Florida HEALTH

Florida Onsite Sewage Nitrogen Reduction Strategies Study

Task B.7

B-HS5 Field System Monitoring Report No. 1

Progress Report

October 2013



In association with:



Otis Environmental Consultants, LLC



Florida Onsite Sewage Nitrogen Reduction Strategies Study

TASK B.7 PROGRESS REPORT

B-HS5 Field System Monitoring Report No. 1

Prepared for:

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FDOH Contract CORCL

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Prepared by:



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1.0 Background

Task B of the Florida Onsite Sewage Nitrogen Reduction Strategies Study (FOSNRS) includes performing field experiments to critically evaluate the performance of nitrogen removal technologies that were identified in FOSNRS Task A.9 and pilot tested in PNRS II. To meet this objective, full scale treatment systems are being installed at various residential sites in Florida and monitored over an extended timeframe under actual onsite conditions. The Task B Quality Assurance Project Plan (Task B.5) documents the objectives, monitoring framework, sample frequency and duration, and analytical methods to be used at the home sites. This report documents the first sample event of the passive nitrogen reduction system at home site B-HS5 in Seminole County, Florida.

2.0 Purpose

This monitoring report documents data collected from the first B-HS5 monitoring and sampling event conducted on September 27, 2013. This monitoring event consisted of collecting flow measurements from the household water use meter, treatment system flow meters, recording electricity use, monitoring of field parameters, collection of water samples from four points in the treatment system, and sample analyses by a NELAC certified laboratory.

3.0 Materials and Methods

3.1 Project Site

The B-HS5 field site is located in Seminole County, FL. The nitrogen reducing onsite treatment system for the single family residence was installed in June 2013. Design and construction details were presented previously in the Task B.6 document. Figure 1 is a system schematic showing the system components and layout of the installation. A flow schematic of the system is shown in Figure 2. The PNRS system consists of the addition of three tanks to the existing permitted system: a 1500 gallon plastic tank Stage 1 unsaturated media filter; 300 gallon concrete pump tank; and 1,500 gallon two chamber concrete Stage 2 saturated media biofilter. The existing 1,350 gallon concrete

septic tank continues to provide primary treatment for the PNRS system. 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 drainfield which is a standard bed.





3.2 Monitoring and Sample Locations and Identification

The four primary monitoring points for the B-HS5 system are shown in Figure 3. Household wastewater enters the primary tank and exits as septic tank effluent through an effluent screen into the Stage 1 biofilter. The first primary monitoring point, B-HS5-STE, is the effluent sampled approximately 1.5 feet below the surface of the primary tank prior to the effluent filter (Figure 4), which is referred to as primary effluent or septic tank effluent (STE). Samples from monitoring point B-HS5-STE are representative of the whole household wastewater. The B-HS5-STE sample represents the influent to the remainder of the onsite nitrogen reduction system.





Figure 4 Primary Tank (B-HS5-STE sample)

The primary tank contents are discharged by gravity to a distribution box, located inside the Stage 1 biofilter, which splits the flow between two perforated distribution pipes along the top of the unsaturated Stage 1 biofilter media. In the Stage 1 biofilter, wastewater percolates downward through the unsaturated expanded clay media where nitrification occurs. The Stage 1 biofilter contains 12.8 inches of coarse expanded clay media (Riverlite[™] 1/4; 1.1 to 4.8 mm) above 21 inches of finer expanded clay media (Riverlite[™] 3/16; 0.6 to 2.4 mm). Stage 1 biofilter effluent flows into the pump tank by gravity. The second primary sampling point (B-HS5-ST1), is sampled approximately 1.5 feet below the surface of the pump tank representing the Stage 1 biofilter effluent (Figure 5).

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Figure 5 Stage 1 Effluent in Pump Tank (B-HS5-ST1 sample)

The pump tank discharge is split via two throttling gate valves which allow for optional recycling of a portion of the Stage 1 biofilter effluent with the balance proceeding to the Stage 2 biofilter. The system was designed with two operational modes. In the first mode, 100 percent of the Stage 1 effluent discharges to the Stage 2 biofilter. Initial operation of B-HS5 is in the non-recirculation mode. The second operating pmode is to recirculate the Stage 1 effluent to the top of the Stage biofilter and disperse it by five spray nozzles. The recirculated effluent would have an opportunity to mix with incoming septic tank effluent discharged by the distribution box. Recirculation back to the Stage 1 biofilter increases the hydraulic loading on the Stage 1 biofilter.

Effluent from the unsaturated (Stage 1) media tank enters the 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 through the baffle wall to the bottom of the second chamber, and upward through the media in the second chamber (elemental sulfur and oyster shell).

The first chamber of the Stage 2 biofilter contains 42-inches of lignocellulosic media. Stainless steel samplers are positioned at 12-inch increments for vertical profiling throughout the lignocellulosic media. The third primary sampling point is a stainless steel sampler positioned at the bottom of the lignocellulosic media (B-HS5-LIGNO-0) with tubing to the surface. The B-HS5-LIGNO-0 sample represents the lignocellulosic media effluent (Figure 6).



Figure 6 First chamber of Stage 2 biofilter (B-HS5-LIGNO-0" sample)

A collection pipe along the bottom transfers the first chamber (lignocellulosic media) effluent to the second chamber, which contains 18-inches of elemental sulfur mixed with oyster shell media. The fourth primary sampling point, B-HS5-ST2, is the second chamber of the Stage 2 biofilter effluent which is sampled approximately 1 foot below the

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PAGE 1-9 HAZEN AND SAWYER, P.C. 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 7).



Figure 7 Second chamber of Stage 2 biofilter (B-HS5-ST2 sample)

3.3 Operational Monitoring

Start-up of the system occurred on July 9, 2013 (Experimental Day 0). The PNRS system has operated continually since that date. Preliminary sampling for several key parameters was conducted July 29, 2013 (Experimental Day 20) and August 15, 2013 (Experimental Day 37) to evaluate start-up performance. The first formal sampling event was conducted September 27, 2013 (Experimental Day 80). For this first formal sampling event, the water meter for the house and treatment system flow meters were read and recorded on September 27, 2013. The household water meter is located on the potable water line from the onsite well prior to entering the household plumbing. The water meter does not include the irrigation water use. Therefore, the water meter reading should be indicative of the wastewater flow to the system.

As previously discussed, the pump tank discharge is split via two throttling gate valves which allow for a portion of the Stage 1 biofilter effluent to be sent back to the Stage 1 biofilter spray nozzles (for recirculation) with the rest proceeding to the Stage 2 biofilter. The treatment system flow meters (Figure 1) are located on pump tank discharge lines following the flow split, and record the cumulative flow in gallons pumped from the pump chamber to the Stage 1 biofilter (R flowmeter) and Stage 2 biofilter (F flowmeter). Currently the mode of operation is set to non-recirculation mode, where 100 percent of the pump is directed to the Stage 2 biofilter. For this sample event, the F flowmeter (Figure 1), which is located following the split on the line from the pump tank, 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 lift station pump installed within the pump tank, 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 18 inches of sulfur and oyster shell mixture media, which ostensibly will last for many years without replenishment or replacement.

3.5 Water Quality Sample Collection and Analyses

Preliminary start-up sampling was conducted on July 29, 2013 (Experimental Day 20) and August 15, 2013 (Experimental Day 37) and consisted of monitoring the nitrogen transformation through the system. The first formal sample event (Sample Event No. 1), was conducted on September 27, 2013 (Experimental Day 80). A full suite of influent, intermediate and effluent water quality samples were collected from the system for water quality analysis. Samples were collected at each of the four monitoring points described in Section 3.2: B-HS5-STE, B-HS5-ST1, B-HS5-LIGNO-0 and B-HS5-ST2. A peristaltic pump was used to collect samples and route them directly into analysis-specific containers after sufficient flushing of the tubing had occurred. Field parameters were then recorded.

In addition, a potable water sample was collected (B-HS5-WELL) by filling sample containers with potable water (from the onsite well) from a hose bib located near the system. This sample was then analyzed for the same parameters as the monitoring samples.

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

Field parameters were measured using portable electronic probes and included temperature (Temp), dissolved oxygen (DO), oxidation-reduction potential (ORP), pH, and specific conductance. The field parameters were measured by placing the analytical probes in a container overflowing with sample water. The influent, intermediate, and effluent samples were analyzed by the laboratory for: total alkalinity, chemical oxygen demand (COD), total Kjeldahl nitrogen (TKN-N), ammonia nitrogen (NH₃-N), nitrate nitrogen (NO₃-N), nitrite nitrogen (NO₂-N), total phosphorus (TP), orthophosphate (Ortho P), total suspended solids (TSS), volatile suspended solids (VSS), total organic carbon (TOC), fecal coliform (fecal), and E.coli. The influent and sulfur media samples included sulfate, sulfide, and hydrogen sulfide (unionized). All analyses were performed by an independent and fully NELAC certified analytical laboratory (Southern Analytical Laboratory). Table 1 lists the analytical parameters, analytical methods, and detection limits for laboratory analyses.

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)	EPA 160.4	1 mg/L
Total Organic Carbon (TOC)	SM5310B	0.06 mg/L
Sulfate	EPA 300.0	2.0 mg/L
Sulfide	SM 4500SF	0.10 mg/L
Hydrogen Sulfide (unionized)	SM 4550SF	0.01 mg/L
Fecal Coliform (fecal)	SM9222D	1 ct/100mL
E.coli	SM9223B	2 ct/100mL

 Table 1

 Analytical Parameters, Method of Analysis, and Detection Limits

4.0 Results and Discussion

4.1 Operational Monitoring

Table 2 provides a summary of the household water use since the water meter installation on February 12, 2013. The treatment system flow meter readings for the B-HS5 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.

Summary of Housenoid water Use Flowmeter											
Date	Cumulative Volume (gallons)	Average Daily Household Flow, Q (gpd)									
2/12/2013 10:30	166.0	INSTALLED									
2/21/2013 10:45	1,130.3	107.0									
2/28/2013 11:45	2,323.9	169.5									
3/7/2013 10:25	2,832.1	73.2									
6/14/2013 13:00	13,460.9	107.2									
6/25/2013 8:53	14,860.1	129.2									
7/23/2013 8:31	17,659.4	100.0									
7/29/2013 11:10	18,769.2	181.6									
8/15/2013 12:28	21,078.4	135.4									
8/27/2013 9:15	22,427.8	113.7									
9/27/2013 10:40	25,738.3	108.6									
Average through 9/27/13		122.6									

Table 2 Summary of Household Water Use Flowmeter

From start-up through September 27, 2013, the household water use average was 122.6 gallons per day with periods of higher and lower flows (Table 2).

		Table 5		
	Summary of T	reatment Syste	m Flowmeters	
	Recirculation	Average	Stage 2 Biofilter	Average
Data	Pumped Flow, R	Recirculation	Pumped Flow, F	Daily
Date	Water Meter	Ratio	Water Meter	Stage 2, Q
	Reading		Reading	
	Cumulative	Recycle:	Cumulative	
	Volume	Forward Flow	Volume	Gallons/Day
	(gallons)		(gallons)	
7/5/2013 12:00	386.1	0.0		Installed
7/9/2013 15:20	386.1	0.0	167.5	Following testing
7/12/2013 14:13	386.1	0.0	207.4	13.5
7/17/2013 9:02	386.1	0.0	995.6	107.0
7/23/2013 8:31	386.1	0.0	1,642.9	107.6
7/29/2013 11:10	386.1	0.0	2,733.4	129.4
8/6/2013 8:51	386.1	0.0	3,894.7	134.4
8/15/2013 11:40	386.1	0.0	4,884.6	128.0
8/27/2013 9:15	386.1	0.0	6,135.4	122.4
9/27/2013 10:40	386.1	0.0	9,035.2	111.1
Average				
through 9/27/13		0.0	Y	106.7

Table 2

The two throttling gate valves control the fraction of Stage 1 effluent that is recirculated and the fraction sent to the Stage 2 biofilter. The gate valves were initially set so that 100 percent of the flow is to the Stage 2 tank (0 recycle ratio). The average pumped flow (forward flow to the Stage 2 biofilter) was 106.7 gallons per day.

