



Florida Onsite Sewage Nitrogen Reduction Strategies Study

Task B.7

B-HS2 Field System Monitoring Report No. 5

Progress Report

August 2013

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Environmental Engineers & Scientists

In association with:



AET
Applied Environmental Technology

**Otis Environmental
Consultants, LLC**

Florida Onsite Sewage Nitrogen Reduction Strategies Study

TASK B.7 PROGRESS REPORT

B-HS2 Field System Monitoring Report No. 5

Prepared for:

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Bureau of Environmental Health
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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. 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 fifth 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 fifth B-HS2 monitoring and sampling event conducted on August 7, 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 gallon concrete pump tank; and 1,500 gallon two chamber concrete Stage 2 saturated

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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.[™] bundles).

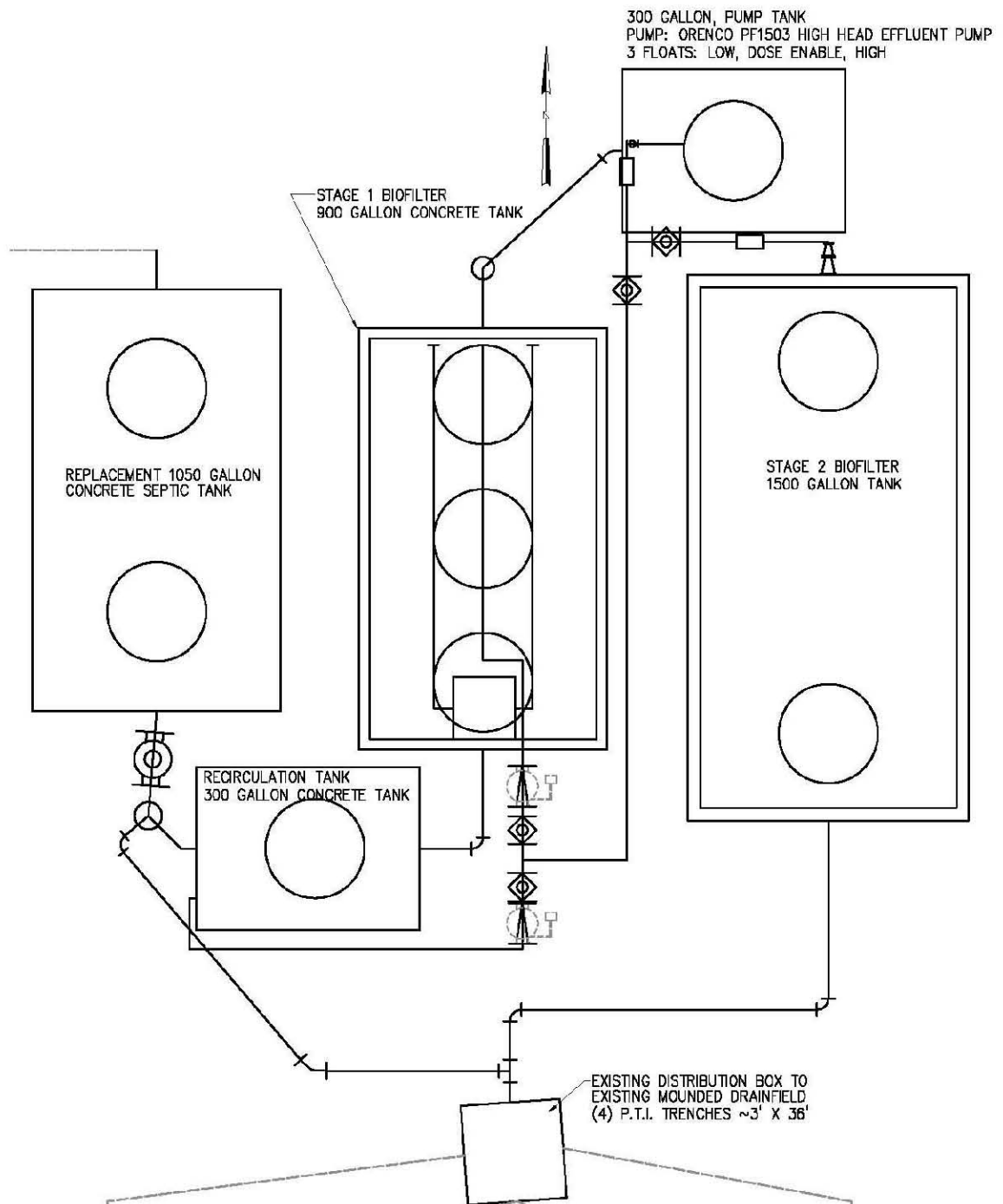


Figure 1
B-HS2 System Schematic

August 2013

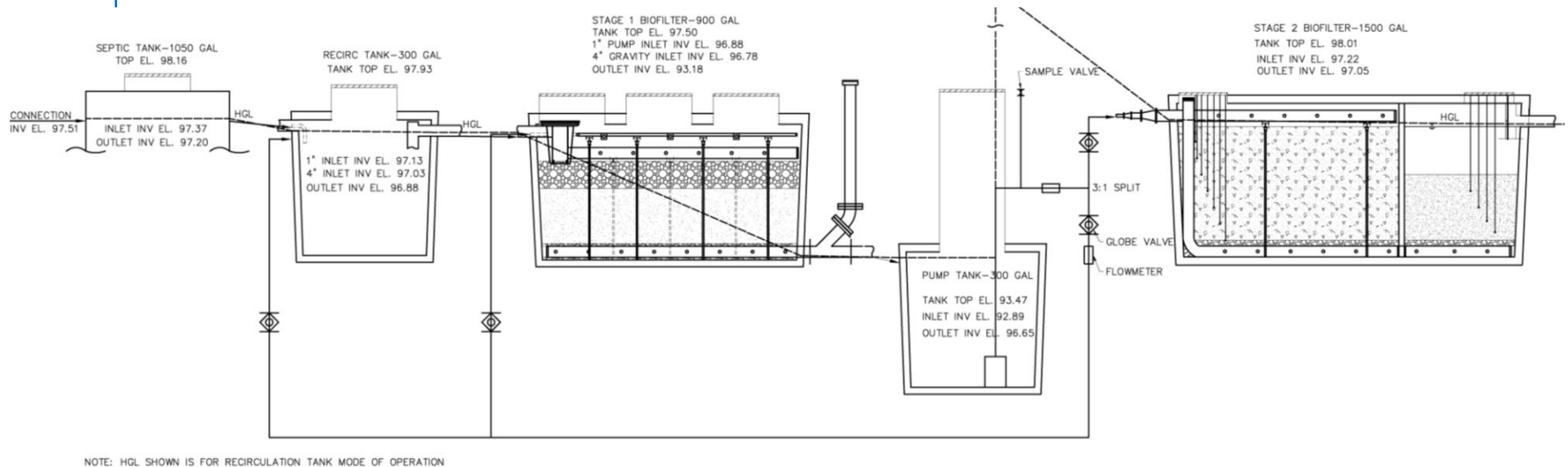


Figure 2
Flow Schematic of B-HS2 PNRS installed in Hillsborough County

3.2 Monitoring and Sample Locations and Identification

The five primary monitoring points for this sample event are shown in Figure 3. Household wastewater enters the 1st 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; it represents the influent to the remainder of the onsite nitrogen reduction system.

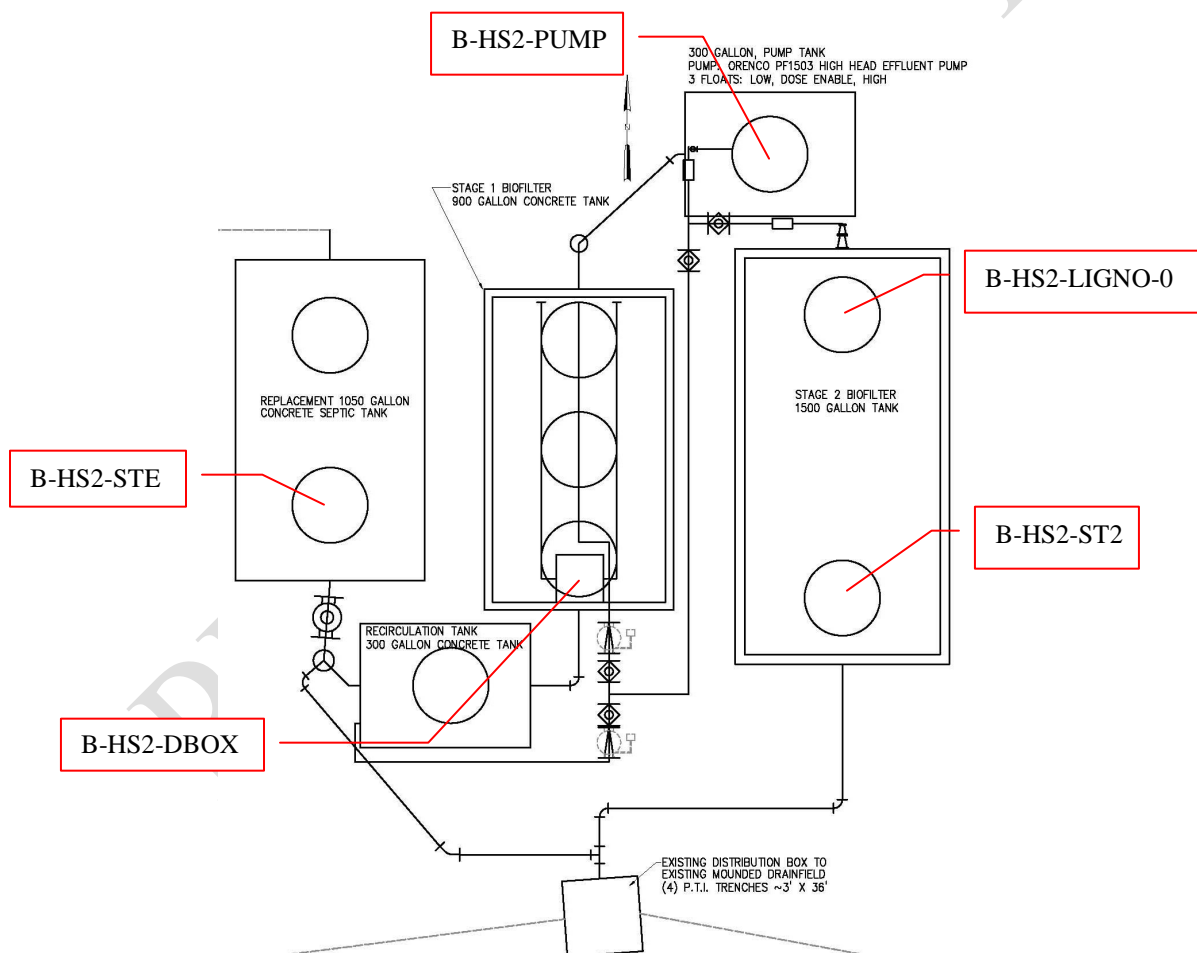


Figure 3
B-HS2 Sample and Monitoring Locations

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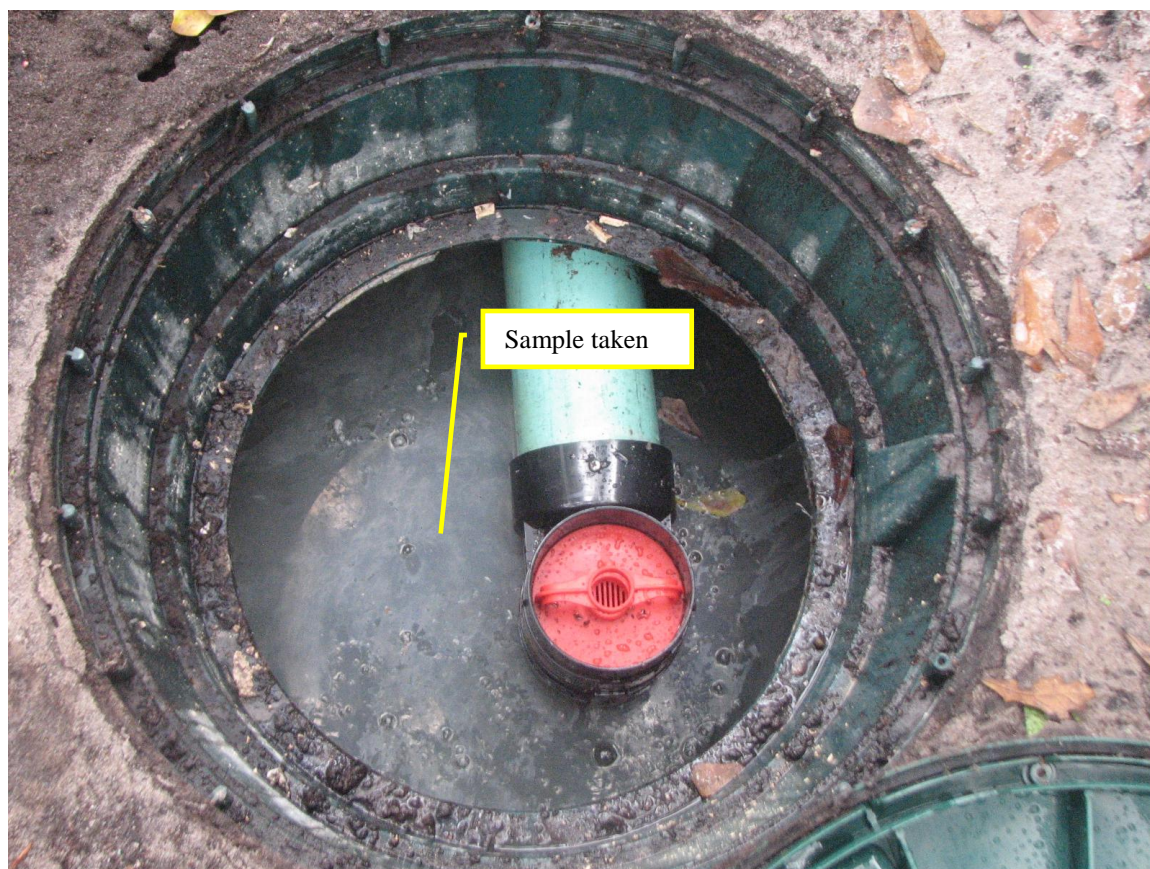


Figure 4
Second chamber of Primary Tank (B-HS2-STE sample)

The recirculation tank contents are discharged by gravity to a distribution box, located inside the Stage 1 biofilter, which splits the flow between two perforated distribution pipes along the top of the unsaturated Stage 1 biofilter media. The second primary sampling point (B-HS2-DBOX) is taken approximately 6 inches below the surface of the distribution box (Figure 5), which contains a mixture of primary effluent (STE) and recirculated effluent from the Stage 1 biofilter. 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 sampling point is a sample port on the pump discharge line (B-HS2-PUMP) and represents the Stage 1 biofilter effluent (Figure 6).

