



Florida Onsite Sewage Nitrogen Reduction Strategies Study

Task B.7

B-HS3 Field System Monitoring Report No. 6

Progress Report

September 2014

442-27-001

HAZEN AND SAWYER
Environmental Engineers & Scientists

In association with:



AET
Applied Environmental Technology

**Otis Environmental
Consultants, LLC**

Florida Onsite Sewage Nitrogen Reduction Strategies Study

TASK B.7 PROGRESS REPORT

B-HS3 Field System Monitoring Report No. 6

Prepared for:

Florida Department of Health
Division of Disease Control and Health Protection
Bureau of Environmental Health
Onsite Sewage Programs
4042 Bald Cypress Way Bin #A-08
Tallahassee, FL 32399-1713

FDOH Contract CORCL

September 2014

Prepared by:

HAZEN AND SAWYER
Environmental Engineers & Scientists

In Association With:

AET
Applied Environmental Technology



B-HS3 Field System Monitoring Report No. 6

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 sixth sample event of a passive nitrogen reduction system at home site B-HS3 in Seminole County, Florida.

2.0 Purpose

Operation of the B-HS3 system was initiated on July 12, 2013. This monitoring report documents data collected from the sixth monitoring and sampling event conducted on August 21 and 22, 2014 (Day 406). The sixth monitoring event consisted of collecting flow measurements from the household water use meter and the treatment system flow meters, recording electricity use, monitoring of field parameters, collection of water samples from ten 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-HS3 field site is located in Seminole County, FL. The nitrogen reducing onsite treatment system for the single family residence was installed in June 2013. Design and construction details were presented previously in the Task B.6 document. The B-HS3 system consists of a replacement septic tank (which was a 1,500 gallon two chamber concrete primary tank); a 600 gallon concrete STE dose tank; a two zone drip system; a Stage 1 lined drip zone; a 1,050 gallon concrete tank Stage 2 saturated media biofilter; and a treated effluent dispersal drip zone. 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.

c:\44237-001R004\Wpdocs\Report\Final

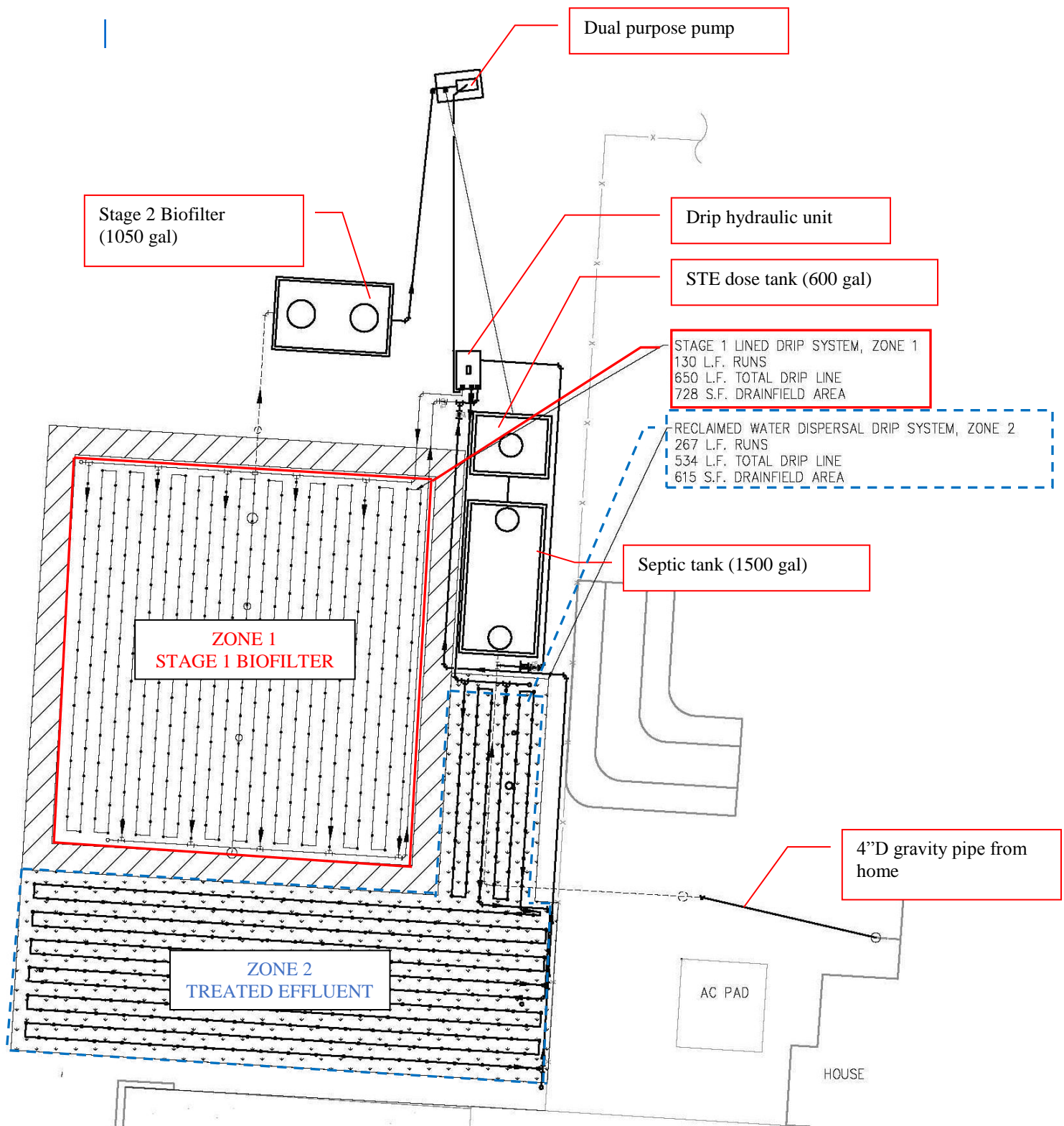


Figure 1
Plan View of B-HS3 System Layout

September 2014

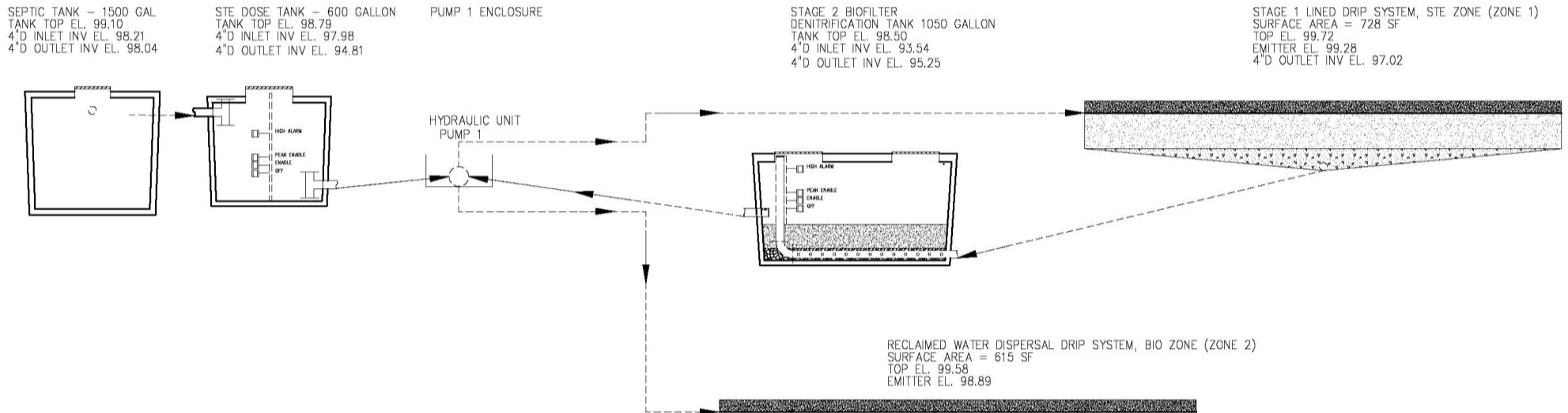


Figure 2
Flow Schematic of B-HS3 PNRS Installed in Seminole County

3.2 Monitoring and Sample Locations and Identification

This monitoring event included sample collection from ten points within the treatment system (Figure 3). The B-HS3 installation also includes five downgradient groundwater monitoring points which are standpipe piezometers that were installed as part of the C-HS2 groundwater monitoring network (Figure 4). In the treatment system, 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 STE dose tank. The first monitoring point, B-HS3-STE, is the effluent sampled approximately 1.5 feet below the surface of the second chamber of the primary tank (Figure 5) before the effluent filter, which is referred to as primary effluent or septic tank effluent (STE). Samples from monitoring point B-HS3-STE are of whole household wastewater after it has had some residence time in the primary tank and represent the influent to the remainder of the onsite nitrogen reduction system.

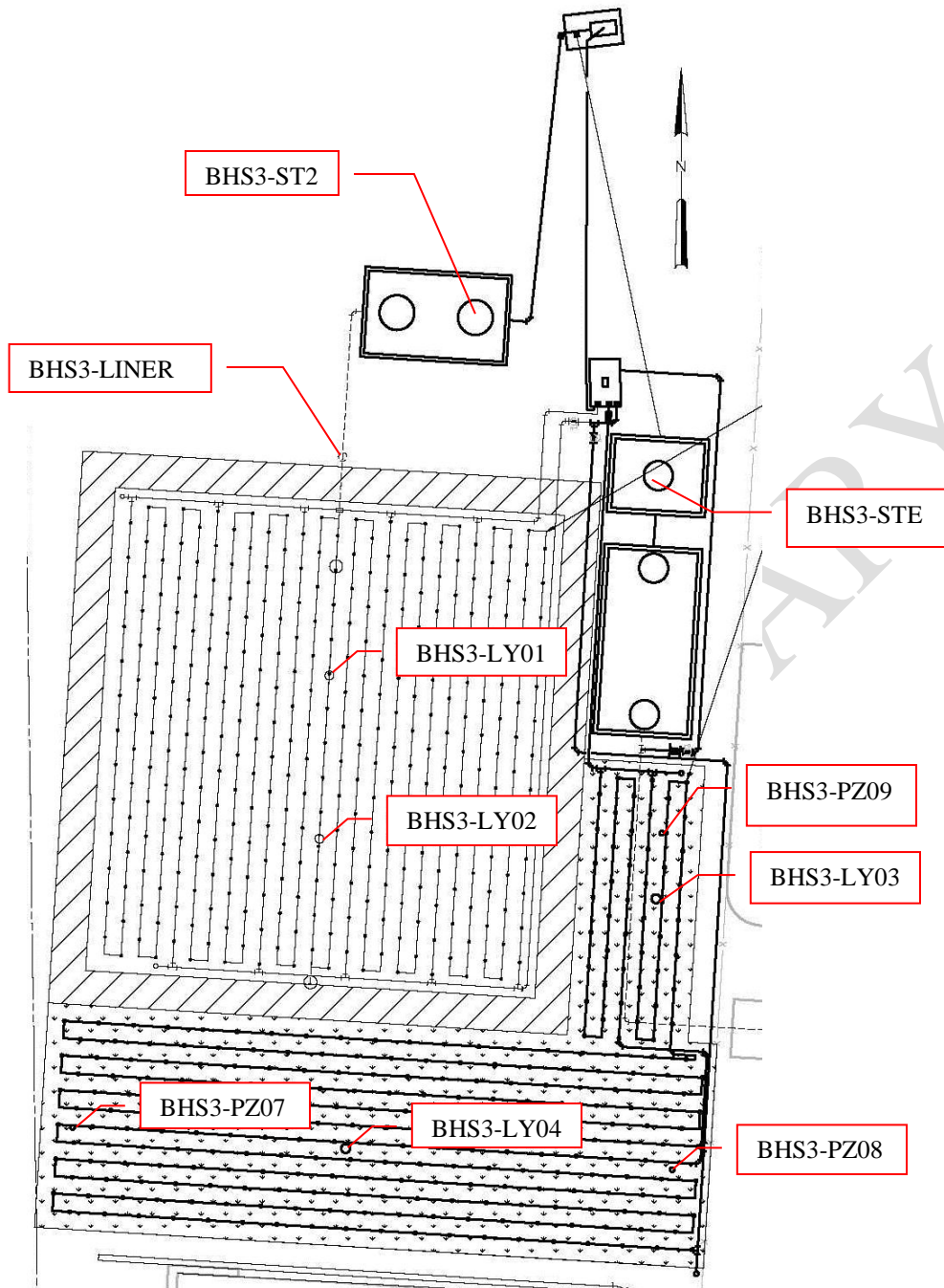


Figure 3
BHS-3 Treatment System Sampling and Monitoring Locations

o:\44237-001R004\Wpdocs\Report\Final

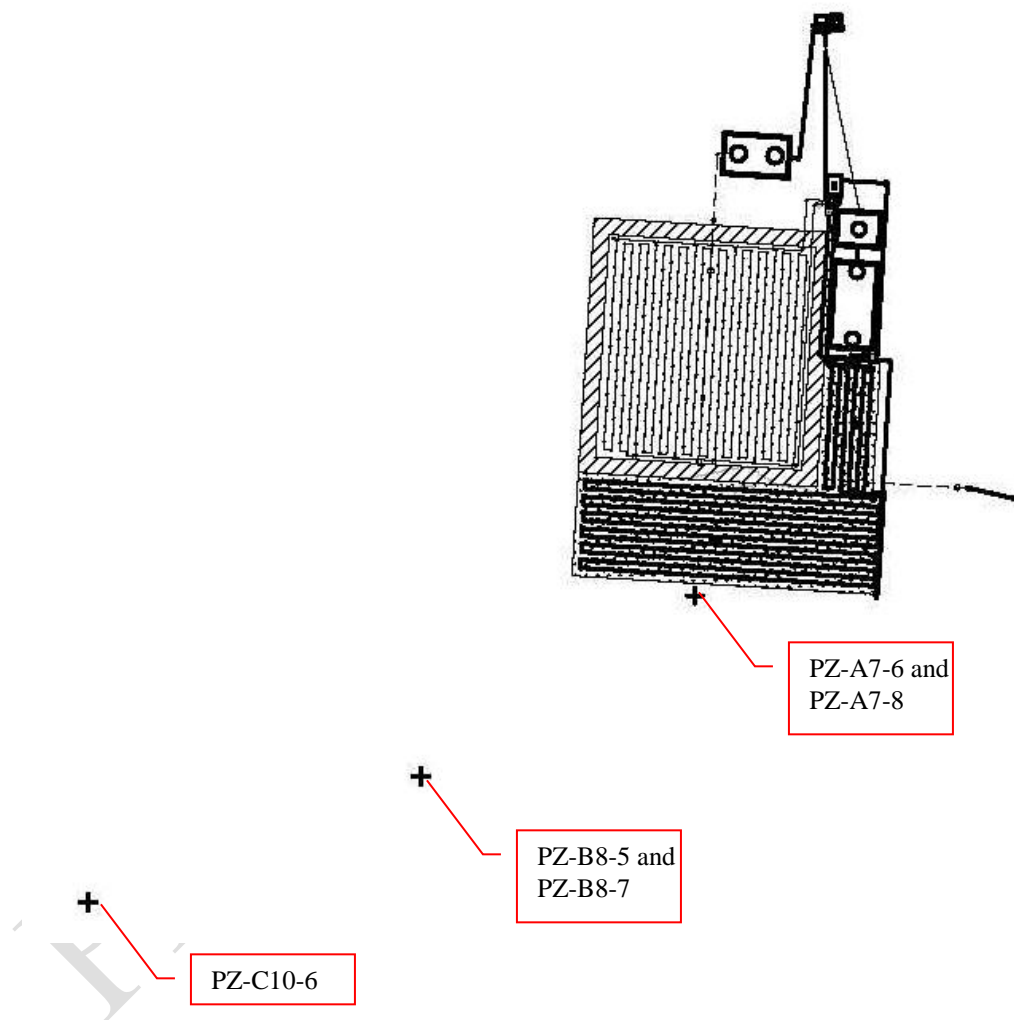


Figure 4
BHS-3 PNRS Downgradient Groundwater Sampling Locations

o:\44237-001R004\Wpdocs\Report\Final



Figure 5
Second Chamber of Primary Tank (B-HS3-STE Sample)

The STE dose tank effluent is pumped through the drip system hydraulic unit and discharged to the Stage 1 drip system (Zone 1). In the Stage 1 drip area, wastewater percolates downward through an 18-inch layer of unsaturated sand and a layer of lignocellulosic and sand media (9-inch maximum thickness) placed above a 30 mil PVC liner. The second and third sampling points are two suction lysimeters (BHS3-LY01 and BHS3-LY02) located at the interface of the overlying sand and underlying lignocellulosic/sand mixture. These sample locations ostensibly represent wastewater that has been nitrified by passage through the overlying sand layer (Figure 6).



Figure 6
Stage 1 Suction Lysimeter (BHS3-LY01 and –LY02)

The Stage 1 drip system area was prepared by grading a V-shape so that effluent would collect on the liner and flow to the center where a perforated pipe within a gravel underdrain conveys the effluent to the Stage 2 denitrification tank through a pipe boot within the liner. The fourth sampling point (BHS3-LINER) is a sample port of the Stage 1 lined area effluent prior to the Stage 2 biofilter. At the BHS3-LINER sample point, wastewater would ostensibly be denitrified by passage through the lignocellulosic media mixture.

The liner effluent is conveyed to a Stage 2 biofilter, a concrete 1,050 gallon tank, containing elemental sulfur reactive media for additional treatment (denitrification). Wastewater flow is in an upward direction. The fifth sampling point, B-HS3-ST2, is the Stage 2 biofilter effluent which is sampled approximately 6 inches below the water surface of the Stage 2 biofilter tank (Figure 7).



Figure 7
Second Chamber of Stage 2 Biofilter (B-HS3-ST2 Sample)

The Stage 2 biofilter effluent is pumped through the drip system hydraulic unit and discharged through the treated effluent drip system emitters (Zone 2) to the natural soil. The sixth and seventh sampling points are two suction lysimeters (BHS3-LY03 and BHS3-LY04) located in the treated effluent drip area with the top of the 9 inch ceramic cup located 24 inches below the drip emitters to represent treatment through 24-inches of unsaturated soil (Figure 8). Also located within the treated effluent drip area, are the eighth, ninth and tenth sampling points which are standpipe piezometers (BHS3-PZ07, BHS3-PZ08, and BHS3-PZ09) positioned so that the top of the 5-foot screen is 24-inches below the drip emitters (Figure 9).



