



# Florida Onsite Sewage Nitrogen Reduction Strategies Study

Task B.7

**B-HS2 Field System Monitoring Report No. 2**

**Progress Report**

February 2013

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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. 2**

#### **Prepared for:**

Florida Department of Health  
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Bureau of Environmental Health  
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FDOH Contract CORCL

**February 2013**

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

### **2.0 Purpose**

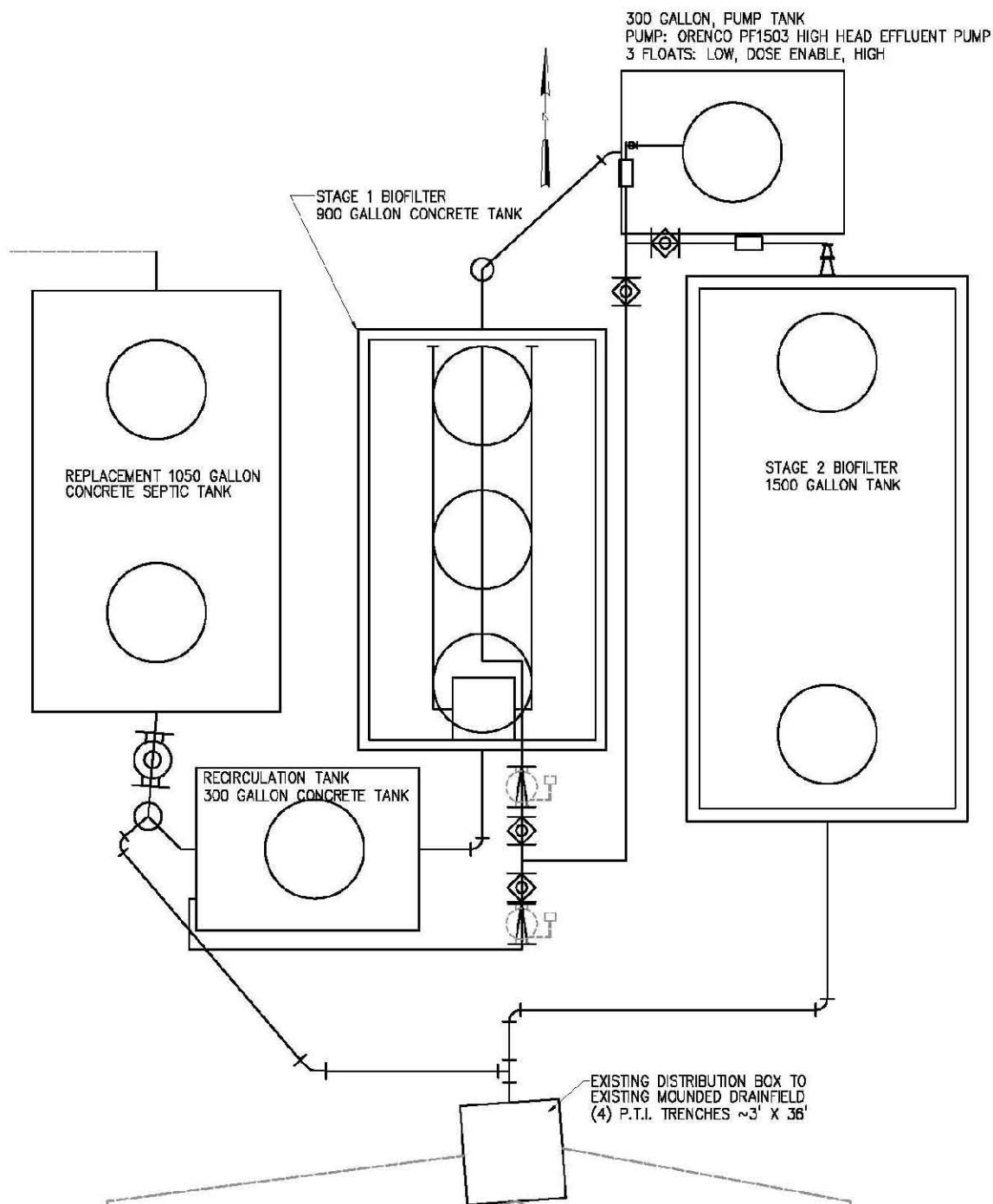
This monitoring report documents data collected from the second B-HS2 monitoring and sampling event conducted on February 5, 2013. This monitoring event consisted of collecting flow measurements from the household water use meter and the treatment system internal water meters, recording electricity use, monitoring of field parameters, collection of water samples from five points in the treatment system, and sample analyses by a NELAC certified laboratory.

### **3.0 Materials and Methods**

#### **3.1 Project Site**

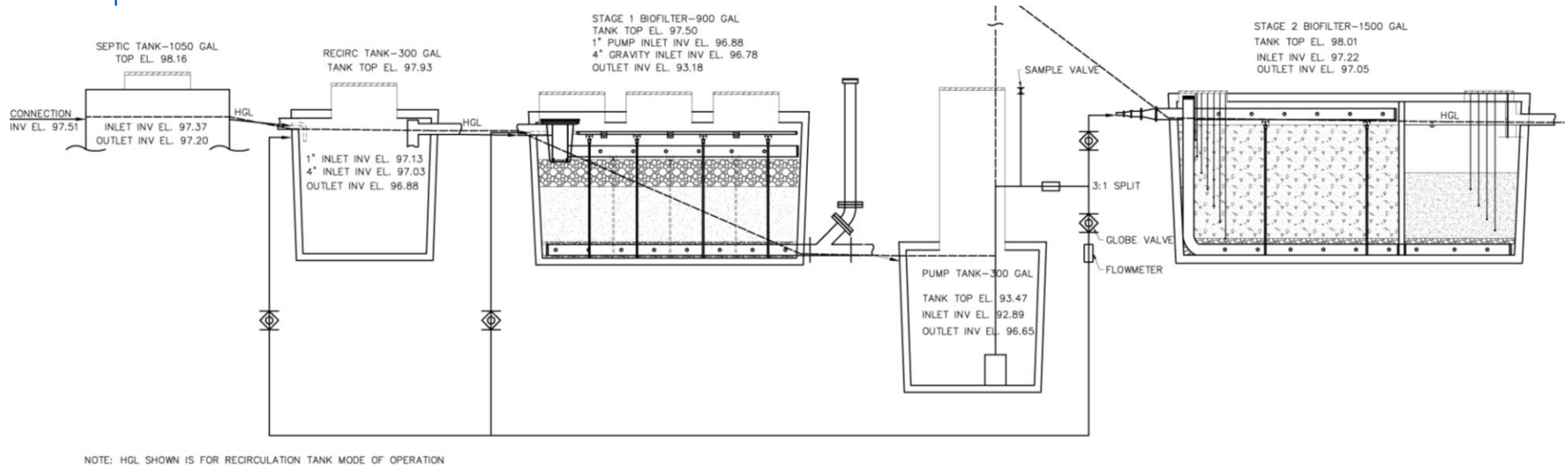
The B-HS2 field site is located in Hillsborough County, FL. The nitrogen reducing onsite treatment system for the single family residence was installed in September 2012. Design and construction details were presented previously in the Task B.6 document. Figure 1 is a system schematic showing the system 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.<sup>TM</sup> bundles).