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Figure 5
Distribution Box within Stage 1 Unsaturated Biofilter (B-HS2-DBOX sample)



Figure 6
Pump discharge line sample port (B-HS2-PUMP 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 is currently being 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. 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 drivepoint samplers are positioned at 6-inch increments for vertical profiling throughout the lignocellulosic media. The fourth primary sampling point is a stainless steel drivepoint 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 7).

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 drivepoint 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 soil infiltration system, or drainfield (Figure 8).



Figure 7
First chamber of Stage 2 biofilter (B-HS2-LIGNO-0" sample)



Figure 8
Second chamber of Stage 2 biofilter (B-HS2-ST2 sample)

3.3 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 fifth formal sampling event, the water meter for the house and the treatment system flow meters were read and recorded on August 7, 2013 (Experimental Day 316). 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.

3.4 Energy Consumption

Energy consumption was monitored using an electrical meter installed between the main power box for the house and the control panel. The electrical meter records the cumulative power usage of the system in kilowatt-hours. The power usage of the system is primarily due to the single 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.

3.5 Water Quality Sample Collection and Analyses

A full suite of influent, intermediate and effluent water quality samples from the system were collected for the fifth formal sample event on August 7, 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 (EB) and tap water (TAP) samples were 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. One tap water sample was collected by filling sample containers with tap water from a hose bib near the system.

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 laboratories (Southern Analytical Laboratory and Benchmark EnviroAnalytical Inc.). Table 1 lists the analytical parameters, analytical methods, and detection limits for laboratory analyses.

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

Analytical Parameter	Method of Analysis	Method Detection Limit (mg/L)
Total Alkalinity as CaCO ₃	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 ₃ -N)	EPA 350.1	0.005 mg/L
Nitrate Nitrogen (NO ₃ -N)	EPA 300.0	0.01 mg/L
Nitrite Nitrogen (NO ₂ -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 ₅)	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	EPA1603	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 Vericom 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.

Table 2
Summary of Household Water Use

Date	Cumulative Volume (gallons)	Average Daily Household Flow, 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
Total average start-up to 8/7/13		107

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
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
Total average start-up to 8/7/13		508.1		112.5	395.5	3.52:1

The two throttling globe valves control the fraction of Stage 1 effluent that is recirculated and the fraction sent to the Stage 2 biofilter. The globe valves were initially set so that 3.5 parts went back to the recirculation tank and 1 part went to the Stage 2 tank (3.5:1 recycle ratio). From start-up to August 7, 2013, the household flow average was 107 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) was 508.1 gallons per day, and the average forward flow to the Stage 2 biofilter was 112.5 gallons per day. Therefore, the average recirculation flow was 395.5 gallons per day, with a corresponding average recirculation ratio of 3.52:1.

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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)
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
Total average start-up to 6/4/13		0.31	0.0027

The total average electrical use through August 7, 2013 was 0.31 kWh per day. The average electrical use per gallon treated was 0.0027 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 11. Water quality analytical results for Sample Event No. 5 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.

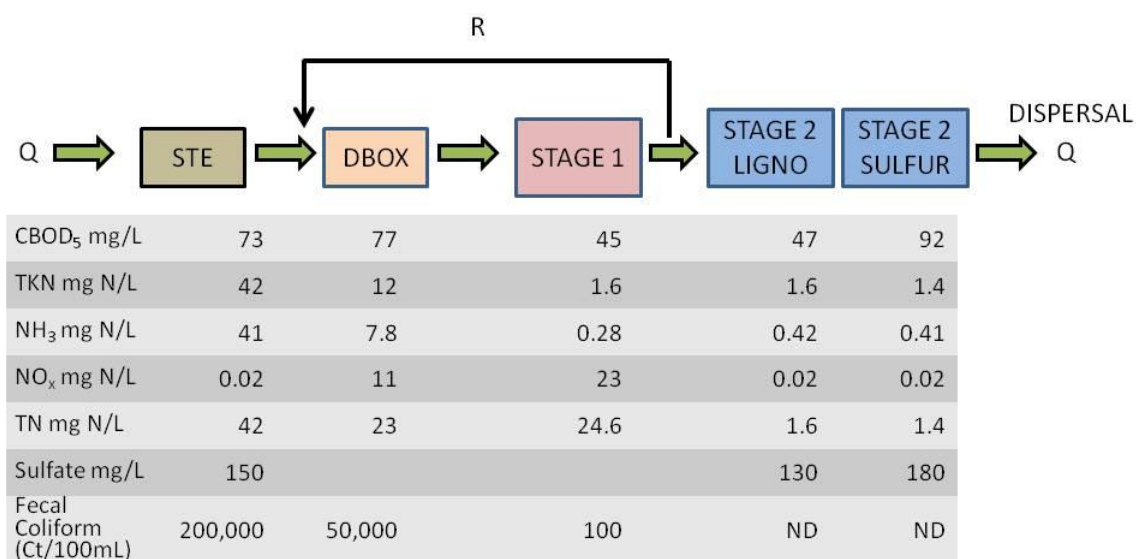


Figure 11
Graphical Representation of Nitrogen Results

Septic Tank Effluent (STE) Quality: The water quality characteristics of STE collected in Sample Event 5 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.

DBOX and Stage 1 Effluent (DBOX and Pump): The DBOX and Stage 1 effluent $\text{NH}_3\text{-N}$ levels were 7.8 mg/L and 0.28 mg/L, respectively with a DO level at 2.01 mg/L in the Stage 1 effluent (Table 5). The DBOX TSS and CBOD₅ were 19 mg/L and 77 mg/L, re-

spectively. The Stage 1 effluent TSS concentration was 7 mg/L, and CBOD₅ was 45 mg/L. The DBOX NO_x-N was 11 mg/L, and the Stage 1 effluent NO_x-N was 23 mg/L. These results indicate significant pre-denitrification (approximately 41% reduction of STE nitrogen) was occurring as the effluent was recirculated back into the recirculation tank. The Stage 1 biofilter showed fairly complete nitrification with an effluent NH₃-N concentration of 0.28 mg/L and TKN of 1.6 mg/L.

Stage 2 Biofilter Effluent (LIGNO-0" and ST2): Effluent NO_x-N from the Stage 2 biofilter monitoring point was below the method detection limit of 0.02 mg/L. The low NO_x-N was accompanied by a measured 0.15 mg/L DO and -372 mV ORP. The lignocellulosic media effluent NO_x-N was also below the method detection limit. The Stage 2 system produced a highly reducing environment and achieved essentially complete NO_x-N reduction. Final total nitrogen (TN) in the treatment system effluent was 1.4 mg/L. Increases in CBOD₅ and TN have been reported previously for lignocellulosic denitrification during start-up, and it will be interesting to track these results as the system matures. The Stage 2 biofilter lignocellulosic media effluent CBOD₅ was 47 mg/L and the sulfur media effluent was 92 mg/L. It is anticipated that the CBOD₅ concentration will decrease over time. The Stage 2 effluent sulfate concentration was 180 mg/L, which was approximately 30 mg/L higher than the STE.

As previously discussed in Section 3.2, Sample Event 5 also included Stage 2 biofilter profile samples. As depicted in Figure 12, 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 12. 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. The profile results from this event indicate that the NO_x-N was effectively reduced below the method detection limit at profile sampler LIGNO-18. The first chamber of the Stage 2 biofilter contains 42-inches of lignocellulosic media; therefore, the effluent has passed through 24 inches of lignocellulosic media at that depth (42 inches minus 18 inches).

FROM PUMP	TKN	NH3-N	NOX-N			TKN	NH3-N	NOX-N
Influent	1.6	0.28	23.0		Effluent	1.4	0.41	0.02
LIGNO-36	1.9	0.46	3.9					
LIGNO-30	1.8	0.34	4.6					
LIGNO-24	1.6	0.13	1.4					
LIGNO-18	1.2	0.095	0.02		SULFUR-18	1.6	0.41	0.02
LIGNO-12	1.4	0.19	0.02		SULFUR-12	1.8	0.41	0.02
LIGNO-6	0.99	0.095	0.06		SULFUR-7	1.5	0.44	0.02
LIGNO-0	1.6	0.42	0.02		SULFUR-3	1.7	0.40	0.02

Figure 12
Graphical Representation of Stage 2 Biofilter Profile Nitrogen Results

Equipment Blank and Tap: 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. One tap water sample was collected by filling sample containers with tap water from a hose bib near the system. The home water supply is obtained from an onsite well, and includes a tray aeration for sulfide removal. The TAP water NOx-N was 0.28 mg/L, TKN was 0.06 mg/L, total phosphorus was 0.013 mg/L and sulfate was 230 mg/L.

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 ₅ (mg/L)	COD (mg/L)	TN (mg/L N) ¹	TKN (mg/L N)	Organic N (mg/L N) ²	NH ₃ -N (mg/L N)	NO ₃ -N (mg/L N)	NO ₂ -N (mg/L N)	NO _x (mg/L N)	TIN (mg/L N) ³	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)
BHS2-STE-SAL	8/7/13 10:47	27.8	7.22	1393	0.06	-369.7	460	22	21	73	150	42.0	42	1.0	41	0.01	0.01	0.02	41.0	18	4.2	150	16	46			46
BHS2-STE-BENCHMARK	8/7/13 10:47																								200,000	200,000	
BHS2-DBOX-SAL	8/7/13 10:41	27.7	6.96	1244	1.75	-103.0	270	19	12	77	10	23.0	12	4.2	7.8	8.6	2.8	11	18.8	13	3.6						18
BHS2-DBOX-BENCHMARK	8/7/13 10:41																								50,000	50,400	
BHS2-PUMP-SAL	8/7/13 10:25	26.9	6.77	1235	2.01	-133.8	230	7	6	45	11	24.6	1.6	1.3	0.28	22	0.77	23	23.3	12	2.6						12
BHS2-PUMP-BENCHMARK	8/7/13 10:25																								100	132	
BHS2-PUMP-DUP-SAL	8/7/13 10:35	26.9	6.77	1235	2.01	-133.8	230	4	4	53	13	25.0	2	1.7	0.33	22	0.62	23	23.3	13	2.5						12
BHS2-PUMP-DUP-BENCHMARK	8/7/13 10:35																								200	144	
BHS2-LIGNO-36	8/7/13 10:18	27.4	6.83	1175	1.17	-244.6						5.8	1.9	1.4	0.46	2.7	1.2	3.9	4.4								
BHS2-LIGNO-30	8/7/13 10:08	27.4	6.79	1179	1.43	-195.4						6.4	1.8	1.5	0.34	2.7	1.9	4.6	4.9								
BHS2-LIGNO-24	8/7/13 9:55	27.3	6.82	1166	1.53	-244.0						3.0	1.6	1.5	0.13	0.44	0.99	1.4	1.5								
BHS2-LIGNO-18	8/7/13 9:38	27.2	6.83	1166	0.54	-333.1						1.2	1.2	1.1	0.095	0.01	0.01	0.02	0.1								
BHS2-LIGNO-12	8/7/13 9:28	27.1	6.87	1165	0.84	-328.2						1.4	1.4	1.2	0.19	0.01	0.01	0.02	0.2								
BHS2-LIGNO-6	8/7/13 9:00	26.9	6.90	1180	0.74	-339.8						1.1	0.99	0.9	0.095	0.06	0.01	0.06	0.2								
BHS2-LIGNO-0-SAL	8/7/13 8:53	26.7	6.92	1220	0.25	-362.1	390	5	4	47	99	1.6	1.6	1.2	0.42	0.01	0.01	0.02	0.4	12	2	130	19	36			20
BHS2-LIGNO-0-BENCHMARK	8/7/13 8:53																								10	1	
BHS2-SULFUR-3	8/7/13 8:49	26.2	6.76	1276	0.13	-371.0						1.7	1.7	1.3	0.4	0.01	0.01	0.02	0.4			170					
BHS2-SULFUR-7	8/7/13 8:38	26.3	6.79	1318	0.15	-374.0						1.5	1.5	1.1	0.44	0.01	0.01	0.02	0.5			180					
BHS2-SULFUR-12	8/7/13 8:28	26.2	6.75	1313	0.15	-375.4						1.8	1.8	1.4	0.41	0.01	0.01	0.02	0.4			180					
BHS2-SULFUR-18	8/7/13 8:19	26.2	6.76	1337	0.15	-376.0						1.6	1.6	1.2	0.41	0.01	0.01	0.02	0.4			180					
BHS2-ST2-SAL	8/7/13 8:04	26.1	6.88	1303	0.15	-372.0	400	3	2	92	10	1.4	1.4	1.0	0.41	0.01	0.01	0.02	0.4	11	1.9	180	40	73			21
BHS2-ST2-BENCHMARK	8/7/13 8:04																								10	1	
BHS2-EB-SAL	8/7/13 11:10	27.0	8.12	3	7.55	-40.8	2.2	1	1	4	10	0.1	0.05	0.0	0.009	0.01	0.01	0.02	0.0	0.01	0.01	0.2	0.01	0.1			0.06
BHS2-EB-BENCHMARK	8/7/13 11:10																								10	1	
BHS2-TAP-SAL	8/7/13 11:00	27.6	7.82	824	4.03	-113.0	160	4	2	4	10	0.3	0.06	0.1	0.009	0.28	0.01	0.28	0.3	0.013	0.01	230	0.02	0.2			5.6
BHS2-TAP-BENCHMARK	8/7/13 11:00																								10	11	

