



Florida Onsite Sewage Nitrogen Reduction Strategies Study

Task B.7

B-HS7 Field System Monitoring Report No. 3

Progress Report

May 2014

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In association with:



AET
Applied Environmental Technology

**Otis Environmental
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TASK B.7 PROGRESS REPORT

B-HS7 Field System Monitoring Report No. 3

Prepared for:

Florida Department of Health
Division of Disease Control and Health Protection
Bureau of Environmental Health
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1.0 Background

Task B of the Florida Onsite Sewage Nitrogen Reduction Strategies Study (FOSNRS) includes performing field experiments to critically evaluate the performance of nitrogen removal technologies that were identified in FOSNRS Task A.9 and pilot tested in Task A.26. 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 third sample event of the passive nitrogen reduction system at a home site B-HS7 in Marion County, Florida.

2.0 Purpose

This monitoring report documents data collected from the third B-HS7 monitoring and sampling event conducted on May 8, 2014. This monitoring event consisted of conducting flow measurements from the household water use meter and the treatment system internal water meters, recording electricity use, monitoring of field parameters, collection of water samples from twenty-one 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-HS7 field site is located in Marion County, FL. The nitrogen reducing onsite treatment system for the single family residence was installed in November 2013. Design and construction details were presented previously in the Task B.6 document. Figure 1 is a system schematic showing the system components and layout of the installation. A flow schematic of the system is shown in Figure 2. The B-HS7 system consists of a 300 gallon concrete pump tank, low-pressure distribution network, and an in-ground Stage 1 nitrification biofilter directly over a lined Stage 2 denitrification biofilter. The existing 900 gallon dual chamber septic tank will continue to provide primary

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treatment for the new PNRS system. The treated effluent is discharged into the soil around the perimeter of the liner.

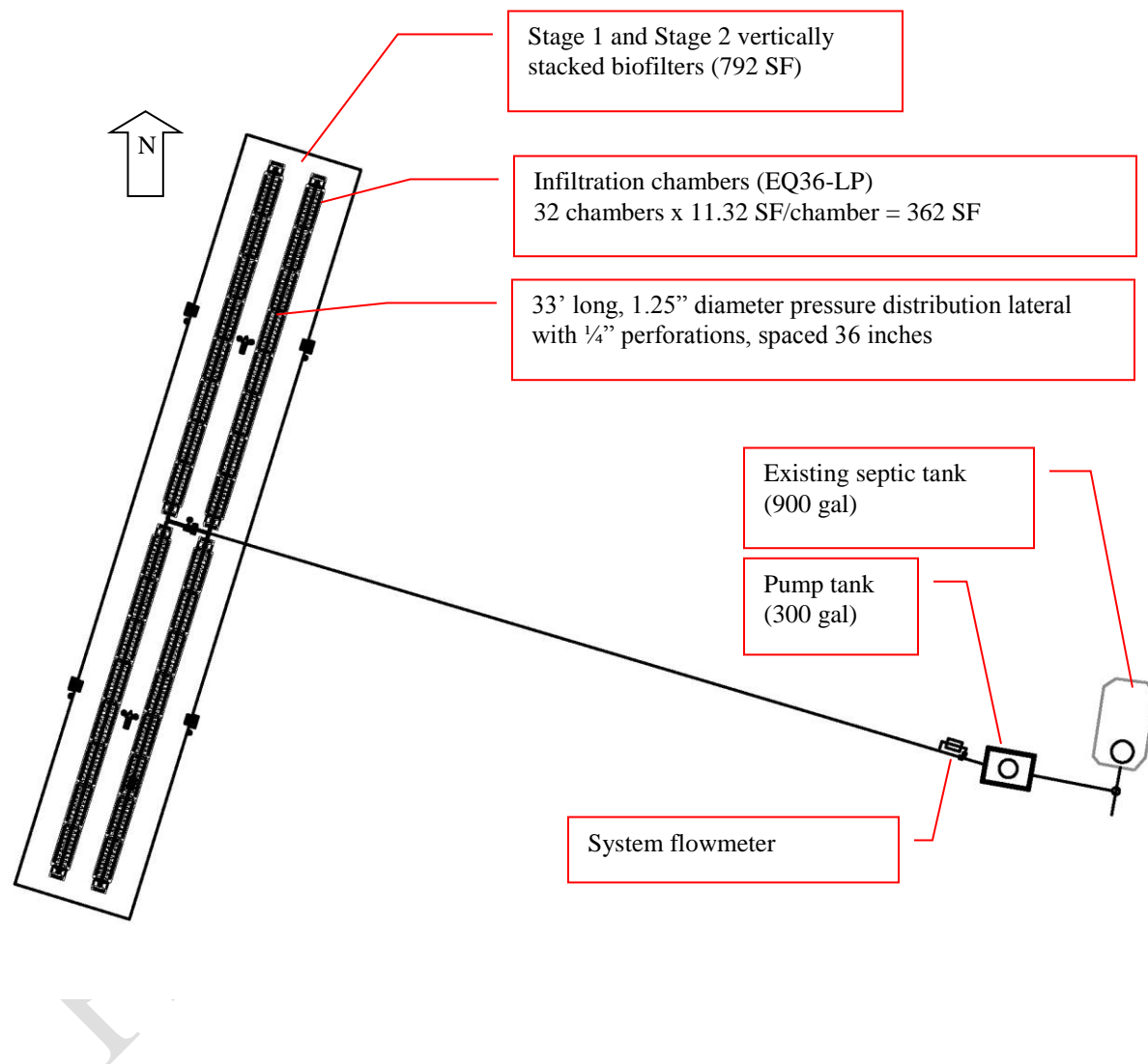


Figure 1
Plan view of B-HS7 System Layout

May 2014

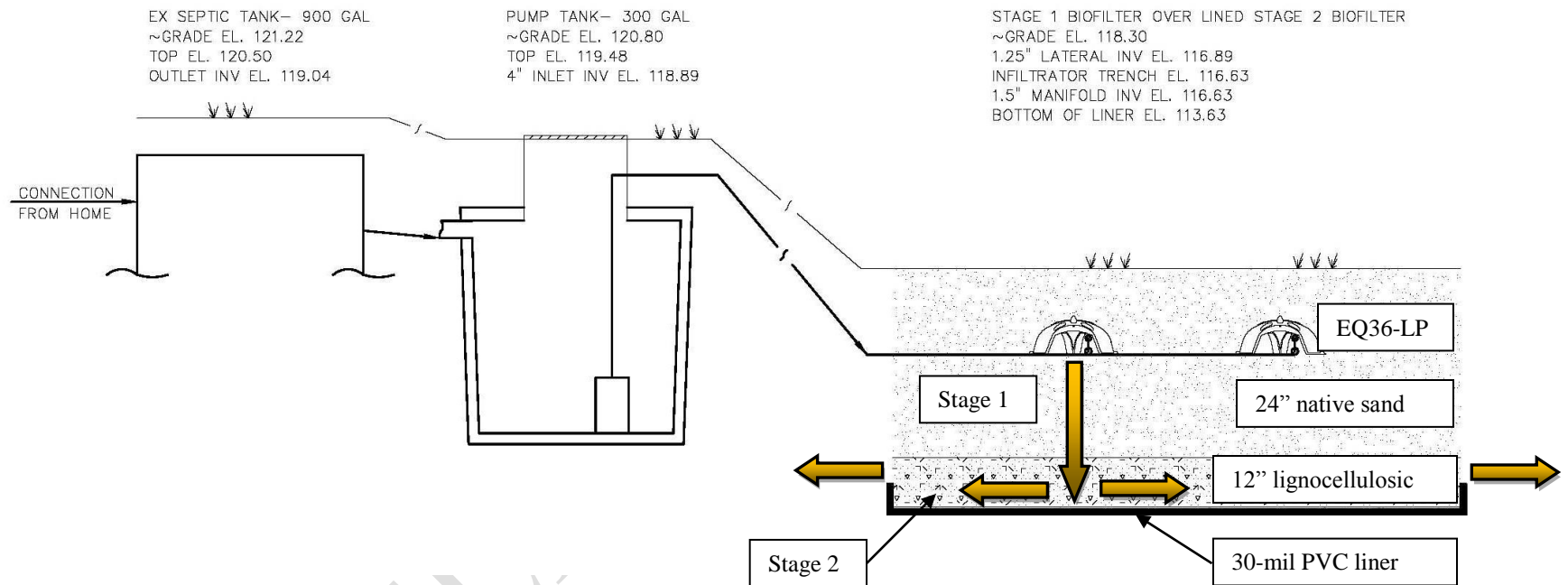


Figure 2
Flow Schematic of B-HS7 PNRS Installed in Marion County

3.3 Monitoring and Sample Locations and Identification

The monitoring points for this sample event are shown in Figure 3. The monitoring points used for treatment evaluation across a cross section in the southwest side of treatment area are shown in Figure 4.

Primary Effluent: Household wastewater enters the 1st chamber of the primary tank and exits the second chamber as septic tank effluent through an effluent screen. Screened effluent is directed to the pump tank which contains the pump and float switches. The first monitoring point, B-HS7-STE, is the effluent sampled approximately 1.5 feet below the surface of the pump tank (Figure 5), which is referred to as primary effluent or septic tank effluent (STE). Samples from monitoring point B-HS7-STE are the whole household wastewater after it has had some residence time in the primary tank.

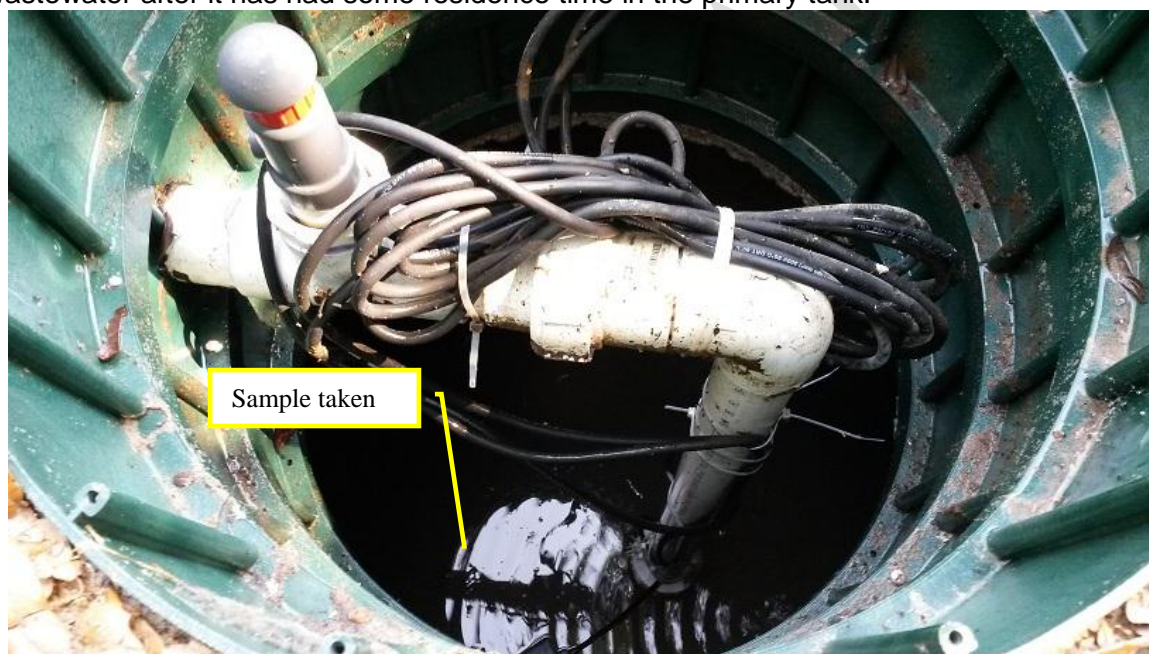
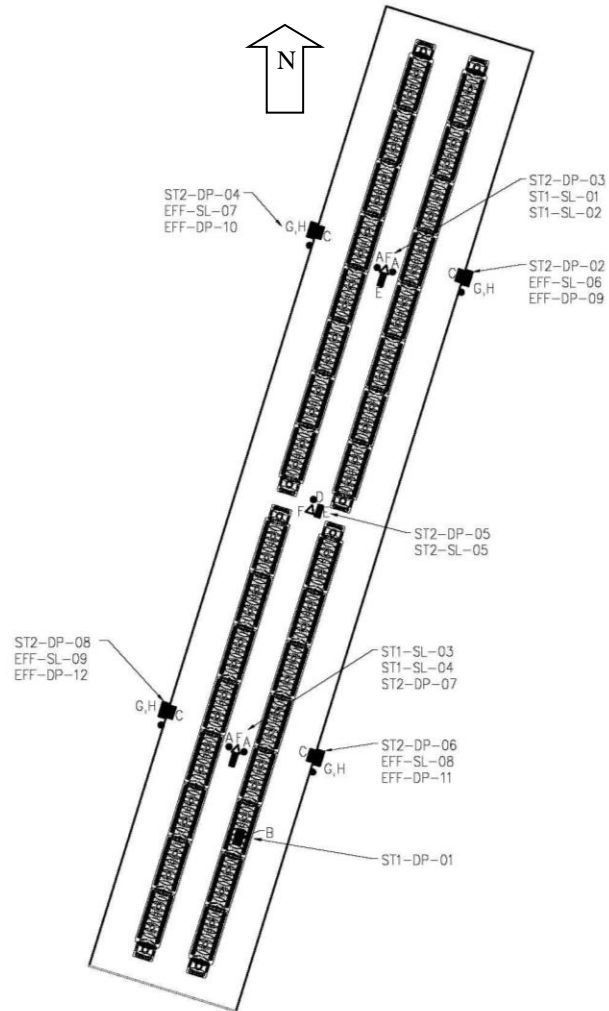