Figure 8
Treated Effluent Suction Lysimeter (B-HS3-LY03 and -LY04 sample)



Figure 9
Treated Effluent Area Standpipe Piezometers (B-HS3-PZ07, -PZ08 and -PZ09)

3.3 Operational Monitoring

Start-up of the system occurred on July 12, 2013 (Experimental Day 0) and the system has operated almost continually since that date. Between September 10, 2013 and Sep-

tember 17, 2013 the system was not operating because a replacement part for the hydraulic unit was required.

The sixth formal sampling event was conducted August 22, 2014 (Experimental Day 406). For the sixth formal sampling event, the water meter for the house and the treatment system flow meters were read and recorded on August 22, 2014. The household potable water use is recorded via a water meter located in the front yard which includes indoor and outdoor water use. The household has a separate irrigation well which supplies the irrigation system; however the metered potable water use includes filling the pool, car washing, etc. The combined pump flow meter is located inside the hydraulic unit following the hydraulic unit filters prior to the split between the two zones, and records the cumulative pumped flow in gallons pumped from both the STE dose tank and Stage 2 biofilter tank. Therefore, the measurement of the combined flow meter includes both the STE flow from the household and the treated effluent flow from the Stage 2 biofilter. The Stage 2 treated effluent flow meter is located following the split on the line from the pump to the treated effluent drip system and records the cumulative flow in gallons pumped from the Stage 2 biofilter tank. The control panel includes telemetry which logs alarms, cumulative pump cycles, and cumulative field flush cycles.

3.4 Energy, Chemical and/or Additives Consumption

Energy consumption was monitored using an electrical meter installed between the main power box for the house and the control panel. The electrical meter records the cumulative power usage of the system in kilowatt-hours. The power usage of the system is primarily due to the single pump, although a small amount of power is used by the control panel itself. There are no chemicals added to the system. However, the denitrification media (lignocellulosic and sulfur) are “reactive” media which will be consumed during operation. The Stage 1 lined area was initially filled with 9 inches of lignocellulosic and sand media mixture and the Stage 2 biofilter was initially filled with 12 inches of sulfur and oyster shell media mixture, which ostensibly will last for many years without replenishment or replacement.

3.5 Water Quality Sample Collection and Analyses

The sixth formal sample event was conducted on August 22, 2014 and included a full suite of influent, intermediate and effluent water quality samples from the system. Samples were collected at each of the fifteen monitoring points described previously in Section 3.2 and illustrated in Figures 3 and 4: ten treatment system monitoring points and five groundwater sampling points. A peristaltic pump was used to collect samples and route them directly into analysis-specific containers after sufficient flushing of the tubing had occurred. Field parameters were then recorded.

In addition, an equipment blank (EB) sample was taken. The equipment blank was collected by pumping deionized water through the cleaned pump tubing. These samples were then analyzed for the same parameters as the monitoring samples.

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

Field parameters were measured using portable electronic probes and included temperature (Temp), dissolved oxygen (DO), oxidation-reduction potential (ORP), pH, and specific conductance. The field parameters were measured by placing the analytical probes in a container overflowing with sample water. The influent, intermediate, and effluent samples were analyzed by the laboratory for: total alkalinity, chemical oxygen demand (COD), total Kjeldahl nitrogen (TKN-N), ammonia nitrogen ($\text{NH}_3\text{-N}$), nitrate nitrogen ($\text{NO}_3\text{-N}$), nitrite nitrogen ($\text{NO}_2\text{-N}$), total phosphorus (TP), orthophosphate (Ortho P), total suspended solids (TSS), volatile suspended solids (VSS), total organic carbon (TOC), chloride, fecal coliform (fecal), and E. coli. The influent and sulfur media samples included sulfate, sulfide, and hydrogen sulfide (unionized). All analyses were performed by an independent and fully NELAC certified analytical laboratory (Southern Analytical Laboratory). Table 1 lists the analytical parameters, analytical methods, and detection limits for these analyses.

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

Analytical Parameter	Method of Analysis	Method Detection Limit (mg/L)
Total Alkalinity as CaCO 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 Suspended Solids (TSS)	SM 2540D	1 mg/L
Volatile Suspended Solids (VSS)	SM 2540E	1 mg/L
Total Organic Carbon (TOC)	SM5310B	0.06 mg/L
Chloride	EPA 300.0	0.50 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)	SM 9222D	2 ct/100mL
E.coli	SM 9223B	2 ct/100mL

4.0 Results and Discussion

4.1 Operational Monitoring

Table 2 provides a summary of the household water use since July 13, 2011. The treatment system flow meter readings for the B-HS3 field site are summarized in Table 3. The operation and maintenance log which includes actions taken since start-up is provided in Appendix B.

Table 2
Summary of Household Water Use

Date	Cumulative Volume (gallons)	Average Daily Household Flow, Q Between readings (gpd)	Comments
7/13/2011 14:45	5302677.9		Installed
7/20/2011 17:50	5304207.8	214.6	
7/26/2011 15:19	5305257.9	178.1	
10/27/2011 15:19	5327920.4	243.7	
11/30/2011 8:00	5355610.4	821.8	
3/13/2012 8:10	5378780.2	222.8	
7/10/2012 16:15	5453899.3	629.5	
10/18/2012 15:30	5470593.1	167.0	
3/7/2013 14:00	5488517.4	128.1	
6/7/2013 14:00	5504725.9	176.2	
7/9/2013 12:50	5508873.0	129.8	
PNRS System Start-up			PNRS start-up
7/12/13 14:01	5509172.1	98.1	
7/17/13 13:55	5509884.1	142.5	
7/29/13 9:50	5510830.9	80.0	
8/6/13 10:40	5511588.8	94.3	
8/12/13 11:07	5512244.8	109.0	
8/15/13 8:48	5513128.8	304.5	Prelim Event No. 1
9/5/13 15:31	5514810.2	79.0	
9/10/13			Septic tank pumped
9/17/13			System running again
9/27/13 8:00	5517331.9	116.3	
9/30/13 8:00	5517622.5	96.9	Sample Event No. 1
10/11/13 8:30	5518421.6	72.5	
10/17/13 11:00	5519187.0	125.4	
11/15/2013 10:00	5524455.0	181.9	
11/27/2013 9:10	5525784.8	111.1	
12/2/2013 8:30	5527623.5	369.8	Several guests stayed in the home over the Thanksgiving holiday
12/4/2013 8:51	5527809.2	92.2	Sample Event No. 2
12/23/2013 11:45	5529755.3	101.8	
1/23/2014 11:00	5532487.5	88.2	
1/30/2014 9:00	5533156.8	96.8	
2/3/2014 8:00	5533482.0	82.2	Sample Event No. 3
2/4/2014 8:15	5533499.6	17.4	Sample Event No. 4

o:\44237-001R004\Wpdocs\Report\Final

Table 2
Summary of Household Water Use

Date	Cumulative Volume (gallons)	Average Daily Household Flow, Q Between readings (gpd)	Comments
2/5/2014 10:45	5533558.4	53.3	Sample Event No. 5
2/6/2014 10:45	5533690.6	132.2	Sample Event No. 6
2/7/2014 8:00	5533788.6	110.7	Sample Event No. 7
2/12/14 10:00	5534282.7	97.2	
3/14/14 8:24	5537363.8	102.9	
4/3/14 8:45	5539932.0	128.3	Sample Event No. 8 (formal No. 4)
4/29/14 10:10	5544794.2	186.6	
5/29/14 10:00	5549396.9	153.5	Sample Event No. 9 (formal No. 5)
6/9/14 12:45	5550719.1	119.0	
7/29/14 9:30	5555927.1	104.4	
8/22/14 7:30	5557593.9	69.7	Sample Event No. 10 (formal No. 6)
Total average PNRs start-up to 8/22/14		119.3	

Table 3
Summary of System Flow

Date and Time Read	Combined Pumped Flow, Stage 1 and Treated Effluent Drip Zones	Average Daily Combined Pumped Flow between readings	Calc Flow to Stage 1	Average Daily Calculated Flow to Stage 1 between readings	Treated Effluent Flow	Average Daily Treated Effluent Flow between readings	Stage 1 Area Water Input or Output ¹
	Cum Vol. (gal)	Gal/ Day	Cum Vol. (gal)	Gal/ Day	Cum Vol. (gal)	Gal/ Day	Gal/ Day
7/12/13 14:01	206.9	Start-up	Start-up	Start-up	58.6	Start-up	Start-up
7/17/13 11:57	423.0	44.0	40.6		234.2	35.7	
7/29/13 9:52	3,345.1	245.3	765.3	60.8	2,431.6	184.5	123.6
8/6/13 9:45	6,541.1	399.7	1,045.1	35.0	5,347.8	364.8	329.8
8/12/13 11:07	8,953.1	398.2	2,360.0	217.1	6,444.9	181.1	-36.0
8/15/13 8:48	10,131.2	405.8	3,084.3	249.4	6,898.7	156.3	-93.1
9/5/13 15:31	18,696.5	402.5	7,734.4	218.5	10,813.8	184.0	-34.5
9/9/13 9:00	19,884.6	318.7	8,287.6	148.4	11,448.8	170.3	22.0
9/17/13 10:12	20,912.4	127.7	8,785.2	61.8	11,979.0	65.9	4.0
9/27/13 8:00	22,142.0	124.1	9,239.3	45.8	12,754.5	78.3	32.4
9/30/13 8:00	22,885.0	247.7	9,692.2	151.0	13,044.6	96.7	-54.2
10/11/13 8:30	26,428.9	321.6	11,417.0	156.5	14,863.7	165.1	8.5
10/17/13 11:00	28,781.4	385.4	12,823.8	230.5	15,809.4	154.9	-75.5
11/8/13 12:30	34,278.1	249.1	15,844.0	136.9	18,285.9	112.2	-24.6
11/27/13 9:10	39,031.1	252.0	18,656.6	149.1	20,226.3	102.9	-46.2
12/2/13 8:30	42,081.5	613.5	20,437.6	358.2	21,495.7	255.3	-102.9
12/4/13 8:51	42,599.8	257.3	20,729.5	144.9	21,722.1	112.4	-32.6
12/23/13 11:45	47,135.0	237.2	23,494.6	144.6	23,640.5	100.3	-44.3
1/23/14 11:00	54,702.9	244.4	27,634.5	133.7	27,068.4	110.7	-23.0
1/30/14 9:00	56,954.9	325.6	28,768.0	163.9	28,187.0	161.7	-2.2
2/3/14 8:00	58,390.4	362.7	29,353.4	147.9	29,037.1	214.8	66.9
2/4/14 8:15	58,688.7	295.2	29,446.4	92.0	29,242.4	203.2	111.1
2/5/14 10:45	58,870.7	164.8	29,542.1	86.7	29,328.6	78.1	-8.6
2/6/14 10:45	59,118.7	248.0	29,702.1	159.9	29,416.7	88.1	-71.9
2/7/14 8:00	59,354.0	265.8	29,852.9	170.4	29,501.1	95.4	-75.0

o:\44237-001R004\Wpdocs\Report\Final

Table 3 (con't)
Summary of System Flow

Date and Time Read	Combined Pumped Flow, Stage 1 and Treated Effluent Drip Zones	Average Daily Combined Pumped Flow between readings	Calc Flow to Stage 1	Average Daily Calculated Flow to Stage 1 between readings	Treated Effluent Flow	Average Daily Treated Effluent Flow between readings	Stage 1 Area Water Input or Output ¹
	Cum Vol. (gal)	Gal/ Day	Cum Vol. (gal)	Gal/ Day	Cum Vol. (gal)	Gal/ Day	Gal/ Day
2/12/14 10:00	61,023.9	328.5	30,284.0	84.8	30,739.9	243.7	158.9
3/14/14 8:24	67,901.2	229.8	34,539.3	142.2	33,361.9	87.6	-54.6
4/3/14 8:45	73,953.4	302.4	37,614.2	153.6	36,339.2	148.8	-4.9
4/29/14 10:10	81,273.0	280.9	41,858.6	162.9	39,414.4	118.0	-44.9
5/29/14 10:00	86,833.4	185.4	44,776.5	97.3	42,057.0	88.1	-9.2
6/9/14 12:45	90,633.4	341.9	46,660.0	169.5	43,973.4	172.4	3.0
7/11/14 14:45	98,858.8	256.4	50,945.7	133.6	47,913.2	122.8	-10.8
7/29/14 9:30	105,444.4	370.4	54,339.3	190.9	51,105.1	179.5	-11.3
8/22/14 7:30	110,175.4	197.8	56,713.6	99.3	53,461.8	98.5	-0.7
Avg start-up to 8/22/14		271.0		139.4		131.6	-7.8

¹This value is the difference between the metered flow to Stage 1 and metered Treated Effluent flow from the Stage 2 biofilter. A positive value indicates an additional water input to the Stage 1 area (precipitation, irrigation, etc.) whereas a negative value indicates a water output (evapotranspiration, etc.).

²The additional volume in the Stage 1 flow as compared to the household water use meter is the volume returned to the septic tank during field flushing of the drip lines.

The average household water use since the PNRS system start-up was 119.3 gallons per day with periods of higher and lower flows. Since the PNRS system start-up, the average combined pumped flow (flow to the Stage 1 drip system and treated effluent drip system) was 271 gallons per day, the average calculated Stage 1 drip system (STE) flow was 139.4 gallons per day and the average treated effluent drip system (Stage 2 biofilter effluent) flow was 131.6 gallons per day.

The difference between the flow to the Stage 1 drip system (STE) and the treated effluent drip system (Stage 2 biofilter effluent) are due to water inputs and outputs. Water inputs include precipitation, applied STE, and any lawn irrigation water collected in the Stage 1 lined area. Water outputs include evapotranspiration. The last column in Table 3 summarizes the difference in the Stage 1 and treated effluent flows for each time period. The positive values indicate higher treated effluent flow (water inputs) which are likely attributed to precipitation and irrigation water collected in the lined area. The negative values indicate higher Stage 1 flow (water outputs) which is likely attributed to evapotranspiration. Overall, there was a net loss of water equal to approximately 7.8 gallons.

A weather station (Lake Wayman Heights, Longwood, FL) is located approximately 5 miles from the site. Data from this weather station is available at the following website: <http://www.wunderground.com>. Recorded meteorological data is provided in Appendix C, Table C.1 from this weather station. Table 4 provides daily precipitation totals leading up to and during the sample event. There was approximately 0.25 inches of rain in the 5 days ending on August 22nd.

Table 4
Precipitation Data Daily Totals Measured August 1, 2014 through August 22, 2014
Sample Event No. 6

Date	Precipitation (inches)
8/1/2014	0
8/2/2014	0
8/3/2014	0.26
8/4/2014	0.18
8/5/2014	0.15
8/6/2014	0.49
8/7/2014	0.04
8/8/2014	0
8/9/2014	0.96
8/10/2014	0.01
8/11/2014	0.53
8/12/2014	0
8/13/2014	0
8/14/2014	0.01
8/15/2014	0.09
8/16/2014	0.11
8/17/2014	0
8/18/2014	0
8/19/2014	0
8/20/2014	0
8/21/2014	0.18
8/22/2014	0.07

4.2 Energy, Chemical and/or Additives Consumption

Energy consumption is monitored using an electrical meter installed between the main power box for the house and the control panel to record cumulative power usage of the pump in kilowatt-hours. The recorded electrical use for the system is summarized in Table 5. The total average electrical use through August 22, 2014 was 0.89 kWh per day. The average electrical use per 1,000 gallons pumped was 3.281 kWh per 1,000 gallons, and this parameter appears fairly stable since start-up.

Table 5
Summary of System Electrical Use

Date and Time Read	Electrical Meter Reading	Average Daily Electrical Use between readings	Average Electrical Use per Gallon Pumped between readings	Average Electrical Use per 1,000 Gallons Pumped between readings
	Cumulative (kWh)	(kWh/day)	(kWh/gal)	(kWh/1,000 gal)
7/12/13 14:01	0.6	Start-up	Start-up	Start-up
7/17/13 11:57	1.1	0.10	0.002	2.314
7/29/13 9:52	8.9	0.65	0.003	2.669
8/6/13 9:45	19.1	1.28	0.003	3.191
8/12/13 11:07	27.9	1.45	0.004	3.648
8/15/13 8:48	32.5	1.58	0.004	3.905
9/5/13 15:31	69.6	1.74	0.004	4.331
9/9/13 9:00	82.3	3.41	0.011	10.689
9/17/13 10:12	86.2	0.48	0.004	3.795
9/27/13 8:00	88.8	0.26	0.002	2.115
9/30/13 8:00	90.6	0.60	0.002	2.423
10/11/13 8:30	98.5	0.72	0.002	2.229
10/17/13 11:00	104.7	1.02	0.003	2.635
11/8/13 12:30	121.1	0.74	0.003	2.984
11/27/13 9:10	135.6	0.77	0.003	3.051
12/2/13 8:30	145.1	1.91	0.003	3.114
12/4/13 8:51	146.8	0.84	0.003	3.280
1/23/14 11:00	185.1	0.76	0.003	3.129
1/30/14 9:00	192.3	1.04	0.003	3.197
2/3/14 8:00	197.0	1.09	0.003	3.017
2/4/14 8:15	198.0	1.15	0.004	3.886
2/5/14 10:45	198.6	0.76	0.005	4.590
2/6/14 10:45	199.3	0.63	0.003	2.546
2/7/14 8:00	200.2	0.85	0.003	3.193
2/12/14 10:00	205.7	1.07	0.003	3.249
3/14/14 8:24	228.2	0.80	0.003	3.480
4/3/14 8:45	248.3	0.85	0.003	2.820
4/29/14 10:10	272.5	0.96	0.003	3.423
5/29/14 10:00	290.2	0.75	0.004	4.032
6/9/14 12:45	302.0	0.72	0.002	2.099
7/11/14 14:45	327.3	0.86	0.003	3.350
7/29/14 9:30	347.3	0.91	0.002	2.453
8/22/14 7:30	361.4	0.82	0.004	4.134
Total average start-up to 8/22/14		0.89	0.003	3.281

o:\44237-001R004\Wpdocs\Report\Final

4.3 Water Quality

Water quality analytical results, for Sample Event No. 6 are listed in Table 6 and graphically displayed in Figure 10. 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 the Sample Event No. 6. The performance of the various system components was compared by considering the changes through treatment of nitrogen species (TKN, $\text{NH}_3\text{-N}$, and $\text{NO}_x\text{-N}$), as well as supporting water quality parameters.