Notes:

¹Total Nitrogen (TN) is a calculated value equal to the sum of TKN and NO_x.

²Organic Nitrogen (ON) is a calculated value equal to the difference of TKN and NH₃.

³Total Inorganic Nitrogen (TIN) is a calculated value equal to the sum of NH₃ and NO_x.

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 recirc tank

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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 ₅ (mg/L)	COD (mg/L)	TN (mg/L N) ¹	TKN (mg/L N)	Organic N (mg/L N) ²	NH ₃ -N (mg/L N)	NO ₃ -N (mg/L N)	NO ₂ -N (mg/L N)	NOx (mg/L N)	TIN (mg/L N) ³	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)
STE	n	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4
	MEAN	23.8	7.3	1,360	0.2	-370.1	462.0	28.2	24.6	105.6	320.0	50.5	50.4	8.8	41.6	0.1	0.01	0.05	41.7	8.2	3.9	83.4	14.8	53.4	115,416	118,949	48
	STD. DEV.	3.3	0.2	48.3	0.2	13.2	39.6	9.4	8.5	25.5	109.3	5.4	5.4	7.7	5.3	0.05	0.00	0.04	5.3	5.5	0.4	44.6	2.9	10.0	641,723	481,310	23
	MIN	18.8	7.2	1,296	0.1	-392.5	410	18	15	73	150	42.0	42.0	1.0	36.0	0.01	0.01	0.02	36.0	4.8	3.5	31	10	41	800	2,420	31
	MAX	27.8	7.6	1,398	0.6	-360.0	510	40	35	140	430	56.1	56.0	18.0	48.0	0.13	0.01	0.13	48.0	18.0	4.3	150	17	65	1,600,000	1,200,000	82
DBOX	n	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
PUMP	n	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	22.7	6.8	1,209	3.6	-86.1	232.0	27.2	12.8	15.2	22.8	19.7	3.1	2.1	0.9	16.3	0.3	16.7	17.6	5.6	1.6				166	130	12.3
	STD. DEV.	4.0	0.2	47.5	1.7	88.0	14.8	28.4	13.1	18.6	10.6	5.8	1.9	0.6	1.5	7.3	0.3	7.3	6.2	3.6	0.7				1,809	1,983	3.6
	MIN	16.1	6.7	1,137	2.0	-180.0	210.0	1.0	1.0	2.0	11.0	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	1,259	5.7	50.8	250.0	68	35	45	36	26.0	6.2	2.7	3.6	24.0	0.8	24.0	24.1	12.0	2.6				4,200	4,611	17.0
LIGNO-0	n	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	3	
	MEAN	22.9	7.0	1,193	0.5	-332.4	386.0	9.2	8.8	47.6	118.6	2.8	2.8	1.3	1.5	0.01	0.01	0.02	1.5	5.0	2.0	159.2	12.8	28.9	38.4	21	18.7
	STD. DEV.	3.0	0.1	45.1	0.3	33.2	56.8	11.8	11.9	30.1	57.9	1.6	1.6	0.3	1.4	0.01	0.00	0.00	1.4	4.0	0.8	53.8	7.0	13.1	571.3	878.0	2.3
	MIN	18.7	6.8	1,141	0.2	-362.1	290.0	1.0	1.0	20.0	81	1.5	1.5	1.0	0.4	0.01	0.01	0.02	0.4	2.6	0.7	86.0	4.2	7.3	10.0	1.0	16.0
	MAX	26.7	7.1	1,230	0.8	-279.4	440.0	30	30	96	220	4.6	4.6	1.8	3.3	0.03	0.01	0.03	3.3	12.0	2.7	220	19	40	1,300	1986	20
ST2	n	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	4	
	MEAN	22.5	6.8	1,222	0.1	-323.3	334.0	6.8	4.2	67.6	170	3.5	3.4	1.3	2.2	0.01	0.01	0.02	2.2	4.9	2.5	192	24.8	41.8	52.66	25.34	22.0
	STD. DEV.	3.7	0.2	65.5	0.1	61.5	76.7	5.2	2.5	32.3	102	2.4	2.4	0.2	2.2	0.00	0.00	0.00	2.2	3.5	1.3	27.7	12.5	21.2	122.80	64.23	2.2
	MIN	16.5	6.5	1,135	0.1	-372.0	220.0	2.0	2.0	32.0	10	1.4	1.4	1.0	0.4	0.01	0.01	0.02	0.4	2.4	0.9	170	14	23	10	1	20.0
	MAX	26.1	7.0	1,303	0.2	-218.8	410.0	15.0	8.0	110	260	6.5	6.5	1.5	5.0	0.01	0.01	0.02	5.0	11.0	4.1	240	40	73	300	155	25.0
FB-TAP	n	5	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	4	5	4	1	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
EB	n	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	4
	MEAN	23.8	7.9	280	6.6	-94.8	2.1	2.2	1.6	3.2	10.8	0.1	0.1	0.0	0.01	0.01	0.01	0.02	0.03	0.01	0.01	0.20	0.01	0.10	7.96	2	0.4
	STD. DEV.	5.50	0.3	622.0	3.73	201.03	0.09	2.68	1.34	1.79	1.79	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.07	11.52	4.02	0.2
	MIN	14.2	7.4	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	9.2	30.7	2.2	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	0.20	0.01	0.20	32.0	10	0.5

Notes:

¹Total Nitrogen (TN) is a calculated value equal to the sum of TKN and NO_x.

²Organic Nitrogen (ON) is a calculated value equal to the difference of TKN and NH₃.

³Total Inorganic Nitrogen (TIN) is a calculated value equal to the sum of NH₃ and NO_x.

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.

0:44:57.00 Report Date: 01/04/2025

5.0 B-HS2 Sample Event No. 5: Summary and Recommendations

5.1 Summary

The results of the fifth sampling event indicate that the system continues to operate well and perform consistently. The Sample Event No. 5 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 1.6 mg/L TKN, of which 0.28 mg/L was ammonia.
- The Stage 2 biofilter produced a reducing environment and effluent $\text{NO}_x\text{-N}$ 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 1.4 mg/L, an approximately 97% reduction from STE.

5.2 Recommendations

The results of Sample Events No. 1 through 5 were used to formulate recommendations for adjustments and modifications to the experimental system.

5.2.1 Recirculation Mode of Operation

As previously discussed in Section 3.2, 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 has been tested since start-up) is to have the recirculated effluent return to the recirculation tank for mixing with incoming septic tank effluent. It is recommended to modify the recirculation mode of operation to test the second option. The second option has the recirculated effluent return to the top of the Stage 1 biofilter, dispersed by three spray nozzles. It will be interesting to see if the same level of pre-denitrification and nitrification is achieved.



Appendix A: Laboratory Report

PRELIMINARY

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

August 29, 2013
Work Order: 1307818

Laboratory Report

Project Name		B-HS2 SE#5						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-STE						
Matrix		Wastewater						
SAL Sample Number		1307818-01						
Date/Time Collected		08/07/13 10:47						
Collected by		Josefin Hirst						
Date/Time Received		08/07/13 13:15						
<u>Client Provided Field Data</u>								
pH		7.22						
Temperature		27.8 °C						
Conductivity		1393 umhos						
Dissolved Oxygen		0.06 mg/L						
<u>Inorganics</u>								
Hydrogen Sulfide (Unionized)	mg/L	16	SM 4550SF	0.04	0.01		08/13/13 12:00	1
Ammonia as N	mg/L	41	EPA 350.1	4.0	0.95		08/26/13 14:06	100
Carbonaceous BOD	mg/L	73	SM 5210B	2	2	08/08/13 11:00	08/16/13 12:09	1
Chemical Oxygen Demand	mg/L	150	EPA 410.4	25	10	08/20/13 11:45	08/20/13 15:00	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/08/13 23:08	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/08/13 23:08	1
Orthophosphate as P	mg/L	4.2	EPA 300.0	0.040	0.010		08/08/13 23:08	1
Phosphorous - Total as P	mg/L	18	SM 4500P-E	0.40	0.10	08/21/13 08:41	08/26/13 10:28	10
Sulfate	mg/L	150	EPA 300.0	6.0	2.0		08/19/13 17:27	10
Sulfide	mg/L	46	SM 4500SF	0.40	0.10		08/13/13 11:00	1
Total Alkalinity	mg/L	460	SM 2320B	8.0	2.0		08/15/13 14:53	1
Total Kjeldahl Nitrogen	mg/L	42	EPA 351.2	0.20	0.05	08/20/13 09:14	08/28/13 16:54	20.83
Total Organic Carbon	mg/L	46	SM 5310B	1.0	0.060		08/07/13 17:53	1
Total Suspended Solids	mg/L	22	SM 2540D	1	1	08/08/13 15:30	08/13/13 10:20	1
Volatile Suspended Solids	mg/L	21	EPA 160.4	1	1	08/08/13 15:30	08/13/13 10:20	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/08/13 23:08	1

Sample Description **BHS2-D BOX**
 Matrix **Wastewater**
 SAL Sample Number **1307818-02**
 Date/Time Collected **08/07/13 10:41**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

Client Provided Field Data

pH 6.96
 Temperature 27.7 °C
 Conductivity 1244 umhos
 Dissolved Oxygen 1.75 mg/L

Inorganics

Ammonia as N	mg/L	7.8	EPA 350.1	0.80	0.19		08/26/13 13:19	20
Carbonaceous BOD	mg/L	77	SM 5210B	2	2	08/08/13 11:00	08/16/13 12:09	1

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

August 29, 2013
Work Order: 1307818

Laboratory Report

Project Name		B-HS2 SE#5						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-DBOX						
Matrix		Wastewater						
SAL Sample Number		1307818-02						
Date/Time Collected		08/07/13 10:41						
Collected by		Josefin Hirst						
Date/Time Received		08/07/13 13:15						

Client Provided Field Data

pH		6.96						
Temperature		27.7 °C						
Conductivity		1244 umhos						
Dissolved Oxygen		1.75 mg/L						
Chemical Oxygen Demand	mg/L	10 U	EPA 410.4	25	10	08/20/13 11:45	08/20/13 15:00	1
Nitrate (as N)	mg/L	8.6	EPA 300.0	0.04	0.01		08/08/13 23:18	1
Nitrite (as N)	mg/L	2.8	EPA 300.0	0.04	0.01		08/08/13 23:18	1
Orthophosphate as P	mg/L	3.6	EPA 300.0	0.040	0.010		08/08/13 23:18	1
Phosphorous - Total as P	mg/L	13	SM 4500P-E	0.40	0.10	08/21/13 08:41	08/26/13 10:29	10
Total Alkalinity	mg/L	270	SM 2320B	8.0	2.0		08/15/13 15:00	1
Total Kjeldahl Nitrogen	mg/L	12	EPA 351.2	0.20	0.05	08/20/13 09:14	08/28/13 16:31	5
Total Organic Carbon	mg/L	18	SM 5310B	1.0	0.060		08/07/13 17:53	1
Total Suspended Solids	mg/L	19	SM 2540D	1	1	08/08/13 15:30	08/13/13 10:20	1
Volatile Suspended Solids	mg/L	12	EPA 160.4	1	1	08/08/13 15:30	08/13/13 10:20	1
Nitrate+Nitrite (N)	mg/L	11	EPA 300.0	0.08	0.02		08/08/13 23:18	1

