	6.61
Temperature	23.7 °C
Conductivity	1177 umhos
Dissolved Oxygen	0.15 mg/L

### Inorganics

Ammonia as N	mg/L	2.8	EPA 350.1	0.080	0.019		12/09/13 13:58	2
Nitrate (as N)	mg/L	18	EPA 300.0	0.04	0.01		12/06/13 18:11	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 18:11	1
Sulfate	mg/L	210	EPA 300.0	6.0	2.0		12/21/13 11:54	10
Total Kjeldahl Nitrogen	mg/L	4.9	EPA 351.2	0.20	0.05	12/05/13 16:48	12/09/13 16:07	5
Nitrate+Nitrite (N)	mg/L	18	EPA 300.0	0.08	0.02		12/06/13 18:11	1

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**December 26, 2013**  
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## Laboratory Report

Project Name		B-HS2 SE#7						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		<b>BHS2-LIGNO-24</b>						
Matrix		<b>Wastewater</b>						
SAL Sample Number		<b>1313004-08</b>						
Date/Time Collected		<b>12/05/13 09:20</b>						
Collected by		<b>Josefin Hirst</b>						
Date/Time Received		<b>12/05/13 12:30</b>						

### Client Provided Field Data

pH	6.66
Temperature	23.8 °C
Conductivity	1154 umhos
Dissolved Oxygen	0.12 mg/L

### Inorganics

Ammonia as N	mg/L	3.8	EPA 350.1	0.20	0.047		12/09/13 16:25	5
Nitrate (as N)	mg/L	9.5	EPA 300.0	0.04	0.01		12/06/13 18:20	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 18:20	1
Sulfate	mg/L	190	EPA 300.0	6.0	2.0		12/21/13 12:31	10
Total Kjeldahl Nitrogen	mg/L	6.7	EPA 351.2	0.20	0.05	12/05/13 16:48	12/09/13 16:08	5
Nitrate+Nitrite (N)	mg/L	9.5	EPA 300.0	0.08	0.02		12/06/13 18:20	1

Sample Description	<b>BHS2-LIGNO-18</b>
Matrix	<b>Wastewater</b>
SAL Sample Number	<b>1313004-09</b>
Date/Time Collected	<b>12/05/13 09:09</b>
Collected by	<b>Josefin Hirst</b>
Date/Time Received	<b>12/05/13 12:30</b>

### Client Provided Field Data

pH	6.66
Temperature	23.6 °C
Conductivity	1127 umhos
Dissolved Oxygen	0.10 mg/L

### Inorganics

Ammonia as N	mg/L	1.2	EPA 350.1	0.040	0.009		12/09/13 15:30	1
Nitrate (as N)	mg/L	7.0	EPA 300.0	0.04	0.01		12/06/13 18:30	1
Nitrite (as N)	mg/L	0.37	EPA 300.0	0.04	0.01		12/06/13 18:30	1
Sulfate	mg/L	180	EPA 300.0	6.0	2.0		12/21/13 12:41	10
Total Kjeldahl Nitrogen	mg/L	4.3	EPA 351.2	0.20	0.05	12/05/13 16:48	12/09/13 15:24	1
Nitrate+Nitrite (N)	mg/L	7.3	EPA 300.0	0.08	0.02		12/06/13 18:30	1

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**Tampa, FL 33619**

**December 26, 2013**  
**Work Order: 1313004**

## Laboratory Report

Project Name		B-HS2 SE#7						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		<b>BHS2-LIGNO-12</b>						
Matrix		<b>Wastewater</b>						
SAL Sample Number		<b>1313004-10</b>						
Date/Time Collected		<b>12/05/13 08:54</b>						
Collected by		<b>Josefin Hirst</b>						
Date/Time Received		<b>12/05/13 12:30</b>						

### Client Provided Field Data

pH	6.65
Temperature	23.4 °C
Conductivity	1129 umhos
Dissolved Oxygen	0.13 mg/L

### Inorganics

Ammonia as N	mg/L	1.1	EPA 350.1	0.040	0.009		12/09/13 15:32	1
Nitrate (as N)	mg/L	3.4	EPA 300.0	0.04	0.01		12/06/13 18:39	1
Nitrite (as N)	mg/L	0.31	EPA 300.0	0.04	0.01		12/06/13 18:39	1
Sulfate	mg/L	190	EPA 300.0	6.0	2.0		12/21/13 12:50	10
Total Kjeldahl Nitrogen	mg/L	4.4	EPA 351.2	0.20	0.05	12/05/13 16:48	12/09/13 15:25	1
Nitrate+Nitrite (N)	mg/L	3.7	EPA 300.0	0.08	0.02		12/06/13 18:39	1

Sample Description	<b>BHS2-LIGNO-6</b>
Matrix	<b>Wastewater</b>
SAL Sample Number	<b>1313004-11</b>
Date/Time Collected	<b>12/05/13 08:42</b>
Collected by	<b>Josefin Hirst</b>
Date/Time Received	<b>12/05/13 12:30</b>

### Client Provided Field Data

pH	6.67
Temperature	23.3 °C
Conductivity	1126 umhos
Dissolved Oxygen	0.14 mg/L

### Inorganics

Ammonia as N	mg/L	1.9	EPA 350.1	0.040	0.009		12/09/13 15:34	1
Nitrate (as N)	mg/L	0.24	EPA 300.0	0.04	0.01		12/06/13 18:48	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 18:48	1
Sulfate	mg/L	150	EPA 300.0	6.0	2.0		12/21/13 13:00	10
Total Kjeldahl Nitrogen	mg/L	4.2	EPA 351.2	0.20	0.05	12/05/13 16:48	12/09/13 16:09	5
Nitrate+Nitrite (N)	mg/L	0.24	EPA 300.0	0.08	0.02		12/06/13 18:48	1

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**December 26, 2013**  
**Work Order: 1313004**

## Laboratory Report

Project Name		B-HS2 SE#7						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-LIGNO-0						
Matrix		Wastewater						
SAL Sample Number		1313004-12						
Date/Time Collected		12/05/13 08:25						
Collected by		Josefin Hirst						
Date/Time Received		12/05/13 12:30						
<b><u>Client Provided Field Data</u></b>								
pH		6.70						
Temperature		22.8 °C						
Conductivity		1125 umhos						
Dissolved Oxygen		0.07 mg/L						
<b><u>Inorganics</u></b>								
Hydrogen Sulfide (Unionized)	mg/L	1.9	SM 4550SF	0.04	0.01		12/10/13 11:00	1
Ammonia as N	mg/L	2.7	EPA 350.1	0.20	0.047		12/09/13 16:27	5
Carbonaceous BOD	mg/L	14	SM 5210B	2	2	12/06/13 09:00	12/11/13 08:44	1
Chemical Oxygen Demand	mg/L	45	EPA 410.4	25	10	12/09/13 13:30	12/09/13 17:00	1
Nitrate (as N)	mg/L	1.9	EPA 300.0	0.04	0.01		12/06/13 18:58	1
Nitrite (as N)	mg/L	0.36	EPA 300.0	0.04	0.01		12/06/13 18:58	1
Orthophosphate as P	mg/L	2.0	EPA 300.0	0.040	0.010		12/06/13 18:58	1
Phosphorous - Total as P	mg/L	3.4	SM 4500P-E	0.080	0.020	12/05/13 14:28	12/10/13 14:47	2
Sulfate	mg/L	160	EPA 300.0	6.0	2.0		12/19/13 06:54	10
Sulfide	mg/L	2.9	SM 4500SF	0.40	0.10		12/10/13 11:00	1
Total Alkalinity	mg/L	330	SM 2320B	8.0	2.0		12/09/13 14:40	1
Total Kjeldahl Nitrogen	mg/L	4.6	EPA 351.2	0.20	0.05	12/05/13 16:48	12/09/13 16:11	5
Total Organic Carbon	mg/L	15	SM 5310B	1.0	0.060		12/09/13 10:53	1
Total Suspended Solids	mg/L	8	SM 2540D	1	1	12/09/13 12:03	12/11/13 11:44	1
Volatile Suspended Solids	mg/L	8	EPA 160.4	1	1	12/09/13 12:03	12/11/13 11:44	1
Nitrate+Nitrite (N)	mg/L	2.2	EPA 300.0	0.08	0.02		12/06/13 18:58	1
<b><u>Microbiology</u></b>								
E. Coli	MPN/100 mL	7,800	SM 9223B	2.0	2.0	12/05/13 13:33	12/06/13 10:02	1
Fecal Coliforms	CFU/100 ml	8,000	SM 9222D	1	1	12/05/13 13:31	12/06/13 12:53	1

Sample Description **BHS2-LIGNO-0-FILTERED**  
 Matrix **Wastewater**  
 SAL Sample Number **1313004-13**  
 Date/Time Collected **12/05/13 08:25**  
 Collected by **Josefin Hirst**  
 Date/Time Received **12/05/13 12:30**

**Client Provided Field Data**

pH 6.70  
 Temperature 22.8 °C  
 Conductivity 1125 umhos  
 Dissolved Oxygen 0.07 mg/L

**Hazen and Sawyer**  
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**December 26, 2013**  
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## Laboratory Report

Project Name		B-HS2 SE#7						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-LIGNO-0-FILTERED						
Matrix		Wastewater						
SAL Sample Number		1313004-13						
Date/Time Collected		12/05/13 08:25						
Collected by		Josefin Hirst						
Date/Time Received		12/05/13 12:30						
<b><u>Client Provided Field Data</u></b>								
pH		6.70						
Temperature		22.8 °C						
Conductivity		1125 umhos						
Dissolved Oxygen		0.07 mg/L						
<b><u>Inorganic, Dissolved</u></b>								
Ammonia as N	mg/L	2.6	EPA 350.1	0.20	0.047		12/13/13 11:17	5
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	12/06/13 09:25	12/11/13 08:44	1
Nitrate (as N)	mg/L	1.5	EPA 300.0	0.04	0.01		12/06/13 19:07	1
Nitrite (as N)	mg/L	0.36	EPA 300.0	0.04	0.01		12/06/13 19:07	1
Total Kjeldahl Nitrogen	mg/L	6.0	EPA 351.2	0.20	0.050	12/09/13 16:46	12/16/13 15:01	5
Nitrate+Nitrite (N)	mg/L	1.9	EPA 300.0	0.08	0.02		12/06/13 19:07	1
Lab filtration for diss. analytes							12/05/13 14:25	

Sample Description **BHS2-SULFUR-3**  
 Matrix **Wastewater**  
 SAL Sample Number **1313004-14**  
 Date/Time Collected **12/05/13 09:20**  
 Collected by **Josefin Hirst**  
 Date/Time Received **12/05/13 12:30**

**Client Provided Field Data**

pH 6.47  
 Temperature 23.3 °C  
 Conductivity 1194 umhos  
 Dissolved Oxygen 0.11 mg/L

