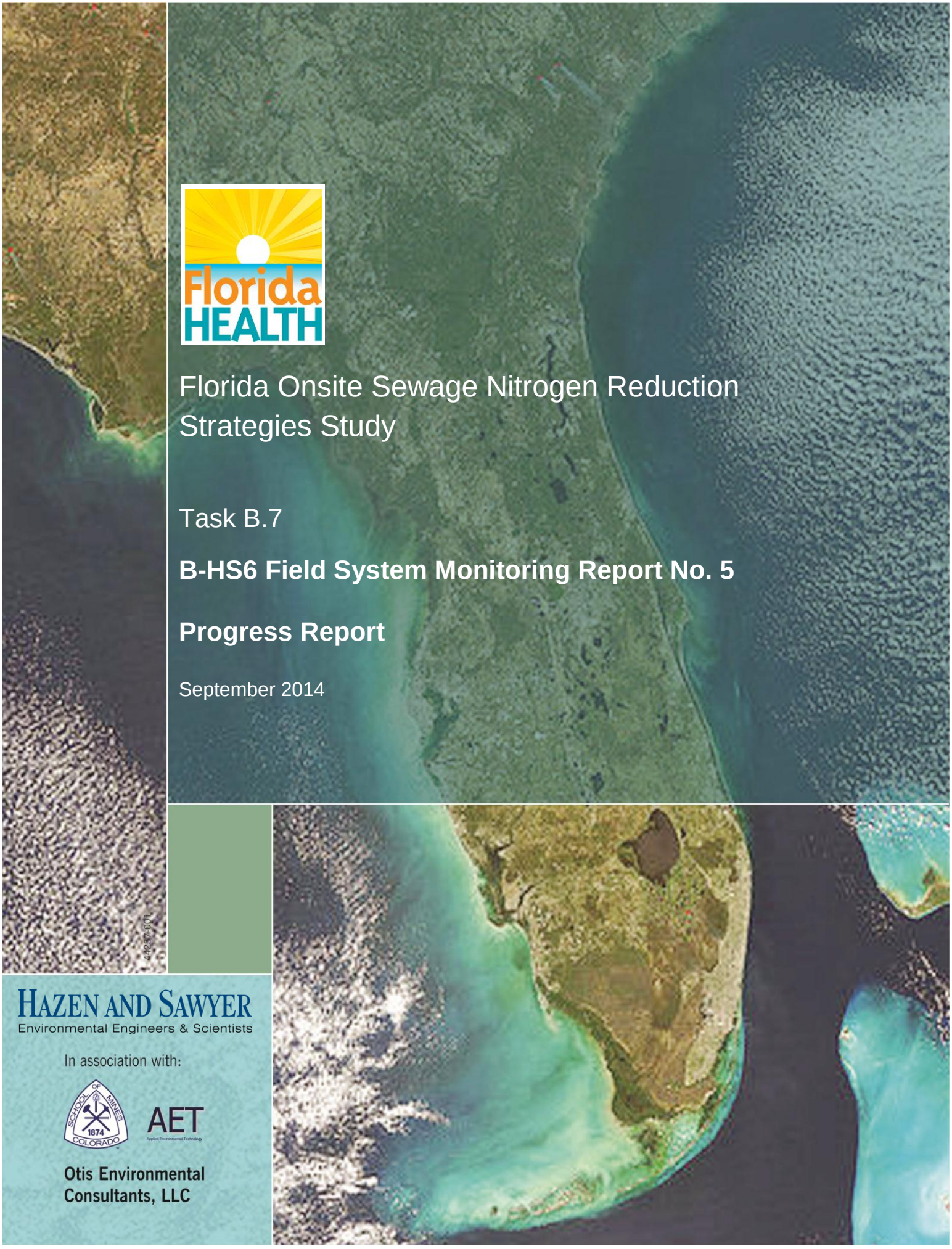

Florida HEALTH

Florida Onsite Sewage Nitrogen Reduction Strategies Study

Task B.7

B-HS6 Field System Monitoring Report No. 5

Progress Report

September 2014

HAZEN AND SAWYER
Environmental Engineers & Scientists

In association with:

SCHOOL OF MINES 1874 COLORADO

AET Applied Environmental Technology

Otis Environmental Consultants, LLC

Florida Onsite Sewage Nitrogen Reduction Strategies Study

TASK B.7
PROGRESS REPORT

B-HS6 Field System
Monitoring Report No. 5

Prepared for:

Florida Department of Health
Division of Disease Control and Health Protection
Bureau of Environmental Health
Onsite Sewage Programs
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September 2014

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B-HS6 Field System
Monitoring Report No. 5

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 fifth sample event of the passive nitrogen reduction system at home site B-HS6 in Wakulla County, Florida.

2.0 Purpose

This monitoring report documents data collected from the fifth B-HS6 monitoring and sampling event conducted on August 27, 2014 (Experimental Day 286). 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 seven points in the treatment system, and chemical analyses of water samples by a NELAC certified laboratory.

3.0 Materials and Methods

3.1 Project Site

The B-HS6 field site is located in Wakulla County, FL. The nitrogen reducing onsite treatment system for the single family residence was installed in November 2013. Operation commenced on November 14, 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 new system replaced the previously installed PNRS system installed at field site B-HS1. The previously installed Aerocell™ unsaturated media filter chamber, Nitrex™ media and split recirculation device were removed from the system.

The existing 1,500 gallon dual chamber septic tank will continue to provide primary treatment for the new PNRS system. However, the effluent screen was moved to the outlet and a vented tee was installed between the chambers per 64E-6.013(2)(h). The existing pump and floats were moved from the second chamber of the primary tank into a new 275 gallon pump tank. A 1,650 gallon concrete combined Stage 1 and Stage 2a media biofilter was installed. The existing 1,500 gallon concrete single chamber tank which contained the Nitrex™ media was converted to a Stage 2b saturated sulfur media biofilter. The denitrified treated effluent is discharged into the soil via the existing drain-field (standard trenches).

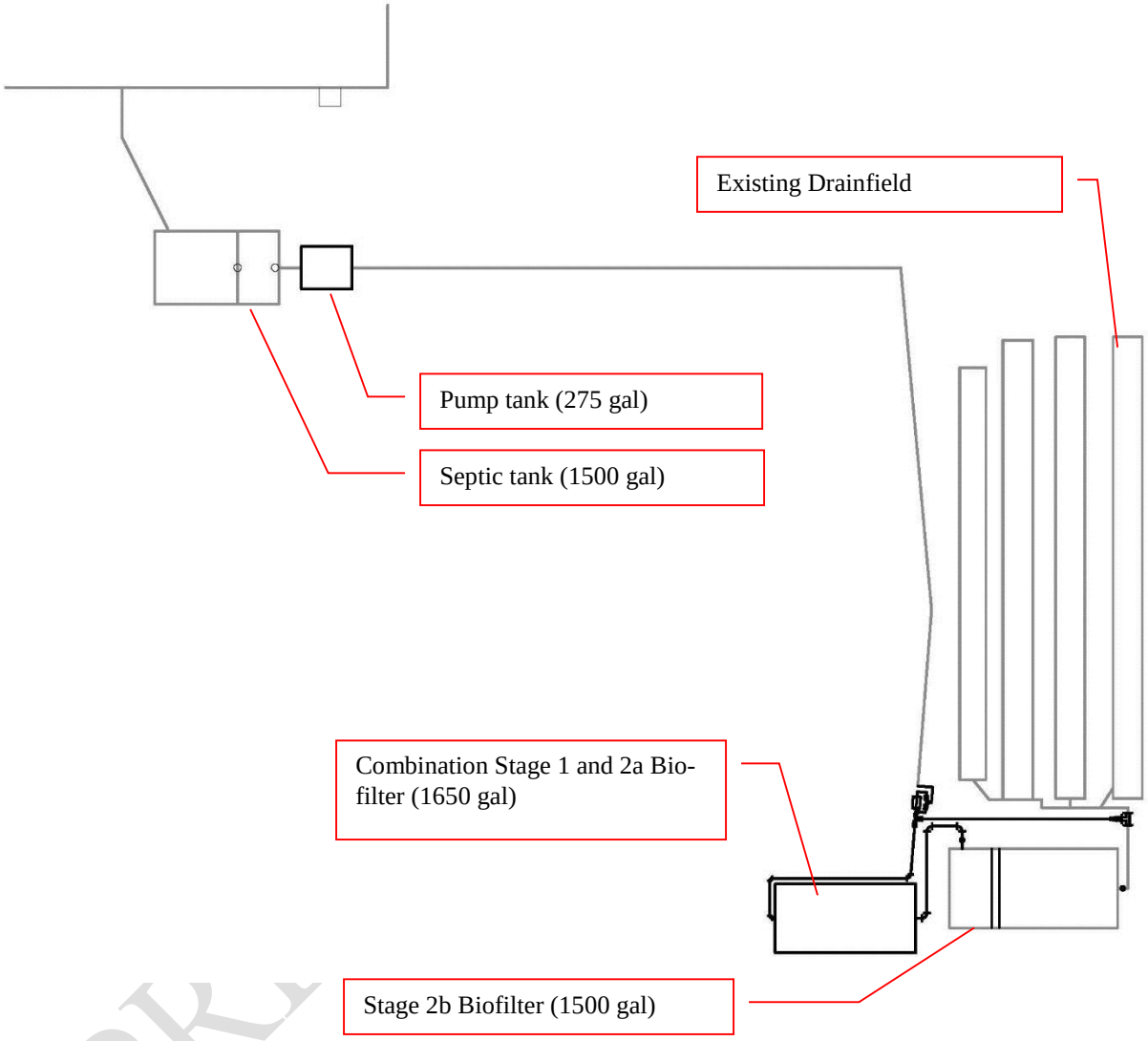

Figure 1
Plan view of B-HS6 system layout installed in Wakulla County

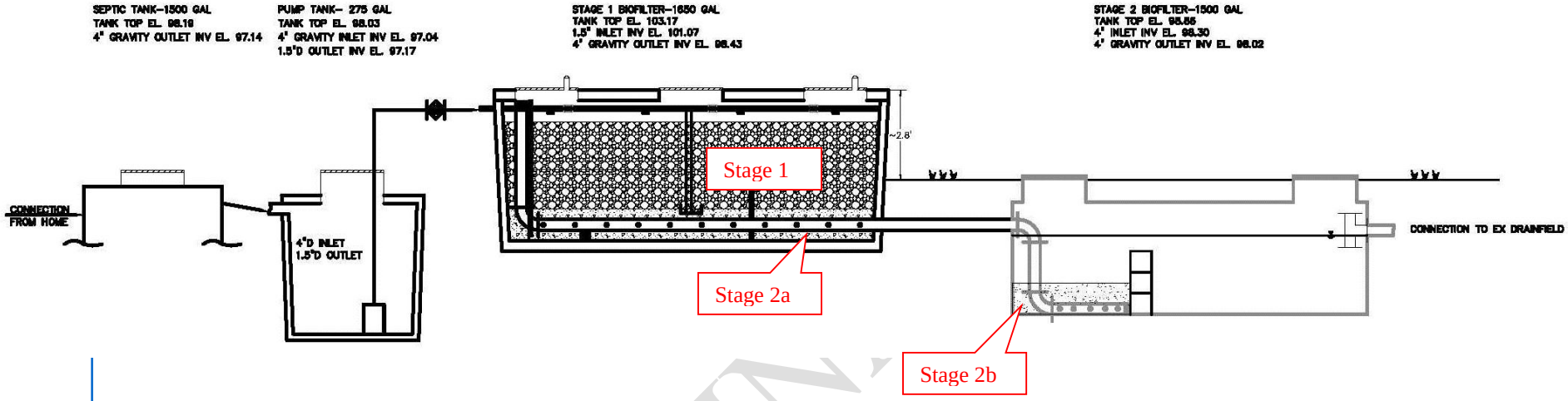

Figure 2
Flow Schematic of B-HS6 PNRS installed in Wakulla County

3.2 Monitoring and Sample Locations and Identification

Seven of the eight monitoring points shown in Figure 3 were sampled for this sample event. Monitoring point B-HS6-ST2-T was not sampled as the water quality was very similar to the adjacent monitoring point B-HS6-ST-P. Household wastewater enters the 1st chamber of the primary tank and exits the second chamber as septic tank effluent through an effluent screen into the pump tank (which contains the pump and float switches). The first monitoring point, B-HS6-STE, is the effluent sampled from a sample port on the pump discharge line (Figure 4), which is referred to as primary effluent or septic tank effluent (STE). Samples from monitoring point B-HS6-STE are representative of the whole household wastewater and represent the influent to the remainder of the onsite nitrogen reduction system.

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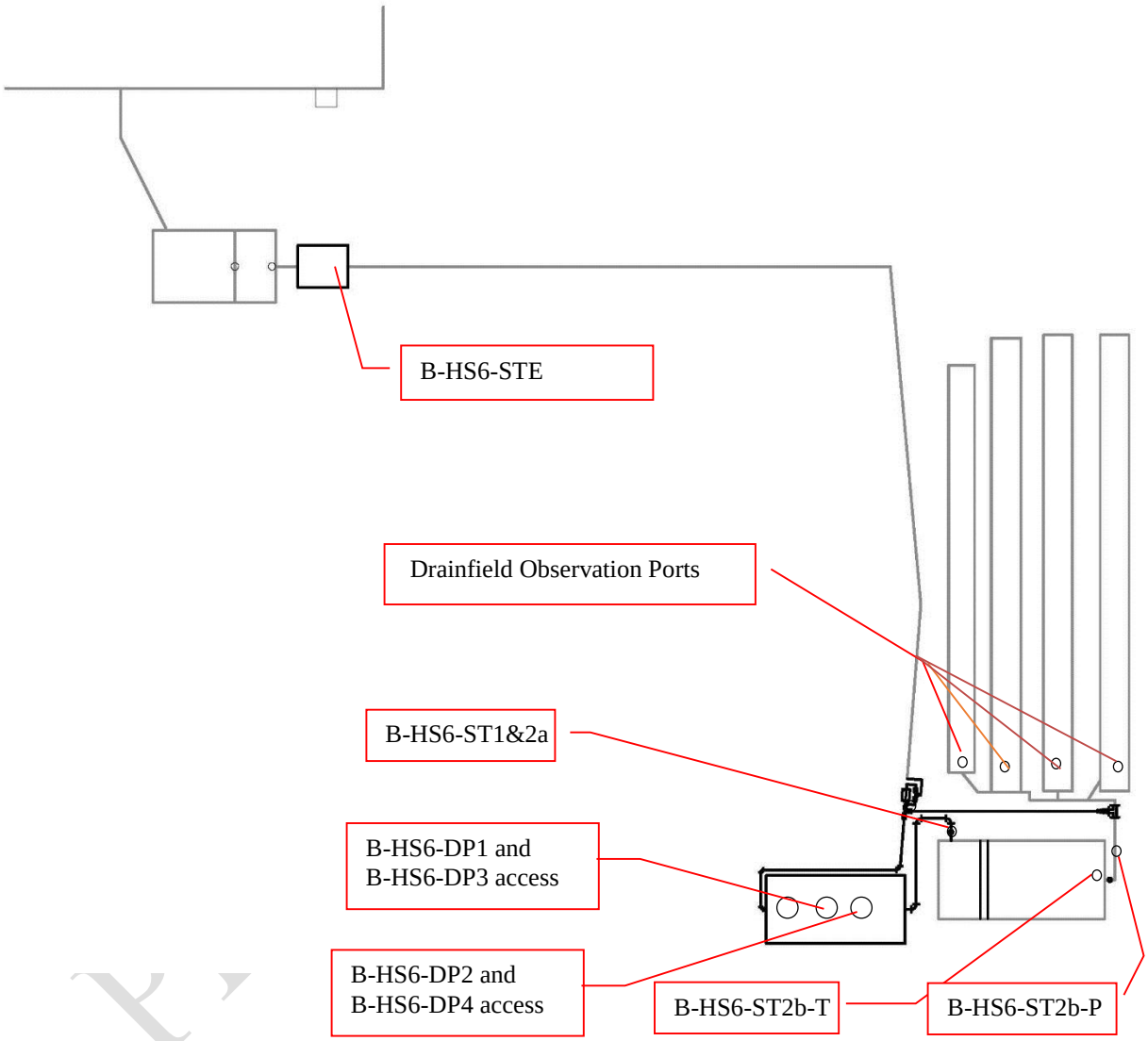

Figure 3
B-HS6 Treatment System Sampling and Monitoring Locations

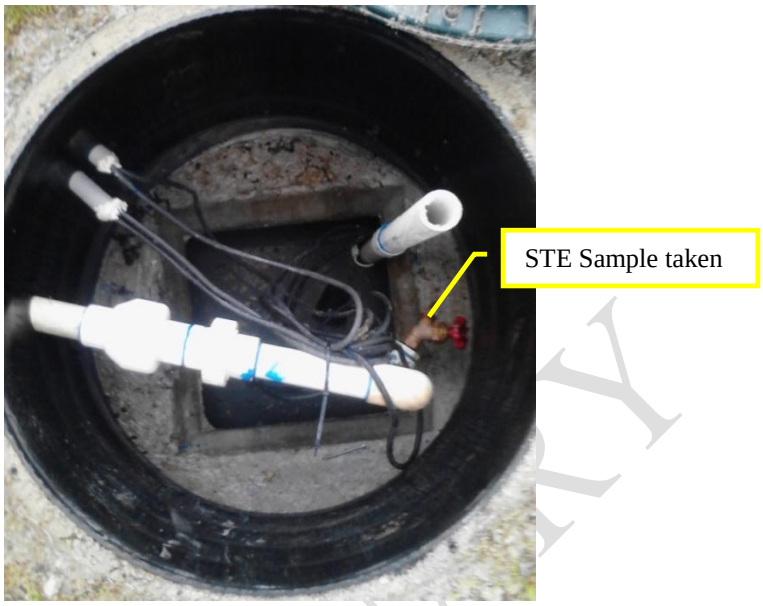

Figure 4
Primary Effluent (B-HS6-STE sample)

The pump tank contents are discharged to the top of the Stage 1 biofilter through three Orenco™ spin nozzles. The spin nozzles seem to adequately cover the surface area of the biofilter and provide relatively uniform flow distribution. The four spray nozzles that were originally installed were replaced with the three spin nozzles sprayers on March 20, 2014. In the Stage 1 biofilter, wastewater percolates downward through the unsaturated expanded clay media where nitrification occurs. The Stage 1 biofilter contains 30 inches of coarse expanded clay media (Riverlite™ 1/4; 1.1 to 4.8 mm). Two shallow pans, each containing a drive point sampler, were installed underneath the expanded clay layer and on top of the Stage 2a lignocellulosic media (see Figure 5). The second and third sampling points (B-HS6-DP1 and B-HS6-DP2) are sampled by connecting a peristaltic pump to the drivepoint tubing, representing the Stage 1 biofilter effluent.