Sample Description	BHS2-PUMP
Matrix	Wastewater
SAL Sample Number	1307818-03
Date/Time Collected	08/07/13 10:25
Collected by	Josefin Hirst
Date/Time Received	08/07/13 13:15

Client Provided Field Data

pH		6.77						
Temperature		26.9 °C						
Conductivity		1235 umhos						
Dissolved Oxygen		2.01 mg/L						
Inorganics								
Ammonia as N	mg/L	0.28 I	EPA 350.1	0.80	0.19		08/26/13 14:29	20
Carbonaceous BOD	mg/L	45	SM 5210B	2	2	08/08/13 11:00	08/16/13 12:09	1
Chemical Oxygen Demand	mg/L	11 I	EPA 410.4	25	10	08/19/13 10:30	08/19/13 14:30	1
Nitrate (as N)	mg/L	22	EPA 300.0	0.40	0.10		08/09/13 09:22	10
Nitrite (as N)	mg/L	0.77	EPA 300.0	0.40	0.10		08/09/13 09:22	10
Orthophosphate as P	mg/L	2.6	EPA 300.0	0.40	0.10		08/09/13 09:22	10
Phosphorous - Total as P	mg/L	12	SM 4500P-E	0.40	0.10	08/21/13 08:41	08/26/13 10:30	10
Total Alkalinity	mg/L	230	SM 2320B	8.0	2.0		08/15/13 15:06	1

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

August 29, 2013
Work Order: 1307818

Laboratory Report

Project Name		B-HS2 SE#5						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-PUMP						
Matrix		Wastewater						
SAL Sample Number		1307818-03						
Date/Time Collected		08/07/13 10:25						
Collected by		Josefin Hirst						
Date/Time Received		08/07/13 13:15						

Client Provided Field Data

pH		6.77						
Temperature		26.9 °C						
Conductivity		1235 umhos						
Dissolved Oxygen		2.01 mg/L						
Total Kjeldahl Nitrogen	mg/L	1.6	EPA 351.2	0.20	0.05	08/20/13 09:14	08/28/13 16:55	1
Total Organic Carbon	mg/L	12	SM 5310B	1.0	0.060		08/07/13 17:53	1
Total Suspended Solids	mg/L	7	SM 2540D	1	1	08/08/13 15:30	08/13/13 10:20	1
Volatile Suspended Solids	mg/L	6	EPA 160.4	1	1	08/08/13 15:30	08/13/13 10:20	1
Nitrate+Nitrite (N)	mg/L	23	EPA 300.0	0.80	0.20		08/09/13 09:22	10

Sample Description		BHS2-PUMP-DUP						
Matrix		Wastewater						
SAL Sample Number		1307818-04						
Date/Time Collected		08/07/13 10:35						
Collected by		Josefin Hirst						
Date/Time Received		08/07/13 13:15						

Client Provided Field Data

pH		6.77						
Temperature		26.9 °C						
Conductivity		1235 umhos						
Dissolved Oxygen		2.01 mg/L						

Inorganics

Ammonia as N	mg/L	0.33 I	EPA 350.1	0.80	0.19		08/26/13 15:08	20
Carbonaceous BOD	mg/L	53	SM 5210B	2	2	08/08/13 11:00	08/16/13 12:09	1
Chemical Oxygen Demand	mg/L	13 I	EPA 410.4	25	10	08/19/13 10:30	08/19/13 14:30	1
Nitrate (as N)	mg/L	22	EPA 300.0	0.40	0.10		08/09/13 09:31	10
Nitrite (as N)	mg/L	0.62	EPA 300.0	0.40	0.10		08/09/13 09:31	10
Orthophosphate as P	mg/L	2.5	EPA 300.0	0.40	0.10		08/09/13 09:31	10
Phosphorous - Total as P	mg/L	13	SM 4500P-E	0.40	0.10	08/21/13 08:41	08/26/13 10:31	10
Total Alkalinity	mg/L	230	SM 2320B	8.0	2.0		08/15/13 15:13	1
Total Kjeldahl Nitrogen	mg/L	2.0	EPA 351.2	0.20	0.05	08/20/13 09:14	08/28/13 16:34	1
Total Organic Carbon	mg/L	12	SM 5310B	1.0	0.060		08/07/13 17:53	1
Total Suspended Solids	mg/L	4	SM 2540D	1	1	08/08/13 15:30	08/13/13 10:20	1
Volatile Suspended Solids	mg/L	4	EPA 160.4	1	1	08/08/13 15:30	08/13/13 10:20	1
Nitrate+Nitrite (N)	mg/L	23	EPA 300.0	0.80	0.20		08/09/13 09:31	10

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Laboratory Report

Project Name		B-HS2 SE#5						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution

Sample Description **BHS2-LIGNO-36**
 Matrix **Wastewater**
 SAL Sample Number **1307818-05**
 Date/Time Collected **08/07/13 10:18**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

Client Provided Field Data

pH 6.83
 Temperature 27.4 °C
 Conductivity 1175 umhos
 Dissolved Oxygen 1.2 mg/L

Inorganics

Ammonia as N	mg/L	0.46 I	EPA 350.1	0.80	0.19		08/26/13 13:24	20
Nitrate (as N)	mg/L	2.7	EPA 300.0	0.04	0.01		08/08/13 23:46	1
Nitrite (as N)	mg/L	1.2	EPA 300.0	0.04	0.01		08/08/13 23:46	1
Total Kjeldahl Nitrogen	mg/L	1.9	EPA 351.2	0.20	0.05	08/20/13 09:14	08/28/13 15:40	1
Nitrate+Nitrite (N)	mg/L	3.9	EPA 300.0	0.08	0.02		08/08/13 23:46	1

Sample Description **BHS2-LIGNO-30**
 Matrix **Wastewater**
 SAL Sample Number **1307818-06**
 Date/Time Collected **08/07/13 10:08**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

Client Provided Field Data

pH 8.79
 Temperature 27.4 °C
 Conductivity 1179 umhos
 Dissolved Oxygen 1.4 mg/L

Inorganics

Ammonia as N	mg/L	0.34 I	EPA 350.1	0.80	0.19		08/26/13 13:26	20
Nitrate (as N)	mg/L	2.7	EPA 300.0	0.04	0.01		08/09/13 00:51	1
Nitrite (as N)	mg/L	1.9	EPA 300.0	0.04	0.01		08/09/13 00:51	1
Total Kjeldahl Nitrogen	mg/L	1.8	EPA 351.2	0.20	0.05	08/20/13 09:14	08/28/13 15:42	1
Nitrate+Nitrite (N)	mg/L	4.6	EPA 300.0	0.08	0.02		08/09/13 00:51	1

Sample Description **BHS2-LIGNO-24**
 Matrix **Wastewater**
 SAL Sample Number **1307818-07**
 Date/Time Collected **08/07/13 09:55**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

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Laboratory Report

Project Name		B-HS2 SE#5						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-LIGNO-24						
Matrix		Wastewater						
SAL Sample Number		1307818-07						
Date/Time Collected		08/07/13 09:55						
Collected by		Josefin Hirst						
Date/Time Received		08/07/13 13:15						

Client Provided Field Data

pH 6.82
 Temperature 27.3 °C
 Conductivity 1166 umhos
 Dissolved Oxygen 1.5 mg/L

Inorganics

Ammonia as N	mg/L	0.13 I	EPA 350.1	0.40	0.095		08/26/13 14:47	10
Nitrate (as N)	mg/L	0.44	EPA 300.0	0.04	0.01		08/09/13 01:01	1
Nitrite (as N)	mg/L	0.99	EPA 300.0	0.04	0.01		08/09/13 01:01	1
Total Kjeldahl Nitrogen	mg/L	1.6	EPA 351.2	0.20	0.05	08/20/13 09:14	08/28/13 15:48	1
Nitrate+Nitrite (N)	mg/L	1.4	EPA 300.0	0.08	0.02		08/09/13 01:01	1

Sample Description **BHS2-LIGNO-18**
 Matrix **Wastewater**
 SAL Sample Number **1307818-08**
 Date/Time Collected **08/07/13 09:38**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

Client Provided Field Data

pH 6.83
 Temperature 27.2 °C
 Conductivity 1166 umhos
 Dissolved Oxygen 0.54 mg/L

Inorganics

Ammonia as N	mg/L	0.095 U	EPA 350.1	0.40	0.095		08/26/13 14:49	10
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 01:10	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 01:10	1
Total Kjeldahl Nitrogen	mg/L	1.2	EPA 351.2	0.20	0.05	08/20/13 09:14	08/28/13 15:50	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/09/13 01:10	1

Sample Description **BHS2-LIGNO-12**
 Matrix **Wastewater**
 SAL Sample Number **1307818-09**
 Date/Time Collected **08/07/13 09:28**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

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Laboratory Report

Project Name		B-HS2 SE#5						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution

Sample Description **BHS2-LIGNO-12**
 Matrix **Wastewater**
 SAL Sample Number **1307818-09**
 Date/Time Collected **08/07/13 09:28**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

Client Provided Field Data

pH 6.87
 Temperature 27.1 °C
 Conductivity 1165 umhos
 Dissolved Oxygen 0.84 mg/L

Inorganics

Ammonia as N	mg/L	0.19 I	EPA 350.1	0.40	0.095		08/26/13 14:51	10
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 01:19	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 01:19	1
Total Kjeldahl Nitrogen	mg/L	1.4	EPA 351.2	0.20	0.05	08/20/13 09:14	08/28/13 15:51	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/09/13 01:19	1

Sample Description **BHS2-LIGNO-6**
 Matrix **Wastewater**
 SAL Sample Number **1307818-10**
 Date/Time Collected **08/07/13 09:00**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

Client Provided Field Data

pH 6.90
 Temperature 26.9 °C
 Conductivity 1180 umhos
 Dissolved Oxygen 0.74 mg/L

Inorganics

Ammonia as N	mg/L	0.095 U	EPA 350.1	0.40	0.095		08/26/13 14:53	10
Nitrate (as N)	mg/L	0.06	EPA 300.0	0.04	0.01		08/09/13 01:29	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 01:29	1
Total Kjeldahl Nitrogen	mg/L	0.99	EPA 351.2	0.20	0.05	08/20/13 09:14	08/28/13 15:52	1
Nitrate+Nitrite (N)	mg/L	0.06 I	EPA 300.0	0.08	0.02		08/09/13 01:29	1

Sample Description **BHS2-LIGNO-0**
 Matrix **Wastewater**
 SAL Sample Number **1307818-11**
 Date/Time Collected **08/07/13 08:53**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

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Laboratory Report

Project Name		B-HS2 SE#5						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-LIGNO-0						
Matrix		Wastewater						
SAL Sample Number		1307818-11						
Date/Time Collected		08/07/13 08:53						
Collected by		Josefin Hirst						
Date/Time Received		08/07/13 13:15						
<u>Client Provided Field Data</u>								
pH		6.92						
Temperature		26.7 °C						
Conductivity		1220 umhos						
Dissolved Oxygen		0.25 mg/L						
<u>Inorganics</u>								
Hydrogen Sulfide (Unionized)	mg/L	19	SM 4550SF	0.04	0.01		08/13/13 12:00	1
Ammonia as N	mg/L	0.42	EPA 350.1	0.40	0.095		08/26/13 14:55	10
Carbonaceous BOD	mg/L	47	SM 5210B	2	2	08/08/13 11:00	08/16/13 12:09	1
Chemical Oxygen Demand	mg/L	99	EPA 410.4	25	10	08/19/13 10:30	08/19/13 14:30	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 01:38	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 01:38	1
Orthophosphate as P	mg/L	2.0	EPA 300.0	0.040	0.010		08/09/13 01:38	1
Phosphorous - Total as P	mg/L	12	SM 4500P-E	0.40	0.10	08/21/13 08:41	08/26/13 10:32	10
Sulfate	mg/L	130	EPA 300.0	6.0	2.0		08/19/13 17:37	10
Sulfide	mg/L	36	SM 4500SF	0.40	0.10		08/13/13 11:00	1
Total Alkalinity	mg/L	390	SM 2320B	8.0	2.0		08/15/13 15:21	1
Total Kjeldahl Nitrogen	mg/L	1.6	EPA 351.2	0.20	0.05	08/20/13 09:14	08/28/13 15:54	1
Total Organic Carbon	mg/L	20	SM 5310B	1.0	0.060		08/07/13 17:53	1
Total Suspended Solids	mg/L	5	SM 2540D	1	1	08/08/13 15:30	08/13/13 10:20	1
Volatile Suspended Solids	mg/L	4	EPA 160.4	1	1	08/08/13 15:30	08/13/13 10:20	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/09/13 01:38	1