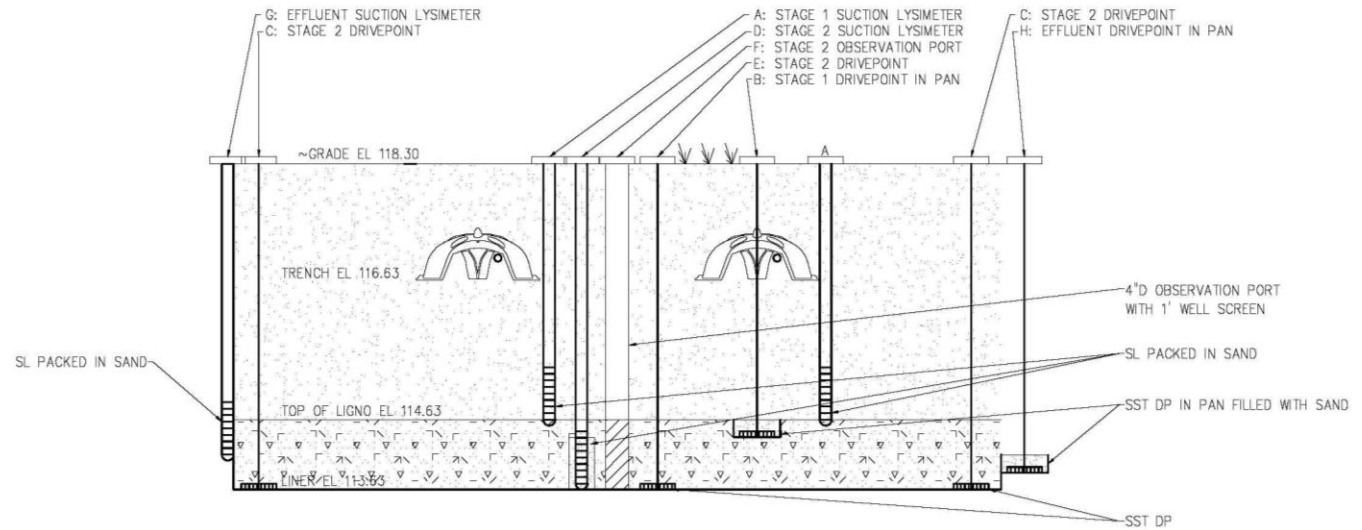
Figure 5
Pump Tank (B-HS7-STE sample)

Stage 1 Effluent: Pump tank contents are discharged through a low-pressure distribution network installed inside Infiltrator EQ36-LP™ chambers. The low-pressure distribution network consists of a central manifold design with (4) 33-foot long, 1.25-inch diameter perforated laterals installed along the top of the 24-inch native sand media (unsaturated Stage 1 biofilter). In the Stage 1 biofilter, wastewater percolates downward

through the unsaturated native sand media where nitrification occurs. Ceramic cup suction lysimeters (BHS7-ST1-SL-01, BHS7-ST1-SL-02, BHS7-ST1-SL-03, and BHS7-ST1-SL-04) were installed with the cup at the bottom of the native sand layer to represent water quality after downward passage through the sand layer (see Figure 6). In addition, one stainless steel drivepoint (BHS7-ST1-DP-01) was installed in a shallow pan at the bottom of the native sand layer (see Figure 7). However, during this sample event the drivepoint did not produce any sample (dry). The Stage 1 monitoring point in the treatment evaluation cross section is BHS7-ST1-SL-04, which is located in the center of the south end of the lined area.



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ID	MONITORING NETWORK SUMMARY	BOTTOM ELEV
STE	(1) PUMP TANK	
	STAGE 1, NITRIFICATION	
	CENTER OF EACH TRENCH	
A	(4) SL PACKED IN SAND	114.63
B	(1) SST DP & LY IN PAN PACKED WITH SAND	114.38
	STAGE 2, DENITRIFICATION	
	EDGE OF LINED AREA	
C	(4) SST DP	113.63
	CENTER OF LINED AREA	
D	(1) SL PACKED IN SAND	113.63
E	(3) SST DP	113.63
F	(3) OBSERVATION PORT TO LINER	113.63
	TREATED EFFLUENT	
	OUTSIDE LINER	
G	(4) SL	114.13
H	(4) SST DP & LY IN PAN PACKED WITH SAND	113.88

Figure 3
B-HS7 Sample and Monitoring Locations

May 2014

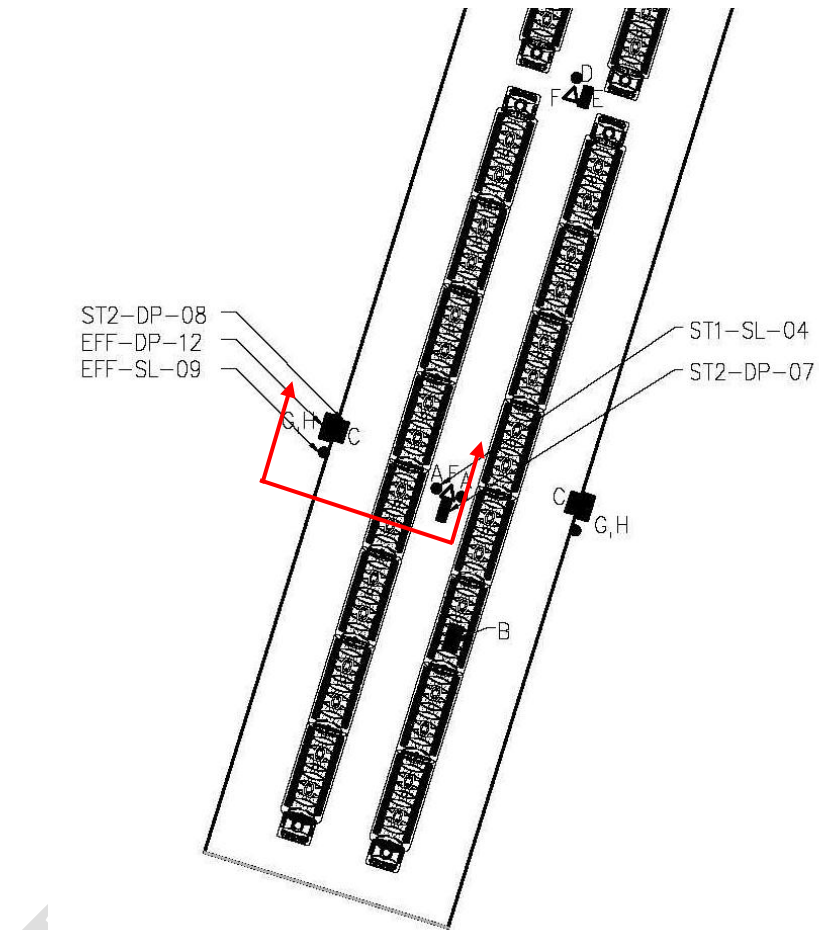


Figure 4
B-HS7 Treatment Evaluation Cross Section



Figure 6

Stage 1 biofilter effluent sample taken from suction lysimeter (BHS7-ST1-SL samples)

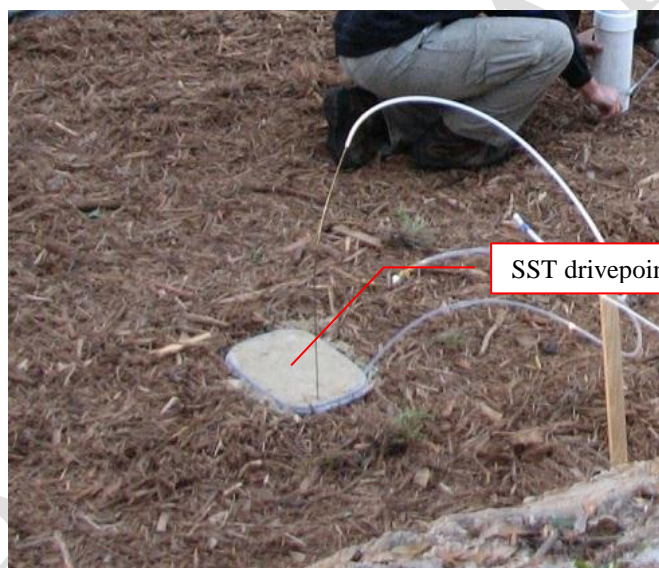


Figure 7

Stage 1 biofilter effluent sample taken from drivepoint in pan (BHS7-ST1-DP-01 sample)

Stage 2 Effluent: Directly below the 24-inch native sand Stage 1 biofilter is a 12-inch layer of lignocellulosic media as a supplemental carbon source for denitrification (Stage 2 biofilter), a blended urban waste wood from Wood Resource Recovery, Ocala, FL. The new Stage 2 biofilter treatment area was prepared with a 30 mil PVC liner installed below the lignocellulosic media. The liner was installed with a 6 inch lip around the outside perimeter. Therefore, approximately 6-inches of the lignocellulosic media is sat-

urated, promoting oxygen depletion and denitrification of the nitrified effluent. At the bottom of the Stage 2 biofilter lignocellulosic media, directly above the liner, stainless steel drivepoint samplers were installed (see Figure 8) including: BHS7-ST2-DP-02, BHS7-ST2-DP-03, BHS7-ST2-DP-04, BHS7-ST2-DP-05, BHS7-ST2-DP-06, BHS7-ST2-DP-07, and BHS7-ST2-DP-08. The Stage 2 monitoring points in the treatment evaluation cross section are BHS7-ST2-DP-07 (which is located in the center of the south end of the lined area) and BHS7-ST2-DP-08 (which is located on the southwest edge of the lined area).



Figure 8

Stage 2 biofilter effluent sample taken from drivepoint (BHS7-ST2-DP samples)

Perimeter Monitoring Points: The treated effluent is discharged into the soil surrounding the perimeter of the lined area. Ceramic cup suction lysimeters (BHS7-EFF-SL-06, BHS7-EFF-SL-07, BHS7-EFF-SL-08, and BHS7-EFF-SL-09) were installed around the perimeter of the liner, with the bottom of the cup approximately 6-inches below the lip of the liner within the native sand (see Figure 9) to represent treated effluent. In addition, stainless steel drivepoints (BHS7-EFF-DP-09, BHS7-EFF-DP-10, BHS7-EFF-DP-11, BHS7-EFF-DP-12) were installed in shallow pans adjacent to the lip of the liner (see Figure 10). The treated effluent monitoring points in the treatment evaluation cross section are BHS7-EFF-SL-09 and BHS7-EFF-DP-12, which are located adjacent to the southwest lined area.

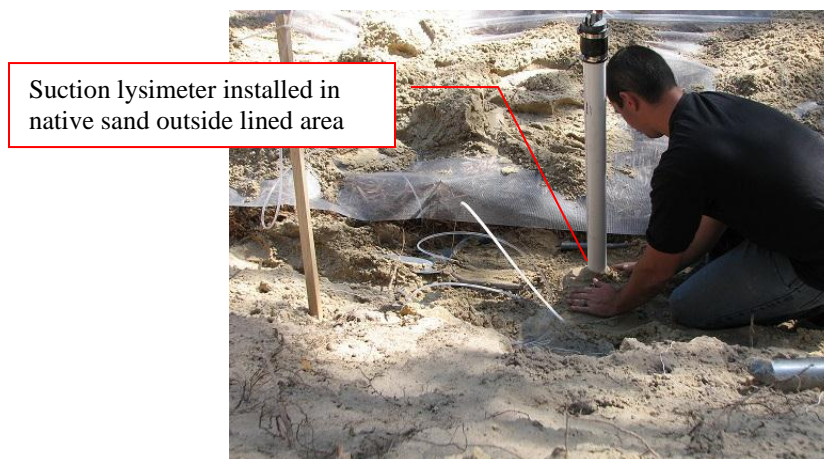


Figure 9
Treated effluent sample taken from suction lysimeter (BHS7-EFF-SL samples)



Figure 10
Treated effluent sample taken from drivepoint in pan (BHS7-EFF-DP samples)

3.4 Operational Monitoring

Start-up of the system occurred on November 19, 2013 (Experimental Day 0). However, during the Thanksgiving holiday, the homeowners projected having between thirty and forty additional people staying at the home. Therefore, since this was so soon after start-up, on November 26, 2013, the Bull Run™ diversion valve was flipped so that all the wastewater flow was diverted to the old drainfield. The diversion valve was flipped back to the PNRS system on December 2, 2014. Shortly thereafter, the homeowners planned a holiday party with a projected eighty people in attendance. Therefore on De-

cember 6, 2013, the diversion valve was flipped again so that all the wastewater flow was diverted to the old drainfield. The diversion valve was flipped back to the PNRS system on December 9, 2013, and the PNRS system has operated continually since that date.

The third formal sampling event was conducted May 8, 2014 (Experimental Day 170). For this third formal sampling event, the water meter for the house and treatment system flow meters were read and recorded on May 8, 2014. The household water meter is located on the potable water line from the onsite well prior to entering the household plumbing. The water meter does not include the irrigation water use. Therefore, the water meter reading should be indicative of the wastewater flow to the system.

The PNRS treatment system flow meter (Figure 11) is located on the pump tank discharge line and records the cumulative flow in gallons pumped from the pump chamber to the low-pressure distribution network.

Three observation ports are installed along the centerline of the Stage 2 biofilter lined area (north, center and south). The observation ports are 4-inch diameter well screens that were installed with the bottom positioned on the liner. Therefore, the water level within the lined area is able to be monitored within the observation ports.



Figure 11
PNRS system flow meter

3.5 Energy Consumption

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

3.6 Water Quality Sample Collection and Analyses

The third formal sample event (Sample Event No. 3), which is the subject of this report, was conducted on May 8, 2014 (Experimental Day 170). A full suite of influent, intermediate and effluent water quality samples were collected from the system for water quality analysis. Samples were collected at each of the monitoring points described in Section 3.2. A peristaltic pump was used to collect samples and route them directly into analysis-specific containers after sufficient flushing of the tubing had occurred. Field parameters were then recorded.

In addition, equipment blank (B-HS2-EB) sample and a background sample were taken. The equipment blank was collected by pumping deionized water through the cleaned pump tubing. The background sample was collected from a suction lysimeter upgradient

of the treatment the system. These samples was then analyzed for the same parameters as the monitoring samples.