**Inorganics**

Ammonia as N	mg/L	3.2	EPA 350.1	0.20	0.047		12/09/13 16:29	5
Nitrate (as N)	mg/L	0.04	EPA 300.0	0.04	0.01		12/06/13 20:13	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 20:13	1
Sulfate	mg/L	180	EPA 300.0	6.0	2.0		12/19/13 07:04	10
Total Kjeldahl Nitrogen	mg/L	4.9	EPA 351.2	0.20	0.05	12/05/13 16:48	12/09/13 16:12	5
Nitrate+Nitrite (N)	mg/L	0.04 I	EPA 300.0	0.08	0.02		12/06/13 20:13	1



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**December 26, 2013**  
**Work Order: 1313004**

## Laboratory Report

Project Name		B-HS2 SE#7						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-SULFUR-7						
Matrix		Wastewater						
SAL Sample Number		1313004-15						
Date/Time Collected		12/05/13 09:10						
Collected by		Josefin Hirst						
Date/Time Received		12/05/13 12:30						
<b><u>Client Provided Field Data</u></b>								
pH		6.45						
Temperature		23.1 °C						
Conductivity		1216 umhos						
Dissolved Oxygen		0.13 mg/L						
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	3.2	EPA 350.1	0.20	0.047		12/09/13 16:30	5
Nitrate (as N)	mg/L	0.05	EPA 300.0	0.04	0.01		12/06/13 20:22	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 20:22	1
Sulfate	mg/L	200	EPA 300.0	6.0	2.0		12/19/13 07:13	10
Total Kjeldahl Nitrogen	mg/L	5.2	EPA 351.2	0.20	0.05	12/05/13 16:48	12/09/13 16:13	5
Nitrate+Nitrite (N)	mg/L	0.05 I	EPA 300.0	0.08	0.02		12/06/13 20:22	1
Sample Description		BHS2-SULFUR-12						
Matrix		Wastewater						
SAL Sample Number		1313004-16						
Date/Time Collected		12/05/13 09:00						
Collected by		Josefin Hirst						
Date/Time Received		12/05/13 12:30						
<b><u>Client Provided Field Data</u></b>								
pH		6.38						
Temperature		23.2 °C						
Conductivity		1231 umhos						
Dissolved Oxygen		0.11 mg/L						
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	2.0	EPA 350.1	0.040	0.009		12/09/13 15:42	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 20:32	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 20:32	1
Sulfate	mg/L	250	EPA 300.0	6.0	2.0		12/20/13 01:13	10
Total Kjeldahl Nitrogen	mg/L	4.9	EPA 351.2	0.20	0.05	12/05/13 16:48	12/09/13 16:14	5
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		12/06/13 20:32	1

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**December 26, 2013**  
**Work Order: 1313004**

## Laboratory Report

Project Name		B-HS2 SE#7						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-SULFUR-18						
Matrix		Wastewater						
SAL Sample Number		1313004-17						
Date/Time Collected		12/05/13 08:40						
Collected by		Josefin Hirst						
Date/Time Received		12/05/13 12:30						
<b><u>Client Provided Field Data</u></b>								
pH		6.50						
Temperature		23.3 °C						
Conductivity		1296 umhos						
Dissolved Oxygen		0.11 mg/L						
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	3.5	EPA 350.1	0.20	0.047		12/09/13 16:32	5
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 20:41	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 20:41	1
Sulfate	mg/L	240	EPA 300.0	6.0	2.0		12/20/13 02:18	10
Total Kjeldahl Nitrogen	mg/L	5.3	EPA 351.2	0.20	0.05	12/05/13 16:48	12/09/13 16:16	5
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		12/06/13 20:41	1
Sample Description		BHS2-ST2						
Matrix		Wastewater						
SAL Sample Number		1313004-18						
Date/Time Collected		12/05/13 08:20						
Collected by		Josefin Hirst						
Date/Time Received		12/05/13 12:30						
<b><u>Client Provided Field Data</u></b>								
pH		6.27						
Temperature		22.6 °C						
Conductivity		1250 umhos						
Dissolved Oxygen		0.07 mg/L						
<b><u>Inorganics</u></b>								
Hydrogen Sulfide (Unionized)	mg/L	5.7	SM 4550SF	0.04	0.01		12/10/13 11:00	1
Ammonia as N	mg/L	2.7	EPA 350.1	0.080	0.019		12/06/13 12:49	2
Carbonaceous BOD	mg/L	42	SM 5210B	2	2	12/06/13 09:00	12/11/13 08:44	1
Chemical Oxygen Demand	mg/L	100	EPA 410.4	25	10	12/09/13 13:30	12/09/13 17:00	1
Chloride	mg/L	43	EPA 300.0	2.0	0.50		12/20/13 02:28	10
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 20:50	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 20:50	1
Orthophosphate as P	mg/L	1.7	EPA 300.0	0.040	0.010		12/06/13 20:50	1
Phosphorous - Total as P	mg/L	3.3	SM 4500P-E	0.080	0.020	12/05/13 14:28	12/10/13 14:48	2
Sulfate	mg/L	320	EPA 300.0	6.0	2.0		12/20/13 02:28	10
Sulfide	mg/L	6.8	SM 4500SF	0.40	0.10		12/10/13 11:00	1
Total Alkalinity	mg/L	330	SM 2320B	8.0	2.0		12/09/13 14:48	1

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## Laboratory Report

Project Name		B-HS2 SE#7						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-ST2						
Matrix		Wastewater						
SAL Sample Number		1313004-18						
Date/Time Collected		12/05/13 08:20						
Collected by		Josefin Hirst						
Date/Time Received		12/05/13 12:30						
<u>Client Provided Field Data</u>								
pH		6.27						
Temperature		22.6 °C						
Conductivity		1250 umhos						
Dissolved Oxygen		0.07 mg/L						
Total Kjeldahl Nitrogen	mg/L	4.5	EPA 351.2	0.20	0.05	12/05/13 16:46	12/09/13 13:22	9.62
Total Organic Carbon	mg/L	17	SM 5310B	1.0	0.060		12/09/13 10:53	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	12/09/13 12:03	12/11/13 11:44	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	12/09/13 12:03	12/11/13 11:44	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		12/06/13 20:50	1
<u>Microbiology</u>								
E. Coli	MPN/100 mL	9,600	SM 9223B	2.0	2.0	12/05/13 13:33	12/06/13 10:02	1
Fecal Coliforms	CFU/100 ml	20,000	SM 9222D	1	1	12/05/13 13:31	12/06/13 12:53	1
Sample Description		BHS2-ST2-FILTERED						
Matrix		Wastewater						
SAL Sample Number		1313004-19						
Date/Time Collected		12/05/13 08:20						
Collected by		Josefin Hirst						
Date/Time Received		12/05/13 12:30						
<u>Client Provided Field Data</u>								
pH		6.27						
Temperature		22.6 °C						
Conductivity		1250 umhos						
Dissolved Oxygen		0.07 mg/L						
<u>Inorganics</u>								
Sulfate	mg/L	250	EPA 300.0	6.0	2.0		12/20/13 02:37	10
<u>Inorganic, Dissolved</u>								
Ammonia as N	mg/L	3.7	EPA 350.1	0.20	0.047		12/13/13 11:18	5
Carbonaceous BOD	mg/L	34	SM 5210B	2	2	12/06/13 09:25	12/11/13 08:44	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 21:00	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 21:00	1
Total Kjeldahl Nitrogen	mg/L	6.7	EPA 351.2	0.20	0.050	12/09/13 16:46	12/16/13 15:02	5
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		12/06/13 21:00	1
Lab filtration for diss. analytes							12/05/13 14:25	

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## Laboratory Report

Project Name		B-HS2 SE#7						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-EB						
Matrix		Reagent Water						
SAL Sample Number		1313004-20						
Date/Time Collected		12/05/13 11:00						
Collected by		Josefin Hirst						
Date/Time Received		12/05/13 12:30						
<b><u>Client Provided Field Data</u></b>								
pH		6.87						
Temperature		27.5 °C						
Conductivity		3.06 umhos						
Dissolved Oxygen		9.90 mg/L						
<b><u>Inorganics</u></b>								
Hydrogen Sulfide (Unionized)	mg/L	0.01 U	SM 4550SF	0.04	0.01		12/10/13 11:00	1
Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		12/06/13 12:51	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	12/07/13 09:00	12/12/13 08:41	1
Chemical Oxygen Demand	mg/L	10 U	EPA 410.4	25	10	12/09/13 13:30	12/09/13 17:00	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 21:09	1
Nitrite (as N)	mg/L	0.01 I	EPA 300.0	0.04	0.01		12/06/13 21:09	1
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		12/06/13 21:09	1
Phosphorous - Total as P	mg/L	0.010 U	SM 4500P-E	0.040	0.010	12/05/13 14:28	12/10/13 14:29	1
Sulfate	mg/L	1.6	EPA 300.0	0.60	0.20		12/06/13 21:09	1
Sulfide	mg/L	0.10 U	SM 4500SF	0.40	0.10		12/10/13 11:00	1
Total Alkalinity	mg/L	2.0 U	SM 2320B	8.0	2.0		12/09/13 14:56	1
Total Kjeldahl Nitrogen	mg/L	0.05 U	EPA 351.2	0.20	0.05	12/05/13 16:46	12/09/13 12:00	1
Total Organic Carbon	mg/L	0.11 I	SM 5310B	1.0	0.060		12/09/13 10:53	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	12/09/13 12:03	12/11/13 11:44	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	12/09/13 12:03	12/11/13 11:44	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		12/06/13 21:09	1
<b><u>Microbiology</u></b>								
E. Coli	MPN/100 mL	2.0 U	SM 9223B	2.0	2.0	12/05/13 13:33	12/06/13 10:02	1
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	12/05/13 13:31	12/06/13 12:53	1

Sample Description **BHS2-RECIRC**  
 Matrix **Wastewater**  
 SAL Sample Number **1313004-21**  
 Date/Time Collected **12/05/13 10:25**  
 Collected by **Josefin Hirst**  
 Date/Time Received **12/05/13 12:30**

**Client Provided Field Data**

pH 6.87  
 Temperature 24.5 °C  
 Conductivity 1292 umhos  
 Dissolved Oxygen 0.06 mg/L

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**December 26, 2013**  
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## Laboratory Report