Sample Description **BHS2-SULFUR-3**
 Matrix **Wastewater**
 SAL Sample Number **1307818-12**
 Date/Time Collected **08/07/13 08:49**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

Client Provided Field Data

pH 6.76
 Temperature 26.2 °C
 Conductivity 1276 umhos
 Dissolved Oxygen 0.1 mg/L

Inorganics

Ammonia as N	mg/L	0.40	EPA 350.1	0.40	0.095		08/26/13 14:57	10
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 01:48	1

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Laboratory Report

Project Name		B-HS2 SE#5						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution

Sample Description **BHS2-SULFUR-3**
 Matrix **Wastewater**
 SAL Sample Number **1307818-12**
 Date/Time Collected **08/07/13 08:49**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

Client Provided Field Data

pH		6.76						
Temperature		26.2 °C						
Conductivity		1276 umhos						
Dissolved Oxygen		0.1 mg/L						
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 01:48	1
Sulfate	mg/L	170	EPA 300.0	6.0	2.0		08/19/13 17:46	10
Total Kjeldahl Nitrogen	mg/L	1.7	EPA 351.2	0.20	0.05	08/20/13 09:14	08/28/13 15:55	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/09/13 01:48	1

Sample Description **BHS2-SULFUR-7**
 Matrix **Wastewater**
 SAL Sample Number **1307818-13**
 Date/Time Collected **08/07/13 08:38**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

Client Provided Field Data

pH		6.79						
Temperature		26.2 °C						
Conductivity		1276 umhos						
Dissolved Oxygen		0.1 mg/L						
Inorganics								
Ammonia as N	mg/L	0.44	EPA 350.1	0.40	0.095		08/26/13 14:59	10
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 01:57	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 01:57	1
Sulfate	mg/L	180	EPA 300.0	6.0	2.0		08/19/13 17:55	10
Total Kjeldahl Nitrogen	mg/L	1.5	EPA 351.2	0.20	0.05	08/20/13 09:14	08/28/13 15:57	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/09/13 01:57	1

Sample Description **BHS2-SULFUR-12**
 Matrix **Wastewater**
 SAL Sample Number **1307818-14**
 Date/Time Collected **08/07/13 08:28**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

Client Provided Field Data

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Laboratory Report

Project Name		B-HS2 SE#5						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-SULFUR-12						
Matrix		Wastewater						
SAL Sample Number		1307818-14						
Date/Time Collected		08/07/13 08:28						
Collected by		Josefin Hirst						
Date/Time Received		08/07/13 13:15						

Client Provided Field Data

pH		6.75
Temperature		26.2 °C
Conductivity		1313 umhos
Dissolved Oxygen		0.1 mg/L

Inorganics

Ammonia as N	mg/L	0.41	EPA 350.1	0.40	0.095		08/26/13 15:01	10
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 02:06	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 02:06	1
Sulfate	mg/L	180	EPA 300.0	6.0	2.0		08/19/13 18:05	10
Total Kjeldahl Nitrogen	mg/L	1.8	EPA 351.2	0.20	0.05	08/20/13 09:14	08/28/13 15:58	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/09/13 02:06	1

Sample Description		BHS2-SULFUR-18						
Matrix		Wastewater						
SAL Sample Number		1307818-15						
Date/Time Collected		08/07/13 08:19						
Collected by		Josefin Hirst						
Date/Time Received		08/07/13 13:15						

Client Provided Field Data

pH		6.76
Temperature		26.2 °C
Conductivity		1337 umhos
Dissolved Oxygen		0.1 mg/L

Inorganics

Ammonia as N	mg/L	0.41	EPA 350.1	0.40	0.095		08/26/13 15:03	10
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 02:16	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 02:16	1
Sulfate	mg/L	180	EPA 300.0	6.0	2.0		08/19/13 18:14	10
Total Kjeldahl Nitrogen	mg/L	1.6	EPA 351.2	0.20	0.05	08/20/13 09:14	08/28/13 15:59	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/09/13 02:16	1

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Laboratory Report

Project Name		B-HS2 SE#5						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution

Sample Description **BHS2-ST2**
 Matrix **Wastewater**
 SAL Sample Number **1307818-16**
 Date/Time Collected **08/07/13 08:04**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

Client Provided Field Data

pH 6.88
 Temperature 26.1 °C
 Conductivity 1303 umhos
 Dissolved Oxygen 0.1 mg/L

Inorganics

Hydrogen Sulfide (Unionized)	mg/L	40	SM 4550SF	0.04	0.01		08/13/13 12:00	1
Ammonia as N	mg/L	0.41	EPA 350.1	0.40	0.095		08/26/13 15:05	10
Carbonaceous BOD	mg/L	92	SM 5210B	2	2	08/08/13 11:00	08/16/13 12:09	1
Chemical Oxygen Demand	mg/L	10 U	EPA 410.4	25	10	08/19/13 10:30	08/19/13 14:30	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 02:53	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 02:53	1
Orthophosphate as P	mg/L	1.9	EPA 300.0	0.040	0.010		08/09/13 02:53	1
Phosphorous - Total as P	mg/L	11	SM 4500P-E	0.40	0.10	08/21/13 08:41	08/26/13 10:33	10
Sulfate	mg/L	180	EPA 300.0	6.0	2.0		08/19/13 18:23	10
Sulfide	mg/L	73	SM 4500SF	0.40	0.10		08/13/13 11:00	1
Total Alkalinity	mg/L	400	SM 2320B	8.0	2.0		08/15/13 15:30	1
Total Kjeldahl Nitrogen	mg/L	1.4	EPA 351.2	0.20	0.05	08/20/13 09:14	08/28/13 16:00	1
Total Organic Carbon	mg/L	21	SM 5310B	1.0	0.060		08/07/13 17:53	1
Total Suspended Solids	mg/L	3	SM 2540D	1	1	08/08/13 15:30	08/13/13 10:20	1
Volatile Suspended Solids	mg/L	2	EPA 160.4	1	1	08/08/13 15:30	08/13/13 10:20	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/09/13 02:53	1

Sample Description **BHS2-EB**
 Matrix **Reagent Water**
 SAL Sample Number **1307818-17**
 Date/Time Collected **08/07/13 11:10**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

Client Provided Field Data

pH 8.12
 Temperature 27.0 °C
 Conductivity 3.1 umhos
 Dissolved Oxygen 7.6 mg/L

Inorganics

Hydrogen Sulfide (Unionized)	mg/L	0.01 U	SM 4550SF	0.04	0.01		08/13/13 12:00	1
Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		08/26/13 15:16	1

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Project Name		B-HS2 SE#5						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution

Sample Description **BHS2-EB**
 Matrix **Reagent Water**
 SAL Sample Number **1307818-17**
 Date/Time Collected **08/07/13 11:10**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

Client Provided Field Data

pH		8.12						
Temperature		27.0 °C						
Conductivity		3.1 umhos						
Dissolved Oxygen		7.6 mg/L						
Carbonaceous BOD	mg/L	4	SM 5210B	2	2	08/08/13 11:00	08/16/13 12:09	1
Chemical Oxygen Demand	mg/L	10 U	EPA 410.4	25	10	08/19/13 10:30	08/19/13 14:30	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 03:03	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 03:03	1
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		08/09/13 03:03	1
Phosphorous - Total as P	mg/L	0.010 U	SM 4500P-E	0.040	0.010	08/21/13 08:41	08/26/13 10:34	1
Sulfate	mg/L	0.20 U	EPA 300.0	0.60	0.20		08/09/13 03:03	1
Sulfide	mg/L	0.10 U	SM 4500SF	0.40	0.10		08/13/13 11:00	1
Total Alkalinity	mg/L	2.2 I	SM 2320B	8.0	2.0		08/15/13 15:33	1
Total Kjeldahl Nitrogen	mg/L	0.05 U	EPA 351.2	0.20	0.05	08/20/13 09:11	08/23/13 08:02	1
Total Organic Carbon	mg/L	0.060 U	SM 5310B	1.0	0.060		08/07/13 17:53	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	08/08/13 15:30	08/13/13 10:20	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	08/08/13 15:30	08/13/13 10:20	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/09/13 03:03	1

Sample Description **BHS2-TAP**
 Matrix **Drinking Water**
 SAL Sample Number **1307818-18**
 Date/Time Collected **08/07/13 11:00**
 Collected by **Josefin Hirst**
 Date/Time Received **08/07/13 13:15**

Client Provided Field Data

pH 7.82
 Temperature 27.6 °C
 Conductivity 824 umhos
 Dissolved Oxygen 4.0 mg/L

Inorganics

Hydrogen Sulfide (Unionized)	mg/L	0.02 I	SM 4550SF	0.04	0.01		08/13/13 12:00	1
Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		08/26/13 15:18	1
Carbonaceous BOD	mg/L	4	SM 5210B	2	2	08/08/13 11:00	08/16/13 12:09	1
Chemical Oxygen Demand	mg/L	10 U	EPA 410.4	25	10	08/19/13 10:30	08/19/13 14:30	1
Nitrate (as N)	mg/L	0.28	EPA 300.0	0.04	0.01		08/09/13 03:12	1

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August 29, 2013
Work Order: 1307818

Laboratory Report

Project Name		B-HS2 SE#5						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-TAP						
Matrix		Drinking Water						
SAL Sample Number		1307818-18						
Date/Time Collected		08/07/13 11:00						
Collected by		Josefin Hirst						
Date/Time Received		08/07/13 13:15						
<u>Client Provided Field Data</u>								
pH		7.82						
Temperature		27.6 °C						
Conductivity		824 umhos						
Dissolved Oxygen		4.0 mg/L						
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/09/13 03:12	1
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		08/09/13 03:12	1
Phosphorous - Total as P	mg/L	0.013 I	SM 4500P-E	0.040	0.010	08/21/13 08:41	08/26/13 10:34	1
Sulfate	mg/L	230	EPA 300.0	6.0	2.0		08/19/13 18:33	10
Sulfide	mg/L	0.20 I	SM 4500SF	0.40	0.10		08/13/13 11:00	1
Total Alkalinity	mg/L	160	SM 2320B	8.0	2.0		08/15/13 15:44	1
Total Kjeldahl Nitrogen	mg/L	0.06 I	EPA 351.2	0.20	0.05	08/20/13 09:11	08/22/13 15:03	1
Total Organic Carbon	mg/L	5.6	SM 5310B	1.0	0.060		08/07/13 17:53	1
Total Suspended Solids	mg/L	4	SM 2540D	1	1	08/08/13 15:30	08/13/13 10:20	1
Volatile Suspended Solids	mg/L	2	EPA 160.4	1	1	08/08/13 15:30	08/13/13 10:20	1
Nitrate+Nitrite (N)	mg/L	0.28	EPA 300.0	0.08	0.02		08/09/13 03:12	1

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August 29, 2013
Work Order: 1307818

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH30729 - TOC prep										
Blank (BH30729-BLK1)					Prepared & Analyzed: 08/07/13					
Total Organic Carbon	0.060 U	1.0	0.060	mg/L						
LCS (BH30729-BS1)					Prepared & Analyzed: 08/07/13					
Total Organic Carbon	10.8	1.0	0.060	mg/L	10		108	90-110		
Matrix Spike (BH30729-MS1)					Source: 1307920-02		Prepared & Analyzed: 08/07/13			
Total Organic Carbon	10.3	1.0	0.060	mg/L	10	ND	103	85-115		
Matrix Spike Dup (BH30729-MSD1)					Source: 1307920-02		Prepared & Analyzed: 08/07/13			
Total Organic Carbon	10.2	1.0	0.060	mg/L	10	ND	102	85-115	0.4	10
Batch BH30824 - Ion Chromatography 300.0 Prep										
Blank (BH30824-BLK1)					Prepared & Analyzed: 08/08/13					
Nitrate (as N)	0.01 U	0.04	0.01	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	0.962			mg/L	1.0		96	90-115		
Surrogate: Dichloroacetate	0.962			mg/L	1.0		96	90-115		
Surrogate: Dichloroacetate	0.962			mg/L	1.0		96	90-115		
LCS (BH30824-BS1)					Prepared & Analyzed: 08/08/13					
Nitrite (as N)	1.30	0.04	0.01	mg/L	1.4		93	85-115		
Nitrate (as N)	1.62	0.04	0.01	mg/L	1.7		95	85-115		
Orthophosphate as P	0.880	0.040	0.010	mg/L	0.90		98	85-115		
Surrogate: Dichloroacetate	0.981			mg/L	1.0		98	90-115		
Surrogate: Dichloroacetate	0.981			mg/L	1.0		98	90-115		
Surrogate: Dichloroacetate	0.981			mg/L	1.0		98	90-115		