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

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

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

Analytical Parameter	Method of Analysis	Method Detection Limit (mg/L)
Total Alkalinity as CaCO ₃	SM 2320B	2 mg/L
Chemical Oxygen Demand (COD)	EPA 410.4	10 mg/L
Total Kjeldahl Nitrogen (TKN-N)	EPA 351.2	0.05 mg/L
Ammonia Nitrogen (NH ₃ -N)	EPA 350.1	0.005 mg/L
Nitrate Nitrogen (NO ₃ -N)	EPA 300.0	0.01 mg/L
Nitrite Nitrogen (NO ₂ -N)	EPA 300.0	0.01 mg/L
Nitrate+Nitrite Nitrogen (NOX-N)	EPA 300.0	0.02 mg/L
Total Phosphorus (TP)	SM 4500P-E	0.01 mg/L
Orthophosphate as P (Ortho P)	EPA 300.0	0.01 mg/L
Carbonaceous Biological Oxygen Demand (CBOD ₅)	SM5210B	2 mg/L
Total Suspended Solids (TSS)	SM 2540D	1 mg/L
Volatile Suspended Solids (VSS)	SM 2540E	1 mg/L
Chloride	EPA 300.0	0.50 mg/L
Fecal Coliform (fecal)	SM9222D	2 ct/100mL
E.coli	SM9223B	2 ct/100mL

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4.0 Results and Discussion

4.1 Operational Monitoring

Table 2 provides a summary of the household water use since the household water meter installation on October 15, 2013. The treatment system flow meter readings for the B-HS7 field site are also summarized in Table 2. The operation and maintenance log which includes actions taken since start-up is provided in Appendix B.

Table 2
Summary of Flowmeters

Date and Time Read	Household Water Meter Reading	Average Daily Household Flow between readings	PNRS Flow Meter Reading	Average Daily PNRS Flow between readings
	Cumulative Volume (gallons)	gallons/day	Cumulative Volume (gallons)	gallons/day
10/15/2013 13:51	2.9	XX		
10/23/2013 12:20	1,186.9	149.2		
11/14/2013 8:50	3,602.5	110.5		
11/15/2013 14:40	3,800.0	158.9		
11/19/2013 14:18	4,997.5	300.5	652.0	PNRS Start-up
11/26/2013 10:30	7,901.4	424.4	2,480.0	267.2
12/2/2013 9:45	9,148.6	209.0	2,480.0	0.0
12/6/2013 9:00	10,470.4	333.1	3,134.0	164.8
12/10/2013 10:00	11,218.9	185.2	3,302.0	41.6
12/12/2013 9:00	11,519.1	153.3	3,635.0	170.0
1/3/2014 10:50	14,722.0	145.1	6,774.0	142.2
1/17/2014 10:00	16,940.8	158.9	8,621.0	132.3
1/20/2014 12:37	17,483.4	174.5	9,134.0	165.0
3/5/2014 12:00	26,166.5	197.5	11,575.0	55.5
3/13/2014 13:30	27,382.4	150.8	12,609.0	128.2
3/19/2014 11:30	28,122.6	125.1	13,167.5	94.4
3/20/2014 12:30	28,281.8	152.8	13,318.0	144.5
4/28/2014 10:05	34,294.9	154.6	18,259.0	127.0
5/8/2014 9:00	36,055.4	176.9	19,521.0	126.8
Average since start-up to May 8, 2014		182.9		111.1

As discussed in Section 3.4, there were two periods during the holidays when the wastewater was diverted to the old drainfield. From PNRS system installation through May 8, 2014, the household water use average was 182.9 gallons per day with periods

of higher and lower flows (Table 2). The average pumped flow to the PNRS system was 111.1 gallons per day from start-up through March 20, 2014.

An additional water input to consider for evaluation of the system treatment performance is precipitation. A weather station was installed at the site on the roof of the home on January 6, 2014. Data from this weather station is available from the homeowner. Recorded meteorological data is provided in Appendix C, Table C.1. Table 3 provides daily precipitation totals leading up to and during the sample event.

Table 3
Precipitation Data Daily Totals Measured
April 23, 2014 through May 8, 2014
Sample Event No. 3

Date	Precipitation (inches)
April 23, 2014	0.00
April 24, 2014	0.00
April 25, 2014	0.00
April 26, 2014	0.00
April 27, 2014	0.00
April 28, 2014	0.00
April 29, 2014	0.45
April 30, 2014	0.58
May 1, 2014	0.00
May 2, 2014	0.32
May 3, 2014	0.75
May 4, 2014	0.01
May 5, 2014	0.00
May 6, 2014	0.00
May 7, 2014	0.00
May 8, 2014	0.00

As discussed in Section 3.4, three observation ports are installed along the centerline of the Stage 2 biofilter lined area (north, center and south). The observation port measurements are summarized in Table 4 which indicate that the monitored liner water level is continuously below the overflow elevation (114.03 ft). During this sample event, the water elevation ranged between 3.5 and 4.0 inches below the overflow elevation.

Table 4
Liner Water Level within Observation Ports

Date Read	North Observation Port water elevation		Center Observation Port water elevation		South Observation Port water elevation		Range
	Water elevation (ft)	Depth below overflow (in)	Water elevation (ft)	Depth below overflow (in)	Water elevation (ft)	Depth below overflow (in)	
11/26/2014	113.65	4.6	113.70	4.0	113.69	4.1	4.0-4.6
12/2/2014	113.60	5.2	113.63	4.8	113.59	5.3	4.8-5.3
12/6/2014	113.64	4.7	113.67	4.3	113.64	4.7	4.3-4.7
12/12/2014	113.65	4.5	113.67	4.4	113.59	5.3	4.4-5.3
1/3/2014	113.67	4.3	113.69	4.1	113.61	5.0	4.1-5.0
1/17/2014	113.67	4.3	113.73	3.6	113.65	4.5	3.6-4.5
3/20/2014	113.67	4.3	113.73	3.6	113.76	3.3	3.3-4.3
4/28/2014	113.72	3.8	113.69	4.1	113.69	4.0	3.8-4.1
5/8/2014	113.74	3.5	113.73	3.6	113.69	4.0	3.5-4.0

Overflow elevation is 114.03 ft which is 6 inches above the liner.

4.2 Energy Consumption

Energy consumption is monitored using an electrical meter installed between the main power box for the house and the control panel to record cumulative power usage of the pump in kilowatt-hours. The recorded electrical use for the system is summarized in Table 5.

Table 5
Summary of System Electrical Use

Date and Time Read	Electrical Meter Reading	Average Daily Electrical Use	Average Electrical Use per Gallon Treated
	Cumulative (kWh)	(kWh/day)	(kWh/ 1000 gal)
11/19/2013 14:18	0.2	0.03	PNRS Start-up
11/26/2013 10:30	0.6	0.06	0.219
12/2/2013 9:45	0.6	0.00	No flow
12/6/2013 9:00	0.8	0.05	0.306
12/10/2013 10:00	0.8	0.00	0.000
12/12/2013 9:00	0.9	0.05	0.300
1/3/2014 10:50	1.7	0.04	0.255
1/17/2014 10:00	2.3	0.04	0.325
1/20/2014 12:37	2.4	0.03	0.195
3/5/2014 12:00	3.1	0.02	0.287
3/13/2014 13:30	3.5	0.05	0.387
3/19/2014 11:30	3.7	0.03	0.358
3/20/2014 12:30	3.7	0.00	0.000
4/28/2014 10:05	5.5	0.05	0.364
5/8/2014 9:00	6.0	0.05	0.396
Total average start-up to 5/8/14		0.03	0.264

The total average electrical use through May 8, 2014 was 0.03 kWh per day. The average electrical use per 1,000 gallons treated since start-up was 0.264 kWh per 1,000 gallons treated, and this parameter has been fairly stable since start-up.

4.3 Water Quality

Water quality results for the third sampling event (Sample Event No. 3) are listed in Table 6. A summary of the water quality data collected for the test system since start-up is presented in Table 7. Nitrogen results for the treatment evaluation cross section displayed in Figure 4 are graphically displayed in Figure 13. The laboratory report containing the raw analytical data is included in Appendix A. The following discussion summarizes the water quality analytical results for Sample Event No. 3. 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.

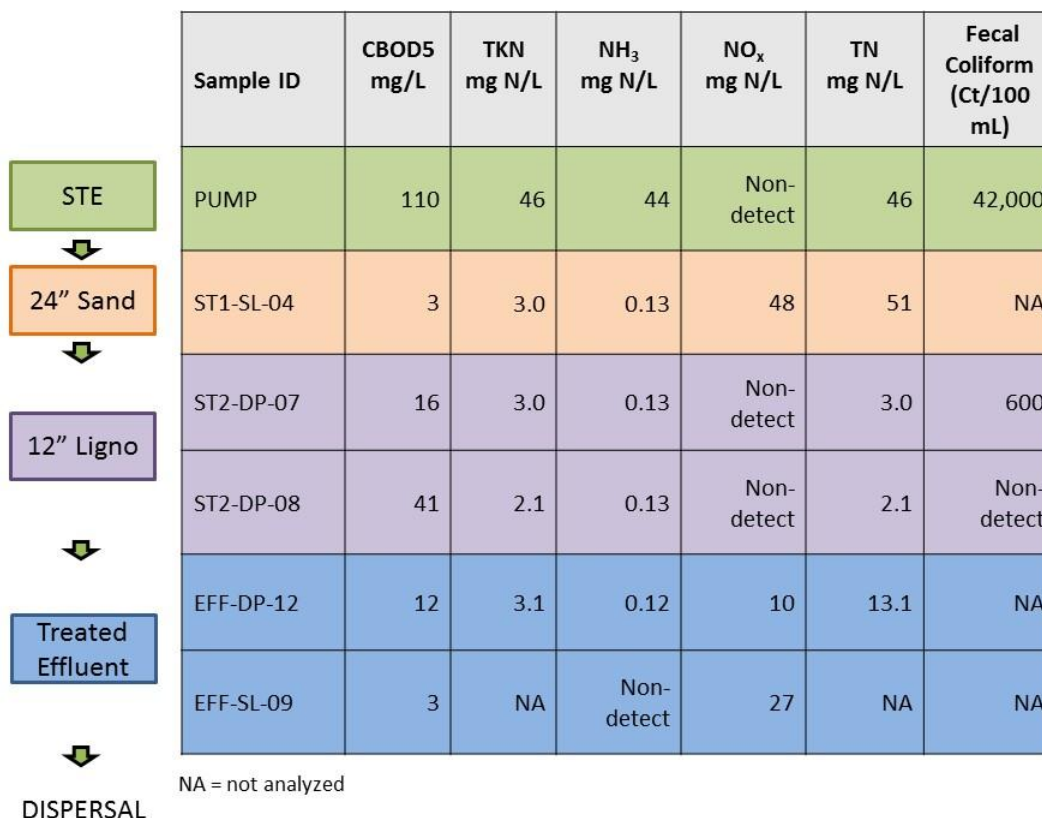


Figure 13
Graphical Representation of Nitrogen Results

Septic Tank Effluent (STE) Quality: The water quality characteristics of STE collected in Sample Event 3 were within the typical range generally expected for domestic STE. The measured STE total nitrogen (TN) concentration was 46 mg/L, which is within the range that has been typically reported for Florida single family residence STE.

Stage 1 Effluent (native sand): The sample points considered representative of Stage 1 effluent included: BHS7-ST1-SL-01, BHS7-ST1-SL-02, BHS7-ST1-SL-03, and BHS7-ST1-SL-04. Based on these samples, the Stage 1 effluent mean NH₃-N level was 0.06 ± 0.05 mg/L with a mean DO level at 4.0 ± 0.6 mg/L in the Stage 1 effluent (Table 6). These results indicate a substantial reduction of ammonia through the Stage 1 biofilter. The Stage 1 effluent mean NO_x-N concentration was 21.5 ± 25.2 mg/L (n=4), signifying significant nitrification.

Stage 2 Biofilter Effluent (lignocellulosic): The sample points considered representative of the effluent of the Stage 2 biofilter (lignocellulosic media) included: BHS7-ST2-DP-03, BHS7-ST2-DP-05, BHS7-ST2-DP-06, BHS7-ST2-DP-07, BHS7-ST2-DP-08, BHS7-ST2-OB-01, BHS7-ST2-OB-02, and BHS7-ST2-OB-03. Based on these samples, the Stage 2 effluent mean $\text{NO}_x\text{-N}$ concentration was 0.07 ± 0.13 mg/L with a mean DO level at 0.4 ± 0.4 mg/L. The Stage 2 system produced a highly reducing environment and achieved nearly complete $\text{NO}_x\text{-N}$ reduction. The mean total nitrogen (TN) concentration was 2.6 ± 0.6 mg/L. The effluent mean CBOD_5 was 30 ± 13 mg/L, an increase over the Stage 1 effluent value due to the lignocellulosic material.

Perimeter Monitoring Points: The sample points considered representative of system effluent included: BHS7-EFF-SL-06, BHS7-EFF-SL-07, BHS7-EFF-SL-08, BHS7-EFF-SL-09, BHS7-EFF-DP-10, BHS7-EFF-DP-11, and BHS7-EFF-DP-12. Based on these samples, the treated effluent mean TN was 31.3 ± 11.8 mg/L of which mean TKN was 2.3 ± 0.7 and mean $\text{NO}_x\text{-N}$ was 28.7 ± 11.0 mg/L.

It is still unclear why $\text{NO}_x\text{-N}$ levels in the perimeter monitoring points are higher than those in the Stage 2 effluent. The observation port measurements at the time of sampling showed that the water level within the liner was between 3.5 and 4.0 inches below the periphery overflow elevation, therefore, the water sampled at the perimeter points is not likely to be water that was recently discharged off of the liner. One hypothesis is that the $\text{NO}_x\text{-N}$ plume beneath the wastewater application zone extends laterally past the width of the Stage 2 biofilter liner area. The overlying Stage 1 biofilter is a 24-inch layer of native sand media which is classified as Candler fine sand. During site reconnaissance, two soil profiles indicated that the water table was below 72 inches, which would provide a free drainage condition for the Stage 1 domain. As depicted in the Task D.7 Hydrus 2-D Simulation, Scenario 45 graphic (Figure 14), it is possible that the nitrate plume may extend approximately +100 cm (3.28 ft) from the exterior trench wall. The Stage 2 biofilter was designed to extend 2.5 ft from the exterior trench wall.