**Figure 1**  
**B-HS2 System Schematic**

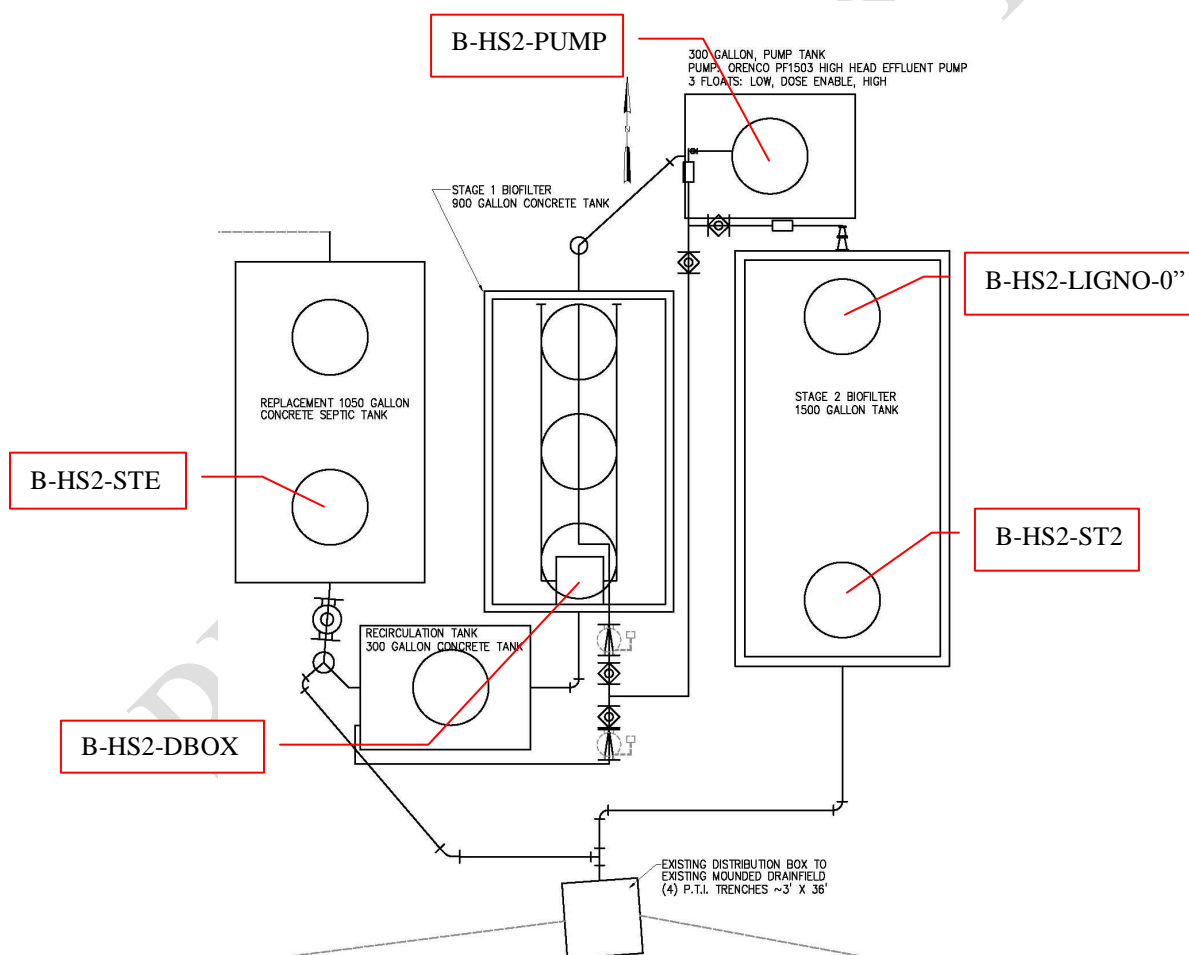
February 2013



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

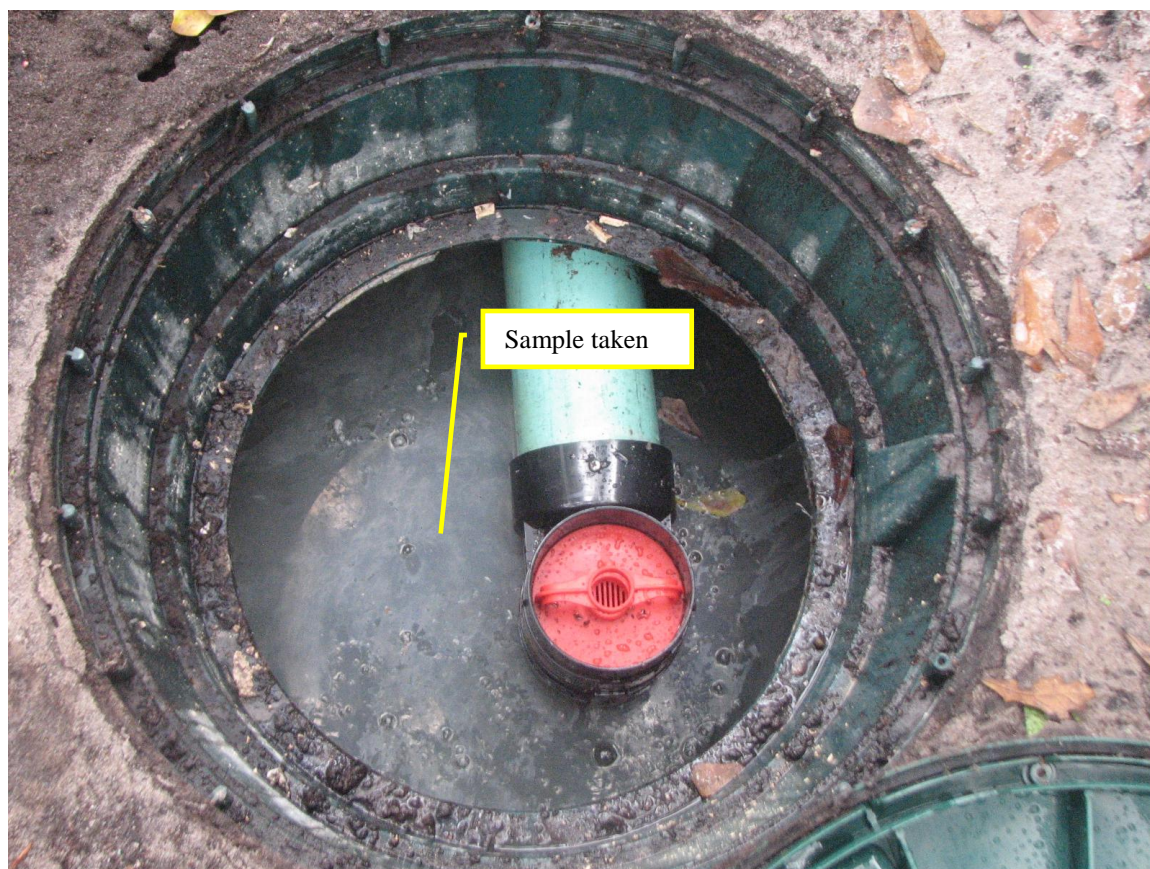
### 3.2 Monitoring and Sample Locations and Identification

The five main monitoring points for this sample event are shown in Figure 3. Household wastewater enters the 1<sup>st</sup> chamber of the primary tank and exits the second chamber as septic tank effluent through an effluent screen into the recirculation tank. The first 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; they represent the influent to the remainder of the onsite nitrogen reduction system.



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

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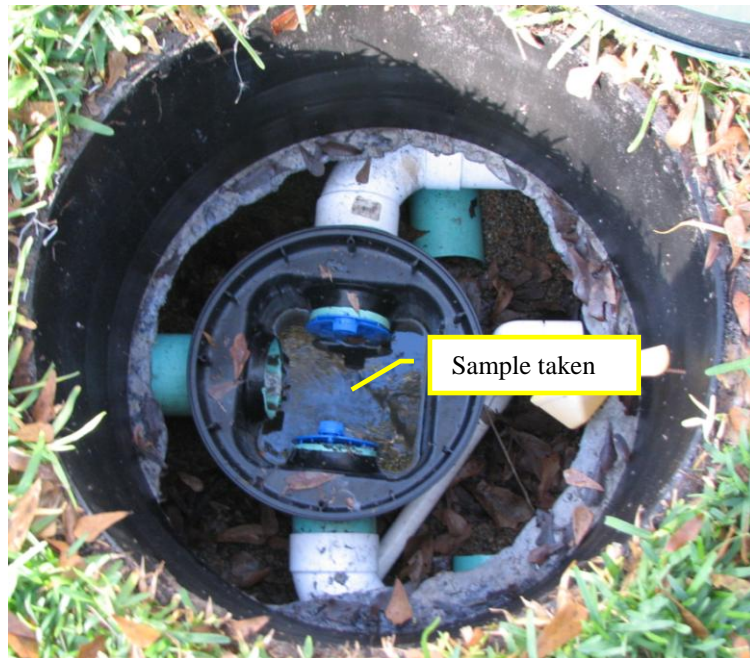


**Figure 4**  
**Second chamber of Primary Tank (B-HS2-STE sample)**

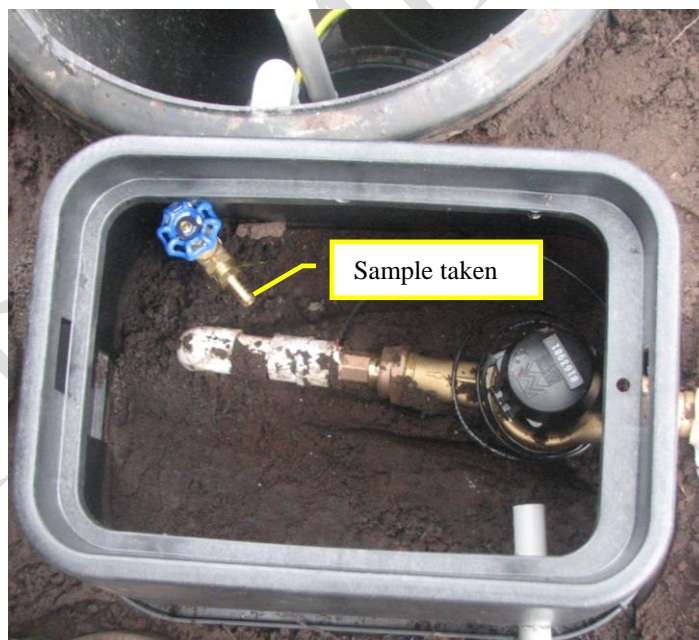
The recirculation tank contents are discharged by gravity to a distribution box, located inside the Stage 1 biofilter, which splits the flow between two perforated distribution pipes along the top of the unsaturated Stage 1 biofilter media. The second sampling point (B-HS2-DBOX) is taken approximately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

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



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

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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. The fourth sampling point is a stainless steel drivepoint positioned at the bottom of the lignocellulosic media (B-HS2-LIGNO-0"). This sample represents the lignocellulosic media effluent (Figure 7). A collection pipe along the bottom transfers the first chamber effluent to the second chamber, which contains 24-inches of elemental sulfur mixed with oyster shell media. The fifth sampling point, B-HS2-ST2, is in the second chamber of the Stage 2 biofilter, effluent is sampled approximately 1 foot below the surface of the effluent baffle tee within the second chamber of the Stage 2 biofilter. This sample location is after passage through the sulfur media; it is the final effluent from the treatment system prior to being discharged to the soil infiltration system, or drainfield (Figure 8).



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



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

### 3.3 Operational Monitoring

Start-up of the system occurred on September 25, 2012 (Experimental Day 0) and the system has operated continually since that date. For this second formal sampling event, the water meter for the house and the treatment system flow meters were read and recorded on February 5, 2013 (Experimental Day 133). As previously discussed, the pump tank discharge is split via two throttling globe valves which allow for a portion of the Stage 1 biofilter effluent to be sent back for recirculation with the rest proceeding to the Stage 2 biofilter. The combined flow meter is located on the pump tank discharge line prior to the split, and records the cumulative flow in gallons pumped from the pump chamber. Therefore the measurement of the combined flow meter includes both the forward wastewater flow from the household and the recirculation flow. The Stage 2 flow meter is located following the split on the line from the pump tank to the Stage 2 biofilter and records the cumulative forward flow in gallons pumped to the Stage 2 biofilter. The control panel includes telemetry where reports are generated regarding alarms, pump cycles, and other information using a Vericomm control panel system.

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### 3.4 Energy, Chemical and/or Additives 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 second formal sample event on February 5, 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 duplicate samples were taken. The equipment blank was collected by pumping deionized water through the cleaned pump tubing. This sample was then analyzed for the same parameters as the monitoring samples. One tap water sample was collected by filling sample containers with tap water from a hose bib near the system. The field sample duplicate (B-HS2-PUMP) was collected immediately subsequent to the regular 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, total Kjeldahl



nitrogen (TKN-N), ammonia nitrogen (NH<sub>3</sub>-N), nitrate nitrogen (NO<sub>3</sub>-N), nitrite nitrogen (NO<sub>2</sub>-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, Pace Analytical and Benchmark EnviroAnalytical Inc.). Table 1 lists the analytical parameters, analytical methods, and detection limits for these 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 <sub>3</sub>	SM 2320B	2 mg/L
Chemical Oxygen Demand (COD)	EPA 410.4	10 mg/L
Total Kjeldahl Nitrogen (TKN-N)	EPA 351.2	0.05 mg/L
Ammonia Nitrogen (NH <sub>3</sub> -N)	EPA 350.1	0.005 mg/L
Nitrate Nitrogen (NO <sub>3</sub> -N)	EPA 300.0	0.01 mg/L
Nitrite Nitrogen (NO <sub>2</sub> -N)	EPA 300.0	0.01 mg/L
Total Phosphorus (TP)	SM 4500P-E	0.01 mg/L
Orthophosphate as P (Ortho P)	EPA 300.0	0.01 mg/L
Carbonaceous Biological Oxygen Demand (CBOD <sub>5</sub> )	SM5210B	2 mg/L
Total Solids (TS)	EPA 160.3	.01 % by wt
Total Suspended Solids (TSS)	SM 2540D	1 mg/L
Volatile Suspended Solids (VSS)	SM 2540E	1 mg/L
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
Total average start-up to 2/5/13		119

**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
	Cumula- tive 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
Total average start-up to 2/5/13		512.0		111.7	400.3	3.58 : 1

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The two throttling globe valves control the fraction of Stage 1 effluent that is recirculated and the fraction sent to the Stage 2 biofilter. 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 119 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 512.0 gallons per day, and the average forward flow to the Stage 2 biofilter was 111.7 gallons per day. Therefore, the average recirculation flow was 400.3 gallons per day, with a corresponding average recirculation ratio of 3.58:1.

#### **4.2 Energy, Chemical and/or Additives 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**

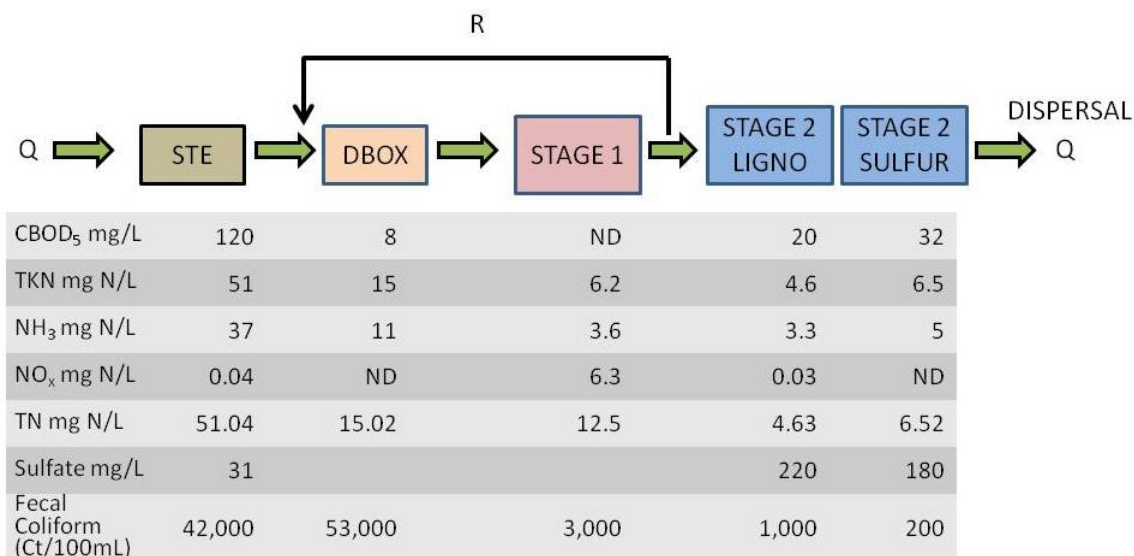
Date and Time Read	Electrical Meter Reading	Average Daily Electrical Use	Average Electrical Use per Gallon Treated
	Cumulative (kWh)	(kWh/day)	(kWh/gal)
9/25/2012 11:05	0.2	Installed	
9/27/2012 9:58	0.3	Start-up	
10/5/2012 8:07	2.6	0.29	0.0031
10/11/2012 7:55	5.0	0.40	0.0036
10/23/2012 9:00	9.5	0.37	0.0032
10/30/2012 14:30	11.8	0.32	0.0028
11/13/2012 14:00	14.8	0.38	0.0037
12/3/2012 8:00	22.8	0.41	0.0035
1/3/2013 8:00	33.0	0.31	0.0027
2/5/2013 7:45	45.5	0.43	0.0035
Total average start-up to 2/5/13		0.36	0.0033

The total average electrical use through February 5, 2013 was 0.36 kWh per day. The average electrical use per gallon treated was 0.0033 kWh per gallon, and this parameter has been fairly stable since start-up.