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH30824 - Ion Chromatography 300.0 Prep										
LCS Dup (BH30824-BSD1)					Prepared & Analyzed: 08/08/13					
Nitrate (as N)	1.61	0.04	0.01	mg/L	1.7		95	85-115	0.7	200
Nitrite (as N)	1.29	0.04	0.01	mg/L	1.4		92	85-115	0.8	200
Orthophosphate as P	0.842	0.040	0.010	mg/L	0.90		94	85-115	4	200
Surrogate: Dichloroacetate	0.959			mg/L	1.0		96	90-115		
Surrogate: Dichloroacetate	0.959			mg/L	1.0		96	90-115		
Surrogate: Dichloroacetate	0.959			mg/L	1.0		96	90-115		
Matrix Spike (BH30824-MS1)					Source: 1308075-01		Prepared & Analyzed: 08/08/13			
Nitrite (as N)	1.30	0.04	0.01	mg/L	1.4	ND	93	85-115		
Orthophosphate as P	0.877	0.040	0.010	mg/L	0.90	0.0610	91	85-115		
Nitrate (as N)	2.28	0.04	0.01	mg/L	1.7	0.680	94	85-115		
Surrogate: Dichloroacetate	0.981			mg/L	1.0		98	90-115		
Surrogate: Dichloroacetate	0.981			mg/L	1.0		98	90-115		
Surrogate: Dichloroacetate	0.981			mg/L	1.0		98	90-115		
Matrix Spike (BH30824-MS2)					Source: 1307818-05		Prepared & Analyzed: 08/08/13			
Orthophosphate as P	3.26	0.040	0.010	mg/L	0.90	2.33	104	85-115		
Nitrate (as N)	4.54	0.04	0.01	mg/L	1.7	2.75	105	85-115		
Nitrite (as N)	2.43	0.04	0.01	mg/L	1.4	1.16	91	85-115		
Surrogate: Dichloroacetate	0.993			mg/L	1.0		99	90-115		
Surrogate: Dichloroacetate	0.993			mg/L	1.0		99	90-115		
Surrogate: Dichloroacetate	0.993			mg/L	1.0		99	90-115		
Batch BH30825 - Ion Chromatography 300.0 Prep										
Blank (BH30825-BLK1)					Prepared & Analyzed: 08/09/13					
Sulfate	0.20 U	0.60	0.20	mg/L						
Orthophosphate as P	0.010 U	0.040	0.010	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						
Surrogate: Dichloroacetate	0.921			mg/L	1.0		92	90-115		
Surrogate: Dichloroacetate	0.921			mg/L	1.0		92	90-115		
Surrogate: Dichloroacetate	0.921			mg/L	1.0		92	90-115		
Surrogate: Dichloroacetate	0.921			mg/L	1.0		92	90-115		

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August 29, 2013
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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH30825 - Ion Chromatography 300.0 Prep										
LCS (BH30825-BS1)					Prepared & Analyzed: 08/09/13					
Nitrate (as N)	1.66	0.04	0.01	mg/L	1.7		97	85-115		
Sulfate	8.26	0.60	0.20	mg/L	9.0		92	85-115		
Nitrite (as N)	1.35	0.04	0.01	mg/L	1.4		97	85-115		
Orthophosphate as P	0.951	0.040	0.010	mg/L	0.90		106	85-115		
Surrogate: Dichloroacetate	0.946			mg/L	1.0		95	90-115		
Surrogate: Dichloroacetate	0.946			mg/L	1.0		95	90-115		
Surrogate: Dichloroacetate	0.946			mg/L	1.0		95	90-115		
Surrogate: Dichloroacetate	0.946			mg/L	1.0		95	90-115		
LCS Dup (BH30825-BSD1)					Prepared & Analyzed: 08/09/13					
Nitrite (as N)	1.41	0.04	0.01	mg/L	1.4		101	85-115	4	200
Orthophosphate as P	0.811	0.040	0.010	mg/L	0.90		90	85-115	16	200
Sulfate	8.96	0.60	0.20	mg/L	9.0		100	85-115	8	200
Nitrate (as N)	1.69	0.04	0.01	mg/L	1.7		100	85-115	2	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		
Matrix Spike (BH30825-MS1)					Source: 1307818-15		Prepared & Analyzed: 08/09/13			
Nitrate (as N)	1.68	0.04	0.01	mg/L	1.7	ND	99	85-115		
Sulfate	90.0 L	0.60	0.20	mg/L	9.0	178	NR	85-115		
Orthophosphate as P	2.56	0.040	0.010	mg/L	0.90	1.66	100	85-115		
Nitrite (as N)	1.29	0.04	0.01	mg/L	1.4	ND	92	85-115		
Surrogate: Dichloroacetate	0.937			mg/L	1.0		94	90-115		
Surrogate: Dichloroacetate	0.937			mg/L	1.0		94	90-115		
Surrogate: Dichloroacetate	0.937			mg/L	1.0		94	90-115		
Surrogate: Dichloroacetate	0.937			mg/L	1.0		94	90-115		

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August 29, 2013
Work Order: 1307818

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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Batch BH30825 - Ion Chromatography 300.0 Prep

Matrix Spike (BH30825-MS2)		Source: 1308099-01			Prepared & Analyzed: 08/09/13					
Sulfate	15.5	0.60	0.20	mg/L	9.0	7.37	91	85-115		
Orthophosphate as P	0.902	0.040	0.010	mg/L	0.90	0.0810	91	85-115		
Nitrate (as N)	2.07	0.04	0.01	mg/L	1.7	0.252	107	85-115		
Nitrite (as N)	1.49	0.04	0.01	mg/L	1.4	ND	106	85-115		
Surrogate: Dichloroacetate	0.920			mg/L	1.0		92	90-115		
Surrogate: Dichloroacetate	0.920			mg/L	1.0		92	90-115		
Surrogate: Dichloroacetate	0.920			mg/L	1.0		92	90-115		
Surrogate: Dichloroacetate	0.920			mg/L	1.0		92	90-115		

Batch BH30829 - BOD

Blank (BH30829-BLK1)					Prepared: 08/08/13 Analyzed: 08/16/13					
Carbonaceous BOD	2 U	2	2	mg/L						
Blank (BH30829-BLK2)					Prepared: 08/08/13 Analyzed: 08/16/13					
Carbonaceous BOD	2 U	2	2	mg/L						
LCS (BH30829-BS1)					Prepared: 08/08/13 Analyzed: 08/16/13					
Carbonaceous BOD	197	2	2	mg/L	200		99	85-115		
LCS (BH30829-BS2)					Prepared: 08/08/13 Analyzed: 08/16/13					
Carbonaceous BOD	173	2	2	mg/L	200		86	85-115		
LCS Dup (BH30829-BSD1)					Prepared: 08/08/13 Analyzed: 08/16/13					
Carbonaceous BOD	197	2	2	mg/L	200		99	85-115	0	200
LCS Dup (BH30829-BSD2)					Prepared: 08/08/13 Analyzed: 08/16/13					
Carbonaceous BOD	173	2	2	mg/L	200		86	85-115	0	200

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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 BH30829 - BOD

Duplicate (BH30829-DUP1)		Source: 1308042-01			Prepared: 08/08/13 Analyzed: 08/16/13					
Carbonaceous BOD	150	2	2	mg/L		140			8	25
Duplicate (BH30829-DUP2)		Source: 1307818-16			Prepared: 08/08/13 Analyzed: 08/16/13					
Carbonaceous BOD	90	2	2	mg/L		92			2	25

Batch BH30840 - TSS prep

Blank (BH30840-BLK1)		Prepared: 08/08/13 Analyzed: 08/13/13								
Total Suspended Solids	1 U	1	1	mg/L						
Volatile Suspended Solids	1 U	1		mg/L						
LCS (BH30840-BS1)		Prepared: 08/08/13 Analyzed: 08/13/13								
Total Suspended Solids	52.8	1	1	mg/L	50		106	85-115		
Duplicate (BH30840-DUP1)		Source: 1307818-01			Prepared: 08/08/13 Analyzed: 08/13/13					
Total Suspended Solids	21.0	1	1	mg/L		22.0			5	30
Volatile Suspended Solids	18.0	1		mg/L		21.0			15	20

Batch BH30922 - Ion Chromatography 300.0 Prep

Blank (BH30922-BLK1)		Prepared & Analyzed: 08/12/13								
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Orthophosphate as P	0.010 U	0.040	0.010	mg/L						
Surrogate: Dichloroacetate	0.953			mg/L	1.0		95	90-115		
Surrogate: Dichloroacetate	0.953			mg/L	1.0		95	90-115		
Surrogate: Dichloroacetate	0.953			mg/L	1.0		95	90-115		

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH30922 - Ion Chromatography 300.0 Prep										
LCS (BH30922-BS1)					Prepared & Analyzed: 08/09/13					
Nitrite (as N)	1.44	0.04	0.01	mg/L	1.4		102	85-115		
Nitrate (as N)	1.72	0.04	0.01	mg/L	1.7		101	85-115		
Orthophosphate as P	0.834	0.040	0.010	mg/L	0.90		93	85-115		
Surrogate: Dichloroacetate	1.03			mg/L	1.0		103	90-115		
Surrogate: Dichloroacetate	1.03			mg/L	1.0		103	90-115		
Surrogate: Dichloroacetate	1.03			mg/L	1.0		103	90-115		
LCS Dup (BH30922-BSD1)					Prepared & Analyzed: 08/09/13					
Nitrate (as N)	1.72	0.04	0.01	mg/L	1.7		101	85-115	0	200
Orthophosphate as P	0.840	0.040	0.010	mg/L	0.90		93	85-115	0.7	200
Nitrite (as N)	1.44	0.04	0.01	mg/L	1.4		103	85-115	0.07	200
Surrogate: Dichloroacetate	1.03			mg/L	1.0		103	90-115		
Surrogate: Dichloroacetate	1.03			mg/L	1.0		103	90-115		
Surrogate: Dichloroacetate	1.03			mg/L	1.0		103	90-115		
Matrix Spike (BH30922-MS1)					Source: 1308102-01		Prepared & Analyzed: 08/09/13			
Orthophosphate as P	1.08	0.040	0.010	mg/L	0.90	0.161	102	85-115		
Nitrate (as N)	1.92	0.04	0.01	mg/L	1.7	0.314	95	85-115		
Nitrite (as N)	1.35	0.04	0.01	mg/L	1.4	ND	96	85-115		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
Matrix Spike (BH30922-MS2)					Source: 1307924-02		Prepared & Analyzed: 08/09/13			
Nitrate (as N)	1,670	40	10	mg/L	1700	51.0	95	85-115		
Nitrite (as N)	1,480	40	10	mg/L	1400	ND	106	85-115		
Orthophosphate as P	816	40	10	mg/L	900	ND	91	85-115		
Surrogate: Dichloroacetate	1.11			mg/L	1.0		111	90-115		
Surrogate: Dichloroacetate	1.11			mg/L	1.0		111	90-115		
Surrogate: Dichloroacetate	1.11			mg/L	1.0		111	90-115		

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August 29, 2013
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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH31331 - Sulfide prep										
Blank (BH31331-BLK1)					Prepared & Analyzed: 08/13/13					
Sulfide	0.10 U	0.40	0.10	mg/L						
LCS (BH31331-BS1)					Prepared & Analyzed: 08/13/13					
Sulfide	4.74	0.40	0.10	mg/L	5.0		95	85-115		
Matrix Spike (BH31331-MS1)					Source: 1308047-01		Prepared & Analyzed: 08/13/13			
Sulfide	4.74	0.40	0.10	mg/L	5.0	ND	95	85-115		
Matrix Spike Dup (BH31331-MSD1)					Source: 1308047-01		Prepared & Analyzed: 08/13/13			
Sulfide	4.74	0.40	0.10	mg/L	5.0	ND	95	85-115	0	14
Batch BH31504 - alkalinity										
Blank (BH31504-BLK1)					Prepared & Analyzed: 08/15/13					
Total Alkalinity	2.2 I	8.0	2.0	mg/L						
Blank (BH31504-BLK2)					Prepared & Analyzed: 08/15/13					
Total Alkalinity	2.4 I	8.0	2.0	mg/L						
LCS (BH31504-BS1)					Prepared & Analyzed: 08/15/13					
Total Alkalinity	120	8.0	2.0	mg/L	120		99	90-110		
LCS (BH31504-BS2)					Prepared & Analyzed: 08/15/13					
Total Alkalinity	130	8.0	2.0	mg/L	120		104	90-110		
Matrix Spike (BH31504-MS1)					Source: 1307786-01		Prepared & Analyzed: 08/15/13			
Total Alkalinity	200	8.0	2.0	mg/L	120	79	96	80-120		