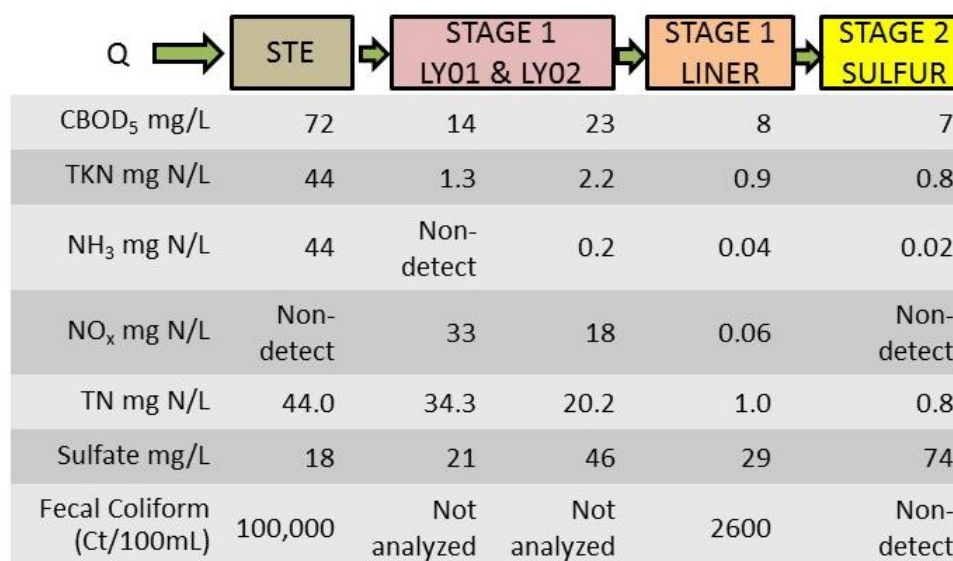


Figure 10
Graphical Representation of Water Quality Results
Sample Event No. 6, August 22, 2014

Septic Tank Effluent (STE) Quality: The water quality characteristics of STE collected in Sample Event 6 were within the typical range generally expected for domestic STE. The measured STE total nitrogen (TN) concentration was 44 mg/L, which is within the range that has been typically reported for Florida single family residence STE.

Stage 1 (Bottom of Sand Layer) Soil Suction Lysimeters (LY01 and LY02): The soil suction lysimeters effluent $\text{NH}_3\text{-N}$ levels were below the method detection limit of 0.009 mg/L and 0.19 mg/L for LY01 and LY02, respectively (Table 6). The $\text{NO}_x\text{-N}$ was 33 mg/L and 18 mg/L for LY01 and LY02, respectively. There has been a considerable difference between these two sample points in terms of $\text{NO}_x\text{-N}$ concentrations in several

sample event, and the reasons for this are unclear. The Stage 1 biofilter showed nearly complete nitrification and some denitrification with an effluent concentration equal to or less than $\text{NH}_3\text{-N}$ of 0.2 mg/L, $\text{NO}_x\text{-N}$ of 33 mg/L and TKN of 2.2 mg/L.

Stage 1 Liner Effluent (Liner): The Stage 1 effluent $\text{NH}_3\text{-N}$ level was 0.04 mg/L with a DO level at 0.31 mg/L (Table 6). TSS and CBOD_5 were 8 mg/L. The Stage 1 effluent $\text{NO}_x\text{-N}$ was 0.06 mg/L. These results indicate significant denitrification by passage through the lignocellulosic/sand layer in the Stage 1 lined area (100% reduction of $\text{NO}_x\text{-N}$). The combined Stage 1/liner area biofilter showed nearly complete ammonium removal and substantial removal of (NO_3+NO_2) with an effluent $\text{NH}_3\text{-N}$ of 0.04 mg/L, $\text{NO}_x\text{-N}$ of 0.06 mg/L and TKN of 0.93 mg/L.

Stage 2 Biofilter Effluent (ST2): Effluent $\text{NO}_x\text{-N}$ from the Stage 2 biofilter was below the method detection limit of 0.02 mg/L with a DO level at 0.06 mg/L and ORP at -234 mV. Final total nitrogen (TN) in the passive nitrogen removal system effluent was 0.8 mg/L. The Stage 2 biofilter effluent CBOD_5 concentration was 7 mg/L, TSS was 5 mg/L and sulfate was 74 mg/L.

Treated Effluent Soil Suction Lysimeters (LY03 and LY04): The treated effluent drip system monitoring devices LY03 and LY04 $\text{NO}_x\text{-N}$ concentrations were 12 mg/L and 3.8 mg/L, respectively, which is considerably higher than the Stage 2 effluent concentration. It appears that there must be another source of nitrogen to the effluent irrigation area, and it is suspected that fertilizer from the new sod installed in the area is still contributing to this result. The $\text{NO}_x\text{-N}$ concentrations did appear to decrease with time following sod installation and in the winter months with less rainfall; however in March and June the $\text{NO}_x\text{-N}$ concentrations increased possibly from sod fertilizer runoff in the rainy season (Figure 11).

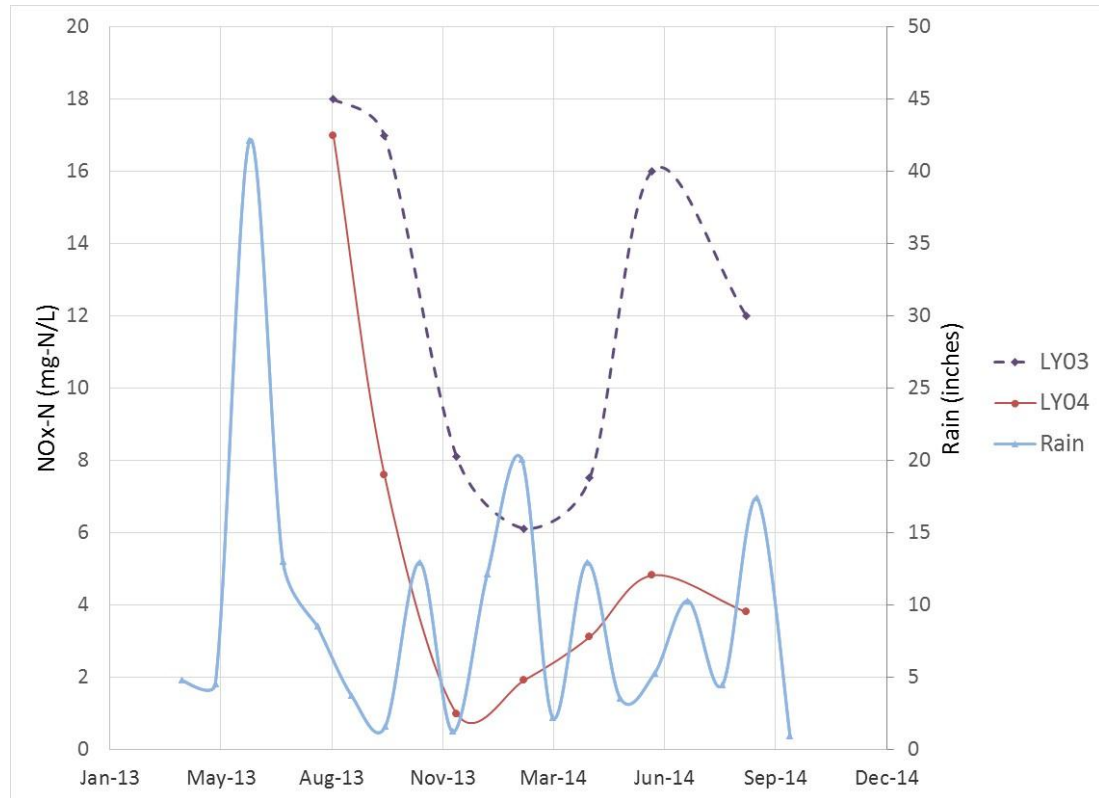


Figure 11
LY03 and LY04 NO_x-N Time Series

Table 6
Sample Event 6 Water Quality Results

Sample ID	Sample Date/Time	Temp (°C)	pH	Specific Conductance (uS/cm)	DO (mg/L)	ORP (mV)	Total Alkalinity (mg/L)	TSS (mg/L)	VSS (mg/L)	CBOD ₅ (mg/L)	COD (mg/L)	TN (mg/L N) ¹	TKN (mg/L N)	Organic N (mg/L N) ²	NH ₃ -N (mg/L N)	NO ₃ -N (mg/L N)	NO ₂ -N (mg/L N)	NO _x (mg/L N)	TIN (mg/L N) ³	TP (mg/L)	Ortho P (mg/L P)	Chloride (mg/L)	Sulfate (mg/L)	Hydrogen Sulfide (mg/L)	Sulfide (mg/L)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)
BHS3-STE	8/22/2014 8:45	28.0	7.33	1135	0.05	-303.3	410	24	22	72	150	44.0	44	0.0	44	0.01	0.01	0.02	44.0	5	3.7	39	18	0.68	1	100000	170
BHS3-STE-FILTERED	8/22/2014 8:45	28.0	7.33	1135	0.05	-303.3				22		50.0	50	10.0	40	0.01	0.01	0.02	40.0								
BHS3-LY01	8/22/2014 8:24	27.3	6.98	541	0.54	-75.0	130	2	2	14	29	34.3	1.3	1.3	0.009	33	0.01	33	33.0	0.6	0.52	61	21				
BHS3-LY02	8/22/2014 8:38	27.4	6.77	714	0.73	-2.5	150	1	1	23	39	20.2	2.2	2.0	0.19	18	0.01	18	18.2	1.2	1.2	36	46				
BHS3-LINER	8/22/2014 7:50	28.4	6.39	697	0.31	-107.8	260	8	5	8	23	1.0	0.93	0.9	0.039	0.06	0.01	0.06	0.1	0.37	0.056	29	29			2600	2
BHS3-LINER-FILTERED	8/22/2014 7:50	28.4	6.39	697	0.31	-107.8				13		0.9	0.82	0.7	0.11	0.05	0.01	0.05	0.2								
BHS3-ST2	8/22/2014 7:46	28.1	6.54	845	0.06	-234.4	250	5	5	7	33	0.8	0.82	0.8	0.021	0.01	0.01	0.02	0.0	0.43	0.22	29	74	1.6	2.2	1	2
BHS3-ST2-DUP	8/22/2014 7:54	28.1	6.54	845	0.06	-234.4	290	2	1	6	31	1.0	0.95	0.9	0.055	0.03	0.01	0.03	0.1	0.46	0.26	29	77	2.9	4	1	2
BHS3-ST2-FILTERED	8/22/2014 7:46	28.1	6.54	845	0.06	-234.4				11		0.9	0.88	0.8	0.059	0.01	0.01	0.02	0.1								
BHS3-LY03	8/22/2014 8:25	25.7	6.60	831	5.08	117.3	9.6	2	2	5	41	13.8	1.8	1.7	0.06	12	0.01	12	12.1	0.21	0.12	21	90				
BHS3-LY04	8/22/2014 8:10	26.2	6.34	786	3.97	66.2	200	1	1	5	27	5.2	1.4	1.4	0.009	3.8	0.01	3.8	3.8	0.087	0.042	0.05	120				
BHS3-PZ07	8/21/2014 11:48	34.7	6.74	733	5.44	174.3	190	11	7	7	43	6.5	1.9	1.9	0.009	4.6	0.01	4.6	4.6	0.37	0.073	20	74	0.13	0.21		
BHS3-PZ08	8/21/2014 11:16	29.7	6.03	606	2.60	186.0	180	28	14	12	50	2.5	0.84	0.8	0.009	1.7	0.01	1.7	1.7	0.34	0.2	18	72	0.01	0.1		
BHS3-PZ09	8/21/2014 10:36	28.9	5.79	629	4.05	241.7	110	74	24		45	12.8	1.8	1.8	0.037	11	0.01	11	11.0	1	0.73	20	82	0.75	0.81		
PZ-A7-6	8/21/2014 15:08	28.0	6.02	568	1.76	21.9	160					0.8	0.77	0.8	0.018	0.01	0.01	0.02	0.0			22	59				
PZ-A7-8	8/21/2014 15:28	26.9	6.02	630	1.67	81.2	190					4.8	1.5	1.5	0.047	3.3	0.01	3.3	3.3			23	59				
PZ-B8-5	8/21/2014 12:28	29.0	5.75	530	0.98	32.1	110					1.6	1.6	1.5	0.074	0.03	0.01	0.03	0.1			26	76				
PZ-B8-7	8/21/2014 12:42	27.8	5.70	305	1.27	134.0	61					1.3	1.3	1.2	0.084	0.01	0.01	0.02	0.1			39	6.9				
PZ-C10-6	8/21/2014 15:44	29.0	6.17	410	1.22	-70.7	180					5.0	5	4.8	0.25	0.03	0.01	0.03	0.3			22	4				
EB	8/22/2014 8:58	23.1	6.52	2.34	1.22	-108.0	2.1	1	1	2	10	0.1	0.05	0.0	0.009	0.01	0.01	0.02	0.0	0.01	0.01	0.3	0.21	0.01	0.1	1	2

Notes:

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

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

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

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

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

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

Table 7
Summary of Water Quality Data

Sample ID	Statistic	Temp (°C)	pH	Specific Conductance (uS/cm)	DO (mg/L)	ORP (mV)	Total Alkalinity (mg/L)	TSS (mg/L)	VSS (mg/L)	CBOD ₅ (mg/L)	COD (mg/L)	TN (mg/L N) ¹	TKN (mg/L N)	Organic N (mg/L N) ²	NH ₃ -N (mg/L N)	NO ₂ -N (mg/L N)	NO ₃ -N (mg/L N)	NOx (mg/L N)	TIN (mg/L N) ³	TP (mg/L)	Ortho P (mg/L P)	Chloride	Sulfate (mg/L)	Hydrogen Sulfide (mg/L)	Sulfide (mg/L)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)
STE	n	16	16	16	16	11	15	12	10	12	11	16	16	16	16	14	13	16	16	12	12	14	13	11	11	12	7
	MEAN	23.88	7.26	1090.06	0.33	-295.86	412.00	24.58	20.50	83.08	187.27	60.34	60.19	11.06	49.13	0.08	0.08	0.15	49.27	5.63	3.96	51.86	19.18	3.83	8.22	64,745	28,671
	STD. DEV.	4.02		143.82	0.46	29.73	39.86	14.82	13.01	47.56	75.64	20.13	19.99	11.76	15.62	0.21	0.26	0.44	15.71	1.86	1.49	9.21	12.40	2.69	3.30		
	MIN	18.50	6.88	868.00	0.00	-341.70	330.00	12.00	9.00	43.00	120.00	30.05	30.00	0.00	27.00	0.01	0.01	0.02	27.05	3.50	2.20	39.00	0.82	0.68	1.00	20,000	10,000
Stage 1 LY01	MAX	29.60	7.82	1322.00	1.20	-253.90	490.00	61.00	55.00	210.00	400.00	110.06	110.00	45.00	85.00	0.82	0.94	1.80	85.06	9.00	7.50	75.00	39.00	8.90	12.00	420,000	240,000
	n	10	10	10	9	9	3	4	4	4	9	10	10	10	10	10	10	10	10	9	9	9	10	0	0	0	0
	MEAN	23.02	6.83	530.10	6.25	109.61	103.00	1.75	1.50	5.00	41.78	17.78	1.68	1.61	0.06	16.07	0.02	16.10	16.16	0.16	0.08	38.22	37.90				
	STD. DEV.	4.44		113.35	2.91	82.01	25.63	0.96	0.58	6.00	53.12	9.77	0.50	0.48	0.09	9.69	0.04	9.68	9.70	0.17	0.17	12.64	12.09				
Stage 1 LY02	MIN	15.80	6.33	330.00	0.54	-75.00	79.00	1.00	1.00	2.00	10.00	2.50	0.99	0.93	0.01	1.30	0.01	1.30	1.38	0.05	0.01	15.00	21.00				
	MAX	30.90	7.24	711.00	9.92	180.50	130.00	3.00	2.00	14.00	180.00	34.30	2.70	2.66	0.30	33.00	0.13	33.00	33.01	0.60	0.52	61.00	54.00				
	n	11	11	11	11	11	4	7	7	7	10	11	11	11	11	11	11	11	11	10	10	10	10	0	0	1	1
	MEAN	22.89	6.59	755.91	4.59	96.40	150.00	2.29	1.71	6.57	23.30	27.22	1.91	1.71	0.20	25.17	0.08	25.31	25.51	2.12	1.60	42.10	40.20			1,000	2
Stage 1 Liner	STD. DEV.	4.45		98.35	2.91	66.95	35.59	1.60	1.50	7.83	12.92	9.85	0.78	0.94	0.47	10.23	0.16	10.35	10.48	1.02	0.99	8.09	9.00				
	MIN	14.60	6.18	559.00	0.73	-25.30	100.00	1.00	1.00	2.00	10.00	9.90	1.00	0.10	0.01	7.10	0.01	7.10	7.12	0.18	0.01	23.00	26.00			1,000	2
	MAX	30.20	6.99	871.00	10.23	182.00	180.00	5.00	5.00	23.00	49.00	37.70	3.70	3.69	1.60	35.00	0.47	36.00	37.60	3.20	2.80	52.00	54.00			1,000	2
	n	11	11	11	11	11	10	10	10	10	10	11	11	11	11	11	11	11	11	10	10	10	9	5	5	10	9
Stage 2	MEAN	23.15	6.73	721.09	2.84	-10.50	269.00	19.20	9.30	4.00	27.90	7.29	1.89	1.75	0.14	5.38	0.01	5.39	5.54	0.51	0.01	35.40	25.36	0.42	0.66	58	4
	STD. DEV.	4.62		107.06	2.61	98.35	44.33	37.33	12.74	4.00	14.53	4.56	0.56	0.51	0.17	4.45	0.01	4.45	4.47	0.91	0.01	8.13	13.20	0.42	0.60		
	MIN	18.10	6.39	552.00	0.31	-199.70	210.00	4.00	3.00	2.00	10.00	0.99	0.93	0.89	0.04	0.01	0.01	0.02	0.07	0.01	0.01	15.00	5.50	0.01	0.10	1	2
	MAX	31.80	7.15	925.00	9.09	124.50	360.00	125.00	45.00	14.00	60.00	16.01	2.80	2.62	0.63	14.00	0.05	14.01	14.07	2.90	0.06	43.00	47.00	1.10	1.60	6,800	310
Treated Effluent LY03	n	11	11	11	11	11	10	10	10	10	10	11	11	11	11	11	11	11	11	10	10	10	11	11	11	10	9
	MEAN	22.55	6.84	841.73	0.27	-212.14	276.00	5.00	3.60	14.10	33.10	1.97	1.26	0.95	0.31	0.41	0.31	0.71	1.02	0.13	0.03	35.40	100.91	2.91	4.61	5	2
	STD. DEV.	4.20		86.38	0.28	89.93	28.36	3.13	2.01	23.90	13.26	1.87	0.39	0.36	0.24	0.96	0.69	1.64	1.61	0.15	0.07	8.45	42.30	3.56	4.95		
	MIN	18.70	6.53	653.00	0.01	-299.90	240.00	2.00	1.00	2.00	10.00	0.84	0.82	0.44	0.02	0.01	0.01	0.02	0.04	0.01	0.01	15.00	27.00	0.01	0.10	1	2
Treated Effluent LY04	MAX	29.70	7.15	942.00	0.91	38.20	310.00	12.00	6.00	81.00	50.00	7.10	1.80	1.58	0.87	3.20	2.10	5.30	5.52	0.43	0.22	45.00	150.00	12.00	16.00	300	10
	n	7	7	7	7	7	3	4	4	5	6	7	7	7	7	7	7	7	7	6	6	6	7	3	3	1	1
	MEAN	24.79	6.43	730.96	4.98	126.91	169.87	2.75	2.75	25.40	47.83	14.43	2.33	2.27	0.06	12.10	0.02	12.10	12.17	0.15	0.05	28.50	87.00	0.32	0.41	1	2
	STD. DEV.	2.51		294.28	2.15	21.15	138.80	1.50	1.50	47.36	52.01	5.36	0.66	0.69	0.09	4.95	0.02	4.95	4.98	0.05	0.05	9.61	28.04	0.30	0.31		
Groundwater PZ07	MIN	21.81	6.27	75.70	2.05	103.30	9.60	1.00	1.00	2.00	10.00	8.61	1.80	1.74	0.01	6.10	0.01	6.11	6.12	0.09	0.01	13.00	50.00	0.01	0.10	1	2
	MAX	29.00	6.64	934.00	9.09	159.00	250.00	4.00	4.00	110.00	150.00	21.60	3.60	3.57	0.25	18.00	0.05	18.00	18.04	0.21	0.12	38.00	120.00	0.60	0.71	1	2
	n	7	7	7	7	7	5	4	4	5	6	7	7	7	7	7	7	7	7	6	6	6	7	3	3	1	1
	MEAN	25.37	6.44	791.29	4.30	105.19	232.00	1.25	1.25	4.00	29.83	7.36	1.75	1.71	0.04	5.60	0.01	5.60	5.64	0.09	0.02	26.51	87.00	0.28	0.37	1	2
Groundwater PZ07	STD. DEV.	2.48	0.16	43.37	2.74	25.15	28.64	0.50	0.50	3.08	13.88	6.57	1.12	1.10	0.04	5.46	0.00	5.46	5.48	0.09	0.01	15.55	33.08	0.24	0.25		
	MIN	22.10	6.21	698.00	1.41	66.20	200.00	1.00	1.00	2.00	18.00	1.79	0.80	0.79	0.01	0.99	0.01	0.99	1.00	0.01	0.01	0.05	40.00	0.01	0.10	1	2
	MAX	29.40	6.62	821.00	9.98	124.00	270.00	2.00	2.00	9.00	56.00	21.00	4.00	3.91	0.10	17.00	0.01	17.00	17.09	0.25	0.04	42.00	130.00	0.48	0.60	1	2
	n	5	5	5	5	5	3	3	3	4	4	5	5	5	5	5	5	5	5	4	4	4	4	3	3	2	2
Groundwater PZ07	MEAN	26.56	6.40	775.80	3.38	2.68	246.67	8.00	5.33	3.75	28.75	7.47	2.13	1.95	0.18	5.34	0.01	5.34	5.53	0.18	0.07	24.25	72.00	0.27	0.34	1	2
	STD. DEV.	5.41	0.21	59.79	2.04	155.90	51.32	4.36	2.08	2.36	13.72	4.08	1.18	0.90	0.31	3.23	0.00	3.22	3.35	0.14	0.07	10.59	35.81	0.12	0.11		
	MIN	21.31	6.18	693.00	0.59	-248.70	190.00	3.00	3.00	2.00	10.00	2.65	0.84	0.83	0.01	1.80	0.01	1.81	1.82	0.04	0.01	17.00	35.00	0.13	0.21	1	2
	MAX	34.70	6.74	833.00	5.44	174.30	290.00	11.00	7.00	7.00	43.00	12.30	4.00	3.26	0.74	10.00	0.01	10.00	10.08	0.37	0.17	40.00	120.00	0.35	0.41	1	2