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 Me- ter Reading	Average Daily Electrical Use	Average Electrical Use per Gal- Ion Treated											
	Cumulative (kWh)	(kWh/day)	(kWh/gal)											
7/5/2013 12:00		Installed												
7/9/2013 15:20	0.3	Start-up												
7/12/2013 14:13	0.4	0.03	0.0025											
7/17/2013 9:02	0.6	0.04	0.0004											
7/23/2013 8:32	0.8	0.03	0.0003											
7/29/2013 11:10	1.2	0.07	0.0005											
8/6/2013 8:51	1.5	0.04	0.0003											
8/15/2013 11:40	1.8	0.03	0.0003											
8/27/2013 9:15	2.2	0.03	0.0003											
9/27/2013 10:40	3.1	0.03	0.0003											
Total average start-up to 9/27/13		0.04	0.0003											

The total average electrical use through September 27, 2013 was 0.04 kWh per day. The average electrical use per gallon treated was 0.0003 kWh per gallon treated, and this parameter has been fairly stable since start-up.

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4.3 Water Quality

Water quality analytical results and raw analytical data for the preliminary start-up sampling conducted on July 29, 2013 (Experimental Day 20) and August 15, 2013 (Experimental Day 37) are included in Appendix A. Nitrogen results for the preliminary sample event are graphically displayed in Figures 8 and 9.

Water quality analytical results for Sample Event No.1 are listed in Table 5. Nitrogen results are graphically displayed in Figure 10. The laboratory report containing the raw analytical data is included in Appendix A. The following discussion summarizes the water quality analytical results. The performance of the various system components was compared by considering the changes through treatment of nitrogen species (TKN-N, NH₃-N, and NO_X-N), as well as supporting water quality parameters.

Q STE STAGE 1 STAGE 2 STAGE 2 STAGE 2 SULFUR STAGE 2 SULFUR STAGE 2 SULFUR STAGE 2 SULFUR STAGE 2 STAGE 2 SULFUR STAGE 2 SULFU	SAL
TKN mg N/L 79 9.4 8.3 10	
NH ₃ mg N/L 54 7.4 4.6 5.8	
NO _x mg N/L ND 34 ND ND	
TN mg N/L 79 43.4 8.3 10.0	
Sulfate mg/L 3.9 200	

Figure 8 Graphical Representation of Nitrogen Results Preliminary Sample Event 1, July 29, 2013 (Experimental Day 20)







Figure 10

Graphical Representation of Nitrogen Results Sample Event No. 1 September 27, 2013 (Experimental Day 80)

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

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Stage 1 Effluent (ST1): The Stage 1 effluent NH_3 -N levels was 7.5 mg/L with a DO level at 2.55 mg/L in the Stage 1 effluent (Table 5). The Stage 1 effluent TSS concentration was 4 mg/L and CBOD₅ was 12 mg/L. The Stage 1 effluent NO_x -N was 43 mg/L. The Stage 1 biofilter showed incomplete nitrification with an effluent NH_3 -N concentration of 7.5 mg/L and TKN of 10 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 -195 mV ORP. The lignocellulosic media effluent NO_x-N was 1.3 mg/L. 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 3.3 mg/L. The Stage 2 biofilter lignocellulosic media effluent CBOD₅ was 14 mg/L and the sulfur media effluent was 4 mg/L. The Stage 2 effluent sulfate concentration was 29 mg/L, which was approximately 25 mg/L higher than the STE. The Stage 2 biofilter effluent fecal coliform and e-coli concentrations were below the method detection limit.

Well: One tap water sample was collected by filling sample containers with tap water from a hose bib near the system. The home water supply is obtained from an onsite well. The onsite well water NOx-N was below the method detection limit, TKN was 0.1 mg/L, total phosphorus was 0.057 mg/L and sulfate was 12 mg/L.

Table 5Water Quality Analytical Results

	-																										
Sample ID	Sample Date/Time	Temp (°C)	рН	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	NH₃-N (mg/L N)	NO₃-N (mg/L N)	NO₂-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)
BHS5-STE	9/27/2013 10:20	27.6	7.09	1294	0.11	-226.8	430	58	54	71	150	87.02	87	16	71	0.01	0.01	0.02	71.02	12	5.5	4.2	2.6	6.2	87000	24000	48
BHS5-Stage 1	9/27/2013 10:10	26.6	6.89	1249	2.55	109.5	230	4	4	12	10	53	10	2.5	7.5	43	0.01	43	50.5	3.1	1.8				2400	980	12
BHS5-Stage 2 Ligno	9/27/2013 10:00	27.4	6.35	1182	1.03	9.7	410	6	6	14	50	2.7	1.4	0	1.4	0.01	1.3	1.3	2.7	0.56	0.13				800	740	29
BHS5-Stage 2 Sulfur	9/27/2013 9:40	27.6	6.61	1335	0.15	-195.4	480	5	5	4	32	3.32	3.3	0.9	2.4	0.01	0.01	0.02	2.42	0.94	0.54	29	5.7	8.2	1	2	25
BHS5-TAP	9/27/2013 9:35	23.6	6.73	462	2.31	280.6	130	1	1	2	10	0.12	0.1	0.091	0.009	0.01	0.01	0.02	0.029	0.057	0.029	12	2.6	4.1	1	2	2.8
Notes:																											
4																											

 $^{1}\mbox{Total}$ Nitrogen (TN) is a calculated value equal to the sum of TKN and NO $_{\chi}$

²Organic Nitrogen (ON) is a calculated value equal to the difference of TKN and NH_{3.}

 3 Total Inorganic Nitrogen (TIN) is a calculated value equal to the sum of $\rm NH_3$ and $\rm NO_{\chi}$

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.

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

5.0 B-HS5 Sample Event No. 1: Summary and Recommendations

5.1 Summary

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

- Septic tank effluent (STE) quality is characteristic of typical household STE quality. The total nitrogen concentration of 87 mg/L is within the range of values typically reported for Florida single family residence STE.
- The Stage 1 biofilter converted most of the ammonia N to oxidized nitrogen; effluent contained 10 mg/L TKN, of which 7.5 mg/L was ammonia.
- The Stage 2 biofilter produced a reducing environment and effluent NO_x-N was below the method detection limit of 0.02 mg N/L.
- The total nitrogen concentration in the final effluent from the total treatment system was 3.32 mg/L, an approximately 96% reduction from STE.

5.2 Recommendations

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

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Appendix A: Laboratory Report

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Table A.1	
Preliminary Start-up Sample Event No. 1 Result	ts

Sample ID	Sample Date/Time	Temp (°C)	рН	Specific Conductance (uS/cm)	DO (mg/L)	ORP (mV)	TSS (mg/L)	CBOD₅ (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	Sulfate (mg/L)	Hydrogen Sulfide (mg/L)	Sulfide (mg/L)
BHS5-STE	7/29/2013 10:45	28.7	6.99	1160	0.11	-341.9	34	120	79.02	79	25	54	0.01	0.01	0.02	54.02	3.9	4.5	9.3
BHS5-Stage 1	7/29/2013 10:55	27.3	7.18	1104	1.70	-127.9			43.4	9.4	2	7.4	33	1.8	34	41.4			
BHS5-Stage 2 Ligno	7/29/2013 10:25	29.2	6.25	1088	2.50	-73.1	24	38	8.32	8.3	3.7	4.6	0.01	0.01	0.02	4.62			
BHS5-Stage 2 Sulfur	7/29/2013 10:35	29.6	6.60	1781	0.33	-357.0			10.02	10	4.2	5.8	0.01	0.01	0.02	5.82	200	45	64
BHS5-TAP	7/29/2013 11:05	26.2	7.60	431	3.05	-65.3			0.41	0.09	0.041	0.049	0.32	0.01	0.32	0.369	13		
Notes:																			
¹ Total Nitrogen (TN) is a calc	ulated value equal to	the sun	n of TKN	and NO _{x.}															
² Organic Nitrogen (ON) is a c	alculated value equa	l to the	differen	ce of TKN and	NH _{3.}														
2																			

³Total Inorganic Nitrogen (TIN) is a calculated value equal to the sum of NH_3 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.

Table A.2

Preliminary Start-up Sample Event No. 2 Results

Sample ID	Sample Date/Time	Temp (°C)	рН	Specific Conductance (uS/cm)	DO (mg/L)	ORP (mV)	TSS (mg/L)	CBOD₅ (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	Sulfate (mg/L)	Hydrogen Sulfide (mg/L)	Sulfide (mg/L)
BHS5-STE	8/15/2013 12:10	28.9	7.19	1205	0.10	-315.4	58	85	76.02	76	0	76	0.01	0.01	0.02	76.02	2.7	4.5	12
BHS5-Stage 1	8/15/2013 12:00	28.2	6.93	1243	2.11	-116.1			61.9	9.9	4.8	5.1	52	0.25	52	57.1			
BHS5-Stage 2 Ligno	8/15/2013 11:50	30.2	6.55	1133	0.69	-230.8	9	17	7.5	6.4	3.7	2.7	0.01	1.1	1.1	3.8			
BHS5-Stage 2 Sulfur	8/15/2013 11:45	30.4	6.79	1309	0.14	-345.2			6.82	6.8	2.6	4.2	0.01	0.01	0.02	4.22	76	16	26
BHS5-TAP	8/15/2013 12:15	29.6	7.54	451	6.47	80.3			0.44	0.11	0.077	0.033	0.33	0.01	0.33	0.363	13		

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 NH_{3.}

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.

FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY B-HS5 MONITORING REPORT NO. 1

PAGE A-2 HAZEN AND SAWYER, P.C.



FLORIDA DEPARTMENT OF HEALTH PNRS II TEST FACILITY SAMPLE EVENT REPORT 1 PAGE B-3 HAZEN AND SAWYER, P.C.

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



August 23, 2013

Work Order: 1307314

Hazen and Sawyer 10002 Princess Palm Ave, Suite 200

Tampa, FL 33619

Project Name B-HS5 Preliminary SE#1												
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed Di	lution				
Sample Description Matrix SAL Sample Number Date/Time Collected Collected by Date/Time Received		STE Wastewater 1307314-01 07/29/13 10:45 Sean Schmidt 07/29/13 14:10										
Client Provided Field Data												
pH Temperature Conductivity Dissolved Oxygen		6.99 28.7 °C 1160 umhos 0.11 mg/L										
Inorganics												
Hydrogen Sulfide (Unionized) Ammonia as N	mg/L mg/L	4.5 54	SM 4550SF EPA 350.1	0.04 2.0	0.01 0.47		07/30/13 11:15 08/14/13 09:10	1 50				
Carbonaceous BOD	mg/L	120	SM 5210B	2	2	07/29/13 14:34	08/03/13 10:01	1				
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		07/31/13 01:31	1				
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		07/31/13 01:31	1				
Sulfate	mg/L	3.9	EPA 300.0	0.60	0.20		07/31/13 01:31	1				
Sulfide	mg/L	9.3	SM 4500SF	0.40	0.10		07/30/13 11:15	1				
Total Kjeldahl Nitrogen	mg/L	79	EPA 351.2	0.20	0.05	08/16/13 08:49	08/19/13 13:18	41.67				
Total Suspended Solids	mg/L	34	SM 2540D	1	1	07/30/13 09:22	07/31/13 08:43	1				
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		07/31/13 01:31	1				
Sample Description Matrix SAL Sample Number Date/Time Collected Collected by Date/Time Received		Stage 1 Wastewater 1307314-02 07/29/13 10:55 Sean Schmidt 07/29/13 14:10										
Client Provided Field Data												
pH Temperature Conductivity Dissolved Oxygen		7.18 27.3 °C 1104 umhos 1.70 mg/L										
Inorganics												
Ammonia as N	mg/L	7.4	EPA 350.1	0.20	0.047		08/13/13 17:11	5				
Nitrate (as N)	mg/L	33	EPA 300.0	0.04	0.01		07/31/13 01:41	1				
Nitrite (as N)	mg/L	1.8	EPA 300.0	0.04	0.01		07/31/13 01:41	1				
Total Kjeldahl Nitrogen	mg/L	9.4	EPA 351.2	0.20	0.05	08/16/13 08:49	08/19/13 12:21	5				
Nitrate+Nitrite (N)	mg/L	34	EPA 300.0	0.08	0.02		07/31/13 01:41	1				