### 4.3 Water Quality

Water quality analytical results for Sample Event No.2 are listed in Table 5. 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, NH<sub>3</sub>-N, and NO<sub>x</sub>-N), as well as supporting water quality parameters. The nitrogen results are graphically displayed in Figure 11. A summary of the water quality data collected to date for the test system is presented in Table 6.





**Figure 11**  
**Graphical Representation of Nitrogen Results**

**Septic Tank Effluent (STE) Quality:** The water quality characteristics of STE collected in Sample Event 2 were within the typical range generally expected for domestic STE. The measured STE total nitrogen (TN) concentration was 51 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 NH<sub>3</sub>-N levels were 11 mg/L and 3.6 mg/L, respectively with a DO level at 3.62 mg/L in the Stage 1 effluent (Table 5). The DBOX TSS concentration was 18 mg/L and CBOD<sub>5</sub> was 8 mg/L, while the Stage 1 effluent TSS and CBOD<sub>5</sub> was below the method detection limit. The DBOX NO<sub>x</sub>-N was below the method detection limit, and the Stage 1 effluent NO<sub>x</sub>-N was 6.3 mg/L. These results indicate significant pre-denitrification (approximately 76% 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 NH<sub>3</sub>-N concentration of 3.6 mg/L and TKN of 6.2 mg/L.

**Stage 2 Biofilter Effluent (LIGNO-0" and ST2):** Effluent NO<sub>x</sub>-N from the Stage 2 biofilter was below the method detection limit of 0.02 mg/L. The low NO<sub>x</sub>-N was accompanied by a measured 0.13 mg/L DO and -322 mV ORP. The lignocellulosic media effluent NO<sub>x</sub>-N was 0.03 mg/L. The Stage 2 system produced a highly reducing environment and achieved essentially complete NO<sub>x</sub>-N reduction. Final total nitrogen (TN) in the treatment system effluent was 6.5 mg/L, and it appears that there is still an increase in nitrogen through the Stage 2 lignocellulosic media and potentially the sulfur

media, but less than measured in sample event 1. Increases in CBOD<sub>5</sub> and TN have been reported previously for lignocellulosic denitrification during start-up, and it will be interesting to track these results as the system matures. The Stage 2 biofilter lignocellulosic effluent CBOD<sub>5</sub> was 20 mg/L and the sulfur effluent was 32 mg/L, so the CBOD<sub>5</sub> concentration is decreasing as compared to the first formal sample event (96 and 110 mg/L respectively). It is anticipated that the CBOD<sub>5</sub> concentration will decrease over time. The Stage 2 effluent sulfate concentration was 180 mg/L.

**Table 5**  
**Water Quality Analytical Results**

Sample ID	Sample Date/Time	pH	Temp (°C)	Specific Conductance (uS/cm)	DO (mg/L)	ORP (mV)	Total Alkalinity (mg/L)	TSS (mg/L)	VSS (mg/L)	CBOD <sub>5</sub> (mg/L)	COD (mg/L)	TN (mg/L N) <sup>1</sup>	TKN (mg/L N)	Organic N (mg/L N) <sup>2</sup>	NH <sub>3</sub> -N (mg/L N)	NO <sub>3</sub> -N (mg/L N)	NO <sub>2</sub> -N (mg/L N)	NOx (mg/L N)	TIN (mg/L N) <sup>3</sup>	TP (mg/L)	Ortho P (mg/L P)	Sulfate (mg/L)	Hydrogen Sulfide (mg/L)	Sulfide (mg/L)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)	TOC (mg/L)
BHS2-STE-SAL	2/5/13 8:55	7.21	18.8	1,296	0.14	-360.6	490	25	20	120	430	51.0	51	14	37	0.04	0.01	0.04	37.04	6	4.3	31	14	41	42,000		82
BHS2-STE-BENCHMARK	2/5/13 8:55																								1,600,000	1,200,000	
BHS2-DBOX-SAL	2/5/13 8:45	7.11	17.4	1,173	1.27	-128.6	270	18	6	8	110	15.0	15	4	11	0.01	0.01	0.02	11.02	4.3	2.2				53,000		31
BHS2-DBOX-BENCHMARK	2/5/13 8:45																								790,000	345,000	
BHS2-PUMP-SAL	2/5/13 8:30	6.70	16.1	1,137	3.62	-107.6	240	1	1	2	36	12.5	6.2	2.6	3.6	6.3	0.26	6.3	9.9	3.9	1.6				3,000		17
BHS2-PUMP-PACE	2/5/13 8:30											12.6	4.7	1.6	3.1			7.9	11								
BHS2-PUMP-BENCHMARK	2/5/13 8:30																								4,200	4,611	
BHS2-LIGNO-O-SAL	2/5/13 8:15	6.82	18.7	1,147	0.79	-279.4	290	1	1	20	83	4.6	4.6	1.3	3.3	0.03	0.01	0.03	3.33	2.6	0.68	220	4.2	7.3	1,000		20
BHS2-LIGNO-O-BENCHMARK	2/5/13 8:15																								1,300	1,986	
BHS2-ST2-SAL	2/5/13 8:00	6.90	16.5	1,181	0.13	-321.7	320	8	8	32	130	6.52	6.5	1.5	5	0.01	0.01	0.02	5.02	2.4	0.85	180	14	27	200		25
BHS2-ST2-BENCHMARK	2/5/13 8:00																								300	155	
BHS2-TAP-SAL	2/5/13 9:15	7.43	18.3	833	5.72	69.2	150	8	6	2	16	0.4	0.23	0.221	0.009	0.13	0.01	0.13	0.139	0.026	0.01	250	0.01	0.1	1		8
BHS2-EB-SAL	2/5/13 9:45	7.88	14.2	2	9.20	30.7	2	7	4	2	14	0.1	0.07	0.061	0.009	0.01	0.01	0.02	0.029	0.024	0.01	0.2	0.01	0.1	1		0.5
BHS2-EB-BENCHMARK	2/5/13 9:45																								1	1	

Notes:

<sup>1</sup>Total Nitrogen (TN) is a calculated value equal to the sum of TKN and NO<sub>x</sub>

<sup>2</sup>Organic Nitrogen (ON) is a calculated value equal to the difference of TKN and NH<sub>3</sub>

<sup>3</sup>Total Inorganic Nitrogen (TIN) is a calculated value equal to the sum of NH<sub>3</sub> and NO<sub>x</sub>

Gray-shaded data points indicate values below method detection level (mdl), mdl value used for statistical analyses.

Yellow-shaded data points indicate the reported value is between the laboratory method detection limit and the laboratory practical quantitation limit, value used for statistical analysis.

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

Results based on colony counts outside the ideal range.

Sample ID	Statistical Parameter	pH	Temp (°C)	Specific Conductance (uS/cm)	DO (mg/L)	ORP (mV)	Total Alkalinity (mg/L)	TSS (mg/L)	VSS (mg/L)	CBOD <sub>5</sub> (mg/L)	COD (mg/L)	TN (mg/L N) <sup>1</sup>	TKN (mg/L N)	Organic N (mg/L N) <sup>2</sup>	NH <sub>3</sub> -N (mg/L N)	NO <sub>3</sub> -N (mg/L N)	NO <sub>2</sub> -N (mg/L N)	NOx (mg/L N)	TiN (mg/L N) <sup>3</sup>	TP (mg/L)	Ortho P (mg/L P)	Sulfate (mg/L)	Hydrogen Sulfide (mg/L)	Sulfide (mg/L)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)	TOC (mg/L)	
STE	n	2	2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
	MEAN	7.26	20.90	1347.00	0.13	-360.30	500.00	30.50	26.00	130.00	415.00	50.04	50.00	7.50	42.50	0.04	0.01	0.04	42.54	5.85	3.90	45.00	15.50	47.50	35,777	53,889	82.00	
	STD. DEV.		2.97	72.12	0.01	0.42	14.14	7.78	8.49	14.14	21.21	1.42	1.41	9.19	7.78	0.01	0.00	0.01	7.77	0.21	0.57	19.80	2.12	9.19				
	MIN	7.21	18.80	1296.00	0.12	-360.60	490.00	25.00	20.00	120.00	400.00	49.03	49.00	1.00	37.00	0.03	0.01	0.03	37.04	5.70	3.50	31.00	14.00	41.00	800	2,420	82.00	
	MAX	7.32	23.00	1398.00	0.14	-360.00	510.00	36.00	32.00	140.00	430.00	51.04	51.00	14.00	48.00	0.04	0.01	0.04	48.03	6.00	4.30	59.00	17.00	54.00	1,600,000	1,200,000	82.00	
DBOX	n	2	2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	2	2	1	
	MEAN	7.12	20.15	1209.00	0.68	-155.20	285.00	16.00	10.00	21.50	105.00	15.52	15.50	4.50	11.00	0.01	0.01	0.02	11.02	4.00	1.65				28,107	28,895	31	
	STD. DEV.		3.89	50.91	0.84	37.62	21.21	2.83	5.66	19.09	7.07	0.71	0.71	0.71	0.00	0.00	0.00	0.00	0.00	0.42	0.78							
	MIN	7.11	17.40	1173.00	0.08	-181.80	270.00	14.00	6.00	8.00	100.00	15.02	15.00	4.00	11.00	0.01	0.01	0.02	11.02	3.70	1.10				1,000	2,420	31	
PUMP	MAX	7.14	22.90	1245.00	1.27	-128.60	300.00	18.00	14.00	35.00	110.00	16.02	16.00	5.00	11.00	0.01	0.01	0.02	11.02	4.30	2.20				790,000	345,000	31	
	n	2	2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	2	2	1	
	MEAN	6.78	19.65	1181.50	4.26	-28.40	245.00	8.00	5.50	3.50	24.50	13.90	4.25	2.31	1.95	9.15	0.26	9.65	11.60	3.80	1.16				159	96	17.00	
	STD. DEV.		5.02	62.93	0.90	112.01	7.07	9.90	6.36	2.12	16.26	1.98	2.76	0.42	2.34	4.03	0.00	4.74	2.40	0.14	0.62							
	MIN	6.70	16.10	1137.00	3.62	-107.60	240.00	1.00	1.00	2.00	13.00	12.50	2.30	2.01	0.29	6.30	0.26	6.30	9.90	3.70	0.72				6	2	17.00	
LIGNO-0	MAX	6.86	23.20	1226.00	4.89	50.80	250.00	15.00	10.00	5.00	36.00	15.30	6.20	2.60	3.60	12.00	0.26	13.00	13.29	3.90	1.60				4,200	4,611	17.00	
	n	2	2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	
	MEAN	6.94	20.55	1187.50	0.47	-318.15	365.00	3.00	2.50	58.00	151.50	4.58</																

Results based on colony counts outside the ideal range.