Figure 5
Stage 1 Unsaturated Biofilter Effluent (B-HS6-DP1 and B-HS6-DP2 sample)

Twelve inches of lignocellulosic media, a blended waste wood from AAA Tree Experts, Tallahassee, FL, was installed underneath the expanded clay media as a supplemental carbon source for denitrification. A single 4-inch outlet pipe connects the Stage 1&2a tank to the Stage 2b tank. The pipe was installed along the centerline of the Stage 1&2a tank with invert at 4-inches above the interior bottom of the tank. Therefore, approximately 4-inches of the lignocellulosic media is saturated, promoting oxygen depletion and denitrification of the nitrified effluent. Two additional stainless steel drive points were installed at the bottom of the Stage 2a saturated lignocellulosic media (see Figure 6). These drive points sample water from or near the bottom of the tank. The fourth and fifth sampling points (B-HS6-DP3 and B-HS6-DP4) are sampled by connecting a peristaltic pump to the drive point tubing, representing the Stage 2a saturated biofilter effluent.

Figure 6
Stage 2a Saturated Biofilter Effluent (B-HS6-DP3 and B-HS6-DP4) sample tubing

The tubing for sample points B-HS6-DP1 and B-HS6-DP3 are accessed via the middle tank cover (Figure 7), and B-HS6-DP2 and B-HS6-DP4 are accessed through the tank cover on the outlet side of the tank.

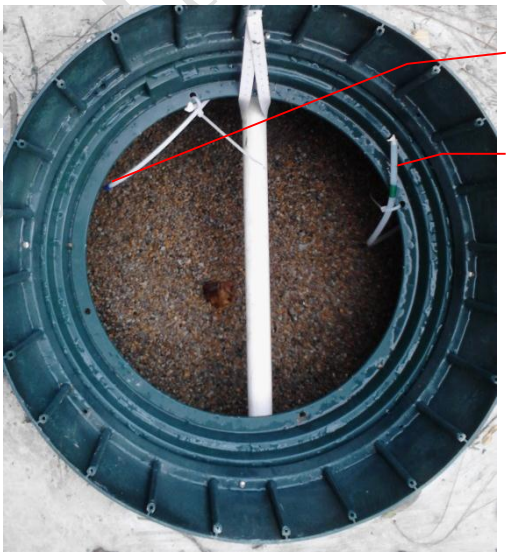

Figure 7
Drivepoint tubing access (B-HS6-DP1 and B-HS6-DP3 sample)

The effluent from the Stage 1&2a biofilter flows into the Stage 2b biofilter by gravity. The sixth sampling point (B-HS6-ST1&2a) is taken from a sample port in the gravity pipe connecting the Stage 1&2a biofilter outlet to the Stage 2b biofilter inlet representing the Stage 1&2a biofilter effluent (see Figure 8).

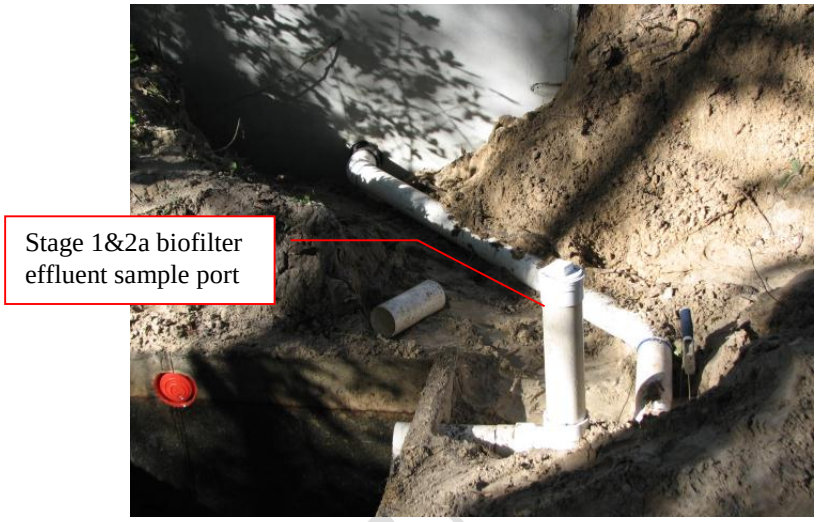

Figure 8
Stage 1&2a Biofilter Effluent Sample Port (B-HS6-ST1&2a sample)

Effluent from the Stage 1&2a biofilter enters the saturated denitrification (Stage 2b) biofilter at the bottom of the tank through a 4-inch diameter perforated pipe, flows upward through the 12-inches of elemental sulfur and oyster shell media mixture, and moves laterally over a concrete block wall to the second chamber. The Stage 2b biofilter effluent discharges near the top of the tank; therefore denitrification occurs in the saturated environment. The seventh primary sampling point, (B-HS6-ST2b-T) is the second chamber of the Stage 2 biofilter effluent which is sampled approximately 1 foot below the surface of the effluent baffle tee. This sample location is after passage through the sulfur media; it is the final effluent from the treatment system prior to being discharged to the soil infiltration system, or drainfield (Figure 9).

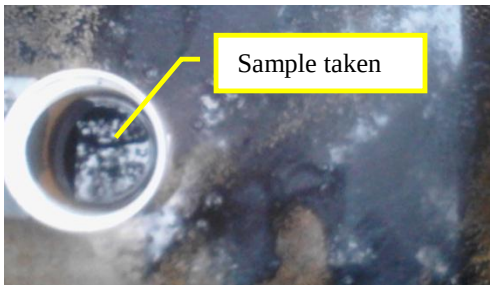

Figure 9
Stage 2b Biofilter Effluent (B-HS6-ST2b-T sample)

The eighth sampling point (B-HS6-ST2b-P) is from a sample port in the gravity pipe connecting the Stage 2b biofilter outlet to the drainfield inlet also representing the treated effluent (Figure 10).

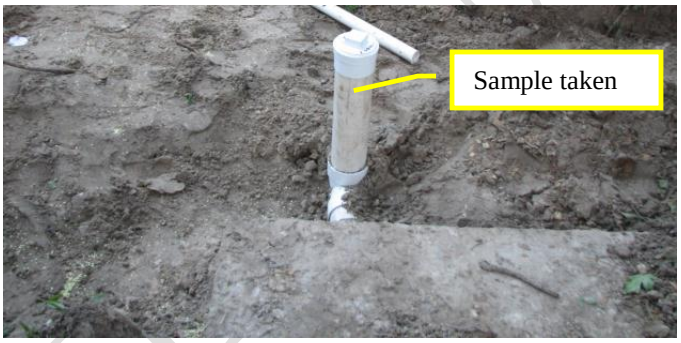

Figure 10
Stage 2b Biofilter Effluent (B-HS6-ST2b-P sample)

Treated effluent is discharged to a soil dispersal system (drainfield) consisting of four Infiltrator trenches. Three of the four Infiltrator trenches are 40 feet in length, and the fourth is 36 feet. The layout of the system and a flow schematic are shown in Figures 1 and 2, respectively.

3.3 Operational Monitoring

Start-up of the system occurred on November 14, 2013 (Experimental Day 0). The PNRS system has operated continually since that date. For this fifth formal sampling event, the water meter for the house and treatment system flow meters were read and recorded on August 27, 2014 (Experimental Day 286). 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 PNRS system.

The PNRS treatment system flow meter (Figure 11) is located on the pump tank discharge line and records the cumulative flow in gallons pumped from the pump chamber to the combined Stage 1&2a biofilter. The control panel includes telemetry where reports are generated regarding alarms, pump cycles, and other information using a Vericomm control panel system.

Figure 11
Treatment system flow meter

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 1&2a biofilter was ini-

tially filled with 12 inches of lignocellulosic media. The Stage 2b biofilter was filled with 12 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

The fifth formal sample event (Sample Event No. 5), which is the subject of this report, was conducted on August 27, 2014 (Experimental Day 286). A full suite of influent, intermediate and effluent water quality samples were collected from the system for water quality analysis. Samples were collected at seven monitoring points described in Section 3.2: B-HS6-STE, B-HS6-DP1, B-HS6-DP2, B-HS6-DP3, B-HS6-DP4, B-HS6-ST1&2a, B-HS6-ST2b-P. A duplicate sample was also taken at B-HS6-ST1&2a. Additionally, laboratory split samples were collected immediately subsequent to the regular samples. The laboratory split samples for this event were filled with B-HS6-STE, B-HS6-ST1&2a, B-HS6-ST2b-P to be analyzed by Advanced Environmental Laboratories (AEL). 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. For sample B-HS6-STE, the system pump was briefly turned on to collect sample from the spigot.

The analysis-specific containers were supplied by the analytical laboratories 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. Field parameters were measured directly in the tank/port for the B-HS6-STE, B-HS6-ST1, and B-HS6-ST2-P samples. Due to the design of the probe, ORP was measured in a container overflowing with sample water. All field parameters were measured in an overflowing container for samples B-HS6-DP3 and B-HS6-DP4. Due to low sample volume, no field parameters were taken during sampling of B-HS6-DP1 and B-HS6-DP2.

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 (NH_3-N), nitrate nitrogen (NO_3-N), nitrite nitrogen (NO_2-N), total phosphorus (TP), orthophosphate (Ortho P), total suspended solids (TSS), volatile suspend-

ed 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). Due to sample size, B-HS6-DP1 and B-HS6-DP2 were only analyzed for the nitrogen species, COD, TSS, VSS, total alkalinity and $CBOD_5$. All analyses were performed by independent and fully NELAC certified analytical laboratories (Southern Analytical Laboratory, Ackuritlabs, Inc., and Advanced Environmental Laboratories, Inc.). Table 1 lists the analytical parameters, analytical methods, and detection limits for laboratory analyses.

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

Analytical Parameter	Method of Analysis	Method Detection Limit (mg/L)
Total Alkalinity as $CaCO_3$	SM 2320B	2 mg/L
Chemical Oxygen Demand (COD)	EPA 410.4	10 mg/L
Total Kjeldahl Nitrogen (TKN-N)	EPA 351.2	0.05 mg/L
Ammonia Nitrogen (NH_3-N)	EPA 350.1	0.005 mg/L
Nitrate Nitrogen (NO_3-N)	EPA 300.0	0.01 mg/L
Nitrite Nitrogen (NO_2-N)	EPA 300.0	0.01 mg/L
Nitrate+Nitrite Nitrogen (NOX-N)	EPA 300.0	0.02 mg/L
Total Phosphorus (TP)	SM 4500P-E	0.01 mg/L
Orthophosphate as P (Ortho P)	EPA 300.0	0.01 mg/L
Carbonaceous Biological Oxygen Demand ($CBOD_5$)	SM5210B	2 mg/L
Total Solids (TS)	EPA 160.3	.01 % by wt
Total Suspended Solids (TSS)	SM 2540D	1 mg/L
Volatile Suspended Solids (VSS)	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	EPA1603	2 ct/100mL

4.0 Results and Discussion

4.1 Operational Monitoring

Table 2 provides a summary of the household water use since the new treatment system installation on November 6, 2013. The treatment system flow meter readings for the B-HS6 field site are summarized in Table 2. 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 cu-

mulative pump runtime and system alarms that are used to check general pump operation and performance.

Table 2
Summary of Flowmeters

Date and Time Read	Household Water Meter Reading	Average House-hold Flow between readings	Daily House hold Flow since start-up	PNRS Flow Meter Reading	Average Daily PNRS Flow between readings	Average PNRS Flow since start-up
	Cumulative Volume (gallons)	gpd	gpd	Cumulative Volume (gallons)	gpd	gpd
11/6/2013 12:15	99,030.4	Installed		1,027,435.3	Installed	
11/14/2013 12:30	100,113.9	135.3	Start-up	1,027,435.3	0.0	Start-up
11/20/2013 8:04	100,925.7	139.6	139.6	1,028,375.4	161.7	161.7
12/4/2013 7:52	102,616.8	120.9	126.4	1,030,645.4	162.3	162.1
12/20/2013 12:46	104,570.6	120.6	123.8	1,033,374.2	168.4	164.9
1/9/2014 11:49	107,163.1	129.9	125.9	1,036,306.1	146.9	158.5
1/22/2014 8:55	109,061.5	147.4	130.0	1,038,248.5	150.8	157.1
3/7/2014 10:30	115,093.0	136.9	132.7	1,045,302.0	160.1	158.2
3/20/2014 11:45	116,543.0	111.1	130.4	1,047,111.1	138.6	156.2
3/24/2014 10:50	116,979.0	110.1	129.8	1,047,597.8	122.9	155.2
4/10/2014 9:29	118,873.3	111.8	127.7	1,050,015.7	142.7	153.7
4/14/2014 19:15	119,370.5	112.8	127.3	1,050,622.9	137.8	153.3
4/16/2014 14:29	119,594.6	124.4	127.3	1,050,904.4	156.3	153.3
4/28/2014 12:47	120,956.3	114.1	126.3	1,052,696.0	150.2	153.1
5/7/2014 9:33	122,109.1	130.0	126.5	1,054,174.5	166.8	153.8
5/27/2014 12:26	124,623.2	125.0	126.3	1,057,401.8	160.4	154.5
5/30/2014 9:45	124,853.9	79.9	125.7	1,057,698.3	102.6	153.7
6/23/2014 9:00	127,482.8	109.7	123.9	1,060,658.0	123.5	150.4
7/21/2014 11:34	130,874.8	120.7	123.6	1,064,238.6	127.4	147.8
8/26/2014 8:54	135,223.9	121.2	123.3	1,068,857.5	128.7	145.4
8/27/2014 10:05	135,334.0	104.9	123.2	1,069,055.3	188.4	145.6

On November 14, 2014, an alarm indicated a pump failure and upon inspection loose wiring was discovered and repaired. PNRS flow readings indicated that the pump had not run since installation until the time the wiring was repaired, therefore the official start-up of the PNRS system was November 14, 2014. From system start-up through August 27, 2014, the household water use average was 123.2 gallons per day with periods of higher and lower flows (Table 2). The average pumped flow to the PNRS was 145.6 gallons per day from start-up through August 27, 2014. The reason for the difference in the two meter readings is not known.

Based on the hydraulic design of the system, a normally expected water level in the Stage 1&2a tank would be approximately 98.52 ft. elevation, or a depth above tank bottom of 4.8 inches. The normal operation level in the Stage 1&2a tanks would be expected to be between 4 and 6 inches above the tank bottom. Water levels above these values could adversely affect treatment performance and would suggest hydraulic blockages in the system. While purging the Stage 1 effluent drive points DP1 and DP2 during Sample Event No. 2, it was observed that the water level in the Stage 1&2a tank was elevated above the pans holding the drive points. The water level in the Stage 1&2a tank was found to be elevated approximately 10-inches above the invert of the collection pipe during that sample event. This water level would saturate all 12-inches of the lignocellulosic media and approximately 2-inches of the expanded clay media. The elevated water level could quite possibly have affected the performance of the system. A piezometer was installed within the Stage 1&2a tank on April 10, 2014 to allow for observation of the water level (Figure 12).

