



Florida Onsite Sewage Nitrogen Reduction Strategies Study

Task B.7

B-HS2 Field System Monitoring Report No. 4

Progress Report

June 2013

44227-001

HAZEN AND SAWYER
Environmental Engineers & Scientists

In association with



AET
Applied Environmental Technology

**OTIS
ENVIRONMENTAL
CONSULTANTS, LLC**

Florida Onsite Sewage Nitrogen Reduction Strategies Study

TASK B.7 PROGRESS REPORT

B-HS2 Field System Monitoring Report No. 4

Prepared for:

Florida Department of Health
Division of Disease Control and Health Protection
Bureau of Environmental Health
Onsite Sewage Programs
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FDOH Contract CORCL

June 2013

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1.0 Background

Task B of the Florida Onsite Sewage Nitrogen Reduction Strategies Study (FOSNRS) includes performing field experiments to critically evaluate the performance of nitrogen removal technologies that were identified in FOSNRS Task A.9. 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 fourth 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 fourth B-HS2 monitoring and sampling event conducted on June 4, 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 five 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

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.TM bundles).

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PRELIMINARY

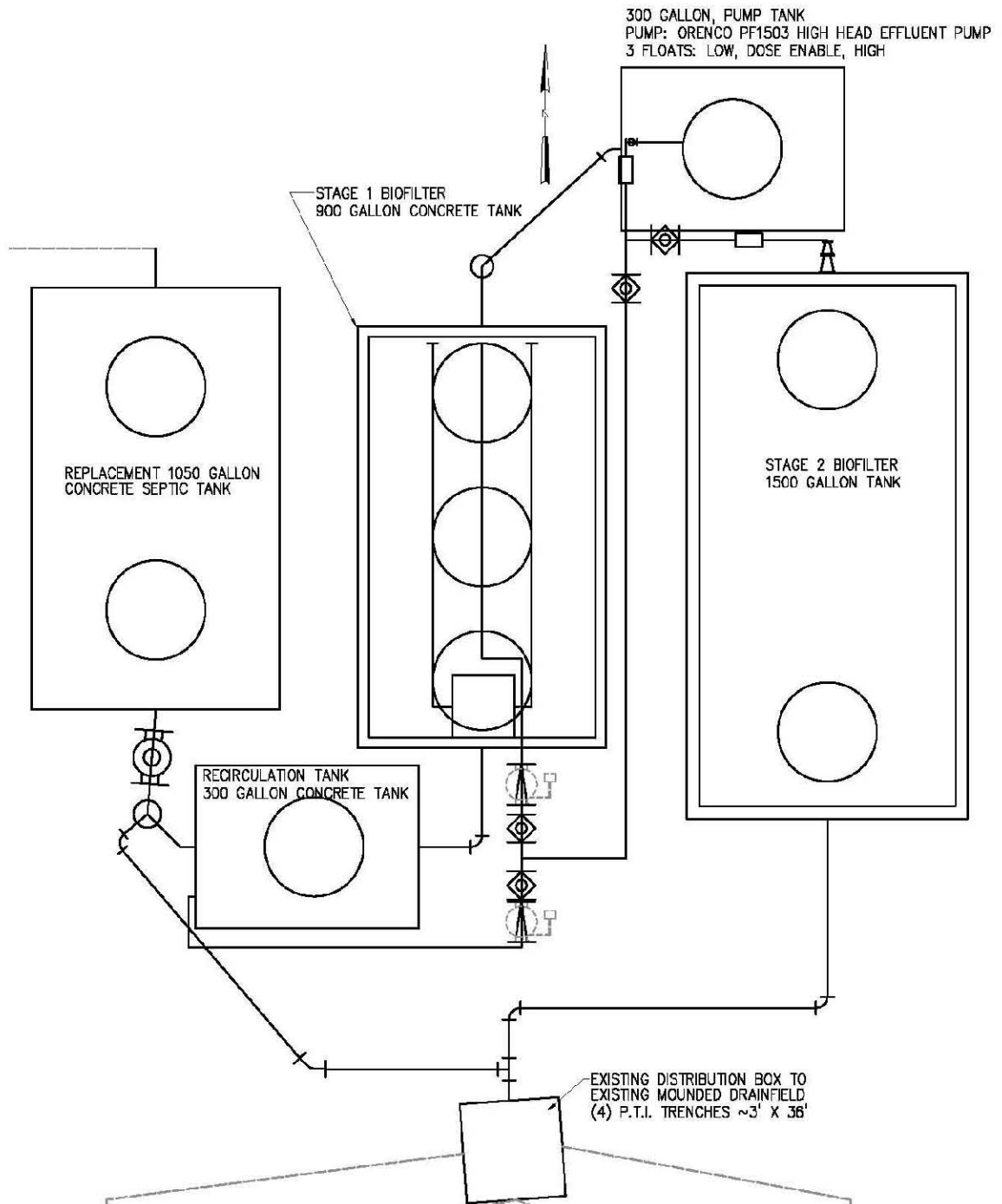
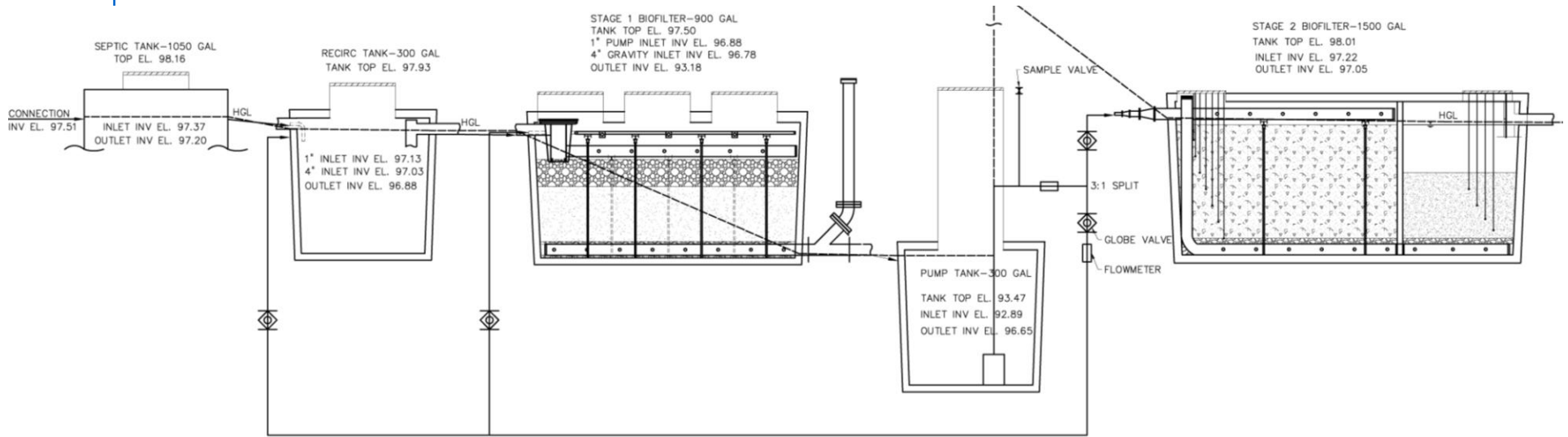


Figure 1
B-HS2 System Schematic

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NOTE: HGL SHOWN IS FOR RECIRCULATION TANK MODE OF OPERATION

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

PRELIMINARY

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.