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH31504 - alkalinity										
Matrix Spike (BH31504-MS2)		Source: 1308288-01			Prepared & Analyzed: 08/15/13					
Total Alkalinity	220	8.0	2.0	mg/L	120	120	75	80-120		
Matrix Spike Dup (BH31504-MSD1)		Source: 1307786-01			Prepared & Analyzed: 08/15/13					
Total Alkalinity	200	8.0	2.0	mg/L	120	79	94	80-120	0.8	26
Matrix Spike Dup (BH31504-MSD2)		Source: 1308288-01			Prepared & Analyzed: 08/15/13					
Total Alkalinity	220	8.0	2.0	mg/L	120	120	80	80-120	3	26
Batch BH31901 - Ion Chromatography 300.0 Prep										
Blank (BH31901-BLK1)		Prepared & Analyzed: 08/19/13								
Sulfate	0.20 U	0.60	0.20	mg/L						
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
LCS (BH31901-BS1)		Prepared & Analyzed: 08/19/13								
Sulfate	8.87	0.60	0.20	mg/L	9.0		99	85-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
LCS Dup (BH31901-BSD1)		Prepared & Analyzed: 08/19/13								
Sulfate	8.85	0.60	0.20	mg/L	9.0		98	85-115	0.2	200
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
Matrix Spike (BH31901-MS1)		Source: 1307782-03			Prepared & Analyzed: 08/19/13					
Sulfate	11.8	0.60	0.20	mg/L	9.0	2.67	102	85-115		
Surrogate: Dichloroacetate	1.08			mg/L	1.0		108	90-115		
Matrix Spike (BH31901-MS2)		Source: 1308132-01			Prepared & Analyzed: 08/19/13					
Sulfate	9.65	0.60	0.20	mg/L	9.0	0.587	101	85-115		
Surrogate: Dichloroacetate	1.09			mg/L	1.0		109	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

August 29, 2013
Work Order: 1307818

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH31906 - COD prep										
Blank (BH31906-BLK1)					Prepared & Analyzed: 08/19/13					
Chemical Oxygen Demand	10 U	25	10	mg/L						
LCS (BH31906-BS1)					Prepared & Analyzed: 08/19/13					
Chemical Oxygen Demand	45	25	10	mg/L	50		90	90-110		
Matrix Spike (BH31906-MS1)					Source: 1307818-03		Prepared & Analyzed: 08/19/13			
Chemical Oxygen Demand	65	25	10	mg/L	50	11	108	85-115		
Matrix Spike Dup (BH31906-MSD1)					Source: 1307818-03		Prepared & Analyzed: 08/19/13			
Chemical Oxygen Demand	61	25	10	mg/L	50	11	100	85-115	6	32
Batch BH31937 - COD prep										
Blank (BH31937-BLK1)					Prepared & Analyzed: 08/20/13					
Chemical Oxygen Demand	10 U	25	10	mg/L						
LCS (BH31937-BS1)					Prepared & Analyzed: 08/20/13					
Chemical Oxygen Demand	50	25	10	mg/L	50		100	90-110		
Matrix Spike (BH31937-MS1)					Source: 1308499-01		Prepared & Analyzed: 08/20/13			
Chemical Oxygen Demand	69	25	10	mg/L	50	21	96	85-115		
Matrix Spike Dup (BH31937-MSD1)					Source: 1308499-01		Prepared & Analyzed: 08/20/13			
Chemical Oxygen Demand	69	25	10	mg/L	50	21	96	85-115	0	32
Batch BH32003 - Digestion for TKN by EPA 351.2										
Blank (BH32003-BLK1)					Prepared: 08/20/13 Analyzed: 08/23/13					
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						

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August 29, 2013
Work Order: 1307818

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH32003 - Digestion for TKN by EPA 351.2										
LCS (BH32003-BS1)					Prepared: 08/20/13 Analyzed: 08/22/13					
Total Kjeldahl Nitrogen	2.57	0.20	0.05	mg/L	2.5		101	90-110		
Matrix Spike (BH32003-MS1)					Source: 1308545-02 Prepared: 08/20/13 Analyzed: 08/22/13					
Total Kjeldahl Nitrogen	3.20	0.20	0.05	mg/L	2.5	0.531	105	90-110		
Matrix Spike (BH32003-MS2)					Source: 1308367-02 Prepared: 08/20/13 Analyzed: 08/22/13					
Total Kjeldahl Nitrogen	3.03	0.20	0.05	mg/L	2.5	0.406	104	90-110		
Matrix Spike Dup (BH32003-MSD1)					Source: 1308545-02 Prepared: 08/20/13 Analyzed: 08/22/13					
Total Kjeldahl Nitrogen	2.92	0.20	0.05	mg/L	2.5	0.531	94	90-110	9	20
Matrix Spike Dup (BH32003-MSD2)					Source: 1308367-02 Prepared: 08/20/13 Analyzed: 08/22/13					
Total Kjeldahl Nitrogen	3.00	0.20	0.05	mg/L	2.5	0.406	102	90-110	1	20
Batch BH32004 - Digestion for TKN by EPA 351.2										
Blank (BH32004-BLK1)					Prepared: 08/20/13 Analyzed: 08/28/13					
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
LCS (BH32004-BS1)					Prepared: 08/20/13 Analyzed: 08/28/13					
Total Kjeldahl Nitrogen	2.72	0.20	0.05	mg/L	2.5		107	90-110		
Matrix Spike (BH32004-MS1)					Source: 1307786-08 Prepared: 08/20/13 Analyzed: 08/28/13					
Total Kjeldahl Nitrogen	3.54	0.20	0.05	mg/L	2.5	0.981	101	90-110		
Matrix Spike (BH32004-MS2)					Source: 1307786-05 Prepared: 08/20/13 Analyzed: 08/28/13					
Total Kjeldahl Nitrogen	3.54	0.20	0.05	mg/L	2.5	0.962	102	90-110		

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August 29, 2013
Work Order: 1307818

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH32004 - Digestion for TKN by EPA 351.2										
Matrix Spike Dup (BH32004-MSD1)		Source: 1307786-08			Prepared: 08/20/13 Analyzed: 08/28/13					
Total Kjeldahl Nitrogen	3.43	0.20	0.05	mg/L	2.5	0.981	97	90-110	3	20
Matrix Spike Dup (BH32004-MSD2)		Source: 1307786-05			Prepared: 08/20/13 Analyzed: 08/28/13					
Total Kjeldahl Nitrogen	3.47	0.20	0.05	mg/L	2.5	0.962	99	90-110	2	20
Batch BH32104 - Digestion for TP by EPA 365.2/SM4500PE										
Blank (BH32104-BLK1)					Prepared: 08/21/13 Analyzed: 08/26/13					
Phosphorous - Total as P	0.010 U	0.040	0.010	mg/L						
LCS (BH32104-BS1)					Prepared: 08/21/13 Analyzed: 08/26/13					
Phosphorous - Total as P	0.744	0.040	0.010	mg/L	0.80		93	90-110		
Matrix Spike (BH32104-MS1)		Source: 1307818-18			Prepared: 08/21/13 Analyzed: 08/26/13					
Phosphorous - Total as P	0.959	0.040	0.010	mg/L	1.0	0.0131	95	90-110		
Matrix Spike (BH32104-MS2)		Source: 1308396-07			Prepared: 08/21/13 Analyzed: 08/26/13					
Phosphorous - Total as P	0.996	0.040	0.010	mg/L	1.0	0.0573	94	90-110		
Matrix Spike Dup (BH32104-MSD1)		Source: 1307818-18			Prepared: 08/21/13 Analyzed: 08/26/13					
Phosphorous - Total as P	0.953	0.040	0.010	mg/L	1.0	0.0131	94	90-110	0.6	25
Matrix Spike Dup (BH32104-MSD2)		Source: 1308396-07			Prepared: 08/21/13 Analyzed: 08/26/13					
Phosphorous - Total as P	1.07	0.040	0.010	mg/L	1.0	0.0573	102	90-110	7	25
Batch BH32614 - Ammonia by SEAL										
Blank (BH32614-BLK1)					Prepared & Analyzed: 08/26/13					
Ammonia as N	0.009 U	0.040	0.009	mg/L						

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August 29, 2013
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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH32614 - Ammonia by SEAL										
LCS (BH32614-BS1)					Prepared & Analyzed: 08/26/13					
Ammonia as N	0.47	0.040	0.009	mg/L	0.50		93	90-110		
Matrix Spike (BH32614-MS1)					Source: 1307786-08 Prepared & Analyzed: 08/26/13					
Ammonia as N	0.48	0.040	0.009	mg/L	0.50	0.017	92	90-110		
Matrix Spike (BH32614-MS2)					Source: 1308326-07 Prepared & Analyzed: 08/26/13					
Ammonia as N	0.49	0.040	0.009	mg/L	0.50	0.015	94	90-110		
Matrix Spike Dup (BH32614-MSD1)					Source: 1307786-08 Prepared & Analyzed: 08/26/13					
Ammonia as N	0.48	0.040	0.009	mg/L	0.50	0.017	92	90-110	0.2	10
Matrix Spike Dup (BH32614-MSD2)					Source: 1308326-07 Prepared & Analyzed: 08/26/13					
Ammonia as N	0.47	0.040	0.009	mg/L	0.50	0.015	91	90-110	3	10
Batch BH32616 - Ammonia by SEAL										
Blank (BH32616-BLK1)					Prepared & Analyzed: 08/26/13					
Ammonia as N	0.009 U	0.040	0.009	mg/L						
LCS (BH32616-BS1)					Prepared & Analyzed: 08/26/13					
Ammonia as N	0.48	0.040	0.009	mg/L	0.50		96	90-110		
Matrix Spike (BH32616-MS1)					Source: 1307818-17 Prepared & Analyzed: 08/26/13					
Ammonia as N	0.47	0.040	0.009	mg/L	0.50	ND	94	90-110		
Matrix Spike (BH32616-MS2)					Source: 1308396-07 Prepared & Analyzed: 08/26/13					
Ammonia as N	0.50	0.040	0.009	mg/L	0.50	0.021	96	90-110		

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August 29, 2013
Work Order: 1307818

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH32616 - Ammonia by SEAL										
Matrix Spike Dup (BH32616-MSD1)		Source: 1307818-17			Prepared & Analyzed: 08/26/13					
Ammonia as N	0.50	0.040	0.009	mg/L	0.50	ND	99	90-110	6	10
Matrix Spike Dup (BH32616-MSD2)		Source: 1308396-07			Prepared & Analyzed: 08/26/13					
Ammonia as N	0.50	0.040	0.009	mg/L	0.50	0.021	95	90-110	0.5	10

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August 29, 2013
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*** Qualifiers, Notes and Definitions**

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



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

SAL Project No.

[illegible]

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

SAL Project No. 1307818

Client Name										Contact / Phone:										
Project Name / Location																				
B-HS2 SE#5																				
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																				
Sample Description										Date Time Matrix Composite Grab 500mLP, Cool Total Alkalinity, TSS, VSS, CBOD, NOX, OP, SO ₄ 125mLP, H ₂ SO ₄ COD, TKN, NH ₃ , TP 500mLP, NaOH, Zn Acetate H ₂ S 40mLaV, HCl TOC 500mLP, Cool Total Alkalinity, TSS, VSS, CBOD, NOX, OP 125mLP, H ₂ SO ₄ TKN, NH ₃ 500mLP, Cool NOx 500mLP, Cool NOx, SO ₄										
										Field pH Field Temperature Field Conductivity Field DO No. of Containers (Total per each location)										
01	BHS2-STE	8/7/13	10:47	WW	X	1	1	1	2							6.88	26.1	1323	8.96	
02	BHS2-DBOX	8/7/13	10:41	WW	X		1		2	1						6.96	27.7	1244	1.75	
03	BHS2-PUMP		10:25	WW	X		1		2	1						6.77	26.9	1235	2.01	
04	BHS2-PUMP-DUP		10:35	WW	X		1		2	1						6.77	26.9	1235	2.01	
05	BHS2-LIGNO-36		10:18	WW	X						1	1				6.83	27.4	1175	1.2	
06	BHS2-LIGNO-30		10:08	WW	X						1	1				6.79	27.4	1179	1.4	
07	BHS2-LIGNO-24		9:55	WW	X						1	1				6.82	27.3	1166	1.5	
08	BHS2-LIGNO-18		9:38	WW	X						1	1				6.83	27.2	1166	0.54	
09	BHS2-LIGNO-12		9:28	WW	X						1	1				6.87	27.1	1165	0.84	
10	BHS2-LIGNO-6		9:00	WW	X						1	1				6.90	26.9	1180	0.74	
11	BHS2-LIGNO-0		8:53	WW	X	1	1	1	2							6.92	26.7	1220	0.25	
12	BHS2-SULFUR-3		8:49	WW	X						1		1			6.76	26.2	1276	0.1	

Containers Prepared/
Relinquished:

Date/Time: 8/2/13

Received:

Date/Time: 8/5/13 12:00

Containers Prepared/
Relinquished:

Date/Time: 8/2/13

Received:

Date/Time: 8/7/13

Containers Prepared/
Relinquished:

Date/Time:

Received:

Date/Time:

Containers Prepared/
Relinquished:

Date/Time:

Received:

Date/Time:

Containers Prepared/
Relinquished:

Date/Time:

Received:

Date/Time:

Seal intact?

Samples intact upon arrival?

Received on ice? Temp

Proper preservatives indicated?

Rec'd within holding time?

Volatiles rec'd w/out headspace?

Proper containers used?

Y N

Y N

Y N

Y N

Y N

Y N

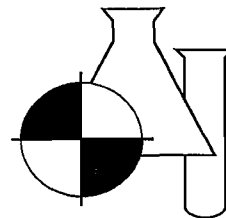
Y N

Instructions / Remarks:

1307818

BENCHMARK

EnviroAnalytical Inc.