Figure 12
Piezometer installed on April 19, 2014 in the Stage 1&2a Tank

Table 3 summarizes the water level readings recorded. On April 14, 2014, it was determined the clog in the system was in the inlet pipe on the Stage 2b sulfur tank. An unsuccessful attempt was made with a plumbing snake to clear the clog. On April 16, 2014, the clog was cleared using compressed air and a 4-inch rubber bladder; the normal operational water level was restored in the Stage 1&2a tank. During Sample Event No. 3, the water level in the Stage 1&2a tank was at normal operational levels. A system check on May 27, 2014 indicated that the water level was elevated approximately 8 inches. A repair on the inlet pipe to the Stage 2 sulfur tank was completed on May 31, 2014. The water level in the Stage 1&2a tank was above the normal operational level during Sample Event No. 5, the subject of this report. This could have resulted in greater saturation of lignocellulosic media in Stage 2a, but submergence of the pans holding drive points DP1 and DP2 would not be expected.

Table 3
Summary of Stage 1&2a Water Level

Date and Time Read	Water level In Stage1&2a PZ from TOC	Stage1&2a Water Elev	Water level above bottom of tank[1]	Water level above outlet invert
	(ft)	(ft)	(in)	(in)
4/14/2014 19:20	3.74	99.57	17.63	13.63
4/14/2014 19:35	3.75	99.56	17.51	13.51
4/16/2014 14:35	3.77	99.54	17.27	13.27
4/16/2014 16:16	4.76	98.55	5.39	1.39
4/16/2014 16:25	4.79	98.52	5.03	1.03
4/16/2014 16:49	4.81	98.50	4.79	0.79
5/6/2014 9:35	4.71	98.60	5.99	1.99
5/6/2014 9:58	4.66	98.65	6.59	2.59
5/7/2014 9:39	4.68	98.63	6.35	2.35
5/7/2014 10:51	4.70	98.61	6.11	2.11
5/27/2014 12:00	4.02	99.29	14.27	10.27
5/30/2014 9:51	4.09	99.22	13.43	9.43
5/30/2014 15:10	4.79	98.52	5.03	1.03
5/31/2014 19:03	4.79	98.52	5.03	1.03
6/23/2014 9:06	4.61	98.70	7.19	3.19
6/23/2014 12:25	4.52	98.79	8.27	4.27
7/21/2014 11:43	4.49	98.82	8.63	4.63
8/26/2014 9:05	4.36	98.95	10.19	6.19
8/27/2014 10:13	4.33	98.98	10.55	6.55

[1]Stage 1&2a tank interior bottom elev = 98.10

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 and has been fairly consistent through system operation.

Table 4
Summary of System Electrical Use

Date and Time Read	Electrical Meter Reading	Average Daily Electrical Use	Average Electrical Use per Gallon Treated	Average Electrical Use per 1,000 Gallons Treated
	Cumulative (kWh)	(kWh/day)	(kWh/gal)	(kWh/ 1,000 gal)
11/6/2013 12:22	2,749	0.00		
11/14/2013 12:32	2,749	0.00		
11/20/2013 8:08	2,751	0.34	0.0021	2.127
12/4/2013 7:54	2,757	0.43	0.0026	2.643
12/20/2013 12:48	2,764	0.43	0.0026	2.565
1/9/2014 11:53	2,772	0.40	0.0027	2.729
1/22/2014 8:57	2,777	0.39	0.0026	2.574
3/7/2014 10:32	2,797	0.45	0.0028	2.836
3/20/14 11:47	2,802	0.38	0.0028	2.764
3/24/2014 10:51	2,803	0.25	0.0021	2.054
4/10/2014 9:32	2,811	0.47	0.0033	3.309
4/14/2014 19:17	2,813	0.45	0.0033	3.293
4/16/2014 14:31	2,814	0.56	0.0036	3.552
4/28/2014 12:48	2,820	0.50	0.0033	3.349
5/7/2014 9:34	2,825	0.99	0.0034	3.382
5/27/2014 12:27	2,835	0.50	0.0031	3.099
5/30/2014 9:47	2,836	0.35	0.0034	3.373
6/23/2014 9:01	2,846	0.42	0.0034	3.379
7/21/2014 11:36	2,857	0.39	0.0031	3.072
8/27/2014 10:03	2,876	0.51	0.0027	2.730
Total average start-up to 8/27/2014		0.44	0.0031	3.051

The total average electrical use through August 27, 2014 was 0.44 kWh per day. The average electrical use per 1,000 gallons treated was 3.05 kWh per 1,000 gallons treated, and this parameter has been fairly stable since start-up.

4.3 Water Quality

As discussed in the Sample Event No. 1 (SE1) report, the preliminary sampling results indicated that ammonia reduction through the Stage 1 biofilter was limited. During preliminary sampling, it was observed that the sprayers were not spraying uniformly over the Stage 1 media surface. Therefore on December 21, 2013, the sprayers were rotated to spray up on the tank lid rather than straight down for better distribution over the media surface. The results from the SE1 DP1 and DP2 samples indicated significant nitrification was occurring with this sprayer set-up; however, the long-term operation and maintenance of the sprayers in this set-up was a concern. Therefore, on March 20, 2014, the four originally installed spray nozzles were replaced by three Orenco™ spin nozzles positioned under the tank lids allowing for easy maintenance and maximum spray coverage.

Water quality analytical results, for Sample Event No. 5 are listed in Table 5. Quality control samples, including equipment blank, external duplicate and lab split samples are also included in this table. Results for blanks were examined for obvious problems with sample contamination or improper decontamination of sampling equipment. Duplicate and split samples were examined for reproducibility. Significant difference determinations for the various lab analyses were based upon a review of reproducibility data in Standard Methods and EPA guidelines as well as on experience of the project team and data accuracy requirements for this project. Table 6 shows the results of the QC sampling for this sample event, and a calculation of the percent difference between the sample value and the duplicate/split samples.

Key results are graphically displayed in Figure 13. A summary of the water quality data collected to date for the test system is presented in Table 7. The laboratory report containing the raw analytical data is included in Appendix A. The following discussion summarizes the water quality analytical results for Sample Event No. 5. The performance of the various system components was compared by considering the changes through treatment of nitrogen species (TKN, NH_3-N, and NO_X-N), as well as supporting water quality parameters.

$CBOD_5$ mg/L	140	7	5	2	45	69	31
TKN mg N/L	81	5	9.6	12	3.5	9	8.9
NH_3 mg N/L	72	1.5	7.3	7.4	1.6	6.7	6.4
NO_x mg N/L	0.11	76	68	22	0.9	29	0.07
TN mg N/L	81	81	78	34	4.4	38	9
Sulfate mg/L	3.7	NA	NA	NA	3.4	18	160
Fecal Coliform (Ct/100mL)	150,000	NA	NA	NA	NA	3,700	2,000

NA = not analyzed

Figure 13
Graphical Representation of Nitrogen Results
Sample Event 5 August 27, 2014 (Experimental Day 286)

Septic Tank Effluent (STE) Quality: The water quality characteristics of STE collected in Sample Event 5 were within the typical range generally expected for domestic STE, although in the high end of the range. The measured TN concentration for this sample event was 81 mg-N/L, which is in the range typically seen for this household.

Stage 1 Unsaturated Effluent (DP1 and DP2): Stage 1 effluent (DP1 and DP2) NO_x-N concentration were 76 and 68 mg/L for samples DP1 and DP2, respectively. DP1 TKN and NH_3-N concentrations of 5 mg/L and 1.5 mg/L were lower than DP2 sample concentrations of 9.6 mg/L TKN and 7.3 mg/L NH_3-N.

Stage 2a Saturated Effluent (DP3 and DP4): Stage 2b saturated effluent is collected from two drive points (DP3 and DP4) located on the bottom of the Stage 1&2a tank. The DP3 drive point TN concentration of 34 mg/L was much higher than the DP4 drive point TN of 4.4 mg/L. DP3 and DP4 saturated effluent TKN concentrations were 12 mg/L and 3.5 mg/L and the NH_3-N concentrations were 7.4 mg/L and 1.6 mg/L, respectively. DP3 and DP4 NO_x-N concentrations were 22 mg/L and 0.9 mg/L, respectively, and were accompanied by a measured 0.43 and 0.34 mg/L DO and -106 and -167 mV ORP, respectively. The $CBOD_5$ concentrations were 2 mg/L and 45 mg/L, respectively. The differences between these two similar sample locations suggests that one of them is not representative or that there is considerable variability in stage 1 performance across the biofilter surface area.

Stage 1&2a Tank Effluent (ST1&2a): The sample port between the Stage 1&2a combination tank and the Stage 2b sulfur tank represents the effluent from the Stage1&2a tank and the influent to the Stage 2b biofilter. The Stage 1&2a sample port effluent TKN was 9 mg/L of which 6.7 mg/L was NH_3-N. The NO_x-N concentration was 29 mg/L was accompanied by a measured 0.72 mg/L DO and -94 mV ORP. The Stage 1&2a effluent TSS concentration was below the method detection limit of 1 mg/L and $CBOD_5$ was 69 mg/L. The ST1 sample indicates incomplete nitrification and effective denitrification in the Stage 1&2a biofilter.

As discussed above, the samples from inside the Stage 1&2a tank (DP3 and DP4) had different water quality characteristics. The water quality in outlet sample port (ST1&2a) was more similar to that of DP3 than DP4, except for $CBOD_5$. These results suggest an uneven performance of the Stage 1&2a biofilter or that one of the sample points (DP4) may not be representative of the effluent from this tank.

Stage 2b Tank Effluent (ST2b): In Sample Events 1 and 2, the monitoring points B-HS6-ST2-T and B-HS6-ST2-P had nearly identical nitrogen concentrations. For this sample event, B-HS6-ST2-T was not sampled. B-HS6-ST2-P was chosen as the preferred sample point as it is located in the pipe leading from the PNRS system to the drainfield.

Effluent NO_x-N from the Stage 2b biofilter was 0.07 mg/L. The low NO_x-N was accompanied by a measured DO of 0.39 mg/L DO and -206 mV ORP. The Stage 2b biofilter produced a highly reducing environment and achieved complete NO_x-N reduction. However, the somewhat limited NH_3-N reduction through the Stage 1 biofilter was evidenced in the Stage 2 effluent NH_3-N concentration of 6.4 mg/L and TKN of 8.9 mg/L. Final total nitrogen (TN) in the treatment system effluent was 9.0 mg/L. The Stage 2b effluent sulfate concentration was 160 mg/L.

Table 5
Water Quality Analytical Results

Sample ID	Analytical Laboratory	Sample Date/Time	Temp (°C)	pH	Total Alkalinity (mg/L)	DO (mg/L)	ORP (mV)	Specific Conductance (µS)	TSS (mg/L)	VSS (mg/L)	$CBOD_5$ (mg/L)	COD (mg/L)	TN (mg/L N)[1]	TKN (mg/L N)	Organic N (mg/L N)[2]	NH_3-N (mg/L N)	NO_3-N (mg/L N)	NO_2-N (mg/L N)	NOx (mg/L N)	TIN (mg/L N)[3]	TP (mg/L)	Ortho P (mg/L P)	Sulfate (mg/L)	H_2S (mg/L)	Sulfide (mg/L)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)
BHS6-STE	Southern	8/27/14 12:54	25.9	7.2	600	0.04	-98	1278	25	25	140	150	81.1	81	9.0	72	0.04	0.07	0.11	72.11	9.6	4.5	3.7	2.6	4.2		
BHS6-STE	Ackuritlabs	8/27/14 12:54																								150,000	67,000
BHS6-STE-DUP	AEL	8/27/14 12:52	25.9	7.2	500	0.04	-98	1278	7.2	7	2	180	80.3	80	12.0	68	0.25	0.25	0.25	68.25	9.27	7	3.5	1.5			
BHS6-DP01	Southern	8/27/14 12:23			87				8	4	7	20	81.0	5	3.5	1.5	76	0.11	76	77.5							
BHS6-DP02	Southern	8/27/14 12:38			95				192	86	5	22	77.6	9.6	2.3	7.3	68	0.05	68	75.3							
BHS6-DP03	Southern	8/27/14 12:00	26.8	6.53	470	0.43	-106	900	7	7	2	54	34.0	12	4.6	7.4	22	0.41	22	29.4							
BHS6-DP04	Southern	8/27/14 12:08	26.7	6.4	290	0.34	-167	971	2	2	45	120	4.4	3.5	1.9	1.6	0.86	0.04	0.9	2.5			3.4				
BHS6-ST1&2a	Southern	8/27/14 11:28	26.5	6.52	270	0.72	-94	915	1	1	69	47	38.0	9	2.3	6.7	29	0.14	29	35.7	5.2	3.4	18	0.01	0.1		
BHS6-ST1&2a-DUP	Southern	8/27/14 11:30	26.5	6.52	270	0.72	-89	915	5	5	72	39	38.0	9	3.3	5.7	29	0.14	29	34.7	5.4	2.6	14	0.15	0.21		
BHS6-ST1&2a	Ackuritlabs	8/27/14 11:28																								3,700	3,600
BHS6-ST1&2a-DUP	Ackuritlabs	8/27/14 11:30																								6,900	5,500
BHS6-ST1&2a-DUP-2	AEL	8/27/14 11:32	26.5	6.52		0.75	-79	917	42	42	5.5	39	36.9	4.9	-0.4	5.3	31	0.5	32	37.3	4.41	4.8	22	0.023			
BHS6-ST2b-Port	Southern	8/27/14 11:12	25.7	6.62	310	0.39	-206	1072	4	4	31	50	9.0	8.9	2.5	6.4	0.05	0.02	0.07	6.47	4.7	2.7	160	1.5	2.2		
BHS6-ST2b-Port	Ackuritlabs	8/27/14 11:12																								2,000	1,700
BHS6-ST2b-Port-DUP	AEL	8/27/14 11:12	25.7	6.62	330	0.39	-206	1072	11	22	2.8	58	7.3	7.2	1.6	5.6	0.05	0.05	0.05	5.65	3.93	3.4	200	1.5			
BHS6-EB	Southern	8/27/14 12:19	28.3	7.83	2.8	0.49	47	3.3	1	1	2	10	0.09	0.08	0.1	0.009	0.02	0.01	0.01	0.019	0.022	0.01	0.2	0.01	0.1	2.0	2.0

Notes:
1Total Nitrogen (TN) is a calculated value equal to the sum of TKN and NOX.
2Organic Nitrogen (ON) is a calculated value equal to the difference of TKN and NH3.
3Total Inorganic Nitrogen (TIN) is a calculated value equal to the sum of NH3 and NOX.
D.O. - Dissolved oxygen
G - Grab sample
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.
Orange-shaded data points indicate results based upon colony counts exceeded the ideal range of 20-60 (fecal coliform) or 20-80 (E. coli) colonies per plate.