Scenario 45

Configuration: trench, equal distribution
Soil Type: more permeable sand
Loading Rate: 2.67 cm/d (0.65 gpd/ft²)
Effluent Nitrogen: 60 mg-N/L as NH₄
Depth to Water Table: free drainage

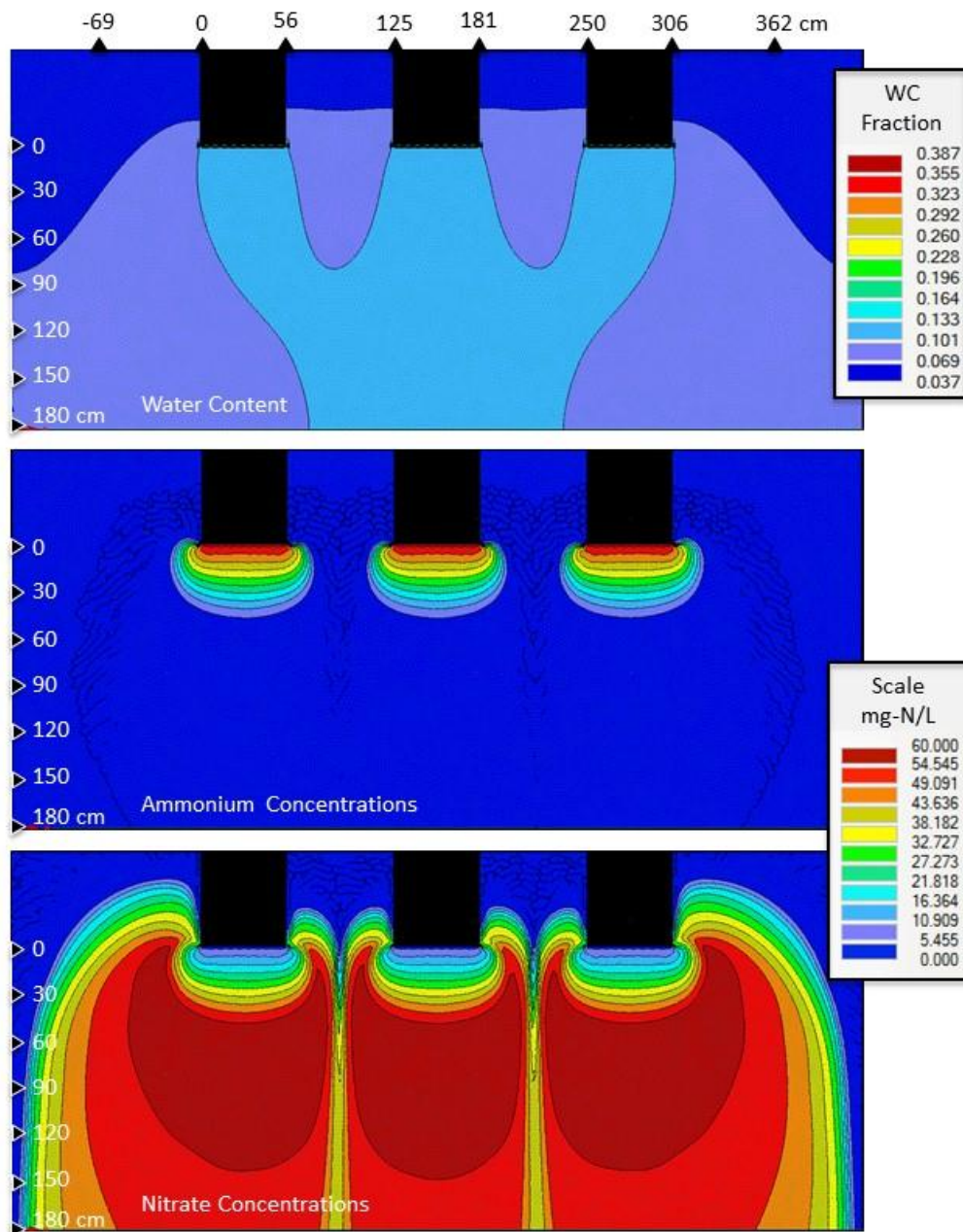


Figure 14
Graphic Representation of Task D.7 Hydrus 2-D Simulation, Scenario 45

Equipment Blank (EB): The equipment blank (EB) was collected by pumping deionized water through the cleaned pump tubing. This sample was then analyzed for the same parameters as the monitoring samples. As expected, all parameters measured were at or below the method detection limit.

Background Lysimeter (BKG): The background sample was collected from a suction lysimeter installed with the bottom of the cup at the same elevation as the perimeter monitoring point lysimeters. The background lysimeter is located upgradient of the treatment system. The background TN concentration was 1.0 mg/L of which TKN was 0.78 mg/L and $\text{NO}_x\text{-N}$ was 0.22 mg/L.

Table 6
Water Quality Analytical Results

Sample ID	Sample Date/Time	Temp (°C)	pH	Specific Conductance (uS/cm)	DO (mg/L)	ORP (mV)	Total Alkalinity (mg/L)	TSS (mg/L)	VSS (mg/L)	CBOD ₅ (mg/L)	COD (mg/L)	TN (mg/L N) ¹	TKN (mg/L N)	Organic N (mg/L N) ²	NH ₃ -N (mg/L N)	NO ₃ -N (mg/L N)	NO ₂ -N (mg/L N)	NOx (mg/L N)	TIN (mg/L N) ³	TP (mg/L)	Ortho P (mg/L P)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)	Chloride (mg/L)
BHS7-PUMP	05/08/2014 11:25:00	23.3	6.92	2454	0.01	-240.1	280	38	40	110	190	46.02	46	2	44	0.01	0.01	0.02	44.02	9.3	4.5	42000	96	700
BHS7-PUMP-DUP	05/08/2014 11:30:00	23.3	6.92	2454	0.01	-240.1	280	34	30	110	27	48.02	48	3	45	0.01	0.01	0.02	45.02	9.6	4.3	58000	98	620
NC-BHS7-ST1-SL-01	05/08/2014 09:20:00	23.7	5.23	1284	4.59	187.8						2.42	2.4	2.358	0.042	0.01	0.01	0.02	0.062					270
NC-BHS7-ST1-SL-02	05/08/2014 09:11:00	23.6	5.04	1210	4.40	196.7						3.12	3.1	3.066	0.034	0.01	0.01	0.02	0.054					240
SC-BHS7-ST1-SL-03	05/08/2014 09:38:00	24.4	5.26	1420	3.95	187.8						40.8	2.8	2.765	0.035	38	0.01	38	38.035					310
SC-BHS7-ST1-SL-04	05/08/2014 09:30:00	24.3	5.11	1618	3.16	194.5	20	8	1	3	27	51	3	2.87	0.13	48	0.01	48	48.13	0.38	0.01		2	300
NC-BHS7-ST2-DP-03	05/08/2014 09:25:00	23.5	5.88	1855	0.15	4.7						2.09	1.7	1.617	0.083	0.39	0.01	0.39	0.473					400
NC-BHS7-ST2-DP-03-DUP	05/08/2014 09:30:00	23.5	5.88	1855	0.15	4.7						1.62	1.6	1.48	0.12	0.01	0.01	0.02	0.14					410
C-BHS7-ST2-DP-05	05/08/2014 10:00:00	24.3	6.12	1933	0.10	-74.1						2.46	2.4	2.302	0.098	0.06	0.01	0.06	0.158					390
SE-BHS7-ST2-DP-06	05/08/2014 10:50:00	23.9	5.95	1951	0.18	33.1						3.52	3.5	3.36	0.14	0.01	0.01	0.02	0.16					410
SE-BHS7-ST2-DP-06-DUP	05/08/2014 10:55:00	23.9	5.95	1951	0.18	33.1						3.52	3.5	3.34	0.16	0.01	0.01	0.02	0.18					420
SC-BHS7-ST2-DP-07	05/08/2014 10:26:00	24.4	6.22	2074	0.46	-33.6	210	14	12	16	170	3.02	3	2.87	0.13	0.01	0.01	0.02	0.15	4.9	2.1	600	2	470
SW-BHS7-ST2-DP-08	05/08/2014 11:10:00	24.3	6.15	1816	0.54	-76.8	200	8	7	41	140	2.12	2.1	1.97	0.13	0.01	0.01	0.02	0.15	3.2	0.96	1	2	370
N-BHS7-ST2-OB-01	05/08/2014 09:17:00	23.4	5.69	1867	0.21	88.9						1.92	1.9	1.71	0.19	0.01	0.01	0.02	0.21					430
C-BHS7-ST2-OB-02	05/08/2014 10:15:00	24.2	6.17	1957	0.17	-76.5						2.52	2.5	2.428	0.072	0.01	0.01	0.02	0.092					390
S-BHS7-ST2-OB-03	05/08/2014 10:40:00	25.3	6.26	2046	1.23	49.6	220	12	10	32	200	3.12	3.1	2.98	0.12	0.01	0.01	0.02	0.14	5.3	2.3	1	2	440
NE-BHS7-EFF-SL-06	05/08/2014 08:58:00	24.6	5.68	1073	5.33	215.8						19.7	1.7	1.662	0.038	18	0.01	18	18.038					86
NW-BHS7-EFF-SL-07	05/08/2014 09:02:00	23.2	4.96	1381	5.80	198.5						39.3	1.3	1.267	0.033	38	0.01	38	38.033					230
NW-BHS7-EFF-DP-10	05/08/2014 08:52:00	23.6	5.91	1722	4.91	149.2						41.2	2.2	2.142	0.058	39	0.01	39	39.058					340
SE-BHS7-EFF-SL-08	05/08/2014 10:20:00	23.6	5.14	1331	4.49	155.9						37.6	2.6	2.523	0.077	35	0.01	35	35.077					280
SE-BHS7-EFF-DP-11	05/08/2014 10:25:00	24.7	5.92	1475	4.34	137.2						37.1	3.1	3.061	0.039	34	0.01	34	34.039					290
SW-BHS7-EFF-SL-09	05/08/2014 09:55:00	23.7	5.63	555	4.58	53.8		1	1	3					0.009	27	0.01	27	27.009		0.01			34
SW-BHS7-EFF-DP-12	05/08/2014 10:00:00	24.6	5.95	1583	3.66	57.5	140	14	11	12	97	13.1	3.1	2.98	0.12	10	0.01	10	10.12	2.6	0.77			330
BHS7-EB	05/08/2014 11:56:00	30.9	6.48	2	5.16	100.5	2	1	1	2	10	0.06	0.05	0.041	0.009	0.01	0.01	0.01	0.019	0.01	0.01	1	2	0.05
BHS7-BKG	05/08/2014 11:10:00	24.1	5.75	104	5.67	155.6	11	1	1	16	49	1.0	0.78	0.717	0.063	0.22	0.01	0.22	0.283	0.054	0.01	1	2	4.6

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.

Table 7
Summary of Water Quality Analytical Results

Sample ID		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)	NOx (mg/L N)	TIN (mg/L N) ³	TP (mg/L)	Ortho P (mg/L P)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)	Cl (mg/L)
BHS7-PUMP	n	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	MEAN	20.74	7.24	2141.00	0.12	-189.60	290.00	36.33	35.00	99.33	176.67	48.04	48.00	1.33	46.67	0.03	0.01	0.04	46.70	7.37	4.60	41667	715	481.02
	STD. DEV.	2.40	0.00	281.38	0.12	81.82	17.32	1.53	4.36	18.48	51.32	2.64	2.65	0.58	3.06	0.03	0.00	0.03	3.05	1.69	0.75			0.00
	MIN	18.60	6.92	1909.00	0.01	-240.10	280.00	35.00	32.00	78.00	120.00	46.02	46.00	1.00	44.00	0.01	0.01	0.02	44.02	6.20	3.90	32000	96	300.00
	MAX	23.33	7.63	2454.00	0.25	-95.20	310.00	38.00	40.00	110.00	220.00	51.02	51.00	2.00	50.00	0.07	0.01	0.07	50.02	9.30	5.40	51000	10000	700.00
BHS7-ST1-SL-01	n	3	3	3	3	3	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	1
	MEAN	20.03	5.39	1426.67	5.08	150.73						20.41	3.07	2.38	0.69	17.34	0.01	17.34	18.03					270.00
	STD. DEV.	4.17	0.00	438.76	0.53	32.27						19.19	1.33	0.32	1.05	18.03	0.00	18.03	18.99					
	MIN	15.50	5.23	1077.00	4.59	128.90						2.42	2.20	2.07	0.04	0.01	0.01	0.02	0.06					270.00
	MAX	23.70	5.62	1919.00	5.65	187.80						40.60	4.60	2.70	1.90	36.00	0.01	36.00	37.90					270.00
BHS7-ST1-SL-02	n	3	3	3	3	3	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	1
	MEAN	19.83	5.12	1339.33	4.89	160.13						19.21	2.20	2.06	0.14	17.01	0.01	17.01	17.16					240.00
	STD. DEV.	4.14	0.00	221.42	0.82	33.95						29.45	0.90	0.92	0.18	29.44	0.00	29.43	29.61					
	MIN	15.40	5.04	1210.00	4.40	129.60						1.32	1.30	1.25	0.03	0.01	0.01	0.02	0.05					240.00
	MAX	23.60	5.26	1595.00	5.84	196.70						53.20	3.10	3.07	0.35	51.00	0.01	51.00	51.35					240.00
BHS7-ST1-SL-03	n	3	3	3	3	3	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	1
	MEAN	19.82	5.53	1595.33	5.08	157.87						30.37	4.03	2.69	1.34	24.67	1.44	26.34	27.68					310.00
	STD. DEV.	4.30	0.00	367.81	1.20	37.94						24.65	2.67	0.54	2.22	21.38	2.48	22.84	24.13					
	MIN	15.80	5.26	1348.00	3.95	115.20						2.22	2.20	2.12	0.04	0.01	0.01	0.02	0.10					310.00
	MAX	24.36	5.87	2018.00	6.33	187.80						48.10	7.10	3.20	3.90	38.00	4.30	41.00	44.90					310.00
BHS7-ST1-DP-01	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	17.85	5.08	1556.50	5.21	138.95						27.56	5.05	3.31	1.74	22.51	0.01	22.51	24.25					
	STD. DEV.	1.48	0.00	675.29	0.23	73.19						36.68	4.88	2.53	2.35	31.81	0.00	31.81	34.15					
	MIN	16.80	5.04	1079.00	5.05	87.20						1.62	1.60	1.52	0.08	0.01	0.01	0.02	0.10					
	MAX	18.90	5.12	2034.00	5.37	190.70						53.50	8.50	5.10	3.40	45.00	0.01	45.00	48.40					
BHS7-ST1-SL-04	n	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	1	2	2
	MEAN	19.57	5.43	1395.33	4.45	153.27	25.50	5.00	2.67	2.33	29.67	34.77	5.10	3.40	1.70	29.67	0.01	29.67	31.38	0.17	0.01	10	2	340.00
	STD. DEV.	4.52	0.00	677.04	1.13	44.03		2.65	1.53	0.58	16.17	27.85	3.99	1.23	2.77	25.92	0.00	25.92	27.11	0.18	0.00			56.57
	MIN	15.30	5.11	635.00	3.16	106.90	20.00	3.00	1.00	2.00	15.00	2.62	2.60	2.52	0.08	0.01	0.01	0.02	0.10	0.04	0.01	10	2	300.00
	MAX	24.30	5.80	1933.00	5.28	194.50	31.00	8.00	4.00	3.00	47.00	51.00	9.70	4.80	4.90	48.00	0.01	48.00	48.13	0.38	0.01	10	2	380.00