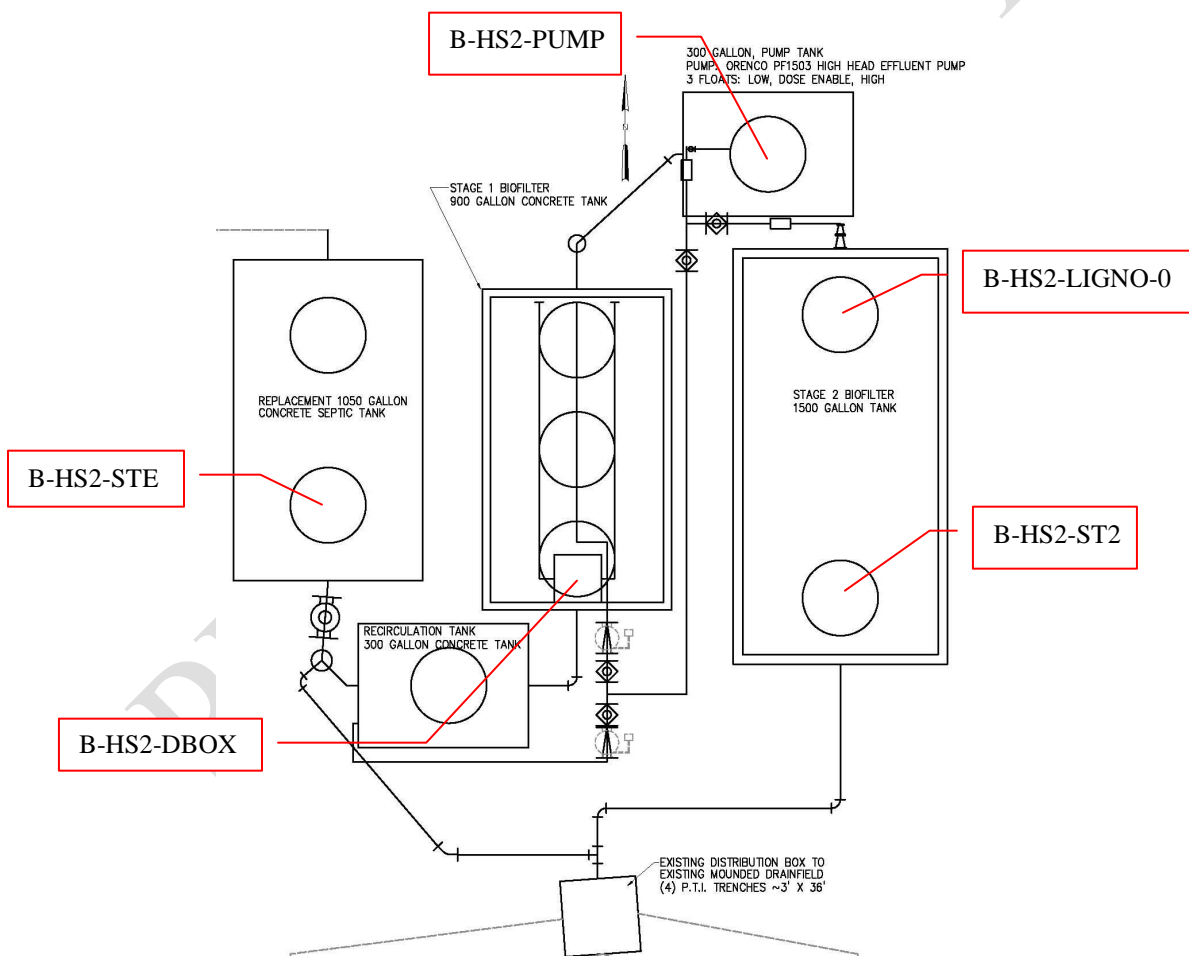


Figure 3
B-HS2 Sample and Monitoring Locations

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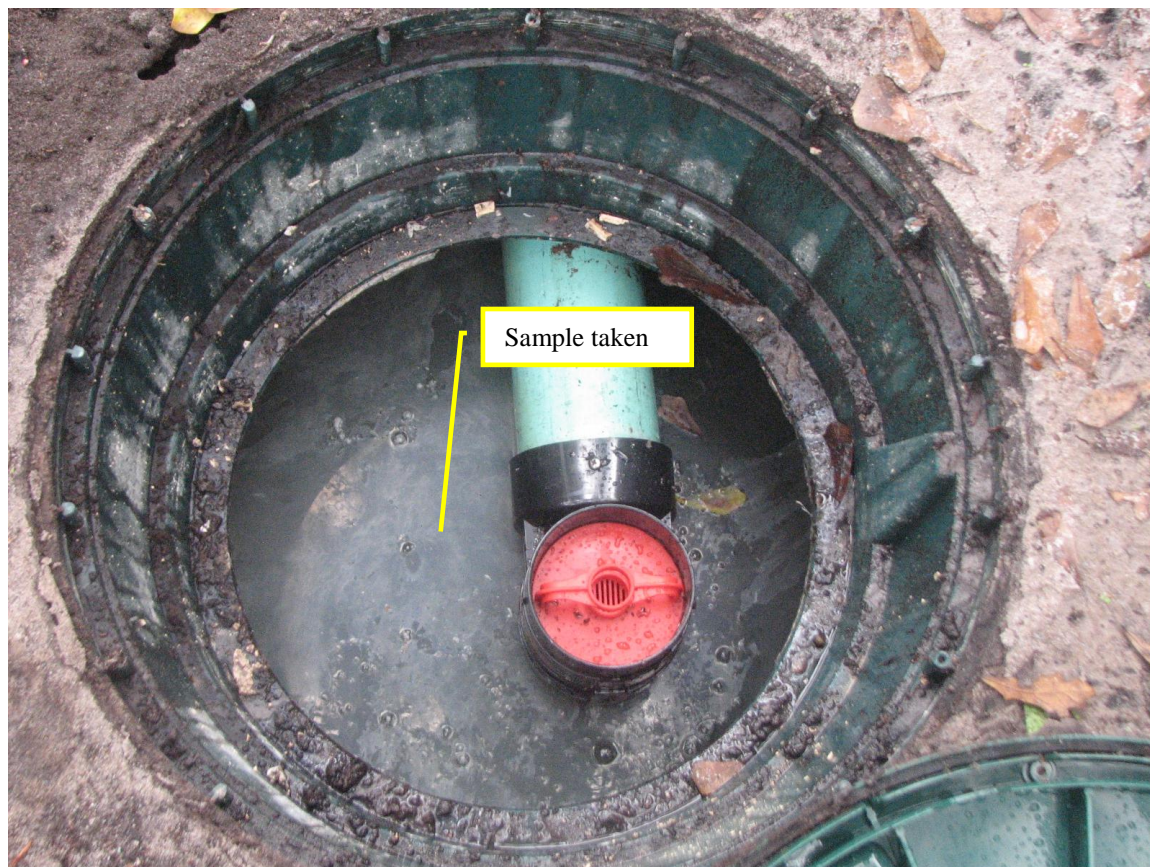


Figure 4
Second chamber of Primary Tank (B-HS2-STE sample)

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).



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



Figure 6
Pump discharge line sample port (B-HS2-PUMP sample)

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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). 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. 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)

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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 fourth formal sampling event, the water meter for the house and the treatment system flow meters were read and recorded on June 4, 2013 (Experimental Day 252). 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 Vericom 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 fourth formal sample event on June 4, 2013 for water quality analysis. Samples were collected at each of the five monitoring points described in Section 3.2: B-HS2-STE, B-HS2-DBOX, B-HS2-PUMP, B-HS2-LIGNO-0 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.

In addition, equipment blank (EB), tap water (TAP), and well water (WELL) 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. In addition, one well water sample was collected by filling sample containers with well water from a hose bib near the pump house.

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, 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), fecal coliform (fecal), and E.coli. 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
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
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 Vericomm PLC recorded data are provided in Appendix C. These include daily and cumulative pump runtime and system alarms that are used to check general pump operation and performance.

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
Total average start-up to 4/16/13		108

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Table 3
Summary of System Flow

Date and Time Read	Combined Pumped Flow, Q+R Water Meter Reading	Average Daily Combined, Q+R Flow	Stage 2, Q Flow Meter Reading	Average Daily Stage 2, Q Flow	Average Daily, R Flow	Average Recycle Ratio
	Cumulative Volume (gallons)	Gallons/day	Cumulative Volume (gallons)	Gallons/Day	Gallons/Day	Recycle: Forward Flow
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
Total average start-up to 6/4/13		513.7		113.1	401.8	3.55:1

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). The household flow average was 108 gallons per day with periods of higher and lower flows. The average combined pumped flow (recirculation and forward flow to the Stage 2 biofilter) was 513.7 gallons per day, and the average forward flow to the Stage 2 biofilter was 113.1 gallons per day. Therefore, the average recirculation flow was 401.8 gallons per day, with a corresponding average recirculation ratio of 3.55:1.

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
Total average start-up to 6/4/13		0.32	0.0028

The total average electrical use through June 4, 2013 was 0.32 kWh per day. The average electrical use per gallon treated was 0.0028 kWh per gallon, 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, NH₃-N, and NO_x-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. 4 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.

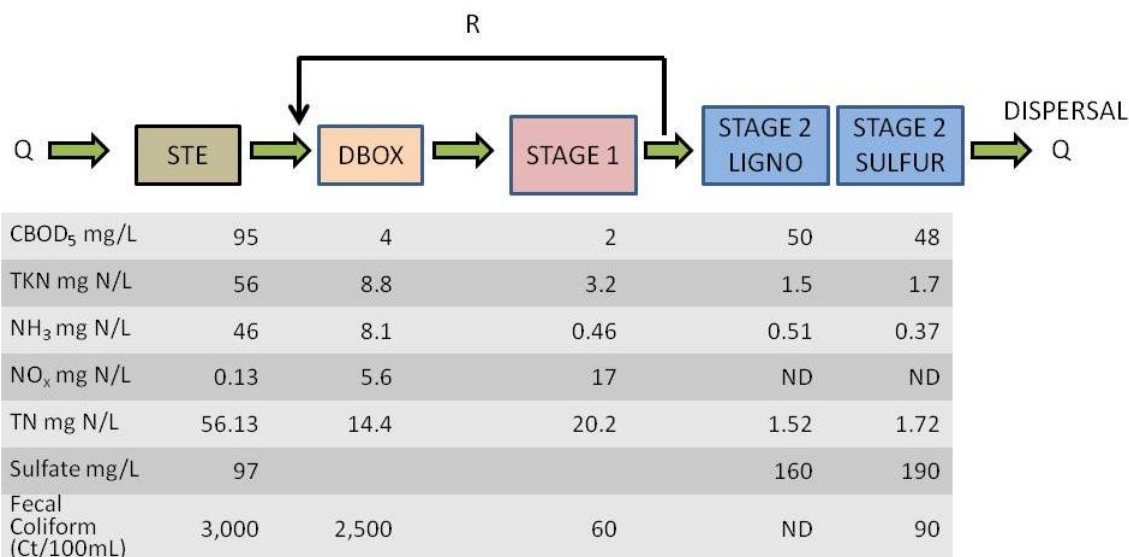


Figure 11
Graphical Representation of Nitrogen Results

Septic Tank Effluent (STE) Quality: The water quality characteristics of STE collected in Sample Event 4 were within the typical range generally expected for domestic STE. The measured STE total nitrogen (TN) concentration was 56 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 NH₃-N levels were 8.1 mg/L and 0.46 mg/L, respectively with a DO level at 2.03 mg/L in the Stage 1 effluent (Table 5). The DBOX TSS and CBOD₅ were 40 mg/L and 4 mg/L, respectively. The Stage 1 effluent TSS concentration was 45 mg/L, and CBOD₅ was below the detection limit of 2 mg/L. The DBOX NO_x-N was 5.6 mg/L, and the Stage 1 effluent NO_x-N was 17 mg/L. These results indicate significant pre-denitrification (approximately 64% 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 0.46 mg/L and TKN of 3.2 mg/L.