## **5.0 B-HS2 Sample Event No. 2: Summary and Recommendations**

### **5.1 Summary**

The results of the second sampling event indicate that the system is operating well and no adjustments are recommended at this time. The Sample Event No. 2 results indicate that:

- Septic tank effluent (STE) quality is characteristic of typical household STE quality. The total nitrogen concentration of 51 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 6.2 mg/L TKN, of which 3.6 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 6.5 mg/L, an approximately 87% 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**

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PRELIMINARY

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

**February 18, 2013**  
**Work Order: 1301309**

## Laboratory Report

Project Name		B-HS2 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-STE						
Matrix		Wastewater						
SAL Sample Number		1301309-01						
Date/Time Collected		02/05/13 08:55						
Collected by		Sean Schmidt						
Date/Time Received		02/05/13 11:40						
<b><u>Inorganics</u></b>								
Hydrogen Sulfide (Unionized)	mg/L	14	SM 4550SF	0.04	0.01		02/12/13 12:00	1
Ammonia as N	mg/L	37	EPA 350.1	0.80	0.19		02/12/13 13:57	20
Ammonia-Unionized as N	mg/L	0.22	SOP-10-3-83	0.01	0.005	02/14/13 14:53	02/14/13 14:55	1
Carbonaceous BOD	mg/L	120	SM 5210B	2	2	02/06/13 13:01	02/11/13 09:21	1
Chemical Oxygen Demand	mg/L	430	EPA 410.4	25	10	02/11/13 09:00	02/11/13 15:00	1
Nitrate (as N)	mg/L	0.04	EPA 300.0	0.04	0.01		02/06/13 16:20	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		02/06/13 16:20	1
Orthophosphate as P	mg/L	4.3	EPA 300.0	0.040	0.010		02/06/13 16:20	1
Phosphorous - Total as P	mg/L	6.0	SM 4500P-E	0.20	0.050	02/08/13 11:28	02/12/13 11:28	5
Sulfate	mg/L	31	EPA 300.0	0.60	0.20		02/06/13 16:20	1
Sulfide	mg/L	41	SM 4500SF	0.40	0.10		02/12/13 12:00	1
Total Alkalinity	mg/L	490	SM 2320B	8.0	2.0		02/09/13 13:46	1
Total Kjeldahl Nitrogen	mg/L	51	EPA 351.2	0.20	0.05	02/05/13 14:22	02/08/13 15:49	20.83
Total Organic Carbon	mg/L	82	SM 5310B	1.0	0.50		02/06/13 00:05	1
Total Suspended Solids	mg/L	25	SM 2540D	1	1	02/06/13 13:24	02/07/13 10:49	1
Volatile Suspended Solids	mg/L	20	EPA 160.4**	1	1	02/06/13 13:24	02/07/13 10:49	1
Nitrate+Nitrite (N)	mg/L	0.04 I	EPA 300.0	0.08	0.02		02/06/13 16:20	1
<b><u>Microbiology</u></b>								
Fecal Coliforms	CFU/100 ml	42,000	SM 9222D	1	1	02/05/13 13:06	02/06/13 12:59	1
Sample Description		BHS2-DBOX						
Matrix		Wastewater						
SAL Sample Number		1301309-02						
Date/Time Collected		02/05/13 08:45						
Collected by		Sean Schmidt						
Date/Time Received		02/05/13 11:40						
<b><u>Inorganics</u></b>								
Ammonia as N	mg/L	11	EPA 350.1	0.80	0.19		02/12/13 13:59	20
Ammonia-Unionized as N	mg/L	0.05	SOP-10-3-83	0.01	0.005	02/14/13 14:53	02/14/13 14:55	1
Carbonaceous BOD	mg/L	8	SM 5210B	2	2	02/06/13 13:01	02/11/13 09:21	1
Chemical Oxygen Demand	mg/L	110	EPA 410.4	25	10	02/11/13 09:00	02/11/13 15:00	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		02/06/13 16:20	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		02/06/13 16:20	1
Orthophosphate as P	mg/L	2.2	EPA 300.0	0.040	0.010		02/06/13 16:20	1
Phosphorous - Total as P	mg/L	4.3	SM 4500P-E	0.20	0.050	02/08/13 11:28	02/12/13 11:29	5
Total Alkalinity	mg/L	270	SM 2320B	8.0	2.0		02/09/13 13:46	1

**Hazen and Sawyer**  
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**February 18, 2013**  
**Work Order: 1301309**

## Laboratory Report

Project Name		B-HS2 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-DBOX						
Matrix		Wastewater						
SAL Sample Number		1301309-02						
Date/Time Collected		02/05/13 08:45						
Collected by		Sean Schmidt						
Date/Time Received		02/05/13 11:40						
Total Kjeldahl Nitrogen	mg/L	15	EPA 351.2	0.20	0.05	02/05/13 14:22	02/08/13 14:32	9.62
Total Organic Carbon	mg/L	31	SM 5310B	1.0	0.50		02/06/13 00:05	1
Total Suspended Solids	mg/L	18	SM 2540D	1	1	02/06/13 13:24	02/07/13 10:49	1
Volatile Suspended Solids	mg/L	6	EPA 160.4**	1	1	02/06/13 13:24	02/07/13 10:49	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		02/06/13 16:20	1
<u>Microbiology</u>								
Fecal Coliforms	CFU/100 ml	53,000	SM 9222D	1	1	02/05/13 13:06	02/06/13 12:59	1
Sample Description		BHS2-PUMP						
Matrix		Wastewater						
SAL Sample Number		1301309-03						
Date/Time Collected		02/05/13 08:30						
Collected by		Sean Schmidt						
Date/Time Received		02/05/13 11:40						
<u>Inorganics</u>								
Ammonia as N	mg/L	3.6	EPA 350.1	0.40	0.095		02/12/13 14:59	10
Ammonia-Unionized as N	mg/L	0.01 U	SOP-10-3-83	0.01	0.005	02/14/13 14:53	02/14/13 14:55	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	02/06/13 13:01	02/11/13 09:21	1
Chemical Oxygen Demand	mg/L	36	EPA 410.4	25	10	02/11/13 09:00	02/11/13 15:00	1
Nitrate (as N)	mg/L	6.3	EPA 300.0	0.04	0.01		02/06/13 16:20	1
Nitrite (as N)	mg/L	0.26	EPA 300.0	0.04	0.01		02/06/13 16:20	1
Orthophosphate as P	mg/L	1.6	EPA 300.0	0.040	0.010		02/06/13 16:20	1
Phosphorous - Total as P	mg/L	3.9	SM 4500P-E	0.20	0.050	02/08/13 11:28	02/12/13 11:30	5
Total Alkalinity	mg/L	240	SM 2320B	8.0	2.0		02/09/13 13:46	1
Total Kjeldahl Nitrogen	mg/L	6.2	EPA 351.2	0.20	0.05	02/05/13 14:22	02/08/13 14:33	9.62
Total Organic Carbon	mg/L	17	SM 5310B	1.0	0.50		02/06/13 00:05	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	02/06/13 13:24	02/07/13 10:49	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4**	1	1	02/06/13 13:24	02/07/13 10:49	1
Nitrate+Nitrite (N)	mg/L	6.6	EPA 300.0	0.08	0.02		02/06/13 16:20	1
<u>Microbiology</u>								
Fecal Coliforms	CFU/100 ml	3,000	SM 9222D	1	1	02/05/13 13:06	02/06/13 12:59	1



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**February 18, 2013**  
**Work Order: 1301309**

## Laboratory Report

Project Name		B-HS2 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-LIGNO-0 inch						
Matrix		Wastewater						
SAL Sample Number		1301309-04						
Date/Time Collected		02/05/13 08:15						
Collected by		Sean Schmidt						
Date/Time Received		02/05/13 11:40						
<b><u>Inorganics</u></b>								
Hydrogen Sulfide (Unionized)	mg/L	4.2	SM 4550SF	0.04	0.01		02/12/13 12:00	1
Ammonia as N	mg/L	3.3	EPA 350.1	0.40	0.095		02/12/13 15:01	10
Ammonia-Unionized as N	mg/L	0.01 U	SOP-10-3-83	0.01	0.005	02/14/13 14:53	02/14/13 14:55	1
Carbonaceous BOD	mg/L	20	SM 5210B	2	2	02/06/13 13:01	02/11/13 09:21	1
Chemical Oxygen Demand	mg/L	83	EPA 410.4	25	10	02/11/13 09:00	02/11/13 15:00	1
Nitrate (as N)	mg/L	0.03 I	EPA 300.0	0.04	0.01		02/06/13 16:20	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		02/06/13 16:20	1
Orthophosphate as P	mg/L	0.68	EPA 300.0	0.040	0.010		02/06/13 16:20	1
Phosphorous - Total as P	mg/L	2.6	SM 4500P-E	0.20	0.050	02/05/13 14:36	02/08/13 12:28	5
Sulfate	mg/L	220	EPA 300.0	0.60	0.20		02/07/13 17:22	1
Sulfide	mg/L	7.3	SM 4500SF	0.40	0.10		02/12/13 12:00	1
Total Alkalinity	mg/L	290	SM 2320B	8.0	2.0		02/09/13 13:46	1
Total Kjeldahl Nitrogen	mg/L	4.6	EPA 351.2	0.20	0.05	02/05/13 14:22	02/08/13 13:25	1
Total Organic Carbon	mg/L	20	SM 5310B	1.0	0.50		02/06/13 00:05	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	02/06/13 13:24	02/07/13 10:49	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4**	1	1	02/06/13 13:24	02/07/13 10:49	1
Nitrate+Nitrite (N)	mg/L	0.03 I	EPA 300.0	0.08	0.02		02/06/13 16:20	1
<b><u>Microbiology</u></b>								
Fecal Coliforms	CFU/100 ml	1,000	SM 9222D	1	1	02/05/13 13:06	02/06/13 12:59	1
Sample Description		BHS2-ST2						
Matrix		Wastewater						
SAL Sample Number		1301309-05						
Date/Time Collected		02/05/13 08:00						
Collected by		Sean Schmidt						
Date/Time Received		02/05/13 11:40						
<b><u>Inorganics</u></b>								
Hydrogen Sulfide (Unionized)	mg/L	14	SM 4550SF	0.04	0.01		02/12/13 12:00	1
Ammonia as N	mg/L	5.0	EPA 350.1	0.40	0.095		02/12/13 15:02	10
Ammonia-Unionized as N	mg/L	0.01	SOP-10-3-83	0.01	0.005	02/14/13 14:53	02/14/13 14:55	1
Carbonaceous BOD	mg/L	32	SM 5210B	2	2	02/06/13 13:01	02/11/13 09:21	1
Chemical Oxygen Demand	mg/L	130	EPA 410.4	25	10	02/11/13 09:00	02/11/13 15:00	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		02/06/13 16:20	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		02/06/13 16:20	1
Orthophosphate as P	mg/L	0.85	EPA 300.0	0.040	0.010		02/06/13 16:20	1
Phosphorous - Total as P	mg/L	2.4	SM 4500P-E	0.20	0.050	02/05/13 14:36	02/08/13 12:29	5

**Hazen and Sawyer**  
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**February 18, 2013**  
**Work Order: 1301309**

## Laboratory Report

Project Name		B-HS2 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		<b>BHS2-ST2</b>						
Matrix		<b>Wastewater</b>						
SAL Sample Number		<b>1301309-05</b>						
Date/Time Collected		<b>02/05/13 08:00</b>						
Collected by		<b>Sean Schmidt</b>						
Date/Time Received		<b>02/05/13 11:40</b>						
Sulfate	mg/L	180	EPA 300.0	0.60	0.20		02/07/13 17:22	1
Sulfide	mg/L	27	SM 4500SF	0.40	0.10		02/12/13 12:00	1
Total Alkalinity	mg/L	320	SM 2320B	8.0	2.0		02/09/13 13:46	1
Total Kjeldahl Nitrogen	mg/L	6.5	EPA 351.2	0.20	0.05	02/05/13 14:22	02/08/13 14:34	9.62
Total Organic Carbon	mg/L	25	SM 5310B	1.0	0.50		02/06/13 00:05	1
Total Suspended Solids	mg/L	8	SM 2540D	1	1	02/06/13 13:24	02/07/13 10:49	1
Volatile Suspended Solids	mg/L	8	EPA 160.4**	1	1	02/06/13 13:24	02/07/13 10:49	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		02/06/13 16:20	1
<b>Microbiology</b>								
Fecal Coliforms	CFU/100 ml	200	SM 9222D	1	1	02/05/13 13:06	02/06/13 12:59	1
Sample Description		<b>BHS2-TAP</b>						
Matrix		<b>Drinking Water</b>						
SAL Sample Number		<b>1301309-06</b>						
Date/Time Collected		<b>02/05/13 09:15</b>						
Collected by		<b>Sean Schmidt</b>						
Date/Time Received		<b>02/05/13 11:40</b>						
<b>Inorganics</b>								
Hydrogen Sulfide (Unionized)	mg/L	0.01 U	SM 4550SF	0.04	0.01		02/12/13 12:00	1
Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		02/12/13 14:07	1
Ammonia-Unionized as N	mg/L	0.01 U	SOP-10-3-83	0.01	0.005	02/14/13 14:53	02/14/13 14:55	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	02/06/13 13:01	02/11/13 09:21	1
Chemical Oxygen Demand	mg/L	16 I	EPA 410.4	25	10	02/11/13 09:00	02/11/13 15:00	1
Nitrate (as N)	mg/L	0.13	EPA 300.0	0.04	0.01		02/06/13 16:20	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		02/06/13 16:20	1
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		02/06/13 16:20	1
Phosphorous - Total as P	mg/L	0.026 I	SM 4500P-E	0.040	0.010	02/05/13 14:36	02/08/13 12:05	1
Sulfate	mg/L	250	EPA 300.0	0.60	0.20		02/07/13 17:22	1
Sulfide	mg/L	0.10 U	SM 4500SF	0.40	0.10		02/12/13 12:00	1
Total Alkalinity	mg/L	150	SM 2320B	8.0	2.0		02/09/13 13:46	1
Total Kjeldahl Nitrogen	mg/L	0.23	EPA 351.2	0.20	0.05	02/05/13 14:22	02/08/13 13:36	1
Total Organic Carbon	mg/L	8.0	SM 5310B	1.0	0.50		02/06/13 00:05	1
Total Suspended Solids	mg/L	8	SM 2540D	1	1	02/06/13 13:24	02/07/13 10:49	1
Volatile Suspended Solids	mg/L	6	EPA 160.4**	1	1	02/06/13 13:24	02/07/13 10:49	1
Nitrate+Nitrite (N)	mg/L	0.13	EPA 300.0	0.08	0.02		02/06/13 16:20	1
<b>Microbiology</b>								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	02/05/13 13:06	02/06/13 12:59	1