Project Name		B-HS2 SE#7						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-RECIRC						
Matrix		Wastewater						
SAL Sample Number		1313004-21						
Date/Time Collected		12/05/13 10:25						
Collected by		Josefin Hirst						
Date/Time Received		12/05/13 12:30						
<b><u>Client Provided Field Data</u></b>								
pH		6.87						
Temperature		24.5 °C						
Conductivity		1292 umhos						
Dissolved Oxygen		0.06 mg/L						
<b><u>Inorganics</u></b>								
Hydrogen Sulfide (Unionized)	mg/L	41	SM 4550SF	0.04	0.01		12/10/13 11:00	1
Ammonia as N	mg/L	35	EPA 350.1	0.80	0.19		12/06/13 14:27	20
Carbonaceous BOD	mg/L	130	SM 5210B	2	2	12/07/13 09:00	12/12/13 08:41	1
Chemical Oxygen Demand	mg/L	230	EPA 410.4	25	10	12/12/13 09:53	12/13/13 10:09	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 21:19	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		12/06/13 21:19	1
Orthophosphate as P	mg/L	1.6	EPA 300.0	0.040	0.010		12/06/13 21:19	1
Phosphorous - Total as P	mg/L	4.7	SM 4500P-E	0.20	0.050	12/05/13 14:28	12/10/13 15:11	5
Sulfate	mg/L	18	EPA 300.0	0.60	0.20		12/06/13 21:19	1
Sulfide	mg/L	74	SM 4500SF	0.40	0.10		12/10/13 11:00	1
Total Alkalinity	mg/L	530	SM 2320B	8.0	2.0		12/09/13 15:07	1
Total Kjeldahl Nitrogen	mg/L	48	EPA 351.2	0.20	0.05	12/05/13 16:46	12/09/13 12:01	20.83
Total Organic Carbon	mg/L	53	SM 5310B	1.0	0.060		12/09/13 10:53	1
Total Suspended Solids	mg/L	10	SM 2540D	1	1	12/09/13 12:03	12/11/13 11:44	1
Volatile Suspended Solids	mg/L	9	EPA 160.4	1	1	12/09/13 12:03	12/11/13 11:44	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		12/06/13 21:19	1
<b><u>Microbiology</u></b>								
E. Coli	MPN/100 mL	240,000	SM 9223B	2.0	2.0	12/05/13 13:33	12/06/13 10:02	1
Fecal Coliforms	CFU/100 ml	311,000	SM 9222D	1	1	12/05/13 13:31	12/06/13 12:53	1



# SOUTHERN ANALYTICAL LABORATORIES, INC.

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December 26, 2013  
Work Order: 1313004

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BL30525 - Digestion for TP by EPA 365.2/SM4500PE</b>										
<b>Blank (BL30525-BLK1)</b>					Prepared: 12/05/13 Analyzed: 12/10/13					
Phosphorous - Total as P	0.010 U	0.040	0.010	mg/L						
<b>LCS (BL30525-BS1)</b>					Prepared: 12/05/13 Analyzed: 12/10/13					
Phosphorous - Total as P	0.747	0.040	0.010	mg/L	0.80		93	90-110		
<b>Matrix Spike (BL30525-MS1)</b>					Source: 1312963-21 Prepared: 12/05/13 Analyzed: 12/10/13					
Phosphorous - Total as P	0.921	0.040	0.010	mg/L	1.0	ND	92	90-110		
<b>Matrix Spike (BL30525-MS2)</b>					Source: 1313004-20 Prepared: 12/05/13 Analyzed: 12/10/13					
Phosphorous - Total as P	0.970	0.040	0.010	mg/L	1.0	ND	97	90-110		
<b>Matrix Spike Dup (BL30525-MSD1)</b>					Source: 1312963-21 Prepared: 12/05/13 Analyzed: 12/10/13					
Phosphorous - Total as P	0.924	0.040	0.010	mg/L	1.0	ND	92	90-110	0.3	25
<b>Matrix Spike Dup (BL30525-MSD2)</b>					Source: 1313004-20 Prepared: 12/05/13 Analyzed: 12/10/13					
Phosphorous - Total as P	0.961	0.040	0.010	mg/L	1.0	ND	96	90-110	0.9	25
<b>Batch BL30527 - VSS Prep</b>										
<b>Blank (BL30527-BLK1)</b>					Prepared: 12/05/13 Analyzed: 12/10/13					
Volatile Suspended Solids	1 U	1		mg/L						
Total Suspended Solids	1 U	1	1	mg/L						
<b>LCS (BL30527-BS1)</b>					Prepared: 12/05/13 Analyzed: 12/10/13					
Total Suspended Solids	51.0	1	1	mg/L	50		102	85-115		
<b>Duplicate (BL30527-DUP1)</b>					Source: 1312963-01 Prepared: 12/05/13 Analyzed: 12/10/13					
Volatile Suspended Solids	51.0	1		mg/L		55.0			8	20
Total Suspended Solids	57.0	1	1	mg/L		61.0			7	30

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December 26, 2013  
Work Order: 1313004

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BL30533 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BL30533-BLK1)</b>					Prepared & Analyzed: 12/06/13					
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						
Orthophosphate as P	0.010 U	0.040	0.010	mg/L						
Surrogate: Dichloroacetate	1.15			mg/L	1.0		115	90-115		
Surrogate: Dichloroacetate	1.15			mg/L	1.0		115	90-115		
Surrogate: Dichloroacetate	1.15			mg/L	1.0		115	90-115		
Surrogate: Dichloroacetate	1.15			mg/L	1.0		115	90-115		
<b>LCS (BL30533-BS1)</b>					Prepared & Analyzed: 12/06/13					
Sulfate	8.58	0.60	0.20	mg/L	9.0		95	85-115		
Nitrate (as N)	1.74	0.04	0.01	mg/L	1.7		102	85-115		
Nitrite (as N)	1.43	0.04	0.01	mg/L	1.4		102	85-115		
Orthophosphate as P	0.815	0.040	0.010	mg/L	0.90		91	85-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
<b>LCS Dup (BL30533-BSD1)</b>					Prepared & Analyzed: 12/06/13					
Sulfate	8.48	0.60	0.20	mg/L	9.0		94	85-115	1	200
Nitrite (as N)	1.49	0.04	0.01	mg/L	1.4		106	85-115	4	200
Nitrate (as N)	1.75	0.04	0.01	mg/L	1.7		103	85-115	1	200
Orthophosphate as P	0.858	0.040	0.010	mg/L	0.90		95	85-115	5	200
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		

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December 26, 2013  
Work Order: 1313004

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BL30533 - Ion Chromatography 300.0 Prep</b>										
<b>Matrix Spike (BL30533-MS1)</b>		<b>Source: 1313004-01</b>			Prepared & Analyzed: 12/06/13					
Nitrite (as N)	1.50	0.04	0.01	mg/L	1.4	ND	108	85-115		
Orthophosphate as P	2.99	0.040	0.010	mg/L	0.90	2.10	99	85-115		
Sulfate	57.8	0.60	0.20	mg/L	9.0	49.1	97	85-115		
Nitrate (as N)	1.65	0.04	0.01	mg/L	1.7	0.0350	95	85-115		
Surrogate: Dichloroacetate	1.05			mg/L	1.0		105	90-115		
Surrogate: Dichloroacetate	1.05			mg/L	1.0		105	90-115		
Surrogate: Dichloroacetate	1.05			mg/L	1.0		105	90-115		
Surrogate: Dichloroacetate	1.05			mg/L	1.0		105	90-115		
<b>Batch BL30536 - Ammonia by SEAL</b>										
<b>Blank (BL30536-BLK1)</b>		Prepared & Analyzed: 12/06/13								
Ammonia as N	0.009 U	0.040	0.009	mg/L						
<b>LCS (BL30536-BS1)</b>		Prepared & Analyzed: 12/06/13								
Ammonia as N	0.51	0.040	0.009	mg/L	0.50		102	90-110		
<b>Matrix Spike (BL30536-MS1)</b>		<b>Source: 1313004-20</b>			Prepared & Analyzed: 12/06/13					
Ammonia as N	0.50	0.040	0.009	mg/L	0.50	ND	100	90-110		
<b>Matrix Spike (BL30536-MS2)</b>		<b>Source: 1312963-21</b>			Prepared & Analyzed: 12/06/13					
Ammonia as N	0.49	0.040	0.009	mg/L	0.50	ND	98	90-110		
<b>Matrix Spike Dup (BL30536-MSD1)</b>		<b>Source: 1313004-20</b>			Prepared & Analyzed: 12/06/13					
Ammonia as N	0.50	0.040	0.009	mg/L	0.50	ND	100	90-110	0.5	10
<b>Matrix Spike Dup (BL30536-MSD2)</b>		<b>Source: 1312963-21</b>			Prepared & Analyzed: 12/06/13					
Ammonia as N	0.49	0.040	0.009	mg/L	0.50	ND	99	90-110	0.4	10

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110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 813-855-1844 FAX 813-855-2218



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

December 26, 2013  
Work Order: 1313004

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BL30538 - Digestion for TKN by EPA 351.2</b>										
<b>Blank (BL30538-BLK1)</b>					Prepared: 12/05/13 Analyzed: 12/09/13					
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
<b>LCS (BL30538-BS1)</b>					Prepared: 12/05/13 Analyzed: 12/09/13					
Total Kjeldahl Nitrogen	2.41	0.20	0.05	mg/L	2.5		95	90-110		
<b>Matrix Spike (BL30538-MS1)</b>					Source: 1313019-07 Prepared: 12/05/13 Analyzed: 12/09/13					
Total Kjeldahl Nitrogen	2.88	0.20	0.05	mg/L	2.5	0.582	91	90-110		
<b>Matrix Spike (BL30538-MS2)</b>					Source: 1312989-02 Prepared: 12/05/13 Analyzed: 12/09/13					
Total Kjeldahl Nitrogen	3.13	0.20	0.05	mg/L	2.5	0.630	98	90-110		
<b>Matrix Spike Dup (BL30538-MSD1)</b>					Source: 1313019-07 Prepared: 12/05/13 Analyzed: 12/09/13					
Total Kjeldahl Nitrogen	3.11	0.20	0.05	mg/L	2.5	0.582	100	90-110	7	20
<b>Matrix Spike Dup (BL30538-MSD2)</b>					Source: 1312989-02 Prepared: 12/05/13 Analyzed: 12/09/13					
Total Kjeldahl Nitrogen	3.11	0.20	0.05	mg/L	2.5	0.630	98	90-110	0.5	20
<b>Batch BL30540 - Digestion for TKN by EPA 351.2</b>										
<b>Blank (BL30540-BLK1)</b>					Prepared: 12/05/13 Analyzed: 12/09/13					
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
<b>LCS (BL30540-BS1)</b>					Prepared: 12/05/13 Analyzed: 12/09/13					
Total Kjeldahl Nitrogen	2.50	0.20	0.05	mg/L	2.5		99	90-110		
<b>Matrix Spike (BL30540-MS1)</b>					Source: 1313004-17 Prepared: 12/05/13 Analyzed: 12/09/13					
Total Kjeldahl Nitrogen	8.39	0.20	0.05	mg/L	2.5	5.32	121	90-110		