NELAC Certification # E84167

ANALYTICAL TEST REPORT

THESE RESULTS MEET NELAC STANDARDS

Submission Number : 13080272

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

Project Name : B-HS2 SE # 5
Date Received : 08/07/2013
Time Received : 1510

Submission Number 13080272

Sample Number: 001 Sample Description: STE
Sample Date: 08/07/2013 Sample Method: Grab
Sample Time: 1047

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	200000 B	#/100 ML	100000	100000	SM9222D	08/07/2013	16:00	KD
E-COLI BY MPN	200000	#/100 ML	100000	100000	SM9223B	08/07/2013	16:00	KD

Submission Number 13080272

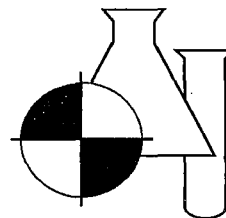
Sample Number: 002 Sample Description: DBOX
Sample Date: 08/07/2013 Sample Method: Grab
Sample Time: 1041

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	50000 B	#/100 ML	10000	10000	SM9222D	08/07/2013	16:00	KD
E-COLI BY MPN	50400	#/100 ML	1000	1000	SM9223B	08/07/2013	16:00	KD

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BENCHMARK

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NELAC Certification # E84167

Submission Number 13080272

Sample Number: 003

Sample Description: PUMP

Sample Date: 08/07/2013

Sample Method: Grab

Sample Time: 1025

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	100 B	#/100 ML	100	100	SM9222D	08/07/2013	16:00	KD
E-COLI BY MPN	132	#/100 ML	10	10	SM9223B	08/07/2013	16:00	KD

Submission Number 13080272

Sample Number: 004

Sample Description: PUMP-DUP

Sample Date: 08/07/2013

Sample Method: Grab

Sample Time: 1035

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	200 B	#/100 ML	100	100	SM9222D	08/07/2013	16:00	KD
E-COLI BY MPN	144	#/100 ML	10	10	SM9223B	08/07/2013	16:00	KD

Submission Number 13080272

Sample Number: 005

Sample Description: ST2

Sample Date: 08/07/2013

Sample Method: Grab

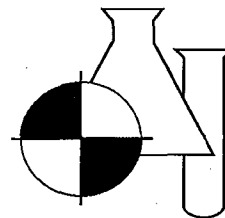
Sample Time: 0804

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	10 U	#/100 ML	10	10	SM9222D	08/07/2013	16:00	KD
E-COLI BY MPN	1	#/100 ML	1	1	SM9223B	08/07/2013	16:00	KD

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NELAC Certification # E84167

Submission Number 13080272

Sample Number: 006

Sample Description: LIGNO-O

Sample Date: 08/07/2013

Sample Method: Grab

Sample Time: 0853

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	10 U	#/100 ML	10	10	SM9222D	08/07/2013	16:00	KD
E-COLI BY MPN	1 U	#/100 ML	1	1	SM9223B	08/07/2013	16:00	KD

Submission Number 13080272

Sample Number: 007

Sample Description: EB

Sample Date: 08/07/2013

Sample Method: Grab

Sample Time: 1110

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	10 U	#/100 ML	10	10	SM9222D	08/07/2013	16:00	KD
E-COLI BY MPN	1 U	#/100 ML	1	1	SM9223B	08/07/2013	16:00	KD

Submission Number 13080272

Sample Number: 008

Sample Description: TAP

Sample Date: 08/07/2013

Sample Method: Grab

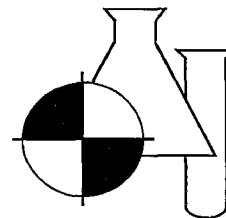
Sample Time: 1100

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	10 B	#/100 ML	10	10	SM9222D	08/07/2013	16:00	KD
E-COLI BY MPN	11	#/100 ML	1	1	SM9223B	08/07/2013	16:00	KD

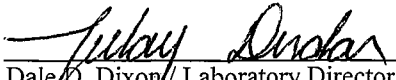
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BENCHMARK

EnviroAnalytical Inc.



NELAC Certification # E84167


Dale D. Dixon / Laboratory Director
Tülay Tanrısever / QC Officer
Jennifer Hatfield / QC Officer

08/14/2013

Date

DATA QUALIFIERS THAT MAY APPLY:

A = Value reported is an average of two or more determinations.

B = Results based upon colony counts outside the ideal range.

H = Value based on field kit determination. Results may not be accurate.

I = Reported value is between the laboratory MDL and the PQL.

J = Estimated value.

J1 = Est. value surrogate recovery limits exceeded.

J2 = Est. value. No quality control criteria exists for component.

J3 = Est. value quality control criteria for precision or accuracy not met.

J4 = Est. value. Sample matrix interference suspected.

J5 = Est. value. Data questionable due to improper lab or field protocols

K = Off-scale low. Value is known to be < the value reported.

L = Off-scale high. Value is known to be > the value reported

NOTES:

PQL = 4xMDL.

MBAS calculated as LAS; molecular weight = 348.

X = Value exceed MCL.

N = Presumptive evidence of presence of material.

O = Sampled, but analysis lost or not performed.

Q = Sample held beyond accepted hold time.

T = Value reported is < MDL. Reported for informational purposes only and shall not be used in statistical analysis.

U = Analyte analyzed but not detected at the value indicated.

V = Analyte detected in sample and method blank. Results for this analyte in associated samples may be biased high. Standard, Duplicate and Spike values are within control limits. Reported data are usable

Y = Analysis performed on an improperly preserved sample. Data may be inaccurate.

Z = Too many colonies were present (TNTC). The numeric value represents the filtration volume.

! = Data deviate from historically established concentration ranges.

? = Data rejected and should not be used. Some or all of QC data were outside criteria, and the Presence or absence of the analyte cannot be determined from the data.

* = Not reported due to interference.

ND = Not Detected at or above adjusted reporting limit.

NOTES:

For questions and comments regarding these results, please contact Bettina Beilfuss at (941) 723-9986

Results relate only to the samples.

Benchmark EnviroAnalytical, Inc
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941-723-9986
941-723-6061 Fax
www.benchmarkea.com

Client Information: **Hazen & Sawyer**

Address 10002 Princess Palm Ave. Suite 200

Tampa FL 33619

Phone # 813-630-4498

Fax # 813-630-1967

Email jhirst@hazenandsawyer.com

Project Name: **B-HS2 SE #5**

Laboratory Submission #

13080272

Sample Name	Sample Type ¹	Sample Matrix ²	Parameters, Preservation ⁴ , Container Type ³		Laboratory Sample #
			Fecal Coliform (MF) E-Coli		
			2 x 100mL Sterile Plastic		
			NaThio		
			Known Concentration:		
STE	G	WW	Date & Time: 8/7/13 10:47 am	10 ⁴ - 10 ⁸	1 ✓
DBOX	G	WW	Date & Time: 8/7/13 10:41 am	10 ³ - 10 ⁷	2 ✓
PUMP	G	WW	Date & Time: 8/7/13 10:25 am	10 - 10 ⁵	3 ✓
PUMP-DUP	G	WW	Date & Time: 8/7/13 10:35 am	10 - 10 ⁵	4 ✓
ST2	G	WW	Date & Time: 8/7/13 8:04 am	0 - 10 ³	5 ✓
LIGNO - O	G	WW	Date & Time: 8/7/13 8:53 am	0 - 10 ³	6 ✓
EB	G	WW	Date & Time: 8/7/13 11:10 am	0 - 10 ³	7 ✓
TAP	G	WW	Date & Time: 8/7/13 11:00 am	0 - 10 ³	8 ✓

1. "Sample Type" is used to indicate whether the sample was a grab (G) or whether it was a composite (C).
2. "Sample Matrix" is used to indicate whether the sample is being discharged to drinking water (DW), groundwater (GW), surface water (SW), soil, sediment (SDMNT), or sludge (SLDG).
3. "Container Type" is used to indicate whether the container is plastic (P) or glass (G).
4. Sample must be refrigerated or stored in wet ice after collection. The temperature during storage should be less than or equal to 6°C (42.8°F).
Under "Preservative," list any preservatives that were added to the sample container.

Instructions:

- Each bottle has a label identifying sample ID, premeasured preservative contained in the bottle, sample type, client ID, and parameters for analysis.
- The following information should be added to each bottle label after collection with permanent black ink: date and time of collection, sampler's name or initials, and any field number or ID.
- All bottles not containing preservative may be rinsed with appropriate sample prior to collection.
- The client is responsible for documentation of the sampling event. Please note special sampling events on the sample custody form.

Laboratory Sample Acceptability: pH < 2.0

BEA Temperature: 2.1°C

1	Collected By: <i>[Signature]</i>	Date: 8/7/13	Time: 1:25	Received By: <i>[Signature]</i>	Date: 8-7-13	Time: 1:25
2	Relinquished By: <i>[Signature]</i>	Date: 8/7/13	Time: 1400	Received By: <i>[Signature]</i>	Date: 8/7/13	Time: 14:00
3	Relinquished By: <i>[Signature]</i>	Date: 8/7/13	Time: 310	Received By: <i>[Signature]</i>	Date: 8/7/13	Time: 1510

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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

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Appendix C: Vericomm PLC Data

System Status			8/7/2013	7/23/2013	7/4/2013	6/23/2013
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	Off	Normal	Override	Normal
6	Active Off Time	Automatic	58.8 Minutes	58.8 Minutes	15.0 Minutes	58.8 Minutes
7	Active On Time	Automatic	1.2 Minutes	1.2 Minutes	1.2 Minutes	1.2 Minutes
9	Pump Mode	Automatic	Off	OffCycl	OffCycl	OffCycl
10	Pump Status	Automatic	Off	Off	Off	Off
12	Pump Cycles Today	Automatic	4.0 Cycles	2.0 Cycles	17.0 Cycles	3.0 Cycles
13	Override Cycles Today	Automatic	0.0 Cycles	0.0 Cycles	5.0 Cycles	0.0 Cycles
14	Pump Run Time Today	Automatic	3.3 Minutes	2.5 Minutes	18.5 Minutes	3.7 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	1.2 Minutes	1.2 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	120.0 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	Contactors 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	3.3 Minutes	2.5 Minutes	18.5 Minutes	3.7 Minutes
50	Override Cycles Today	Automatic	0	0	5	0
51	Pump Cycles Today	Automatic	4.0 Cycles	2.0 Cycles	17.0 Cycles	3.0 Cycles
52	Average Run Time per Cycle Today	Automatic	0.8 Minutes	1.3 Minutes	1.1 Minutes	1.2 Minutes
54	Brownouts Today	Automatic	0	0	0	0

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			8/7/2013	7/23/2013	7/4/2013	6/23/2013
30-Day History Data						
Point	Description	Status	Value	Value	Value	Value
65	30 Day Average Run Time per Day	Automatic	19.9 Minutes	19.0 Minutes	20.4 Minutes	20.3 Minutes
66	30 Day Average Override Cycles per Day	Automatic	1.2 Cycles	0.5 Cycles	1.3 Cycles	2.4 Cycles
67	30 Day Average Cycles per Day	Automatic	18.0 Cycles	17.2 Cycles	18.3 Cycles	18.3 Cycles
68	30 Day Average Run Time per Cycle	Automatic	1.1 Minutes	1.1 Minutes	1.1 Minutes	1.1 Minutes
71	30 Day Total Pump Run Time	Automatic	598.0 Minutes	570.5 Minutes	612.8 Minutes	608.6 Minutes
72	30 Day Total Override Cycles	Automatic	36.0 Cycles	14.0 Cycles	40.0 Cycles	73.0 Cycles
73	30 Day Total Cycles	Automatic	541.0 Cycles	517.0 Cycles	550.0 Cycles	550.0 Cycles
76	30 Day Total Brownouts	Automatic	1	1	1	3
Totalized Pump Data						
Point	Description	Status	Value	Value	Value	Value
82	Pump Total Run Time	Automatic	129.4 Hours	123.6 Hours	118.1 Hours	114.1 Hours
83	Pump Total Cycles	Automatic	6682.0 Cycles	6373.0 Cycles	6070.0 Cycles	5857.0 Cycles
Miscellaneous						
Point	Description	Status	Value	Value	Value	Value
145	Pump On Auto	Automatic	Off	Off	Off	Off
147	Pump Test Today	Automatic	Off	Off	On	Off
148	Pump Check Enable	Automatic	Off	Off	Off	Off
149	Total Override Cycles	Automatic	0	0	1	0
150	High Level Condition	Automatic	Off	Off	Off	Off
151	Leak Check Enable	Automatic	Off	On	On	On
152	Brownout State	Automatic	Off	Off	Off	Off
153	Test Mode	Automatic	Off	Off	Off	Off
Alarm Points						
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
Inputs & Outputs						
Point	Description	Status	Value	Value	Value	Value
177	High Level/Override Timer Float Input	Automatic	Off	Off	Off	Off
178	Timer Float Input	Automatic	Off	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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