Table 7 (continued)
Summary of Water Quality Analytical Results

Sample ID		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)	NOx (mg/L N)	TIN (mg/L N) ³	TP (mg/L)	Ortho P (mg/L P)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)	Cl (mg/L)
BHS7-ST2-DP-02	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	19.25	6.00	1732.50	0.12	24.70						10.74	10.40	9.73	0.68	0.34	0.06	0.34	1.02					
	STD. DEV.	0.35	0.00	369.82	0.01	142.69						8.00	7.92	8.27	0.35	0.08	0.06	0.08	0.26					
	MIN	19.00	5.99	1471.00	0.11	-76.20						5.08	4.80	3.88	0.43	0.28	0.01	0.28	0.83					
	MAX	19.50	6.01	1994.00	0.12	125.60						16.40	16.00	15.57	0.92	0.40	0.10	0.40	1.20					
BHS7-ST2-DP-03	n	3	3	3	3	3	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	1
	MEAN	21.10	5.96	1824.00	0.30	6.83						3.76	3.53	3.41	0.12	0.22	0.01	0.22	0.35					400.00
	STD. DEV.	2.12	0.00	260.89	0.28	117.51						1.72	1.90	1.88	0.04	0.19	0.00	0.19	0.17					
	MIN	19.50	5.88	1549.00	0.13	-109.60						2.09	1.70	1.62	0.08	0.01	0.01	0.02	0.16					400.00
	MAX	23.50	6.05	2068.00	0.62	125.40						5.52	5.50	5.36	0.15	0.39	0.01	0.39	0.47					400.00
BHS7-ST2-DP-04	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	19.80	6.02	1828.50	0.08	-5.45						3.77	3.75	3.66	0.09	0.01	0.01	0.02	0.11					
	STD. DEV.	0.71	0.00	375.47	0.00	208.38						1.34	1.34	1.35	0.01	0.00	0.00	0.00	0.01					
	MIN	19.30	5.94	1563.00	0.08	-152.80						2.82	2.80	2.71	0.08	0.01	0.01	0.02	0.10					
	MAX	20.30	6.10	2094.00	0.08	141.90						4.72	4.70	4.62	0.09	0.01	0.01	0.02	0.11					
BHS7-ST2-DP-05	n	3	3	3	3	3	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	1
	MEAN	21.43	6.12	1867.33	0.12	-34.10						2.65	2.60	2.51	0.09	0.05	0.01	0.05	0.14					390.00
	STD. DEV.	2.58	0.00	303.87	0.05	137.92						0.55	0.53	0.56	0.03	0.03	0.00	0.03	0.02					
	MIN	19.30	6.05	1536.00	0.08	-147.60						2.22	2.20	2.09	0.06	0.01	0.01	0.02	0.13					390.00
	MAX	24.30	6.20	2133.00	0.18	119.40						3.27	3.20	3.15	0.11	0.07	0.01	0.07	0.16					390.00
BHS7-ST2-SL-05	n	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0
	MEAN	19.25	6.02	1585.50	2.30	97.20						8.80	3.45	3.36	0.09	5.35	0.01	5.35	5.44					
	STD. DEV.	4.60	0.00	651.25	1.56	59.40						2.26	1.63	1.66	0.03	0.64	0.00	0.64	0.61					
	MIN	16.00	5.94	1125.00	1.20	55.20						7.20	2.30	2.19	0.07	4.90	0.01	4.90	5.01					
	MAX	22.50	6.10	2046.00	3.40	139.20						10.40	4.60	4.53	0.11	5.80	0.01	5.80	5.87					
BHS7-ST2-DP-06	n	3	3	3	3	3	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	1
	MEAN	21.30	6.21	8768.33	0.11	-9.07						5.46	5.40	5.24	0.16	0.05	0.01	0.06	0.22					410.00
	STD. DEV.	2.25	0.00	12153.40	0.06	97.36						2.25	2.26	2.27	0.03	0.08	0.00	0.07	0.10					
	MIN	19.90	5.95	1554.00	0.06	-120.40						3.52	3.50	3.36	0.14	0.01	0.01	0.02	0.16					410.00
	MAX	23.90	6.63	22800.00	0.18	60.10						7.92	7.90	7.76	0.20	0.14	0.01	0.14	0.34					410.00
BHS7-ST2-DP-07	n	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2
	MEAN	21.60	6.25	9070.00	0.23	-27.13	206.67	17.33	12.67	33.33	306.67	4.62	4.60	4.46	0.14	0.01	0.01	0.02	0.16	25.63	15.53	90	3	470.00
	STD. DEV.	2.44	0.00	12498.67	0.20	93.57	5.77	8.50	4.04	26.63	118.46	2.27	2.27	2.28	0.01	0.00	0.00	0.00	0.01	29.97	17.26			0.00
	MIN	19.90	6.14	1636.00	0.10	-117.30	200.00	11.00	9.00	16.00	170.00	3.02	3.00	2.87	0.13	0.01	0.01	0.02	0.15	4.90	2.10	1	2	470.00
	MAX	24.40	6.38	23500.00	0.46	69.50	210.00	27.00	17.00	64.00	380.00	7.22	7.20	7.07	0.15	0.01	0.01	0.02	0.17	60.00	35.00	1200	10	470.00
BHS7-ST2-DP-08	n	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2
	MEAN	20.97	6.12	1828.67	0.26	-58.00	200.00	10.67	9.33	46.00	523.33	3.36	3.30	3.19	0.11	0.06	0.01	0.06	0.17	18.40	10.65	1	2	415.00
	STD. DEV.	3.02	0.00	235.26	0.25	113.57	0.00	4.62	3.21	29.82	508.36	1.30	1.31	1.33	0.02	0.08	0.00	0.08	0.08	17.15	9.52			63.64
	MIN	18.40	6.09	1600.00	0.08	-161.00	200.00	8.00	7.00	19.00	140.00	2.12	2.10	1.97	0.09	0.01	0.01	0.02	0.11	3.20	0.96	1	2	370.00
	MAX	24.30	6.15	2070.00	0.54	63.80	200.00	16.00	13.00	78.00	1100.00	4.72	4.70	4.61	0.13	0.15	0.01	0.15	0.26	37.00	20.00	1	2	460.00

Table 7 (continued)
Summary of Water Quality Analytical Results

Sample ID		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)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)	Cl (mg/L)
BHS7-EFF-SL-06	n	3	3	3	3	3	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	1
	MEAN	19.37	5.66	701.67	5.59	160.77						20.77	2.43	2.33	0.10	18.33	0.01	18.33	18.43					86.00
	STD. DEV.	6.28	0.00	325.00	0.23	48.53						2.76	1.27	1.31	0.09	1.53	0.00	1.53	1.47					
	MIN	12.40	5.64	469.00	5.33	124.10						18.70	1.70	1.50	0.04	17.00	0.01	17.00	17.20					86.00
	MAX	24.60	5.68	1073.00	5.74	215.80						23.90	3.90	3.84	0.20	20.00	0.01	20.00	20.06					86.00
BHS7-EFF-DP-09	n	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0
	MEAN	17.70	6.06	431.00	6.36	131.50						7.20	2.50	1.59	0.91	4.70	0.01	4.70	5.61					
	STD. DEV.																							
	MIN	17.70	6.06	431.00	6.36	131.50						7.20	2.50	1.59	0.91	4.70	0.01	4.70	5.61					
	MAX	17.70	6.06	431.00	6.36	131.50						7.20	2.50	1.59	0.91	4.70	0.01	4.70	5.61					
BHS7-EFF-SL-07	n	3	3	3	3	3	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	1
	MEAN	20.03	4.95	861.67	6.30	169.70						29.80	1.37	1.28	0.08	28.43	0.01	28.43	28.52					230.00
	STD. DEV.	4.03	0.33	507.45	0.48	26.69						17.59	0.21	0.30	0.11	17.44	0.00	17.44	17.33					
	MIN	15.50	4.61	367.00	5.80	145.80						9.50	1.20	0.99	0.01	8.30	0.01	8.30	8.51					230.00
	MAX	23.20	5.27	1381.00	6.75	198.50						40.60	1.60	1.59	0.21	39.00	0.01	39.00	39.01					230.00
BHS7-EFF-DP-10	n	3	3	3	3	3	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	1
	MEAN	18.70	5.94	1519.67	6.26	146.03						33.90	2.57	2.49	0.08	31.33	0.01	31.33	31.41					340.00
	STD. DEV.	5.17	0.22	267.03	1.19	2.87						9.62	0.40	0.37	0.03	10.02	0.00	10.02	9.98					
	MIN	13.30	5.74	1217.00	4.91	143.60						23.00	2.20	2.14	0.06	20.00	0.01	20.00	20.12					340.00
	MAX	23.60	6.18	1722.00	7.18	149.20						41.20	3.00	2.88	0.12	39.00	0.01	39.00	39.06					340.00
BHS7-EFF-SL-08	n	3	3	3	3	3	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	1
	MEAN	19.57	5.51	1466.67	5.79	145.77						35.47	2.80	2.46	0.35	32.67	0.01	32.67	33.01					280.00
	STD. DEV.	3.91	0.64	221.27	1.13	27.92						11.75	1.11	0.70	0.46	10.69	0.00	10.69	11.05					
	MIN	15.80	5.14	1331.00	4.49	114.20						22.80	1.80	1.72	0.08	21.00	0.01	21.00	21.08					280.00
	MAX	23.60	6.25	1722.00	6.56	167.20						46.00	4.00	3.12	0.88	42.00	0.01	42.00	42.88					280.00
BHS7-EFF-SL-09	n	3	3	3	3	3	1	3	3	3	2	1	1	1	3	3	3	3	3	2	3	0	0	2
	MEAN	19.73	5.85	537.67	5.34	84.77	11.00	1.00	1.00	2.33	21.50	12.70	1.70	1.29	0.21	26.00	0.01	26.00	26.21	0.15	0.09			58.50
	STD. DEV.	3.69	0.26	260.43	0.76	53.55		0.00	0.00	0.58	16.26				0.20	14.53	0.00	14.53	14.42	0.19	0.13			34.65
	MIN	16.40	5.63	269.00	4.58	53.80	11.00	1.00	1.00	2.00	10.00	12.70	1.70	1.29	0.01	11.00	0.01	11.00	11.41	0.02	0.01			34.00
	MAX	23.70	6.14	789.00	6.10	146.60	11.00	1.00	1.00	3.00	33.00	12.70	1.70	1.29	0.41	40.00	0.01	40.00	40.22	0.29	0.24			83.00
BHS7-EFF-DP-12	n	3	3	3	3	3	1	1	1	1	1	3	3	3	3	3	3	3	3	1	1	0	0	1
	MEAN	20.40	6.13	1576.33	4.23	41.93	140.00	14.00	11.00	12.00	97.00	8.63	3.50	3.37	0.13	5.13	0.01	5.13	5.26	2.60	0.77			330.00
	STD. DEV.	3.80	0.16	264.06	0.70	71.73						4.55	0.96	0.96	0.01	4.47	0.00	4.47	4.47					
	MIN	17.20	5.95	1309.00	3.66	-36.30	140.00	14.00	11.00	12.00	97.00	4.00	2.80	2.67	0.12	1.20	0.01	1.20	1.33	2.60	0.77			330.00
	MAX	24.60	6.25	1837.00	5.01	104.60	140.00	14.00	11.00	12.00	97.00	13.10	4.60	4.47	0.13	10.00	0.01	10.00	10.12	2.60	0.77			330.00

Table 7 (continued)
Summary of Water Quality Analytical Results

Sample ID		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)	Fecal (Ct/100 mL)	E-coli (Ct/100 mL)	Cl (mg/L)
BHS7-BKG-LY	n	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MEAN	24.10	5.75	104.00	5.67	155.60	11.00	1.00	1.00	16.00	49.00	1.00	0.78	0.72	0.06	0.22	0.01	0.22	0.28	0.05	0.01	1.00	2.00	4.60
	STD. DEV.																							
	MIN	24.10	5.75	104.00	5.67	155.60	11.00	1.00	1.00	16.00	49.00	1.00	0.78	0.72	0.06	0.22	0.01	0.22	0.28	0.05	0.01	1.00	2.00	4.60
	MAX	24.10	5.75	104.00	5.67	155.60	11.00	1.00	1.00	16.00	49.00	1.00	0.78	0.72	0.06	0.22	0.01	0.22	0.28	0.05	0.01	1.00	2.00	4.60
BHS7-TAP	n	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
	MEAN	21.40	7.21	176.60	6.49	99.75	82.50	2.00	2.00	2.00	10.00	0.24	0.05	0.04	0.01	0.11	0.08	0.19	0.20	0.15	0.12	1.00	2.00	4.00
	STD. DEV.	1.84	0.10	3.82	0.93	77.00	6.36	1.41	1.41	0.00	0.00	0.04	0.00	0.00	0.00	0.03	0.01	0.04	0.04	0.04	0.04			
	MIN	20.10	7.14	173.90	5.83	45.30	78.00	1.00	1.00	2.00	10.00	0.21	0.05	0.04	0.01	0.09	0.07	0.16	0.17	0.12	0.10	1.00	2.00	4.00
	MAX	22.70	7.28	179.30	7.15	154.20	87.00	3.00	3.00	2.00	10.00	0.27	0.05	0.04	0.01	0.13	0.09	0.22	0.23	0.17	0.15	1.00	2.00	4.00
BHS7-EB	n	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2
	MEAN	23.13	6.98	1.82	7.41	67.33	2.00	1.00	1.00	2.00	10.00	0.06	0.05	0.04	0.01	0.01	0.01	0.01	0.02	0.01	0.01	1.00	2.00	0.05
	STD. DEV.	7.51	0.46	0.55	2.09	29.72	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00			0.00
	MIN	15.90	6.48	1.20	5.16	43.10	2.00	1.00	1.00	2.00	10.00	0.06	0.05	0.04	0.01	0.01	0.01	0.01	0.02	0.01	0.01	1.00	2.00	0.05
	MAX	30.90	7.39	2.26	9.29	100.50	2.00	1.00	1.00	2.00	10.00	0.07	0.05	0.04	0.01	0.01	0.01	0.02	0.03	0.01	0.01	1.00	2.00	0.05

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.