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## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BL30540 - Digestion for TKN by EPA 351.2										
Matrix Spike Dup (BL30540-MSD1)		Source: 1313004-17			Prepared: 12/05/13 Analyzed: 12/09/13					
Total Kjeldahl Nitrogen	7.97	0.20	0.05	mg/L	2.5	5.32	105	90-110	5	20
Batch BL30623 - Digestion for TP by EPA 365.2/SM4500PE										
Blank (BL30623-BLK1)					Prepared: 12/06/13 Analyzed: 12/12/13					
Phosphorous - Total as P	0.010 U	0.040	0.010	mg/L						
LCS (BL30623-BS1)					Prepared: 12/06/13 Analyzed: 12/12/13					
Phosphorous - Total as P	0.860	0.040	0.010	mg/L	0.80		108	90-110		
Matrix Spike (BL30623-MS1)		Source: 1313019-07			Prepared: 12/06/13 Analyzed: 12/12/13					
Phosphorous - Total as P	1.09	0.040	0.010	mg/L	1.0	0.0431	105	90-110		
Matrix Spike (BL30623-MS2)		Source: 1313035-02			Prepared: 12/06/13 Analyzed: 12/12/13					
Phosphorous - Total as P	1.10	0.040	0.010	mg/L	1.0	0.0298	107	90-110		
Matrix Spike Dup (BL30623-MSD1)		Source: 1313019-07			Prepared: 12/06/13 Analyzed: 12/12/13					
Phosphorous - Total as P	1.13	0.040	0.010	mg/L	1.0	0.0431	108	90-110	3	25
Matrix Spike Dup (BL30623-MSD2)		Source: 1313035-02			Prepared: 12/06/13 Analyzed: 12/12/13					
Phosphorous - Total as P	1.12	0.040	0.010	mg/L	1.0	0.0298	109	90-110	2	25
Batch BL30633 - BOD										
Blank (BL30633-BLK1)					Prepared: 12/06/13 Analyzed: 12/11/13					
Carbonaceous BOD	2 U	2	2	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 BL30633 - BOD</b>										
<b>Blank (BL30633-BLK2)</b>					Prepared: 12/06/13 Analyzed: 12/11/13					
Carbonaceous BOD	2 U	2	2	mg/L						
<b>LCS (BL30633-BS1)</b>					Prepared: 12/06/13 Analyzed: 12/11/13					
Carbonaceous BOD	184	2	2	mg/L	200		92	85-115		
<b>LCS (BL30633-BS2)</b>					Prepared: 12/06/13 Analyzed: 12/11/13					
Carbonaceous BOD	188	2	2	mg/L	200		94	85-115		
<b>LCS Dup (BL30633-BSD1)</b>					Prepared: 12/06/13 Analyzed: 12/11/13					
Carbonaceous BOD	187	2	2	mg/L	200		93	85-115	1	200
<b>LCS Dup (BL30633-BSD2)</b>					Prepared: 12/06/13 Analyzed: 12/11/13					
Carbonaceous BOD	190	2	2	mg/L	200		95	85-115	1	200
<b>Duplicate (BL30633-DUP1)</b>					Source: 1312938-01 Prepared: 12/06/13 Analyzed: 12/11/13					
Carbonaceous BOD	25	2	2	mg/L		26			3	25
<b>Duplicate (BL30633-DUP2)</b>					Source: 1312989-01 Prepared: 12/06/13 Analyzed: 12/11/13					
Carbonaceous BOD	110	2	2	mg/L		110			6	25

## Batch BL30634 - Ion Chromatography 300.0 Prep

<b>Blank (BL30634-BLK1)</b>					Prepared & Analyzed: 12/06/13					
Orthophosphate as P	0.010 U	0.040	0.010	mg/L						
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Surrogate: Dichloroacetate	0.974			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	0.974			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	0.974			mg/L	1.0		97	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 BL30634 - Ion Chromatography 300.0 Prep</b>										
<b>LCS (BL30634-BS1)</b>					Prepared & Analyzed: 12/06/13					
Orthophosphate as P	0.811	0.040	0.010	mg/L	0.90		90	85-115		
Nitrite (as N)	1.46	0.04	0.01	mg/L	1.4		104	85-115		
Nitrate (as N)	1.75	0.04	0.01	mg/L	1.7		103	85-115		
Surrogate: Dichloroacetate	1.01			mg/L	1.0		101	90-115		
Surrogate: Dichloroacetate	1.01			mg/L	1.0		101	90-115		
Surrogate: Dichloroacetate	1.01			mg/L	1.0		101	90-115		
<b>LCS Dup (BL30634-BSD1)</b>					Prepared & Analyzed: 12/06/13					
Nitrate (as N)	1.74	0.04	0.01	mg/L	1.7		102	85-115	0.6	200
Nitrite (as N)	1.50	0.04	0.01	mg/L	1.4		107	85-115	3	200
Orthophosphate as P	0.815	0.040	0.010	mg/L	0.90		91	85-115	0.5	200
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		
<b>Matrix Spike (BL30634-MS1)</b>					<b>Source: 1313004-03</b>		Prepared & Analyzed: 12/06/13			
Nitrate (as N)	17.0 L	0.04	0.01	mg/L	1.7	26.2	NR	85-115		
Orthophosphate as P	3.13	0.040	0.010	mg/L	0.90	2.25	98	85-115		
Nitrite (as N)	1.94	0.04	0.01	mg/L	1.4	0.652	92	85-115		
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
<b>Matrix Spike (BL30634-MS2)</b>					<b>Source: 1313004-13</b>		Prepared & Analyzed: 12/06/13			
Nitrite (as N)	1.76	0.04	0.01	mg/L	1.4	0.363	100	85-115		
Nitrate (as N)	3.20	0.04	0.01	mg/L	1.7	1.49	101	85-115		
Orthophosphate as P	2.87	0.040	0.010	mg/L	0.90	1.94	103	85-115		
Surrogate: Dichloroacetate	0.957			mg/L	1.0		96	90-115		
Surrogate: Dichloroacetate	0.957			mg/L	1.0		96	90-115		
Surrogate: Dichloroacetate	0.957			mg/L	1.0		96	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 BL30635 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BL30635-BLK1)</b>					Prepared & Analyzed: 12/06/13					
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Sulfate	0.20 U	0.60	0.20	mg/L						
Orthophosphate as P	0.010 U	0.040	0.010	mg/L						
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Surrogate: Dichloroacetate	0.967			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	0.967			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	0.967			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	0.967			mg/L	1.0		97	90-115		
<b>LCS (BL30635-BS1)</b>					Prepared & Analyzed: 12/06/13					
Nitrate (as N)	1.75	0.04	0.01	mg/L	1.7		103	85-115		
Nitrite (as N)	1.43	0.04	0.01	mg/L	1.4		102	85-115		
Orthophosphate as P	0.812	0.040	0.010	mg/L	0.90		90	85-115		
Sulfate	8.36	0.60	0.20	mg/L	9.0		93	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		
Surrogate: Dichloroacetate	1.00			mg/L	1.0		100	90-115		
<b>LCS Dup (BL30635-BSD1)</b>					Prepared & Analyzed: 12/06/13					
Nitrite (as N)	1.47	0.04	0.01	mg/L	1.4		105	85-115	3	200
Nitrate (as N)	1.76	0.04	0.01	mg/L	1.7		103	85-115	0.2	200
Sulfate	8.50	0.60	0.20	mg/L	9.0		94	85-115	2	200
Orthophosphate as P	0.813	0.040	0.010	mg/L	0.90		90	85-115	0.1	200
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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## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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### Batch BL30635 - Ion Chromatography 300.0 Prep

Matrix Spike (BL30635-MS1)		Source: 1313027-02			Prepared & Analyzed: 12/06/13					
Orthophosphate as P	0.819	0.040	0.010	mg/L	0.90	ND	91	85-115		
Nitrite (as N)	1.42	0.04	0.01	mg/L	1.4	ND	101	85-115		
Sulfate	22.2	0.60	0.20	mg/L	9.0	14.4	86	85-115		
Nitrate (as N)	1.66	0.04	0.01	mg/L	1.7	0.0410	95	85-115		
Surrogate: Dichloroacetate	0.970			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	0.970			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	0.970			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	0.970			mg/L	1.0		97	90-115		

Matrix Spike (BL30635-MS2)		Source: 1313027-04			Prepared & Analyzed: 12/06/13					
Sulfate	25.8	0.60	0.20	mg/L	9.0	17.3	95	85-115		
Orthophosphate as P	0.976	0.040	0.010	mg/L	0.90	ND	108	85-115		
Nitrate (as N)	1.64	0.04	0.01	mg/L	1.7	ND	96	85-115		
Nitrite (as N)	1.77	0.04	0.01	mg/L	1.4	0.397	98	85-115		
Surrogate: Dichloroacetate	0.978			mg/L	1.0		98	90-115		
Surrogate: Dichloroacetate	0.978			mg/L	1.0		98	90-115		
Surrogate: Dichloroacetate	0.978			mg/L	1.0		98	90-115		
Surrogate: Dichloroacetate	0.978			mg/L	1.0		98	90-115		

### Batch BL30645 - alkalinity

Blank (BL30645-BLK1)		Prepared & Analyzed: 12/09/13								
Total Alkalinity	2.0 U	8.0	2.0	mg/L						

LCS (BL30645-BS1)		Prepared & Analyzed: 12/09/13								
Total Alkalinity	130	8.0	2.0	mg/L	120		100	90-110		

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## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BL30645 - alkalinity</b>										
<b>Matrix Spike (BL30645-MS1)</b>		<b>Source: 1313001-01</b>			Prepared & Analyzed: 12/09/13					
Total Alkalinity	290	8.0	2.0	mg/L	120	160	101	80-120		
<b>Matrix Spike Dup (BL30645-MSD1)</b>		<b>Source: 1313001-01</b>			Prepared & Analyzed: 12/09/13					
Total Alkalinity	280	8.0	2.0	mg/L	120	160	97	80-120	2	26
<b>Batch BL30702 - BOD</b>										
<b>Blank (BL30702-BLK1)</b>					Prepared: 12/07/13 Analyzed: 12/12/13					
Carbonaceous BOD	2 U	2	2	mg/L						
<b>LCS (BL30702-BS1)</b>					Prepared: 12/07/13 Analyzed: 12/12/13					
Carbonaceous BOD	191	2	2	mg/L	200		95	85-115		
<b>LCS Dup (BL30702-BSD1)</b>					Prepared: 12/07/13 Analyzed: 12/12/13					
Carbonaceous BOD	194	2	2	mg/L	200		97	85-115	2	200
<b>Duplicate (BL30702-DUP1)</b>		<b>Source: 1313065-03</b>			Prepared: 12/07/13 Analyzed: 12/12/13					
Carbonaceous BOD	140	2	2	mg/L		140			2	25
<b>Batch BL30910 - Ammonia by SEAL</b>										
<b>Blank (BL30910-BLK1)</b>					Prepared & Analyzed: 12/09/13					
Ammonia as N	0.009 U	0.040	0.009	mg/L						
<b>LCS (BL30910-BS1)</b>					Prepared & Analyzed: 12/09/13					
Ammonia as N	0.50	0.040	0.009	mg/L	0.50		100	90-110		