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August 23, 2013

Work Order: 1307314

Hazen and Sawyer 10002 Princess Palm Ave, Suite 200

Tampa, FL 33619

Project Name B-HS5 Preliminary SE#1												
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution				
Sample Description Matrix SAL Sample Number Date/Time Collected Collected by Date/Time Received		Stage 2 - LIGNO Wastewater 1307314-03 07/29/13 10:25 Sean Schmidt 07/29/13 14:10										
Client Provided Field Data												
pH Temperature Conductivity Dissolved Oxygen		6.24 29.2 °C 1088 umhos 2.5 mg/L										
Inorganics												
Ammonia as N	mg/L	4.6	EPA 350.1	0.20	0.047		08/14/13 08:3	33 5				
Carbonaceous BOD	mg/L	38	SM 5210B	2	2	07/29/13 14:34	08/03/13 10:0)1 1				
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		07/31/13 01:5	50 1				
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		07/31/13 01:5	50 1				
Total Kjeldahl Nitrogen	mg/L	8.3	EPA 351.2	0.20	0.05	08/16/13 08:49	08/19/13 12:2	22 5				
Iotal Suspended Solids	mg/L	24	SM 2540D	1	1	07/30/13 09:22	07/31/13 08:4	3 1				
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		07/31/13 01:5	0 1				
Sample Description Matrix SAL Sample Number Date/Time Collected Collected by Date/Time Received		Stage 2 - SULFUR Wastewater 1307314-04 07/29/13 10:35 Sean Schmidt 07/29/13 14:10										
Client Provided Field Data												
pH Temperature Conductivity Dissolved Oxygen		6.6 29.6 °C 1781 umhos 0.33 mg/L										
Inorganics			014 455005									
Hydrogen Sulfide (Unionized)	mg/L "	45	SM 4550SF	0.04	0.01		07/30/13 11:1	5 1				
Ammonia as N	mg/L	5.8	EPA 350.1	0.20	0.047		08/14/13 08:3	35 5				
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		07/31/13 02:0	0 1				
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		07/31/13 02:0	1 10				
Suirate	mg/L "	200	EPA 300.0	6.0	2.0		08/16/13 06:2	10				
Sulfide	mg/L	64	SM 4500SF	0.40	0.10		07/30/13 11:1	5 1				
Iotal Kjeldahl Nitrogen	mg/L	10	EPA 351.2	0.20	0.05	08/16/13 08:49	08/19/13 12:2	23 5				
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		07/31/13 02:0	1 1				

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August 23, 2013

Work Order: 1307314

Hazen and Sawyer 10002 Princess Palm Ave, Suite 200

Tampa, FL 33619

Project Name		B-HS5 Prelin	ninary SE#1					
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description Matrix SAL Sample Number Date/Time Collected Collected by		TAP Drinking Water 1307314-05 07/29/13 11:05 Sean Schmidt						
Date/Time Received		07/29/13 14:10						
Client Provided Field Data								
pH Temperature Conductivity Dissolved Oxygen		7.61 26.2 °C 431 umhos 3.05 mg/L						
Inorganics								
Ammonia as N	mg/L	0.049	EPA 350.1	0.040	0.009		08/13/13 16:	:17 1
Nitrate (as N)	mg/L	0.32	EPA 300.0	0.04	0.01		07/31/13 02:	:09 1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		07/31/13 02:	:09 1
Sulfate	mg/L	13	EPA 300.0	0.60	0.20		07/31/13 02:	:09 1
Total Kjeldahl Nitrogen	mg/L	0.09 I	EPA 351.2	0.20	0.05	08/16/13 08:55	08/20/13 15:	23 1
Nitrate+Nitrite (N)	mg/L	0.32	EPA 300.0	0.08	0.02		07/31/13 02:	:09 1

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August 23, 2013

Work Order: 1307314

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Analyta	Popult	POL		Linito	Spike	Source		%REC	חחם	RPD Limit
Analyte	Result	PQL	IVIDL	Units	Levei	Result	%REC	LIMIUS	RPD	
Batch BG32927 - BOD										
Blank (BG32927-BLK1)					Prepared:	07/29/13 Ar	nalyzed: 08	/03/13		
Carbonaceous BOD	2 U	2	2	mg/L						
LCS (BG32927-BS1)					Prepared:	07/29/13 Ar	nalyzed: 08	/03/13		
Carbonaceous BOD	197	2	2	mg/L	200		99	85-115		
LCS Dup (BG32927-BSD1)					Prepared:	07/29/13 Ar	nalyzed: 08	/03/13		
Carbonaceous BOD	210	2	2	mg/L	200		105	85-115	6	200
Duplicate (BG32927-DUP1)		Source: 1	307693-01		Prepared:	07/29/13 Ar	nalyzed: 08	/03/13		
Carbonaceous BOD	110	2	2	mg/L		110			0.7	25
Batch BG33006 - TSS prep										
Blank (BG33006-BLK1)					Prepared: (07/30/13 Ar	nalyzed: 07	/31/13		
Total Suspended Solids	1 U	1	1	mg/L						
LCS (BG33006-BS1)					Prepared:	07/30/13 Ar	nalyzed: 07	/31/13		
Total Suspended Solids	44.5	1	1	mg/L	50		89	85-115		
Duplicate (BG33006-DUP1)		Source: 1	307210-02		Prepared:	07/30/13 Ar	nalyzed: 07	/31/13		
Total Suspended Solids	66.0	1	1	mg/L		65.0			2	30
Batch BG33019 - Sulfide prep										
Blank (BG33019-BLK1)					Prepared 8	Analyzed:	07/30/13			
Sulfide	0.10 U	0.40	0.10	mg/L						

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August 23, 2013

Work Order: 1307314

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Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BG33019 - Suifide pre	p									
LCS (BG33019-BS1)					Prepared 8	& Analyzed:	07/30/13			
Sulfide	5.15	0.40	0.10	mg/L	5.0		103	85-115		
Matrix Spike (BG33019-MS1)		Source: 1	307621-01		Prepared 8	Analyzed:	07/30/13			
Sulfide	4.95	0.40	0.10	mg/L	5.0	ND	99	85-115		
Matrix Spike Dup (BG33019-MSE	01)	Source: 1	307621-01		Prepared 8	& Analyzed:	07/30/13			
Sulfide	4.95	0.40	0.10	mg/L	5.0	ND	99	85-115	0	14
Batch BG33024 - Ion Chroma	atography 300.0) Prep								
Blank (BG33024-BLK1)					Prepared 8	Analyzed:	07/30/13			
Sulfate	0.20 U	0.60	0.20	mg/L						
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Surrogate: Dichloroacetate	0.952			mg/L	1.0		95	90-115		
Surrogate: Dichloroacetate	0.952			mg/L	1.0		95	90-115		
Surrogate: Dichloroacetate	0.952			mg/L	1.0		95	90-115		
LCS (BG33024-BS1)					Prepared 8	& Analyzed:	07/30/13			
Nitrite (as N)	1.51	0.04	0.01	mg/L	1.4		108	85-115		
Nitrate (as N)	1.68	0.04	0.01	mg/L	1.7		99	85-115		
Sulfate	8.82	0.60	0.20	mg/L	9.0		98	85-115		
Surrogate: Dichloroacetate	0.990			mg/L	1.0		99	90-115		
Surrogate: Dichloroacetate	0.990			mg/L	1.0		99	90-115		
Surrogate: Dichloroacetate	0.990			mg/L	1.0		99	90-115		
LCS Dup (BG33024-BSD1)					Prepared 8	Analyzed:	07/30/13			
Nitrate (as N)	1.70	0.04	0.01	mg/L	1.7		100	85-115	1	200
Sulfate	8.92	0.60	0.20	mg/L	9.0		99	85-115	1	200
Nitrite (as N)	1.52	0.04	0.01	mg/L	1.4		108	85-115	0.3	200
Surrogate: Dichloroacetate	0.944			mg/L	1.0		94	90-115		
Surrogate: Dichloroacetate	0.944			mg/L	1.0		94	90-115		
Surrogate: Dichloroacetate	0.944			mg/L	1.0		94	90-115		

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August 23, 2013

Work Order: 1307314

Hazen and Sawyer

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Apolyto	Popult	POI	MDI	Linita	Spike	Source		%REC	חחם	RPD Limit
Analyte	Result	FQL	MDL	Units	Level	Result	%REC	LIIIIIIS	KFD	LIIIII
Batch BG33024 - Ion Chroma	tography 300.0) Prep								
Matrix Spike (BG33024-MS1)		Source: 1	307730-06	;	Prepared &	& Analyzed:	07/31/13			
Sulfate	90.0 L	0.60	0.20	mg/L	9.0	103	NR	85-115		
Nitrate (as N)	1.92	0.04	0.01	mg/L	1.7	0.228	100	85-115		
Nitrite (as N)	1.78	0.04	0.01	mg/L	1.4	0.334	103	85-115		
Surrogate: Dichloroacetate	0.910			mg/L	1.0		91	90-115		
Surrogate: Dichloroacetate	0.910			mg/L	1.0		91	90-115		
Surrogate: Dichloroacetate	0.910			mg/L	1.0		91	90-115		
Matrix Spike (BG33024-MS2)		Source: 1	307318-03	5	Prepared &	& Analyzed:	07/31/13			
Nitrate (as N)	1.78	0.04	0.01	mg/L	1.7	ND	105	85-115		
Nitrite (as N)	1.51	0.04	0.01	mg/L	1.4	ND	108	85-115		
Sulfate	16.5	0.60	0.20	mg/L	9.0	8.04	94	85-115		
Surrogate: Dichloroacetate	1.09			mg/L	1.0		109	90-115		
Surrogate: Dichloroacetate	1.09			mg/L	1.0		109	90-115		
Surrogate: Dichloroacetate	1.09			mg/L	1.0		109	90-115		
Batch BH31303 - Ammonia b	y SEAL									

Blank (BH31303-BLK1)		Prepared &	Analyzed: 0	8/13/13						
Ammonia as N	0.009 U	0.040	0.009	mg/L						
LCS (BH31303-BS1)					Prepared &	Analyzed: 0	8/13/13			
Ammonia as N	0.50	0.040	0.009	mg/L	0.50		99	90-110		
Matrix Spike (BH31303-MS1)		Source: 1	307314-05		Prepared &	Analyzed: 0	8/14/13			
Ammonia as N	0.52	0.040	0.009	mg/L	0.50	0.049	95	90-110		
Matrix Spike Dup (BH31303-MSD1)		Source: 1	307314-05		Prepared &	Analyzed: 0	8/14/13			

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August 23, 2013

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Tampa, FL 33619

					Spike	Source		%REC		RPD
Analyte	Result	PQL	MDL	Units	Level	Result	%REC	Limits	RPD	Limit
Batch BH31542 - Ion Chroma	tography 300.0) Prep								
Blank (BH31542-BLK1)					Prepared &	Analyzed:	08/16/13			
Sulfate	0.20 U	0.60	0.20	mg/L						
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
LCS (BH31542-BS1)					Prepared &	Analyzed:	08/16/13			
Sulfate	9.15	0.60	0.20	mg/L	9.0		102	85-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
LCS Dup (BH31542-BSD1)					Prepared &	Analyzed:	08/16/13			
Sulfate	9.30	0.60	0.20	mg/L	9.0		103	85-115	2	200
Surrogate: Dichloroacetate	1.13			mg/L	1.0		113	90-115		
Matrix Spike (BH31542-MS1)		Source: 1	307772-06		Prepared &	Analyzed:	08/16/13			
Sulfate	210	6.0	2.0	mg/L	90	117	104	85-115		
Surrogate: Dichloroacetate	1.07			mg/L	1.0		107	90-115		
Matrix Spike (BH31542-MS2)		Source: 1	307781-01		Prepared &	Analyzed:	08/16/13			
Sulfate	11,400	600	200	mg/L	9000	1500	110	85-115		
Surrogate: Dichloroacetate	1.11			mg/L	1.0		111	90-115		
Batch BH31602 - Digestion for	or TKN by EPA	351.2								
Blank (BH31602-BLK1)					Prepared:	08/16/13 Ar	nalyzed: 08/	/19/13		
Total Kjeldahl Nitrogen	0.0569 I	0.20	0.05	mg/L						
					Dranarady	00/10/12 4.	aluradi 00	10/12		

LCS (BH31602-BS1)			Prepared: 08/16/13 Analyzed: 08/19/13							
Total Kjeldahl Nitrogen	2.43	0.20	0.05	mg/L	2.5	96	90-110			