Stage 2 Biofilter Effluent (LIGNO-0" and ST2): Effluent NO_x-N from the Stage 2 biofilter was below the method detection limit of 0.02 mg/L. The low NO_x-N was accompanied by a measured 0.14 mg/L DO and -361.1 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 1.72 mg/L, and

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it appears that there is still a slight increase in nitrogen through the Stage 2 lignocellulosic and sulfur media, but less than measured in sample events 1 and 2. Increases in CBOD_5 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 effluent CBOD_5 was 48 mg/L. It is anticipated that the CBOD_5 concentration will decrease over time. The Stage 2 effluent sulfate concentration was 190 mg/L. This sample event did not include the Stage 2 biofilter profile samples.

PRELIMINARY

**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	6/4/2013 8:23	25.4	7.36	1393	0.07	-392.5	410	40	35	95	320	56.13	56	10	46	0.13	0.01	0.13	46.13	6.6	3.7	97	17	61	3000		31
BHS2-STE-BENCHMARK	6/4/2013 8:23																								200000	100000	
BHS2-DBOX-SAL	6/4/2013 8:11	25.1	6.77	1231	0.27	-154.7	310	40	40	4	48	14.4	8.8	0.7	8.1	5	0.59	5.6	13.7	5.3	3.2				2500		11
BHS2-DBOX-BENCHMARK	6/4/2013 8:11																								30000	10000	
BHS2-PUMP-SAL	6/4/2013 8:01	24.3	6.70	1259	2.03	-180.0	230	45	35	2	28	20.2	3.2	2.74	0.46	17	0.08	17	17.46	4.7	2				60		8.3
BHS2-PUMP-BENCHMARK	6/4/2013 8:01																								100	41	
BHS2-LIGNO-O-SAL	6/4/2013 9:00	24.7	6.97	1230	0.56	-339.8	400	5	5	50	110	1.52	1.5	0.99	0.51	0.01	0.01	0.02	0.53	4.5	2.7	160	19	35	1		13
BHS2-LIGNO-O-BENCHMARK	6/4/2013 9:00																								10	1	
BHS2-ST2-SAL	6/4/2013 7:47	24.6	6.51	1135	0.14	-361.1	320	15	5	48	260	1.72	1.7	1.33	0.37	0.01	0.01	0.02	0.39	3.5	2.2	190	16	23	90		22
BHS2-ST2-BENCHMARK	6/4/2013 7:47																								30	101	
BHS2-EB-SAL	6/4/2013 8:34	25.4	7.36	1393	0.07	-392.5	2	1	1	2	10	0.07	0.05	0.041	0.009	0.01	0.01	0.02	0.029	0.01	0.01	0.2	0.02	0.2	1		0.5
BHS2-EB-BENCHMARK	6/4/2013 8:34																								10	1	
BHS2-WELL	6/4/2013 8:50	24.5	7.50	836	0.63	-297.5	240	1	1	5	22	0.16	0.14	0.03	0.11	0.01	0.01	0.02	0.13	0.014	0.01	210	0.94	4.1	1		3.5
BHS2-TAP	6/4/2013 8:44	24.9	7.37	835	2.78	86.9	150	10	10	2	18	0.68	0.3	0.291	0.009	0.38	0.01	0.38	0.389	0.023	0.01	230	0.05	0.2	1		3.1

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.

PRELIMINARY

5.0 B-HS2 Sample Event No. 4: Summary and Recommendations

5.1 Summary

The results of the fourth sampling event indicate that the system is operating well and no adjustments are recommended at this time. The Sample Event No. 4 results indicate that:

- Septic tank effluent (STE) quality is characteristic of typical household STE quality. The total nitrogen concentration of 56 mg/L is within the range of values typically reported for Florida single family residence STE.
- The Stage 1 biofilter was effective in converting most of the ammonia N to oxidized nitrogen; effluent contained 3.2 mg/L TKN, of which 0.46 mg/L was ammonia.
- The Stage 2 biofilter was effective in producing a reducing environment and effluent $\text{NO}_x\text{-N}$ was below the method detection limit.
- The total nitrogen concentration in the final effluent from the total treatment system was approximately 2 mg/L, an approximately 97% reduction from STE.

5.2 Recommendations

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



Appendix A: Laboratory Report

PRELIMINARY

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

July 12, 2013
Work Order: 1305542

Laboratory Report

Project Name		B-HS2 SE#4						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-STE						
Matrix		Wastewater						
SAL Sample Number		1305542-01						
Date/Time Collected		06/04/13 08:23						
Collected by		Josephine Edeback-Hirst						
Date/Time Received		06/04/13 11:40						
<u>Inorganics</u>								
Hydrogen Sulfide (Unionized)	mg/L	17	SM 4550SF	0.04	0.01		06/04/13 12:45	1
Ammonia as N	mg/L	46	EPA 350.1	4.0	0.95		06/17/13 09:20	100
Carbonaceous BOD	mg/L	95	SM 5210B	2	2	06/04/13 17:15	06/09/13 15:22	1
Chemical Oxygen Demand	mg/L	320	EPA 410.4	25	10	06/11/13 13:04	06/11/13 17:08	1
Nitrate (as N)	mg/L	0.13	EPA 300.0	0.04	0.01		06/04/13 22:34	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		06/04/13 22:34	1
Orthophosphate as P	mg/L	3.7	EPA 300.0	0.040	0.010		06/04/13 22:34	1
Phosphorous - Total as P	mg/L	6.6	SM 4500P-E	0.20	0.050	06/12/13 11:20	06/17/13 12:54	5
Sulfate	mg/L	97	EPA 300.0	0.60	0.20		06/04/13 22:34	1
Sulfide	mg/L	61	SM 4500SF	0.40	0.10		06/04/13 12:45	1
Total Alkalinity	mg/L	410	SM 2320B	8.0	2.0		06/11/13 10:30	1
Total Kjeldahl Nitrogen	mg/L	56	EPA 351.2	0.20	0.05	06/13/13 09:23	06/18/13 16:25	20.83
Total Organic Carbon	mg/L	31	SM 5310B	1.0	0.50		06/07/13 13:21	1
Total Suspended Solids	mg/L	40	SM 2540D	1	1	06/05/13 09:10	06/06/13 10:40	1
Volatile Suspended Solids	mg/L	35	EPA 160.4	1	1	06/06/13 11:16	06/11/13 12:19	1
Nitrate+Nitrite (N)	mg/L	0.13	EPA 300.0	0.08	0.02		06/04/13 22:34	1
<u>Microbiology</u>								
Fecal Coliforms	CFU/100 ml	3,000	SM 9222D	1	1	06/04/13 14:11	06/05/13 12:48	1

Sample Description **BHS2-DBOX**
 Matrix **Wastewater**
 SAL Sample Number **1305542-02**
 Date/Time Collected **06/04/13 08:11**
 Collected by **Josephine Edeback-Hirst**
 Date/Time Received **06/04/13 11:40**

<u>Inorganics</u>								
Ammonia as N	mg/L	8.1	EPA 350.1	0.40	0.095		06/17/13 08:48	10
Carbonaceous BOD	mg/L	4	SM 5210B	2	2	06/04/13 17:15	06/09/13 15:22	1
Chemical Oxygen Demand	mg/L	48	EPA 410.4	25	10	06/11/13 13:04	06/11/13 17:08	1
Nitrate (as N)	mg/L	5.0	EPA 300.0	0.04	0.01		06/05/13 19:16	1
Nitrite (as N)	mg/L	0.59	EPA 300.0	0.04	0.01		06/05/13 19:16	1
Orthophosphate as P	mg/L	3.2	EPA 300.0	0.040	0.010		06/05/13 19:16	1
Phosphorous - Total as P	mg/L	5.3	SM 4500P-E	0.20	0.050	06/12/13 11:20	06/17/13 12:55	5
Total Alkalinity	mg/L	310	SM 2320B	8.0	2.0		06/11/13 10:30	1
Total Kjeldahl Nitrogen	mg/L	8.8	EPA 351.2	0.20	0.05	06/13/13 09:23	06/18/13 16:27	20.83
Total Organic Carbon	mg/L	11	SM 5310B	1.0	0.50		06/07/13 13:21	1

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Laboratory Report

Project Name **B-HS2 SE#4**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-DBOX						
Matrix		Wastewater						
SAL Sample Number		1305542-02						
Date/Time Collected		06/04/13 08:11						
Collected by		Josephine Edeback-Hirst						
Date/Time Received		06/04/13 11:40						
Total Suspended Solids	mg/L	40	SM 2540D	1	1	06/05/13 09:10	06/06/13 10:40	1
Volatile Suspended Solids	mg/L	40	EPA 160.4	1	1	06/06/13 11:16	06/11/13 12:19	1
Nitrate+Nitrite (N)	mg/L	5.6	EPA 300.0	0.08	0.02		06/05/13 19:16	1
Microbiology								
Fecal Coliforms	CFU/100 ml	2,500	SM 9222D	1	1	06/04/13 14:11	06/05/13 12:48	1

Sample Description **BHS2-PUMP**
 Matrix **Wastewater**
 SAL Sample Number **1305542-03**
 Date/Time Collected **06/04/13 08:01**
 Collected by **Josephine Edeback-Hirst**
 Date/Time Received **06/04/13 11:40**