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Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BL30910 - Ammonia by SEAL</b>										
<b>Matrix Spike (BL30910-MS1)</b>		<b>Source: 1312994-11</b>			Prepared & Analyzed: 12/09/13					
Ammonia as N	0.53	0.040	0.009	mg/L	0.50	ND	105	90-110		
<b>Matrix Spike (BL30910-MS2)</b>		<b>Source: 1313037-07</b>			Prepared & Analyzed: 12/09/13					
Ammonia as N	0.52	0.040	0.009	mg/L	0.50	0.010	101	90-110		
<b>Matrix Spike Dup (BL30910-MSD1)</b>		<b>Source: 1312994-11</b>			Prepared & Analyzed: 12/09/13					
Ammonia as N	0.52	0.040	0.009	mg/L	0.50	ND	104	90-110	2	10
<b>Matrix Spike Dup (BL30910-MSD2)</b>		<b>Source: 1313037-07</b>			Prepared & Analyzed: 12/09/13					
Ammonia as N	0.51	0.040	0.009	mg/L	0.50	0.010	100	90-110	0.7	10
<b>Batch BL30914 - COD prep</b>										
<b>Blank (BL30914-BLK1)</b>		Prepared & Analyzed: 12/09/13								
Chemical Oxygen Demand	10 U	25	10	mg/L						
<b>LCS (BL30914-BS1)</b>		Prepared & Analyzed: 12/09/13								
Chemical Oxygen Demand	45	25	10	mg/L	50		90	90-110		
<b>Matrix Spike (BL30914-MS1)</b>		<b>Source: 1312994-11</b>			Prepared & Analyzed: 12/09/13					
Chemical Oxygen Demand	45	25	10	mg/L	50	ND	90	85-115		
<b>Matrix Spike Dup (BL30914-MSD1)</b>		<b>Source: 1312994-11</b>			Prepared & Analyzed: 12/09/13					
Chemical Oxygen Demand	48	25	10	mg/L	50	ND	96	85-115	6	32
<b>Batch BL30919 - VSS Prep</b>										
<b>Blank (BL30919-BLK1)</b>		Prepared: 12/09/13 Analyzed: 12/11/13								
Volatile Suspended Solids	1 U	1		mg/L						
Total Suspended Solids	1 U	1	1	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 BL30919 - VSS Prep</b>										
<b>LCS (BL30919-BS1)</b>					Prepared: 12/09/13 Analyzed: 12/11/13					
Total Suspended Solids	48.5	1	1	mg/L	50		97	85-115		
<b>Duplicate (BL30919-DUP1)</b>					<b>Source: 1313004-03</b>		Prepared: 12/09/13 Analyzed: 12/11/13			
Total Suspended Solids	1 U	1	1	mg/L		ND				30
Volatile Suspended Solids	1 U	1		mg/L		ND				20
<b>Batch BL30925 - Ammonia by SEAL</b>										
<b>Blank (BL30925-BLK1)</b>					Prepared & Analyzed: 12/09/13					
Ammonia as N	0.009 U	0.040	0.009	mg/L						
<b>LCS (BL30925-BS1)</b>					Prepared & Analyzed: 12/09/13					
Ammonia as N	0.51	0.040	0.009	mg/L	0.50		101	90-110		
<b>Matrix Spike (BL30925-MS1)</b>					<b>Source: 1313087-02</b>		Prepared & Analyzed: 12/09/13			
Ammonia as N	0.52	0.040	0.009	mg/L	0.50	0.019	101	90-110		
<b>Matrix Spike (BL30925-MS2)</b>					<b>Source: 1313093-07</b>		Prepared & Analyzed: 12/09/13			
Ammonia as N	0.52	0.040	0.009	mg/L	0.50	ND	104	90-110		
<b>Matrix Spike Dup (BL30925-MSD1)</b>					<b>Source: 1313087-02</b>		Prepared & Analyzed: 12/09/13			
Ammonia as N	0.52	0.040	0.009	mg/L	0.50	0.019	100	90-110	1	10
<b>Matrix Spike Dup (BL30925-MSD2)</b>					<b>Source: 1313093-07</b>		Prepared & Analyzed: 12/09/13			
Ammonia as N	0.50	0.040	0.009	mg/L	0.50	ND	99	90-110	5	10

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## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BL30929 - TOC prep</b>										
<b>Blank (BL30929-BLK1)</b>					Prepared & Analyzed: 12/09/13					
Total Organic Carbon	0.060 U	1.0	0.060	mg/L						
<b>LCS (BL30929-BS1)</b>					Prepared & Analyzed: 12/09/13					
Total Organic Carbon	10.8	1.0	0.060	mg/L	10		108	90-110		
<b>Matrix Spike (BL30929-MS1)</b>					Source: 1313027-04 Prepared & Analyzed: 12/09/13					
Total Organic Carbon	13.2	1.0	0.060	mg/L	10	3.13	101	85-115		
<b>Matrix Spike Dup (BL30929-MSD1)</b>					Source: 1313027-04 Prepared & Analyzed: 12/09/13					
Total Organic Carbon	13.4	1.0	0.060	mg/L	10	3.13	102	85-115	1	10
<b>Batch BL30934 - Digestion for TKN by EPA 351.2</b>										
<b>Blank (BL30934-BLK1)</b>					Prepared: 12/09/13 Analyzed: 12/11/13					
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
<b>LCS (BL30934-BS1)</b>					Prepared: 12/09/13 Analyzed: 12/11/13					
Total Kjeldahl Nitrogen	2.32	0.20	0.05	mg/L	2.5		92	90-110		
<b>Matrix Spike (BL30934-MS1)</b>					Source: 1313093-07 Prepared: 12/09/13 Analyzed: 12/11/13					
Total Kjeldahl Nitrogen	2.77	0.20	0.05	mg/L	2.5	0.367	95	90-110		
<b>Matrix Spike (BL30934-MS2)</b>					Source: 1313106-02 Prepared: 12/09/13 Analyzed: 12/11/13					
Total Kjeldahl Nitrogen	2.65	0.20	0.05	mg/L	2.5	0.364	90	90-110		
<b>Matrix Spike Dup (BL30934-MSD1)</b>					Source: 1313093-07 Prepared: 12/09/13 Analyzed: 12/11/13					
Total Kjeldahl Nitrogen	2.91	0.20	0.05	mg/L	2.5	0.367	101	90-110	5	20

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December 26, 2013  
Work Order: 1313004

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BL30934 - Digestion for TKN by EPA 351.2										
Matrix Spike Dup (BL30934-MSD2)		Source: 1313106-02			Prepared: 12/09/13 Analyzed: 12/11/13					
Total Kjeldahl Nitrogen	2.70	0.20	0.05	mg/L	2.5	0.364	92	90-110	2	20
Batch BL31007 - COD prep										
Blank (BL31007-BLK1)					Prepared: 12/12/13 Analyzed: 12/13/13					
Chemical Oxygen Demand	10 U	25	10	mg/L						
LCS (BL31007-BS1)					Prepared: 12/12/13 Analyzed: 12/13/13					
Chemical Oxygen Demand	45	25	10	mg/L	50		90	90-110		
Matrix Spike (BL31007-MS1)		Source: 1313259-02			Prepared: 12/12/13 Analyzed: 12/13/13					
Chemical Oxygen Demand	58	25	10	mg/L	50	13	90	85-115		
Matrix Spike Dup (BL31007-MSD1)		Source: 1313259-02			Prepared: 12/12/13 Analyzed: 12/13/13					
Chemical Oxygen Demand	58	25	10	mg/L	50	13	90	85-115	0	32
Batch BL31028 - Sulfide prep										
Blank (BL31028-BLK1)					Prepared & Analyzed: 12/10/13					
Sulfide	0.10 U	0.40	0.10	mg/L						
Blank (BL31028-BLK2)					Prepared & Analyzed: 12/10/13					
Sulfide	0.10 U	0.40	0.10	mg/L						
LCS (BL31028-BS1)					Prepared & Analyzed: 12/10/13					
Sulfide	4.92	0.40	0.10	mg/L	5.0		98	85-115		

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December 26, 2013  
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## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BL31028 - Sulfide prep</b>										
<b>LCS (BL31028-BS2)</b>					Prepared & Analyzed: 12/10/13					
Sulfide	4.71	0.40	0.10	mg/L	5.0		94	85-115		
<b>Matrix Spike (BL31028-MS1)</b>					Source: 1313000-01 Prepared & Analyzed: 12/10/13					
Sulfide	4.51	0.40	0.10	mg/L	5.0	ND	90	85-115		
<b>Matrix Spike (BL31028-MS2)</b>					Source: 1313004-20 Prepared & Analyzed: 12/10/13					
Sulfide	4.92	0.40	0.10	mg/L	5.0	ND	98	85-115		
<b>Matrix Spike Dup (BL31028-MSD1)</b>					Source: 1313000-01 Prepared & Analyzed: 12/10/13					
Sulfide	4.71	0.40	0.10	mg/L	5.0	ND	94	85-115	4	14
<b>Matrix Spike Dup (BL31028-MSD2)</b>					Source: 1313004-20 Prepared & Analyzed: 12/10/13					
Sulfide	4.71	0.40	0.10	mg/L	5.0	ND	94	85-115	4	14
<b>Batch BL31130 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BL31130-BLK1)</b>					Prepared & Analyzed: 12/11/13					
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Sulfate	0.20 U	0.60	0.20	mg/L						
Surrogate: Dichloroacetate	1.15			mg/L	1.0		115	90-115		
Surrogate: Dichloroacetate	1.15			mg/L	1.0		115	90-115		
<b>LCS (BL31130-BS1)</b>					Prepared & Analyzed: 12/11/13					
Sulfate	9.44	0.60	0.20	mg/L	9.0		105	85-115		
Nitrate (as N)	1.86	0.04	0.01	mg/L	1.7		109	85-115		
Surrogate: Dichloroacetate	1.15			mg/L	1.0		115	90-115		
Surrogate: Dichloroacetate	1.15			mg/L	1.0		115	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 BL31130 - Ion Chromatography 300.0 Prep</b>										
<b>LCS Dup (BL31130-BSD1)</b>					Prepared & Analyzed: 12/11/13					
Nitrate (as N)	1.86	0.04	0.01	mg/L	1.7		110	85-115	0.3	200
Sulfate	9.43	0.60	0.20	mg/L	9.0		105	85-115	0.1	200
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
<b>Matrix Spike (BL31130-MS1)</b>					<b>Source: 1313254-01</b>		Prepared & Analyzed: 12/17/13			
Sulfate	43.9	0.60	0.20	mg/L	9.0	34.6	103	85-115		
Nitrate (as N)	1.65	0.04	0.01	mg/L	1.7	0.0410	94	85-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
<b>Matrix Spike (BL31130-MS2)</b>					<b>Source: 1313235-04</b>		Prepared & Analyzed: 12/11/13			
Sulfate	90.0 L	0.60	0.20	mg/L	9.0	88.2	20	85-115		
Nitrate (as N)	2.12	0.04	0.01	mg/L	1.7	0.256	110	85-115		
Surrogate: Dichloroacetate	1.15			mg/L	1.0		115	90-115		
Surrogate: Dichloroacetate	1.15			mg/L	1.0		115	90-115		
<b>Batch BL31301 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BL31301-BLK1)</b>					Prepared & Analyzed: 12/13/13					
Sulfate	0.20 U	0.60	0.20	mg/L						
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						
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		