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					Spike	Source		%REC		RPD
Analyte	Result	PQL	MDL	Units	Level	Result	%REC	Limits	RPD	Limit
Batch BH31602 - Digestion for	TKN by FPA	351.2								
	<u> </u>				Drawarada	00/40/40 A		4042		
Matrix Spike (BH31602-MS1)		Source: 1	308183-07		Prepared:	08/16/13 Ar	alyzed: 08	19/13		
Total Kjeldahl Nitrogen	2.68	0.20	0.05	mg/L	2.5	0.226	97	90-110		
Matrix Spike (BH31602-MS2)		Source: 1	308223-01		Prepared:	08/16/13 Ar	nalyzed: 08	/19/13		
Total Kjeldahl Nitrogen	3.26	0.20	0.05	mg/L	2.5	0.629	104	90-110		
Matrix Spike Dup (BH31602-MSD1)		Source: 1	308183-07		Prepared:	08/16/13 Ar	nalyzed: 08	/19/13		
Total Kjeldahl Nitrogen	2.16	0.20	0.05	mg/L	2.5	0.226	76	90-110	22	20
Matrix Spike Dup (BH31602-MSD2)		Source: 1	308223-01		Prepared:	08/16/13 Ar	nalyzed: 08	/19/13		
Total Kjeldahl Nitrogen	3.16	0.20	0.05	mg/L	2.5	0.629	100	90-110	3	20
Batch BH31605 - Digestion for	TKN by EPA	351.2								
Blank (BH31605-BLK1)					Prepared:	08/16/13 Ar	nalyzed: 08	/19/13		
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
LCS (BH31605-BS1)					Prepared:	08/16/13 Ar	nalyzed: 08	/19/13		
Total Kjeldahl Nitrogen	2.51	0.20	0.05	mg/L	2.5		99	90-110		
Matrix Spike (BH31605-MS1)		Source: 1	308252-02		Prepared:	08/16/13 Ar	nalyzed: 08	/19/13		
Total Kjeldahl Nitrogen	3.17	0.20	0.05	mg/L	2.5	0.662	99	90-110		
Matrix Spike (BH31605-MS2)		Source: 1	308293-07		Prepared:	08/16/13 Ar	nalyzed: 08	/19/13		
Total Kjeldahl Nitrogen	2.57	0.20	0.05	mg/L	2.5	0.277	91	90-110		
Matrix Spike Dup (BH31605-MSD1)		Source: 1	308252-02		Prepared:	08/16/13 Ar	nalyzed: 08	/19/13		
Total Kjeldahl Nitrogen	3.32	0.20	0.05	mg/L	2.5	0.662	105	90-110	5	20

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Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	
Batch BH31605 - Digestion	for TKN by EPA	351.2									
Matrix Spike Dup (BH31605-MS	D2)	Source: 1	308293-07	7	Prepared:	08/16/13 Ar	nalyzed: 08	/19/13			
Total Kjeldahl Nitrogen	2.72	0.20	0.05	mg/L	2.5	0.277	96	90-110	6	20	

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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 limts 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@southernanalyticallabs.com



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Client	Name																		
Proie	ct Name / Location	Hazen a	ind Sawyer	r															
	(Batel)	<u>В-Н\$5</u> F	reliminary	SE#1					_										
Samp	lers: (Signature)	7	5.	\bigwedge	7					PA	RAMET	ER / COI		DESCRIP	TION				
SAL Use Only	Matrix Codes: DW-Drinking Water WW-Wastewate SW-SurfaceWater SL-Sludge SO-S GW-Groundwater SA-Saline Water O-C R-Reagent Water	er oil Other			×	nposite	mLP, Cool , CBOD, NOX, SO4	nLP, H ₂ SO4 , NH ₃	mLP, NaOH, Zn late	mLP, Cool	mLP, Cool t, SO4	, CBOD, NOX	d Temperature アビ・ゴモ フ	10H 6.9 4	d Conductivity	HDO TÉ . el l			of Containers (Total sach location)
Sample. No.	Sample Description		Date		Matr	S C	12S	125i TKN	500 Acet H ₃ S	500i NOX	200 200	500r TSS	N H	Fiel	Piel S-	Č, Ē			No. o
01	STE		1/29	10:45	ww		K 1_	1	1				24.7		- 1987	250			
02	Stage 1		7/24	10:55	ww		×	1		1			27.3	7.18	Incy	$\sqrt{2}$			
03	Stage 2 - LIGNO		7/29	10:25	ww		<u>× </u>	1				1	24.2	(0.24	830(2.50			
04	Stage		7/29	10:35	ww		×	1	1		1		29.6	$\mathcal{L}_{\mathcal{A}}$	1781	0.53			
05	ТАР		7/29	11.05	DW		×	1			1		26.7	H.C.	431	247			
														7.61		3.05			
									<u> </u>										
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SAL Project No. 1307314

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



September 9, 2013

Work Order: 1307315

Hazen and Sawyer 10002 Princess Palm Ave, Suite 200

Tampa, FL 33619

Project Name		B-HS5 Prelim	inary SE#2					
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed Di	ution
Sample Description Matrix SAL Sample Number Date/Time Collected Collected by Date/Time Received		STE Wastewater 1307315-01 08/15/13 12:10 Josefin Hirst 08/15/13 14:30						
Client Provided Field Data								
pH Temperature Conductivity Dissolved Oxygen		7.19 28.9 °C 1205 umhos 0.1 mg/L						
Inorganics								
Hydrogen Sulfide (Unionized) Ammonia as N	mg/L mg/L	4.5 76	SM 4550SF EPA 350.1	0.04 2.0	0.01 0.47		08/20/13 10:45 08/28/13 14:55	1 50
Carbonaceous BOD	mg/L	85	SM 5210B	2	2	08/16/13 11:33	08/21/13 09:51	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/16/13 16:29	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/16/13 16:29	1
Sulfate	mg/L	2.7	EPA 300.0	0.60	0.20		08/16/13 16:29	1
Sulfide	mg/L	12	SM 4500SF	0.40	0.10		08/20/13 10:45	1
Total Kjeldahl Nitrogen	mg/L	76	EPA 351.2	0.20	0.05	08/29/13 16:08	09/06/13 12:29	20.83
Total Suspended Solids	mg/L	58	SM 2540D	1	1	08/16/13 13:00	08/19/13 13:56	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/16/13 16:29	1
Sample Description Matrix SAL Sample Number Date/Time Collected Collected by Date/Time Received		Stage 1 Wastewater 1307315-02 08/15/13 12:00 Josefin Hirst 08/15/13 14:30						
Client Provided Field Data								
pH Temperature Conductivity Dissolved Oxygen		6.93 28.2 °C 1243 umhos 2.11 mg/L						
Inorganics								
Ammonia as N	mg/L	5.1	EPA 350.1	0.40	0.095		08/28/13 12:24	10
Nitrate (as N)	mg/L	52	EPA 300.0	0.40	0.10		08/16/13 16:39	10
Nitrite (as N)	mg/L	0.25	EPA 300.0	0.04	0.01		08/16/13 16:39	1
Total Kjeldahl Nitrogen	mg/L	9.9	EPA 351.2	0.20	0.05	08/29/13 16:08	09/06/13 11:03	5
Nitrate+Nitrite (N)	mg/L	52	EPA 300.0	0.44	0.11		08/16/13 16:39	10

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September 9, 2013

Work Order: 1307315

Hazen and Sawyer 10002 Princess Palm Ave, Suite 200

Tampa, FL 33619

Project Name		B-HS5 Prelim	inary SE#2					
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed D	ilution
Sample Description Matrix SAL Sample Number Date/Time Collected Collected by Date/Time Received		Stage 2 - LIGNO Wastewater 1307315-03 08/15/13 11:50 Josefin Hirst 08/15/13 14:30						
Client Provided Field Data								
pH Temperature Conductivity Dissolved Oxygen		6.55 30.2 °C 1133 umhos 0.69 mg/L						
Inorganics								
Ammonia as N	mg/L	2.7	EPA 350.1	0.40	0.095		08/28/13 12:26	i 10
Carbonaceous BOD	mg/L	17	SM 5210B	2	2	08/16/13 11:33	08/21/13 09:51	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/16/13 16:48	5 1
Nitrite (as N)	mg/L	1.1	EPA 300.0	0.04	0.01	00/00/40 40 00	08/16/13 16:48	
Iotal Kjeldahl Nitrogen	mg/L	6.4	EPA 351.2	0.20	0.05	08/29/13 16:08	09/06/13 12:09	9.62
Nitrate+Nitrite (N)	mg/L mg/L	9 1.1	EPA 300.0	0.08	0.02	08/16/13 13:00	08/19/13 13:56	1 1
Sample Description Matrix SAL Sample Number Date/Time Collected Collected by Date/Time Received		Stage 4 - SULFUR Wastewater 1307315-04 08/15/13 11:45 Josefin Hirst 08/15/13 14:30						
Client Provided Field Data								
pH Temperature Conductivity Dissolved Oxygen		6.79 30.4 °C 1309 umhos 0.1 mg/L						
Inorganics								
Hydrogen Sulfide (Unionized)	mg/L	16	SM 4550SF	0.04	0.01		08/20/13 10:45	i 1
Ammonia as N	mg/L	4.2	EPA 350.1	0.40	0.095		08/28/13 12:28	10
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/16/13 16:57	′ 1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/16/13 16:57	′ 1
Sulfate	mg/L	76	EPA 300.0	0.60	0.20		08/16/13 16:57	' 1
Sulfide	mg/L	26	SM 4500SF	0.40	0.10		08/20/13 10:45	i 1
Total Kjeldahl Nitrogen	mg/L	6.8	EPA 351.2	0.20	0.05	08/29/13 16:08	09/06/13 11:07	5
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/16/13 16:57	<u> </u>

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September 9, 2013

Work Order: 1307315

Hazen and Sawyer 10002 Princess Palm Ave, Suite 200

Tampa, FL 33619

Project Name		B-HS5 Prelin	ninary SE#2					
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		TAP						
Matrix		Drinking Water						
SAL Sample Number		1307315-05						
Date/Time Collected		08/15/13 12:15						
Collected by		Josefin Hirst						
Date/Time Received		08/15/13 14:30						
Client Provided Field Data								
рΗ		7.54						
Temperature		29.6 °C						
Conductivity		451 umhos						
Dissolved Oxygen		6.47 mg/L						
Inorganics								
Ammonia as N	mg/L	0.033 I	EPA 350.1	0.080	0.019		08/28/13 14	:57 2
Nitrate (as N)	mg/L	0.33	EPA 300.0	0.04	0.01		08/16/13 17	:07 1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/16/13 17	:07 1
Sulfate	mg/L	13	EPA 300.0	0.60	0.20		08/16/13 17	:07 1
Total Kjeldahl Nitrogen	mg/L	0.11 I	EPA 351.2	0.20	0.05	08/29/13 16:08	09/06/13 11	:08 1
Nitrate+Nitrite (N)	mg/L	0.33	EPA 300.0	0.08	0.02		08/16/13 17	:07 1

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Hazen and Sawyer

10002 Princess Palm Ave, Suite 200

Tampa, FL 33619

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH31603 - Ion Chroma	tography 300.0	Prep								
Blank (BH31603-BLK1)					Prepared &	& Analyzed:	08/16/13			
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Sulfate	0.20 U	0.60	0.20	mg/L						
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
LCS (BH31603-BS1)					Prepared &	& Analyzed:	08/16/13			
Nitrite (as N)	1.43	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		
Sulfate	9.05	0.60	0.20	mg/L	9.0		101	85-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
LCS Dup (BH31603-BSD1)					Prepared &	& Analyzed:	08/16/13			
Sulfate	9.06	0.60	0.20	mg/L	9.0		101	85-115	0.1	200
Nitrate (as N)	1.72	0.04	0.01	mg/L	1.7		101	85-115	0	200
Nitrite (as N)	1.43	0.04	0.01	mg/L	1.4		102	85-115	0.2	200
Surrogate: Dichloroacetate	1.13			mg/L	1.0		113	90-115		
Surrogate: Dichloroacetate	1.13			mg/L	1.0		113	90-115		
Surrogate: Dichloroacetate	1.13			mg/L	1.0		113	90-115		
Matrix Spike (BH31603-MS1)		Source: 1	308471-01		Prepared &	& Analyzed:	08/19/13			
Nitrite (as N)	0.696 J5	0.04	0.01	mg/L	1.4	ND	50	85-115		
Nitrate (as N)	2.38 J5	0.04	0.01	mg/L	1.7	0.0650	136	85-115		
Sulfate	17.1	0.60	0.20	mg/L	9.0	8.52	95	85-115		
Surrogate: Dichloroacetate	1.00			mg/L	1.0		100	90-115		
Surrogate: Dichloroacetate	1.00			mg/L	1.0		100	90-115		
Surrogate: Dichloroacetate	1.00			mg/L	1.0		100	90-115		