Table 6
Sample Event No. 5 QC Sample Results

	TSS (mg/L)		VSS (mg/L)		$CBOD_5$ (mg/L)		COD (mg/L)		TKN (mg/L)		NH_3-N (mg-N/L)		NOx (mg-N/L)		TP (mg/L)		Ortho P (mg/L)		Sulfate (mg/L)		H_2S (mg/L)	
	Value	% diff	Value	% diff	Value	% diff	Value	% diff	Value	% diff	Value	% diff	Value	% diff	Value	% diff	Value	% diff	Value	% diff	Value	% diff
STE Lab	25		25		140		150		81		72		0.11		9.6		4.5		3.7		2.6	
STE Split	7.2	-71.2%	7	-72.0%	2	-98.6%	180	20.0%	80	-1.2%	68	-5.6%	0.25	127.3%	9.27	-3.4%	7	55.6%	3.5	-5.4%	1.5	-42.3%
ST1&2A Lab	1		1		69		47		9		6.7		29		5.2		3.4		18		0.01	
ST1&2A Lab Dup	5	400.0%	5	400.0%	72	4.3%	39	-17.0%	9	0.0%	5.7	-14.9%	29	0.0%	5.4	3.8%	2.6	-23.5%	14	-22.2%	0.15	1400.0%
ST1&2A Lab Split	42	4100.0%	42	4100.0%	5.5	-92.0%	39	-17.0%	4.9	-45.6%	5.3	-20.9%	32	10.3%	4.41	-15.2%	4.8	41.2%	22	22.2%	0.023	130.0%
ST2b Lab	4		4		31		50		8.9		6.4		0.07		4.7		2.7		160		1.5	
ST2b Split	11	175.0%	22	450.0%	2.8	-91.0%	58	16.0%	7.2	-19.1%	5.6	-12.5%	0.05	-28.6%	3.93	-16.4%	3.4	25.9%	200	25.0%	1.5	0.0%
Equipment Blank	1	MDL	1	MDL	2		10	MDL	0.08	PQL	0.009	MDL	0.02	MDL	0.022	PQL	0.01	MDL	0.2	MDL	0.01	MDL

Table 7
Summary of Water Quality Data

Sample ID	Statistical Parameter	Temp (°C)	pH[4]	Total Alkalinity (mg/L)	DO (mg/L)	ORP (mV)	Specific Conductance (µS)	TSS (mg/L)	VSS (mg/L)	$CBOD_5$ (mg/L)	COD (mg/L)	TN (mg/L N)[1]	TKN (mg/L N)	Organic N (mg/L N)[2]	NH_3-N (mg/L N)	NO_3-N (mg/L N)	NO_2-N (mg/L N)	NOx (mg/L N)	TIN (mg/L N)[3]	TP (mg/L)	Ortho P (mg/L P)	Sulfate (mg/L)	H2S (mg/L)
BHS6-STE	n	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6
	MEAN	20.8	7.2	524.3	0.1	-182.4	1,163.6	27.0	24.6	75.6	165.7	66.7	54.2	-4.2	58.4	0.01	0.02	0.03	58.5	10.4	5.2	3.0	1.7
	STD. DEV.	3.3		43.5	0.1	58.2	84.8	8.1	7.5	28.9	25.7	20.6	26.4	37.2	22.0	0.01	0.02	0.03	22.0	3.8	0.7	2.3	0.8
	MIN	16.1	7.1	470.0	0.0	-245.0	1,086.0	16.0	15.0	60.0	140.0	33.0	7.4	-87.6	23.0	0.01	0.01	0.02	23.0	6.3	4.4	0.5	0.8
	MAX	25.9	7.3	600.0	0.2	-98.0	1,278.0	42.0	38.0	140.0	200.0	95.0	81.0	20.0	95.0	0.04	0.07	0.11	95.0	17.0	6.3	6.9	2.6
BHS6-ST1&2a	n	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5
	MEAN	20.0	6.4	321.7	0.7	-102.0	925.3	6.8	6.3	40.3	89.2	30.4	16.2	4.0	12.2	13.4	0.9	14.2	26.4	6.1	2.7	15.8	0.9
	STD. DEV.	4.2		95.8	0.5	40.7	88.1	4.1	3.8	28.4	71.9	13.0	16.2	2.8	13.7	12.2	0.5	11.7	11.0	4.5	0.9	4.2	1.5
	MIN	13.8	6.2	240.0	0.2	-146.0	849.0	1.0	1.0	10.0	37.0	10.8	5.1	1.2	1.8	0.0	0.1	0.9	9.6	2.8	1.4	9.0	0.0
	MAX	26.5	6.7	500.0	1.7	-28.0	1091.0	11.0	10.0	72.0	230.0	49.7	48.0	9.0	39.0	29.0	1.5	29.0	40.7	15.0	3.7	20.0	3.5
BHS6-ST2b-Port	n	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	MEAN	19.7	6.6	375.0	0.3	-187.3	1072.2	9.2	7.2	21.7	103.8	12.9	12.9	2.7	10.2	0.02	0.01	0.03	10.2	5.9	2.8	121.2	6.3
	STD. DEV.	4.5		66.6	0.1	59.7	107.3	14.1	9.3	29.5	135.5	9.1	9.1	1.7	7.4	0.02	0.00	0.02	7.4	4.5	1.0	35.7	9.7
	MIN	13.6	6.2	310.0	0.2	-239.0	895.0	2.0	2.0	3.0	35.0	5.9	5.9	1.0	4.9	0.01	0.01	0.02	4.9	3.0	2.0	64.0	0.7
	MAX	25.7	6.9	480.0	0.4	-71.0	1216.0	38.0	26.0	78.0	380.0	31.0	31.0	6.0	25.0	0.05	0.02	0.07	25.0	15.0	4.7	160.0	26.0
BHS6-ST2b-Tee	n	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	MEAN	16.3	6.6	400.0	0.1	-181.0	1082.7	21.0	18.7	32.0	146.3	20.4	20.3	6.3	14.1	0.04	0.01	0.04	14.1	6.9	3.2	95.0	7.9
	STD. DEV.	2.3		88.9	0.0	95.3	166.1	18.1	16.6	21.4	167.7	15.3	15.3	6.8	8.6	0.03	0.00	0.02	8.6	6.2	1.3	33.6	8.2
	MIN	13.7	6.2	300.0	0.1	-237.0	897.0	2.0	1.0	15.0	49.0	11.0	11.0	1.5	8.7	0.01	0.01	0.02	8.8	3.0	2.0	63.0	1.0
	MAX	17.9	6.9	470.0	0.1	-71.0	1217.0	38.0	34.0	56.0	340.0	38.0	38.0	14.0	24.0	0.06	0.01	0.06	24.0	14.0	4.5	130.0	17.0
BHS6-DP01	n	1	1	2	1	1	1	1	1	3	2	4	4	4	6	5	6	6	6	0	0	0	0
	MEAN	19.7	6.9	110.4	2.5	40.0	929.0	8.0	4.0	7.3	21.4	29.6	7.4	3.2	12.8	40.0	0.5	33.7	46.5				
	STD. DEV.			37.5						3.1	2.1	32.5	5.8	2.1	29.9	22.8	0.6	23.0	8.6				
	MIN	19.7	6.9	87.0	2.5	40.0	929.0	8.0	4.0	5.0	20.0	3.3	3.2	0.1	0.3	0.1	0.0	0.1	3.2				
	MAX	19.7	6.9	140.0	2.5	40.0	929.0	8.0	4.0	11.0	23.0	81.0	16.0	5.1	58.0	76.0	1.6	76.0	77.5				
BHS6-DP02	n	1	1	1	1	1	1	1	1	2	1	3	3	3	5	4	5	5	5	0	0	0	0
	MEAN	19.8	7.0	95.0	3.4	12.0	917.0	192.0	86.0	3.2	22.0	30.9	9.5	2.1	8.3	13.4	0.2	5.6	34.4				
	STD. DEV.									2.1		35.4	2.3	0.3	19.8	27.9	0.8	28.9	25.2				
	MIN	19.8	7.0	95.0	3.4	12.0	917.0	192.0	86.0	2.0	22.0	7.4	7.4	1.8	2.0	0.3	0.0	0.0	5.6				
	MAX	19.8	7.0	95.0	3.4	12.0	917.0	192.0	86.0	5.0	22.0	77.6	12.0	2.3	50.0	68.0	2.1	68.0	75.3				
BHS6-DP03	n	5	5	2	5	5	5	2	2	5	1	5	5	5	5	5	5	5	5	0	0	0	0
	MEAN	20.8	6.3	411.3	0.4	-130.2	961.6	5.3	4.6	88.2	54.0	21.4	12.0	4.8	7.2	9.0	0.6	9.4	16.6				
	STD. DEV.	5.1		77.8	0.3	35.4	93.1	2.1	2.8	141.4	0.0	11.5	5.0	4.1	4.6	10.6	0.9	10.3	12.3				
	MIN	14.4	5.5	360.0	0.2	-184.0	894.0	4.0	3.0	2.0	54.0	5.6	3.8	1.8	2.0	0.0	0.0	0.0	3.8				
	MAX	26.8	6.8	470.0	0.8	-93.0	1101.0	7.0	7.0	340.0	54.0	34.0	16.0	11.9	14.0	22.0	2.1	22.0	29.4				
BHS6-DP04	n	5	5	2	5	5	5	2	2	5	2	5	5	5	5	5	5	5	5	0	0	2	0
	MEAN	20.6	6.2	345.0	0.4	-134.4	994.0	5.5	5.5	129.0	115.0	12.7	10.1	5.0	5.1	2.2	0.4	2.6	7.7			3.5	
	STD. DEV.	5.3		77.8	0.3	44.9	107.1	4.9	4.9	182.1	7.1	8.0	6.5	5.5	5.9	3.4	0.5	3.7	8.3			0.1	
	MIN	14.2	5.3	290.0	0.2	-176.0	888.0	2.0	2.0	24.0	110.0	3.8	3.0	1.9	0.4	0.0	0.0	0.0	1.2			3.4	
	MAX	26.7	6.5	400.0	0.9	-80.0	1166.0	9.0	9.0	450.0	120.0	21.0	16.0	14.8	14.0	8.3	1.1	9.0	17.3			3.5	

Notes:

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

[2]Organic 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 NH_3 and NO_X.

[4]Geometric mean provided rather than arithmetic mean.

5.0 B-HS6 Sample Event No. 5: Summary

5.1 Summary

The Sample Event No. 5 results indicate that:

- Septic tank effluent (STE) quality is characteristic of typical household STE quality, although in the upper range seen at this household. The total nitrogen of 81 mg/L is at the high end of the range of values typically reported for Florida single family residence STE.

- The Stage 1 biofilter samples DP1 and DP2 showed 98% and 90% reduction in ammonium concentration, respectively; effluent in the DP1 sample contained 1.5 mg/L ammonia-N and the DP2 sample contained 7.3 mg/L ammonia-N. These results indicate variable performance across the filter area or that one of the points may not be yielding a representative sample. The hydraulic problems that resulted in the elevated saturation in the Stage 1&2a tank may have influenced one of the sample points.

- The Stage 1&2a effluent sample port (ST1&2a) between the Stage 1&2a combination tank outlet and the Stage 2b sulfur tank inlet, showed 91% reduction in ammonium concentration from STE.

- The Stage 2b sulfur biofilter (ST2b) produced a highly reducing environment and effluent NO_x-N was 0.07 mg N/L.

- The total nitrogen concentration in the final effluent from the total treatment system was 9.0 mg/L, of which 6.4 mg/L was NH_3-N, an approximately 89% reduction from STE. Limited nitrification in the Stage 1 media was responsible for this somewhat reduced performance.

Appendix A: Laboratory Report

SOUTHERN ANALYTICAL LABORATORIES, INC.
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Hazen and Sawyer
10002 Princess Palm Ave, Suite 200
Tampa, FL 33619

September 11, 2014
Work Order: 1408501

Laboratory Report

Project Name **BHS6 SE#6**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		**BHS6-STE**						
Matrix		**Wastewater**						
SAL Sample Number		**1408501-01**						
Date/Time Collected		**08/27/14 12:54**						
Collected by		**Josefin Hirst**						
Date/Time Received		**08/28/14 10:00**						
Inorganics								
Hydrogen Sulfide (Unionized)	mg/L	2.6	SM 4550SF	0.04	0.01	09/02/14 09:43	09/05/14 10:46	1
Ammonia as N	mg/L	72	EPA 350.1	1.0	0.24		09/10/14 12:58	25
Carbonaceous BOD	mg/L	140	SM 5210B	2	2	08/28/14 13:32	09/02/14 14:29	1
Chemical Oxygen Demand	mg/L	150	EPA 410.4	25	10	09/05/14 08:42	09/05/14 17:06	1
Nitrate+Nitrite (N)	mg/L	0.11	EPA 353.2	0.04	0.01	09/02/14 12:39	09/02/14 14:10	1
Nitrite (as N)	mg/L	0.07	SM 4500NO2-B	0.04	0.01		08/28/14 15:52	1
Orthophosphate as P	mg/L	4.5	EPA 300.0	0.040	0.010		08/28/14 20:32	1
Phosphorous - Total as P	mg/L	9.6	SM 4500P-E	0.040	0.010	08/28/14 14:17	09/03/14 15:01	1
Sulfate	mg/L	3.7	EPA 300.0	0.60	0.20		08/28/14 20:32	1
Sulfide	mg/L	4.2	SM 4500SF	0.40	0.10		09/02/14 15:20	1
Total Alkalinity	mg/L	600	SM 2320B	8.0	2.0	09/05/14 08:45	09/05/14 15:57	1
Total Kjeldahl Nitrogen	mg/L	81	EPA 351.2	0.20	0.05	08/28/14 14:17	09/03/14 15:01	1
Total Suspended Solids	mg/L	25	SM 2540D	1	1	09/02/14 08:29	09/03/14 16:26	1
Volatile Suspended Solids	mg/L	25	EPA 160.4	1	1	09/02/14 08:29	09/03/14 16:26	1
Nitrate (as N)	mg/L	0.04 I	EPA 353.2	0.08	0.02	09/02/14 12:39	09/02/14 14:10	1
Sample Description		**BHS6-DP01**						
Matrix		**Wastewater**						
SAL Sample Number		**1408501-02**						
Date/Time Collected		**08/27/14 12:23**						
Collected by		**Josefin Hirst**						
Date/Time Received		**08/28/14 10:00**						
Inorganics								
Ammonia as N	mg/L	1.5	EPA 350.1	0.040	0.009		09/10/14 11:55	1
Carbonaceous BOD	mg/L	7	SM 5210B	2	2	08/28/14 13:32	09/02/14 14:29	1
Chemical Oxygen Demand	mg/L	20 I	EPA 410.4	25	10	09/05/14 08:42	09/05/14 17:06	1
Nitrate+Nitrite (N)	mg/L	76	EPA 353.2	0.96	0.24	09/02/14 12:39	09/02/14 14:10	24
Nitrite (as N)	mg/L	0.11	SM 4500NO2-B	0.04	0.01		08/28/14 15:53	1
Total Alkalinity	mg/L	87	SM 2320B	8.0	2.0	09/05/14 08:45	09/05/14 16:01	1
Total Kjeldahl Nitrogen	mg/L	5.0	EPA 351.2	0.20	0.05	08/28/14 14:17	09/03/14 15:01	1
Total Suspended Solids	mg/L	8	SM 2540D	1	1	09/02/14 08:29	09/03/14 16:26	1
Volatile Suspended Solids	mg/L	4	EPA 160.4	1	1	09/02/14 08:29	09/03/14 16:26	1
Nitrate (as N)	mg/L	76	EPA 353.2	1.0	0.25	09/02/14 12:39	09/02/14 14:10	24

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September 11, 2014
Work Order: 1408501

Laboratory Report

Project Name **BHS6 SE#6**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		**BHS6-DP02**						
Matrix		**Wastewater**						
SAL Sample Number		**1408501-03**						
Date/Time Collected		**08/27/14 12:38**						
Collected by		**Josefin Hirst**						
Date/Time Received		**08/28/14 10:00**						
Inorganics								
Ammonia as N	mg/L	7.3	EPA 350.1	0.40	0.095	09/10/14 11:56	09/10/14 11:58	10
Carbonaceous BOD	mg/L	5	SM 5210B	2	2	08/28/14 13:32	09/02/14 14:29	1
Chemical Oxygen Demand	mg/L	22 I	EPA 410.4	25	10	09/05/14 08:42	09/05/14 17:06	1
Nitrate+Nitrite (N)	mg/L	68	EPA 353.2	0.96	0.24	09/02/14 12:39	09/02/14 14:10	24
Nitrite (as N)	mg/L	0.05	SM 4500NO2-B	0.04	0.01		08/28/14 15:53	1
Total Alkalinity	mg/L	95	SM 2320B	8.0	2.0	09/05/14 08:45	09/05/14 16:09	1
Total Kjeldahl Nitrogen	mg/L	9.6	EPA 351.2	0.20	0.05	08/28/14 14:17	09/03/14 15:01	1
Total Suspended Solids	mg/L	192	SM 2540D	1	1	09/02/14 08:29	09/03/14 16:26	1
Volatile Suspended Solids	mg/L	86	EPA 160.4	1	1	09/02/14 08:29	09/03/14 16:26	1
Nitrate (as N)	mg/L	68	EPA 353.2	1.0	0.25	09/02/14 12:39	09/02/14 14:10	24
Sample Description		**BHS6-DP03**						
Matrix		**Wastewater**						
SAL Sample Number		**1408501-04**						
Date/Time Collected		**08/27/14 12:00**						
Collected by		**Josefin Hirst**						
Date/Time Received		**08/28/14 10:00**						
Inorganics								
Ammonia as N	mg/L	7.4	EPA 350.1	0.40	0.095		09/10/14 11:59	10
Carbonaceous BOD	mg/L	2	SM 5210B	2	2	08/28/14 13:32	09/02/14 14:29	1
Chemical Oxygen Demand	mg/L	54	EPA 410.4	25	10	09/05/14 08:42	09/05/14 17:06	1
Nitrate+Nitrite (N)	mg/L	22	EPA 353.2	0.96	0.24	09/02/14 12:39	09/02/14 14:10	24
Nitrite (as N)	mg/L	0.41	SM 4500NO2-B	0.40	0.10		08/28/14 16:10	10
Total Alkalinity	mg/L	470	SM 2320B	8.0	2.0	09/05/14 08:45	09/05/14 16:25	1
Total Kjeldahl Nitrogen	mg/L	12	EPA 351.2	0.20	0.05	08/28/14 14:17	09/03/14 15:01	1
Total Suspended Solids	mg/L	7	SM 2540D	1	1	09/02/14 08:29	09/03/14 16:26	1
Volatile Suspended Solids	mg/L	7	EPA 160.4	1	1	09/02/14 08:29	09/03/14 16:26	1
Nitrate (as N)	mg/L	22	EPA 353.2	1.4	0.34	09/02/14 12:39	09/02/14 14:10	24

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September 11, 2014
Work Order: 1408501