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Work Order: 1313004

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BL31301 - Ion Chromatography 300.0 Prep</b>										
<b>LCS (BL31301-BS1)</b>					Prepared & Analyzed: 12/13/13					
Orthophosphate as P	0.821	0.040	0.010	mg/L	0.90		91	85-115		
Nitrate (as N)	1.77	0.04	0.01	mg/L	1.7		104	85-115		
Nitrite (as N)	1.52	0.04	0.01	mg/L	1.4		109	85-115		
Sulfate	9.22	0.60	0.20	mg/L	9.0		102	85-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
<b>LCS Dup (BL31301-BS1)</b>					Prepared & Analyzed: 12/13/13					
Nitrate (as N)	1.75	0.04	0.01	mg/L	1.7		103	85-115	0.9	200
Orthophosphate as P	0.870	0.040	0.010	mg/L	0.90		97	85-115	6	200
Sulfate	9.15	0.60	0.20	mg/L	9.0		102	85-115	0.7	200
Nitrite (as N)	1.53	0.04	0.01	mg/L	1.4		109	85-115	0.4	200
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		
Surrogate: Dichloroacetate	1.09			mg/L	1.0		109	90-115		
<b>Matrix Spike (BL31301-MS1)</b>					Source: 1313349-01 Prepared & Analyzed: 12/13/13					
Nitrate (as N)	2.79	0.04	0.01	mg/L	1.7	0.879	112	85-115		
Sulfate	21.5	0.60	0.20	mg/L	9.0	13.0	95	85-115		
Nitrite (as N)	1.46	0.04	0.01	mg/L	1.4	ND	104	85-115		
Orthophosphate as P	5.51	0.040	0.010	mg/L	0.90	4.67	94	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		
Surrogate: Dichloroacetate	1.07			mg/L	1.0		107	90-115		



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December 26, 2013  
Work Order: 1313004

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BL31301 - Ion Chromatography 300.0 Prep</b>										
<b>Matrix Spike (BL31301-MS2)</b>		<b>Source: 1313348-01</b>			Prepared & Analyzed: 12/13/13					
Orthophosphate as P	3.75	0.040	0.010	mg/L	0.90	2.78	108	85-115		
Sulfate	17.2	0.60	0.20	mg/L	9.0	7.96	102	85-115		
Nitrate (as N)	1.83	0.04	0.01	mg/L	1.7	0.263	92	85-115		
Nitrite (as N)	1.41	0.04	0.01	mg/L	1.4	ND	101	85-115		
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		
Surrogate: Dichloroacetate	1.04			mg/L	1.0		104	90-115		
<b>Batch BL31821 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BL31821-BLK1)</b>		Prepared & Analyzed: 12/19/13								
Sulfate	0.20 U	0.60	0.20	mg/L						
Surrogate: Dichloroacetate	0.966			mg/L	1.0		97	90-115		
<b>LCS (BL31821-BS1)</b>		Prepared & Analyzed: 12/19/13								
Sulfate	8.92	0.60	0.20	mg/L	9.0		99	85-115		
Surrogate: Dichloroacetate	0.968			mg/L	1.0		97	90-115		
<b>LCS Dup (BL31821-BSD1)</b>		Prepared & Analyzed: 12/19/13								
Sulfate	8.75	0.60	0.20	mg/L	9.0		97	85-115	2	200
Surrogate: Dichloroacetate	0.956			mg/L	1.0		96	90-115		
<b>Matrix Spike (BL31821-MS1)</b>		<b>Source: 1310895-04</b>			Prepared & Analyzed: 12/19/13					
Sulfate	87.3	6.0	2.0	mg/L	90	5.72	91	85-115		
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	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 BL31821 - Ion Chromatography 300.0 Prep</b>										
<b>Matrix Spike (BL31821-MS2)</b>		<b>Source: 1313004-15</b>			Prepared & Analyzed: 12/19/13					
Sulfate	282	6.0	2.0	mg/L	90	198	93	85-115		
Surrogate: Dichloroacetate	0.978			mg/L	1.0		98	90-115		
<b>Batch BL31911 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BL31911-BLK1)</b>		Prepared & Analyzed: 12/19/13								
Sulfate	0.20 U	0.60	0.20	mg/L						
Surrogate: Dichloroacetate	1.10			mg/L	1.0		110	90-115		
<b>LCS (BL31911-BS1)</b>		Prepared & Analyzed: 12/20/13								
Sulfate	9.42	0.60	0.20	mg/L	9.0		105	85-115		
Surrogate: Dichloroacetate	1.13			mg/L	1.0		113	90-115		
<b>LCS Dup (BL31911-BSD1)</b>		Prepared & Analyzed: 12/21/13								
Sulfate	9.04	0.60	0.20	mg/L	9.0		100	85-115	4	200
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
<b>Matrix Spike (BL31911-MS1)</b>		<b>Source: 1313556-01</b>			Prepared & Analyzed: 12/19/13					
Sulfate	28.0	0.60	0.20	mg/L	9.0	18.9	102	85-115		
Surrogate: Dichloroacetate	1.13			mg/L	1.0		113	90-115		
<b>Matrix Spike (BL31911-MS2)</b>		<b>Source: 1313004-16</b>			Prepared & Analyzed: 12/20/13					
Nitrite (as N)	14.7	0.40	0.10	mg/L	14	0.638	101	85-115		
Sulfate	338	6.0	2.0	mg/L	90	249	99	85-115		
Nitrate (as N)	17.6	0.40	0.10	mg/L	17	0.986	98	85-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	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 BL31912 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BL31912-BLK1)</b>					Prepared & Analyzed: 12/20/13					
Chloride	0.050 U	0.20	0.050	mg/L						
Sulfate	0.20 U	0.60	0.20	mg/L						
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
<b>LCS (BL31912-BS1)</b>					Prepared & Analyzed: 12/20/13					
Chloride	3.11	0.20	0.050	mg/L	3.0		104	85-115		
Sulfate	9.24	0.60	0.20	mg/L	9.0		103	85-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
<b>LCS Dup (BL31912-BSD1)</b>					Prepared & Analyzed: 12/20/13					
Chloride	3.11	0.20	0.050	mg/L	3.0		104	85-115	0.2	200
Sulfate	9.24	0.60	0.20	mg/L	9.0		103	85-115	0.08	200
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
<b>Matrix Spike (BL31912-MS1)</b>					<b>Source: 1313322-03</b>		Prepared & Analyzed: 12/20/13			
Chloride	129	2.0	0.50	mg/L	30	98.2	102	80-120		
Sulfate	173	6.0	2.0	mg/L	90	71.4	113	85-115		
Surrogate: Dichloroacetate	1.10			mg/L	1.0		110	90-115		
Surrogate: Dichloroacetate	1.10			mg/L	1.0		110	90-115		
<b>Matrix Spike (BL31912-MS2)</b>					<b>Source: 1313052-01</b>		Prepared & Analyzed: 12/20/13			
Sulfate	10,700	600	200	mg/L	9000	1350	104	85-115		
Chloride	8,950	200	50	mg/L	3000	5680	109	80-120		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	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 BL32004 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BL32004-BLK1)</b>					Prepared & Analyzed: 12/21/13					
Sulfate	0.20 U	0.60	0.20	mg/L						
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
<b>LCS (BL32004-BS1)</b>					Prepared & Analyzed: 12/21/13					
Sulfate	9.27	0.60	0.20	mg/L	9.0		103	85-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
<b>LCS Dup (BL32004-BSD1)</b>					Prepared & Analyzed: 12/21/13					
Sulfate	9.20	0.60	0.20	mg/L	9.0		102	85-115	0.7	200
Surrogate: Dichloroacetate	1.05			mg/L	1.0		105	90-115		
<b>Matrix Spike (BL32004-MS1)</b>					<b>Source: 1313004-07</b>		Prepared & Analyzed: 12/21/13			
Sulfate	302	6.0	2.0	mg/L	90	205	108	85-115		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
<b>Matrix Spike (BL32004-MS2)</b>					<b>Source: 1313310-01</b>		Prepared & Analyzed: 12/21/13			
Sulfate	109	6.0	2.0	mg/L	90	13.3	106	85-115		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		

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## Inorganic, Dissolved - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BL30634 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BL30634-BLK1)</b>					Prepared & Analyzed: 12/06/13					
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Surrogate: Dichloroacetate	0.974			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	0.974			mg/L	1.0		97	90-115		
<b>LCS (BL30634-BS1)</b>					Prepared & Analyzed: 12/06/13					
Nitrite (as N)	1.46	0.04	0.01	mg/L	1.4		104	85-115		
Nitrate (as N)	1.75	0.04	0.01	mg/L	1.7		103	85-115		
Surrogate: Dichloroacetate	1.01			mg/L	1.0		101	90-115		
Surrogate: Dichloroacetate	1.01			mg/L	1.0		101	90-115		
<b>LCS Dup (BL30634-BSD1)</b>					Prepared & Analyzed: 12/06/13					
Nitrite (as N)	1.50	0.04	0.01	mg/L	1.4		107	85-115	3	200
Nitrate (as N)	1.74	0.04	0.01	mg/L	1.7		102	85-115	0.6	200
Surrogate: Dichloroacetate	1.00			mg/L	1.0		100	90-115		
Surrogate: Dichloroacetate	1.00			mg/L	1.0		100	90-115		
<b>Matrix Spike (BL30634-MS1)</b>					<b>Source: 1313004-03</b>		Prepared & Analyzed: 12/06/13			
Nitrite (as N)	1.94	0.04	0.01	mg/L	1.4	0.652	92	85-115		
Nitrate (as N)	17.0 L	0.04	0.01	mg/L	1.7	25.8	NR	85-115		
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
<b>Matrix Spike (BL30634-MS2)</b>					<b>Source: 1313004-13</b>		Prepared & Analyzed: 12/06/13			
Nitrate (as N)	3.20	0.04	0.01	mg/L	1.7	1.49	101	85-115		
Nitrite (as N)	1.76	0.04	0.01	mg/L	1.4	0.363	100	85-115		
Surrogate: Dichloroacetate	0.957			mg/L	1.0		96	90-115		
Surrogate: Dichloroacetate	0.957			mg/L	1.0		96	90-115		

# SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 813-855-1844 FAX 813-855-2218



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

December 26, 2013  
Work Order: 1313004

## Inorganic, Dissolved - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BL30635 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BL30635-BLK1)</b>					Prepared & Analyzed: 12/06/13					
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Surrogate: Dichloroacetate	0.967			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	0.967			mg/L	1.0		97	90-115		
<b>LCS (BL30635-BS1)</b>					Prepared & Analyzed: 12/06/13					
Nitrate (as N)	1.75	0.04	0.01	mg/L	1.7		103	85-115		
Nitrite (as N)	1.43	0.04	0.01	mg/L	1.4		102	85-115		
Surrogate: Dichloroacetate	1.00			mg/L	1.0		100	90-115		
Surrogate: Dichloroacetate	1.00			mg/L	1.0		100	90-115		
<b>LCS Dup (BL30635-BSD1)</b>					Prepared & Analyzed: 12/06/13					
Nitrate (as N)	1.76	0.04	0.01	mg/L	1.7		103	85-115	0.2	200
Nitrite (as N)	1.47	0.04	0.01	mg/L	1.4		105	85-115	3	200
Surrogate: Dichloroacetate	1.02			mg/L	1.0		102	90-115		
Surrogate: Dichloroacetate	1.02			mg/L	1.0		102	90-115		
<b>Matrix Spike (BL30635-MS1)</b>					<b>Source: 1313027-02</b>		Prepared & Analyzed: 12/06/13			
Nitrite (as N)	1.42	0.04	0.01	mg/L	1.4	ND	101	85-115		
Nitrate (as N)	1.66	0.04	0.01	mg/L	1.7	0.0410	95	85-115		
Surrogate: Dichloroacetate	0.970			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	0.970			mg/L	1.0		97	90-115		
<b>Matrix Spike (BL30635-MS2)</b>					<b>Source: 1313027-04</b>		Prepared & Analyzed: 12/06/13			
Nitrate (as N)	1.64	0.04	0.01	mg/L	1.7	ND	96	85-115		
Nitrite (as N)	1.77	0.04	0.01	mg/L	1.4	0.397	98	85-115		
Surrogate: Dichloroacetate	0.978			mg/L	1.0		98	90-115		
Surrogate: Dichloroacetate	0.978			mg/L	1.0		98	90-115		