September 9, 2013 Work Order: 1307315

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September 9, 2013

Work Order: 1307315

Hazen and Sawyer

10002 Princess Palm Ave, Suite 200

Tampa, FL 33619

					Spike	Source		%REC		RPD
Analyte	Result	PQL	MDL	Units	Level	Result	%REC	Limits	RPD	Limit
Batch BH31603 - Ion Chromat	ography 300.0	Prep								
Matrix Spike (BH31603-MS2)		Source: 1	307316-04		Prepared &	Analyzed:	08/16/13			
Sulfate	25.5	0.60	0.20	mg/L	9.0	16.5	100	85-115		
Nitrite (as N)	1.44	0.04	0.01	mg/L	1.4	ND	103	85-115		
Nitrate (as N)	1.76	0.04	0.01	mg/L	1.7	0.0560	101	85-115		
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
Batch BH31616 - BOD										
Blank (BH31616-BLK1)					Prepared:	08/16/13 Ar	nalyzed: 08/	21/13		
Carbonaceous BOD	2 U	2	2	mg/L						
LCS (BH31616-BS1)					Prepared:	08/16/13 Ar	nalyzed: 08/	21/13		
Carbonaceous BOD	199	2	2	mg/L	200		99	85-115		
LCS Dup (BH31616-BSD1)					Prepared:	08/16/13 Ar	nalyzed: 08/	21/13		
Carbonaceous BOD	210	2	2	mg/L	200		105	85-115	5	200
Duplicate (BH31616-DUP1)		Source: 1	307316-01		Prepared:	08/16/13 Ar	nalyzed: 08/	21/13		
Carbonaceous BOD	51	2	2	mg/L		54			6	25
Batch BH31619 - TSS prep										
Blank (BH31619-BLK1)					Prepared:	08/16/13 Ar	nalyzed: 08/	/19/13		
Total Suspended Solids	1 U	1	1	mg/L						

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September 9, 2013

Work Order: 1307315

Hazen and Sawyer 10002 Princess Palm Ave, Suite 200

Tampa, FL 33619

					Spike	Source		%REC		RPD
Analyte	Result	PQL	MDL	Units	Level	Result	%REC	Limits	RPD	Limit
Batch BH31619 - TSS prep										
LCS (BH31619-BS1)					Prepared:	08/16/13 Ar	nalyzed: 08/	19/13		
Total Suspended Solids	46.5	1	1	mg/L	50		93	85-115		
Duplicate (BH31619-DUP1)		Source: 1	307315-01		Prepared:	08/16/13 Ar	nalyzed: 08/	19/13		
Total Suspended Solids	54.0	1	1	mg/L		58.0			7	30
Batch BH32001 - Ion Chromat	tography 300.0	Prep								
Blank (BH32001-BLK1)					Prepared 8	Analyzed:	08/20/13			
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
LCS (BH32001-BS1)					Prepared 8	Analyzed:	08/20/13			
Nitrate (as N)	1.68	0.04	0.01	mg/L	1.7		99	85-115		
Surrogate: Dichloroacetate	1.10			mg/L	1.0		110	90-115		
LCS Dup (BH32001-BSD1)					Prepared 8	Analyzed:	08/20/13			
Nitrate (as N)	1.67	0.04	0.01	mg/L	1.7		98	85-115	0.2	200
Surrogate: Dichloroacetate	1.02			mg/L	1.0		102	90-115		
Matrix Spike (BH32001-MS1)		Source: 1	308565-02		Prepared 8	Analyzed:	08/20/13			
Nitrate (as N)	8.66	0.04	0.01	mg/L	1.7	6.93	102	85-115		
Surrogate: Dichloroacetate	1.04			mg/L	1.0		104	90-115		
Matrix Spike (BH32001-MS2)		Source: 1	307708-04		Prepared 8	Analyzed:	08/20/13			
Nitrate (as N)	8.00	0.04	0.01	mg/L	1.7	6.35	97	85-115		
Surrogate: Dichloroacetate	1.04			mg/L	1.0		104	90-115		

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September 9, 2013

Work Order: 1307315

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					Spike	Source		%REC		RPD
Analyte	Result	PQL	MDL	Units	Level	Result	%REC	Limits	RPD	Limit
Batch BH32022 - Sulfide prep										
Blank (BH32022-BLK1)					Prepared &	Analyzed:	08/20/13			
Sulfide	0.10 U	0.40	0.10	mg/L						
LCS (BH32022-BS1)					Prepared &	Analyzed:	08/20/13			
Sulfide	5.08	0.40	0.10	mg/L	5.0		102	85-115		
Matrix Spike (BH32022-MS1)		Source: 1	308433-01		Prepared &	Analyzed:	08/20/13			
Sulfide	4.88	0.40	0.10	mg/L	5.0	0.200	94	85-115		
Matrix Spike Dup (BH32022-MSD1)		Source: 1	308433-01		Prepared &	Analyzed:	08/20/13			
Sulfide	4.88	0.40	0.10	mg/L	5.0	0.200	94	85-115	0	14
Batch BH32618 - Ammonia by S	SEAL									
Blank (BH32618-BLK1)					Prepared 8	Analyzed:	08/28/13			
Ammonia as N	0.009 U	0.040	0.009	mg/L						
LCS (BH32618-BS1)					Prepared &	Analyzed:	08/28/13			
Ammonia as N	0.49	0.040	0.009	mg/L	0.50		98	90-110		
Matrix Spike (BH32618-MS1)		Source: 1	308651-07		Prepared &	Analyzed:	08/28/13			
Ammonia as N	0.52	0.040	0.009	mg/L	0.50	ND	105	90-110		
Matrix Spike (BH32618-MS2)		Source: 1	308703-07		Prepared &	Analyzed:	08/28/13			
Ammonia as N	0.52	0.040	0.009	mg/L	0.50	ND	104	90-110		
Matrix Spike Dup (BH32618-MSD1)		Source: 1	<u>308651-</u> 07		Prepared &	Analyzed:	08/28/13			
Ammonia as N	0.53	0.040	0.009	mg/L	0.50	ND	106	90-110	1	10

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September 9, 2013

Work Order: 1307315

Hazen and Sawyer

10002 Princess Palm Ave, Suite 200

Tampa, FL 33619

					Spike	Source		%REC		RPD
Analyte	Result	PQL	MDL	Units	Level	Result	%REC	Limits	RPD	Limit
Batch BH32618 - Ammonia	by SEAL									
Matrix Spike Dup (BH32618-MS	D2)	Source: 1	308703-07		Prepared &	Analyzed:	08/28/13			
Ammonia as N	0.54	0.040	0.009	mg/L	0.50	ND	108	90-110	4	10
Batch BH32939 - Digestion	for TKN by EPA	351.2								
Blank (BH32939-BLK1)					Prepared:	08/29/13 Ar	nalyzed: 09	/06/13		
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
LCS (BH32939-BS1)					Prepared:	08/29/13 Ar	nalyzed: 09	/06/13		
Total Kjeldahl Nitrogen	2.40	0.20	0.05	mg/L	2.5		95	90-110		
Matrix Spike (BH32939-MS1)		Source: 1	308848-07		Prepared:	08/29/13 Ar	nalyzed: 09	/06/13		
Total Kjeldahl Nitrogen	2.98	0.20	0.05	mg/L	2.5	0.638	92	90-110		
Matrix Spike (BH32939-MS2)		Source: 1	307315-05		Prepared:	08/29/13 Ar	nalyzed: 09	/06/13		
Total Kjeldahl Nitrogen	2.48	0.20	0.05	mg/L	2.5	0.108	94	90-110		
Matrix Spike Dup (BH32939-MS	D1)	Source: 1	308848-07		Prepared:	08/29/13 Ar	nalyzed: 09	/06/13		
Total Kjeldahl Nitrogen	3.08	0.20	0.05	mg/L	2.5	0.638	97	90-110	4	20
Matrix Spike Dup (BH32939-MS	D2)	Source: 1	307315-05		Prepared:	08/29/13 Ar	nalyzed: 09	/06/13		
Total Kjeldahl Nitrogen	2.64	0.20	0.05	mg/L	2.5	0.108	100	90-110	6	20

AND RED IN ACCORDANCE

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

* 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 limts 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.

J5 Matrix spike of this sample was outside typical range. All other QC criteria were acceptable.

Questions regarding this report should be directed to :

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

Finbail

September 9, 2013 Work Order: 1307315

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

Client	Name																	
	Hazen	and Sawye	·															
Projec	ct Name / Location B-HS5	Preliminary	SE#2															
Samp	lers: (Signature) Apple -	5							PAR	ZAMET								
SAL: Use	Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water	-			site	9, Cool BOD, NOX, SO4	o, H ₂ SO4 H ₃	o, NaOH, Zh	, Cool	o, Cool	P, Cool BOD, NOX	emperature	I	onductivity	0			Containers (Total h location)
Sample No	Sample Description	Date	Time	Matrix	Compo Grab	500mLI TSS, CI	125mLl TKN, N	500mL Acetate H ₂ S	500mLl NOx	500mL NOX, S	500mL TSS, C	Field T	Field p	Field C	Field D			No. of C per eac
01	STE	8/15/13	12:10	ww	X	1	1	1				28.9	7.19	1205	0,1			
02	Stage 1	81513	12:00	ww	x		1		1			28.2	6.93	1243	2.11			
03	Stage 2 - LIGNO	8/15/13	11:50	ww	x		1				1	30.2	6.55	1133	0.69			
04	Stage 4 - SULFUR	8/15/13	11:45	ww	X	ļ	1	1		1		30.4	6.79	1309	0.1			
05	ТАР	8/15/13	12:15	DW	×	ļ	1			1		29.6	7.54	451	6.47			
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-10	prof 0 4-0 8/15/13	HHe	vul	lo	08	- 15 -	ig 30 B		Rece	lived on i	ce? Temp		() N	N/A				
Relinqu	iished: Date/Time:	Received:			Date/Tir	ne:			Prop	er preser	vatives in	dicated?	ØN	N/A				
Relinqu	iished: Date/Time:	Received:		*****	Date/Tir	ne:			Rec'o Volat	d within h tiles rec'o	holding time 1 w /out he	e? adspace?	¶ N Y N	NVA NDA				
Relinqu	iished: Date/Time:	Received:			Date/Tir	ne:		- <u></u>	Prop	er contair	ners used	?	Ø	N/A	130	1 31	5	

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

SAL Project No. 307365

Chain of Custody

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



October 14, 2013

Work Order: 1308840

Hazen and Sawyer

10002 Princess Palm Ave, Suite 200

Tampa, FL 33619

Project Name		B-HS5	SE#1					
Sample Description Matrix SAL Sample Number Date/Time Collected Collected by Date/Time Received	BI W 1; 0; Ju 0	HS5-STE Vastewater 308840-01 9/27/13 10:20 osefin Hirst 9/27/13 15:34						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed D	ilution
Client Provided Field Data								
pH Temperature Conductivity Dissolved Oxygen		7.09 27.6 °C 1294 umho 0.11 mg/L	s/cm					
Inorganics								
Ammonia as N	mg/L	71	EPA 350.1	2.0	0.47		09/30/13 11:39	50
Carbonaceous BOD	mg/L	71	SM 5210B	2	2	09/27/13 12:20	10/03/13 10:35	1
Chemical Oxygen Demand	mg/L	150	EPA 410.4	25	10	10/11/13 08:45	10/11/13 16:55	1
Hydrogen Sulfide (Unionized)	mg/L	2.6	SM 4550SF	0.04	0.01		09/30/13 11:30	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		09/28/13 00:17	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		09/28/13 00:17	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		09/28/13 00:17	1
Orthophosphate as P	mg/L	5.5	EPA 300.0	0.040	0.010		09/28/13 00:17	1
Phosphorous - Total as P	mg/L	12	SM 4500P-E	0.40	0.10	10/01/13 11:35	10/04/13 11:21	10
Sulfate	mg/L	4.2	EPA 300.0	0.60	0.20		09/28/13 00:17	1
Sulfide	mg/L	6.2	SM 4500SF	0.40	0.10		09/30/13 11:30	1
Total Alkalinity	mg/L	430	SM 2320B	8.0	2.0		10/03/13 13:38	1
Total Kjeldahl Nitrogen	mg/L	87	EPA 351.2	0.20	0.05	10/03/13 11:28	10/11/13 11:08	20.83
Total Organic Carbon	mg/L	48	SM 5310B	1.0	0.060		09/30/13 13:18	1
Total Suspended Solids	mg/L	58	SM 2540D	1	1	09/27/13 15:55	10/01/13 08:58	1
Volatile Suspended Solids	mg/L	54	EPA 160.4	1	1	09/27/13 15:55	10/01/13 08:58	1
Microbiology								
E. Coli	MPN/100 mL	24,000 z	SM 9223B	2.0	2.0	09/27/13 16:12	09/28/13 10:30	1
Fecal Coliforms	CFU/100 ml	87,000	SM 9222D	1	1	09/27/13 16:11	09/28/13 16:30	1