Inorganics

Ammonia as N	mg/L	0.46	EPA 350.1	0.040	0.009		06/14/13 15:33	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	06/04/13 17:15	06/09/13 15:22	1
Chemical Oxygen Demand	mg/L	28	EPA 410.4	25	10	06/11/13 13:04	06/11/13 17:08	1
Nitrate (as N)	mg/L	17	EPA 300.0	0.04	0.01		06/05/13 19:25	1
Nitrite (as N)	mg/L	0.08	EPA 300.0	0.04	0.01		06/05/13 19:25	1
Orthophosphate as P	mg/L	2.0	EPA 300.0	0.040	0.010		06/05/13 19:25	1
Phosphorous - Total as P	mg/L	4.7	SM 4500P-E	0.20	0.050	06/12/13 11:20	06/17/13 12:56	5
Total Alkalinity	mg/L	230	SM 2320B	8.0	2.0		06/11/13 10:30	1
Total Kjeldahl Nitrogen	mg/L	3.2	EPA 351.2	0.20	0.05	06/13/13 09:23	06/18/13 15:05	1
Total Organic Carbon	mg/L	8.3	SM 5310B	1.0	0.50		06/07/13 13:21	1
Total Suspended Solids	mg/L	45	SM 2540D	1	1	06/05/13 09:10	06/06/13 10:40	1
Volatile Suspended Solids	mg/L	35	EPA 160.4	1	1	06/06/13 11:16	06/11/13 12:19	1
Nitrate+Nitrite (N)	mg/L	17	EPA 300.0	0.08	0.02		06/05/13 19:25	1

Microbiology

Fecal Coliforms	CFU/100 ml	60	SM 9222D	1	1	06/04/13 14:11	06/05/13 12:48	1
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Sample Description **BHS2-LIGNO-0**
 Matrix **Wastewater**
 SAL Sample Number **1305542-04**
 Date/Time Collected **06/04/13 09:00**
 Collected by **Josephine Edeback-Hirst**
 Date/Time Received **06/04/13 11:40**

Inorganics

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Laboratory Report

Project Name		B-HS2 SE#4						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-LIGNO-0						
Matrix		Wastewater						
SAL Sample Number		1305542-04						
Date/Time Collected		06/04/13 09:00						
Collected by		Josephine Edeback-Hirst						
Date/Time Received		06/04/13 11:40						
Hydrogen Sulfide (Unionized)	mg/L	19	SM 4550SF	0.04	0.01		06/04/13 12:45	1
Ammonia as N	mg/L	0.51	EPA 350.1	0.040	0.009		06/14/13 15:35	1
Carbonaceous BOD	mg/L	50	SM 5210B	2	2	06/04/13 17:15	06/09/13 15:22	1
Chemical Oxygen Demand	mg/L	110	EPA 410.4	25	10	06/11/13 13:04	06/11/13 17:08	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		06/05/13 19:34	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		06/05/13 19:34	1
Orthophosphate as P	mg/L	2.7	EPA 300.0	0.040	0.010		06/05/13 19:34	1
Phosphorous - Total as P	mg/L	4.5	SM 4500P-E	0.20	0.050	06/12/13 11:20	06/17/13 12:57	5
Sulfate	mg/L	160	EPA 300.0	6.0	2.0		06/10/13 22:31	10
Sulfide	mg/L	35	SM 4500SF	0.40	0.10		06/04/13 12:45	1
Total Alkalinity	mg/L	400	SM 2320B	8.0	2.0		06/11/13 10:30	1
Total Kjeldahl Nitrogen	mg/L	1.5	EPA 351.2	0.20	0.05	06/13/13 09:23	06/18/13 15:07	1
Total Organic Carbon	mg/L	13	SM 5310B	1.0	0.50		06/07/13 13:21	1
Total Suspended Solids	mg/L	5	SM 2540D	1	1	06/05/13 09:10	06/06/13 10:40	1
Volatile Suspended Solids	mg/L	5	EPA 160.4	1	1	06/06/13 11:16	06/11/13 12:19	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		06/05/13 19:34	1
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	06/04/13 14:11	06/05/13 12:48	1

Sample Description **BHS2-ST2**
 Matrix **Wastewater**
 SAL Sample Number **1305542-05**
 Date/Time Collected **06/04/13 07:47**
 Collected by **Josephine Edeback-Hirst**
 Date/Time Received **06/04/13 11:40**

Inorganics								
Hydrogen Sulfide (Unionized)	mg/L	16	SM 4550SF	0.04	0.01		06/04/13 12:45	1
Ammonia as N	mg/L	0.37	EPA 350.1	0.040	0.009		06/14/13 15:38	1
Carbonaceous BOD	mg/L	48	SM 5210B	2	2	06/05/13 11:25	06/10/13 15:33	1
Chemical Oxygen Demand	mg/L	260	EPA 410.4	25	10	06/11/13 13:04	06/11/13 17:08	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		06/05/13 19:44	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		06/05/13 19:44	1
Orthophosphate as P	mg/L	2.2	EPA 300.0	0.040	0.010		06/05/13 19:44	1
Phosphorous - Total as P	mg/L	3.5	SM 4500P-E	0.080	0.020	06/12/13 11:20	06/17/13 12:38	2
Sulfate	mg/L	190	EPA 300.0	6.0	2.0		06/10/13 22:40	10
Sulfide	mg/L	23	SM 4500SF	0.40	0.10		06/04/13 12:45	1
Total Alkalinity	mg/L	320	SM 2320B	8.0	2.0		06/11/13 10:30	1

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Laboratory Report

Project Name		B-HS2 SE#4						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-ST2						
Matrix		Wastewater						
SAL Sample Number		1305542-05						
Date/Time Collected		06/04/13 07:47						
Collected by		Josephine Edeback-Hirst						
Date/Time Received		06/04/13 11:40						
Total Kjeldahl Nitrogen	mg/L	1.7	EPA 351.2	0.20	0.05	06/13/13 09:23	06/18/13 15:08	1
Total Organic Carbon	mg/L	22	SM 5310B	1.0	0.50		06/07/13 13:21	1
Total Suspended Solids	mg/L	15	SM 2540D	1	1	06/05/13 09:10	06/06/13 10:40	1
Volatile Suspended Solids	mg/L	5	EPA 160.4	1	1	06/06/13 11:16	06/11/13 12:19	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		06/05/13 19:44	1
Microbiology								
Fecal Coliforms	CFU/100 ml	90	SM 9222D	1	1	06/04/13 14:11	06/05/13 12:48	1
Sample Description		BHS2-EB						
Matrix		Reagent Water						
SAL Sample Number		1305542-06						
Date/Time Collected		06/04/13 08:34						
Collected by		Josephine Edeback-Hirst						
Date/Time Received		06/04/13 11:40						
Inorganics								
Hydrogen Sulfide (Unionized)	mg/L	0.02 I	SM 4550SF	0.04	0.01		06/04/13 12:45	1
Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		06/14/13 15:40	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	06/05/13 11:25	06/10/13 15:33	1
Chemical Oxygen Demand	mg/L	10 U	EPA 410.4	25	10	06/11/13 13:04	06/11/13 17:08	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		06/05/13 20:21	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		06/05/13 20:21	1
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		06/05/13 20:21	1
Phosphorous - Total as P	mg/L	0.010 U	SM 4500P-E	0.040	0.010	06/12/13 11:20	06/17/13 11:52	1
Sulfate	mg/L	0.20 U	EPA 300.0	0.60	0.20		06/05/13 20:21	1
Sulfide	mg/L	0.20 I	SM 4500SF	0.40	0.10		06/04/13 12:45	1
Total Alkalinity	mg/L	2.0 U	SM 2320B	8.0	2.0		06/11/13 10:30	1
Total Kjeldahl Nitrogen	mg/L	0.05 U	EPA 351.2	0.20	0.05	06/13/13 09:30	06/19/13 08:30	1
Total Organic Carbon	mg/L	0.50 U	SM 5310B	1.0	0.50		06/07/13 13:21	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	06/05/13 09:10	06/06/13 10:40	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	06/06/13 11:16	06/11/13 12:19	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		06/05/13 20:21	1
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	06/04/13 14:11	06/05/13 12:48	1

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Laboratory Report

Project Name		B-HS2 SE#4						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-WELL						
Matrix		Groundwater						
SAL Sample Number		1305542-07						
Date/Time Collected		06/04/13 08:50						
Collected by		Josephine Edeback-Hirst						
Date/Time Received		06/04/13 11:40						
<u>Inorganics</u>								
Hydrogen Sulfide (Unionized)	mg/L	0.94	SM 4550SF	0.04	0.01		06/04/13 12:45	1
Ammonia as N	mg/L	0.11	EPA 350.1	0.040	0.009		06/14/13 15:42	1
Carbonaceous BOD	mg/L	5	SM 5210B	2	2	06/05/13 11:25	06/10/13 15:33	1
Chemical Oxygen Demand	mg/L	22 I	EPA 410.4	25	10	06/11/13 13:04	06/11/13 17:08	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		06/05/13 20:31	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		06/05/13 20:31	1
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		06/05/13 20:31	1
Phosphorous - Total as P	mg/L	0.014 I	SM 4500P-E	0.040	0.010	06/12/13 11:20	06/17/13 11:53	1
Sulfate	mg/L	210	EPA 300.0	6.0	2.0		06/10/13 22:50	10
Sulfide	mg/L	4.1	SM 4500SF	0.40	0.10		06/04/13 12:45	1
Total Alkalinity	mg/L	240	SM 2320B	8.0	2.0		06/11/13 10:30	1
Total Kjeldahl Nitrogen	mg/L	0.14 I	EPA 351.2	0.20	0.05	06/13/13 09:30	06/20/13 15:52	1
Total Organic Carbon	mg/L	3.5	SM 5310B	1.0	0.50		06/07/13 13:21	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	06/05/13 09:10	06/06/13 10:40	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	06/06/13 11:16	06/11/13 12:19	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		06/05/13 20:31	1
<u>Microbiology</u>								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	06/04/13 14:11	06/05/13 12:48	1