Table 7 (continued)
Summary of Water Quality Data

Sample ID	Statistic	Temp (°C)	pH	Specific Conductance (uS/cm)	DO (mg/L)	ORP (mV)	Total Alkalinity (mg/L)	TSS (mg/L)	VSS (mg/L)	CBOD ₅ (mg/L)	COD (mg/L)	TN (mg/L N) ¹	TKN (mg/L N)	Organic N (mg/L N) ²	NH ₃ -N (mg/L N)	NO ₃ -N (mg/L N)	NO ₂ -N (mg/L N)	NO _x (mg/L N)	TIN (mg/L N) ³	TP (mg/L)	Ortho P (mg/L P)	Chloride	Sulfate (mg/L)	Hydrogen Sulfide (mg/L)	Sulfide (mg/L)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)
Groundwater PZ08	n	5	5	5	5	5	3	3	3	4	4	5	5	5	5	5	5	5	5	4	4	4	4	4	4	3	3
	MEAN	24.67	6.16	688.20	3.06	78.60	180.00	18.33	8.67	6.75	32.50	8.48	1.59	1.57	0.02	6.88	0.01	6.88	6.90	0.38	0.17	23.75	76.50	0.13	0.20	2	2
	STD. DEV.	4.20		171.14	1.14	77.96	10.00	12.66	6.11	5.50	18.48	8.04	0.84	0.84	0.02	7.32	0.00	7.32	7.31	0.08	0.14	11.21	39.42	0.15	0.15		
	MIN	20.04	5.67	527.00	2.12	-21.90	170.00	4.00	2.00	2.00	10.00	2.54	0.84	0.83	0.01	1.70	0.01	1.70	1.71	0.29	0.05	15.00	35.00	0.01	0.10	1	2
	MAX	29.70	6.44	962.00	4.90	186.00	190.00	28.00	14.00	12.00	50.00	21.50	2.50	2.48	0.05	19.00	0.01	19.00	19.02	0.47	0.36	40.00	130.00	0.32	0.41	10	2
Groundwater PZ09	n	4	4	4	4	4	2	2	2	2	3	4	4	4	4	4	4	4	4	3	3	3	3	3	3	2	2
	MEAN	25.98	5.59	558.25	3.22	98.90	115.00	42.50	17.50	2.00	126.67	14.13	2.30	2.25	0.05	11.83	0.01	11.83	11.87	2.23	1.66	26.33	75.67	0.57	0.61	1	2
	STD. DEV.	3.27		48.92	1.83	95.96				0.00	150.19	2.68	0.63	0.60	0.03	2.10	0.00	2.09	2.12	1.97	1.60	12.74	37.90	0.19	0.20		
	MIN	21.30	5.09	525.00	0.62	38.30	110.00	11.00	11.00	2.00	35.00	11.11	1.80	1.76	0.01	9.30	0.01	9.31	9.32	1.00	0.73	18.00	35.00	0.37	0.41	1	2
	MAX	28.90	5.94	629.00	4.81	241.70	120.00	74.00	24.00	2.00	300.00	17.10	3.10	3.03	0.07	14.00	0.01	14.00	14.07	4.50	3.50	41.00	110.00	0.75	0.81	1	2
Groundwater PZA7-6	n	10	10	10	10	6	9	0	0	0	3	10	10	10	10	7	6	10	10	2	1	8	7	0	0	1	1
	MEAN	23.45	6.04	494.70	2.12	53.37	114.67				186.67	4.60	1.89	1.72	0.17	0.46	0.02	2.71	2.88	0.62	1.00	22.59	48.89			1	2
	STD. DEV.	3.40		185.66	2.04	110.26	49.59				15.28	6.26	1.14	1.10	0.12	0.64	0.02	5.46	5.49	0.51		11.33	38.60				
	MIN	18.50	5.80	242.00	0.09	-51.40	58.00				170.00	0.58	0.56	0.44	0.02	0.01	0.01	0.02	0.04	0.26	1.00	5.70	0.20			1	2
	MAX	28.00	6.30	701.00	5.50	249.90	190.00				200.00	20.60	3.60	3.30	0.35	1.70	0.06	17.00	17.30	0.98	1.00	42.00	110.00			1	2
Groundwater PZA7-8	n	11	11	11	11	6	10	0	0	0	4	11	11	11	11	9	9	11	11	2	2	9	8	0	0	1	1
	MEAN	23.62	5.99	559.36	0.61	-19.92	108.30				90.50	13.86	3.17	2.30	0.87	6.93	0.03	10.69	11.55	5.00	3.00	24.10	48.63			1	2
	STD. DEV.	2.32		160.46	0.55	113.25	102.79				57.88	12.74	1.53	1.32	1.28	8.91	0.04	12.46	12.53	0.42	1.41	12.06	22.89				
	MIN	20.00	5.60	186.00	0.11	-200.20	2.00				36.00	1.24	0.89	0.58	0.01	0.34	0.01	0.35	0.66	4.70	2.00	3.90	14.00			1	2
	MAX	26.90	6.38	784.00	1.67	115.30	270.00				150.00	39.20	5.80	4.87	4.10	23.00	0.12	37.00	37.01	5.30	4.00	40.00	84.00			1	2
Groundwater PZB8-5	n	11	11	11	11	6	10	0	0	0	5	11	11	11	11	10	9	11	11	2	3	9	10	0	0	1	1
	MEAN	23.71	5.81	460.09	0.71	89.83	81.10				86.20	12.92	2.78	2.68	0.10	7.03	0.05	10.13	10.24	0.75	0.70	22.56	40.50			1	2
	STD. DEV.	2.81		86.13	0.58	80.65	46.30				51.74	14.26	1.11	1.17	0.08	9.67	0.06	13.44	13.40	0.92	0.26	6.82	22.81				
	MIN	19.79	5.50	296.00	0.10	-4.90	21.00				0.00	1.02	1.00	0.72	0.03	0.01	0.01	0.02	0.10	0.10	0.49	13.00	0.00			1	2
	MAX	29.00	6.16	586.00	2.19	213.30	180.00				130.00	39.70	4.70	4.67	0.28	28.00	0.18	35.00	35.03	1.40	0.99	34.00	76.00			1	2
Groundwater PZB8-7	n	11	11	11	10	6	9	1	1	1	5	11	11	11	11	7	7	11	11	2	0	9	6	0	0	1	1
	MEAN	23.64	5.85	348.18	0.51	114.13	51.89				44.20	6.05	1.61	1.52	0.09	2.48	0.05	4.44	4.53	0.50		29.10	14.83			1	2
	STD. DEV.	2.31		91.38	0.40	68.90	25.17				32.19	6.63	0.60	0.59	0.10	5.97	0.11	6.14	6.18	0.38		12.29	11.07				
	MIN	20.84	5.46	249.00	0.10	32.10	2.00				0.00	0.77	0.75	0.60	0.01	0.01	0.01	0.02	0.10	0.23		6.90	4.00			1	2
	MAX	27.80	6.10	518.00	1.27	207.00	93.00				90.00	18.00	2.50	2.36	0.38	16.00	0.30	16.00	16.02	0.77		44.00	30.00			1	2
Groundwater PZC10-6	n	11	11	11	11	6	10	0	0	0	4	11	11	11	11	8	7	11	11	2	1	9	7	0	0	1	1
	MEAN	24.18	5.91	383.88	0.94	15.30	119.20				97.75	5.69	3.59	2.91	0.68	1.26	0.03	2.10	2.78	0.10	0.01	17.67	13.91			1	2
	STD. DEV.	2.98		153.40	0.99	115.60	97.54				17.75	2.54	0.74	0.82	0.48	1.15	0.04	2.70	2.68	0.02		8.70	7.84				
	MIN	19.19	5.10	200.70	0.10	-70.70	15.00				77.00	2.98	2.70	1.50	0.11	0.01	0.01	0.02	0.21	0.08	0.01	8.00	4.00			1	2
	MAX	29.00	6.30	689.00	2.78	230.00	270.00				120.00	11.90	5.00	4.75	1.40	2.80	0.12	9.20	9.51	0.11	0.01	32.00	23.00			1	2

Notes:

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

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

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

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

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

5.0 B-HS3 Sample Event No. 6: Summary and Recommendations

5.1 Summary

The results of the sixth sampling event indicate that the system is operating well and no adjustments are recommended at this time. The Sample Event No. 6 results indicate that:

- Septic tank effluent (STE) quality is characteristic of typical household STE quality. The total nitrogen concentration of 44 mg/L is within the range of values typically reported for Florida single family residence STE.
- The combined Stage 1 and lined drip system with lignocellulosic media was effective in converting ammonium to oxidized nitrogen; effluent contained 0.93 mg/L TKN, of which 0.04 mg/L was ammonia. The lower media layer produced a reducing environment and effluent $\text{NO}_x\text{-N}$ was 0.06 mg/L.
- The Stage 2 biofilter effluent $\text{NO}_x\text{-N}$ was below the method detection limit of 0.02 mg/L.
- The total nitrogen concentration in the final effluent from the total treatment system was approximately 0.8 mg/L, an approximately 98% reduction from STE.

5.2 Recommendations

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



Appendix A: Laboratory Report

PRELIMINARY

o:\44237-001\Wpdocs\Report\Draft

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

September 17, 2014
Work Order: 1407939

Laboratory Report

Project Name		BHS3 SE#10						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS3-STE						
Matrix		Wastewater						
SAL Sample Number		1407939-01						
Date/Time Collected		08/22/14 08:45						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
<u>Inorganics</u>								
Hydrogen Sulfide (Unionized)	mg/L	0.68	SM 4550SF	0.04	0.01	08/26/14 09:43	09/05/14 10:46	1
Ammonia as N	mg/L	44	EPA 350.1	3.6	0.85		08/27/14 19:27	90
Carbonaceous BOD	mg/L	72	SM 5210B	2	2	08/22/14 15:23	08/27/14 11:43	1
Chemical Oxygen Demand	mg/L	150	EPA 410.4	25	10	09/02/14 14:15	09/03/14 09:11	1
Chloride	mg/L	39	EPA 300.0	0.20	0.050		08/22/14 18:42	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 18:42	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 18:42	1
Orthophosphate as P	mg/L	3.7	EPA 300.0	0.040	0.010		08/22/14 18:42	1
Phosphorous - Total as P	mg/L	5.0	SM 4500P-E	0.040	0.010	08/26/14 10:56	08/26/14 14:39	1
Sulfate	mg/L	18	EPA 300.0	0.60	0.20		08/22/14 18:42	1
Sulfide	mg/L	1.0	SM 4500SF	0.40	0.10		08/26/14 15:15	1
Total Alkalinity	mg/L	410	SM 2320B	8.0	2.0	08/26/14 11:22	08/26/14 13:13	1
Total Kjeldahl Nitrogen	mg/L	44	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Total Suspended Solids	mg/L	24	SM 2540D	1	1	08/27/14 08:36	08/28/14 16:19	1
Volatile Suspended Solids	mg/L	22	EPA 160.4	1	1	08/27/14 08:36	08/28/14 16:19	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/22/14 18:42	1
<u>Microbiology</u>								
E. Coli	MPN/100 mL	170	SM 9223B	2.0	2.0	08/22/14 16:20	08/23/14 11:15	1
Fecal Coliforms	CFU/100 ml	100,000 B	SM 9222D	1000	1000	08/22/14 16:06	08/23/14 12:20	1000
Sample Description		BHS3-STE-FILTERED						
Matrix		Wastewater						
SAL Sample Number		1407939-02						
Date/Time Collected		08/22/14 08:45						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
<u>Inorganic, Dissolved</u>								
Ammonia as N	mg/L	40	EPA 350.1	3.6	0.85		09/08/14 18:02	90
Carbonaceous BOD	mg/L	22	SM 5210B	2	2	08/22/14 15:20	08/28/14 11:49	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 18:52	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 18:52	1
Total Kjeldahl Nitrogen	mg/L	50	EPA 351.2	0.20	0.050	09/02/14 12:46	09/04/14 15:10	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/22/14 18:52	1
Lab filtration for diss. analytes							08/22/14 15:00	

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

September 17, 2014
Work Order: 1407939

Laboratory Report

Project Name		BHS3 SE#10						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS3-LY01						
Matrix		Wastewater						
SAL Sample Number		1407939-03						
Date/Time Collected		08/22/14 08:24						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
Inorganics								
Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		08/27/14 16:23	1
Carbonaceous BOD	mg/L	14	SM 5210B	2	2	08/22/14 15:23	08/27/14 11:43	1
Chemical Oxygen Demand	mg/L	29	EPA 410.4	25	10	09/02/14 14:15	09/03/14 09:11	1
Chloride	mg/L	61	EPA 300.0	0.20	0.050		08/22/14 19:01	1
Nitrate (as N)	mg/L	33	EPA 300.0	0.04	0.01		08/22/14 19:01	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 19:01	1
Orthophosphate as P	mg/L	0.52 Q	EPA 300.0	0.040	0.010		09/12/14 12:21	1
Phosphorous - Total as P	mg/L	0.60	SM 4500P-E	0.040	0.010	08/26/14 10:56	08/26/14 14:39	1
Sulfate	mg/L	21	EPA 300.0	0.60	0.20		08/22/14 19:01	1
Total Alkalinity	mg/L	130	SM 2320B	8.0	2.0	08/26/14 11:22	08/26/14 13:40	1
Total Kjeldahl Nitrogen	mg/L	1.3	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Total Suspended Solids	mg/L	2	SM 2540D	1	1	08/27/14 08:36	08/28/14 16:19	1
Volatile Suspended Solids	mg/L	2	EPA 160.4	1	1	08/27/14 08:36	08/28/14 16:19	1
Nitrate+Nitrite (N)	mg/L	33	EPA 300.0	0.08	0.02		08/22/14 19:01	1
Sample Description		BHS3-LY02						
Matrix		Wastewater						
SAL Sample Number		1407939-04						
Date/Time Collected		08/22/14 08:38						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
Inorganics								
Ammonia as N	mg/L	0.19	EPA 350.1	0.040	0.009		08/27/14 16:25	1
Carbonaceous BOD	mg/L	23	SM 5210B	2	2	08/22/14 15:23	08/27/14 11:43	1
Chemical Oxygen Demand	mg/L	39	EPA 410.4	25	10	09/02/14 14:15	09/03/14 09:11	1
Chloride	mg/L	36	EPA 300.0	0.20	0.050		08/22/14 19:10	1
Nitrate (as N)	mg/L	18	EPA 300.0	0.04	0.01		08/22/14 19:10	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 19:10	1
Orthophosphate as P	mg/L	1.2	EPA 300.0	0.040	0.010		08/22/14 19:10	1
Phosphorous - Total as P	mg/L	1.2	SM 4500P-E	0.040	0.010	08/26/14 10:56	08/26/14 14:39	1
Sulfate	mg/L	46	EPA 300.0	0.60	0.20		08/22/14 19:10	1
Total Alkalinity	mg/L	150	SM 2320B	8.0	2.0	08/26/14 11:22	08/26/14 13:53	1
Total Kjeldahl Nitrogen	mg/L	2.2	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Total Suspended Solids	mg/L	1	SM 2540D	1	1	08/27/14 08:36	08/28/14 16:19	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	08/27/14 08:36	08/28/14 16:19	1
Nitrate+Nitrite (N)	mg/L	18	EPA 300.0	0.08	0.02		08/22/14 19:10	1