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October 14, 2013

Work Order: 1308840

Hazen and Sawyer

10002 Princess Palm Ave, Suite 200

Tampa, FL 33619

Project Name		B-HS5	SE#1					
Sample Description Matrix SAL Sample Number Date/Time Collected Collected by Date/Time Received	BI W 1: 0: Ja 0:	HS5-ST1 /astewater 308840-02 9/27/13 10:10 osefin Hirst 9/27/13 15:34						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
<u>Client Provided Field Data</u> pH Temperature Conductivity Dissolved Oxygen		6.89 26.6 °C 1249 umho 2.55 mg/L	s/cm					
Inorganics								
Ammonia as N	mg/L	7.5	EPA 350.1	0.40	0.095		09/30/13 13:	:36 10
Carbonaceous BOD	mg/L	12	SM 5210B	2	2	09/27/13 12:20	10/03/13 10:	:35 1
Chemical Oxygen Demand	mg/L	10 U	EPA 410.4	25	10	10/11/13 08:45	10/11/13 16:	55 1
Nitrate (as N)	mg/L	43	EPA 300.0	0.40	0.10		09/28/13 00:	34 10
Nitrate+Nitrite (N)	mg/L	43	EPA 300.0	0.44	0.11		09/28/13 00:	34 10
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		09/28/13 00:	:34 1
Orthophosphate as P	mg/L	1.8	EPA 300.0	0.040	0.010		09/28/13 00:	34 1
Phosphorous - Total as P	mg/L	3.1	SM 4500P-E	0.20	0.050	10/01/13 11:35	10/04/13 11:	08 5
Total Alkalinity	mg/L	230	SM 2320B	8.0	2.0		10/03/13 13:	45 1
Total Kjeldahl Nitrogen	mg/L	10	EPA 351.2	0.20	0.05	10/03/13 11:28	10/11/13 10:	48 5
Total Organic Carbon	mg/L	12	SM 5310B	1.0	0.060		09/30/13 13:	18 1
Total Suspended Solids	mg/L	4	SM 2540D	1	1	09/27/13 15:55	10/01/13 08:	:58 1
Volatile Suspended Solids	mg/L	4	EPA 160.4	1	1	09/27/13 15:55	10/01/13 08:	:58 1
Microbiology								
E. Coli	MPN/100 mL	980	SM 9223B	2.0	2.0	09/27/13 16:12	09/28/13 10:	:30 1
Fecal Coliforms	CFU/100 ml	2,400	SM 9222D	1	1	09/27/13 16:11	09/28/13 16:	:30 1

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Project Name		B-HS5	SE#1					
Sample Description Matrix SAL Sample Number Date/Time Collected Collected by Date/Time Received	B 1 0 J 0	HS5-LIGNO-0 Vastewater 308840-03 9/27/13 10:00 osefin Hirst 9/27/13 15:34						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
<u>Client Provided Field Data</u> pH		6.35						
Temperature Conductivity Dissolved Oxygen		27.4 °C 1182 umho 1.03 mg/L	s/cm					
Inorganics								
Ammonia as N	mg/L	1.4	EPA 350.1	0.080	0.019		09/30/13 13	:38 2
Carbonaceous BOD	mg/L	14	SM 5210B	2	2	09/27/13 12:20	10/03/13 10	:35 1
Chemical Oxygen Demand	mg/L	50	EPA 410.4	25	10	10/11/13 08:45	10/11/13 16	:55 1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		09/28/13 00	:44 1
Nitrate+Nitrite (N)	mg/L	1.3	EPA 300.0	0.08	0.02		09/28/13 00	:44 1
Nitrite (as N)	mg/L	1.3	EPA 300.0	0.04	0.01		09/28/13 00	:44 1
Orthophosphate as P	mg/L	0.13	EPA 300.0	0.040	0.010		09/28/13 00	:44 1
Phosphorous - Total as P	mg/L	0.56	SM 4500P-E	0.040	0.010	10/01/13 11:35	10/04/13 10	:43 1
Total Alkalinity	mg/L	410	SM 2320B	8.0	2.0		10/03/13 13	:58 1
Total Kjeldahl Nitrogen	mg/L	1.4	EPA 351.2	0.20	0.05	10/03/13 11:28	10/11/13 10	:49 1
Total Organic Carbon	mg/L	29	SM 5310B	1.0	0.060		09/30/13 13	:18 1
Total Suspended Solids	mg/L	6	SM 2540D	1	1	09/27/13 15:55	10/01/13 08	:58 1
Volatile Suspended Solids	mg/L	6	EPA 160.4	1	1	09/27/13 15:55	10/01/13 08	:58 1
Microbiology								
E. Coli	MPN/100 mL	740	SM 9223B	2.0	2.0	09/27/13 16:12	09/28/13 10	:30 1
Fecal Coliforms	CFU/100 ml	800	SM 9222D	1	1	09/27/13 16:11	09/28/13 16	:30 1

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Work Order: 1308840

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Project Name		B-HS5	SE#1					
Sample Description Matrix SAL Sample Number Date/Time Collected Collected by Date/Time Received	B V 1 0 J 0 0 0	HS5-ST2 Vastewater 308840-04 9/27/13 09:40 osefin Hirst 9/27/13 15:34						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Client Provided Field Data								
pH Temperature Conductivity Dissolved Oxygen		6.61 27.6 °C 1335 umho 0.15 mg/L	s/cm					
Inorganics								
Ammonia as N	mg/L	2.4	EPA 350.1	0.20	0.047		09/30/13 13:	40 5
Carbonaceous BOD	mg/L	4	SM 5210B	2	2	09/27/13 12:20	10/03/13 10:	35 1
Chemical Oxygen Demand	mg/L	32	EPA 410.4	25	10	10/11/13 08:45	10/11/13 16:	55 1
Hydrogen Sulfide (Unionized)	mg/L	5.7	SM 4550SF	0.04	0.01		09/30/13 11:	30 1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		09/28/13 00:	53 1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		09/28/13 00:	53 1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		09/28/13 00:	53 1
Orthophosphate as P	mg/L	0.54	EPA 300.0	0.040	0.010		09/28/13 00:	53 1
Phosphorous - Total as P	mg/L	0.94	SM 4500P-E	0.040	0.010	10/01/13 11:35	10/04/13 10:	44 1
Sulfate	mg/L	29	EPA 300.0	0.60	0.20		09/28/13 00:	53 1
Sulfide	mg/L	8.2	SM 4500SF	0.40	0.10		09/30/13 11:	30 1
Total Alkalinity	mg/L	480	SM 2320B	8.0	2.0		10/03/13 14:	11 1
Total Kjeldahl Nitrogen	mg/L	3.3	EPA 351.2	0.20	0.05	10/03/13 11:28	10/11/13 10:	23 1
Total Organic Carbon	mg/L	25	SM 5310B	1.0	0.060		09/30/13 13:	18 1
Total Suspended Solids	mg/L	5	SM 2540D	1	1	09/27/13 15:55	10/01/13 08:	58 1
Volatile Suspended Solids	mg/L	5	EPA 160.4	1	1	09/27/13 15:55	10/01/13 08:	58 1
Microbiology								
E. Coli	MPN/100 mL	2.0 U	SM 9223B	2.0	2.0	09/27/13 16:12	09/28/13 10:	30 1
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	09/27/13 16:11	09/28/13 16:	30 1

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October 14, 2013

Work Order: 1308840

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Project Name		B-HS5	SE#1					
Sample Description Matrix SAL Sample Number Date/Time Collected Collected by Date/Time Received	B V 1 0 J 0 0 0 0 0 0 0	HS5-WELL Vastewater 308840-05 9/27/13 09:35 losefin Hirst 99/27/13 15:34						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Client Provided Field Data								
pH Temperature Conductivity Dissolved Oxygen		6.73 23.6 °C 462 umhos 2.31 mg/L	s/cm					
Inorganics								
Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		09/30/13 11:4	i7 1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	09/27/13 12:20	10/03/13 10:3	35 1
Chemical Oxygen Demand	mg/L	10 U	EPA 410.4	25	10	10/11/13 08:45	10/11/13 16:5	55 1
Hydrogen Sulfide (Unionized)	mg/L	2.6	SM 4550SF	0.04	0.01		09/30/13 11:3	30 1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		09/28/13 01:0	03 1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		09/28/13 01:0	03 1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		09/28/13 01:0	03 1
Orthophosphate as P	mg/L	0.029	EPA 300.0	0.040	0.010		09/28/13 01:0	03 1
Phosphorous - Total as P	mg/L	0.057	SM 4500P-E	0.040	0.010	10/01/13 11:35	10/04/13 10:4	46 1
Sulfate	mg/L	12	EPA 300.0	0.60	0.20		09/28/13 01:0	03 1
Sulfide	mg/L	4.1	SM 4500SF	0.40	0.10		09/30/13 11:3	30 1
Total Alkalinity	mg/L	130	SM 2320B	8.0	2.0		10/03/13 14:1	17 1
Total Kjeldahl Nitrogen	mg/L	0.10 1	EPA 351.2	0.20	0.05	10/03/13 11:28	10/11/13 10:2	24 1
Total Organic Carbon	mg/L	2.8	SM 5310B	1.0	0.060		09/30/13 13:1	18 1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	09/27/13 15:55	10/01/13 08:5	58 1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	09/27/13 15:55	10/01/13 08:5	58 1
Microbiology								
E. Coli	MPN/100 mL	2.0 U	SM 9223B	2.0	2.0	09/27/13 16:12	09/28/13 10:3	30 1
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	09/27/13 16:11	09/28/13 16:3	30 1

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Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BI32727 - BOD										
Blank (BI32727-BLK1)					Prepared:	09/27/13 Ar	nalyzed: 10/	/03/13		
Carbonaceous BOD	2 U	2	2	mg/L						
LCS (BI32727-BS1)					Prepared:	09/27/13 Ar	nalyzed: 10/	/03/13		
Carbonaceous BOD	171	2	2	mg/L	200		86	85-115		
LCS Dup (BI32727-BSD1)					Prepared:	09/27/13 Ar	nalyzed: 10/	/03/13		
Carbonaceous BOD	173	2	2	mg/L	200		86	85-115	0.9	200
Duplicate (BI32727-DUP1)		Source: 1	310283-03		Prepared:	09/27/13 Ar	nalyzed: 10/	/03/13		
Carbonaceous BOD	83	2	2	mg/L		90			8	25
Batch BI32741 - Ion Chroma	tography 300.0 F	rep								
Blank (BI32741-BLK1)					Prepared &	Analyzed:	09/27/13			
Sulfate	0.20 U	0.60	0.20	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						
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Surrogate: Dichloroacetate	R	esult: 0.99	9	mg/L	1.0		100	90-115		
Surrogate: Dichloroacetate	R	esult: 0.99	9	mg/L	1.0		100	90-115		
Surrogate: Dichloroacetate	R	esult: 0.99	9	mg/L	1.0		100	90-115		
Surrogate: Dichloroacetate	R	esult: 0.99	9	mg/L	1.0		100	90-115		
LCS (BI32741-BS1)					Prepared 8	& Analyzed:	09/27/13			
Sulfate	9.05	0.60	0.20	mg/L	9.0		101	85-115		
Orthophosphate as P	0.813	0.040	0.010	mg/L	0.90		90	85-115		
Nitrate (as N)	1.69	0.04	0.01	mg/L	1.7		99	85-115		
Nitrite (as N)	1.44	0.04	0.01	mg/L	1.4		103	85-115		
Surrogate: Dichloroacetate	R	esult: 0.98	0	mg/L	1.0		98	90-115		
Surrogate: Dichloroacetate	R	esult: 0.98	0	mg/L	1.0		98	90-115		
Surrogate: Dichloroacetate	R	esult: 0.98	0	mg/L	1.0		98	90-115		
Surrogate: Dichloroacetate	R	esult: 0.98	0	mg/L	1.0		98	90-115		