Laboratory Report

Project Name **BHS6 SE#6**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		**BHS6-DP04**						
Matrix		**Wastewater**						
SAL Sample Number		**1408501-05**						
Date/Time Collected		**08/27/14 12:08**						
Collected by		**Josefin Hirst**						
Date/Time Received		**08/28/14 10:00**						
Inorganics								
Ammonia as N	mg/L	1.6	EPA 350.1	0.040	0.009		09/10/14 12:01	1
Carbonaceous BOD	mg/L	45	SM 5210B	2	2	08/28/14 13:32	09/02/14 14:29	1
Chemical Oxygen Demand	mg/L	120	EPA 410.4	25	10	09/05/14 08:42	09/05/14 17:06	1
Nitrate+Nitrite (N)	mg/L	0.90	EPA 353.2	0.04	0.01	09/02/14 12:39	09/02/14 14:10	1
Nitrite (as N)	mg/L	0.04	SM 4500NO2-B	0.04	0.01		08/28/14 17:00	1
Sulfate	mg/L	3.4	EPA 300.0	0.60	0.20		08/28/14 20:41	1
Total Alkalinity	mg/L	290	SM 2320B	8.0	2.0	09/05/14 08:45	09/05/14 16:32	1
Total Kjeldahl Nitrogen	mg/L	3.5	EPA 351.2	0.20	0.05	08/28/14 14:17	09/03/14 15:01	1
Total Suspended Solids	mg/L	2	SM 2540D	1	1	09/02/14 08:29	09/03/14 16:26	1
Volatile Suspended Solids	mg/L	2	EPA 160.4	1	1	09/02/14 08:29	09/03/14 16:26	1
Nitrate (as N)	mg/L	0.86	EPA 353.2	0.08	0.02	09/02/14 12:39	09/02/14 14:10	1
Sample Description		**BHS6-ST1&2a**						
Matrix		**Wastewater**						
SAL Sample Number		**1408501-06**						
Date/Time Collected		**08/27/14 11:28**						
Collected by		**Josefin Hirst**						
Date/Time Received		**08/28/14 10:00**						
Inorganics								
Hydrogen Sulfide (Unionized)	mg/L	0.01 U	SM 4550SF	0.04	0.01	09/02/14 09:43	09/05/14 10:46	1
Ammonia as N	mg/L	6.7	EPA 350.1	0.40	0.095		09/10/14 12:03	10
Carbonaceous BOD	mg/L	69	SM 5210B	2	2	08/28/14 13:32	09/02/14 14:29	1
Chemical Oxygen Demand	mg/L	47	EPA 410.4	25	10	09/09/14 09:23	09/09/14 16:34	1
Nitrate+Nitrite (N)	mg/L	29	EPA 353.2	0.96	0.24	09/02/14 12:39	09/02/14 14:10	24
Nitrite (as N)	mg/L	0.14	SM 4500NO2-B	0.04	0.01		08/28/14 17:01	1
Orthophosphate as P	mg/L	3.4	EPA 300.0	0.040	0.010		08/28/14 20:51	1
Phosphorous - Total as P	mg/L	5.2	SM 4500P-E	0.040	0.010	08/28/14 14:17	09/03/14 15:01	1
Sulfate	mg/L	18	EPA 300.0	0.60	0.20		08/28/14 20:51	1
Sulfide	mg/L	0.10 U	SM 4500SF	0.40	0.10		09/02/14 15:20	1
Total Alkalinity	mg/L	270	SM 2320B	8.0	2.0	09/05/14 08:45	09/08/14 11:44	1
Total Kjeldahl Nitrogen	mg/L	9.0	EPA 351.2	0.20	0.05	08/28/14 14:17	09/03/14 15:01	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	09/02/14 08:29	09/03/14 16:26	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	09/02/14 08:29	09/03/14 16:26	1
Nitrate (as N)	mg/L	29	EPA 353.2	1.0	0.25	09/02/14 12:39	09/02/14 14:10	24

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September 11, 2014
Work Order: 1408501

Laboratory Report

Project Name **BHS6 SE#6**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		**BHS6-ST1&2a-DUP**						
Matrix		**Wastewater**						
SAL Sample Number		**1408501-07**						
Date/Time Collected		**08/27/14 11:30**						
Collected by		**Josefin Hirst**						
Date/Time Received		**08/28/14 10:00**						
Inorganics								
Hydrogen Sulfide (Unionized)	mg/L	0.15	SM 4550SF	0.04	0.01	09/02/14 09:43	09/05/14 10:46	1
Ammonia as N	mg/L	5.7	EPA 350.1	0.40	0.095		09/10/14 12:05	10
Carbonaceous BOD	mg/L	72	SM 5210B	2	2	08/28/14 13:32	09/02/14 14:29	1
Chemical Oxygen Demand	mg/L	39	EPA 410.4	25	10	09/09/14 09:23	09/09/14 16:34	1
Nitrate+Nitrite (N)	mg/L	29	EPA 353.2	0.96	0.24	09/02/14 12:39	09/02/14 14:10	24
Nitrite (as N)	mg/L	0.14	SM 4500NO2-B	0.04	0.01		08/28/14 17:01	1
Orthophosphate as P	mg/L	2.6	EPA 300.0	0.040	0.010		08/28/14 21:00	1
Phosphorous - Total as P	mg/L	5.4	SM 4500P-E	0.040	0.010	08/28/14 14:17	09/03/14 15:01	1
Sulfate	mg/L	14	EPA 300.0	0.60	0.20		08/28/14 21:00	1
Sulfide	mg/L	0.21 I	SM 4500SF	0.40	0.10		09/02/14 15:20	1
Total Alkalinity	mg/L	270	SM 2320B	8.0	2.0	09/05/14 08:45	09/08/14 11:52	1
Total Kjeldahl Nitrogen	mg/L	9.0	EPA 351.2	0.20	0.05	08/28/14 14:17	09/03/14 15:01	1
Total Suspended Solids	mg/L	5	SM 2540D	1	1	09/02/14 08:29	09/03/14 16:26	1
Volatile Suspended Solids	mg/L	5	EPA 160.4	1	1	09/02/14 08:29	09/03/14 16:26	1
Nitrate (as N)	mg/L	29	EPA 353.2	1.0	0.25	09/02/14 12:39	09/02/14 14:10	24
Sample Description		**BHS6-ST2b-P**						
Matrix		**Wastewater**						
SAL Sample Number		**1408501-08**						
Date/Time Collected		**08/27/14 11:12**						
Collected by		**Josefin Hirst**						
Date/Time Received		**08/28/14 10:00**						
Inorganics								
Hydrogen Sulfide (Unionized)	mg/L	1.5	SM 4550SF	0.04	0.01	09/02/14 09:43	09/05/14 10:46	1
Ammonia as N	mg/L	6.4	EPA 350.1	0.40	0.095		09/10/14 12:15	10
Carbonaceous BOD	mg/L	31	SM 5210B	2	2	08/28/14 13:32	09/02/14 14:29	1
Chemical Oxygen Demand	mg/L	50	EPA 410.4	25	10	09/09/14 09:23	09/09/14 16:34	1
Nitrate+Nitrite (N)	mg/L	0.07	EPA 353.2	0.04	0.01	09/02/14 12:39	09/02/14 14:10	1
Nitrite (as N)	mg/L	0.02 I	SM 4500NO2-B	0.04	0.01		08/28/14 17:02	1
Orthophosphate as P	mg/L	2.7	EPA 300.0	0.040	0.010		08/28/14 21:10	1
Phosphorous - Total as P	mg/L	4.7	SM 4500P-E	0.040	0.010	08/28/14 14:17	09/03/14 15:01	1
Sulfate	mg/L	160	EPA 300.0	6.0	2.0		09/05/14 09:11	10
Sulfide	mg/L	2.2	SM 4500SF	0.40	0.10		09/02/14 15:20	1
Total Alkalinity	mg/L	310	SM 2320B	8.0	2.0	09/05/14 08:45	09/08/14 12:01	1
Total Kjeldahl Nitrogen	mg/L	8.9	EPA 351.2	0.20	0.05	08/28/14 14:17	09/03/14 15:01	1

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September 11, 2014
Work Order: 1408501

Laboratory Report

Project Name **BHS6 SE#6**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		**BHS6-ST2b-P**						
Matrix		**Wastewater**						
SAL Sample Number		**1408501-08**						
Date/Time Collected		**08/27/14 11:12**						
Collected by		**Josefin Hirst**						
Date/Time Received		**08/28/14 10:00**						
Total Suspended Solids	mg/L	4	SM 2540D	1	1	09/02/14 08:29	09/03/14 16:26	1
Volatile Suspended Solids	mg/L	4	EPA 160.4	1	1	09/02/14 08:29	09/03/14 16:26	1
Nitrate (as N)	mg/L	0.05 I	EPA 353.2	0.08	0.02	09/02/14 12:39	09/02/14 14:10	1
Sample Description		**BHS6-EB**						
Matrix		**Reagent Water**						
SAL Sample Number		**1408501-09**						
Date/Time Collected		**08/27/14 12:16**						
Collected by		**Josefin Hirst**						
Date/Time Received		**08/28/14 10:00**						
Inorganics								
Hydrogen Sulfide (Unionized)	mg/L	0.01 U	SM 4550SF	0.04	0.01	09/02/14 09:43	09/05/14 10:46	1
Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		09/10/14 12:17	1
Carbonaceous BOD	mg/L	2	SM 5210B	2	2	08/28/14 13:32	09/02/14 14:29	1
Chemical Oxygen Demand	mg/L	10 U	EPA 410.4	25	10	09/09/14 09:23	09/09/14 16:34	1
Nitrate+Nitrite (N)	mg/L	0.01 U	EPA 353.2	0.04	0.01	09/02/14 12:39	09/02/14 14:10	1
Nitrite (as N)	mg/L	0.01 U	SM 4500NO2-B	0.04	0.01		08/28/14 17:02	1
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		08/28/14 21:27	1
Phosphorous - Total as P	mg/L	0.022 I	SM 4500P-E	0.040	0.010	08/28/14 14:17	09/03/14 15:01	1
Sulfate	mg/L	0.20 U	EPA 300.0	0.60	0.20		08/28/14 21:27	1
Sulfide	mg/L	0.10 U	SM 4500SF	0.40	0.10		09/02/14 15:20	1
Total Alkalinity	mg/L	2.8 I	SM 2320B	8.0	2.0	09/05/14 08:45	09/08/14 12:04	1
Total Kjeldahl Nitrogen	mg/L	0.08 I	EPA 351.2	0.20	0.05	08/28/14 14:17	09/03/14 15:01	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	09/02/14 08:29	09/03/14 16:26	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	09/02/14 08:29	09/03/14 16:26	1
Nitrate (as N)	mg/L	0.02 U	EPA 353.2	0.08	0.02	09/02/14 12:39	09/02/14 14:10	1

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH42820 - BOD										
Blank (BH42820-BLK1)					Prepared: 08/28/14 Analyzed: 09/02/14 14:29					
Carbonaceous BOD	2 U	2	2	mg/L						
LCS (BH42820-BS1)					Prepared: 08/28/14 Analyzed: 09/02/14 14:29					
Carbonaceous BOD	213	2	2	mg/L	200		107	85-115		
LCS Dup (BH42820-BSD1)					Prepared: 08/28/14 Analyzed: 09/02/14 14:29					
Carbonaceous BOD	218	2	2	mg/L	200		109	85-115	2	200
Duplicate (BH42820-DUP1)		**Source: 1409292-01**			Prepared: 08/28/14 Analyzed: 09/02/14 14:29					
Carbonaceous BOD	67	2	2	mg/L		75			11	25
Batch BH42823 - Digestion for TP and TKN										
Blank (BH42823-BLK1)					Prepared: 08/28/14 Analyzed: 09/03/14 15:01					
Phosphorous - Total as P	0.010 U	0.040	0.010	mg/L						
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
LCS (BH42823-BS1)					Prepared: 08/28/14 Analyzed: 09/03/14 15:01					
Phosphorous - Total as P	1.09	0.040	0.010	mg/L	1.0		109	90-110		
Total Kjeldahl Nitrogen	1.05	0.20	0.05	mg/L	1.0		105	90-110		
Matrix Spike (BH42823-MS1)		**Source: 1409214-07**			Prepared: 08/28/14 Analyzed: 09/03/14 15:01					
Total Kjeldahl Nitrogen	1.69 J2	0.20	0.05	mg/L	1.0	0.954	73	90-110		
Phosphorous - Total as P	1.22	0.040	0.010	mg/L	1.0	0.123	110	90-110		
Matrix Spike (BH42823-MS2)		**Source: 1408501-09**			Prepared: 08/28/14 Analyzed: 09/03/14 15:01					
Total Kjeldahl Nitrogen	1.05	0.20	0.05	mg/L	1.0	0.0830	96	90-110		
Phosphorous - Total as P	1.10	0.040	0.010	mg/L	1.0	0.0222	108	90-110		

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH42823 - Digestion for TP and TKN										
Matrix Spike Dup (BH42823-MSD1)		**Source: 1409214-07**			Prepared: 08/28/14 Analyzed: 09/03/14 15:01					
Total Kjeldahl Nitrogen	1.59 J2	0.20	0.05	mg/L	1.0	0.954	63	90-110	6	20
Phosphorous - Total as P	1.21	0.040	0.010	mg/L	1.0	0.123	109	90-110	0.9	25
Matrix Spike Dup (BH42823-MSD2)		**Source: 1408501-09**			Prepared: 08/28/14 Analyzed: 09/03/14 15:01					
Total Kjeldahl Nitrogen	0.999	0.20	0.05	mg/L	1.0	0.0830	92	90-110	5	20
Phosphorous - Total as P	1.10	0.040	0.010	mg/L	1.0	0.0222	108	90-110	0.08	25
Batch BH42824 - Nitrite SM 4500NO2-B by seal										
Blank (BH42824-BLK1)					Prepared & Analyzed: 08/28/14 15:38					
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
LCS (BH42824-BS1)					Prepared & Analyzed: 08/28/14 15:39					
Nitrite (as N)	0.0812	0.04	0.01	mg/L	0.080		102	90-110		
Matrix Spike (BH42824-MS1)		**Source: 1409275-01**			Prepared & Analyzed: 08/28/14 16:08					
Nitrite (as N)	0.453 J5	0.40	0.10	mg/L	0.10	0.392	61	77-119		
Matrix Spike (BH42824-MS2)		**Source: 1409285-01**			Prepared & Analyzed: 08/28/14 15:47					
Nitrite (as N)	0.100	0.04	0.01	mg/L	0.10	ND	100	77-119		
Matrix Spike Dup (BH42824-MSD1)		**Source: 1409275-01**			Prepared & Analyzed: 08/28/14 16:09					
Nitrite (as N)	0.460 J5	0.40	0.10	mg/L	0.10	0.392	68	77-119	1	20
Matrix Spike Dup (BH42824-MSD2)		**Source: 1409285-01**			Prepared & Analyzed: 08/28/14 15:48					
Nitrite (as N)	0.102	0.04	0.01	mg/L	0.10	ND	102	77-119	2	20

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

September 11, 2014
Work Order: 1408501

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH42828 - Ion Chromatography 300.0 Prep										
Blank (BH42828-BLK1)					Prepared & Analyzed: 08/28/14 19:56					
Orthophosphate as P	0.010 U	0.040	0.010	mg/L						
Sulfate	0.20 U	0.60	0.20	mg/L						
Surrogate: Dichloroacetate	*0.978*			*mg/L*	*1.0*		*98*	*78-120*		
Surrogate: Dichloroacetate	*0.978*			*mg/L*	*1.0*		*98*	*78-120*		
LCS (BH42828-BS1)					Prepared & Analyzed: 08/29/14 10:14					
Sulfate	8.74	0.60	0.20	mg/L	9.0		97	85-115		
Orthophosphate as P	0.876	0.040	0.010	mg/L	0.90		97	85-115		
Surrogate: Dichloroacetate	*1.04*			*mg/L*	*1.0*		*104*	*78-120*		
Surrogate: Dichloroacetate	*1.04*			*mg/L*	*1.0*		*104*	*78-120*		
LCS Dup (BH42828-BSD1)					Prepared & Analyzed: 08/28/14 20:15					
Orthophosphate as P	0.940	0.040	0.010	mg/L	0.90		104	85-115	7	200
Sulfate	8.77	0.60	0.20	mg/L	9.0		97	85-115	0.4	200
Surrogate: Dichloroacetate	*1.02*			*mg/L*	*1.0*		*102*	*78-120*		
Surrogate: Dichloroacetate	*1.02*			*mg/L*	*1.0*		*102*	*78-120*		
Matrix Spike (BH42828-MS1)		**Source: 1408546-02**			Prepared & Analyzed: 08/29/14 10:42					
Sulfate	1,480	60	20	mg/L	900	532	105	85-115		
Orthophosphate as P	84.1	4.0	1.0	mg/L	90	ND	93	85-115		
Surrogate: Dichloroacetate	*1.18*			*mg/L*	*1.0*		*118*	*78-120*		
Surrogate: Dichloroacetate	*1.18*			*mg/L*	*1.0*		*118*	*78-120*		
Matrix Spike (BH42828-MS2)		**Source: 1408628-04**			Prepared & Analyzed: 08/29/14 00:40					
Orthophosphate as P	0.668 J2	0.040	0.010	mg/L	0.90	ND	74	85-115		
Sulfate	9.70	0.60	0.20	mg/L	9.0	1.33	93	85-115		
Surrogate: Dichloroacetate	*0.963*			*mg/L*	*1.0*		*96*	*78-120*		
Surrogate: Dichloroacetate	*0.963*			*mg/L*	*1.0*		*96*	*78-120*		