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

September 17, 2014
Work Order: 1407939

Laboratory Report

Project Name		BHS3 SE#10						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS3-LINER						
Matrix		Wastewater						
SAL Sample Number		1407939-05						
Date/Time Collected		08/22/14 07:50						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
<u>Inorganics</u>								
Ammonia as N	mg/L	0.039 I	EPA 350.1	0.040	0.009		08/27/14 16:26	1
Carbonaceous BOD	mg/L	8	SM 5210B	2	2	08/22/14 15:23	08/27/14 11:43	1
Chemical Oxygen Demand	mg/L	23 I	EPA 410.4	25	10	09/02/14 14:15	09/03/14 09:11	1
Chloride	mg/L	29	EPA 300.0	0.20	0.050		08/22/14 19:20	1
Nitrate (as N)	mg/L	0.06	EPA 300.0	0.04	0.01		08/22/14 19:20	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 19:20	1
Orthophosphate as P	mg/L	0.056	EPA 300.0	0.040	0.010		08/22/14 19:20	1
Phosphorous - Total as P	mg/L	0.37	SM 4500P-E	0.040	0.010	08/26/14 10:56	08/26/14 14:39	1
Sulfate	mg/L	29	EPA 300.0	0.60	0.20		08/22/14 19:20	1
Total Alkalinity	mg/L	260	SM 2320B	8.0	2.0	08/26/14 11:22	08/26/14 14:02	1
Total Kjeldahl Nitrogen	mg/L	0.93	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Total Suspended Solids	mg/L	8	SM 2540D	1	1	08/27/14 08:36	08/28/14 16:19	1
Volatile Suspended Solids	mg/L	5	EPA 160.4	1	1	08/27/14 08:36	08/28/14 16:19	1
Nitrate+Nitrite (N)	mg/L	0.06 I	EPA 300.0	0.08	0.02		08/22/14 19:20	1
<u>Microbiology</u>								
E. Coli	MPN/100 mL	2.0 U,Q	SM 9223B	2.0	2.0	08/22/14 16:20	08/23/14 11:15	1
Fecal Coliforms	CFU/100 ml	2,600 Q	SM 9222D	10	10	08/22/14 16:06	08/23/14 12:20	10

Sample Description **BHS3-LINER-FILTERED**
 Matrix **Wastewater**
 SAL Sample Number **1407939-06**
 Date/Time Collected **08/22/14 07:50**
 Collected by **Josefin Hirst**
 Date/Time Received **08/22/14 15:00**

<u>Inorganic, Dissolved</u>								
Ammonia as N	mg/L	0.11	EPA 350.1	0.040	0.009		09/08/14 15:21	1
Carbonaceous BOD	mg/L	13	SM 5210B	2	2	08/22/14 15:20	08/28/14 11:49	1
Nitrate (as N)	mg/L	0.05	EPA 300.0	0.04	0.01		08/22/14 19:29	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 19:29	1
Total Kjeldahl Nitrogen	mg/L	0.82	EPA 351.2	0.20	0.050	09/02/14 12:46	09/04/14 15:10	1
Nitrate+Nitrite (N)	mg/L	0.05 I	EPA 300.0	0.08	0.02		08/22/14 19:29	1
Lab filtration for diss. analytes							08/22/14 15:00	

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

September 17, 2014
Work Order: 1407939

Laboratory Report

Project Name		BHS3 SE#10						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS3-ST2						
Matrix		Wastewater						
SAL Sample Number		1407939-07						
Date/Time Collected		08/22/14 07:46						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
<u>Inorganics</u>								
Hydrogen Sulfide (Unionized)	mg/L	1.6	SM 4550SF	0.04	0.01	08/26/14 09:43	09/05/14 10:46	1
Ammonia as N	mg/L	0.021 I	EPA 350.1	0.040	0.009		08/27/14 16:28	1
Carbonaceous BOD	mg/L	7	SM 5210B	2	2	08/22/14 15:23	08/27/14 11:43	1
Chemical Oxygen Demand	mg/L	33	EPA 410.4	25	10	09/02/14 14:15	09/03/14 09:11	1
Chloride	mg/L	29	EPA 300.0	0.20	0.050		08/22/14 19:39	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 19:39	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 19:39	1
Orthophosphate as P	mg/L	0.22	EPA 300.0	0.040	0.010		08/22/14 19:39	1
Phosphorous - Total as P	mg/L	0.43	SM 4500P-E	0.040	0.010	08/26/14 10:56	08/26/14 14:39	1
Sulfate	mg/L	74	EPA 300.0	0.60	0.20		08/22/14 19:39	1
Sulfide	mg/L	2.2	SM 4500SF	0.40	0.10		08/26/14 15:15	1
Total Alkalinity	mg/L	250	SM 2320B	8.0	2.0	08/26/14 11:22	08/26/14 14:09	1
Total Kjeldahl Nitrogen	mg/L	0.82	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Total Suspended Solids	mg/L	5	SM 2540D	1	1	08/27/14 08:36	08/28/14 16:19	1
Volatile Suspended Solids	mg/L	5	EPA 160.4	1	1	08/27/14 08:36	08/28/14 16:19	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/22/14 19:39	1
<u>Microbiology</u>								
E. Coli	MPN/100 mL	2.0 U,Q	SM 9223B	2.0	2.0	08/22/14 16:20	08/23/14 11:15	1
Fecal Coliforms	CFU/100 ml	1 U,Q	SM 9222D	1	1	08/22/14 16:06	08/23/14 12:20	1

Sample Description **BHS3-ST2-DUP**
 Matrix **Wastewater**
 SAL Sample Number **1407939-08**
 Date/Time Collected **08/22/14 07:54**
 Collected by **Josefin Hirst**
 Date/Time Received **08/22/14 15:00**

<u>Inorganics</u>								
Hydrogen Sulfide (Unionized)	mg/L	2.9	SM 4550SF	0.04	0.01	08/26/14 09:43	09/05/14 10:46	1
Ammonia as N	mg/L	0.055	EPA 350.1	0.040	0.009		08/27/14 18:36	1
Carbonaceous BOD	mg/L	6	SM 5210B	2	2	08/22/14 15:23	08/27/14 11:43	1
Chemical Oxygen Demand	mg/L	31	EPA 410.4	25	10	09/02/14 14:15	09/03/14 09:11	1
Chloride	mg/L	29	EPA 300.0	0.20	0.050		08/22/14 19:48	1
Nitrate (as N)	mg/L	0.03 I	EPA 300.0	0.04	0.01		08/22/14 19:48	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 19:48	1
Orthophosphate as P	mg/L	0.26	EPA 300.0	0.040	0.010		08/22/14 19:48	1
Phosphorous - Total as P	mg/L	0.46	SM 4500P-E	0.040	0.010	08/26/14 10:56	08/26/14 14:39	1

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

September 17, 2014
Work Order: 1407939

Laboratory Report

Project Name		BHS3 SE#10						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS3-ST2-DUP						
Matrix		Wastewater						
SAL Sample Number		1407939-08						
Date/Time Collected		08/22/14 07:54						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
Sulfate	mg/L	77	EPA 300.0	0.60	0.20		08/22/14 19:48	1
Sulfide	mg/L	4.0	SM 4500SF	0.40	0.10		08/26/14 15:15	1
Total Alkalinity	mg/L	290	SM 2320B	8.0	2.0	09/05/14 08:45	09/05/14 14:26	1
Total Kjeldahl Nitrogen	mg/L	0.95	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Total Suspended Solids	mg/L	2	SM 2540D	1	1	08/27/14 08:36	08/28/14 16:19	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	08/27/14 08:36	08/28/14 16:19	1
Nitrate+Nitrite (N)	mg/L	0.03 I	EPA 300.0	0.08	0.02		08/22/14 19:48	1
Microbiology								
E. Coli	MPN/100 mL	2.0 U,Q	SM 9223B	2.0	2.0	08/22/14 16:20	08/23/14 11:15	1
Fecal Coliforms	CFU/100 ml	1 U,Q	SM 9222D	1	1	08/22/14 16:06	08/23/14 12:20	1
Sample Description		BHS3-ST2-FILTERED						
Matrix		Wastewater						
SAL Sample Number		1407939-09						
Date/Time Collected		08/22/14 07:46						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
Inorganic, Dissolved								
Ammonia as N	mg/L	0.059	EPA 350.1	0.040	0.009		09/08/14 15:22	1
Carbonaceous BOD	mg/L	11	SM 5210B	2	2	08/22/14 15:20	08/28/14 11:49	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 19:57	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 19:57	1
Total Kjeldahl Nitrogen	mg/L	0.88	EPA 351.2	0.20	0.050	09/02/14 12:46	09/04/14 15:10	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/22/14 19:57	1
Lab filtration for diss. analytes		08/22/14 15:00						
Sample Description		BHS3-LY03						
Matrix		Wastewater						
SAL Sample Number		1407939-10						
Date/Time Collected		08/22/14 08:25						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
Inorganics								
Ammonia as N	mg/L	0.060	EPA 350.1	0.040	0.009		09/10/14 11:50	1
Chemical Oxygen Demand	mg/L	41	EPA 410.4	25	10	09/02/14 14:15	09/03/14 09:11	1
Chloride	mg/L	21	EPA 300.0	0.20	0.050		08/22/14 20:07	1

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

September 17, 2014
Work Order: 1407939

Laboratory Report

Project Name		BHS3 SE#10						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS3-LY03						
Matrix		Wastewater						
SAL Sample Number		1407939-10						
Date/Time Collected		08/22/14 08:25						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
Nitrate (as N)	mg/L	12	EPA 300.0	0.04	0.01		08/22/14 20:07	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 20:07	1
Orthophosphate as P	mg/L	0.12	EPA 300.0	0.040	0.010		08/22/14 20:07	1
Phosphorous - Total as P	mg/L	0.21	SM 4500P-E	0.040	0.010	08/26/14 10:56	08/26/14 14:39	1
Sulfate	mg/L	90	EPA 300.0	0.60	0.20		08/22/14 20:07	1
Total Alkalinity	mg/L	9.6	SM 2320B	8.0	2.0	09/05/14 08:45	09/05/14 14:32	1
Total Kjeldahl Nitrogen	mg/L	1.8	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Total Suspended Solids	mg/L	2	SM 2540D	1	1	08/27/14 08:36	08/28/14 16:19	1
Volatile Suspended Solids	mg/L	2	EPA 160.4	1	1	08/27/14 08:36	08/28/14 16:19	1
Nitrate+Nitrite (N)	mg/L	12	EPA 300.0	0.08	0.02		08/22/14 20:07	1
Sample Description		BHS3-LY04						
Matrix		Wastewater						
SAL Sample Number		1407939-11						
Date/Time Collected		08/22/14 08:10						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
<u>Inorganics</u>								
Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		08/27/14 18:38	1
Carbonaceous BOD	mg/L	5	SM 5210B	2	2	08/22/14 15:23	08/27/14 11:43	1
Chemical Oxygen Demand	mg/L	27	EPA 410.4	25	10	09/02/14 14:15	09/03/14 09:11	1
Chloride	mg/L	0.050 U	EPA 300.0	0.20	0.050		08/22/14 20:44	1
Nitrate (as N)	mg/L	3.8	EPA 300.0	0.04	0.01		08/22/14 20:44	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 20:44	1
Orthophosphate as P	mg/L	0.042	EPA 300.0	0.040	0.010		08/22/14 20:44	1
Phosphorous - Total as P	mg/L	0.087	SM 4500P-E	0.040	0.010	08/26/14 10:56	08/26/14 14:39	1
Sulfate	mg/L	120	EPA 300.0	0.60	0.20		08/22/14 20:44	1
Total Alkalinity	mg/L	200	SM 2320B	8.0	2.0	09/05/14 08:45	09/05/14 14:40	1
Total Kjeldahl Nitrogen	mg/L	1.4	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	08/27/14 08:36	08/28/14 16:19	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	08/27/14 08:36	08/28/14 16:19	1
Nitrate+Nitrite (N)	mg/L	3.8	EPA 300.0	0.08	0.02		08/22/14 20:44	1

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

September 17, 2014
Work Order: 1407939

Laboratory Report

Project Name		BHS3 SE#10						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS3-PZ07						
Matrix		Wastewater						
SAL Sample Number		1407939-12						
Date/Time Collected		08/21/14 11:48						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
Inorganics								
Hydrogen Sulfide (Unionized)	mg/L	0.13	SM 4550SF	0.04	0.01	08/26/14 09:43	09/05/14 10:46	1
Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		08/27/14 18:40	1
Carbonaceous BOD	mg/L	5	SM 5210B	2	2	08/22/14 15:23	08/27/14 11:43	1
Chemical Oxygen Demand	mg/L	43	EPA 410.4	25	10	09/02/14 14:15	09/03/14 09:11	1
Chloride	mg/L	20	EPA 300.0	0.20	0.050		08/22/14 20:54	1
Nitrate (as N)	mg/L	4.6	EPA 300.0	0.04	0.01		08/22/14 20:54	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 20:54	1
Orthophosphate as P	mg/L	0.073	EPA 300.0	0.040	0.010		08/22/14 20:54	1
Phosphorous - Total as P	mg/L	0.37	SM 4500P-E	0.040	0.010	08/26/14 10:56	08/26/14 14:39	1
Sulfate	mg/L	74	EPA 300.0	0.60	0.20		08/22/14 20:54	1
Sulfide	mg/L	0.21 I	SM 4500SF	0.40	0.10		08/26/14 15:15	1
Total Alkalinity	mg/L	190	SM 2320B	8.0	2.0	08/26/14 11:22	08/26/14 14:16	1
Total Kjeldahl Nitrogen	mg/L	1.9	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Total Suspended Solids	mg/L	11	SM 2540D	1	1	08/27/14 08:36	08/28/14 16:19	1
Volatile Suspended Solids	mg/L	7	EPA 160.4	1	1	08/27/14 08:36	08/28/14 16:19	1
Nitrate+Nitrite (N)	mg/L	4.6	EPA 300.0	0.08	0.02		08/22/14 20:54	1

Sample Description **BHS3-PZ08**
Matrix **Wastewater**
SAL Sample Number **1407939-13**
Date/Time Collected **08/21/14 11:16**
Collected by **Josefin Hirst**
Date/Time Received **08/22/14 15:00**

Inorganics								
Hydrogen Sulfide (Unionized)	mg/L	0.01 U	SM 4550SF	0.04	0.01	08/26/14 09:43	09/05/14 10:46	1
Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		08/27/14 11:18	1
Carbonaceous BOD	mg/L	7	SM 5210B	2	2	08/22/14 15:23	08/27/14 11:43	1
Chemical Oxygen Demand	mg/L	50	EPA 410.4	25	10	09/02/14 14:15	09/03/14 09:11	1
Chloride	mg/L	18	EPA 300.0	0.20	0.050		08/22/14 21:03	1
Nitrate (as N)	mg/L	1.7	EPA 300.0	0.04	0.01		08/22/14 21:03	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 21:03	1
Orthophosphate as P	mg/L	0.20	EPA 300.0	0.040	0.010		08/22/14 21:03	1
Phosphorous - Total as P	mg/L	0.34	SM 4500P-E	0.040	0.010	08/26/14 10:56	08/26/14 14:39	1
Sulfate	mg/L	72	EPA 300.0	0.60	0.20		08/22/14 21:03	1
Sulfide	mg/L	0.10 U	SM 4500SF	0.40	0.10		08/26/14 15:15	1
Total Alkalinity	mg/L	180	SM 2320B	8.0	2.0	08/26/14 11:22	08/26/14 14:23	1

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

September 17, 2014
Work Order: 1407939

Laboratory Report

Project Name		BHS3 SE#10						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS3-PZ08						
Matrix		Wastewater						
SAL Sample Number		1407939-13						
Date/Time Collected		08/21/14 11:16						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						

Total Kjeldahl Nitrogen	mg/L	0.84	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Total Suspended Solids	mg/L	28	SM 2540D	1	1	08/27/14 08:36	08/28/14 16:19	1
Volatile Suspended Solids	mg/L	14	EPA 160.4	1	1	08/27/14 08:36	08/28/14 16:19	1
Nitrate+Nitrite (N)	mg/L	1.7	EPA 300.0	0.08	0.02		08/22/14 21:03	1

Sample Description		BHS3-PZ09						
Matrix		Wastewater						
SAL Sample Number		1407939-14						
Date/Time Collected		08/21/14 10:36						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						

Inorganics

Hydrogen Sulfide (Unionized)	mg/L	0.75	SM 4550SF	0.04	0.01	08/26/14 09:43	09/05/14 10:46	1
Ammonia as N	mg/L	0.037 I	EPA 350.1	0.040	0.009		08/27/14 11:29	1
Carbonaceous BOD	mg/L	12	SM 5210B	2	2	08/22/14 15:23	08/27/14 11:43	1
Chemical Oxygen Demand	mg/L	45	EPA 410.4	25	10	09/02/14 14:15	09/03/14 09:11	1
Chloride	mg/L	20	EPA 300.0	0.20	0.050		08/22/14 21:12	1
Nitrate (as N)	mg/L	11	EPA 300.0	0.04	0.01		08/22/14 21:12	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 21:12	1
Orthophosphate as P	mg/L	0.73	EPA 300.0	0.040	0.010		08/22/14 21:12	1
Phosphorous - Total as P	mg/L	1.0	SM 4500P-E	0.040	0.010	08/26/14 10:56	08/26/14 14:39	1
Sulfate	mg/L	82	EPA 300.0	0.60	0.20		08/22/14 21:12	1
Sulfide	mg/L	0.81	SM 4500SF	0.40	0.10		08/26/14 15:15	1
Total Alkalinity	mg/L	110	SM 2320B	8.0	2.0	08/26/14 11:22	08/26/14 14:29	1
Total Kjeldahl Nitrogen	mg/L	1.8	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Total Suspended Solids	mg/L	74	SM 2540D	1	1	08/27/14 08:36	08/28/14 16:19	1
Volatile Suspended Solids	mg/L	24	EPA 160.4	1	1	08/27/14 08:36	08/28/14 16:19	1
Nitrate+Nitrite (N)	mg/L	11	EPA 300.0	0.08	0.02		08/22/14 21:12	1