Sample Description **BHS2-TAP**
 Matrix **Drinking Water**
 SAL Sample Number **1305542-08**
 Date/Time Collected **06/04/13 08:44**
 Collected by **Josephine Edeback-Hirst**
 Date/Time Received **06/04/13 11:40**

<u>Inorganics</u>								
Hydrogen Sulfide (Unionized)	mg/L	0.05	SM 4550SF	0.04	0.01		06/04/13 12:45	1
Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		06/14/13 15:44	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	06/05/13 11:25	06/10/13 15:33	1
Chemical Oxygen Demand	mg/L	18 I	EPA 410.4	25	10	06/11/13 13:04	06/11/13 17:08	1
Nitrate (as N)	mg/L	0.38	EPA 300.0	0.04	0.01		06/05/13 20:40	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		06/05/13 20:40	1
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		06/05/13 20:40	1
Phosphorous - Total as P	mg/L	0.023 I	SM 4500P-E	0.040	0.010	06/12/13 11:20	06/17/13 11:54	1
Sulfate	mg/L	230	EPA 300.0	6.0	2.0		06/10/13 22:59	10
Sulfide	mg/L	0.20 I	SM 4500SF	0.40	0.10		06/04/13 12:45	1

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Laboratory Report

Project Name		B-HS2 SE#4						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-TAP						
Matrix		Drinking Water						
SAL Sample Number		1305542-08						
Date/Time Collected		06/04/13 08:44						
Collected by		Josephine Edeback-Hirst						
Date/Time Received		06/04/13 11:40						
Total Alkalinity	mg/L	150	SM 2320B	8.0	2.0		06/11/13 10:30	1
Total Kjeldahl Nitrogen	mg/L	0.30	EPA 351.2	0.20	0.05	06/13/13 09:30	06/19/13 08:31	1
Total Organic Carbon	mg/L	3.1	SM 5310B	1.0	0.50		06/07/13 13:21	1
Total Suspended Solids	mg/L	10	SM 2540D	1	1	06/05/13 09:10	06/06/13 10:40	1
Volatile Suspended Solids	mg/L	10	EPA 160.4	1	1	06/06/13 11:16	06/11/13 12:19	1
Nitrate+Nitrite (N)	mg/L	0.38	EPA 300.0	0.08	0.02		06/05/13 20:40	1
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	06/04/13 14:11	06/05/13 12:48	1

SOUTHERN ANALYTICAL LABORATORIES, INC.

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BF30424 - Sulfide prep										
Blank (BF30424-BLK1)					Prepared & Analyzed: 06/04/13					
Sulfide	0.10 U	0.40	0.10	mg/L						
LCS (BF30424-BS1)					Prepared & Analyzed: 06/04/13					
Sulfide	4.92	0.40	0.10	mg/L	5.0		98	85-115		
Matrix Spike (BF30424-MS1)					Source: 1305651-01 Prepared & Analyzed: 06/04/13					
Sulfide	4.71	0.40	0.10	mg/L	5.0	0.200	90	85-115		
Matrix Spike Dup (BF30424-MSD1)					Source: 1305651-01 Prepared & Analyzed: 06/04/13					
Sulfide	4.51	0.40	0.10	mg/L	5.0	0.200	86	85-115	4	14
Batch BF30431 - Ion Chromatography 300.0 Prep										
Blank (BF30431-BLK1)					Prepared & Analyzed: 06/04/13					
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Sulfate	0.20 U	0.60	0.20	mg/L						
Orthophosphate as P	0.010 U	0.040	0.010	mg/L						
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
LCS (BF30431-BS1)					Prepared & Analyzed: 06/04/13					
Nitrite (as N)	1.33	0.04	0.01	mg/L	1.4		95	85-115		
Nitrate (as N)	1.61	0.04	0.01	mg/L	1.7		95	85-115		
Orthophosphate as P	0.867	0.040	0.010	mg/L	0.90		96	85-115		
Sulfate	8.68	0.60	0.20	mg/L	9.0		96	85-115		
LCS (BF30431-BS2)					Prepared & Analyzed: 06/04/13					
Nitrite (as N)	1.35	0.04	0.01	mg/L	1.4		96	85-115		
Orthophosphate as P	0.876	0.040	0.010	mg/L	0.90		97	85-115		
Sulfate	8.78	0.60	0.20	mg/L	9.0		98	85-115		
Nitrate (as N)	1.62	0.04	0.01	mg/L	1.7		95	85-115		

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC %REC	%REC Limits	RPD	RPD Limit
Batch BF30431 - Ion Chromatography 300.0 Prep										
LCS (BF30431-BS3)					Prepared & Analyzed: 06/04/13					
Nitrate (as N)	1.71	0.04	0.01	mg/L	1.7		101	85-115		
Sulfate	9.08	0.60	0.20	mg/L	9.0		101	85-115		
Orthophosphate as P	0.875	0.040	0.010	mg/L	0.90		97	85-115		
Nitrite (as N)	1.47	0.04	0.01	mg/L	1.4		105	85-115		
LCS (BF30431-BS4)					Prepared & Analyzed: 06/04/13					
Sulfate	8.78	0.60	0.20	mg/L	9.0		98	85-115		
Nitrite (as N)	1.34	0.04	0.01	mg/L	1.4		96	85-115		
Nitrate (as N)	1.62	0.04	0.01	mg/L	1.7		96	85-115		
Orthophosphate as P	0.875	0.040	0.010	mg/L	0.90		97	85-115		
LCS (BF30431-BS5)					Prepared & Analyzed: 06/04/13					
Nitrite (as N)	1.48	0.04	0.01	mg/L	1.4		105	85-115		
Sulfate	9.08	0.60	0.20	mg/L	9.0		101	85-115		
Orthophosphate as P	0.875	0.040	0.010	mg/L	0.90		97	85-115		
Nitrate (as N)	1.70	0.04	0.01	mg/L	1.7		100	85-115		
LCS Dup (BF30431-BSD1)					Prepared & Analyzed: 06/04/13					
Sulfate	8.87	0.60	0.20	mg/L	9.0		99	85-115	2	200
Nitrite (as N)	1.36	0.04	0.01	mg/L	1.4		97	85-115	2	200
Orthophosphate as P	0.880	0.040	0.010	mg/L	0.90		98	85-115	1	200
Nitrate (as N)	1.64	0.04	0.01	mg/L	1.7		96	85-115	2	200
Matrix Spike (BF30431-MS1)					Source: 1305750-01		Prepared & Analyzed: 06/04/13			
Orthophosphate as P	1.23	0.040	0.010	mg/L	0.90	0.298	103	85-115		
Nitrite (as N)	1.47	0.04	0.01	mg/L	1.4	ND	105	85-115		
Sulfate	16.4	0.60	0.20	mg/L	9.0	7.93	94	85-115		
Nitrate (as N)	1.96	0.04	0.01	mg/L	1.7	0.332	96	85-115		

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 Tampa, FL 33619

July 12, 2013
 Work Order: 1305542

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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Batch BF30431 - Ion Chromatography 300.0 Prep

Matrix Spike (BF30431-MS2)		Source: 1305750-09			Prepared & Analyzed: 06/04/13					
Orthophosphate as P	0.899	0.040	0.010	mg/L	0.90	ND	100	85-115		
Sulfate	17.0	0.60	0.20	mg/L	9.0	8.13	98	85-115		
Nitrate (as N)	2.10	0.04	0.01	mg/L	1.7	0.426	99	85-115		
Nitrite (as N)	1.40	0.04	0.01	mg/L	1.4	ND	100	85-115		

Batch BF30438 - BOD

Blank (BF30438-BLK1)					Prepared: 06/04/13 Analyzed: 06/09/13					
Carbonaceous BOD	2 U	2	2	mg/L						
LCS (BF30438-BS1)					Prepared: 06/04/13 Analyzed: 06/09/13					
Carbonaceous BOD	202	2	2	mg/L	200		101	85-115		
LCS Dup (BF30438-BSD1)					Prepared: 06/04/13 Analyzed: 06/09/13					
Carbonaceous BOD	214	2	2	mg/L	200		107	85-115	6	200
Duplicate (BF30438-DUP1)		Source: 1305542-01			Prepared: 06/04/13 Analyzed: 06/09/13					
Carbonaceous BOD	99	2	2	mg/L		95			3	25

Batch BF30503 - TSS prep

Blank (BF30503-BLK1)					Prepared: 06/05/13 Analyzed: 06/06/13					
Total Suspended Solids	1 U	1	1	mg/L						
LCS (BF30503-BS1)					Prepared: 06/05/13 Analyzed: 06/06/13					
Total Suspended Solids	51.5	1	1	mg/L	50		103	85-115		