PRELIMINARY

5.0 B-HS7 Sample Event No. 3: Summary and Recommendations

5.1 Summary

The Sample Event No. 3 results indicate that:

- Septic tank effluent (STE) quality is characteristic of typical household STE quality. The total nitrogen concentration of 46 mg/L is within the range of values typically reported for Florida single family residence STE.
- The Stage 1 biofilter converted most of the ammonia N to oxidized nitrogen; mean effluent values contained 2.8 ± 0.3 mg/L TKN, of which 0.06 ± 0.05 mg/L was ammonia.
- The Stage 2 biofilter produced a reducing environment and mean effluent $\text{NO}_x\text{-N}$ was 0.07 ± 0.13 mg N/L.
- The total nitrogen concentration in the perimeter monitoring points surrounding the treatment system was 31.3 ± 11.8 mg/L of which mean TKN was 2.3 ± 0.7 and mean $\text{NO}_x\text{-N}$ was 28.7 ± 11.0 mg/L. It is still unclear why the perimeter monitoring points show higher $\text{NO}_x\text{-N}$ levels than the Stage 2 points. Since the observation port measurements indicated that the liner water level was between 3.5 and 4.0 inches below the overflow elevation, at the time of sampling, the water sampled by the perimeter points is not likely to be water recently discharged off the liner. One hypothesis is that the $\text{NO}_x\text{-N}$ plume extends past the width of the Stage 2 biofilter liner area.

5.2 Recommendations

In Sample Event 3, the Stage 1 and 2 biofilters exhibited better nitrification and denitrification performance, respectively, as compared to Sample Event No. 2. However, the perimeter monitoring point samples continue to show high total nitrogen in the effluent mostly comprised of $\text{NO}_x\text{-N}$, and it continues to appear possible that these sample points may not be representative of effluent from the system. One possible method to track the wastewater plume without compromising nitrogen analyses is to introduce rhodamine dye into the system.

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Appendix A: Laboratory Report

PRELIMINARY

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

June 11, 2014
Work Order: 1404447

Laboratory Report

Project Name		B-HS7 SE#3						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS7-PUMP						
Matrix		Wastewater						
SAL Sample Number		1404447-01						
Date/Time Collected		05/08/14 11:25						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						
<u>Client Provided Field Data</u>								
pH		6.92						
Temperature		23.3 °C						
Conductivity		2454 umhos						
Dissolved Oxygen		0.01 mg/L						
<u>Inorganics</u>								
Ammonia as N	mg/L	44	EPA 350.1	2.0	0.47		05/21/14 08:05	50
Carbonaceous BOD	mg/L	110	SM 5210B	2	2	05/09/14 10:43	05/14/14 08:26	1
Chemical Oxygen Demand	mg/L	190	EPA 410.4	25	10		05/14/14 16:05	1
Chloride	mg/L	700	EPA 300.0	20	5.0		05/21/14 11:34	100
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 20:49	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 20:49	1
Orthophosphate as P	mg/L	4.5	EPA 300.0	0.040	0.010		05/09/14 20:49	1
Phosphorous - Total as P	mg/L	9.3	SM 4500P-E	0.80	0.20	05/28/14 15:49	05/30/14 12:01	20
Total Alkalinity	mg/L	280	SM 2320B	8.0	2.0		05/15/14 14:00	1
Total Kjeldahl Nitrogen	mg/L	46	EPA 351.2	4.0	1.0	05/28/14 15:49	05/30/14 12:01	20
Total Suspended Solids	mg/L	38	SM 2540D	1	1	05/10/14 10:29	05/11/14 09:47	1
Volatile Suspended Solids	mg/L	40	EPA 160.4	1	1	05/10/14 08:55	05/11/14 09:47	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		05/09/14 20:49	1
<u>Microbiology</u>								
E. Coli	MPN/100 mL	96	SM 9223B	2.0	2.0	05/08/14 15:52	05/09/14 10:21	1
Fecal Coliforms	CFU/100 ml	42,000	SM 9222D	1	1	05/08/14 15:57	05/09/14 13:57	1

Sample Description **BHS7-PUMP-DUP**
 Matrix **Wastewater**
 SAL Sample Number **1404447-02**
 Date/Time Collected **05/08/14 11:30**
 Collected by **Josefin Hirst**
 Date/Time Received **05/08/14 14:35**

Client Provided Field Data

pH 6.92
 Temperature 23.3 °C
 Conductivity 2454 umhos
 Dissolved Oxygen 0.01 mg/L

Inorganics

Ammonia as N	mg/L	45	EPA 350.1	2.0	0.47		05/21/14 08:07	50
Carbonaceous BOD	mg/L	110	SM 5210B	2	2	05/09/14 10:43	05/14/14 08:26	1

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June 11, 2014
Work Order: 1404447

Laboratory Report

Project Name		B-HS7 SE#3						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS7-PUMP-DUP						
Matrix		Wastewater						
SAL Sample Number		1404447-02						
Date/Time Collected		05/08/14 11:30						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						
Chemical Oxygen Demand	mg/L	27	EPA 410.4	25	10	05/19/14 14:03	05/19/14 14:11	1
Chloride	mg/L	620	EPA 300.0	20	5.0		05/20/14 19:09	100
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 21:00	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 21:00	1
Orthophosphate as P	mg/L	4.3	EPA 300.0	0.040	0.010		05/09/14 21:00	1
Phosphorous - Total as P	mg/L	9.6	SM 4500P-E	0.80	0.20	05/28/14 15:49	05/30/14 12:02	20
Total Alkalinity	mg/L	280	SM 2320B	8.0	2.0		05/15/14 14:08	1
Total Kjeldahl Nitrogen	mg/L	48	EPA 351.2	4.0	1.0	05/28/14 15:49	05/30/14 12:02	20
Total Suspended Solids	mg/L	34	SM 2540D	1	1	05/09/14 09:48	05/12/14 17:30	1
Volatile Suspended Solids	mg/L	30	EPA 160.4	1	1	05/09/14 09:48	05/12/14 17:30	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		05/09/14 21:00	1
<u>Microbiology</u>								
E. Coli	MPN/100 mL	98	SM 9223B	2.0	2.0	05/08/14 15:52	05/09/14 10:21	1
Fecal Coliforms	CFU/100 ml	58,000	SM 9222D	1	1	05/08/14 15:57	05/09/14 13:57	1
Sample Description		NC-BHS7-ST1-SL-01						
Matrix		Wastewater						
SAL Sample Number		1404447-03						
Date/Time Collected		05/08/14 09:20						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						
<u>Client Provided Field Data</u>								
pH		5.23						
Temperature		23.7 °C						
Conductivity		1284 umhos						
Dissolved Oxygen		4.59 mg/L						
<u>Inorganics</u>								
Ammonia as N	mg/L	0.042	EPA 350.1	0.040	0.009		05/20/14 15:19	1
Chloride	mg/L	270	EPA 300.0	2.0	0.50		05/20/14 19:26	10
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 21:12	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 21:12	1
Total Kjeldahl Nitrogen	mg/L	2.4	EPA 351.2	0.20	0.05	05/28/14 15:49	05/30/14 12:03	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		05/09/14 21:12	1

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June 11, 2014
Work Order: 1404447

Laboratory Report

Project Name		B-HS7 SE#3						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		NC-BHS7-ST1-SL-02						
Matrix		Wastewater						
SAL Sample Number		1404447-04						
Date/Time Collected		05/08/14 09:11						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						

Client Provided Field Data

pH		5.04
Temperature		23.6 °C
Conductivity		1210 umhos
Dissolved Oxygen		4.40 mg/L

Inorganics

Ammonia as N	mg/L	0.034 I	EPA 350.1	0.040	0.009		05/20/14 15:21	1
Chloride	mg/L	240	EPA 300.0	2.0	0.50		05/21/14 15:10	10
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 21:23	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 21:23	1
Total Kjeldahl Nitrogen	mg/L	3.1	EPA 351.2	0.20	0.05	05/28/14 15:49	05/30/14 12:08	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		05/09/14 21:23	1

Sample Description		SC-BHS7-ST1-SL-03						
Matrix		Wastewater						
SAL Sample Number		1404447-05						
Date/Time Collected		05/08/14 09:38						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						

Client Provided Field Data

pH		5.26
Temperature		24.4 °C
Conductivity		1420 umhos
Dissolved Oxygen		3.95 mg/L

Inorganics

Ammonia as N	mg/L	0.035 I	EPA 350.1	0.040	0.009		05/20/14 15:23	1
Chloride	mg/L	310	EPA 300.0	4.0	1.0		05/21/14 15:19	20
Nitrate (as N)	mg/L	38	EPA 300.0	0.04	0.01		05/09/14 21:34	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 21:34	1
Total Kjeldahl Nitrogen	mg/L	2.8	EPA 351.2	0.20	0.05	05/28/14 15:49	05/30/14 12:09	1
Nitrate+Nitrite (N)	mg/L	38	EPA 300.0	0.08	0.02		05/09/14 21:34	1

Hazen and Sawyer
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June 11, 2014
Work Order: 1404447

Laboratory Report

Project Name		B-HS7 SE#3						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		SC-BHS7-ST1-SL-04						
Matrix		Wastewater						
SAL Sample Number		1404447-07						
Date/Time Collected		05/08/14 09:30						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						
<u>Client Provided Field Data</u>								
pH		5.11						
Temperature		24.3 °C						
Conductivity		1618 umhos						
Dissolved Oxygen		3.16 mg/L						
<u>Inorganics</u>								
Ammonia as N	mg/L	0.13	EPA 350.1	0.040	0.009		05/20/14 15:33	1
Carbonaceous BOD	mg/L	3	SM 5210B	2	2	05/09/14 10:43	05/14/14 08:26	1
Chemical Oxygen Demand	mg/L	27	EPA 410.4	25	10	05/20/14 15:06	05/21/14 08:00	1
Chloride	mg/L	300	EPA 300.0	4.0	1.0		05/21/14 15:37	20
Nitrate (as N)	mg/L	48	EPA 300.0	0.04	0.01		05/09/14 21:46	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 21:46	1
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		05/09/14 21:46	1
Phosphorous - Total as P	mg/L	0.38	SM 4500P-E	0.040	0.010	05/28/14 15:49	05/30/14 12:10	1
Total Alkalinity	mg/L	20	SM 2320B	8.0	2.0		05/15/14 14:12	1
Total Kjeldahl Nitrogen	mg/L	3.0	EPA 351.2	0.20	0.05	05/28/14 15:49	05/30/14 12:10	1
Total Suspended Solids	mg/L	8	SM 2540D	1	1	05/09/14 09:48	05/12/14 17:30	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	05/09/14 09:48	05/12/14 17:30	1
Nitrate+Nitrite (N)	mg/L	48	EPA 300.0	0.08	0.02		05/09/14 21:46	1
<u>Microbiology</u>								
E. Coli	MPN/100 mL	2.0 U	SM 9223B	2.0	2.0	05/08/14 15:52	05/09/14 10:21	1

Sample Description **NC-BHS7-ST2-DP-03**
 Matrix **Wastewater**
 SAL Sample Number **1404447-08**
 Date/Time Collected **05/08/14 09:25**
 Collected by **Josephine Edeback-Hirst**
 Date/Time Received **05/08/14 14:35**

Client Provided Field Data

pH 5.88
 Temperature 23.5 °C
 Conductivity 1855 umhos
 Dissolved Oxygen 0.15 mg/L

Inorganics

Ammonia as N	mg/L	0.083	EPA 350.1	0.040	0.009		05/20/14 15:35	1
Chloride	mg/L	400	EPA 300.0	20	5.0		05/22/14 11:12	100
Nitrate (as N)	mg/L	0.39	EPA 300.0	0.04	0.01		05/09/14 21:57	1

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Project Name		B-HS7 SE#3						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		NC-BHS7-ST2-DP-03						
Matrix		Wastewater						
SAL Sample Number		1404447-08						
Date/Time Collected		05/08/14 09:25						
Collected by		Josephine Edeback-Hirst						
Date/Time Received		05/08/14 14:35						
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 21:57	1
Total Kjeldahl Nitrogen	mg/L	1.7	EPA 351.2	0.20	0.05	05/28/14 15:49	05/30/14 12:11	1
Nitrate+Nitrite (N)	mg/L	0.39	EPA 300.0	0.08	0.02		05/09/14 21:57	1

Sample Description	NC-BHS7-ST2-DP-03-DUP							
Matrix	Wastewater							
SAL Sample Number	1404447-09							
Date/Time Collected	05/08/14 09:30							
Collected by	Josefin Hirst							
Date/Time Received	05/08/14 14:35							

Client Provided Field Data

pH	5.88
Temperature	23.5 °C
Conductivity	1855 umhos
Dissolved Oxygen	0.15 mg/L

Inorganics

Ammonia as N	mg/L	0.12	EPA 350.1	0.040	0.009		06/05/14 16:42	1
Chloride	mg/L	410	EPA 300.0	20	5.0		05/22/14 16:36	100
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 22:08	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 22:08	1
Total Kjeldahl Nitrogen	mg/L	1.6	EPA 351.2	0.20	0.05	05/28/14 15:49	05/30/14 12:12	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		05/09/14 22:08	1