Sample Description		PZ-A7-6						
Matrix		Wastewater						
SAL Sample Number		1407939-15						
Date/Time Collected		08/21/14 15:08						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						

Inorganics

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

September 17, 2014
Work Order: 1407939

Laboratory Report

Project Name		BHS3 SE#10						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		PZ-A7-6						
Matrix		Wastewater						
SAL Sample Number		1407939-15						
Date/Time Collected		08/21/14 15:08						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
Ammonia as N	mg/L	0.018 I	EPA 350.1	0.040	0.009		08/27/14 11:36	1
Chloride	mg/L	22	EPA 300.0	0.20	0.050		08/22/14 21:22	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 21:22	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 21:22	1
Sulfate	mg/L	59	EPA 300.0	0.60	0.20		08/22/14 21:22	1
Total Alkalinity	mg/L	160	SM 2320B	8.0	2.0	08/26/14 11:22	08/26/14 14:37	1
Total Kjeldahl Nitrogen	mg/L	0.77	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/22/14 21:22	1
Sample Description		PZ-A7-8						
Matrix		Wastewater						
SAL Sample Number		1407939-16						
Date/Time Collected		08/21/14 15:28						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
<u>Inorganics</u>								
Ammonia as N	mg/L	0.047	EPA 350.1	0.040	0.009		08/27/14 11:27	1
Chloride	mg/L	23	EPA 300.0	0.20	0.050		08/22/14 21:31	1
Nitrate (as N)	mg/L	3.3	EPA 300.0	0.04	0.01		08/22/14 21:31	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 21:31	1
Sulfate	mg/L	59	EPA 300.0	0.60	0.20		08/22/14 21:31	1
Total Alkalinity	mg/L	190	SM 2320B	8.0	2.0	08/26/14 11:22	08/26/14 14:45	1
Total Kjeldahl Nitrogen	mg/L	1.5	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Nitrate+Nitrite (N)	mg/L	3.3	EPA 300.0	0.08	0.02		08/22/14 21:31	1
Sample Description		PZ-B8-5						
Matrix		Wastewater						
SAL Sample Number		1407939-17						
Date/Time Collected		08/21/14 12:28						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
<u>Inorganics</u>								
Ammonia as N	mg/L	0.074	EPA 350.1	0.040	0.009		08/27/14 11:17	1
Chloride	mg/L	26	EPA 300.0	0.20	0.050		08/22/14 21:40	1
Nitrate (as N)	mg/L	0.03 I	EPA 300.0	0.04	0.01		08/22/14 21:40	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 21:40	1

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

September 17, 2014
Work Order: 1407939

Laboratory Report

Project Name		BHS3 SE#10						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		PZ-B8-5						
Matrix		Wastewater						
SAL Sample Number		1407939-17						
Date/Time Collected		08/21/14 12:28						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
Sulfate	mg/L	76	EPA 300.0	0.60	0.20		08/22/14 21:40	1
Total Alkalinity	mg/L	110	SM 2320B	8.0	2.0	08/26/14 11:22	08/26/14 14:52	1
Total Kjeldahl Nitrogen	mg/L	1.6	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Nitrate+Nitrite (N)	mg/L	0.03 I	EPA 300.0	0.08	0.02		08/22/14 21:40	1
Sample Description		PZ-B8-7						
Matrix		Wastewater						
SAL Sample Number		1407939-18						
Date/Time Collected		08/21/14 12:42						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
<u>Inorganics</u>								
Ammonia as N	mg/L	0.084	EPA 350.1	0.040	0.009		08/27/14 11:20	1
Chloride	mg/L	39	EPA 300.0	0.20	0.050		08/22/14 21:50	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 21:50	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 21:50	1
Sulfate	mg/L	6.9	EPA 300.0	0.60	0.20		08/22/14 21:50	1
Total Alkalinity	mg/L	61	SM 2320B	8.0	2.0	08/26/14 11:22	08/26/14 14:57	1
Total Kjeldahl Nitrogen	mg/L	1.3	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/22/14 21:50	1
Sample Description		PZ-C10-6						
Matrix		Wastewater						
SAL Sample Number		1407939-19						
Date/Time Collected		08/21/14 15:44						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
<u>Inorganics</u>								
Ammonia as N	mg/L	0.25	EPA 350.1	0.040	0.009		08/27/14 11:22	1
Chloride	mg/L	22	EPA 300.0	0.20	0.050		08/22/14 21:59	1
Nitrate (as N)	mg/L	0.03 I	EPA 300.0	0.04	0.01		08/22/14 21:59	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 21:59	1
Sulfate	mg/L	4.0	EPA 300.0	0.60	0.20		08/22/14 21:59	1
Total Alkalinity	mg/L	180	SM 2320B	8.0	2.0	08/26/14 11:22	08/26/14 15:11	1
Total Kjeldahl Nitrogen	mg/L	5.0	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Nitrate+Nitrite (N)	mg/L	0.03 I	EPA 300.0	0.08	0.02		08/22/14 21:59	1

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

September 17, 2014
Work Order: 1407939

Laboratory Report

Project Name		BHS3 SE#10						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		EB						
Matrix		Reagent Water						
SAL Sample Number		1407939-20						
Date/Time Collected		08/22/14 08:58						
Collected by		Josefin Hirst						
Date/Time Received		08/22/14 15:00						
<u>Inorganics</u>								
Hydrogen Sulfide (Unionized)	mg/L	0.01 U	SM 4550SF	0.04	0.01	08/26/14 09:43	09/05/14 10:46	1
Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		08/27/14 18:41	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	08/22/14 15:23	08/27/14 11:43	1
Chemical Oxygen Demand	mg/L	10 U	EPA 410.4	25	10	09/02/14 14:15	09/03/14 09:11	1
Chloride	mg/L	0.30	EPA 300.0	0.20	0.050		08/22/14 22:18	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 22:18	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		08/22/14 22:18	1
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		08/22/14 22:18	1
Phosphorous - Total as P	mg/L	0.010 U	SM 4500P-E	0.040	0.010	08/26/14 10:56	08/26/14 14:39	1
Sulfate	mg/L	0.21 I	EPA 300.0	0.60	0.20		08/22/14 22:18	1
Sulfide	mg/L	0.10 U	SM 4500SF	0.40	0.10		08/26/14 15:15	1
Total Alkalinity	mg/L	2.1 I	SM 2320B	8.0	2.0	09/05/14 08:45	09/05/14 14:52	1
Total Kjeldahl Nitrogen	mg/L	0.05 U	EPA 351.2	0.20	0.05	08/26/14 10:56	08/26/14 14:39	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	08/28/14 08:55	09/29/14 09:58	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	08/28/14 08:55	08/29/14 17:10	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		08/22/14 22:18	1
<u>Microbiology</u>								
E. Coli	MPN/100 mL	2.0 U	SM 9223B	2.0	2.0	08/22/14 16:20	08/23/14 11:15	1
Fecal Coliforms	CFU/100 ml	1	SM 9222D	1	1	08/22/14 16:06	08/23/14 12:20	1

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

September 17, 2014
 Work Order: 1407939

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH42233 - Ion Chromatography 300.0 Prep										
Blank (BH42233-BLK1)					Prepared & Analyzed: 08/22/14 18:14					
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Chloride	0.050 U	0.20	0.050	mg/L						
Orthophosphate as P	0.010 U	0.040	0.010	mg/L						
Sulfate	0.20 U	0.60	0.20	mg/L						
Surrogate: Dichloroacetate	0.919			mg/L	1.0		92	78-120		
Surrogate: Dichloroacetate	0.919			mg/L	1.0		92	78-120		
Surrogate: Dichloroacetate	0.919			mg/L	1.0		92	78-120		
Surrogate: Dichloroacetate	0.919			mg/L	1.0		92	78-120		
Surrogate: Dichloroacetate	0.919			mg/L	1.0		92	78-120		
LCS (BH42233-BS1)					Prepared & Analyzed: 08/22/14 18:23					
Sulfate	9.06	0.60	0.20	mg/L	9.0		101	85-115		
Nitrate (as N)	1.63	0.04	0.01	mg/L	1.7		96	85-115		
Chloride	2.92	0.20	0.050	mg/L	3.0		97	85-115		
Orthophosphate as P	0.920	0.040	0.010	mg/L	0.90		102	85-115		
Nitrite (as N)	1.38	0.04	0.01	mg/L	1.4		98	85-115		
Surrogate: Dichloroacetate	0.991			mg/L	1.0		99	78-120		
Surrogate: Dichloroacetate	0.991			mg/L	1.0		99	78-120		
Surrogate: Dichloroacetate	0.991			mg/L	1.0		99	78-120		
Surrogate: Dichloroacetate	0.991			mg/L	1.0		99	78-120		
Surrogate: Dichloroacetate	0.991			mg/L	1.0		99	78-120		
LCS Dup (BH42233-BSD1)					Prepared & Analyzed: 08/22/14 18:33					
Nitrite (as N)	1.29	0.04	0.01	mg/L	1.4		92	85-115	6	200
Nitrate (as N)	1.58	0.04	0.01	mg/L	1.7		93	85-115	3	200
Chloride	2.82	0.20	0.050	mg/L	3.0		94	85-115	3	200
Orthophosphate as P	0.920	0.040	0.010	mg/L	0.90		102	85-115	0	200
Sulfate	8.78	0.60	0.20	mg/L	9.0		98	85-115	3	200
Surrogate: Dichloroacetate	0.981			mg/L	1.0		98	78-120		
Surrogate: Dichloroacetate	0.981			mg/L	1.0		98	78-120		
Surrogate: Dichloroacetate	0.981			mg/L	1.0		98	78-120		
Surrogate: Dichloroacetate	0.981			mg/L	1.0		98	78-120		
Surrogate: Dichloroacetate	0.981			mg/L	1.0		98	78-120		

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

September 17, 2014
 Work Order: 1407939

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
---------	--------	-----	-----	-------	-------------	---------------	------	-------------	-----	-----------

Batch BH42233 - Ion Chromatography 300.0 Prep

Matrix Spike (BH42233-MS1)		Source: 1407939-10			Prepared & Analyzed: 08/22/14 20:16					
Chloride	24.6 L2	0.20	0.050	mg/L	3.0	21.0	120	80-120		
Nitrite (as N)	1.62 L2	0.04	0.01	mg/L	1.4	ND	116	85-115		
Nitrate (as N)	14.1 L2	0.04	0.01	mg/L	1.7	11.7	139	85-115		
Sulfate	96.6 L2	0.60	0.20	mg/L	9.0	90.0	74	85-115		
Orthophosphate as P	0.935	0.040	0.010	mg/L	0.90	0.124	90	85-115		
Surrogate: Dichloroacetate	1.11			mg/L	1.0		111	78-120		
Surrogate: Dichloroacetate	1.11			mg/L	1.0		111	78-120		
Surrogate: Dichloroacetate	1.11			mg/L	1.0		111	78-120		
Surrogate: Dichloroacetate	1.11			mg/L	1.0		111	78-120		
Surrogate: Dichloroacetate	1.11			mg/L	1.0		111	78-120		

Matrix Spike (BH42233-MS2)		Source: 1407939-19			Prepared & Analyzed: 08/22/14 22:09					
Sulfate	12.4	0.60	0.20	mg/L	9.0	4.04	92	85-115		
Orthophosphate as P	0.790 J2	0.040	0.010	mg/L	0.90	0.0310	84	85-115		
Nitrite (as N)	1.55	0.04	0.01	mg/L	1.4	ND	111	85-115		
Nitrate (as N)	1.65	0.04	0.01	mg/L	1.7	0.0310	95	85-115		
Chloride	22.6 L2	0.20	0.050	mg/L	3.0	22.3	9	80-120		
Surrogate: Dichloroacetate	0.906			mg/L	1.0		91	78-120		
Surrogate: Dichloroacetate	0.906			mg/L	1.0		91	78-120		
Surrogate: Dichloroacetate	0.906			mg/L	1.0		91	78-120		
Surrogate: Dichloroacetate	0.906			mg/L	1.0		91	78-120		
Surrogate: Dichloroacetate	0.906			mg/L	1.0		91	78-120		

Batch BH42239 - BOD

Blank (BH42239-BLK1)		Prepared: 08/22/14 Analyzed: 08/27/14 11:43								
Carbonaceous BOD	2 U	2	2	mg/L						

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 17, 2014
Work Order: 1407939

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH42239 - BOD										
LCS (BH42239-BS1)					Prepared: 08/22/14 Analyzed: 08/27/14 11:43					
Carbonaceous BOD	190	2	2	mg/L	200		95	85-115		
LCS Dup (BH42239-BS1)					Prepared: 08/22/14 Analyzed: 08/27/14 11:43					
Carbonaceous BOD	174	2	2	mg/L	200		87	85-115	9	200
Duplicate (BH42239-DUP1)					Source: 1407939-01		Prepared: 08/22/14 Analyzed: 08/27/14 11:43			
Carbonaceous BOD	65	2	2	mg/L		72			10	25
Batch BH42604 - Sulfide prep										
Blank (BH42604-BLK1)					Prepared & Analyzed: 08/26/14 15:15					
Sulfide	0.10 U	0.40	0.10	mg/L						
Blank (BH42604-BLK2)					Prepared & Analyzed: 08/26/14 15:15					
Sulfide	0.10 U	0.40	0.10	mg/L						
LCS (BH42604-BS1)					Prepared & Analyzed: 08/26/14 15:15					
Sulfide	5.03	0.40	0.10	mg/L	5.0		101	85-115		
LCS (BH42604-BS2)					Prepared & Analyzed: 08/26/14 15:15					
Sulfide	5.03	0.40	0.10	mg/L	5.0		101	85-115		
Matrix Spike (BH42604-MS1)					Source: 1408911-01		Prepared & Analyzed: 08/26/14 15:15			
Sulfide	4.83	0.40	0.10	mg/L	5.0	ND	97	85-115		
Matrix Spike (BH42604-MS2)					Source: 1408911-01		Prepared & Analyzed: 08/26/14 15:15			
Sulfide	4.83	0.40	0.10	mg/L	5.0	ND	97	85-115		

SOUTHERN ANALYTICAL LABORATORIES, INC.

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



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

September 17, 2014
Work Order: 1407939

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH42604 - Sulfide prep										
Matrix Spike Dup (BH42604-MSD1)		Source: 1408911-01			Prepared & Analyzed: 08/26/14 15:15					
Sulfide	4.83	0.40	0.10	mg/L	5.0	ND	97	85-115	0	14
Matrix Spike Dup (BH42604-MSD2)		Source: 1408911-01			Prepared & Analyzed: 08/26/14 15:15					
Sulfide	4.83	0.40	0.10	mg/L	5.0	ND	97	85-115	0	14
Batch BH42610 - alkalinity										
Blank (BH42610-BLK1)					Prepared & Analyzed: 09/04/14 11:22					
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
Blank (BH42610-BLK2)					Prepared & Analyzed: 08/26/14 12:42					
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
LCS (BH42610-BS1)					Prepared & Analyzed: 08/26/14 12:57					
Total Alkalinity	120	8.0	2.0	mg/L	120		98	90-110		
LCS (BH42610-BS2)					Prepared & Analyzed: 08/26/14 13:03					
Total Alkalinity	120	8.0	2.0	mg/L	120		97	90-110		
Matrix Spike (BH42610-MS1)		Source: 1407939-01			Prepared & Analyzed: 08/26/14 13:24					
Total Alkalinity	520	8.0	2.0	mg/L	120	410	83	80-120		
Matrix Spike (BH42610-MS2)		Source: 1407976-01			Prepared: 08/26/14 Analyzed: 09/04/14 11:22					
Total Alkalinity	560	8.0	2.0	mg/L	120	440	97	80-120		
Matrix Spike Dup (BH42610-MSD1)		Source: 1407939-01			Prepared & Analyzed: 08/26/14 13:34					
Total Alkalinity	510	8.0	2.0	mg/L	120	410	82	80-120	0.2	26

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 17, 2014
Work Order: 1407939

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH42610 - alkalinity										
Matrix Spike Dup (BH42610-MSD2)		Source: 1407976-01			Prepared: 08/26/14 Analyzed: 09/04/14 11:22					
Total Alkalinity	560	8.0	2.0	mg/L	120	440	95	80-120	0.4	26
Batch BH42619 - Digestion for TP and TKN										
Blank (BH42619-BLK1)		Prepared & Analyzed: 08/26/14 14:39								
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
Phosphorous - Total as P	0.010 U	0.040	0.010	mg/L						
LCS (BH42619-BS1)		Prepared & Analyzed: 08/26/14 14:39								
Phosphorous - Total as P	1.07	0.040	0.010	mg/L	1.0		107	90-110		
Total Kjeldahl Nitrogen	0.978	0.20	0.05	mg/L	1.0		98	90-110		
Matrix Spike (BH42619-MS1)		Source: 1407939-13			Prepared & Analyzed: 08/26/14 14:39					
Total Kjeldahl Nitrogen	1.77	0.20	0.05	mg/L	1.0	0.844	93	90-110		
Phosphorous - Total as P	1.35	0.040	0.010	mg/L	1.0	0.335	102	90-110		
Matrix Spike (BH42619-MS2)		Source: 1407975-04			Prepared & Analyzed: 08/26/14 14:39					
Phosphorous - Total as P	4.20	0.040	0.010	mg/L	1.0	3.14	106	90-110		
Total Kjeldahl Nitrogen	7.28 J5	0.20	0.05	mg/L	1.0	5.56	172	90-110		
Matrix Spike Dup (BH42619-MSD1)		Source: 1407939-13			Prepared & Analyzed: 08/26/14 14:39					
Phosphorous - Total as P	1.34	0.040	0.010	mg/L	1.0	0.335	101	90-110	0.7	25
Total Kjeldahl Nitrogen	1.83	0.20	0.05	mg/L	1.0	0.844	98	90-110	3	20
Matrix Spike Dup (BH42619-MSD2)		Source: 1407975-04			Prepared & Analyzed: 08/26/14 14:39					
Phosphorous - Total as P	4.16	0.040	0.010	mg/L	1.0	3.14	101	90-110	1	25
Total Kjeldahl Nitrogen	5.12 J5	0.20	0.05	mg/L	1.0	5.56	NR	90-110	35	20