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

December 26, 2013  
Work Order: 1313004

## Inorganic, Dissolved - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BL30636 - BOD Dissolved</b>										
<b>Blank (BL30636-BLK1)</b>					Prepared: 12/06/13 Analyzed: 12/11/13					
Carbonaceous BOD	2 U	2	2	mg/L						
<b>LCS (BL30636-BS1)</b>					Prepared: 12/06/13 Analyzed: 12/11/13					
Carbonaceous BOD	188	2	2	mg/L	200		94	85-115		
<b>LCS Dup (BL30636-BSD1)</b>					Prepared: 12/06/13 Analyzed: 12/11/13					
Carbonaceous BOD	190	2	2	mg/L	200		95	85-115	1	200
<b>Duplicate (BL30636-DUP1)</b>					Source: 1312963-02 Prepared: 12/06/13 Analyzed: 12/11/13					
Carbonaceous BOD	89	2	2	mg/L		91			2	25
<b>Batch BL30935 - Digestion for TKN by EPA 351.2</b>										
<b>Blank (BL30935-BLK1)</b>					Prepared: 12/09/13 Analyzed: 12/16/13					
Total Kjeldahl Nitrogen	0.050 U	0.20	0.050	mg/L						
<b>LCS (BL30935-BS1)</b>					Prepared: 12/09/13 Analyzed: 12/16/13					
Total Kjeldahl Nitrogen	2.59	0.20	0.050	mg/L	2.5		102	90-110		
<b>Matrix Spike (BL30935-MS1)</b>					Source: 1312816-14 Prepared: 12/09/13 Analyzed: 12/16/13					
Total Kjeldahl Nitrogen	4.55	0.20	0.050	mg/L	2.5	1.94	103	90-110		
<b>Matrix Spike (BL30935-MS2)</b>					Source: 1312964-10 Prepared: 12/09/13 Analyzed: 12/16/13					
Total Kjeldahl Nitrogen	4.54	0.20	0.050	mg/L	2.5	2.02	99	90-110		
<b>Matrix Spike Dup (BL30935-MSD1)</b>					Source: 1312816-14 Prepared: 12/09/13 Analyzed: 12/16/13					
Total Kjeldahl Nitrogen	4.68	0.20	0.050	mg/L	2.5	1.94	108	90-110	3	20

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**December 26, 2013**  
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**Inorganic, Dissolved - Quality Control**

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BL30935 - Digestion for TKN by EPA 351.2										
Matrix Spike Dup (BL30935-MSD2)		Source: 1312964-10			Prepared: 12/09/13 Analyzed: 12/16/13					
Total Kjeldahl Nitrogen	4.77	0.20	0.050	mg/L	2.5	2.02	109	90-110	5	20
Batch BL31305 - Ammonia by SEAL										
Blank (BL31305-BLK1)					Prepared & Analyzed: 12/13/13					
Ammonia as N	0.009 U	0.040	0.009	mg/L						
LCS (BL31305-BS1)					Prepared & Analyzed: 12/13/13					
Ammonia as N	0.47	0.040	0.009	mg/L	0.50		94	90-110		
Matrix Spike (BL31305-MS1)		Source: 1312964-10			Prepared & Analyzed: 12/13/13					
Ammonia as N	1.2	0.040	0.009	mg/L	0.50	0.74	91	90-110		
Matrix Spike (BL31305-MS2)		Source: 1312816-10			Prepared & Analyzed: 12/13/13					
Ammonia as N	1.4	0.040	0.009	mg/L	0.50	0.91	99	90-110		
Matrix Spike Dup (BL31305-MSD1)		Source: 1312964-10			Prepared & Analyzed: 12/13/13					
Ammonia as N	1.2	0.040	0.009	mg/L	0.50	0.74	97	90-110	2	10
Matrix Spike Dup (BL31305-MSD2)		Source: 1312816-10			Prepared & Analyzed: 12/13/13					
Ammonia as N	1.4	0.040	0.009	mg/L	0.50	0.91	98	90-110	0.3	10

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Tampa, FL 33619

December 26, 2013  
Work Order: 1313004

## Microbiology - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BL30521 - FC-MF</b>										
<b>Blank (BL30521-BLK1)</b>					Prepared: 12/05/13 Analyzed: 12/06/13					
Fecal Coliforms	1 U	1	1	CFU/100 ml						
<b>Duplicate (BL30521-DUP1)</b>					<b>Source: 1312991-02</b> Prepared: 12/05/13 Analyzed: 12/06/13					
Fecal Coliforms	1 U	1	1	CFU/100 ml		ND				200

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

**December 26, 2013**  
**Work Order: 1313004**

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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

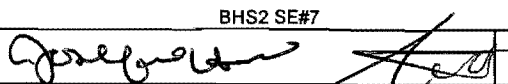
Kathryn@southernanalyticalabs.com



## SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 813-855-1844 fax 813-855-2218

SAL Project No. 1313004

Client Name Hazan and Sawyer										Contact / Phone: Josefin Hirst 813-630-4498									
Project Name / Location BHS2 SE#7																			
Samplers: (Signature) 										PARAMETER / CONTAINER DESCRIPTION									
Matrix Codes: DW-Drinking Water WW-Wastewater SW-Surface Water 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	1LP, Cool Total Alkalinity, TSS, VSS, CBOD, NOx, OP, SO <sub>4</sub>	125mLP, H <sub>2</sub> SO <sub>4</sub> COD, TKN, NH <sub>3</sub> , TP	500mLP, NaOH & Zn Acetate H <sub>2</sub> S	40mLaV, HCl TOC	1LP, Cool Dissolved-Filter in lab (CBOD, TKN, NH <sub>3</sub> , NOx)	1LP, Cool Total Alkalinity, TSS, VSS, CBOD, NOx, OP	125mLP, H <sub>2</sub> SO <sub>4</sub> TKN, NH <sub>3</sub>	DO mg/L 500mLP, Cool NOx	pH	Temperature	Conductivity
	01	BHS2-STE	12/5/13	10:45	WW		X	4	1	1	1	2				0.03	7.0	25.7	1248
	02	BHS2-STE-FILTERED		10:45	WW		X						1			0.03	7.0	25.7	1248
	03	BHS2-ST1		9:50	WW		X	4		1		2		1		3.83	6.54	23.9	1197
	04	BHS2-ST1-DUP		9:55	WW		X	4		1		2		1		3.83	6.54	23.9	1197
	05	BHS2-ST1-FILTERED		9:50	WW		X						1			3.83	6.54	23.9	1197
	06	BHS2-LIGNO-36		09:40	WW		X								1	0.17 1	6.55	23.7	1180
	07	BHS2-LIGNO-30		09:30	WW		X								1	0.15 1	6.61	23.7	1177
	08	BHS2-LIGNO-24		09:20	WW		X								1	0.12 1	6.66	23.8	1154
	09	BHS2-LIGNO-18		9:09	WW		X								1	0.10 1	6.66	23.4	1127
	10	BHS2-LIGNO-12		8:54	WW		X								1	0.13 1	6.65	23.4	1129
	11	BHS2-LIGNO-6		8:42	WW		X								1	0.14 1	6.67	23.3	1126
	12	BHS2-LIGNO-0		8:25	WW		X	4	1	1	1	2				0.07 1	6.70	22.8	1125
Containers Prepared/Relinquished:		Date/Time:	Received:		Date/Time:		Seal intact?		<input checked="" type="radio"/> N N/A		Instructions / Remarks								
Relinquished:		Date/Time:	Received:		Date/Time:		Samples intact upon arrival?		<input checked="" type="radio"/> N N/A										
Relinquished:		Date/Time:	Received:		Date/Time:		Received on ice? Temp		<input checked="" type="radio"/> N N/A										
Relinquished:		Date/Time:	Received:		Date/Time:		Proper preservatives indicated?		<input checked="" type="radio"/> N N/A										
Relinquished:		Date/Time:	Received:		Date/Time:		Rec'd w/in holding time?		<input checked="" type="radio"/> N N/A										
Relinquished:		Date/Time:	Received:		Date/Time:		Volatiles rec'd w/out headspace		<input checked="" type="radio"/> N N/A										
Relinquished:		Date/Time:	Received:		Date/Time:		Proper containers used?		<input checked="" type="radio"/> N N/A										

## SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 813-855-1844 fax 813-855-2218

SAL Project No. 1313004

Client Name Hazan and Sawyer										Contact / Phone: Josefin Hirst 813-630-4498									
Project Name / Location BHS2 SE#7																			
Samplers: (Signature) <i>Josefin Hirst</i>										PARAMETER / CONTAINER DESCRIPTION									
Matrix Codes: DW-Drinking Water WW-Wastewater SW-Surface Water 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	1LP, Cool Total Alkalinity, TSS, VSS, CBOD, NOx, OP, SO <sub>4</sub>	125mLP, H <sub>2</sub> SO <sub>4</sub> COD, TKN, NH <sub>3</sub> , TP	500mLP, NaOH & Zn Acetate H <sub>2</sub> S	40mLaV, HCl TOC	1LP, Cool Dissolved-Filter in lab (CBOD, TKN, NH <sub>3</sub> , NOx)	1LP, Cool Total Alkalinity, TSS, VSS, CBOD, NOx, OP	125mLP, H <sub>2</sub> SO <sub>4</sub> TKN, NH <sub>3</sub>	1LP, Cool Dissolved-Filter in lab (CBOD, TKN, NH <sub>3</sub> , NOx, SO <sub>4</sub> )	500mLP, Cool NOx, SO <sub>4</sub>	pH	Temperature	Conductivity
SAL Use Only	Sample No.																		
	13	BHS2-LIGNO-0-FILTERED	12/5/13	8:25	WW	X						1				0.07	6.70	22.8	1125
	14	BHS2-SULFUR-3		9:20	WW	X								1		0.11	6.47	23.3	1194
	15	BHS2-SULFUR-7		9:10	WW	X								1		0.13	6.45	23.1	1216
	16	BHS2-SULFUR-12		9:00	WW	X								1		0.11	6.38	23.2	1231
	17	BHS2-SULFUR-18		8:40	WW	X								1		0.11	6.50	23.3	1296
	18	BHS2-ST2		8:20	WW	X	4	1	1	1	2	please add chloride to this sample				0.07	6.27	22.6	1250
	19	BHS2-ST2-FILTERED		8:20	WW	X								1		0.07	6.27	22.6	1250
	20	BHS2-EB		11:00	R	X	4	1	1	1	2					9.90	6.87	27.5	3.06
	21	BHS2-RECIRC		10:25	WW	X	4	1	1	1	2					0.06	6.87	24.5	1272
Containers Prepared/Relinquished:		Date/Time:	Received:		Date/Time:		Seal intact?		0 N NA		Instructions / Remarks								
Relinquished:		Date/Time:	Received:		Date/Time:		Samples intact upon arrival?		0 N NA										
Relinquished:		Date/Time:	Received:		Date/Time:		Received on ice? Temp		0 N NA										
Relinquished:		Date/Time:	Received:		Date/Time:		Proper preservatives indicated?		0 N NA										
Relinquished:		Date/Time:	Received:		Date/Time:		Rec'd w/ in holding time?		0 N NA										
Relinquished:		Date/Time:	Received:		Date/Time:		Volatiles rec'd w/ out headspace		Y N NA										
Relinquished:		Date/Time:	Received:		Date/Time:		Proper containers used?		0 N NA										