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					Spike	Source		%REC		RPD
Analyte	Result	PQL	MDL	Units	Level	Result	%REC	Limits	RPD	Limit
Batch BI32741 - Ion Chromat	ography 300.0	0 Prep								
LCS Dup (BI32741-BSD1)					Prepared 8	Analyzed:	09/27/13			
Sulfate	9.02	0.60	0.20	mg/L	9.0		100	85-115	0.3	200
Orthophosphate as P	0.811	0.040	0.010	mg/L	0.90		90	85-115	0.2	200
Nitrate (as N)	1.69	0.04	0.01	mg/L	1.7		99	85-115	0	200
Nitrite (as N)	1.43	0.04	0.01	mg/L	1.4		102	85-115	0.3	200
Surrogate: Dichloroacetate		Result: 1.02		mg/L	1.0		102	90-115		
Surrogate: Dichloroacetate		Result: 1.02		mg/L	1.0		102	90-115		
Surrogate: Dichloroacetate		Result: 1.02		mg/L	1.0		102	90-115		
Surrogate: Dichloroacetate		Result: 1.02		mg/L	1.0		102	90-115		
Matrix Spike (BI32741-MS1)		Source: 13	310163-01		Prepared 8	Analyzed:	09/27/13			
Sulfate	88.1	6.0	2.0	mg/L	90	ND	98	85-115		
Nitrite (as N)	13.2	0.40	0.10	mg/L	14	ND	94	85-115		
Orthophosphate as P	8.24	0.40	0.10	mg/L	9.0	ND	92	85-115		
Nitrate (as N)	53.1	0.40	0.10	mg/L	17	33.6	114	85-115		
Surrogate: Dichloroacetate		Result: 1.01		mg/L	1.0		101	90-115		
Surrogate: Dichloroacetate		Result: 1.01		mg/L	1.0		101	90-115		
Surrogate: Dichloroacetate		Result: 1.01		mg/L	1.0		101	90-115		
Surrogate: Dichloroacetate		Result: 1.01		mg/L	1.0		101	90-115		
Matrix Spike (BI32741-MS2)		Source: 13	310323-01		Prepared 8	Analyzed:	09/27/13			
Sulfate	10.7	0.60	0.20	mg/L	9.0	1.74	99	85-115		
Orthophosphate as P	0.816	0.040	0.010	mg/L	0.90	ND	91	85-115		
Nitrate (as N)	2.00	0.04	0.01	mg/L	1.7	0.107	112	85-115		
Nitrite (as N)	1.26	0.04	0.01	mg/L	1.4	ND	90	85-115		
Surrogate: Dichloroacetate		Result: 1.00		mg/L	1.0		100	90-115		
Surrogate: Dichloroacetate		Result: 1.00		mg/L	1.0		100	90-115		
Surrogate: Dichloroacetate		Result: 1.00		mg/L	1.0		100	90-115		
Surrogate: Dichloroacetate		Result: 1.00		mg/L	1.0		100	90-115		

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					Spike	Source		%REC		RPD
Analyte	Result	PQL	MDL	Units	Level	Result	%REC	Limits	RPD	Limit
Batch BI32742 - Sulfide prep										
Blank (BI32742-BLK1)					Prepared 8	& Analyzed:	09/30/13			
Sulfide	0.10 U	0.40	0.10	mg/L						
LCS (BI32742-BS1)					Prepared &	& Analyzed:	09/30/13			
Sulfide	4.93	0.40	0.10	mg/L	5.0		99	85-115		
Matrix Spike (BI32742-MS1)		Source: 1	308591-01		Prepared 8	Analyzed:	09/30/13			
Sulfide	4.52	0.40	0.10	mg/L	5.0	ND	90	85-115		
Matrix Spike Dup (BI32742-MSD1)		Source: 1	308591-01		Prepared &	& Analyzed:	09/30/13			
Sulfide	4.52	0.40	0.10	mg/L	5.0	ND	90	85-115	0	14
Batch BI32745 - VSS Prep										
Blank (BI32745-BLK1)					Prepared:	09/27/13 Ar	nalyzed: 10	/01/13		
Volatile Suspended Solids	1 U	1		mg/L						
Total Suspended Solids	1 U	1	1	mg/L						
LCS (BI32745-BS1)					Prepared:	09/27/13 Ar	nalyzed: 10	/01/13		
Total Suspended Solids	49.8	1	1	mg/L	50		100	85-115		
Duplicate (BI32745-DUP1)		Source: 1	308840-01		Prepared:	09/27/13 Ar	nalyzed: 10	/01/13		
Volatile Suspended Solids	55.0	1		mg/L		54.0			2	20
Total Suspended Solids	59.0	1	1	mg/L		58.0			2	30
Duplicate (BI32745-DUP2)		Source: 1	308840-01		Prepared:	09/27/13 Ar	nalyzed: 10	/01/13		
Volatile Suspended Solids	57.0	1		mg/L		54.0			5	20
Total Suspended Solids	59.0	1	1	mg/L		58.0			2	30

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					Spike	Source		%REC		RPD
Analyte	Result	PQL	MDL	Units	Level	Result	%REC	Limits	RPD	Limit
Batch BI32745 - VSS Prep										
Duplicate (BI32745-DUP3)		Source: 13	08840-01		Prepared:	09/27/13 Ar	nalyzed: 10/	01/13		
Total Suspended Solids	58.0	1	1	mg/L		58.0			0	30
Volatile Suspended Solids	57.0	1		mg/L		54.0			5	20
Duplicate (BI32745-DUP4)		Source: 13	808840-01		Prepared:	09/27/13 Ar	nalyzed: 10/	01/13		
Total Suspended Solids	59.0	1	1	mg/L		58.0			2	30
Volatile Suspended Solids	55.0	1		mg/L		54.0			2	20
Duplicate (BI32745-DUP5)		Source: 13	08840-01		Prepared:	09/27/13 Ar	nalyzed: 10/	01/13		
Total Suspended Solids	59.0	1	1	mg/L		58.0			2	30
Volatile Suspended Solids	56.0	1		mg/L		54.0			4	20
Batch BI33001 - Ion Chromat	ography 300.0) Prep								
Blank (BI33001-BLK1)					Prepared &	Analyzed:	09/30/13			
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Surrogate: Dichloroacetate		Result: 0.900		mg/L	1.0		90	90-115		
LCS (BI33001-BS1)					Prepared &	Analyzed:	09/30/13			
Nitrate (as N)	1.66	0.04	0.01	mg/L	1.7		98	85-115		
Surrogate: Dichloroacetate		Result: 0.928		mg/L	1.0		93	90-115		
LCS Dup (BI33001-BSD1)					Prepared &	Analyzed:	09/30/13			
Nitrate (as N)	1.67	0.04	0.01	mg/L	1.7		98	85-115	0.4	200
Surrogate: Dichloroacetate		Result: 0.915		mg/L	1.0		92	90-115		
Matrix Spike (BI33001-MS1)		Source: 13	310245-02		Prepared &	Analyzed:	09/30/13			
Nitrate (as N)	19.1	0.40	0.10	mg/L	17	2.28	99	85-115		
Surrogate: Dichloroacetate		Result: 0.927		mg/L	1.0		93	90-115		

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					Spike	Source		%REC		RPD
Analyte	Result	PQL	MDL	Units	Level	Result	%REC	Limits	RPD	Limit
Batch BI33001 - Ion Chromatog	raphy 300.	0 Prep								
Matrix Spike (BI33001-MS2)		Source: 13	08593-01		Prepared 8	& Analyzed:	09/30/13			
Nitrate (as N)	18.0	0.40	0.10	mg/L	17	1.16	99	85-115		
Surrogate: Dichloroacetate		Result: 0.903		mg/L	1.0		90	90-115		
Batch BI33007 - Ammonia by SE	EAL									
Blank (BI33007-BLK1)					Prepared 8	Analyzed:	09/30/13			
Ammonia as N	0.009 U	0.040	0.009	mg/L						
LCS (BI33007-BS1)					Prepared &	Analyzed:	09/30/13			
Ammonia as N	0.49	0.040	0.009	mg/L	0.50		98	90-110		
Matrix Spike (BI33007-MS1)		Source: 13	10254-01		Prepared &	Analyzed:	09/30/13			
Ammonia as N	0.51	0.040	0.009	mg/L	0.50	0.016	99	90-110		
Matrix Spike (BI33007-MS2)		Source: 13	10314-07		Prepared &	Analyzed:	09/30/13			
Ammonia as N	0.52	0.040	0.009	mg/L	0.50	ND	103	90-110		
Matrix Spike Dup (Bl33007-MSD1)		Source: 13	10254-01		Prepared &	Analyzed:	09/30/13			
Ammonia as N	0.52	0.040	0.009	mg/L	0.50	0.016	100	90-110	0.7	10
Matrix Spike Dup (Bl33007-MSD2)		Source: 13	10314-07		Prepared &	Analyzed:	09/30/13			
Ammonia as N	0.52	0.040	0.009	mg/L	0.50	ND	104	90-110	0.5	10
Batch BI33028 - TOC prep										
Blank (BI33028-BLK1)					Prepared 8	Analyzed:	09/30/13			
Total Organic Carbon	0.060 U	1.0	0.060	mg/L						

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					Spike	Source		%REC		RPD
Analyte	Result	PQL	MDL	Units	Level	Result	%REC	Limits	RPD	Limit
Batch BI33028 - TOC prep										
LCS (BI33028-BS1)					Prepared 8	& Analyzed:	09/30/13			
Total Organic Carbon	9.12	1.0	0.060	mg/L	10		91	90-110		
Matrix Spike (Bl33028-MS1)		Source: 1	308840-05		Prepared &	Analyzed:	09/30/13			
Total Organic Carbon	12.0	1.0	0.060	mg/L	10	2.85	91	85-115		
Matrix Spike Dup (Bl33028-MSD1)		Source: 1	308840-05		Prepared &	& Analyzed:	09/30/13			
Total Organic Carbon	12.0	1.0	0.060	mg/L	10	2.85	91	85-115	0.03	10
Batch BI33039 - alkalinity										
Blank (BI33039-BLK1)					Prepared 8	Analyzed:	10/03/13			
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
LCS (BI33039-BS1)					Prepared &	Analyzed:	10/03/13			
Total Alkalinity	120	8.0	2.0	mg/L	120		98	90-110		
Matrix Spike (BI33039-MS1)		Source: 1	310291-04		Prepared &	Analyzed:	10/03/13			
Total Alkalinity	210	8.0	2.0	mg/L	120	90	95	80-120		
Matrix Spike Dup (Bl33039-MSD1)		Source: 1	310291-04		Prepared &	Analyzed:	10/03/13			
Total Alkalinity	210	8.0	2.0	mg/L	120	90	97	80-120	1	26
Batch BJ30123 - Digestion for T	P by EPA 36	5.2/SM4500	PE							
Blank (BJ30123-BLK1)					Prepared:	10/01/13 Ar	nalyzed: 10/	/04/13		
Phosphorous - Total as P	0.010 U	0.040	0.010	mg/L						

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					Spike	Source		%REC		RPD
Analyte	Result	PQL	MDL	Units	Level	Result	%REC	Limits	RPD	Limit
Batch BJ30123 - Digestion fo	r TP by EPA 36	5.2/SM4500	PE							
LCS (BJ30123-BS1)					Prepared:	10/01/13 Ar	nalyzed: 10/	/04/13		
Phosphorous - Total as P	0.859	0.040	0.010	mg/L	0.80		107	90-110		
Matrix Spike (BJ30123-MS1)		Source: 1	308838-17		Prepared:	10/01/13 Ar	alyzed: 10/	/04/13		
Phosphorous - Total as P	0.946	0.040	0.010	mg/L	1.0	ND	95	90-110		
Matrix Spike (BJ30123-MS2)		Source: 1	310368-02		Prepared:	10/01/13 Ar	alyzed: 10/	/04/13		
Phosphorous - Total as P	0.998	0.040	0.010	mg/L	1.0	0.0598	94	90-110		
Matrix Spike Dup (BJ30123-MSD	1)	Source: 1	308838-17		Prepared:	10/01/13 Ar	alyzed: 10/	/04/13		
Phosphorous - Total as P	1.00	0.040	0.010	mg/L	1.0	ND	100	90-110	5	25
Matrix Spike Dup (BJ30123-MSD	2)	Source: 1	310368-02		Prepared:	10/01/13 Ar	alyzed: 10/	/04/13		
Phosphorous - Total as P	1.11	0.040	0.010	mg/L	1.0	0.0598	105	90-110	10	25
Batch BJ30312 - Digestion fo	r TKN by EPA 3	351.2								
Blank (BJ30312-BLK1)					Prepared:	10/03/13 Ar	alyzed: 10/	/11/13		
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
LCS (BJ30312-BS1)					Prepared:	10/03/13 Ar	alyzed: 10/	'11/13		
Total Kjeldahl Nitrogen	2.40	0.20	0.05	mg/L	2.5		95	90-110		
Matrix Spike (BJ30312-MS1)		Source: 1	308838-08		Prepared:	10/03/13 Ar	alyzed: 10/	'11/13		
Total Kjeldahl Nitrogen	4.81	0.20	0.05	mg/L	2.5	2.29	99	90-110		
Matrix Spike (BJ30312-MS2)		Source: 1	308838-15		Prepared:	10/03/13 Ar	alyzed: 10/	/11/13		
Total Kjeldahl Nitrogen	2.64	0.20	0.05	mg/L	2.5	0.0882	101	90-110		