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 17, 2014
Work Order: 1407939

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH42639 - Ammonia by SEAL										
Blank (BH42639-BLK1)					Prepared & Analyzed: 08/27/14 10:56					
Ammonia as N	0.009 U	0.040	0.009	mg/L						
LCS (BH42639-BS1)					Prepared & Analyzed: 08/27/14 10:58					
Ammonia as N	0.52	0.040	0.009	mg/L	0.50		105	90-110		
Matrix Spike (BH42639-MS1)					Source: 1408931-07 Prepared & Analyzed: 08/27/14 11:00					
Ammonia as N	0.25 J5	0.040	0.009	mg/L	0.50	ND	50	90-110		
Matrix Spike (BH42639-MS2)					Source: 1407939-16 Prepared & Analyzed: 08/27/14 11:24					
Ammonia as N	0.39 J5	0.040	0.009	mg/L	0.50	0.047	68	90-110		
Matrix Spike Dup (BH42639-MSD1)					Source: 1408931-07 Prepared & Analyzed: 08/27/14 11:01					
Ammonia as N	0.40 J5	0.040	0.009	mg/L	0.50	ND	81	90-110	47	10
Matrix Spike Dup (BH42639-MSD2)					Source: 1407939-16 Prepared & Analyzed: 08/27/14 11:25					
Ammonia as N	0.34 J5	0.040	0.009	mg/L	0.50	0.047	58	90-110	14	10
Batch BH42703 - VSS Prep										
Blank (BH42703-BLK1)					Prepared: 08/27/14 Analyzed: 08/28/14 16:19					
Total Suspended Solids	1 U	1	1	mg/L						
Volatile Suspended Solids	1 U	1		mg/L						
LCS (BH42703-BS1)					Prepared: 08/27/14 Analyzed: 08/28/14 16:19					
Total Suspended Solids	45.0	1	1	mg/L	50		90	85-115		
LCS Dup (BH42703-BSD1)					Prepared: 08/27/14 Analyzed: 08/28/14 16:19					
Total Suspended Solids	48.8	1	1	mg/L	50		98	85-115	8	200

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 17, 2014
Work Order: 1407939

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH42703 - VSS Prep										
Duplicate (BH42703-DUP1)		Source: 1407939-01			Prepared: 08/27/14 Analyzed: 08/28/14 16:19					
Volatile Suspended Solids	32.0	1		mg/L		22.0			37	20
Total Suspended Solids	35.0	1	1	mg/L		24.0			37	30
Batch BH42719 - Ammonia by SEAL										
Blank (BH42719-BLK1)		Prepared & Analyzed: 08/27/14 16:14								
Ammonia as N	0.009 U	0.040	0.009	mg/L						
LCS (BH42719-BS1)		Prepared & Analyzed: 08/27/14 16:16								
Ammonia as N	0.52	0.040	0.009	mg/L	0.50		105	90-110		
Matrix Spike (BH42719-MS1)		Source: 1407939-01			Prepared & Analyzed: 08/27/14 19:24					
Ammonia as N	39 J5	3.6	0.85	mg/L	0.50	44	NR	90-110		
Matrix Spike (BH42719-MS2)		Source: 1407975-08			Prepared & Analyzed: 08/27/14 18:45					
Ammonia as N	1.8 J5	0.040	0.009	mg/L	0.50	1.7	24	90-110		
Matrix Spike Dup (BH42719-MSD1)		Source: 1407939-01			Prepared & Analyzed: 08/27/14 19:26					
Ammonia as N	39 J5	3.6	0.85	mg/L	0.50	44	NR	90-110	1	10
Matrix Spike Dup (BH42719-MSD2)		Source: 1407975-08			Prepared & Analyzed: 08/27/14 18:47					
Ammonia as N	1.8 J5	0.040	0.009	mg/L	0.50	1.7	16	90-110	2	10
Batch BH42807 - VSS Prep										
Blank (BH42807-BLK1)		Prepared: 08/28/14 Analyzed: 08/29/14 17:10								
Volatile Suspended Solids	1 U	1		mg/L						
Total Suspended Solids	1 U	1	1	mg/L						

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 17, 2014
Work Order: 1407939

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH42807 - VSS Prep										
LCS (BH42807-BS1)					Prepared: 08/28/14 Analyzed: 08/29/14 17:10					
Total Suspended Solids	51.0	1	1	mg/L	50		102	85-115		
Duplicate (BH42807-DUP1)					Source: 1407939-20 Prepared: 08/28/14 Analyzed: 08/29/14 17:10					
Volatile Suspended Solids	1 U	1		mg/L		ND				20
Total Suspended Solids	1 U	1	1	mg/L		ND				30
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

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

September 17, 2014
 Work Order: 1407939

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BI40231 - COD prep										
Blank (BI40231-BLK1)					Prepared: 09/02/14 Analyzed: 09/03/14 09:11					
Chemical Oxygen Demand	10 U	25	10	mg/L						
LCS (BI40231-BS1)					Prepared: 09/02/14 Analyzed: 09/03/14 09:11					
Chemical Oxygen Demand	49	25	10	mg/L	50		98	90-110		
Matrix Spike (BI40231-MS1)					Source: 1408512-26		Prepared: 09/02/14 Analyzed: 09/03/14 09:11			
Chemical Oxygen Demand	43	25	10	mg/L	50	ND	86	85-115		
Matrix Spike Dup (BI40231-MSD1)					Source: 1408512-26		Prepared: 09/02/14 Analyzed: 09/03/14 09:11			
Chemical Oxygen Demand	47	25	10	mg/L	50	ND	94	85-115	9	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		

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 17, 2014
Work Order: 1407939

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BI40506 - alkalinity										
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		
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 BI41123 - Ion Chromatography 300.0 Prep										
Blank (BI41123-BLK1)		Prepared & Analyzed: 09/12/14 10:38								
Orthophosphate as P	0.010 U	0.040	0.010	mg/L						
Surrogate: Dichloroacetate	0.897			mg/L	1.0		90	78-120		
LCS (BI41123-BS1)		Prepared & Analyzed: 09/12/14 10:47								
Orthophosphate as P	0.842	0.040	0.010	mg/L	0.90		94	85-115		
Surrogate: Dichloroacetate	1.03			mg/L	1.0		103	78-120		
LCS Dup (BI41123-BSD1)		Prepared & Analyzed: 09/12/14 10:56								
Orthophosphate as P	0.838	0.040	0.010	mg/L	0.90		93	85-115	0.5	200
Surrogate: Dichloroacetate	1.02			mg/L	1.0		102	78-120		
Matrix Spike (BI41123-MS1)		Source: 1409727-09			Prepared & Analyzed: 09/12/14 12:11					
Orthophosphate as P	9.07	0.40	0.10	mg/L	9.0	ND	101	85-115		
Surrogate: Dichloroacetate	1.18			mg/L	1.0		118	78-120		

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 17, 2014
Work Order: 1407939

Inorganic, Dissolved - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH42233 - Ion Chromatography 300.0 Prep										
Blank (BH42233-BLK1)					Prepared & Analyzed: 08/22/14 18:14					
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Surrogate: Dichloroacetate	0.919			mg/L	1.0		92	78-120		
Surrogate: Dichloroacetate	0.919			mg/L	1.0		92	78-120		
LCS (BH42233-BS1)					Prepared & Analyzed: 08/22/14 18:23					
Nitrite (as N)	1.38	0.04	0.01	mg/L	1.4		98	85-115		
Nitrate (as N)	1.63	0.04	0.01	mg/L	1.7		96	85-115		
Surrogate: Dichloroacetate	0.991			mg/L	1.0		99	78-120		
Surrogate: Dichloroacetate	0.991			mg/L	1.0		99	78-120		
LCS Dup (BH42233-BSD1)					Prepared & Analyzed: 08/22/14 18:33					
Nitrite (as N)	1.29	0.04	0.01	mg/L	1.4		92	85-115	6	200
Nitrate (as N)	1.58	0.04	0.01	mg/L	1.7		93	85-115	3	200
Surrogate: Dichloroacetate	0.981			mg/L	1.0		98	78-120		
Surrogate: Dichloroacetate	0.981			mg/L	1.0		98	78-120		
Matrix Spike (BH42233-MS1)					Source: 1407939-10		Prepared & Analyzed: 08/22/14 20:16			
Nitrate (as N)	14.1 L2	0.04	0.01	mg/L	1.7	11.7	139	85-115		
Nitrite (as N)	1.62 L2	0.04	0.01	mg/L	1.4	ND	116	85-115		
Surrogate: Dichloroacetate	1.11			mg/L	1.0		111	78-120		
Surrogate: Dichloroacetate	1.11			mg/L	1.0		111	78-120		
Matrix Spike (BH42233-MS2)					Source: 1407939-19		Prepared & Analyzed: 08/22/14 22:09			
Nitrate (as N)	1.66	0.04	0.01	mg/L	1.7	0.0310	96	85-115		
Nitrite (as N)	1.55	0.04	0.01	mg/L	1.4	ND	111	85-115		
Surrogate: Dichloroacetate	0.906			mg/L	1.0		91	78-120		
Surrogate: Dichloroacetate	0.906			mg/L	1.0		91	78-120		

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 17, 2014
Work Order: 1407939

Inorganic, Dissolved - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH42235 - BOD Dissolved										
Blank (BH42235-BLK1)					Prepared: 08/22/14 Analyzed: 08/28/14 11:49					
Carbonaceous BOD	2 U	2	2	mg/L						
LCS (BH42235-BS1)					Prepared: 08/22/14 Analyzed: 08/28/14 11:49					
Carbonaceous BOD	183	2	2	mg/L	200		92	85-115		
LCS Dup (BH42235-BSD1)					Prepared: 08/22/14 Analyzed: 08/28/14 11:49					
Carbonaceous BOD	175	2	2	mg/L	200		87	85-115	5	200
Duplicate (BH42235-DUP1)					Prepared: 08/22/14 Analyzed: 08/28/14 11:49					
Carbonaceous BOD	21	2	2	mg/L		22			6	25
Batch BI40224 - Digestion for TP and TKN										
Blank (BI40224-BLK1)					Prepared: 09/02/14 Analyzed: 09/04/14 15:10					
Total Kjeldahl Nitrogen	0.0740 I	0.20	0.050	mg/L						
LCS (BI40224-BS1)					Prepared: 09/02/14 Analyzed: 09/04/14 15:10					
Total Kjeldahl Nitrogen	1.02	0.20	0.050	mg/L	1.0		102	90-110		
Matrix Spike (BI40224-MS1)					Prepared: 09/02/14 Analyzed: 09/04/14 15:10					
Total Kjeldahl Nitrogen	4.68	0.20	0.050	mg/L	1.0	3.60	108	90-110		
Matrix Spike Dup (BI40224-MSD1)					Prepared: 09/02/14 Analyzed: 09/04/14 15:10					
Total Kjeldahl Nitrogen	4.70	0.20	0.050	mg/L	1.0	3.60	110	90-110	0.4	20
Batch BI40331 - Ammonia by SEAL										
Blank (BI40331-BLK1)					Prepared & Analyzed: 09/08/14 14:27					
Ammonia as N	0.009 U	0.040	0.009	mg/L						

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 17, 2014
Work Order: 1407939

Inorganic, Dissolved - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BI40331 - Ammonia by SEAL										
LCS (BI40331-BS1)					Prepared & Analyzed: 09/08/14 14:36					
Ammonia as N	0.53	0.040	0.009	mg/L	0.50		106	90-110		
Matrix Spike (BI40331-MS1)					Source: 1409399-06 Prepared & Analyzed: 09/08/14 17:07					
Ammonia as N	1.2 L	0.40	0.095	mg/L	0.50	19	NR	90-110		
Matrix Spike (BI40331-MS2)					Source: 1409390-07 Prepared & Analyzed: 09/08/14 15:02					
Ammonia as N	0.60 J2	0.040	0.009	mg/L	0.50	ND	120	90-110		
Matrix Spike Dup (BI40331-MSD1)					Source: 1409399-06 Prepared & Analyzed: 09/08/14 17:57					
Ammonia as N	22 L	3.6	0.85	mg/L	0.50	19	567	90-110	179	10
Matrix Spike Dup (BI40331-MSD2)					Source: 1409390-07 Prepared & Analyzed: 09/08/14 15:03					
Ammonia as N	0.56 J2	0.040	0.009	mg/L	0.50	ND	113	90-110	6	10

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 17, 2014
Work Order: 1407939

Microbiology - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BH42236 - FC-MF										
Blank (BH42236-BLK1)					Prepared: 08/22/14 Analyzed: 08/23/14 12:20					
Fecal Coliforms	1 U	1	1	CFU/100 ml						
Duplicate (BH42236-DUP1)					Source: 1407939-20 Prepared: 08/22/14 Analyzed: 08/23/14 12:20					
Fecal Coliforms	5.00	1	1	CFU/100 ml		1.00			133	200
Duplicate (BH42236-DUP2)					Source: 1407975-10 Prepared: 08/22/14 Analyzed: 08/23/14 12:20					
Fecal Coliforms	1 U	1	1	CFU/100 ml		ND				200

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

September 17, 2014
Work Order: 1407939

* Qualifiers, Notes and Definitions

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

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

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

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

- Q Sample held beyond the accepted holding time.
- 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.
- B Results based upon colony counts outside the indicated ideal range.

Questions regarding this report should be directed to :

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



Client Name Hazan and Sawyer										Contact / Phone: Josefin Hirst 813-630-4498									
Project Name / Location BHS3 SE#10																			
Samplers: (Signature) <i>[Signature]</i>										PARAMETER / CONTAINER DESCRIPTION									
Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water		Date	Time	Matrix	Composite	Grab	125mLP, Na ₂ S ₂ O ₃ FC-MF, FC-QT	500mLP, Cool Total Alkalinity, TSS, VSS, CBOD, NOx, Cl, OP, SO ₄	125mLP, H ₂ SO ₄ COD, TKN, NH ₃ , TP	500mLP, NaOH & Zn Acetate H ₂ S	500mLP, Cool Lab Filter (CBOD, TKN, NH ₃ , NOx)				pH	Temperature	Conductivity	DO	
SAL Use Only Sample No.	Sample Description																		
01	BHS3-STE	8/22/14	8:45	WW		X	4	2	1	1					7.33	27.97	1135	0.05	
02	BHS3-STE-FILTERED	↑	8:45	WW		X					1				7.33	27.97	1135	0.05	
03	BHS3-LY01		8:24	WW		X		2	1						6.98	27.79	541	0.54	
04	BHS3-LY02		8:38	WW		X		2	1						6.77	27.41	714	0.73	
05	BHS3-LINER		7:50	WW		X	4	2	1						6.39	28.4	697	0.31	
06	BHS3-LINER-FILTERED		7:50	WW		X					1				6.39	28.4	697	0.31	
07	BHS3-ST2		7:46	WW		X	4	2	1	1					6.54	28.05	854	0.06	
08	BHS3-ST2-DUP		7:54	WW		X	4	2	1	1					6.56	28.15	835	0.05	
09	BHS3-ST2-FILTERED		7:46	WW		X					1				6.54	28.05	854	0.06	
10	BHS3-LY03		8:25	WW		X		2	1	1					6.60	25.7	831	5.08	
11	BHS3-LY04	8/22/14	8:10	WW		X		2	1	1					6.34	26.2	786	3.97	
12	BHS3-PZ07	8/21/14	11:48	WW		X	4	2	1	1					6.74	34.7	733	5.44	
Containers Prepared/ Relinquished: <i>[Signature]</i>		Date/Time: 080114 0730	Received: <i>[Signature]</i>		Date/Time: 080114 13:00		Seal intact? <input checked="" type="checkbox"/> N N/A Samples intact upon arrival? <input checked="" type="checkbox"/> N N/A Received on ice? Temp _____ <input type="checkbox"/> N N/A Proper preservatives indicated: <input checked="" type="checkbox"/> N N/A Rec'd within holding time? <input checked="" type="checkbox"/> N N/A Volatiles rec'd w/out headspace: Y N <input checked="" type="checkbox"/> Proper containers used? <input checked="" type="checkbox"/> N N/A										Instructions / Remarks		
Relinquished: <i>[Signature]</i>		Date/Time: 082214	Received: <i>[Signature]</i>		Date/Time: 8/22/14 15:20														
Relinquished: <i>[Signature]</i>		Date/Time: 082214 1:27	Received: <i>[Signature]</i>		Date/Time: 8-22-14 1500														
Relinquished: <i>[Signature]</i>		Date/Time:	Received:		Date/Time:														
Relinquished:		Date/Time:	Received:		Date/Time:														