Hazen and Sawyer
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September 11, 2014
Work Order: 1408501

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH42829 - Nitrite SM 4500NO2-B by seal										
Blank (BH42829-BLK1)					Prepared & Analyzed: 08/28/14 16:58					
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
LCS (BH42829-BS1)					Prepared & Analyzed: 08/28/14 16:59					
Nitrite (as N)	0.0794	0.04	0.01	mg/L	0.080		99	90-110		
Matrix Spike (BH42829-MS1)		**Source: 1408501-05**			Prepared & Analyzed: 08/28/14 16:59					
Nitrite (as N)	0.116	0.04	0.01	mg/L	0.10	0.0357	80	77-119		
Matrix Spike Dup (BH42829-MSD1)		**Source: 1408501-05**			Prepared & Analyzed: 08/28/14 17:00					
Nitrite (as N)	0.113	0.04	0.01	mg/L	0.10	0.0357	78	77-119	2	20
Batch BH42909 - Nitrate 353.2 by seal										
Blank (BH42909-BLK1)					Prepared & Analyzed: 09/02/14 14:10					
Nitrate+Nitrite (N)	0.0120 I	0.04	0.01	mg/L						
LCS (BH42909-BS1)					Prepared & Analyzed: 09/02/14 14:10					
Nitrate+Nitrite (N)	0.801	0.04	0.01	mg/L	0.80		100	90-110		
LCS (BH42909-BS2)					Prepared & Analyzed: 09/02/14 14:10					
Nitrate+Nitrite (N)	0.762	0.04	0.01	mg/L	0.80		95	90-110		
LCS (BH42909-BS3)					Prepared & Analyzed: 09/02/14 14:10					
Nitrate+Nitrite (N)	0.776	0.04	0.01	mg/L	0.80		97	90-110		
LCS (BH42909-BS4)					Prepared & Analyzed: 09/02/14 14:10					
Nitrate+Nitrite (N)	0.767	0.04	0.01	mg/L	0.80		96	90-110		

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September 11, 2014
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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH42909 - Nitrate 353.2 by seal										
LCS (BH42909-BS5)					Prepared & Analyzed: 09/02/14 14:10					
Nitrate+Nitrite (N)	0.788	0.04	0.01	mg/L	0.80		98	90-110		
Matrix Spike (BH42909-MS1)		**Source: 1408501-02**			Prepared & Analyzed: 09/02/14 14:10					
Nitrate+Nitrite (N)	71.0 J5	0.04	0.01	mg/L	1.0	76.5	NR	90-110		
Matrix Spike (BH42909-MS2)		**Source: 1409142-02**			Prepared & Analyzed: 09/02/14 14:10					
Nitrate+Nitrite (N)	1.54	0.04	0.01	mg/L	1.0	0.604	94	90-110		
Matrix Spike Dup (BH42909-MSD1)		**Source: 1408501-02**			Prepared & Analyzed: 09/02/14 14:10					
Nitrate+Nitrite (N)	66.6 J5	0.04	0.01	mg/L	1.0	76.5	NR	90-110	6	20
Matrix Spike Dup (BH42909-MSD2)		**Source: 1409142-02**			Prepared & Analyzed: 09/02/14 14:10					
Nitrate+Nitrite (N)	1.57	0.04	0.01	mg/L	1.0	0.604	97	90-110	2	20
Batch BI40205 - VSS Prep										
Blank (BI40205-BLK1)					Prepared: 09/02/14 Analyzed: 09/03/14 16:26					
Total Suspended Solids	1 U	1	1	mg/L						
Volatile Suspended Solids	1 U	1		mg/L						
LCS (BI40205-BS1)					Prepared: 09/02/14 Analyzed: 09/03/14 16:26					
Total Suspended Solids	47.5	1	1	mg/L	50		95	85-115		
LCS Dup (BI40205-BSD1)					Prepared: 09/02/14 Analyzed: 09/03/14 16:26					
Total Suspended Solids	54.5	1	1	mg/L	50		109	85-115	14	200
Duplicate (BI40205-DUP1)		**Source: 1408501-01**			Prepared: 09/02/14 Analyzed: 09/03/14 16:26					
Volatile Suspended Solids	25.0	1		mg/L		25.0			0	20
Total Suspended Solids	25.0	1	1	mg/L		25.0			0	30

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September 11, 2014
Work Order: 1408501

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BI40228 - Ammonia by SEAL										
Blank (BI40228-BLK1)					Prepared & Analyzed: 09/10/14 11:42					
Ammonia as N	0.009 U	0.040	0.009	mg/L						
LCS (BI40228-BS1)					Prepared & Analyzed: 09/10/14 11:44					
Ammonia as N	0.48	0.040	0.009	mg/L	0.50		97	90-110		
Matrix Spike (BI40228-MS1)		**Source: 1408501-02**			Prepared & Analyzed: 09/10/14 12:57					
Ammonia as N	2.5	0.40	0.095	mg/L	1.0	1.5	96	90-110		
Matrix Spike (BI40228-MS2)		**Source: 1408501-08**			Prepared & Analyzed: 09/10/14 12:11					
Ammonia as N	6.2 L	0.40	0.095	mg/L	0.50	6.4	NR	90-110		
Matrix Spike Dup (BI40228-MSD1)		**Source: 1408501-02**			Prepared & Analyzed: 09/10/14 11:48					
Ammonia as N	1.9 J2	0.040	0.009	mg/L	1.0	1.5	42	90-110	24	10
Matrix Spike Dup (BI40228-MSD2)		**Source: 1408501-08**			Prepared & Analyzed: 09/10/14 12:13					
Ammonia as N	5.6 L	0.40	0.095	mg/L	0.50	6.4	NR	90-110	11	10
Batch BI40232 - Sulfide prep										
Blank (BI40232-BLK1)					Prepared & Analyzed: 09/02/14 15:20					
Sulfide	0.10 U	0.40	0.10	mg/L						
LCS (BI40232-BS1)					Prepared & Analyzed: 09/02/14 15:20					
Sulfide	4.83	0.40	0.10	mg/L	5.0		97	85-115		
Matrix Spike (BI40232-MS1)		**Source: 1408501-09**			Prepared & Analyzed: 09/02/14 15:20					
Sulfide	4.83	0.40	0.10	mg/L	5.0	ND	97	85-115		

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September 11, 2014
Work Order: 1408501

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BI40232 - Sulfide prep										
Matrix Spike Dup (BI40232-MSD1)		**Source: 1408501-09**			Prepared & Analyzed: 09/02/14 15:20					
Sulfide	4.83	0.40	0.10	mg/L	5.0	ND	97	85-115	0	14
Batch BI40420 - Ion Chromatography 300.0 Prep										
Blank (BI40420-BLK1)					Prepared & Analyzed: 09/04/14 19:20					
Sulfate	0.20 U	0.60	0.20	mg/L						
Surrogate: Dichloroacetate	*1.13*			*mg/L*	*1.0*		*113*	*78-120*		
LCS (BI40420-BS1)					Prepared & Analyzed: 09/04/14 19:30					
Sulfate	8.85	0.60	0.20	mg/L	9.0		98	85-115		
Surrogate: Dichloroacetate	*1.17*			*mg/L*	*1.0*		*117*	*78-120*		
LCS Dup (BI40420-BSD1)					Prepared & Analyzed: 09/04/14 19:39					
Sulfate	8.85	0.60	0.20	mg/L	9.0		98	85-115	0.01	200
Surrogate: Dichloroacetate	*1.14*			*mg/L*	*1.0*		*114*	*78-120*		
Matrix Spike (BI40420-MS1)		**Source: 1409312-01**			Prepared & Analyzed: 09/05/14 09:30					
Sulfate	22.4	0.60	0.20	mg/L	9.0	13.1	104	85-115		
Surrogate: Dichloroacetate	*1.06*			*mg/L*	*1.0*		*106*	*78-120*		
Matrix Spike (BI40420-MS2)		**Source: 1409351-02**			Prepared & Analyzed: 09/04/14 23:24					
Sulfate	46.3 L2	0.60	0.20	mg/L	9.0	38.8	84	85-115		
Surrogate: Dichloroacetate	*1.03*			*mg/L*	*1.0*		*103*	*78-120*		
Batch BI40505 - COD prep										
Blank (BI40505-BLK1)					Prepared & Analyzed: 09/05/14 17:06					
Chemical Oxygen Demand	10 U	25	10	mg/L						

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September 11, 2014
Work Order: 1408501

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BI40505 - COD prep										
LCS (BI40505-BS1)					Prepared & Analyzed: 09/05/14 17:06					
Chemical Oxygen Demand	50	25	10	mg/L	50		100	90-110		
Matrix Spike (BI40505-MS1)		**Source: 1407975-10**			Prepared & Analyzed: 09/05/14 17:06					
Chemical Oxygen Demand	52	25	10	mg/L	50	ND	104	85-115		
Matrix Spike Dup (BI40505-MSD1)		**Source: 1407975-10**			Prepared & Analyzed: 09/05/14 17:06					
Chemical Oxygen Demand	49	25	10	mg/L	50	ND	98	85-115	6	32
Batch BI40506 - alkalinity										
Blank (BI40506-BLK1)					Prepared & Analyzed: 09/05/14 12:35					
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
Blank (BI40506-BLK2)					Prepared & Analyzed: 09/05/14 12:38					
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
LCS (BI40506-BS1)					Prepared & Analyzed: 09/05/14 12:53					
Total Alkalinity	130	8.0	2.0	mg/L	120		101	90-110		
LCS (BI40506-BS2)					Prepared & Analyzed: 09/05/14 12:59					
Total Alkalinity	120	8.0	2.0	mg/L	120		99	90-110		
Matrix Spike (BI40506-MS1)		**Source: 1407939-20**			Prepared & Analyzed: 09/05/14 14:59					
Total Alkalinity	130	8.0	2.0	mg/L	120	2.1	103	80-120		
Matrix Spike (BI40506-MS2)		**Source: 1408501-09**			Prepared: 09/05/14 Analyzed: 09/08/14 12:10					
Total Alkalinity	120	8.0	2.0	mg/L	120	2.8	97	80-120		

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September 11, 2014
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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BI40506 - alkalinity										
Matrix Spike Dup (BI40506-MSD1)		**Source: 1407939-20**			Prepared & Analyzed: 09/05/14 15:10					
Total Alkalinity	130	8.0	2.0	mg/L	120	2.1	103	80-120	0.08	26
Matrix Spike Dup (BI40506-MSD2)		**Source: 1408501-09**			Prepared: 09/05/14 Analyzed: 09/08/14 12:15					
Total Alkalinity	120	8.0	2.0	mg/L	120	2.8	97	80-120	0.3	26
Batch BI40909 - COD prep										
Blank (BI40909-BLK1)					Prepared & Analyzed: 09/09/14 16:34					
Chemical Oxygen Demand	10 U	25	10	mg/L						
LCS (BI40909-BS1)					Prepared & Analyzed: 09/09/14 16:34					
Chemical Oxygen Demand	47	25	10	mg/L	50		94	90-110		
Matrix Spike (BI40909-MS1)		**Source: 1408501-09**			Prepared & Analyzed: 09/09/14 16:34					
Chemical Oxygen Demand	45	25	10	mg/L	50	ND	90	85-115		
Matrix Spike Dup (BI40909-MSD1)		**Source: 1408501-09**			Prepared & Analyzed: 09/09/14 16:34					
Chemical Oxygen Demand	47	25	10	mg/L	50	ND	94	85-115	4	32

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

September 11, 2014
Work Order: 1408501

* 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.

L2	Analyte level in sample invalidated Matrix Spike.
L	Off-scale high. Result exceeded highest calibration standard.
J5	Matrix spike of this sample was outside typical range. All other QC criteria were acceptable.
J2	Quality control value for accuracy was outside control limits.

Questions regarding this report should be directed to :

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

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

SAL Project No. 1408501

Client Name	Contact / Phone:
Hazen and Sawyer	
Project Name / Location: BHS6 SE#6	
Samplers: (Signature)	

Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water

PARAMETER / CONTAINER DESCRIPTION

SAL Use Only Sample No.	Sample Description	Date	Time	Matrix	Composite	Grab	500mLP, Cool Total Alkalinity, TSS, VSS, CBOD, NOx, OP, SO_4	125mLP, H_2SO_4 COD, TKN, NH_3, TP	500mLP, NaOH, Zn Acetate H_2S	500mLP, Cool Total Alkalinity, TSS, VSS, CBOD, NOx	125mLP, H_2SO_4 COD, TKN, NH_3	500mLP, Cool Total Alkalinity, TSS, VSS, CBOD, NOx, SO_4				Field pH	Field Temperature	Field Conductivity	Field DO			No. of Containers (Total per each location)
01	BHS6-STE	8/27	12:54	WW		X	2	1	1							7.19	25.9	1272	.08			
02	BHS6-DP01	8/27	12:23	WW		X				1	1											
03	BHS5-DP02	8/27	12:38	WW		X				1	1											
04	BHS6-DP03	8/27	12:00	WW		X				2	1					26.8	6.54	722	.44			
05	BHS6-DP04	8/27	12:08	WW		X					1	2				6.44	26.7	975	.46			
06	BHS6-ST1&2a	8/27	11:28	WW		X	2	1	1							6.52	26.5	914	.73			
07	BHS6-ST1&2a-DUP	8/27	11:30	WW		X	2	1	1							6.52	28.6	915	.72			
08	BHS6-ST2b-P	8/27	11:12	WW		X	2	1	1							6.62	25.7	1072	.39			
09	BHS6-EB	8/27	12:16	R		X	2	1	1							7.83	28.3	2.7	.49			

Containers Prepared/ Relinquished:	Date/Time: 1600 08/12/14	Received:	Date/Time: 8/22/14 1500
Relinquished:	Date/Time: 15:30 8/27/14	Received: Fedex	Date/Time:
Relinquished: Fedex	Date/Time:	Received:	Date/Time: 8/28-H 1000
Relinquished:	Date/Time:	Received:	Date/Time:
Relinquished:	Date/Time:	Received:	Date/Time:

Seal intact?	(Y) N N/A
Samples intact upon arrival?	(Y) N N/A
Received on ice? Temp 0.3	(Y) N N/A
Proper preservatives indicated?	(Y) N N/A
Rec'd within holding time?	(Y) N N/A
Volatiles rec'd w/out headspace?	Y N (N/A)
Proper containers used?	(Y) N N/A

Instructions / Remarks:
Ship to:
Harmon Harden
1825 Cottage Grove Rd.
Talahassee, FL 32303 850-212-4378

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

Chain of Custody

1408501

Ackuritlabs, Inc.

3345 North Monroe Street, Tallahassee, FL 32303 • Telephone (850) 562-7751

Environmental Services Section

REPORT OF MICROBIOLOGICAL ANALYSIS

Hazen and Sawyer, P.C.
Attn: Josefin Edeback-Hirst, PE
10002 Princess Palm Avenue
Suite 200
Tampa, FL 33619

Report #: 25002
Report Date: September 3, 2014
NELAC#: E81350
FDEPQA#: 920087G
Project#: 211296
Sampled By: Mark Busby
Sample Site: [redacted] Drive Septic System
Sample Date: 08-27-14

Table 1. Samples received 08-27-14.

Units:	Fecal Coliform # colonies/100 mL	Dilution Factor	*E. coli* # colonies/100 mL	Dilution Factor
Methodology:	SM 9222D		EPA 1603	
Detection Limit:	2.0		2.0	
Analysis Date:	08-27-14		08-27-14	
Analysis Time:	15:30		15:30	
Analyst:	AL		AL	
Sample Location/Time:				
Lab Number:				
ST2, 11:12				
#124925	2,000	100	1,700	100
ST1, 11:28				
#124926	3,700	100	3,600	100
ST1 Dup, 11:30				
#124927	6,900 B	100	5,500	100
Equipment Blank, 12:16				
#124928	2.0 U	2	2.0 U	2
STE, 12:54				
#124929	150,000	10,000	67,000	1,000

Data Qualifiers that may apply:
U = Analyte was not detected and the indicated value is the detection limit.
B = Colony count exceeded the ideal of 20-60 (fecal coliform) or 20-80 (*E. coli*) colonies per plate.