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC %REC	Limit	RPD	RPD Limit
Batch BF30503 - TSS prep										
Duplicate (BF30503-DUP1)		Source: 1305542-01			Prepared: 06/05/13 Analyzed: 06/06/13					
Total Suspended Solids	42.5	1	1	mg/L		40.0			6	30
Batch BF30519 - Ion Chromatography 300.0 Prep										
Blank (BF30519-BLK1)		Prepared & Analyzed: 06/05/13								
Nitrite (as N)	0.01 U	0.04	0.01	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						
Sulfate	0.20 U	0.60	0.20	mg/L						
LCS (BF30519-BS1)		Prepared & Analyzed: 06/05/13								
Nitrate (as N)	1.61	0.04	0.01	mg/L	1.7		95	85-115		
Orthophosphate as P	0.867	0.040	0.010	mg/L	0.90		96	85-115		
Nitrite (as N)	1.40	0.04	0.01	mg/L	1.4		100	85-115		
Sulfate	8.67	0.60	0.20	mg/L	9.0		96	85-115		
LCS Dup (BF30519-BSD1)		Prepared & Analyzed: 06/05/13								
Orthophosphate as P	0.866	0.040	0.010	mg/L	0.90		96	85-115	0.1	200
Nitrate (as N)	1.70	0.04	0.01	mg/L	1.7		100	85-115	5	200
Sulfate	8.95	0.60	0.20	mg/L	9.0		99	85-115	3	200
Nitrite (as N)	1.46	0.04	0.01	mg/L	1.4		104	85-115	4	200
Matrix Spike (BF30519-MS1)		Source: 1305542-05			Prepared & Analyzed: 06/05/13					
Nitrate (as N)	1.58	0.04	0.01	mg/L	1.7	ND	93	85-115		
Nitrite (as N)	1.36	0.04	0.01	mg/L	1.4	ND	97	85-115		
Orthophosphate as P	3.08	0.040	0.010	mg/L	0.90	2.19	99	85-115		
Sulfate	160	0.60	0.20	mg/L	9.0	151	97	85-115		

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC %REC	%REC Limits	RPD	RPD Limit
Batch BF30519 - Ion Chromatography 300.0 Prep										
Matrix Spike (BF30519-MS2)		Source: 1305328-01			Prepared & Analyzed: 06/05/13					
Sulfate	212	6.0	2.0	mg/L	90		236	85-115		
Orthophosphate as P	10.8	0.40	0.10	mg/L	9.0		120	85-115		
Nitrate (as N)	16.4	0.40	0.10	mg/L	17	0.0750	96	85-115		
Nitrite (as N)	15.0	0.40	0.10	mg/L	14		107	85-115		
Batch BF30529 - BOD										
Blank (BF30529-BLK1)					Prepared: 06/05/13 Analyzed: 06/10/13					
Carbonaceous BOD	2 U	2	2	mg/L						
LCS (BF30529-BS1)					Prepared: 06/05/13 Analyzed: 06/10/13					
Carbonaceous BOD	206	2	2	mg/L	200		103	85-115		
LCS Dup (BF30529-BSD1)					Prepared: 06/05/13 Analyzed: 06/10/13					
Carbonaceous BOD	215	2	2	mg/L	200		107	85-115	4	200
Duplicate (BF30529-DUP1)		Source: 1305764-01			Prepared: 06/05/13 Analyzed: 06/10/13					
Carbonaceous BOD	210	2	2	mg/L		260			18	25
Batch BF30612 - TSS prep										
Blank (BF30612-BLK1)					Prepared: 06/06/13 Analyzed: 06/11/13					
Volatile Suspended Solids	1 U	1		mg/L						
Duplicate (BF30612-DUP1)		Source: 1305542-01			Prepared: 06/06/13 Analyzed: 06/11/13					
Volatile Suspended Solids	35.0	1		mg/L		35.0			0	20

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC %REC	Limit	RPD	RPD Limit
Batch BF30715 - TOC prep										
Blank (BF30715-BLK1)					Prepared & Analyzed: 06/07/13					
Total Organic Carbon	0.50 U	1.0	0.50	mg/L						
LCS (BF30715-BS1)					Prepared & Analyzed: 06/07/13					
Total Organic Carbon	9.40	1.0	0.50	mg/L	10		94	90-110		
LCS (BF30715-BS2)					Prepared & Analyzed: 06/07/13					
Total Organic Carbon	9.56	1.0	0.50	mg/L	10		96	90-110		
LCS (BF30715-BS3)					Prepared & Analyzed: 06/07/13					
Total Organic Carbon	9.83	1.0	0.50	mg/L	10		98	90-110		
LCS (BF30715-BS4)					Prepared & Analyzed: 06/07/13					
Total Organic Carbon	10.1	1.0	0.50	mg/L	10		101	90-110		
LCS (BF30715-BS5)					Prepared & Analyzed: 06/07/13					
Total Organic Carbon	10.3	1.0	0.50	mg/L	10		103	90-110		
Matrix Spike (BF30715-MS1)		Source: 1305542-08			Prepared & Analyzed: 06/07/13					
Total Organic Carbon	12.1	1.0	0.50	mg/L	10	3.08	90	85-115		
Matrix Spike Dup (BF30715-MSD1)		Source: 1305542-08			Prepared & Analyzed: 06/07/13					
Total Organic Carbon	12.4	1.0	0.50	mg/L	10	3.08	94	85-115	3	10
Batch BF31026 - Ion Chromatography 300.0 Prep										
Blank (BF31026-BLK1)					Prepared & Analyzed: 06/10/13					
Sulfate	0.20 U	0.60	0.20	mg/L						

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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 BF31026 - Ion Chromatography 300.0 Prep

LCS (BF31026-BS1)					Prepared & Analyzed: 06/10/13					
Sulfate	8.48	0.60	0.20	mg/L	9.0		94	85-115		
LCS Dup (BF31026-BSD1)					Prepared & Analyzed: 06/10/13					
Sulfate	8.52	0.60	0.20	mg/L	9.0		95	85-115	0.4	200
Matrix Spike (BF31026-MS1)		Source: 1305551-01			Prepared & Analyzed: 06/10/13					
Sulfate	1,050	60	20	mg/L	900	205	94	85-115		
Matrix Spike (BF31026-MS2)		Source: 1305885-03			Prepared & Analyzed: 06/11/13					
Sulfate	9,290	600	200	mg/L	9000	771	95	85-115		

Batch BF31121 - COD prep

Blank (BF31121-BLK1)					Prepared & Analyzed: 06/11/13					
Chemical Oxygen Demand	10 U	25	10	mg/L						
LCS (BF31121-BS1)					Prepared & Analyzed: 06/11/13					
Chemical Oxygen Demand	49	25	10	mg/L	50		98	90-110		
Matrix Spike (BF31121-MS1)		Source: 1305542-06			Prepared & Analyzed: 06/11/13					
Chemical Oxygen Demand	55	25	10	mg/L	50	ND	110	85-115		
Matrix Spike Dup (BF31121-MSD1)		Source: 1305542-06			Prepared & Analyzed: 06/11/13					
Chemical Oxygen Demand	57	25	10	mg/L	50	ND	114	85-115	4	32

Batch BF31216 - Digestion for TP by EPA 365.2/SM4500PE

Blank (BF31216-BLK1)					Prepared: 06/12/13 Analyzed: 06/17/13					
Phosphorous - Total as P	0.010 U	0.040	0.010	mg/L						

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC %REC	%REC Limits	RPD	RPD Limit
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Batch BF31216 - Digestion for TP by EPA 365.2/SM4500PE

LCS (BF31216-BS1)					Prepared: 06/12/13 Analyzed: 06/17/13					
Phosphorous - Total as P	0.784	0.040	0.010	mg/L	0.80		98	90-110		
Matrix Spike (BF31216-MS1)					Source: 1305979-07 Prepared: 06/12/13 Analyzed: 06/17/13					
Phosphorous - Total as P	0.978	0.040	0.010	mg/L	1.0	0.0419	94	90-110		
Matrix Spike (BF31216-MS2)					Source: 1305985-02 Prepared: 06/12/13 Analyzed: 06/17/13					
Phosphorous - Total as P	0.956	0.040	0.010	mg/L	1.0	0.0222	93	90-110		
Matrix Spike Dup (BF31216-MSD1)					Source: 1305979-07 Prepared: 06/12/13 Analyzed: 06/17/13					
Phosphorous - Total as P	0.970	0.040	0.010	mg/L	1.0	0.0419	93	90-110	0.9	25
Matrix Spike Dup (BF31216-MSD2)					Source: 1305985-02 Prepared: 06/12/13 Analyzed: 06/17/13					
Phosphorous - Total as P	0.932	0.040	0.010	mg/L	1.0	0.0222	91	90-110	3	25

Batch BF31306 - Digestion for TKN by EPA 351.2

Blank (BF31306-BLK1)					Prepared: 06/13/13 Analyzed: 06/19/13					
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
LCS (BF31306-BS1)					Prepared: 06/13/13 Analyzed: 06/18/13					
Total Kjeldahl Nitrogen	2.40	0.20	0.05	mg/L	2.5		95	90-110		
Matrix Spike (BF31306-MS1)					Source: 1305939-07 Prepared: 06/13/13 Analyzed: 06/18/13					
Total Kjeldahl Nitrogen	2.98	0.20	0.05	mg/L	2.5	0.366	103	90-110		
Matrix Spike (BF31306-MS2)					Source: 1305705-01 Prepared: 06/13/13 Analyzed: 06/18/13					
Total Kjeldahl Nitrogen	2.53	0.20	0.05	mg/L	2.5	0.218	91	90-110		