Client Name Hazan and Sawyer										Contact / Phone: Josefin Hirst 813-630-4498									
Project Name / Location BHS3 SE#10																			
Samplers: (Signature) <i>[Signature]</i>										PARAMETER / CONTAINER DESCRIPTION									
Matrix Codes: DW-Drinking Water WW-Wastewater SW-Surface Water SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water		Date	Time	Matrix	Composite	Grab	125mLP, Na ₂ S ₂ O ₃ FC-MF, FC-QT	500mLP, Cool Total Alkalinity, TSS, VSS, CBOD, NOx, Cl, OP, SO ₄	125mLP, H ₂ SO ₄ COD, TKN, NH ₃ , TP	500mLP, NaOH & Zn Acetate H ₂ S	500mLP, Cool Lab Filter (CBOD, TKN, NH ₃ , NOx)	500mLP, Cool Total Alkalinity, NOx, Cl, SO ₄	125mLP, H ₂ SO ₄ TKN, NH ₃	pH	Temperature	Conductivity	DO		
SAL Use Only Sample No.	Sample Description																		
13	BHS3-PZ08	8/21/14	11:16	WW		X	4	2	1	1				6.03	29.7	606	2.60		
14	BHS3-PZ09	↑	10:36	WW		X	4	2	1	1				5.79	28.9	629	4.05		
15	PZ-A7-6		15:08	WW		X						1	1	6.02	28.0	568	1.76		
16	PZ-A7-8		15:28	WW		X						1	1	6.02	26.9	630	1.67		
17	PZ-B8-5		12:28	WW		X						1	1	5.75	29.0	530	0.98		
18	PZ-B8-7		12:42	WW		X						1	1	5.70	22.8	305	1.27		
19	PZ-C10-6	8/21/14	15:44	WW		X						1	1	6.17	29.0	410	1.22		
20	EB	8/22/14	8:58	R		X	4	2	1	1				6.52	23.14	1	1.22		
Containers Prepared/ Relinquished: <i>[Signature]</i>		Date/Time: 0730/14	Received: <i>[Signature]</i>		Date/Time: 0801/14 12:00		Seal intact? <input checked="" type="checkbox"/> N N/A						Instructions / Remarks						
Relinquished: <i>[Signature]</i>		Date/Time: 0822/14	Received: <i>[Signature]</i>		Date/Time: 8/22/14 13:20		Samples intact upon arrival? <input checked="" type="checkbox"/> N N/A												
Relinquished: <i>[Signature]</i>		Date/Time: 0822/14	Received: <i>[Signature]</i>		Date/Time: 8/22/14 15:00		Received on ice? Temp. <input checked="" type="checkbox"/> N N/A												
Relinquished: <i>[Signature]</i>		Date/Time: 0822/14	Received: <i>[Signature]</i>		Date/Time: 8/22/14 15:00		Proper preservatives indicated? <input checked="" type="checkbox"/> N N/A												
Relinquished: <i>[Signature]</i>		Date/Time: 0822/14	Received: <i>[Signature]</i>		Date/Time: 8/22/14 15:00		Rec'd within holding time? <input checked="" type="checkbox"/> N N/A												
Relinquished: <i>[Signature]</i>		Date/Time: 0822/14	Received: <i>[Signature]</i>		Date/Time: 8/22/14 15:00		Volatiles rec'd w/out headspace? <input checked="" type="checkbox"/> Y N N/A												
Relinquished: <i>[Signature]</i>		Date/Time: 0822/14	Received: <i>[Signature]</i>		Date/Time: 8/22/14 15:00		Proper containers used? <input checked="" type="checkbox"/> Y N N/A												



Appendix B: Operation & Maintenance Log

Table B.1
Operation and Maintenance Log

Date	Description
7/25/2011	C-HS2 Groundwater Sample Event 1
11/30/2011	C-HS2 Groundwater Sample Event 2
3/13/2012	C-HS2 Groundwater Sample Event 3
7/10/2012	C-HS2 Groundwater Sample Event 4
6/14/2013	PNRS Pre-construction sample event
6/17/2013	PNRS construction. Old septic tank removed, new septic tank installed
	Stage 2 biofilter installed
6/18/2013	PNRS construction - backfill to set tanks, anchor trench for liner area
6/19/2013	PNRS construction - liner installed by Comanco
	Ligno and sand 50/50 filled to toe of lined area, fill dirt to grade
6/24/2013	New piezometers PZ-07, PZ-08, and PZ-09 installed and developed
	4 Lysimeters installed
6/26/2013	Both drip systems covered
7/9/2013	Electrician installed panel for system
7/11/2013	Electrician set up panel for hydraulic unit
	Dose times and volumes set
7/12/2013	System start-up
	Installed priming tee on pump. Installed reclaimed water flowmeter
7/17/2013	Site visit. System ok.
7/22/2013	Repaired leaks in feed and return lines
	Installed new fittings for air release valves
7/29/2013	Site visit. System ok.
7/31/2013	Sod installation
8/15/2013	Preliminary SE#1
9/5/2013	Site visit. System ok.
9/8/2013	Homeowner reported alarm went off at 9 pm
9/9/2013	System check - high water level in STE dose tank
	Both filters severely clogged - not able to dose
9/10/2013	System check, still high alarm - high water level in STE dose tank

o:\44237-001\Wpdocs\Report\Draft

Date	Description
9/10/2013	Not able to fix system - need replacement part for hydraulic unit
	Septic tank was pumped at 4 pm
9/11/2013	Homeowner reported no alarms
9/13/2013	Site visit. System ok.
9/17/2013	Installed replacement solenoid coil on backwash filter valve #2
	System operational again, septic tank very low volume
9/27/2013	SE#1 prep
	Applied vacuum to lysimeters
	Cleaned STE outlet filter screen
9/30/2013	Sample Event No. 1
10/11/2013	Site visit. System ok. Uploaded new program
10/17/2013	System check
	Bio valve ahead of pump had sand under the diaphragm in valve
11/8/2013	Site visit. System ok.
11/15/2013	Site visit. System ok.
11/27/2013	Site visit. System ok.
12/2/2013	Sample Event No. 2 preparation
12/4/2013	Sample Event No. 2
12/23/2013	Site visit. System ok.
1/23/2014	Site visit. System ok.
1/30/2014	Sample Event No. 3 preparation
2/3/2014	Sample Event No. 3
2/4/2014	Sample Event No. 4
2/5/2014	Sample Event No. 5
2/6/2014	Sample Event No. 6
2/7/2014	Sample Event No. 7
2/12/2014	Site visit. System ok.
3/14/2014	Site visit. System ok.
4/3/2014	Sample Event No. 8 (formal No. 4)
4/25/2014	Site visit. System ok.
4/29/2014	Site visit. System ok.
5/28/2014	Sample Event No. 9 (formal No. 5)
5/29/2014	Sample Event No. 9 (formal No. 5)
	Collected additives testing samples.
6/9/2014	Re-sampled BHS3-STE for toxicity testing.

o:\44237-001\Wpdocs\Report\Draft

Date	Description
7/11/2014	Site visit. Primary tank water level elevated.
	Cleaned STE screen; severely clogged.
	Pumped down STE dose tank to below high level float.
7/29/2014	Site visit. System ok.
8/21/2014	Sample Event No. 10 (formal No. 6)
8/22/2014	Sample Event No. 10 (formal No. 6)

o:\44237-001\Wpdocs\Report\Draft



Appendix C: Weather Station Data

Table C.1
Weather Station Data

2014	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Pressure (in)			Visibility (mi)			Wind (mph)			Precip (in)	Events
June	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	gust	sum	
6/1/2014	84	78	72	75	73	71	100	89	63	30.13	30.08	30.04	10	7	2	18	7	25	0.41	Rain-Thunderstorm
6/2/2014	84	77	72	72	68	65	93	76	54	30.16	30.11	30.08	10	10	10	20	9		0	
6/3/2014	82	75	68	69	66	64	87	74	58	30.11	30.07	30.01	10	10	10	12	6		0.02	
6/4/2014	87	77	68	68	63	59	93	65	41	30.03	29.98	29.94	10	10	10	13	3		0	
6/5/2014	91	78	68	69	66	62	90	66	40	30.00	29.94	29.88	10	10	10	10	4		0	
6/6/2014	93	82	72	72	69	66	87	66	41	30.01	29.95	29.90	10	10	10	12	7		0	
6/7/2014	93	84	75	74	70	67	96	69	45	30.02	29.96	29.84	10	10	8	23	8	30	0.04	Rain-Thunderstorm
6/8/2014	93	82	72	75	71	70	97	82	48	30.01	29.97	29.89	10	9	2	29	6	39	0.42	Rain-Thunderstorm
6/9/2014	93	81	71	74	71	69	93	75	50	30.00	29.96	29.91	10	10	10	12	5		0	Thunderstorm
6/10/2014	96	84	73	76	72	65	96	83	37	30.07	30.01	29.95	10	7	0	24	6		0.79	Fog-Rain-Thunderstorm
6/11/2014	88	79	71	74	71	67	97	87	59	30.02	29.98	29.94	10	8	1	18	6	38	1.09	Rain-Thunderstorm
6/12/2014	88	80	72	71	69	65	97	82	55	30.02	29.99	29.93	10	10	7	29	7	43	0.01	Rain-Thunderstorm
6/13/2014	86	77	70	74	71	69	97	84	65	30.04	29.99	29.95	10	9	2	17	9	31	0.09	Rain-Thunderstorm
6/14/2014	88	80	72	73	71	68	93	84	57	30.09	30.04	29.99	10	9	1	28	9	40	0.28	Rain-Thunderstorm
6/15/2014	91	80	70	74	71	66	97	77	53	30.14	30.10	30.06	10	10	10	21	4		0.02	Rain-Thunderstorm
6/16/2014	89	79	70	73	70	66	97	81	56	30.18	30.14	30.09	10	9	2	30	5	39	0.11	Rain-Hail-Thunderstorm
6/17/2014	90	81	72	73	70	66	96	73	48	30.18	30.13	30.09	10	10	10	14	4	28	0	
6/18/2014	88	80	73	74	71	68	96	77	55	30.15	30.13	30.10	10	10	7	22	5	32	0.01	Rain-Thunderstorm
6/19/2014	87	80	73	73	72	70	96	83	59	30.16	30.12	30.07	10	9	1	13	2		0.44	Rain-Thunderstorm
6/20/2014	91	82	73	76	73	69	97	80	53	30.09	30.04	29.98	10	10	10	15	6	17	0.06	Rain-Thunderstorm
6/21/2014	90	81	73	75	72	68	93	76	55	30.01	29.97	29.91	10	9	1	21	8	29	0.19	Rain-Thunderstorm
6/22/2014	90	82	75	75	72	69	94	72	57	29.98	29.95	29.92	10	10	10	20	9	28	0	Thunderstorm
6/23/2014	91	82	73	75	73	71	97	82	55	30.09	30.02	29.95	10	9	2	16	5		0	Rain-Thunderstorm
6/24/2014	93	84	75	75	73	71	94	75	47	30.14	30.10	30.06	10	10	10	15	6	22	0	Thunderstorm
6/25/2014	93	84	75	76	73	70	94	74	46	30.15	30.09	30.03	10	10	7	18	5	32	0	Thunderstorm
6/26/2014	95	84	73	75	72	69	97	77	44	30.12	30.05	29.96	10	8	0	18	6	31	1.14	Fog-Rain-Thunderstorm
6/27/2014	95	83	73	76	73	69	97	78	44	30.12	30.07	30.02	10	10	5	24	6	43	0.15	Rain-Thunderstorm
6/28/2014	95	84	73	74	72	69	93	70	43	30.15	30.12	30.07	10	10	10	12	6		0	
6/29/2014	93	85	77	75	73	72	90	71	50	30.14	30.09	30.05	10	10	10	15	6	20	0	Thunderstorm
6/30/2014	91	83	75	77	75	72	100	81	53	30.06	30.00	29.94	10	10	5	15	8	25	0	Rain

o:\44237-001\Wpdocs\Report\Draft

Table C.1
Weather Station Data (continued)

2014	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Pressure (in)			Visibility (mi)			Wind (mph)			Precip (in)	Events
July	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	gust	sum	
7/1/2014	91	84	77	78	75	72	100	84	55	29.95	29.92	29.88	10	10	10	21	8	28	0.02	Thunderstorm
7/2/2014	91	82	75	76	74	71	94	80	61	29.93	29.90	29.87	10	9	2	20	9	32	0	Rain-Thunderstorm
7/3/2014	93	84	75	77	73	70	94	77	48	30.09	30.00	29.93	10	9	2	21	10	36	0.11	Rain-Thunderstorm
7/4/2014	91	82	75	75	73	71	96	79	59	30.12	30.09	30.04	10	10	6	17	7	24	0.03	Thunderstorm
7/5/2014	93	83	73	75	73	71	100	88	49	30.14	30.11	30.06	10	7	1	21	7	29	1.41	Rain-Thunderstorm
7/6/2014	89	80	72	76	73	71	97	88	61	30.10	30.08	30.05	10	10	8	15	4		0.16	Rain-Thunderstorm
7/7/2014	89	80	71	76	73	71	100	82	63	30.14	30.09	30.05	10	10	10	14	3		0	Thunderstorm
7/8/2014	91	83	75	76	73	71	97	84	52	30.16	30.12	30.07	10	8	0	18	6	24	1.75	Rain-Thunderstorm
7/9/2014	93	82	73	78	74	71	97	85	52	30.15	30.10	30.06	10	10	10	17	5		0.09	Rain-Thunderstorm
7/10/2014	91	82	73	75	73	70	97	81	53	30.14	30.10	30.07	10	10	10	17	6	28	0.06	Rain-Thunderstorm
7/11/2014	90	81	73	76	74	70	100	81	59	30.17	30.13	30.08	10	9	1	18	5		0.38	Rain-Thunderstorm
7/12/2014	93	82	73	76	73	71	97	85	50	30.17	30.13	30.10	10	9	2	16	5		0.28	Rain-Thunderstorm
7/13/2014	93	82	73	78	74	71	100	88	57	30.13	30.10	30.06	10	8	0	25	4	36	1.1	Fog-Rain-Thunderstorm
7/14/2014	93	83	75	77	74	70	97	80	54	30.10	30.07	30.00	10	10	10	13	5	28	0.02	Rain-Thunderstorm
7/15/2014	91	82	73	75	73	70	96	85	53	30.04	30.00	29.95	10	9	2	15	6	20	0.63	Rain-Thunderstorm
7/16/2014	87	80	73	76	74	71	100	90	72	29.99	29.95	29.91	10	9	1	33	9	38	0.26	Rain-Thunderstorm
7/17/2014	91	83	75	76	74	69	97	80	52	30.03	29.97	29.92	10	10	10	15	6		0	Thunderstorm
7/18/2014	93	82	73	76	74	67	100	77	44	30.10	30.05	30.01	10	10	8	14	3		0	
7/19/2014	93	85	77	77	75	71	94	78	52	30.09	30.06	30.03	10	10	9	12	4		0	
7/20/2014	93	83	75	77	75	71	97	80	53	30.08	30.04	30.00	10	8	1	22	7	38	0.51	Rain-Thunderstorm
7/21/2014	93	82	73	77	74	71	100	85	52	30.09	30.05	29.99	10	8	1	25	6	33	2.47	Rain-Thunderstorm
7/22/2014	91	82	73	78	75	73	100	85	59	30.08	30.05	30.01	10	10	6	17	4	31	0.04	Rain-Thunderstorm
7/23/2014	91	83	75	79	75	72	100	80	53	30.09	30.05	30.00	10	10	7	9	3		0.01	Rain
7/24/2014	91	84	78	78	76	73	96	77	55	30.06	30.02	29.96	10	10	2	20	5	32	0.02	Rain-Thunderstorm
7/25/2014	87	81	75	75	74	73	94	87	66	30.09	30.07	30.06	10	10	10	8	6		0	
7/26/2014	84	81	78	75	74	73	83	80	74	30.07	30.06	30.04	10	10	10	8			0	Thunderstorm
7/27/2014	93	85	77	79	76	73	94	74	56	30.09	30.06	30.03	10	10	7	13	8	17	0	Rain-Thunderstorm
7/28/2014	93	86	80	78	76	73	89	71	57	30.05	30.00	29.94	10	9	0	16	10	26	0.25	Rain
7/29/2014	90	82	75	79	75	72	96	85	65	29.99	29.95	29.91	10	8	0	25	9	39	0.67	Fog-Rain-Thunderstorm
7/30/2014	93	83	73	77	70	63	100	68	38	29.99	29.95	29.92	10	10	7	9	6		0	
7/31/2014	93	83	75	79	76	72	97	80	55	29.99	29.96	29.93	10	10	8	15	4		0	Thunderstorm

o:\44237-001\Wpdocs\Report\Draft

Table C.1
Weather Station Data (continued)

2014	Temp. (°F)			Dew Point (°F)			Humidity (%)			Sea Level Pressure (in)			Visibility (mi)			Wind (mph)			Precip (in)	Events
August	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	low	high	avg	gust	sum	
8/1/2014	93	84	78	77	74	71	96	76	52	30.00	29.97	29.94	10	10	10	14	7		0	
8/2/2014	91	84	77	78	76	74	97	79	59	30.01	29.97	29.93	10	10	10	16	5	18	0	
8/3/2014	91	84	78	78	77	74	94	84	61	29.96	29.93	29.89	10	9	2	22	4	26	0.26	Rain-Thunderstorm
8/4/2014	90	82	75	78	76	72	97	84	63	29.97	29.92	29.88	10	10	2	17	4	26	0.18	Rain-Thunderstorm
8/5/2014	91	82	75	78	75	74	97	85	61	30.06	30.01	29.94	10	10	5	13	8		0.15	Thunderstorm
8/6/2014	93	84	75	77	75	69	100	81	44	30.07	30.02	29.98	10	9	1	25	5	31	0.49	Rain-Thunderstorm
8/7/2014	91	84	77	77	75	70	94	79	59	30.03	30.00	29.96	10	10	7	16	4	23	0.04	Rain-Thunderstorm
8/8/2014	91	84	77	76	74	71	96	77	57	30.07	30.02	29.96	10	10	10	12	4	22	0	Thunderstorm
8/9/2014	93	84	75	77	74	72	94	76	49	30.09	30.03	30.00	10	9	0	25	7	33	0.96	Fog-Rain-Thunderstorm
8/10/2014	91	84	78	77	74	70	93	80	57	30.07	30.03	30.00	10	10	10	25	8	37	0.01	Rain-Thunderstorm
8/11/2014	91	82	75	76	74	72	94	84	63	30.04	30.01	29.99	10	9	1	22	9	32	0.53	Rain-Thunderstorm
8/12/2014	91	82	75	76	73	71	94	78	59	30.01	29.99	29.94	10	10	10	20	8	28	0	
8/13/2014	95	85	77	76	73	69	94	68	44	30.01	29.98	29.95	10	10	10	15	7	20	0	Thunderstorm
8/14/2014	91	82	73	77	75	72	97	77	59	30.03	29.99	29.97	10	10	10	18	7	24	0.01	Rain-Thunderstorm
8/15/2014	84	80	75	78	74	71	100	86	69	30.05	30.01	29.99	10	10	3	15	5		0.09	Rain
8/16/2014	91	82	73	76	74	72	100	87	59	30.10	30.06	30.00	10	9	1	23	6	37	0.11	Rain-Thunderstorm
8/17/2014	93	84	75	77	75	70	100	80	47	30.13	30.08	30.02	10	10	10	9	5		0	
8/18/2014	95	86	78	77	74	71	94	73	47	30.07	30.02	29.97	10	10	10	12	4		0	Thunderstorm
8/19/2014	95	86	78	78	74	70	94	70	47	30.05	29.99	29.95	10	10	10	12	6		0	
8/20/2014	96	86	77	77	73	69	94	69	44	30.10	30.05	29.99	10	10	10	9	4		0	
8/21/2014	97	84	73	76	73	66	91	72	44	30.14	30.09	30.03	10	9	2	20	5	23	0.18	Rain-Thunderstorm
8/22/2014	97	86	75	76	73	67	94	72	46	30.09	30.04	29.99	10	10	8	8	2	23	0.07	Rain-Thunderstorm

o:\44237-001\Wpdocs\Report\Draft