Data Release Authorization:
Sample integrity and reliability certified by lab personnel prior to analysis. All quality assurance samples met quality control limits unless otherwise specified. The reported analytical results relate only to the sample submitted. This report shall not be reproduced, except in full, without the written approval of Ackuritlabs. Please contact the undersigned at the above phone number with any questions regarding this report.

Amanda Lawhon 9-3-14
Amanda Lawhon, QA Officer

Ackuritlabs, Inc.

3345 N. Monroe Street, Tallahassee, FL 32303 · Telephone (850) 562-7751

№ 125002

CHAIN OF CUSTODY RECORD

Page 1 of ___

CLIENT NAME & ADDRESS: Hazen + Sawyer

LAB PROJECT #: 211296

PROJECT NAME: [redacted] Septic

CONTACT PERSON:

SAMPLE CONTAINERS	PRESERVATIVE									PLASTIC CONTAINERS								GLASS CONTAINERS									
	A	N	S	H	B	Z	T																				
QUANTITY	NH_4Cl	HNO_3	H_2SO_4	HCl	NaOH	$Zn(C_2H_3O_2)_2$	$Na_2S_2O_3$			125 mL	250 mL	500 mL	1 Liter	WHIRLPAK - DW	WHIRLPAK - WW	WHIRLPAK - ICE		40 mL	125 mL	250 mL	500 mL	1 Liter			TRIP BLANK	REMARKS

PRECLEANED CONTAINERS RELINQUISHED BY: ✓ DATE: 8-26-14 TIME: 0800 RECEIVED BY: Mark Burby DATE: 8-27-14 TIME: 1405

RELINQUISHED BY: DATE: TIME: RECEIVED BY: DATE: TIME:

SAMPLE COLLECTION 2014

SAMPLERS: (PRINT NAME) Mark Burby

SAMPLERS: (SIGNATURE) Mark Burby

FIELD ID NUMBER	DATE MM/DD/YY	TIME	STATION LOCATION/NUMBER	MATRIX	GRAB OR COMPOSITE	NO. OF CONTAINERS	ANALYSES REQUESTED: Fec. Coli.								LAB ID#
#1	8-27-14	1112	ST2	ww	G	1	X	X							124925
2	↓	1128	ST1	↓	↓	1	X	X							124926
3		1130	ST1 Dup			1	X	X							124927
4		1216	E/Blank			1	X	X							124928
5	↓	1254	BHSG-STE	↓	↓	1	X	X							124929

COMMENTS:

SAMPLES RECEIVED: ICED (Y)/ N TEMP: 17.0 °C HOLD TIME Y/N PROPER PRESERVATION (Y)/ N

RELINQUISHED BY(SIGNATURE) / AFFILIATION / DATE & TIME: Mark Burby / AMA / 8-27-14 1405

RECEIVED BY(SIGNATURE) / AFFILIATION / DATE & TIME: 8-27-14 1405

RELINQUISHED BY(SIGNATURE) / AFFILIATION / DATE & TIME:

RECEIVED BY(SIGNATURE) / AFFILIATION / DATE & TIME:

RELINQUISHED BY(SIGNATURE) / AFFILIATION / DATE & TIME:

RECEIVED BY(SIGNATURE) / AFFILIATION / DATE & TIME:

MATRIX TYPES:

SW SURFACE WATER
WW WASTE WATER
GW GROUND WATER
DW DRINKING WATER
FT FISH TISSUE
SO SOIL
SL SLUDGE
MI MICROBENTHIC INVERTEBRATES
SH SHELLFISH
HZ HAZARDOUS WASTE
SE SEDIMENT
OT OTHER

Advanced Environmental Laboratories, Inc.
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September 22, 2014

Harmon Harden
Hazen and Sawyer
10002 Princess Palm Ave.
#200
Tampa, FL 33619

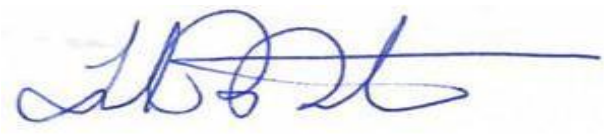
RE: Workorder: S1400653 BHS6 SE#6

Dear Harmon Harden:

Enclosed are the analytical results for sample(s) received by the laboratory on Wednesday, August 27, 2014. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report. The analytical results for the samples contained in this report were submitted for analysis as outlined by the Chain of Custody and results pertain only to these samples.

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

Sincerely,



Tim Preston
TPreston@AELLab.com

Enclosures

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SAMPLE SUMMARY

Workorder: S1400653 BHS6 SE#6

Lab ID	Sample ID	Matrix	Date Collected	Date Received
S1400653001	BHS6-STE	Water	8/27/2014 12:52	8/27/2014 14:38
S1400653002	BHS6-ST2b	Water	8/27/2014 11:12	8/27/2014 14:38
S1400653003	BHS6-ST1	Water	8/27/2014 11:32	8/27/2014 14:38

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ANALYTICAL RESULTS

Workorder: S1400653 BHS6 SE#6

Lab ID: **S1400653001** Date Received: 08/27/14 14:38 Matrix: Water

Sample ID: **BHS6-STE** Date Collected: 08/27/14 12:52

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: IC,E300.0,Water	Analytical Method: EPA 300.0							
Nitrate	**0.25**	**U**	**mg/L**	**5**	2.5	0.25	8/28/2014 21:07	J
Nitrate + Nitrite	**0.25**	**U**	**mg/L**	**5**	2.5	0.25	8/28/2014 21:07	J
Nitrite	**0.25**	**U**	**mg/L**	**5**	2.5	0.25	8/28/2014 21:07	J
Orthophosphate	**7.0**		**mg/L**	**5**	2.5	0.25	8/28/2014 21:07	J
Sulfate	**3.5**	**I**	**mg/L**	**5**	25	2.5	8/28/2014 21:07	J
Analysis Desc: Ammonia,E350.1,Water	Analytical Method: EPA 350.1							
Ammonia (N)	**68**		**mg/L**	**250**	2.50	2.00	9/4/2014 13:50	G
Analysis Desc: TKN,E351.2,Water	Preparation Method: Copper Sulfate Digestion Analytical Method: EPA 351.2							
Total Kjeldahl Nitrogen	**80**		**mg/L**	**20**	2.0	1.4	9/3/2014 15:14	G
Total Kjeldahl Nitrogen	**80**		**mg/L**	**20**	2.0	1.4	9/3/2014 15:14	G
Analysis Desc: Total Phosphorus,E365.3,Analysis	Preparation Method: EPA 365.3 Analytical Method: EPA 365.3							
Total Phosphorus (as P)	**9.27**		**mg/L**	**15**	0.06	0.03	9/5/2014 13:00	G
Analysis Desc: COD,E410.4,Water	Analytical Method: EPA 410.4							
Chemical Oxygen Demand	**180**		**mg/L**	**1**	20	7.2	9/2/2014 17:40	G
Analysis Desc: Alkalinity,SM2320B,Water	Analytical Method: SM 2320B							
Alkalinity, Total	**500**		**mg/L**	**1**	5.0	5.0	9/2/2014 19:36	J
Analysis Desc: TSS,SM2540D,Water	Analytical Method: SM 2540D							
Total Suspended Solids	**7.2**		**mg/L**	**2**	4.0	4.0	9/3/2014 17:44	G
Analysis Desc: Volatile Residue,SM2540E,Water	Analytical Method: SM 2540E							
Volatile Suspended Solids	**7.0**		**mg/L**	**1**	1.0	1.0	9/3/2014 17:44	G
Analysis Desc: CBOD,SM5210B,Water	Analytical Method: SM 5210B							
Carbonaceous BOD (CBOD)	**2.0**	**U**	**mg/L**	**1**	2.0	2.0	8/28/2014 13:31	S
Analysis Desc: Sulfide,SM4500S-D,Aqueous	Analytical Method: SM18 4500-S D							
Hydrogen Sulfide	**1.5**		**mg/L**	**2**	0.10	0.012	8/29/2014 15:55	T

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ANALYTICAL RESULTS

Workorder: S1400653 BHS6 SE#6

Lab ID: **S1400653002** Date Received: 08/27/14 14:38 Matrix: Water

Sample ID: **BHS6-ST2b** Date Collected: 08/27/14 11:12

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: IC,E300.0,Water	Analytical Method: EPA 300.0							
Nitrate	**0.050**	**U**	**mg/L**	**1**	0.50	0.050	8/28/2014 16:45	J
Nitrate + Nitrite	**0.050**	**U**	**mg/L**	**1**	0.50	0.050	8/28/2014 16:45	J
Nitrite	**0.050**	**U**	**mg/L**	**1**	0.50	0.050	8/28/2014 16:45	J
Orthophosphate	**3.4**		**mg/L**	**1**	0.50	0.050	8/28/2014 16:45	J
Sulfate	**200**		**mg/L**	**5**	25	2.5	9/17/2014 13:18	J
Analysis Desc: Ammonia,E350.1,Water	Analytical Method: EPA 350.1							
Ammonia (N)	**5.6**		**mg/L**	**10**	0.10	0.08	9/4/2014 13:50	G
Analysis Desc: TKN,E351.2,Water	Preparation Method: Copper Sulfate Digestion Analytical Method: EPA 351.2							
Total Kjeldahl Nitrogen	**7.2**		**mg/L**	**2**	0.20	0.14	9/3/2014 15:14	G
Total Kjeldahl Nitrogen	**7.2**		**mg/L**	**2**	0.20	0.14	9/3/2014 15:14	G
Analysis Desc: Total Phosphorus,E365.3,Analysis	Preparation Method: EPA 365.3 Analytical Method: EPA 365.3							
Total Phosphorus (as P)	**3.93**		**mg/L**	**10**	0.04	0.02	9/3/2014 16:50	G
Analysis Desc: COD,E410.4,Water	Analytical Method: EPA 410.4							
Chemical Oxygen Demand	**58**		**mg/L**	**1**	20	7.2	9/2/2014 17:40	G
Analysis Desc: Alkalinity,SM2320B,Water	Analytical Method: SM 2320B							
Alkalinity, Total	**330**		**mg/L**	**1**	5.0	5.0	9/2/2014 19:36	J
Analysis Desc: TSS,SM2540D,Water	Analytical Method: SM 2540D							
Total Suspended Solids	**11**		**mg/L**	**5**	10	10	9/3/2014 17:44	G
Analysis Desc: Volatile Residue,SM2540E,Water	Analytical Method: SM 2540E							
Volatile Suspended Solids	**22**		**mg/L**	**1**	1.0	1.0	9/3/2014 17:44	G
Analysis Desc: CBOD,SM5210B,Water	Analytical Method: SM 5210B							
Carbonaceous BOD (CBOD)	**2.8**		**mg/L**	**1**	2.0	2.0	8/28/2014 13:28	S
Analysis Desc: Sulfide,SM4500S-D,Aqueous	Analytical Method: SM18 4500-S D							
Hydrogen Sulfide	**1.5**		**mg/L**	**2**	0.10	0.012	8/29/2014 15:55	T

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ANALYTICAL RESULTS

Workorder: S1400653 BHS6 SE#6

Lab ID: **S1400653003** Date Received: 08/27/14 14:38 Matrix: Water

Sample ID: **BHS6-ST1** Date Collected: 08/27/14 11:32

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: IC,E300.0,Water	Analytical Method: EPA 300.0							
Nitrate	**31**		**mg/L**	**10**	5.0	0.50	8/29/2014 00:50	J
Nitrate + Nitrite	**32**		**mg/L**	**10**	5.0	0.50	8/29/2014 00:50	J
Nitrite	**0.50**	**U**	**mg/L**	**10**	5.0	0.50	8/29/2014 00:50	J
Orthophosphate	**4.8**	**I**	**mg/L**	**10**	5.0	0.50	8/29/2014 00:50	J
Sulfate	**22**	**I**	**mg/L**	**10**	50	5.0	8/29/2014 00:50	J
Analysis Desc: Ammonia,E350.1,Water	Analytical Method: EPA 350.1							
Ammonia (N)	**5.3**		**mg/L**	**10**	0.10	0.08	9/4/2014 13:50	G
Analysis Desc: TKN,E351.2,Water	Preparation Method: Copper Sulfate Digestion Analytical Method: EPA 351.2							
Total Kjeldahl Nitrogen	**4.9**		**mg/L**	**1**	0.10	0.071	9/3/2014 15:14	G
Total Kjeldahl Nitrogen	**4.9**		**mg/L**	**1**	0.10	0.071	9/3/2014 15:14	G
Analysis Desc: Total Phosphorus,E365.3,Analysis	Preparation Method: EPA 365.3 Analytical Method: EPA 365.3							
Total Phosphorus (as P)	**4.41**		**mg/L**	**10**	0.04	0.02	9/3/2014 16:50	G
Analysis Desc: COD,E410.4,Water	Analytical Method: EPA 410.4							
Chemical Oxygen Demand	**39**		**mg/L**	**1**	20	7.2	9/2/2014 17:40	G
Analysis Desc: Alkalinity,SM2320B,Water	Analytical Method: SM 2320B							
Alkalinity, Total	**270**		**mg/L**	**1**	5.0	5.0	9/22/2014 15:00	G
Analysis Desc: TSS,SM2540D,Water	Analytical Method: SM 2540D							
Total Suspended Solids	**42**		**mg/L**	**5**	10	10	9/3/2014 17:44	G
Analysis Desc: Volatile Residue,SM2540E,Water	Analytical Method: SM 2540E							
Volatile Suspended Solids	**42**		**mg/L**	**1**	1.0	1.0	9/3/2014 17:44	G
Analysis Desc: CBOD,SM5210B,Water	Analytical Method: SM 5210B							
Carbonaceous BOD (CBOD)	**5.5**		**mg/L**	**1**	2.0	2.0	8/28/2014 13:41	S
Analysis Desc: Sulfide,SM4500S-D,Aqueous	Analytical Method: SM18 4500-S D							
Hydrogen Sulfide	**0.023**	**I**	**mg/L**	**1**	0.050	0.0062	8/29/2014 15:55	T

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ANALYTICAL RESULTS QUALIFIERS

Workorder: S1400653 BHS6 SE#6

PARAMETER QUALIFIERS

U	The compound was analyzed for but not detected.
I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

LAB QUALIFIERS

G	DOH Certification #E82001(AEL-G)(FL NELAC Certification)
J	DOH Certification #E82574(AEL-JAX)(FL NELAC Certification)
S	DOH Certification #E811095(AEL-T)(FL NELAC Certification)
T	DOH Certification #E84589(AEL-T)(FL NELAC Certification)

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QUALITY CONTROL DATA

Workorder: S1400653 BHS6 SE#6

QC Batch: WCAj/2503 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Prepared:
Associated Lab Samples: S1400653002

METHOD BLANK: 1542077

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Nitrite	mg/L	0.050	0.050	U
Nitrate	mg/L	0.050	0.050	U
Orthophosphate	mg/L	0.050	0.050	U
Sulfate	mg/L	0.50	0.50	U
Nitrate + Nitrite	mg/L	0.050	0.050	U

QC Batch: WCAj/2504 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Prepared:
Associated Lab Samples: S1400653001, S1400653003

METHOD BLANK: 1542098

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Nitrite	mg/L	0.050	0.050	U
Nitrate	mg/L	0.050	0.050	U
Orthophosphate	mg/L	0.050	0.050	U
Sulfate	mg/L	0.50	0.50	U
Nitrate + Nitrite	mg/L	0.050	0.050	U

QC Batch: WCAs/1182 Analysis Method: SM 5210B
QC Batch Method: SM 5210B Prepared:
Associated Lab Samples: S1400653001, S1400653002, S1400653003

METHOD BLANK: 1542320

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Carbonaceous BOD (CBOD)	mg/L	2.0	2.0	U

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QUALITY CONTROL DATA

Workorder: S1400653 BHS6 SE#6

QC Batch: WCAg/2774 Analysis Method: EPA 410.4
QC Batch Method: EPA 410.4 Prepared:
Associated Lab Samples: S1400653001, S1400653002, S1400653003

METHOD BLANK: 1543113

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Chemical Oxygen Demand	mg/L	7.2	7.2	U

QC Batch: WCAj/2521 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Prepared:
Associated Lab Samples: S1400653001, S1400653002

METHOD BLANK: 1544213

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Alkalinity, Total	mg/L	5.0	5.0	U

QC Batch: WCAg/2784 Analysis Method: EPA 351.2
QC Batch Method: Copper Sulfate Digestion Prepared: 09/03/2014 15:14
Associated Lab Samples: S1400653001, S1400653002, S1400653003

METHOD BLANK: 1544494

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Kjeldahl Nitrogen	mg/L	0.071	0.071	U

QC Batch: WCAg/2793 Analysis Method: EPA 365.3
QC Batch Method: EPA 365.3 Prepared: 09/03/2014 16:50
Associated Lab Samples: S1400653001, S1400653002, S1400653003