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BF31306 - Digestion for TKN by EPA 351.2										
Matrix Spike Dup (BF31306-MSD1)		Source: 1305939-07			Prepared: 06/13/13 Analyzed: 06/18/13					
Total Kjeldahl Nitrogen	2.86	0.20	0.05	mg/L	2.5	0.366	99	90-110	4	20
Matrix Spike Dup (BF31306-MSD2)		Source: 1305705-01			Prepared: 06/13/13 Analyzed: 06/18/13					
Total Kjeldahl Nitrogen	2.66	0.20	0.05	mg/L	2.5	0.218	96	90-110	5	20
Batch BF31309 - Digestion for TKN by EPA 351.2										
Blank (BF31309-BLK1)					Prepared: 06/13/13 Analyzed: 06/19/13					
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
LCS (BF31309-BS1)					Prepared: 06/13/13 Analyzed: 06/18/13					
Total Kjeldahl Nitrogen	2.54	0.20	0.05	mg/L	2.5		100	90-110		
Matrix Spike (BF31309-MS1)		Source: 1305985-02			Prepared: 06/13/13 Analyzed: 06/20/13					
Total Kjeldahl Nitrogen	2.91	0.20	0.05	mg/L	2.5	0.451	97	90-110		
Matrix Spike Dup (BF31309-MSD1)		Source: 1305985-02			Prepared: 06/13/13 Analyzed: 06/20/13					
Total Kjeldahl Nitrogen	2.89	0.20	0.05	mg/L	2.5	0.451	96	90-110	0.7	20
Batch BF31312 - alkalinity										
Blank (BF31312-BLK1)					Prepared & Analyzed: 06/11/13					
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
LCS (BF31312-BS1)					Prepared & Analyzed: 06/11/13					
Total Alkalinity	130	8.0	2.0	mg/L	120		105	90-110		

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BF31312 - alkalinity										
Matrix Spike (BF31312-MS1)		Source: 1305863-01			Prepared & Analyzed: 06/11/13					
Total Alkalinity	250	8.0	2.0	mg/L	120	130	96	80-120		
Matrix Spike Dup (BF31312-MSD1)		Source: 1305863-01			Prepared & Analyzed: 06/11/13					
Total Alkalinity	240	8.0	2.0	mg/L	120	130	87	80-120	4	26
Batch BF31402 - Ammonia by SEAL										
Blank (BF31402-BLK1)					Prepared & Analyzed: 06/14/13					
Ammonia as N	0.009 U	0.040	0.009	mg/L						
LCS (BF31402-BS1)					Prepared & Analyzed: 06/17/13					
Ammonia as N	0.46	0.040	0.009	mg/L	0.50		91	90-110		
Matrix Spike (BF31402-MS1)		Source: 1305542-08			Prepared & Analyzed: 06/17/13					
Ammonia as N	0.46	0.040	0.009	mg/L	0.50	ND	92	90-110		
Matrix Spike (BF31402-MS2)		Source: 1305979-07			Prepared & Analyzed: 06/17/13					
Ammonia as N	0.53	0.040	0.009	mg/L	0.50	0.016	102	90-110		
Matrix Spike Dup (BF31402-MSD1)		Source: 1305542-08			Prepared & Analyzed: 06/17/13					
Ammonia as N	0.45	0.040	0.009	mg/L	0.50	ND	90	90-110	1	10
Matrix Spike Dup (BF31402-MSD2)		Source: 1305979-07			Prepared & Analyzed: 06/17/13					
Ammonia as N	0.50	0.040	0.009	mg/L	0.50	0.016	97	90-110	5	10

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Microbiology - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BF30426 - FC-MF										
Blank (BF30426-BLK1)					Prepared: 06/04/13 Analyzed: 06/05/13					
Fecal Coliforms	1 U	1	1	CFU/100 ml						
Duplicate (BF30426-DUP1)					Source: 1305725-02 Prepared: 06/04/13 Analyzed: 06/05/13					
Fecal Coliforms	1 U	1	1	CFU/100 ml		ND				200
Duplicate (BF30426-DUP2)					Source: 1305542-06 Prepared: 06/04/13 Analyzed: 06/05/13					
Fecal Coliforms	1 U	1	1	CFU/100 ml		ND				200

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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.

Questions regarding this report should be directed to :

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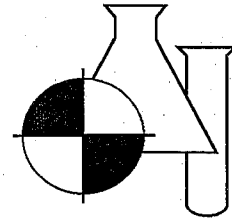
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SAL Project No. 1305542

Client Name Hazen and Sawyer										Contact / Phone:															
Project Name / Location B-HS2 SE#4																									
Samplers: (Signature) <i>[Signature]</i>										PARAMETER / CONTAINER DESCRIPTION															
Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water																									
SAL Use Only Sample No.	Sample Description	Date	Time	Matrix	Composite	Grab	500mLP, Cool Total Alkalinity, TSS, VSS, CBOD, NOx, OP, SO ₄	125mLP, H ₂ SO ₄ COD, TKN, NH ₃ , TP	500mLP, Zn Acetate, NaOH H ₂ S	40mLaV, HCl TOC	125mLP, Na ₂ S ₂ O ₃ FC	500mLP, Cool Total Alkalinity, TSS, VSS, CBOD, NOx, OP	Field pH	Field Temperature	Field Conductivity	Field DO	No. of Containers (Total per each location)								
	01 BHS2-STE	6/4/13	8:23	WW		X	1	1	1	2	2		7.30	25.4	1393	0.07									
	02 BHS2-DBOX	6/4/13	8:11	WW		X		1		2	2	1	6.71	25.1	1231	0.27									
	03 BHS2-PUMP	6/4/13	8:01	WW		X		1		2	2	1	6.7	24.3	1259	2.03									
	04 BHS2-LIGNO-0	6/4/13	9:00	WW		X	1	1	1	2	2		6.97	24.7	1230	0.56									
	05 BHS2-ST2	6/4/13	7:47	WW		X	1	1	1	2	2		6.51	21.6	1135	0.14									
	06 BHS2-EB	6/4/13	8:34	R		X	1	1	1	2	2		8.2	25.4	682	7.70									
	07 BHS2-WELL	6/4/13	8:50	GW		X	1	1	1	2	2		7.5	24.5	836	0.63									
	08 BHS2-TAP	6/4/13	8:44	DW		X	1	1	1	2	2		7.37	24.9	835	2.78									
Containers Prepared/ Relinquished:		Date/Time:	Received:	Date/Time:	Instructions / Remarks:																				
<i>[Signature]</i>		5-30-13 ²⁰⁰	<i>[Signature]</i>	5/31/13 1200	Seal intact? <input checked="" type="radio"/> N NA Samples intact upon arrival? <input checked="" type="radio"/> N NA Received on ice? Temp _____ <input checked="" type="radio"/> N NA Proper preservatives indicated? <input checked="" type="radio"/> N NA Rec'd w/ lthin holding time? <input checked="" type="radio"/> N NA Volatiles rec'd w/ out headspace? Y <input checked="" type="radio"/> N NA Proper containers used? <input checked="" type="radio"/> N NA 1305542																				
<i>[Signature]</i>		6/4/13 10:30	<i>[Signature]</i>	6/4/13 10:30																					
<i>[Signature]</i>			<i>[Signature]</i>	6/4/13 1140																					

BENCHMARK

EnviroAnalytical Inc.



NELAC Certification # E84167

ANALYTICAL TEST REPORT

THESE RESULTS MEET NELAC STANDARDS

Submission Number : 13060047

Pace Analytical Services, Inc.
8 East Tower Circle
Ormond Beach, FL 32174

Project Name : HAZEN & SAWYER
Date Received : 06/04/2013
Time Received : 1245

Sakina

Submission Number 13060047

Sample Number: 001 **Sample Description:** BHS2-STE
Sample Date: 06/04/2013 **Sample Method:** Grab
Sample Time: 0823

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	200000 B	#/100 ML	100000	100000	SM9222D	06/04/2013	14:00	MR
E-COLI BY MPN	100000	#/100 ML	100000	100000	SM9223B	06/04/2013	14:00	MR

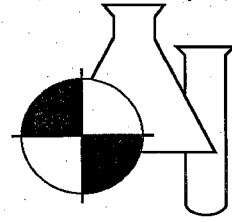
Submission Number 13060047

Sample Number: 002 **Sample Description:** BHS2-DBOX
Sample Date: 06/04/2013 **Sample Method:** Grab
Sample Time: 0811

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	30000 B	#/100 ML	10000	10000	SM9222D	06/04/2013	14:00	MR
E-COLI BY MPN	10000 U	#/100 ML	10000	10000	SM9223B	06/04/2013	14:00	MR

BENCHMARK

EnviroAnalytical Inc.



NELAC Certification # E84167

Submission Number 13060047

Sample Number: 003 Sample Description: BHS2-PUMP
 Sample Date: 06/04/2013 Sample Method: Grab
 Sample Time: 0801

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	100 U	#/100 ML	100	100	SM9222D	06/04/2013	14:00	MR
E-COLI BY MPN	41	#/100 ML	10	10	SM9223B	06/04/2013	14:00	MR

Submission Number 13060047

Sample Number: 004 Sample Description: BHS2-LI6NO-O
 Sample Date: 06/04/2013 Sample Method: Grab
 Sample Time: 0900

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	10 U	#/100 ML	10	10	SM9222D	06/04/2013	14:00	MR
E-COLI BY MPN	1 U	#/100 ML	1	1	SM9223B	06/04/2013	14:00	MR

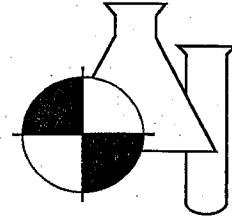
Submission Number 13060047

Sample Number: 005 Sample Description: BHS2-ST2
 Sample Date: 06/04/2013 Sample Method: Grab
 Sample Time: 0747

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	30 B	#/100 ML	10	10	SM9222D	06/04/2013	14:00	MR
E-COLI BY MPN	101	#/100 ML	1	1	SM9223B	06/04/2013	14:00	MR

BENCHMARK

EnviroAnalytical Inc.