**Hazen and Sawyer**  
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**February 18, 2013**  
**Work Order: 1301309**

## Laboratory Report

Project Name		B-HS2 SE#2						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS2-EB						
Matrix		Reagent Water						
SAL Sample Number		1301309-07						
Date/Time Collected		02/05/13 09:45						
Collected by		Sean Schmidt						
Date/Time Received		02/05/13 11:40						
<b><u>Inorganics</u></b>								
Hydrogen Sulfide (Unionized)	mg/L	0.01 U	SM 4550SF	0.04	0.01		02/12/13 12:00	1
Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		02/12/13 14:09	1
Ammonia-Unionized as N	mg/L	0.01 U	SOP-10-3-83	0.01	0.005	02/14/13 14:53	02/14/13 14:55	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	02/06/13 13:01	02/11/13 09:21	1
Chemical Oxygen Demand	mg/L	14 I	EPA 410.4	25	10	02/11/13 09:00	02/11/13 15:00	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		02/06/13 16:20	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		02/06/13 16:20	1
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		02/06/13 16:20	1
Phosphorous - Total as P	mg/L	0.024 I	SM 4500P-E	0.040	0.010	02/05/13 14:36	02/08/13 12:06	1
Sulfate	mg/L	0.20 U	EPA 300.0	0.60	0.20		02/06/13 16:20	1
Sulfide	mg/L	0.10 U	SM 4500SF	0.40	0.10		02/12/13 12:00	1
Total Alkalinity	mg/L	2.0 U	SM 2320B	8.0	2.0		02/09/13 13:46	1
Total Kjeldahl Nitrogen	mg/L	0.07 I	EPA 351.2	0.20	0.05	02/05/13 14:22	02/08/13 13:37	1
Total Organic Carbon	mg/L	0.50 U	SM 5310B	1.0	0.50		02/06/13 00:05	1
Total Suspended Solids	mg/L	7	SM 2540D	1	1	02/06/13 13:24	02/07/13 10:49	1
Volatile Suspended Solids	mg/L	4	EPA 160.4**	1	1	02/06/13 13:24	02/07/13 10:49	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		02/06/13 16:20	1
<b><u>Microbiology</u></b>								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	02/05/13 13:06	02/06/13 12:59	1

# SOUTHERN ANALYTICAL LABORATORIES, INC.

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



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

February 18, 2013  
Work Order: 1301309

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BB30508 - TOC prep</b>										
<b>Blank (BB30508-BLK1)</b>					Prepared & Analyzed: 02/06/13					
Total Organic Carbon	0.50 U	1.0	0.50	mg/L						
<b>LCS (BB30508-BS1)</b>					Prepared & Analyzed: 02/06/13					
Total Organic Carbon	10.3	1.0	0.50	mg/L	10		103	90-110		
<b>Matrix Spike (BB30508-MS1)</b>					<b>Source: 1301227-01</b>		Prepared & Analyzed: 02/06/13			
Total Organic Carbon	26.4	1.0	0.50	mg/L	10	16.8	96	85-115		
<b>Matrix Spike Dup (BB30508-MSD1)</b>					<b>Source: 1301227-01</b>		Prepared & Analyzed: 02/06/13			
Total Organic Carbon	25.3	1.0	0.50	mg/L	10	16.8	86	85-115	4	10
<b>Batch BB30530 - Digestion for TKN by EPA 351.2</b>										
<b>Blank (BB30530-BLK1)</b>					Prepared: 02/05/13 Analyzed: 02/08/13					
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
<b>LCS (BB30530-BS1)</b>					Prepared: 02/05/13 Analyzed: 02/08/13					
Total Kjeldahl Nitrogen	2.46	0.20	0.05	mg/L	2.5		97	90-110		
<b>Matrix Spike (BB30530-MS1)</b>					<b>Source: 1301298-02</b>		Prepared: 02/05/13 Analyzed: 02/08/13			
Total Kjeldahl Nitrogen	3.45	0.20	0.05	mg/L	2.5	0.781	105	90-110		
<b>Matrix Spike (BB30530-MS2)</b>					<b>Source: 1301333-07</b>		Prepared: 02/05/13 Analyzed: 02/08/13			
Total Kjeldahl Nitrogen	3.21	0.20	0.05	mg/L	2.5	0.685	100	90-110		
<b>Matrix Spike Dup (BB30530-MSD1)</b>					<b>Source: 1301298-02</b>		Prepared: 02/05/13 Analyzed: 02/08/13			
Total Kjeldahl Nitrogen	3.32	0.20	0.05	mg/L	2.5	0.781	100	90-110	4	20



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Tampa, FL 33619

February 18, 2013  
Work Order: 1301309

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BB30530 - Digestion for TKN by EPA 351.2										
Matrix Spike Dup (BB30530-MSD2)		Source: 1301333-07			Prepared: 02/05/13 Analyzed: 02/08/13					
Total Kjeldahl Nitrogen	3.34	0.20	0.05	mg/L	2.5	0.685	105	90-110	4	20
Batch BB30533 - Digestion for TP by EPA 365.2/SM4500PE										
Blank (BB30533-BLK1)					Prepared: 02/05/13 Analyzed: 02/08/13					
Phosphorous - Total as P	0.010 U	0.040	0.010	mg/L						
LCS (BB30533-BS1)					Prepared: 02/05/13 Analyzed: 02/08/13					
Phosphorous - Total as P	0.795	0.040	0.010	mg/L	0.80		99	90-110		
Matrix Spike (BB30533-MS1)					Prepared: 02/05/13 Analyzed: 02/08/13					
Phosphorous - Total as P	1.68	0.040	0.010	mg/L	1.0	0.702	97	90-110		
Matrix Spike Dup (BB30533-MSD1)					Prepared: 02/05/13 Analyzed: 02/08/13					
Phosphorous - Total as P	1.67	0.040	0.010	mg/L	1.0	0.702	97	90-110	0.2	25
Batch BB30621 - Ion Chromatography 300.0 Prep										
Blank (BB30621-BLK1)					Prepared & Analyzed: 02/06/13					
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Sulfate	0.20 U	0.60	0.20	mg/L						
Orthophosphate as P	0.010 U	0.040	0.010	mg/L						
LCS (BB30621-BS1)					Prepared & Analyzed: 02/06/13					
Orthophosphate as P	0.874	0.040	0.010	mg/L	0.90		97	85-115		
Nitrite (as N)	1.37	0.04	0.01	mg/L	1.4		98	85-115		
Nitrate (as N)	1.71	0.04	0.01	mg/L	1.7		101	85-115		
Sulfate	9.03	0.60	0.20	mg/L	9.0		100	85-115		

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February 18, 2013  
Work Order: 1301309

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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### Batch BB30621 - Ion Chromatography 300.0 Prep

#### LCS Dup (BB30621-BSD1)

Prepared & Analyzed: 02/06/13

Orthophosphate as P	0.897	0.040	0.010	mg/L	0.90		100	85-115	3	200
Nitrate (as N)	1.72	0.04	0.01	mg/L	1.7		101	85-115	0.6	200
Nitrite (as N)	1.37	0.04	0.01	mg/L	1.4		98	85-115	0	200
Sulfate	9.08	0.60	0.20	mg/L	9.0		101	85-115	0.6	200

#### Matrix Spike (BB30621-MS1)

Source: 1301318-01

Prepared & Analyzed: 02/06/13

Orthophosphate as P	4.67	0.040	0.010	mg/L	0.90	3.70	108	85-115		
Nitrite (as N)	1.34	0.04	0.01	mg/L	1.4	0.0641	91	85-115		
Nitrate (as N)	2.55	0.04	0.01	mg/L	1.7	1.01	91	85-115		
Sulfate	29.5	0.60	0.20	mg/L	9.0	20.2	103	85-115		

#### Matrix Spike (BB30621-MS2)

Source: 1301323-08

Prepared & Analyzed: 02/06/13

Orthophosphate as P	1.09	0.040	0.010	mg/L	0.90	0.253	93	85-115		
Nitrite (as N)	1.47	0.04	0.01	mg/L	1.4	ND	105	85-115		
Nitrate (as N)	2.07	0.04	0.01	mg/L	1.7	0.339	102	85-115		
Sulfate	18.6	0.60	0.20	mg/L	9.0	9.34	103	85-115		

### Batch BB30630 - BOD

#### Blank (BB30630-BLK1)

Prepared: 02/06/13 Analyzed: 02/11/13

Carbonaceous BOD	2 U	2	2	mg/L
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#### Blank (BB30630-BLK2)

Prepared: 02/06/13 Analyzed: 02/11/13

Carbonaceous BOD	2 U	2	2	mg/L
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#### LCS (BB30630-BS1)

Prepared: 02/06/13 Analyzed: 02/11/13

Carbonaceous BOD	186	2	2	mg/L	200		93	85-115		
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Hazen and Sawyer  
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Tampa, FL 33619

February 18, 2013  
Work Order: 1301309

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BB30630 - BOD</b>										
<b>LCS (BB30630-BS2)</b>					Prepared: 02/06/13 Analyzed: 02/11/13					
Carbonaceous BOD	171	2	2	mg/L	200		85	85-115		
<b>LCS Dup (BB30630-BS2)</b>					Prepared: 02/06/13 Analyzed: 02/11/13					
Carbonaceous BOD	175	2	2	mg/L	200		88	85-115	6	200
<b>LCS Dup (BB30630-BS2)</b>					Prepared: 02/06/13 Analyzed: 02/11/13					
Carbonaceous BOD	190	2	2	mg/L	200		95	85-115	11	200
<b>Duplicate (BB30630-DUP1)</b>					<b>Source: 1301333-01</b>		Prepared: 02/06/13 Analyzed: 02/11/13			
Carbonaceous BOD	220	2	2	mg/L		230			7	25
<b>Duplicate (BB30630-DUP2)</b>					<b>Source: 1301375-01</b>		Prepared: 02/06/13 Analyzed: 02/11/13			
Carbonaceous BOD	140	2	2	mg/L		120			16	25
<b>Batch BB30631 - TSS prep</b>										
<b>Blank (BB30631-BLK1)</b>					Prepared: 02/06/13 Analyzed: 02/07/13					
Total Suspended Solids	1 U	1	1	mg/L						
<b>LCS (BB30631-BS1)</b>					Prepared: 02/06/13 Analyzed: 02/07/13					
Total Suspended Solids	43.8	1	1	mg/L	50		88	85-115		
<b>Duplicate (BB30631-DUP1)</b>					<b>Source: 1301263-04</b>		Prepared: 02/06/13 Analyzed: 02/07/13			
Total Suspended Solids	184	1	1	mg/L		175			5	30
<b>Batch BB30706 - Ion Chromatography 300.0 Prep</b>										
<b>Blank (BB30706-BLK1)</b>					Prepared & Analyzed: 02/07/13					
Sulfate	0.20 U	0.60	0.20	mg/L						

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February 18, 2013  
Work Order: 1301309

## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BB30706 - Ion Chromatography 300.0 Prep</b>										
<b>LCS (BB30706-BS1)</b>					Prepared & Analyzed: 02/07/13					
Sulfate	9.12	0.60	0.20	mg/L	9.0		101	85-115		
<b>LCS Dup (BB30706-BS1)</b>					Prepared & Analyzed: 02/07/13					
Sulfate	9.16	0.60	0.20	mg/L	9.0		102	85-115	0.4	200
<b>Matrix Spike (BB30706-MS1)</b>					<b>Source: 1301421-02</b>		Prepared & Analyzed: 02/07/13			
Sulfate	28.8	0.60	0.20	mg/L	9.0	19.2	107	85-115		
<b>Matrix Spike (BB30706-MS2)</b>					<b>Source: 1301327-02</b>		Prepared & Analyzed: 02/07/13			
Sulfate	100	0.60	0.20	mg/L	90	10.5	99	85-115		
<b>Batch BB30809 - Digestion for TP by EPA 365.2/SM4500PE</b>										
<b>Blank (BB30809-BLK1)</b>					Prepared: 02/08/13 Analyzed: 02/12/13					
Phosphorous - Total as P	0.010 U	0.040	0.010	mg/L						
<b>LCS (BB30809-BS1)</b>					Prepared: 02/08/13 Analyzed: 02/12/13					
Phosphorous - Total as P	0.867	0.040	0.010	mg/L	0.80		108	90-110		
<b>Matrix Spike (BB30809-MS1)</b>					<b>Source: 1301298-02</b>		Prepared: 02/08/13 Analyzed: 02/12/13			
Phosphorous - Total as P	0.992	0.040	0.010	mg/L	1.0	0.0361	96	90-110		
<b>Matrix Spike (BB30809-MS2)</b>					<b>Source: 1301351-05</b>		Prepared: 02/08/13 Analyzed: 02/12/13			
Phosphorous - Total as P	1.38	0.040	0.010	mg/L	1.0	0.394	99	90-110		
<b>Matrix Spike Dup (BB30809-MSD1)</b>					<b>Source: 1301298-02</b>		Prepared: 02/08/13 Analyzed: 02/12/13			
Phosphorous - Total as P	1.09	0.040	0.010	mg/L	1.0	0.0361	106	90-110	10	25

Hazen and Sawyer  
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 Tampa, FL 33619

February 18, 2013  
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## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BB30809 - Digestion for TP by EPA 365.2/SM4500PE										
Matrix Spike Dup (BB30809-MSD2)		Source: 1301351-05			Prepared: 02/08/13 Analyzed: 02/12/13					
Phosphorous - Total as P	1.38	0.040	0.010	mg/L	1.0	0.394	99	90-110	0.2	25
Batch BB30903 - alkalinity										
Blank (BB30903-BLK1)					Prepared & Analyzed: 02/09/13					
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
Blank (BB30903-BLK2)					Prepared & Analyzed: 02/09/13					
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
LCS (BB30903-BS1)					Prepared & Analyzed: 02/09/13					
Total Alkalinity	120	8.0	2.0	mg/L	120		96	90-110		
LCS (BB30903-BS2)					Prepared & Analyzed: 02/09/13					
Total Alkalinity	120	8.0	2.0	mg/L	120		96	90-110		
Matrix Spike (BB30903-MS1)		Source: 1301309-07			Prepared & Analyzed: 02/09/13					
Total Alkalinity	120	8.0	2.0	mg/L	120	ND	96	80-120		
Matrix Spike (BB30903-MS2)		Source: 1301460-01			Prepared & Analyzed: 02/09/13					
Total Alkalinity	240	8.0	2.0	mg/L	120	120	96	80-120		
Matrix Spike Dup (BB30903-MSD1)		Source: 1301309-07			Prepared & Analyzed: 02/09/13					
Total Alkalinity	120	8.0	2.0	mg/L	120	ND	96	80-120	0	26
Matrix Spike Dup (BB30903-MSD2)		Source: 1301460-01			Prepared & Analyzed: 02/09/13					
Total Alkalinity	240	8.0	2.0	mg/L	120	120	96	80-120	0	26



**Hazen and Sawyer**  
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**February 18, 2013**  
**Work Order: 1301309**

**Inorganics - Quality Control**

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BB31131 - COD prep</b>										
<b>Blank (BB31131-BLK1)</b>					Prepared & Analyzed: 02/11/13					
Chemical Oxygen Demand	10 U	25	10	mg/L						
<b>LCS (BB31131-BS1)</b>					Prepared & Analyzed: 02/11/13					
Chemical Oxygen Demand	55	25	10	mg/L	50		110	90-110		
<b>Matrix Spike (BB31131-MS1)</b>					Source: 1301455-01 Prepared & Analyzed: 02/11/13					
Chemical Oxygen Demand	93	25	10	mg/L	50	44	98	85-115		
<b>Matrix Spike Dup (BB31131-MSD1)</b>					Source: 1301455-01 Prepared & Analyzed: 02/11/13					
Chemical Oxygen Demand	89	25	10	mg/L	50	44	90	85-115	4	32
<b>Batch BB31211 - Ammonia by SEAL</b>										
<b>Blank (BB31211-BLK1)</b>					Prepared & Analyzed: 02/12/13					
Ammonia as N	0.009 U	0.040	0.009	mg/L						
<b>LCS (BB31211-BS1)</b>					Prepared & Analyzed: 02/12/13					
Ammonia as N	0.51	0.040	0.009	mg/L	0.50		102	90-110		
<b>Matrix Spike (BB31211-MS1)</b>					Source: 1301243-07 Prepared & Analyzed: 02/12/13					
Ammonia as N	0.55	0.040	0.009	mg/L	0.50	0.029	105	90-110		
<b>Matrix Spike (BB31211-MS2)</b>					Source: 1301486-07 Prepared & Analyzed: 02/12/13					
Ammonia as N	0.52	0.040	0.009	mg/L	0.50	0.019	100	90-110		
<b>Matrix Spike Dup (BB31211-MSD1)</b>					Source: 1301243-07 Prepared & Analyzed: 02/12/13					
Ammonia as N	0.55	0.040	0.009	mg/L	0.50	0.029	105	90-110	0.4	10

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Tampa, FL 33619

February 18, 2013  
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## Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BB31211 - Ammonia by SEAL										
Matrix Spike Dup (BB31211-MSD2)		Source: 1301486-07			Prepared & Analyzed: 02/12/13					
Ammonia as N	0.50	0.040	0.009	mg/L	0.50	0.019	97	90-110	4	10
Batch BB31232 - Sulfide prep										
Blank (BB31232-BLK1)					Prepared & Analyzed: 02/12/13					
Sulfide	0.10 U	0.40	0.10	mg/L						
LCS (BB31232-BS1)					Prepared & Analyzed: 02/12/13					
Sulfide	5.43	0.40	0.10	mg/L	5.0		109	85-115		
Matrix Spike (BB31232-MS1)		Source: 1301319-01			Prepared & Analyzed: 02/12/13					
Sulfide	6.23	0.40	0.10	mg/L	5.0	1.51	94	85-115		
Matrix Spike Dup (BB31232-MSD1)		Source: 1301319-01			Prepared & Analyzed: 02/12/13					
Sulfide	6.23	0.40	0.10	mg/L	5.0	1.51	94	85-115	0	14
Batch BB31306 - VSS Prep										
Blank (BB31306-BLK1)					Prepared: 02/06/13 Analyzed: 02/07/13					
Volatile Suspended Solids	1 U	1		mg/L						

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## Microbiology - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch BB30521 - FC-MF</b>										
<b>Blank (BB30521-BLK1)</b>					Prepared: 02/05/13 Analyzed: 02/06/13					
Fecal Coliforms	1 U	1	1	CFU/100 ml						
<b>Duplicate (BB30521-DUP1)</b>					<b>Source: 1301297-01</b> Prepared: 02/05/13 Analyzed: 02/06/13					
Fecal Coliforms	1 U	1	1	CFU/100 ml		ND				200

**Hazen and Sawyer**  
**10002 Princess Palm Ave, Suite 200**  
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**February 18, 2013**  
**Work Order: 1301309**

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**\* Qualifiers, Notes and Definitions**

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Results followed by a "U" indicate that the sample was analyzed but the compound was not detected. Results followed by "I" indicate that the reported value is between the laboratory method detection limits and the laboratory practical quantitation limit.

A statement of estimated uncertainty of test results is available upon request.

For methods marked with \*\*, all QC criteria have been met for this method which is equivalent to a SAL certified method.

Test results in this report meet all the requirements of the NELAC standards. Any applicable qualifiers are shown below.

Questions regarding this report should be directed to :

Kathryn Nordmark

Telephone (813) 855-1844 FAX (813) 855-2218

Kathryn@southernanalyticalabs.com

Kathryn@southernanalyticalabs.com



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

SAL Project No.

Containers Prepared/ Relinquished:	Date/Time:	Received:	Date/Time:	Seal intact?	Y N N/A	Instructions / Remarks:
Chambers	1-21-13 16:00	<i>[Signature]</i>	1-22-13 12:00pm	Samples intact upon arrival?	Y N N/A	
Relinquished:	2/5/13 1140	<i>[Signature]</i>	2/5/13 1140	Received on ice? Temp _____	Y N N/A	
Relinquished:	Date/Time:	Received:	Date/Time:	Proper preservatives indicated?	Y N N/A	
Relinquished:	Date/Time:	Received:	Date/Time:	Rec'd w/in holding time?	Y N N/A	
Relinquished:	Date/Time:	Received:	Date/Time:	Volatiles rec'd w/out headspace?	Y N N/A	
Relinquished:	Date/Time:	Received:	Date/Time:	Proper containers used?	Y N N/A	



February 15, 2013

Ms. Josefin Edebeck-Hirst  
Hazen and Sawyer, P.C  
10002 Princess Palm Avenue  
Suite 200  
Tampa, FL 33619

RE: Project: FOSBVR/44237-00 Tash 200  
Pace Project No.: 3581871

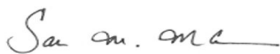
Dear Ms. Edebeck-Hirst:

Enclosed are the analytical results for sample(s) received by the laboratory on February 05, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

Some analyses have been subcontracted outside of the Pace Network. The subcontracted laboratory report has been attached.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Sakina McKenzie

sakina.mckenzie@pacelabs.com  
Project Manager

Enclosures



## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc..

## CERTIFICATIONS

Project: FOSBVR/44237-00 Tash 200

Pace Project No.: 3581871

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### Ormond Beach Certification IDs

8 East Tower Circle, Ormond Beach, FL 32174  
Alabama Certification #: 41320  
Arizona Certification #: AZ0735  
Colorado Certification: FL NELAC Reciprocity  
Connecticut Certification #: PH-0216  
Florida Certification #: E83079  
Georgia Certification #: 955  
Guam Certification: FL NELAC Reciprocity  
Hawaii Certification: FL NELAC Reciprocity  
Illinois Certification #: 200068  
Indiana Certification: FL NELAC Reciprocity  
Kansas Certification #: E-10383  
Kentucky Certification #: 90050  
Louisiana Certification #: FL NELAC Reciprocity  
Louisiana Environmental Certificate #: 05007  
Maine Certification #: FL01264  
Massachusetts Certification #: M-FL1264  
Michigan Certification #: 9911  
Mississippi Certification: FL NELAC Reciprocity  
Missouri Certification #: 236

Montana Certification #: Cert 0074  
Nevada Certification: FL NELAC Reciprocity  
New Hampshire Certification #: 2958  
New Jersey Certification #: FL765  
New York Certification #: 11608  
North Carolina Environmental Certificate #: 667  
North Carolina Certification #: 12710  
Pace Analytical Services - Ormond certification number  
E83509  
Pennsylvania Certification #: 68-00547  
Puerto Rico Certification #: FL01264  
Tennessee Certification #: TN02974  
Texas Certification: FL NELAC Reciprocity  
US Virgin Islands Certification: FL NELAC Reciprocity  
Virginia Environmental Certification #: 460165  
Washington Certification #: C955  
West Virginia Certification #: 9962C  
Wisconsin Certification #: 399079670  
Wyoming (EPA Region 8): FL NELAC Reciprocity

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## REPORT OF LABORATORY ANALYSIS