Chain of Custody  
Rev. Date 11/18/01

Chain of Custody





## Appendix B: Operation & Maintenance Log

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

Date	Description
7/31/12	Existing system evaluation performed. Septic tank was pumped out.
8/15/2012	Local DOH performed site evaluation
9/10/2012	System construction started
9/25/2012	System start-up
9/27/2012	Globe valves were set at 3.5:1 recirculation ratio
10/5/2012	Tanks full
10/11/2012	Preliminary sample event 1
10/23/2012	Preliminary sample event 2
10/30/2012	Preliminary sample event 3. Low level in pump tank.
11/7/2012	Very high level in pump tank.
	Pulled float tree up (reset floats), and pump immediately came on.
11/13/2012	Water level below top float in pump tank
12/3/2012	Sample Event No. 1
12/21/2012	Very high level in pump tank.
	Pulled float tree up (reset floats), and pump immediately came on.
12/22/2012	Very high level in pump tank. Audio alarm came on and was reset.
1/3/2013	Water level below top float in pump tank
	Re-positioned floats and zip-tied wires to tree.
1/10/2013	Very high level in pump tank.
	Pulled float tree up (reset floats), and pump immediately came on.
1/11/2013	Water level below top float in pump tank
1/15/2013	Low level in pump tank
1/16/2013	Floats not registering in panel
	Pulled float tree up (reset floats)
1/17/2013	Moved bottom float down
	Re-wrapped wires and checked lights in panel, floats registered.
2/5/2013	Sample Event No. 2
2/27/2013	Site visit. Cleaned out leaves from DBOX.
4/16/2013	Sample Event No. 3
5/29/2013	Site visit.

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**Table B.1 (continued)**  
**Operation and Maintenance Log**

6/4/2013	Sample Event No. 4
7/8/2013	System check
8/7/2013	Sample Event No. 5
	Revised recirculation mode of operation to Stage 1 biofilter spray nozzles
	Cleaned STE effluent screen
9/3/2013	System check
	Recirculation ratio still at 3:1
9/6/2013	System check
	Recirculation ratio still at 3:1
9/24/2013	System check
	Recirculation ratio still at 3:1
10/7/2013	Sample Event No. 6
	Recirculation ratio still at 3:1
10/24/2013	System check
11/27/2013	System check
	Recirculation ratio still at 3:1
12/3/2013	System check
12/5/2013	Sample Event No. 7



## Appendix C: Vericomm PLC Data

System Status			12/5/2013	11/27/2013	11/16/2013	10/31/2013
Point	Description	Status	Value	Value	Value	Value
1	Alarm Status	Automatic	OK	OK	OK	OK
2	Alert Status	Automatic	OK	OK	OK	OK
3	System Mode	Automatic	Normal	Normal	Normal	Normal
5	Timer Mode	Automatic	Normal	Normal	Override	Override
6	Active Off Time	Automatic	58.8 Minutes	58.8 Minutes	15.0 Minutes	15.0 Minutes
7	Active On Time	Automatic	1.2 Minutes	1.2 Minutes	1.2 Minutes	1.2 Minutes
9	Pump Mode	Automatic	OffCycl	OffCycl	OffCycl	OffCycl
10	Pump Status	Automatic	Off	Off	Off	Off
12	Pump Cycles Today	Automatic	9.0 Cycles	9.0 Cycles	11.0 Cycles	10.0 Cycles
13	Override Cycles Today	Automatic	0.0 Cycles	0.0 Cycles	5.0 Cycles	5.0 Cycles
14	Pump Run Time Today	Automatic	10.9 Minutes	10.9 Minutes	11.6 Minutes	10.1 Minutes
Settings						
Point	Description	Status	Value	Value	Value	Value
17	Off Cycle Time	Constant/Setpoint	58.8 Minutes	58.8 Minutes	58.8 Minutes	58.8 Minutes
18	On Cycle Time	Constant/Setpoint	1.2 Minutes	1.2 Minutes	1.2 Minutes	1.2 Minutes
19	Override Off Cycle Time	Constant/Setpoint	15.0 Minutes	15.0 Minutes	15.0 Minutes	15.0 Minutes
20	Override On Cycle Time	Constant/Setpoint	2.0 Minutes	2.0 Minutes	1.2 Minutes	1.2 Minutes
21	Minimum Override Cycles	Automatic	3.0 Cycles	3.0 Cycles	3.0 Cycles	3.0 Cycles
23	Override Cycle Limit per Day	Automatic	10.0 Cycles	10.0 Cycles	10.0 Cycles	10.0 Cycles
24	Time Limit per Day	Constant/Setpoint	40.0 Minutes	40.0 Minutes	40.0 Minutes	40.0 Minutes
25	High Level Pump Test	Automatic	2.0 Minutes	2.0 Minutes	2.0 Minutes	2.0 Minutes
28	Alarm Update Interval	Automatic	120.0 Minutes	120.0 Minutes	120.0 Minutes	240.0 Minutes
29	Page Delay	Automatic	960.0 Minutes	960.0 Minutes	960.0 Minutes	960.0 Minutes
30	Page Interval	Automatic	30.0 Minutes	30.0 Minutes	30.0 Minutes	30.0 Minutes
31	Local Alarm Delay	Constant/Setpoint	1140.0 Minutes	1140.0 Minutes	1140.0 Minutes	1140.0 Minutes
32	Local Reactivate Delay	Automatic	120.0 Minutes	120.0 Minutes	120.0 Minutes	120.0 Minutes
Troubleshooting						
Point	Description	Status	Value	Value	Value	Value
33	Top Float Status	Automatic	OK	OK	OK	OK
34	Middle Float Status	Automatic	OK	OK	OK	OK
35	Bottom Float Status	Automatic	OK	OK	OK	OK
37	Contactor Status	Automatic	OK	OK	OK	OK
38	Pump Status	Automatic	OK	OK	OK	OK
40	Filter Status	Automatic	OK	OK	OK	OK
41	Tank Status	Automatic	OK	OK	OK	OK
43	Power Status	Automatic	OK	OK	OK	OK
Flow Data						
Point	Description	Status	Value	Value	Value	Value
49	Pump Run Time Today	Automatic	10.9 Minutes	10.9 Minutes	11.6 Minutes	10.1 Minutes
50	Override Cycles Today	Automatic	0	0	5	5
51	Pump Cycles Today	Automatic	9.0 Cycles	9.0 Cycles	11.0 Cycles	10.0 Cycles
52	Average Run Time per Cycle Today	Automatic	1.2 Minutes	1.2 Minutes	1.1 Minutes	1.0 Minutes
54	Brownouts Today	Automatic	0	0	0	0

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			12/5/2013	11/27/2013	11/16/2013	10/31/2013
<b>30-Day History Data</b>						
Point	Description	Status	Value	Value	Value	Value
65	30 Day Average Run Time per Day	Automatic	29.1 Minutes	23.2 Minutes	20.8 Minutes	18.3 Minutes
66	30 Day Average Override Cycles per Day	Automatic	4.8 Cycles	2.6 Cycles	1.2 Cycles	1.1 Cycles
67	30 Day Average Cycles per Day	Automatic	22.8 Cycles	20.3 Cycles	18.4 Cycles	16.6 Cycles
68	30 Day Average Run Time per Cycle	Automatic	1.3 Minutes	1.1 Minutes	1.1 Minutes	1.1 Minutes
71	30 Day Total Pump Run Time	Automatic	874.0 Minutes	697.0 Minutes	625.1 Minutes	549.8 Minutes
72	30 Day Total Override Cycles	Automatic	145.0 Cycles	78.0 Cycles	37.0 Cycles	34.0 Cycles
73	30 Day Total Cycles	Automatic	683.0 Cycles	608.0 Cycles	551.0 Cycles	497.0 Cycles
76	30 Day Total Brownouts	Automatic	0	0	0	0
<b>Totalized Pump Data</b>						
Point	Description	Status	Value	Value	Value	Value
82	Pump Total Run Time	Automatic	172.5 Hours	166.4 Hours	161.9 Hours	156.0 Hours
83	Pump Total Cycles	Automatic	8919.0 Cycles	8677.0 Cycles	8441.0 Cycles	8135.0 Cycles
<b>Miscellaneous</b>						
Point	Description	Status	Value	Value	Value	Value
145	Pump On Auto	Automatic	Off	Off	Off	Off
147	Pump Test Today	Automatic	Off	Off	On	On
148	Pump Check Enable	Automatic	Off	Off	Off	Off
149	Total Override Cycles	Automatic	0	0	1	1
150	High Level Condition	Automatic	Off	Off	Off	Off
151	Leak Check Enable	Automatic	On	On	On	On
152	Brownout State	Automatic	Off	Off	Off	Off
153	Test Mode	Automatic	Off	Off	Off	Off
<b>Alarm Points</b>						
Point	Description	Status	Value	Value	Value	Value
161	General Alarm	Automatic	Off	Off	Off	Off
162	New Alarm	Automatic	Off	Off	Off	Off
163	Update Central Enable	Automatic	On	On	On	On
167	Page Alarm Start	Automatic	Off	Off	Off	Off
168	Pager Signal	Override Off	Off	Off	Off	Off
169	Local Alarm Start	Automatic	Off	Off	Off	Off
170	Local Alarm Silence	Automatic	Off	Off	Off	Off
<b>Inputs &amp; Outputs</b>						
Point	Description	Status	Value	Value	Value	Value
177	High Level/Override Timer Float Input	Automatic	Off	Off	Off	Off
178	Timer Float Input	Automatic	On	On	On	On
179	Redundant Off Float & Low Level Alarm Input	Automatic	On	On	On	On
181	Push To Silence Input	Automatic	Off	Off	Off	Off
182	Auxiliary Contact Input	Automatic	Off	Off	Off	Off
186	Pump Output	Automatic	Off	Off	Off	Off
188	Alarm Light Output	Automatic	Off	Off	Off	Off
189	Audible Alarm Output	Automatic	Off	Off	Off	Off

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