NELAC Certification # E84167

Submission Number 13060047

Sample Number: 006

Sample Description: BHS2-EB

Sample Date: 06/04/2013

Sample Method: Grab

Sample Time: 0834

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	10 U	#/100 ML	10	10	SM9222D	06/04/2013	14:00	MR
E-COLI BY MPN	1 U	#/100 ML	1	1	SM9223B	06/04/2013	14:00	MR

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

06/05/2013

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

- 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.

NOTES:

- PQL = 4xMDL.
- MBAS calculated as LAS; molecular weight = 348.
- X = Value exceed MCL.

ND = Not Detected at or above adjusted reporting limit.
 NOTES:

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

Results relate only to the samples.

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: of

1623975

Section A
Required Client Information:

Section B
Required Project Information:

Section C
Invoice Information:

Company: Hazen + Sawyer
Address: 10002 Princess Palm Ave
Tampa, FL
Email To: jhirst@hazendawson.com
Phone: 813 630 4148 Fax: _____
Requested Due Date/TAT: _____

Report To: _____
Copy To: _____
Purchase Order No.: _____
Project Name: _____
Project Number: _____

Attention: _____
Company Name: _____
Address: _____
Pace Quote Reference: _____
Pace Project Manager: _____
Pace Profile #: _____

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER _____

Site Location
STATE: _____

Section D
Required Client Information

SAMPLE ID

(A-Z, 0-9 /, -)
Sample IDs MUST BE UNIQUE

ITEM #	Matrix Codes MATRIX / CODE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED				SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives								Analysis Test ↓	Requested Analysis Filtered (Y/N)	Residual Chlorine (Y/N)
				COMPOSITE START		COMPOSITE END/GRAB				Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₃	Methanol	Other			
				DATE	TIME	DATE	TIME													
1	BHS2-STE	G		6/4	8:23			3												
2	BHS2-DBOX	G		6/4	8:11			2												
3	BHS2-PUMP	G		6/4	8:01			3												
4	BHS2-LIGNO-0	G		6/4	9:00			3												
5	BHS2-ST 2	G		6/4	7:47			2												
6	BHS2-EB	G		6/4	8:34			2												
7	BHS2-WELL																			
8	BHS																			
9																				
10																				
11																				
12																				

Fecal Range

STE 10⁴-10⁹

DBox 10³-10⁸

PUMP 10-10⁶

ST 2 0-10⁴

LIGNO-0 0-10⁴

EB 0-10⁴

Pace Project No./ Lab I.D.

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
EMPTY CONTAINER	Joseph L. H. HAS	5-29-13	1300	Joseph L. H. HAS	5-29-13	1300				
B-HS-PUMP Nitrogen contains	Joseph L. H. HAS	6-4-13	9:56	Scott McCell	6-4-13	0956				
Fecal coliform + e-coli contains	Joseph L. H. HAS	6-4-13	10:30	Scott McCell	6-4-13	10:30				
	Scott McCell	6/4/13	1245	Joseph L. H. HAS	6/4/13	1245	3.1	Y	N	Y

* Did Not receive bottle for TRN/NH3/NOx. 6/4/13 ORIGINAL

SAMPLER NAME AND SIGNATURE: Joseph L. H. HAS

PRINT Name of SAMPLER: Joseph L. H. HAS

SIGNATURE of SAMPLER: [Signature] DATE Signed (MM/DD/YY): 6/4/13

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

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
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PRELIMINARY

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Appendix C: Vericomm PLC Data

System Status			6/4/2013	5/23/2013	5/6/2013
Point	Description	Status	Value	Value	Value
1	Alarm Status	Automatic	OK	OK	OK
2	Alert Status	Automatic	OK	OK	OK
3	System Mode	Automatic	Normal	Normal	Normal
5	Timer Mode	Automatic	Off	Normal	Override
6	Active Off Time	Automatic	58.8 Minutes	58.8 Minutes	15.0 Minutes
7	Active On Time	Automatic	1.2 Minutes	1.2 Minutes	1.2 Minutes
9	Pump Mode	Automatic	Off	OffCycl	OffCycl
10	Pump Status	Automatic	Off	Off	Off
12	Pump Cycles Today	Automatic	1.0 Cycles	2.0 Cycles	15.0 Cycles
13	Override Cycles Today	Automatic	0.0 Cycles	0.0 Cycles	5.0 Cycles
14	Pump Run Time Today	Automatic	0.6 Minutes	2.4 Minutes	17.2 Minutes
Settings					
Point	Description	Status	Value	Value	Value
17	Off Cycle Time	Constant/Setpoint	58.8 Minutes	58.8 Minutes	58.8 Minutes
18	On Cycle Time	Constant/Setpoint	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
20	Override On Cycle Time	Constant/Setpoint	1.2 Minutes	1.2 Minutes	1.2 Minutes
21	Minimum Override Cycles	Automatic	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
24	Time Limit per Day	Constant/Setpoint	40.0 Minutes	40.0 Minutes	40.0 Minutes
25	High Level Pump Test	Automatic	2.0 Minutes	2.0 Minutes	2.0 Minutes
28	Alarm Update Interval	Automatic	120.0 Minutes	120.0 Minutes	120.0 Minutes
29	Page Delay	Automatic	960.0 Minutes	960.0 Minutes	960.0 Minutes
30	Page Interval	Automatic	30.0 Minutes	30.0 Minutes	30.0 Minutes
31	Local Alarm Delay	Constant/Setpoint	1140.0 Minutes	1140.0 Minutes	1140.0 Minutes
32	Local Reactivate Delay	Automatic	120.0 Minutes	120.0 Minutes	120.0 Minutes
Troubleshooting					
Point	Description	Status	Value	Value	Value
33	Top Float Status	Automatic	OK	OK	OK
34	Middle Float Status	Automatic	OK	OK	OK
35	Bottom Float Status	Automatic	OK	OK	OK
37	Contactator Status	Automatic	OK	OK	OK
38	Pump Status	Automatic	OK	OK	OK
40	Filter Status	Automatic	OK	OK	OK
41	Tank Status	Automatic	OK	OK	OK
43	Power Status	Automatic	OK	OK	OK
Flow Data					
Point	Description	Status	Value	Value	Value
49	Pump Run Time Today	Automatic	0.6 Minutes	2.4 Minutes	17.2 Minutes
50	Override Cycles Today	Automatic	0	0	5
51	Pump Cycles Today	Automatic	1.0 Cycles	2.0 Cycles	15.0 Cycles
52	Average Run Time per Cycle Today	Automatic	0.6 Minutes	1.2 Minutes	1.1 Minutes
54	Brownouts Today	Automatic	0	0	0

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			6/4/2013	5/23/2013	5/6/2013
30-Day History Data					
Point	Description	Status	21.2 Minutes	21.0 Minutes	21.4 Minutes
65	30 Day Average Run Time per Day	Automatic	1.5 Cycles	1.6 Cycles	2.3 Cycles
66	30 Day Average Override Cycles per Day	Automatic	18.8 Cycles	18.6 Cycles	19.0 Cycles
67	30 Day Average Cycles per Day	Automatic	1.1 Minutes	1.1 Minutes	1.1 Minutes
68	30 Day Average Run Time per Cycle	Automatic	636.9 Minutes	630.5 Minutes	640.5 Minutes
71	30 Day Total Pump Run Time	Automatic	44.0 Cycles	48.0 Cycles	69.0 Cycles
72	30 Day Total Override Cycles	Automatic	564.0 Cycles	558.0 Cycles	569.0 Cycles
73	30 Day Total Cycles	Automatic	3	1	0
76	30 Day Total Brownouts	Automatic			
Totalized Pump Data			Value	Value	Value
Point	Description	Status	107.6 Hours	103.6 Hours	97.7 Hours
82	Pump Total Run Time	Automatic	5504.0 Cycles	5289.0 Cycles	4976.0 Cycles
83	Pump Total Cycles	Automatic			
Miscellaneous					
Point	Description	Status	Off	Off	Off
145	Pump On Auto	Automatic	Off	Off	On
147	Pump Test Today	Automatic	Off	Off	Off
148	Pump Check Enable	Automatic	0	0	1
149	Total Override Cycles	Automatic	Off	Off	Off
150	High Level Condition	Automatic	Off	On	On
151	Leak Check Enable	Automatic	Off	Off	Off
152	Brownout State	Automatic	Off	Off	Off
153	Test Mode	Automatic			
Alarm Points					
Point	Description	Status	Off	Off	Off
161	General Alarm	Automatic	Off	Off	Off
162	New Alarm	Automatic	On	On	On
163	Update Central Enable	Automatic	Off	Off	Off
167	Page Alarm Start	Automatic	Off	Off	Off
168	Pager Signal	Override Off	Off	Off	Off
169	Local Alarm Start	Automatic	Off	Off	Off
170	Local Alarm Silence	Automatic			
Inputs & Outputs					
Point	Description	Status	Off	Off	Off
177	High Level/Override Timer Float Input	Automatic	Off	On	On
178	Timer Float Input	Automatic	On	On	On
179	Redundant Off Float & Low Level Alarm Input	Automatic	Off	Off	Off
181	Push To Silence Input	Automatic	Off	Off	Off
182	Auxiliary Contact Input	Automatic	Off	Off	Off
186	Pump Output	Automatic	Off	Off	Off
188	Alarm Light Output	Automatic	Off	Off	Off
189	Audible Alarm Output	Automatic			

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