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## SAMPLE SUMMARY

Project: FOSBVRS/44237-00 Tash 200

Pace Project No.: 3581871

Lab ID	Sample ID	Matrix	Date Collected	Date Received
3581871001	B-HS2-STE	Water	02/05/13 08:55	02/05/13 11:05
3581871002	B-HS2-DBOX	Water	02/05/13 08:45	02/05/13 11:05
3581871003	B-HS2-PUMP	Water	02/05/13 08:30	02/05/13 11:05
3581871004	B-HS2-46-NO-D	Water	02/05/13 08:15	02/05/13 11:05
3581871005	B-HS2-ST2	Water	02/05/13 08:00	02/05/13 11:05
3581871006	B-HS2-EB	Water	02/05/13 09:45	02/05/13 11:05

## REPORT OF LABORATORY ANALYSIS

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## SAMPLE ANALYTE COUNT

Project: FOSBVRS/44237-00 Tash 200

Pace Project No.: 3581871

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
3581871003	B-HS2-PUMP	EPA 350.1	SOA	1	PASI-O
		EPA 351.2	AMD	1	PASI-O
		EPA 353.2	AMD	1	PASI-O

## REPORT OF LABORATORY ANALYSIS

Page 4 of 10

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## ANALYTICAL RESULTS

Project: FOSBVRS/44237-00 Tash 200

Pace Project No.: 3581871

Sample: B-HS2-PUMP		Lab ID: 3581871003	Collected: 02/05/13 08:30	Received: 02/05/13 11:05	Matrix: Water				
Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>350.1 Ammonia</b>	Analytical Method: EPA 350.1								
Nitrogen, Ammonia	3.1	mg/L	0.050	0.020	1		02/07/13 14:13	7664-41-7	
<b>351.2 Total Kjeldahl Nitrogen</b>	Analytical Method: EPA 351.2 Preparation Method: EPA 351.2								
Nitrogen, Kjeldahl, Total	4.7	mg/L	0.50	0.086	1	02/07/13 07:35	02/07/13 20:09	7727-37-9	
<b>353.2 Nitrogen, NO2/NO3 pres.</b>	Analytical Method: EPA 353.2								
Nitrogen, NO2 plus NO3	7.9	mg/L	0.25	0.12	5		02/12/13 21:38		



## QUALITY CONTROL DATA

Project: FOSBVRS/44237-00 Tash 200

Pace Project No.: 3581871

QC Batch:	WETA/23641	Analysis Method:	EPA 350.1
QC Batch Method:	EPA 350.1	Analysis Description:	350.1 Ammonia
Associated Lab Samples:	3581871003		

METHOD BLANK: 557867 Matrix: Water

Associated Lab Samples: 3581871003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Ammonia	mg/L	0.020U	0.050	02/07/13 13:59	

LABORATORY CONTROL SAMPLE: 557868

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/L	1	1.0	103	90-110	

MATRIX SPIKE SAMPLE: 557870

Parameter	Units	3581207063 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/L	7.8	1	9.2	144	90-110	J(M1)

SAMPLE DUPLICATE: 557869

Parameter	Units	3581207063 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, Ammonia	mg/L	7.8	7.4	5	20	

## QUALITY CONTROL DATA

Project: FOSBVR/44237-00 Tash 200

Pace Project No.: 3581871

QC Batch:	WETA/23646	Analysis Method:	EPA 351.2
QC Batch Method:	EPA 351.2	Analysis Description:	351.2 TKN
Associated Lab Samples:	3581871003		

METHOD BLANK: 557994 Matrix: Water

Associated Lab Samples: 3581871003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	0.094 I	0.50	02/07/13 19:51	

LABORATORY CONTROL SAMPLE: 557995

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	20	21.3	107	90-110	

MATRIX SPIKE SAMPLE: 557997

Parameter	Units	3582101002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	6.5	20	27.2	104	90-110	

SAMPLE DUPLICATE: 557996

Parameter	Units	3582101002 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	6.5	6.4	1	20	

## QUALITY CONTROL DATA

Project: FOSBVR/44237-00 Tash 200

Pace Project No.: 3581871

QC Batch:	WETA/23801	Analysis Method:	EPA 353.2
QC Batch Method:	EPA 353.2	Analysis Description:	353.2 Nitrate + Nitrite, preserved
Associated Lab Samples:	3581871003		

METHOD BLANK:	562483	Matrix:	Water
Associated Lab Samples:	3581871003		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, NO2 plus NO3	mg/L	0.025U	0.050	02/12/13 19:45	

LABORATORY CONTROL SAMPLE: 562484

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, NO2 plus NO3	mg/L	2	2.1	103	90-110	

MATRIX SPIKE SAMPLE: 562486

Parameter	Units	3582166001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, NO2 plus NO3	mg/L	0.18	2	2.3	104	80-120	

MATRIX SPIKE SAMPLE: 562743

Parameter	Units	3582468004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, NO2 plus NO3	mg/L	0.082	2	2.1	101	80-120	

SAMPLE DUPLICATE: 562485

Parameter	Units	3582166001 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, NO2 plus NO3	mg/L	0.18	0.18	2	20	

SAMPLE DUPLICATE: 562742

Parameter	Units	3582468004 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, NO2 plus NO3	mg/L	0.082	0.098	17	20	

## QUALIFIERS

Project: FOSBVR/44237-00 Tash 200

Pace Project No.: 3581871

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### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

### LABORATORIES

PASI-O Pace Analytical Services - Ormond Beach

### ANALYTE QUALIFIERS

I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

J(M1) Estimated Value. Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

## QUALITY CONTROL DATA CROSS REFERENCE TABLE

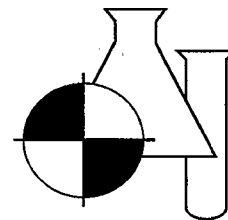
Project: FOSBVRS/44237-00 Tash 200

Pace Project No.: 3581871

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
3581871003	B-HS2-PUMP	EPA 350.1	WETA/23641		
3581871003	B-HS2-PUMP	EPA 351.2	WETA/23646	EPA 351.2	WETA/23674
3581871003	B-HS2-PUMP	EPA 353.2	WETA/23801		

# BENCHMARK

*EnviroAnalytical Inc.*



NELAC Certification # E84167

## ANALYTICAL TEST REPORT

THESE RESULTS MEET NELAC STANDARDS

**Submission Number :** 13020107

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

**Project Name :** 3581871 FOSBVRS/44237-00 TASH200  
**Date Received :** 02/05/2013  
**Time Received :** 1250

Sakina Mc Kenzie

**Submission Number** 13020107

**Sample Number:** 001 **Sample Description:** B-HS2-STE  
**Sample Date:** 02/05/2013 **Sample Method:** Grab  
**Sample Time:** 0855

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	1600000 B	#/100 ML	100000	100000	SM9222D	02/05/2013	13:30	MR
E-COLI BY MPN	1200000	#/100 ML	100000	100000	SM9223B	02/05/2013	13:30	MR

**Submission Number** 13020107

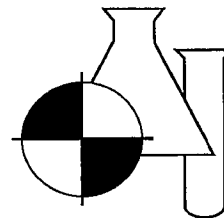
**Sample Number:** 002 **Sample Description:** B-HS2-DBOX  
**Sample Date:** 02/05/2013 **Sample Method:** Grab  
**Sample Time:** 0845

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	790000 B	#/100 ML	10000	10000	SM9222D	02/05/2013	13:30	MR
E-COLI BY MPN	345000	#/100 ML	10000	10000	SM9223B	02/05/2013	13:30	MR



# BENCHMARK

*EnviroAnalytical Inc.*



NELAC Certification # E84167

Submission Number 13020107

Sample Number: 003

Sample Description: B-HS2-PUMP

Sample Date: 02/05/2013

Sample Method: Grab

Sample Time: 0830

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	4200	#/100 ML	100	100	SM9222D	02/05/2013	13:30	MR
E-COLI BY MPN	4611	#/100 ML	10	10	SM9223B	02/05/2013	13:30	MR

Submission Number 13020107

Sample Number: 004

Sample Description: B-HS2-46-NO-D

Sample Date: 02/05/2013

Sample Method: Grab

Sample Time: 0815

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	1300 B	#/100 ML	100	100	SM9222D	02/05/2013	13:30	MR
E-COLI BY MPN	1986	#/100 ML	1	1	SM9223B	02/05/2013	13:30	MR

Submission Number 13020107

Sample Number: 005

Sample Description: B-HS2-ST2

Sample Date: 02/05/2013

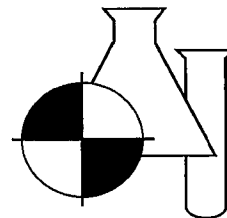
Sample Method: Grab

Sample Time: 0800

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	300	#/100 ML	10	10	SM9222D	02/05/2013	13:30	MR
E-COLI BY MPN	155	#/100 ML	1	1	SM9223B	02/05/2013	13:30	MR

# BENCHMARK

*EnviroAnalytical Inc.*



NELAC Certification # E84167

Submission Number 13020107

Sample Number: 006

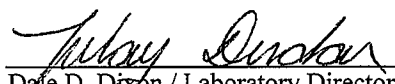
Sample Description: B-HS2-EB

Sample Date: 02/05/2013

Sample Method: Grab

Sample Time: 0945

Parameter	Result	Units	MDL	PQL	Procedure	Analysis		Analyst
						Date	Time	
FECAL COLIFORM	1 U	#/100 ML	1	1	SM9222D	02/05/2013	13:30	MR
E-COLI BY MPN	1 U	#/100 ML	1	1	SM9223B	02/05/2013	13:30	MR

  
Dale D. Dixon / Laboratory Director

02/12/2013

Date

Tülay Tanrisever/ QC Officer

Jennifer Jordan / QC Officer

#### DATA QUALIFIERS THAT MAY APPLY:

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

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

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

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

J = Estimated value.

J1 = Est. value surrogate recovery limits exceeded.

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

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

J4 = Est. value. Sample matrix interference suspected.

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

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

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

#### NOTES:

PQL = 4xMDL.

MBAS calculated as LAS; molecular weight = 348.

X = Value exceed MCL.

N = Presumptive evidence of presence of material.

O = Sampled, but analysis lost or not performed.

Q = Sample held beyond accepted hold time.

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

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

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

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

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

! = Data deviate from historically established concentration ranges.

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

\* = Not reported due to interference.

ND = Not Detected at or above adjusted reporting limit.

NOTES:

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

Results relate only to the samples.

# CHAIN-OF-CUSTODY / Analytical Request Document

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

## Section A

Required Client Information:

Company: Hazen and Sawyer  
Address: 10002 Princess Palm Ave  
Suite 200, Tampa, FL 33619  
Email To: \_\_\_\_\_  
Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
Requested Due Date/TAT: \_\_\_\_\_

## Section B

Required Project Information:

Report To: j.hirst@hazenandsawyer.com  
Copy To: \_\_\_\_\_  
Purchase Order No.: \_\_\_\_\_  
Project Name: FOUR  
Project Number: 44237-001 Task 200

## Section C

Invoice Information:

Attention: Joseph Hirst  
Company Name: H&S  
Address: \_\_\_\_\_  
Pace Quote Reference: \_\_\_\_\_  
Pace Project Manager: \_\_\_\_\_  
Pace Profile #: \_\_\_\_\_

Page:

of

**1569780**

## REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER  
☐ UST ☐ RCRA ☐ OTHER \_\_\_\_\_

Site Location

STATE: FL

ITEM #	Section D Required Client Information		Matrix Codes MATRIX / CODE		MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED				SAMPLE TEMP AT COLLECTION	Q	# OF CONTAINERS	Preservatives										Y/N	Analysis Test ↓	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N</
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ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
Empty containers	Joseph Hirst	1-28-13	1300	Joseph Hirst	1-28-13	1300				
	Joseph Hirst	2-5-13	1027	Joseph Hirst	2-5-13	1027	6.0	ROI	X	Y
									CF=0	
									TP-14	

ORIGINAL

SAMPLER NAME AND SIGNATURE

Joseph Hirst

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER:

Joseph Hirst

DATE Signed (MM/DD/YY):

02/05/13

Temp in °C

Received on ice (Y/N)

Custody Sealed Cooler (Y/N)

Samples Intact (Y/N)

## Sample Condition Upon Receipt Form (SCUR)

Table Number: \_\_\_\_\_

Client Name: Hazen Sawyer Project # \_\_\_\_\_Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☒ Client ☐ Commercial ☐ Pace ☐ Other