Sample Description	C-BHS7-ST2-DP-05							
Matrix	Wastewater							
SAL Sample Number	1404447-10							
Date/Time Collected	05/08/14 10:00							
Collected by	Josefin Hirst							
Date/Time Received	05/08/14 14:35							

Client Provided Field Data

pH	6.12
Temperature	24.3 °C
Conductivity	1933 umhos
Dissolved Oxygen	0.10 mg/L

Inorganics

Ammonia as N	mg/L	0.098	EPA 350.1	0.040	0.009		05/31/14 09:49	1
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Laboratory Report

Project Name		B-HS7 SE#3						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		C-BHS7-ST2-DP-05						
Matrix		Wastewater						
SAL Sample Number		1404447-10						
Date/Time Collected		05/08/14 10:00						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						
Chloride	mg/L	390	EPA 300.0	20	5.0		05/22/14 16:46	100
Nitrate (as N)	mg/L	0.06	EPA 300.0	0.04	0.01		05/09/14 22:20	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 22:20	1
Total Kjeldahl Nitrogen	mg/L	2.4	EPA 351.2	0.20	0.05	05/28/14 15:49	05/30/14 12:13	1
Nitrate+Nitrite (N)	mg/L	0.06 I	EPA 300.0	0.08	0.02		05/09/14 22:20	1

Sample Description	SE-BHS7-ST2-DP-06
Matrix	Wastewater
SAL Sample Number	1404447-11
Date/Time Collected	05/08/14 10:50
Collected by	Josefin Hirst
Date/Time Received	05/08/14 14:35

Client Provided Field Data

pH	5.95
Temperature	23.9 °C
Conductivity	1951 umhos
Dissolved Oxygen	0.18 mg/L

Inorganics

Ammonia as N	mg/L	0.14	EPA 350.1	0.040	0.009		05/31/14 09:51	1
Chloride	mg/L	410	EPA 300.0	20	5.0		05/22/14 17:14	100
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 22:31	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 22:31	1
Total Kjeldahl Nitrogen	mg/L	3.5	EPA 351.2	0.20	0.05	05/28/14 15:49	05/30/14 12:14	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		05/09/14 22:31	1

Sample Description	SE-BHS7-ST2-DP-06-DUP
Matrix	Wastewater
SAL Sample Number	1404447-12
Date/Time Collected	05/08/14 10:55
Collected by	Josefin Hirst
Date/Time Received	05/08/14 14:35

Client Provided Field Data

pH	5.95
Temperature	23.9 °C
Conductivity	1951 umhos
Dissolved Oxygen	0.18 mg/L

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Project Name		B-HS7 SE#3						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		SE-BHS7-ST2-DP-06-DUP						
Matrix		Wastewater						
SAL Sample Number		1404447-12						
Date/Time Collected		05/08/14 10:55						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						
<u>Inorganics</u>								
Ammonia as N	mg/L	0.16	EPA 350.1	0.040	0.009		05/31/14 09:53	1
Chloride	mg/L	420	EPA 300.0	20	5.0		05/22/14 17:23	100
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 23:16	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 23:16	1
Total Kjeldahl Nitrogen	mg/L	3.5	EPA 351.2	0.20	0.05	05/28/14 15:49	05/30/14 12:15	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		05/09/14 23:16	1
Sample Description		SC-BHS7-ST2-DP-07						
Matrix		Wastewater						
SAL Sample Number		1404447-13						
Date/Time Collected		05/08/14 10:26						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						
<u>Client Provided Field Data</u>								
pH		6.22						
Temperature		24.4 °C						
Conductivity		2074 umhos						
Dissolved Oxygen		0.46 mg/L						
<u>Inorganics</u>								
Ammonia as N	mg/L	0.13	EPA 350.1	0.040	0.009		05/31/14 09:55	1
Carbonaceous BOD	mg/L	16	SM 5210B	2	2	05/09/14 10:43	05/14/14 08:26	1
Chemical Oxygen Demand	mg/L	170	EPA 410.4	25	10	05/20/14 15:06	05/21/14 08:00	1
Chloride	mg/L	470	EPA 300.0	20	5.0		05/22/14 17:33	100
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 23:28	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 23:28	1
Orthophosphate as P	mg/L	2.1	EPA 300.0	0.040	0.010		05/09/14 23:28	1
Phosphorous - Total as P	mg/L	4.9	SM 4500P-E	0.040	0.010	05/28/14 15:49	05/30/14 12:18	1
Total Alkalinity	mg/L	210	SM 2320B	8.0	2.0		05/15/14 14:20	1
Total Kjeldahl Nitrogen	mg/L	3.0	EPA 351.2	0.20	0.05	05/28/14 15:49	05/30/14 12:18	1
Total Suspended Solids	mg/L	14	SM 2540D	1	1	05/09/14 09:48	05/12/14 17:30	1
Volatile Suspended Solids	mg/L	12	EPA 160.4	1	1	05/09/14 09:48	05/12/14 17:30	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		05/09/14 23:28	1
<u>Microbiology</u>								
E. Coli	MPN/100 mL	2.0 U	SM 9223B	2.0	2.0	05/08/14 15:52	05/09/14 10:21	1
Fecal Coliforms	CFU/100 ml	600	SM 9222D	1	1	05/08/14 15:57	05/09/14 13:57	1

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Project Name		B-HS7 SE#3						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		SW-BHS7-ST2-DP-08						
Matrix		Wastewater						
SAL Sample Number		1404447-14						
Date/Time Collected		05/08/14 11:10						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						
<u>Client Provided Field Data</u>								
pH		6.15						
Temperature		24.3 °C						
Conductivity		1816 umhos						
Dissolved Oxygen		0.54 mg/L						
<u>Inorganics</u>								
Ammonia as N	mg/L	0.13	EPA 350.1	0.040	0.009		05/31/14 09:57	1
Carbonaceous BOD	mg/L	41	SM 5210B	2	2	05/09/14 10:43	05/14/14 08:26	1
Chemical Oxygen Demand	mg/L	140	EPA 410.4	25	10	05/19/14 14:03	05/19/14 14:11	1
Chloride	mg/L	370	EPA 300.0	20	5.0		05/22/14 17:42	100
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 23:39	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 23:39	1
Orthophosphate as P	mg/L	0.96	EPA 300.0	0.040	0.010		05/09/14 23:39	1
Phosphorous - Total as P	mg/L	3.2	SM 4500P-E	0.040	0.010	05/29/14 08:06	05/30/14 12:31	1
Total Alkalinity	mg/L	200	SM 2320B	8.0	2.0		05/15/14 14:29	1
Total Kjeldahl Nitrogen	mg/L	2.1	EPA 351.2	0.20	0.05	05/29/14 08:06	05/30/14 12:31	1
Total Suspended Solids	mg/L	8	SM 2540D	1	1	05/09/14 09:48	05/12/14 17:30	1
Volatile Suspended Solids	mg/L	7	EPA 160.4	1	1	05/09/14 09:48	05/12/14 17:30	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		05/09/14 23:39	1
<u>Microbiology</u>								
E. Coli	MPN/100 mL	2.0 U	SM 9223B	2.0	2.0	05/08/14 15:52	05/09/14 10:21	1
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/08/14 15:57	05/09/14 13:57	1

Sample Description **N-BHS7-ST2-OB-01**
 Matrix **Wastewater**
 SAL Sample Number **1404447-15**
 Date/Time Collected **05/08/14 09:17**
 Collected by **Josefin Hirst**
 Date/Time Received **05/08/14 14:35**

Client Provided Field Data

pH 5.69
 Temperature 23.4 °C
 Conductivity 1867 umhos
 Dissolved Oxygen 0.21 mg/L

Inorganics

Ammonia as N	mg/L	0.19	EPA 350.1	0.040	0.009		05/20/14 15:37	1
Chloride	mg/L	430	EPA 300.0	20	5.0		05/22/14 17:52	100

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Project Name		B-HS7 SE#3						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		N-BHS7-ST2-OB-01						
Matrix		Wastewater						
SAL Sample Number		1404447-15						
Date/Time Collected		05/08/14 09:17						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						

Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 23:50	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/09/14 23:50	1
Total Kjeldahl Nitrogen	mg/L	1.9	EPA 351.2	0.20	0.05	05/29/14 08:06	05/30/14 12:32	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		05/09/14 23:50	1

Sample Description		C-BHS7-ST2-OB-02						
Matrix		Wastewater						
SAL Sample Number		1404447-16						
Date/Time Collected		05/08/14 10:15						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						

Client Provided Field Data

pH	6.17
Temperature	24.2 °C
Conductivity	1957 umhos
Dissolved Oxygen	0.17 mg/L

Inorganics

Ammonia as N	mg/L	0.072	EPA 350.1	0.040	0.009		05/31/14 09:59	1
Chloride	mg/L	390	EPA 300.0	20	5.0		05/22/14 18:01	100
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/10/14 00:02	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/10/14 00:02	1
Total Kjeldahl Nitrogen	mg/L	2.5	EPA 351.2	0.20	0.05	05/29/14 08:06	05/30/14 12:33	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		05/10/14 00:02	1

Sample Description		S-BHS7-ST2-OB-03						
Matrix		Wastewater						
SAL Sample Number		1404447-17						
Date/Time Collected		05/08/14 10:40						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						

Client Provided Field Data

pH	6.26
Temperature	25.3 °C
Conductivity	2046 umhos
Dissolved Oxygen	1.23 mg/L

Inorganics

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Project Name		B-HS7 SE#3						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		S-BHS7-ST2-OB-03						
Matrix		Wastewater						
SAL Sample Number		1404447-17						
Date/Time Collected		05/08/14 10:40						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						
Ammonia as N	mg/L	0.12	EPA 350.1	0.040	0.009		05/20/14 15:39	1
Carbonaceous BOD	mg/L	32	SM 5210B	2	2	05/09/14 10:43	05/14/14 08:26	1
Chemical Oxygen Demand	mg/L	200	EPA 410.4	25	10	05/20/14 15:06	05/21/14 08:00	1
Chloride	mg/L	440	EPA 300.0	20	5.0		05/22/14 18:10	100
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/10/14 00:13	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/10/14 00:13	1
Orthophosphate as P	mg/L	2.3	EPA 300.0	0.040	0.010		05/10/14 00:13	1
Phosphorous - Total as P	mg/L	5.3	SM 4500P-E	0.040	0.010	05/29/14 08:06	05/30/14 12:34	1
Total Alkalinity	mg/L	220	SM 2320B	8.0	2.0		05/15/14 14:37	1
Total Kjeldahl Nitrogen	mg/L	3.1	EPA 351.2	0.20	0.05	05/29/14 08:06	05/30/14 12:34	1
Total Suspended Solids	mg/L	12	SM 2540D	1	1	05/09/14 09:48	05/12/14 17:30	1
Volatile Suspended Solids	mg/L	10	EPA 160.4	1	1	05/09/14 09:48	05/12/14 17:30	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		05/10/14 00:13	1
Microbiology								
E. Coli	MPN/100 mL	2.0 U	SM 9223B	2.0	2.0	05/08/14 15:52	05/09/14 10:21	1
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/08/14 15:57	05/09/14 13:57	1

Sample Description		NE-BHS7-EFF-SL-06						
Matrix		Wastewater						
SAL Sample Number		1404447-18						
Date/Time Collected		05/08/14 08:58						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						

Client Provided Field Data

pH	5.68
Temperature	24.6 °C
Conductivity	1073 umhos
Dissolved Oxygen	5.33 mg/L

Inorganics

Ammonia as N	mg/L	0.038 I	EPA 350.1	0.040	0.009		05/20/14 15:41	1
Chloride	mg/L	86	EPA 300.0	20	5.0		05/22/14 18:20	100
Nitrate (as N)	mg/L	18	EPA 300.0	0.04	0.01		05/10/14 00:24	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/10/14 00:24	1
Total Kjeldahl Nitrogen	mg/L	1.7	EPA 351.2	0.20	0.05	05/29/14 08:06	05/30/14 12:35	1
Nitrate+Nitrite (N)	mg/L	18	EPA 300.0	0.08	0.02		05/10/14 00:24	1

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Laboratory Report

Project Name		B-HS7 SE#3						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		NW-BHS7-EFF-SL-07						
Matrix		Wastewater						
SAL Sample Number		1404447-20						
Date/Time Collected		05/08/14 09:02						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						
<u>Client Provided Field Data</u>								
pH		4.96						
Temperature		23.2 °C						
Conductivity		1381 umhos						
Dissolved Oxygen		5.80 mg/L						
<u>Inorganics</u>								
Ammonia as N	mg/L	0.033 I	EPA 350.1	0.040	0.009		05/20/14 15:43	1
Chloride	mg/L	230	EPA 300.0	2.0	0.50		05/22/14 18:29	10
Nitrate (as N)	mg/L	38	EPA 300.0	0.04	0.01		05/10/14 00:36	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/10/14 00:36	1
Total Kjeldahl Nitrogen	mg/L	1.3	EPA 351.2	0.20	0.05	05/29/14 08:06	05/30/14 12:36	1
Nitrate+Nitrite (N)	mg/L	38	EPA 300.0	0.08	0.02		05/10/14 00:36	1
Sample Description		NW-BHS7-EFF-DP-10						
Matrix		Wastewater						
SAL Sample Number		1404447-21						
Date/Time Collected		05/08/14 08:52						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						
<u>Client Provided Field Data</u>								
pH		5.91						
Temperature		23.6 °C						
Conductivity		1722 umhos						
Dissolved Oxygen		4.91 mg/L						
<u>Inorganics</u>								
Ammonia as N	mg/L	0.058	EPA 350.1	0.040	0.009		05/20/14 12:10	1
Chloride	mg/L	340	EPA 300.0	20	5.0		05/22/14 18:38	100
Nitrate (as N)	mg/L	39	EPA 300.0	0.04	0.01		05/10/14 00:47	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/10/14 00:47	1
Total Kjeldahl Nitrogen	mg/L	2.2	EPA 351.2	0.20	0.05	05/29/14 08:06	05/30/14 12:37	1
Nitrate+Nitrite (N)	mg/L	39	EPA 300.0	0.08	0.02		05/10/14 00:47	1