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					Spike	Source		%REC		RPD
Analyte	Result	PQL	MDL	Units	Level	Result	%REC	Limits	RPD	Limit
Batch BJ30312 - Digestion for T	KN by EPA	351.2								
Matrix Spike Dup (BJ30312-MSD1)		Source: 1	308838-08		Prepared:	10/03/13 Ar	nalyzed: 10	/11/13		
Total Kjeldahl Nitrogen	4.89	0.20	0.05	mg/L	2.5	2.29	102	90-110	2	20
Matrix Spike Dup (BJ30312-MSD2)		Source: 1	308838-15	;	Prepared:	10/03/13 Ar	nalyzed: 10	/11/13		
Total Kjeldahl Nitrogen	2.55	0.20	0.05	mg/L	2.5	0.0882	97	90-110	3	20
Batch BJ31115 - COD prep										
Blank (BJ31115-BLK1)					Prepared &	& Analyzed:	10/11/13			
Chemical Oxygen Demand	10 U	25	10	mg/L						
LCS (BJ31115-BS1)					Prepared &	& Analyzed:	10/11/13			
Chemical Oxygen Demand	52	25	10	mg/L	50		104	90-110		
Matrix Spike (BJ31115-MS1)		Source: 1	308840-02		Prepared &	& Analyzed:	10/11/13			
Chemical Oxygen Demand	61	25	10	mg/L	50	ND	122	85-115		
Matrix Spike Dup (BJ31115-MSD1)		Source: 1	308840-02		Prepared &	& Analyzed:	10/11/13			
Chemical Oxygen Demand	61	25	10	mg/L	50	ND	122	85-115	0	32

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Microbiology - Quality Control

					Spike	Source		%REC		RPD
Analyte	Result	PQL	MDL	Units	Level	Result	%REC	Limits	RPD	Limit
Batch BI32746 - FC-MF										
Blank (BI32746-BLK1)					Prepared:	09/27/13 Ar	nalyzed: 09/	28/13		
Fecal Coliforms	1 U	1	1	CFU/100 m	nl					
Duplicate (BI32746-DUP1)		Source: 1	308840-0	05	Prepared:	09/27/13 Ar	nalyzed: 09/	28/13		
Fecal Coliforms	1 U	1	1	CFU/100 m	n	ND				200

ANTED IN ACCORDANCE

October 14, 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 limts 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.

Z Too many colonies were present for accurate counting.

Questions regarding this report should be directed to :

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

Finbail

SOUTHERN ANALYTICAL LABORATORIES, INC. 110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 813-855-1844 fax 813-855-2218

Client	Name												Contact	/ Phone:	Q	12-1	20.4	ug	R	i		
Proje	t Name / Location	and S	awye													·	50-	~ (0			
	B-HS5	SE#1											L	,	2							
Samp	iers: (Signature) Josefan Ur	É		2								P/	RAMET	ER / CONT		ESCRIPT	ION _					
SAL Use Only Sample No	Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water Sample Description		Date	Time	Matrix	Composite	Grab	125mLP, Na ₂ S ₂ O ₃ FC	125mLP, Na ₂ S ₂ O ₃ FC-QT	500mLP, Cool Total Alkalinity, TSS, VSS, CBOD, NOx, OP, SO ₄	125mLP, H ₂ SO₄ COD, TKN, NH ₃ , TP	500mLP, NaOH, Zn Acetate H ₂ S	40mLaV, HCI TOC	500mLP, Cool Total Alkalinity, TSS, VSS, CBOD, NOX, OP					На	Temperature	Conductivity	02
01	BHS\$-STE	91:	27/13	10:20	ww		x	2	2	1	1	1	2						7.09	27.6	1294	0.11
02	BHS5-ST1		1	10:10	ww		x	2	2		1		2	1					6.89	26.6	1249	2.55
03	BHS5-LIGNO-0			10:00	ww		x	2	2		1		2	1					6:35	27.4	1182	1.03
04	BHS5-ST2			9:40	ww		x	2	2	1	1	1	2						6.61	27.6	1335	0.15
05	BHS5-WELL		∇	9:35	ww		x	2	2	1	1	1	2						6.73	23.6	462	2.31
			_																			
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Reling	uished: Date/Time:	Rec	eived:	V	/	Date	Time G-	: 27-12	3153	9	Prop	er preserv	atives indic	ated?	Ø N	N/A						
Relinq	uished: Date/Time:	Rece	eived:	1		Date	/Time	a;			Rec'o	t within ho tiles rec'd v	lding time? w/out head	space?	♥ N Y N	NVA ØØ						
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Chain of Custody xls Rev.Date 11/19/01

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Chain of Custody

SAL Project No. 1308840



Appendix B: Operation & Maintenance Log

Table B.1

	Operation and Maintenance Log
Date	Description
6/24/2013	Construction - Stage 1 and Stage 2 tanks installed
6/25/2013	Construction - Drainfield distribution box installed and all pipework
7/9/2013	System Start-up
	Bull run valve switched from drainfield to Stage 1 biofilter
7/17/2013	System check
7/23/2013	Construction - sod installation
7/29/2013	Preliminary sample event No. 1
8/6/2013	System check
	Need to add soil around low side of pump tank riser
8/15/2013	Preliminary sample event No. 2
9/27/2013	Sample Event No. 1

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Appendix C: Vericomm PLC Data

Syster	n Status	9/27/2013	8/27/2013	8/15/2013	7/29/2013	7/17/2013
Point	Description	Value	Value	Value	Value	Value
1	Alarm Status	ОК	ОК	ОК	OK	OK
2	Alert Status	ОК	ОК	ОК	ОК	OK
3	System Mode	Normal	Normal	Normal	Normal	Normal
5	Timer Mode	Off	Off	Off	Off	Off
6	Active Off Time	60.0 Minutes				
7	Active On Time	0.7 Minutes				
9	Pump Mode	Off	Off	Off	Off	Off
10	Pump Status	Off	Off	Off	Off	Off
12	Pump Cycles Today	2.0 Cycles	1.0 Cycles	2.0 Cycles	3.0 Cycles	0.0 Cycles
13	Override Cycles Today	0.0 Cycles				
14	Pump Run Time Today	1.4 Minutes	0.7 Minutes	1.4 Minutes	2.1 Minutes	0.0 Minutes
Setting	js					
Point	Description	Value	Value	Value	Value	Value
17	Off Cycle Time	60.0 Minutes				
18	On Cycle Time	0.7 Minutes				
19	Override Off Cycle Time	30.0 Minutes				
20	Override On Cycle Time	0.7 Minutes				
21	Minimum Override Cycles	3.0 Cycles	3.0 Cycles	3.0 Cycles	3.0 Cycles	3.0 Cycles
23	Override Cycle Limit per Day	7.0 Cycles				
24	Time Limit per Day	16.0 Minutes				
25	High Level Pump Test	2.0 Minutes				
28	Alarm Update Interval	120.0 Minutes	120.0 Minutes	120.0 Minutes	120.0 Minutes	240.0 Minutes
29	Page Delay	960.0 Minutes				
30	Page Interval	30.0 Minutes				
31	Local Alarm Delay	1140.0 Minutes				
32	Local Reactivate Delay	120.0 Minutes				
Troubl	eshooting					
Point	Description	Value	Value	Value	Value	Value
33	Top Float Status	OK	ОК	ОК	OK	OK
34	Middle Float Status	OK	ОК	ОК	OK	OK
35	Bottom Float Status	ОК	ОК	ОК	OK	OK
37	Contactor Status	ОК	ОК	ОК	OK	OK
38	Pump Status	OK	OK	ОК	ОК	ОК
40	Filter Status	OK	OK	OK	ОК	ОК
41	Tank Status	OK	OK	ОК	ОК	ОК
43	Power Status	OK	OK	ОК	ОК	ОК
Flow D	ata					
Point	Description	Value	Value	Value	Value	Value
49	Pump Run Time Today	1.4 Minutes	0.7 Minutes	1.4 Minutes	2.1 Minutes	0.0 Minutes
50	Override Cycles Today	0	0	0	0	0
51	Pump Cycles Today	2.0 Cycles	1.0 Cycles	2.0 Cycles	3.0 Cycles	0.0 Cycles
52	Average Run Time per Cycle Today	0.7 Minutes	0.7 Minutes	0.7 Minutes	0.7 Minutes	0.0 Minutes
54	Brownouts Today	0	0	0	0	0

Appendix C

		9/27/2013	8/27/2013	8/15/2013	7/29/2013	7/17/2013
30-Day	/ History Data					
Point	Description	Value	Value	Value	Value	Value
65	30 Day Average Run Time per Day	3.4 Minutes	4.3 Minutes	4.8 Minutes	4.5 Minutes	4.1 Minutes
66	30 Day Average Override Cycles per Day	0.0 Cycles	0.0 Cycles	0.0 Cycles	0.1 Cycles	0.2 Cycles
67	30 Day Average Cycles per Day	4.9 Cycles	6.0 Cycles	6.8 Cycles	6.3 Cycles	5.8 Cycles
68	30 Day Average Run Time per Cycle	0.7 Minutes	0.7 Minutes	0.7 Minutes	0.7 Minutes	0.7 Minutes
71	30 Day Total Pump Run Time	103.1 Minutes	128.4 Minutes	144.7 Minutes	134.1 Minutes	78.0 Minutes
72	30 Day Total Override Cycles	0.0 Cycles	0.0 Cycles	0.0 Cycles	3.0 Cycles	3.0 Cycles
73	30 Day Total Cycles	146.0 Cycles	181.0 Cycles	204.0 Cycles	190.0 Cycles	111.0 Cycles
76	30 Day Total Brownouts	0	3	0	0	1
Totaliz	ed Pump Data					
Point	Description	Value	Value	Value	Value	Value
82	Pump Total Run Time	6.1 Hours	4.4 Hours	3.7 Hours	2.4 Hours	1.3 Hours
83	Pump Total Cycles	520.0 Cycles	373.0 Cycles	310.0 Cycles	202.0 Cycles	111.0 Cycles
Miscel	laneous					
Point	Description	Value	Value	Value	Value	Value
145	Pump On Auto	Off	Off	Off	Off	Off
147	Pump Test Today	Off	Off	Off	Off	Off
148	Pump Check Enable	Off	Off	Off	Off	Off
149	Total Override Cycles	0	0	0	0	0
150	High Level Condition	Off	Off	Off	Off	Off
151	Leak Check Enable	Off	Off	Off	Off	Off
152	Brownout State	Off	Off	Off	Off	Off
153	Test Mode	Off	Off	Off	Off	Off
Alarm	Points					
Point	Description	Value	Value	Value	Value	Value
161	General Alarm	Off	Off	Off	Off	Off
162	New Alarm	Off	Off	Off	Off	Off
163	Update Central Enable	On	On	On	On	On
167	Page Alarm Start	Off	Off	Off	Off	Off
168	Pager Signal	Off	Off	Off	Off	Off
169	Local Alarm Start	Off	Off	Off	Off	Off
170	Local Alarm Silence	Off	Off	Off	Off	Off
Inputs	& Outputs					
Point	Description	Value	Value	Value	Value	Value
177	High Level/Override Timer Float Input	Off	Off	Off	Off	Off
178	Timer Float Input	Off	Off	Off	Off	Off
179	Redundant Off Float & Low Level Alarm Input	On	On	On	On	On
181	Push To Silence Input	Off	Off	Off	Off	Off
182	Auxiliary Contact Input	Off	Off	Off	Off	Off
186	Pump Output	Off	Off	Off	Off	Off
188	Alarm Light Output	Off	Off	Off	Off	Off
189	Audible Alarm Output	Off	Off	Off	Off	Off

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