FOSNRS

Tracking # \_\_\_\_\_

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☒ noPacking Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ None ☐ Other \_\_\_\_\_Thermometer Used TP-14 Type of Ice: ☒ Wet ☐ Blue ☐ NoneCooler Temperature °C 6 Visual 0 Correction Factor 6 Actual(Temp should be above freezing to 0°-6°C).  
If below 0°C, then was sample frozen?☐ Yes ☐ NoReceipt of samples satisfactory: ☐ Yes ☐ NoRush TAT requested on COC: ☐

If yes, then all conditions below were met:

If no, then mark box &amp; describe issue (use comments area if necessary):

Chain of Custody Present	<input type="checkbox"/>
Chain of Custody Filled Out	<input type="checkbox"/>
Relinquished Signature & Sampler Name COC	<input type="checkbox"/>
Samples Arrived within Hold Time	<input type="checkbox"/>
Sufficient Volume	<input type="checkbox"/> Fecal & E-Coli subbed out to Benchmark
Correct Containers Used	<input type="checkbox"/>
Containers Intact	<input type="checkbox"/>
Sample Labels match COC (sample IDs & date/time of collection)	<input type="checkbox"/>
	No Labels: <input type="checkbox"/> No Time/Date on Labels: <input type="checkbox"/>
All containers needing preservation are found to be in compliance with EPA recommendation.	<input type="checkbox"/>
No Headspace in VOA Vials (>6mm):	<input type="checkbox"/>

## Client Notification/ Resolution:

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments/ Resolution (use back for additional comments): \_\_\_\_\_

Project Manager Review: \_\_\_\_\_

Date: \_\_\_\_\_

## Finished Product Information Only

F.P. Sample ID: \_\_\_\_\_

Production Code: \_\_\_\_\_

Date/Time Opened: \_\_\_\_\_

Number of Unopened Bottles Remaining: \_\_\_\_\_

Extra Sample in Shed: Yes No

## Size &amp; Qty of Bottles Received

☐ x 5 Gal  
☐ x 2.5 Gal  
☐ x 1 Gal  
☐ x 1 Liter  
☐ x 500 mL  
☐ x 250 mL  
☐ x Other: \_\_\_\_\_



Sample Condition Upon Receipt Form (SCUR)

Table Number: \_\_\_\_\_

Client Name: \_\_\_\_\_ Project # \_\_\_\_\_

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☒ Commercial ☐ Pace ☐ Other \_\_\_\_\_

Tracking # \_\_\_\_\_

Custody Seal on Cooler/Box Present: ☐ yes ☒ no    Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ None ☐ Other \_\_\_\_\_

Thermometer Used TL2    Type of Ice: ☒ Wet ☐ Blue ☐ None

Cooler Temperature °C 0.3 (Visual) +0.3 (Correction Factor) +0.4 (Actual)

Date and Initials of person examining contents: \_\_\_\_\_

(Temp should be above freezing to 6°C). If below 0°C, then was sample frozen?  
☐ Yes ☐ No

Receipt of samples satisfactory: ☐ Yes ☐ No

Rush TAT requested on COC: \_\_\_\_\_

If yes, then all conditions below were met:

If no, then mark box & describe issue (use comments area if necessary):

Chain of Custody Present	<input type="checkbox"/>
Chain of Custody Filled Out	<input type="checkbox"/>
Relinquished Signature & Sampler Name COC	<input type="checkbox"/>
Samples Arrived within Hold Time	<input type="checkbox"/>
Sufficient Volume	<input type="checkbox"/>
Correct Containers Used	<input type="checkbox"/>
Containers Intact	<input type="checkbox"/>
Sample Labels match COC (sample IDs & date/time of collection)	<input type="checkbox"/>
	No Labels: <input type="checkbox"/> No Time/Date on Labels: <input type="checkbox"/>
All containers needing preservation are found to be in compliance with EPA recommendation.	<input type="checkbox"/>
No Headspace in VOA Vials (>6mm):	<input type="checkbox"/>

Client Notification/ Resolution:

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments/ Resolution (use back for additional comments):  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Project Manager Review: \_\_\_\_\_ Date: \_\_\_\_\_

Finished Product Information Only

F.P. Sample ID: \_\_\_\_\_  
Production Code: \_\_\_\_\_  
Date/Time Opened: \_\_\_\_\_  
Number of Unopened Bottles Remaining: \_\_\_\_\_

Size & Qty of Bottles Received  
\_\_\_\_\_  
x 5 Gal  
\_\_\_\_\_  
x 2.5 Gal  
\_\_\_\_\_  
x 1 Gal  
\_\_\_\_\_  
x 1 Liter  
\_\_\_\_\_  
x 500 mL  
\_\_\_\_\_  
x 250 mL  
\_\_\_\_\_  
x Other: \_\_\_\_\_

Extra Sample in Shed:    Yes    No

## 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

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## Appendix C: Vericomm PLC Data

System Status			2/5/2013	1/23/2013	1/4/2013	12/23/2012
Point	Description	Status	Value	Value	Value	Value
1	Alarm Status	Automatic	OK	OK	OK	OK
2	Alert Status	Automatic	OK	OK	Filter	OK
3	System Mode	Automatic	Normal	Normal	Normal	Normal
5	Timer Mode	Automatic	Normal	Normal	Off	Override
6	Active Off Time	Automatic	58.8 Minutes	58.8 Minutes	58.8 Minutes	15.0 Minutes
7	Active On Time	Automatic	1.2 Minutes	1.2 Minutes	1.2 Minutes	1.2 Minutes
9	Pump Mode	Automatic	OffCycl	OffCycl	RO	OffCycl
10	Pump Status	Automatic	Off	Off	Off	Off
12	Pump Cycles Today	Automatic	11.0 Cycles	12.0 Cycles	21.0 Cycles	14.0 Cycles
13	Override Cycles Today	Automatic	1.0 Cycles	0.0 Cycles	0.0 Cycles	4.0 Cycles
14	Pump Run Time Today	Automatic	13.3 Minutes	14.5 Minutes	25.4 Minutes	16.0 Minutes
Settings						
Point	Description	Status	Value	Value	Value	Value
17	Off Cycle Time	Constant/Setpoint	58.8 Minutes	58.8 Minutes	58.8 Minutes	58.8 Minutes
18	On Cycle Time	Constant/Setpoint	1.2 Minutes	1.2 Minutes	1.2 Minutes	1.2 Minutes
19	Override Off Cycle Time	Constant/Setpoint	15.0 Minutes	15.0 Minutes	15.0 Minutes	15.0 Minutes
20	Override On Cycle Time	Constant/Setpoint	1.2 Minutes	1.2 Minutes	1.2 Minutes	1.2 Minutes
21	Minimum Override Cycles	Automatic	3.0 Cycles	3.0 Cycles	3.0 Cycles	3.0 Cycles
23	Override Cycle Limit per Day	Automatic	10.0 Cycles	10.0 Cycles	10.0 Cycles	7.0 Cycles
24	Time Limit per Day	Constant/Setpoint	40.0 Minutes	40.0 Minutes	40.0 Minutes	40.0 Minutes
25	High Level Pump Test	Automatic	2.0 Minutes	2.0 Minutes	2.0 Minutes	2.0 Minutes
28	Alarm Update Interval	Automatic	120.0 Minutes	240.0 Minutes	120.0 Minutes	120.0 Minutes
29	Page Delay	Automatic	960.0 Minutes	960.0 Minutes	960.0 Minutes	960.0 Minutes
30	Page Interval	Automatic	30.0 Minutes	30.0 Minutes	30.0 Minutes	30.0 Minutes
31	Local Alarm Delay	Constant/Setpoint	1140.0 Minutes	1140.0 Minutes	1140.0 Minutes	1140.0 Minutes
32	Local Reactivate Delay	Automatic	120.0 Minutes	120.0 Minutes	120.0 Minutes	120.0 Minutes
Troubleshooting						
Point	Description	Status	Value	Value	Value	Value
33	Top Float Status	Automatic	OK	OK	OK	OK
34	Middle Float Status	Automatic	OK	OK	OK	OK
35	Bottom Float Status	Automatic	OK	OK	OK	OK
37	Contactors Status	Automatic	OK	OK	OK	OK
38	Pump Status	Automatic	OK	OK	OK	OK
40	Filter Status	Automatic	OK	OK	Clog	OK
41	Tank Status	Automatic	OK	OK	OK	OK
43	Power Status	Automatic	OK	OK	OK	OK
Flow Data						
Point	Description	Status	Value	Value	Value	Value
49	Pump Run Time Today	Automatic	13.3 Minutes	14.5 Minutes	25.4 Minutes	16.0 Minutes
50	Override Cycles Today	Automatic	1	0	0	4
51	Pump Cycles Today	Automatic	11.0 Cycles	12.0 Cycles	21.0 Cycles	14.0 Cycles
52	Average Run Time per Cycle Today	Automatic	1.2 Minutes	1.2 Minutes	1.2 Minutes	1.1 Minutes
54	Brownouts Today	Automatic	0	0	0	0

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			2/5/2013	1/23/2013	1/4/2013	12/23/2012
<b>30-Day History Data</b>						
Point	Description	Status	Value	Value	Value	Value
65	30 Day Average Run Time per Day	Automatic	31.7 Minutes	32.1 Minutes	27.6 Minutes	27.7 Minutes
66	30 Day Average Override Cycles per Day	Automatic	12.8 Cycles	10.9 Cycles	7.6 Cycles	7.6 Cycles
67	30 Day Average Cycles per Day	Automatic	26.8 Cycles	26.6 Cycles	23.0 Cycles	23.1 Cycles
68	30 Day Average Run Time per Cycle	Automatic	1.2 Minutes	1.2 Minutes	1.2 Minutes	1.2 Minutes
71	30 Day Total Pump Run Time	Automatic	950.7 Minutes	961.8 Minutes	827.8 Minutes	832.1 Minutes
72	30 Day Total Override Cycles	Automatic	383.0 Cycles	328.0 Cycles	228.0 Cycles	227.0 Cycles
73	30 Day Total Cycles	Automatic	803.0 Cycles	799.0 Cycles	691.0 Cycles	694.0 Cycles
76	30 Day Total Brownouts	Automatic	2	2	0	0
<b>Totalized Pump Data</b>						
Point	Description	Status	Value	Value	Value	Value
82	Pump Total Run Time	Automatic	63.1 Hours	56.9 Hours	47.0 Hours	40.3 Hours
83	Pump Total Cycles	Automatic	3160.0 Cycles	2837.0 Cycles	2346.0 Cycles	2007.0 Cycles
<b>Miscellaneous</b>						
Point	Description	Status	Value	Value	Value	Value
145	Pump On Auto	Automatic	Off	Off	Off	Off
147	Pump Test Today	Automatic	Off	Off	Off	On
148	Pump Check Enable	Automatic	Off	Off	Off	Off
149	Total Override Cycles	Automatic	0	0	0	1
150	High Level Condition	Automatic	Off	Off	Off	Off
151	Leak Check Enable	Automatic	On	Off	Off	On
152	Brownout State	Automatic	Off	Off	Off	Off
153	Test Mode	Automatic	Off	Off	Off	Off
<b>Alarm Points</b>						
Point	Description	Status	Value	Value	Value	Value
161	General Alarm	Automatic	Off	Off	Off	Off
162	New Alarm	Automatic	Off	Off	Off	Off
163	Update Central Enable	Automatic	On	On	On	On
167	Page Alarm Start	Automatic	Off	Off	Off	Off
168	Pager Signal	Override Off	Off	Off	Off	Off
169	Local Alarm Start	Automatic	Off	Off	Off	Off
170	Local Alarm Silence	Automatic	Off	Off	Off	Off
<b>Inputs &amp; Outputs</b>						
Point	Description	Status	Value	Value	Value	Value
177	High Level/Override Timer Float Input	Automatic	Off	Off	Off	Off
178	Timer Float Input	Automatic	On	On	Off	On
179	Redundant Off Float & Low Level Alarm Input	Automatic	On	On	Off	On
181	Push To Silence Input	Automatic	Off	Off	Off	Off
182	Auxiliary Contact Input	Automatic	Off	Off	Off	Off
186	Pump Output	Automatic	Off	Off	Off	Off
188	Alarm Light Output	Automatic	Off	Off	Off	Off
189	Audible Alarm Output	Automatic	Off	Off	Off	Off

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