METHOD BLANK: 1545092

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				

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QUALITY CONTROL DATA

Workorder: S1400653 BHS6 SE#6

METHOD BLANK: 1545092

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
Total Phosphorus (as P)	mg/L	0.002	0.002	U

QC Batch: WCAg/2796 Analysis Method: SM 2540D
QC Batch Method: SM 2540D Prepared:
Associated Lab Samples: S1400653001, S1400653002, S1400653003

METHOD BLANK: 1545195

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Suspended Solids	mg/L	2.0	2.0	U

QC Batch: WCAg/2807 Analysis Method: EPA 350.1
QC Batch Method: EPA 350.1 Prepared:
Associated Lab Samples: S1400653001, S1400653002, S1400653003

METHOD BLANK: 1546682

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Ammonia (N)	mg/L	0.01	0.01	U

QC Batch: WCAg/2937 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Prepared:
Associated Lab Samples: S1400653003

METHOD BLANK: 1560111

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Alkalinity, Total	mg/L	5.0	5.0	U

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QUALITY CONTROL DATA QUALIFIERS

Workorder: S1400653 BHS6 SE#6

QUALITY CONTROL PARAMETER QUALIFIERS

U	The compound was analyzed for but not detected.
I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
J3	Lab QC Failure
J4	Estimated Result

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Workorder: S1400653 BHS6 SE#6

Lab ID	Sample ID	Prep Method	Prep Batch	Analysis Method	Analysis Batch
S1400653002	BHS6-ST2b			EPA 300.0	WCAj/2503
S1400653001	BHS6-STE			EPA 300.0	WCAj/2504
S1400653003	BHS6-ST1			EPA 300.0	WCAj/2504
S1400653001	BHS6-STE			SM 5210B	WCAs/1182
S1400653002	BHS6-ST2b			SM 5210B	WCAs/1182
S1400653003	BHS6-ST1			SM 5210B	WCAs/1182
S1400653001	BHS6-STE			SM18 4500-S D	WCAt/5283
S1400653002	BHS6-ST2b			SM18 4500-S D	WCAt/5283
S1400653003	BHS6-ST1			SM18 4500-S D	WCAt/5283
S1400653001	BHS6-STE			EPA 410.4	WCAg/2774
S1400653002	BHS6-ST2b			EPA 410.4	WCAg/2774
S1400653003	BHS6-ST1			EPA 410.4	WCAg/2774
S1400653001	BHS6-STE			SM 2320B	WCAj/2521
S1400653002	BHS6-ST2b			SM 2320B	WCAj/2521
S1400653001	BHS6-STE	Copper Sulfate Digestion	WCAg/2784	EPA 351.2	WCAg/2795
S1400653002	BHS6-ST2b	Copper Sulfate Digestion	WCAg/2784	EPA 351.2	WCAg/2795
S1400653003	BHS6-ST1	Copper Sulfate Digestion	WCAg/2784	EPA 351.2	WCAg/2795
S1400653002	BHS6-ST2b	EPA 365.3	WCAg/2793	EPA 365.3	WCAg/2794
S1400653003	BHS6-ST1	EPA 365.3	WCAg/2793	EPA 365.3	WCAg/2794
S1400653001	BHS6-STE	EPA 365.3	WCAg/2793	EPA 365.3	WCAg/2812
S1400653001	BHS6-STE			SM 2540D	WCAg/2796
S1400653002	BHS6-ST2b			SM 2540D	WCAg/2796
S1400653003	BHS6-ST1			SM 2540D	WCAg/2796

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Workorder: S1400653 BHS6 SE#6

Lab ID	Sample ID	Prep Method	Prep Batch	Analysis Method	Analysis Batch
S1400653001	BHS6-STE			EPA 350.1	WCAg/2807
S1400653002	BHS6-ST2b			EPA 350.1	WCAg/2807
S1400653003	BHS6-ST1			EPA 350.1	WCAg/2807
S1400653001	BHS6-STE			SM 2540E	WCAg/2881
S1400653002	BHS6-ST2b			SM 2540E	WCAg/2881
S1400653003	BHS6-ST1			SM 2540E	WCAg/2881
S1400653003	BHS6-ST1			SM 2320B	WCAg/2937

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☐ **Miramar:** 10200 USA Today Way, Miramar, FL 33025 • 954.889.2288 • Fax 954.889.2281
☐ **Tallahassee:** 1288 Cedar Center Drive, Tallahassee, FL 32301 • 850.219.6274 • Fax 850.219.6275
☐ **Tampa:** 9610 Princess Palm Ave. • Tampa, FL 33619 • 813.630.9616 • Fax 813.630.4327

Client Name: Hazen & Sawyer
Address:
Phone:
FAX:
Contact:
Sampled By: Harmon Harden
Turnaround Time: ☐ STANDARD ☐ RUSH
Page 1 of 1

Project Name: BHS6 SE#6
P.O. Number or Project Number:
Project Location:
REMARKS/SPECIAL INSTRUCTIONS:

SAMPLE ID	SAMPLE DESCRIPTION	Grab Comp	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. COUNT	PRESERVATION	EPA 8260 HCl	EPA 504 Na Thio	TSS None	VSS None	CBOD None	COD,TKN, NH3, TP H2SO4	NO3, NO2, OP, SO4 None	H2S NaOH, Zn Ac			LABORATORY I.D. NUMBER
	BOTTLE SIZE & TYPE																	
	ANALYSIS REQUIRED							EPA 8260 (8/27/14)	EPA 504 (8/27/14)	TSS	VSS	CBOD	COD,TKN, NH3, TP	NO3, NO2, OP, SO4	H2S			
1	BHS6-STE		8/27	12:52	ww	6		X	X	X	X	X	X	X	X			
2	BHS6-ST2b		8/27	11:12	ww	6				X	X	X	X	X	X			
3	BHS6-ST1		8/27	11:32	ww	6				X	X	X	X	X	X			

Received on Ice ☑ Yes ☐ No ☑ Temp taken from sample ☐ Temp from blank
Where required, pH checked
Temperature when received 5.1 (in degrees celcius)

Form revised 06/15/2010
Device used for measuring Temp by unique identifier (circle IR temp gun used) J: 9A G: LT-1 LT-2 T: 10A A: 3A M: 1A

	Relinquished by	Date	Time	Received by:	Date	Time
1	[signature]	8/27/14	14:15	[signature]	8/27/14	14:15
2						
3						
4						

FOR DRINKING WATER USE (When PWS Information not otherwise supplied)
PWS ID:
Contact Person Phone:
upplier of Wate
Site-Address:

Appendix B: Operation & Maintenance Log

Table B.1
Operation and Maintenance Log

Date	Description
9/12/2013	Checked system. Met with contractor regarding second system construction.
11/5/2013	Started installation of second passive treatment system.
11/6/2013	Finished installation
11/14/2013	High water alarm in pump tank. Pump was not working.
	Contractor repaired loose wiring. Pump had not run from time of installation.
	Cleaned two Stage 1 sprayers clogged with construction debris.
11/20/2013	Preliminary Sample Event No. 1 (STE and ST1).
	No ponding in drainfield observation ports.
	Cleaned all four Stage 1 sprayers - not clogged but were not spraying properly.
12/4/2013	Preliminary Sample Event No. 2
	Ponding of 1.5 inches in drainfield obs. port #2, other three ports were dry.
12/20/2013	Preliminary sampling indicated nitrification was insufficient
	Checked and cleaned Stage 1 sprayers.
	Even after cleaning, majority of spray going straight down.
12/21/2013	Rotated Stage 1 sprayers so they are spraying straight up on the tank lid.
	Observed better coverage of Stage 1 media
1/9/2014	Site visit. System ok. Observed that vents on Stage 1 tank were pushed down.
	Vents were pulled back up and resealed with existing mastic.
1/22/2014	Sample Event No. 1
3/7/2014	Site visit. System ok. Observed one of the sprayers had a broken tip.
	Ponding of ¼ inch in observation port #2, all others dry.
3/20/2014	Removed existing sprayers. Installed 3 Orenco sprayers.
3/24/2014	Site visit. System ok. Ponding of 1/4 inch in observation port #2, all others dry.
	Sprayers working well.
4/10/2014	Sample Event No. 2
	Water level within Stage 1&2a tank elevated approximately 14-inches.
4/10/2014	Installed piezometer in the Stage 1&2a tank.
4/14/2014	Attempt to clear clog in the inlet pipe to Stage 2b tank with plumbing snake.
4/16/2014	Cleared clog in inlet pipe to Stage 2b tank with compressed air and rubber bladder.
	Water level in piezometer in Stage 1&2a tank dropped by approximately 12 inches.
4/28/2014	System Check. Ponding of 1/4 inch in observation port #2, all others dry.
	Sprayers working well. Water level in ST1 sample port elevated by less than 2 inches .
5/7/2014	Sample Event No. 3.
	Water level in ST1 sample port elevated by approximately 4 inches.

Table B.1 (con't)
Operation and Maintenance Log

5/27/2014	System Check
	Water level in ST1 sample port elevated by approximately 8 inches
5/30/2014	Start repair of sulfur tank inlet pipe. Drained tank, remove portion of sulfur
5/31/2014	Finish removing sulfur. Repair inlet pipe to sulfur tank and replace sulfur in tank
6/23/2014	Sample Event No. 4
	Water level in Stage 1 tank at normal operational level.
7/21/2014	System Check
	Water level in Stage 1 tank elevated by approximately 1 inch.
8/27/2014	Sample Event No. 5
	Water level in Stage 1 tank elevated by approximately 2 inches.

Appendix C: Vericomm PLC Data

System Status			27-Aug-14	5-Aug-14	21-Jul-14	5-Jul-14
Point	Description	Status	Value	Value	Value	Value
1	Alarm Status	Automatic	OK	OK	OK	OK
2	Alert Status	Automatic	OK	OK	OK	OK
3	System Mode	Automatic	Normal	Normal	Normal	Normal
5	Timer Mode	Automatic	Normal	Normal	Normal	Overide
6	Active Off Time	Automatic	180.0 Minutes	180.0 Minutes	180.0 Minutes	30.0 Minutes
7	Active On Time	Automatic	2.0 Minutes	2.0 Minutes	2.0 Minutes	2.0 Minutes
9	Pump Mode	Automatic	OffCycl	OffCycl	OffCycl	OffCycl
10	Pump Status	Automatic	Off	Off	Off	Off
12	Pump Cycles Today	Automatic	3.0 Cycles	1.0 Cycles	4.0 Cycles	3.0 Cycles
13	Override Cycles Today	Automatic	0.0 Cycles	0.0 Cycles	0.0 Cycles	2.0 Cycles
14	Pump Run Time Today	Automatic	6.1 Minutes	2.0 Minutes	8.1 Minutes	9.2 Minutes
Settings						
Point	Description	Status	Value	Value	Value	Value
17	Off Cycle Time	Constant/Setpoint	180.0 Minutes	180.0 Minutes	180.0 Minutes	180.0 Minutes
18	On Cycle Time	Constant/Setpoint	2.0 Minutes	2.0 Minutes	2.0 Minutes	2.0 Minutes
19	Override Off Cycle Time	Constant/Setpoint	30.0 Minutes	30.0 Minutes	30.0 Minutes	30.0 Minutes
20	Override On Cycle Time	Constant/Setpoint	2.0 Minutes	2.0 Minutes	2.0 Minutes	2.0 Minutes
21	Minimum Override Cycles	Automatic	3.0 Cycles	3.0 Cycles	3.0 Cycles	3.0 Cycles
23	Override Cycle Limit per Day	Constant/Setpoint	21.0 Cycles	21.0 Cycles	21.0 Cycles	21.0 Cycles
24	Time Limit per Day	Constant/Setpoint	200.0 Minutes	200.0 Minutes	200.0 Minutes	200.0 Minutes
25	High Level Pump Test	Automatic	5.0 Minutes	5.0 Minutes	5.0 Minutes	5.0 Minutes
28	Alarm Update Interval	Timing Override	120.0 Minutes	120.0 Minutes	120.0 Minutes	240.0 Minutes
29	Page Delay	Automatic	960.0 Minutes	960.0 Minutes	960.0 Minutes	960.0 Minutes
30	Page Interval	Automatic	30.0 Minutes	30.0 Minutes	30.0 Minutes	30.0 Minutes
31	Local Alarm Delay	Constant/Setpoint	1140.0 Minutes	1140.0 Minutes	1140.0 Minutes	1140.0 Minutes
32	Local Reactivate Delay	Automatic	120.0 Minutes	120.0 Minutes	120.0 Minutes	120.0 Minutes
Troubleshooting						
Point	Description	Status	Value	Value	Value	Value
33	Top Float Status	Automatic	OK	OK	OK	OK
34	Middle Float Status	Automatic	OK	OK	OK	OK
35	Bottom Float Status	Automatic	OK	OK	OK	OK
37	Contactor Status	Automatic	OK	OK	OK	OK
38	Pump Status	Automatic	OK	OK	OK	OK
40	Filter Status	Automatic	OK	OK	OK	OK
41	Tank Status	Automatic	OK	OK	OK	OK
43	Power Status	Automatic	OK	OK	OK	OK
Flow Data						
Point	Description	Status	Value	Value	Value	Value
49	Pump Run Time Today	Automatic	6.1 Minutes	2.0 Minutes	8.1 Minutes	9.2 Minutes
50	Override Cycles Today	Automatic	0.0	0.0	0.0	2.0
51	Pump Cycles Today	Automatic	3.0 Cycles	1.0 Cycles	4.0 Cycles	3.0 Cycles
52	Average Run Time per Cycle Today	Automatic	2.0 Minutes	2.0 Minutes	2.0 Minutes	3.1 Minutes
54	Brownouts Today	Automatic	0.0	0.0	0.0	0.0

30-Day History Data			27-Aug-14	5-Aug-14	21-Jul-14	5-Jul-14
Point	Description	Status	Value	Value	Value	Value
65	30 Day Average Run Time per Day	Automatic	18.8 Minutes	14.4 Minutes	13.7 Minutes	13.0 Minutes
66	30 Day Average Override Cycles per Day	Automatic	2.0 Cycles	0.3 Cycles	0.8 Cycles	0.7 Cycles
67	30 Day Average Cycles per Day	Automatic	9.1 Cycles	7.1 Cycles	6.7 Cycles	6.4 Cycles
68	30 Day Average Run Time per Cycle	Automatic	2.1 Minutes	2.0 Minutes	2.0 Minutes	2.0 Minutes
71	30 Day Total Pump Run Time	Automatic	564.6 Minutes	430.9 Minutes	412.3 Minutes	391.4 Minutes
72	30 Day Total Override Cycles	Automatic	61.0 Cycles	9.0 Cycles	23.0 Cycles	21.0 Cycles
73	30 Day Total Cycles	Automatic	272.0 Cycles	213.0 Cycles	200.0 Cycles	192.0 Cycles
76	30 Day Total Brownouts	Automatic	0.0	0.0	0.0	0.0
Totalized Pump Data						
Point	Description	Status	Value	Value	Value	Value
82	Pump Total Run Time	Automatic	1650.8 Hours	1643.4 Hours	1639.6 Hours	1636.0 Hours
83	Pump Total Cycles	Automatic	49748.0 Cycles	49536.0 Cycles	49426.0 Cycles	49315.0 Cycles
Miscellaneous						
Point	Description	Status	Value	Value	Value	Value
145	Pump On Auto	Automatic	Off	Off	Off	Off
147	Pump Test Today	Automatic	Off	Off	Off	On
148	Pump Check Enable	Automatic	Off	Off	Off	Off
149	Total Override Cycles	Automatic	0.0	0.0	0.0	2.0
150	High Level Condition	Automatic	Off	Off	Off	Off
151	Leak Check Enable	Automatic	On	On	On	On
152	Brownout State	Automatic	Off	Off	Off	Off
153	Test Mode	Automatic	Off	Off	Off	Off
Alarm Points						
Point	Description	Status	Value	Value	Value	Value
161	General Alarm	Automatic	Off	Off	Off	Off
162	New Alarm	Automatic	Off	Off	Off	Off
163	Update Central Enable	Automatic	On	On	On	On
167	Page Alarm Start	Automatic	Off	Off	Off	Off
168	Pager Signal	Override Off	Off	Off	Off	Off
169	Local Alarm Start	Automatic	Off	Off	Off	Off
170	Local Alarm Silence	Automatic	Off	Off	Off	Off
Inputs & Outputs						
Point	Description	Status	Value	Value	Value	Value
177	High Level/Override Timer Float Input	Automatic	Off	Off	Off	Off
178	Timer Float Input	Automatic	On	On	On	On
179	Redundant Off Float & Low Level Alarm Input	Automatic	On	On	On	On
181	Push To Silence Input	Automatic	Off	Off	Off	Off
182	Auxiliary Contact Input	Automatic	Off	Off	Off	Off
186	Pump Output	Automatic	Off	Off	Off	Off
188	Alarm Light Output	Automatic	Off	Off	Off	Off
189	Audible Alarm Output	Automatic	Off	Off	Off	Off