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Project Name		B-HS7 SE#3						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		SE-BHS7-EFF-SL-08						
Matrix		Wastewater						
SAL Sample Number		1404447-22						
Date/Time Collected		05/08/14 10:20						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						

Client Provided Field Data

pH		5.14
Temperature		23.6 °C
Conductivity		1331 umhos
Dissolved Oxygen		4.49 mg/L

Inorganics

Ammonia as N	mg/L	0.077	EPA 350.1	0.040	0.009		05/20/14 12:12	1
Chloride	mg/L	280	EPA 300.0	4.0	1.0		05/24/14 16:24	20
Nitrate (as N)	mg/L	35	EPA 300.0	0.04	0.01		05/10/14 00:58	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/10/14 00:58	1
Total Kjeldahl Nitrogen	mg/L	2.6	EPA 351.2	0.20	0.05	05/29/14 08:06	05/30/14 12:38	1
Nitrate+Nitrite (N)	mg/L	35	EPA 300.0	0.08	0.02		05/10/14 00:58	1

Sample Description		SE-BHS7-EFF-DP-11						
Matrix		Wastewater						
SAL Sample Number		1404447-23						
Date/Time Collected		05/08/14 10:25						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						

Client Provided Field Data

pH		5.92
Temperature		24.7 °C
Conductivity		1475 umhos
Dissolved Oxygen		4.34 mg/L

Inorganics

Ammonia as N	mg/L	0.039 I	EPA 350.1	0.040	0.009		05/09/14 14:51	1
Chloride	mg/L	290	EPA 300.0	4.0	1.0		05/24/14 16:33	20
Nitrate (as N)	mg/L	34	EPA 300.0	0.04	0.01		05/10/14 02:40	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/10/14 02:40	1
Total Kjeldahl Nitrogen	mg/L	3.1	EPA 351.2	0.20	0.05	05/29/14 08:06	05/30/14 12:43	1
Nitrate+Nitrite (N)	mg/L	34	EPA 300.0	0.08	0.02		05/10/14 02:40	1

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June 11, 2014
Work Order: 1404447

Laboratory Report

Project Name		B-HS7 SE#3						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution

Sample Description **SW-BHS7-EFF-SL-09**
 Matrix **Wastewater**
 SAL Sample Number **1404447-24**
 Date/Time Collected **05/08/14 09:55**
 Collected by **Josefin Hirst**
 Date/Time Received **05/08/14 14:35**

Client Provided Field Data

pH 5.63
 Temperature 23.7 °C
 Conductivity 555 umhos
 Dissolved Oxygen 4.58 mg/L

Inorganics

Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		05/09/14 14:53	1
Carbonaceous BOD	mg/L	3	SM 5210B	2	2	05/09/14 10:43	05/14/14 08:26	1
Chloride	mg/L	34	EPA 300.0	0.20	0.050		05/10/14 02:51	1
Nitrate (as N)	mg/L	27	EPA 300.0	0.04	0.01		05/10/14 02:51	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/10/14 02:51	1
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		05/10/14 02:51	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	05/09/14 09:48	05/12/14 17:30	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	05/09/14 09:48	05/12/14 17:30	1
Nitrate+Nitrite (N)	mg/L	27	EPA 300.0	0.08	0.02		05/10/14 02:51	1

Sample Description **SW-BHS7-EFF-DP-12**
 Matrix **Wastewater**
 SAL Sample Number **1404447-25**
 Date/Time Collected **05/08/14 10:00**
 Collected by **Josefin Hirst**
 Date/Time Received **05/08/14 14:35**

Client Provided Field Data

pH 5.95
 Temperature 24.6 °C
 Conductivity 1583 umhos
 Dissolved Oxygen 3.66 mg/L

Inorganics

Ammonia as N	mg/L	0.12	EPA 350.1	0.040	0.009		05/09/14 14:55	1
Carbonaceous BOD	mg/L	12	SM 5210B	2	2	05/09/14 10:43	05/14/14 08:26	1
Chemical Oxygen Demand	mg/L	97	EPA 410.4	25	10	05/20/14 15:06	05/21/14 08:00	1
Chloride	mg/L	330	EPA 300.0	20	5.0		05/24/14 16:42	100
Nitrate (as N)	mg/L	10	EPA 300.0	0.04	0.01		05/10/14 03:03	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/10/14 03:03	1
Orthophosphate as P	mg/L	0.77	EPA 300.0	0.040	0.010		05/10/14 03:03	1
Phosphorous - Total as P	mg/L	2.6	SM 4500P-E	0.040	0.010	05/29/14 08:06	05/30/14 12:44	1
Total Alkalinity	mg/L	140	SM 2320B	8.0	2.0		05/15/14 14:43	1

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Laboratory Report

Project Name		B-HS7 SE#3						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		SW-BHS7-EFF-DP-12						
Matrix		Wastewater						
SAL Sample Number		1404447-25						
Date/Time Collected		05/08/14 10:00						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						
Total Kjeldahl Nitrogen	mg/L	3.1	EPA 351.2	0.20	0.05	05/29/14 08:06	05/30/14 12:44	1
Total Suspended Solids	mg/L	14	SM 2540D	1	1	05/09/14 09:48	05/12/14 17:30	1
Volatile Suspended Solids	mg/L	11	EPA 160.4	1	1	05/09/14 09:48	05/12/14 17:30	1
Nitrate+Nitrite (N)	mg/L	10	EPA 300.0	0.08	0.02		05/10/14 03:03	1
Sample Description		BHS7-EB						
Matrix		Reagent Water						
SAL Sample Number		1404447-26						
Date/Time Collected		05/08/14 11:56						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						
<u>Client Provided Field Data</u>								
pH		6.48						
Temperature		30.9 °C						
Conductivity		2 umhos						
Dissolved Oxygen		5.16 mg/L						
<u>Inorganics</u>								
Ammonia as N	mg/L	0.009 U	EPA 350.1	0.040	0.009		05/09/14 15:53	1
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/09/14 10:43	05/14/14 08:26	1
Chemical Oxygen Demand	mg/L	10 U	EPA 410.4	25	10	05/19/14 14:03	05/19/14 14:11	1
Chloride	mg/L	0.050 U	EPA 300.0	0.20	0.050		05/10/14 03:14	1
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/10/14 03:14	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/10/14 03:14	1
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		05/10/14 03:14	1
Phosphorous - Total as P	mg/L	0.010 U	SM 4500P-E	0.040	0.010	05/29/14 08:06	05/30/14 12:45	1
Total Alkalinity	mg/L	2.0 U	SM 2320B	8.0	2.0		05/15/14 14:53	1
Total Kjeldahl Nitrogen	mg/L	0.05 U	EPA 351.2	0.20	0.05	05/29/14 08:06	05/30/14 12:45	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	05/09/14 09:48	05/12/14 17:30	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	05/09/14 09:48	05/12/14 17:30	1
Nitrate+Nitrite (N)	mg/L	0.02 U	EPA 300.0	0.08	0.02		05/10/14 03:14	1
<u>Microbiology</u>								
E. Coli	MPN/100 mL	2.0 U	SM 9223B	2.0	2.0	05/08/14 15:52	05/09/14 10:21	1
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/08/14 15:57	05/09/14 13:57	1

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Laboratory Report

Project Name		B-HS7 SE#3						
Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	Dilution
Sample Description		BHS7-BKG						
Matrix		Wastewater						
SAL Sample Number		1404447-28						
Date/Time Collected		05/08/14 11:10						
Collected by		Josefin Hirst						
Date/Time Received		05/08/14 14:35						
<u>Client Provided Field Data</u>								
pH		5.75						
Temperature		24.1 °C						
Conductivity		104 umhos						
Dissolved Oxygen		5.67 mg/L						
<u>Inorganics</u>								
Ammonia as N	mg/L	0.063	EPA 350.1	0.040	0.009		05/13/14 15:26	1
Carbonaceous BOD	mg/L	16	SM 5210B	2	2	05/09/14 10:43	05/14/14 08:26	1
Chemical Oxygen Demand	mg/L	49	EPA 410.4	25	10	05/20/14 15:06	05/21/14 08:00	1
Chloride	mg/L	4.6	EPA 300.0	0.20	0.050		05/10/14 03:25	1
Nitrate (as N)	mg/L	0.22	EPA 300.0	0.04	0.01		05/10/14 03:25	1
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/10/14 03:25	1
Orthophosphate as P	mg/L	0.010 U	EPA 300.0	0.040	0.010		05/10/14 03:25	1
Phosphorous - Total as P	mg/L	0.054	SM 4500P-E	0.040	0.010	05/29/14 08:06	05/30/14 12:46	1
Total Alkalinity	mg/L	11	SM 2320B	8.0	2.0		05/15/14 14:56	1
Total Kjeldahl Nitrogen	mg/L	0.78	EPA 351.2	0.20	0.05	05/29/14 08:06	05/30/14 12:46	1
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	05/09/14 09:48	05/12/14 17:30	1
Volatile Suspended Solids	mg/L	1 U	EPA 160.4	1	1	05/09/14 09:48	05/12/14 17:30	1
Nitrate+Nitrite (N)	mg/L	0.22	EPA 300.0	0.08	0.02		05/10/14 03:25	1
<u>Microbiology</u>								
E. Coli	MPN/100 mL	2.0 U	SM 9223B	2.0	2.0	05/08/14 15:52	05/09/14 10:21	1
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/08/14 15:57	05/09/14 13:57	1

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June 11, 2014
Work Order: 1404447

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE40824 - Ammonia by SEAL										
Blank (BE40824-BLK1)					Prepared & Analyzed: 05/13/14 15:12					
Ammonia as N	0.009 U	0.040	0.009	mg/L						
LCS (BE40824-BS1)					Prepared & Analyzed: 05/13/14 15:14					
Ammonia as N	0.53	0.040	0.009	mg/L	0.50		106	90-110		
Matrix Spike (BE40824-MS1)					Source: 1404556-01 Prepared & Analyzed: 05/13/14 16:36					
Ammonia as N	0.54	0.040	0.009	mg/L	0.50	ND	108	90-110		
Matrix Spike (BE40824-MS2)					Source: 1404670-01 Prepared & Analyzed: 05/13/14 16:48					
Ammonia as N	0.52	0.040	0.009	mg/L	0.50	ND	104	90-110		
Matrix Spike Dup (BE40824-MSD1)					Source: 1404556-01 Prepared & Analyzed: 05/13/14 16:38					
Ammonia as N	0.53	0.040	0.009	mg/L	0.50	ND	106	90-110	2	10
Matrix Spike Dup (BE40824-MSD2)					Source: 1404670-01 Prepared & Analyzed: 05/13/14 16:49					
Ammonia as N	0.53	0.040	0.009	mg/L	0.50	ND	105	90-110	0.6	10

Batch BE40826 - Ion Chromatography 300.0 Prep

Blank (BE40826-BLK1)					Prepared & Analyzed: 05/09/14 20:15					
Orthophosphate as P	0.010 U	0.040	0.010	mg/L						
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	0.924			mg/L	1.0		92	90-115		
Surrogate: Dichloroacetate	0.924			mg/L	1.0		92	90-115		
Surrogate: Dichloroacetate	0.924			mg/L	1.0		92	90-115		

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June 11, 2014

Work Order: 1404447

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE40826 - Ion Chromatography 300.0 Prep										
LCS (BE40826-BS1)					Prepared & Analyzed: 05/09/14 20:26					
Orthophosphate as P	0.892	0.040	0.010	mg/L	0.90		99	85-115		
Nitrite (as N)	1.52	0.04	0.01	mg/L	1.4		109	85-115		
Nitrate (as N)	1.91	0.04	0.01	mg/L	1.7		112	85-115		
Surrogate: Dichloroacetate	1.13			mg/L	1.0		113	90-115		
Surrogate: Dichloroacetate	1.13			mg/L	1.0		113	90-115		
Surrogate: Dichloroacetate	1.13			mg/L	1.0		113	90-115		
LCS Dup (BE40826-BSD1)					Prepared & Analyzed: 05/09/14 20:38					
Orthophosphate as P	0.892	0.040	0.010	mg/L	0.90		99	85-115	0	200
Nitrite (as N)	1.52	0.04	0.01	mg/L	1.4		109	85-115	0.07	200
Nitrate (as N)	1.91	0.04	0.01	mg/L	1.7		112	85-115	0.05	200
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Matrix Spike (BE40826-MS1)					Source: 1404447-11		Prepared & Analyzed: 05/09/14 22:42			
Chloride	30.0 L	0.20	0.050	mg/L	3.0	414	NR	80-120		
Nitrate (as N)	1.82	0.04	0.01	mg/L	1.7	ND	107	85-115		
Nitrite (as N)	1.32	0.04	0.01	mg/L	1.4	ND	94	85-115		
Orthophosphate as P	5.77	0.040	0.010	mg/L	0.90	4.95	91	85-115		
Surrogate: Dichloroacetate	0.972			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	0.972			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	0.972			mg/L	1.0		97	90-115		
Surrogate: Dichloroacetate	0.972			mg/L	1.0		97	90-115		
Matrix Spike (BE40826-MS2)					Source: 1404447-22		Prepared & Analyzed: 05/10/14 01:09			
Nitrite (as N)	1.51	0.04	0.01	mg/L	1.4	ND	108	85-115		
Orthophosphate as P	0.921	0.040	0.010	mg/L	0.90	ND	102	85-115		
Chloride	30.0 L	0.20	0.050	mg/L	3.0	277	NR	80-120		
Nitrate (as N)	36.5	0.04	0.01	mg/L	1.7	34.5	115	85-115		
Surrogate: Dichloroacetate	1.04			mg/L	1.0		104	90-115		
Surrogate: Dichloroacetate	1.04			mg/L	1.0		104	90-115		
Surrogate: Dichloroacetate	1.04			mg/L	1.0		104	90-115		
Surrogate: Dichloroacetate	1.04			mg/L	1.0		104	90-115		

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June 11, 2014

Work Order: 1404447

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE40827 - Ion Chromatography 300.0 Prep										
Blank (BE40827-BLK1)					Prepared & Analyzed: 05/10/14 02:06					
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Orthophosphate as P	0.010 U	0.040	0.010	mg/L						
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Chloride	0.050 U	0.20	0.050	mg/L						
Surrogate: Dichloroacetate	0.923			mg/L	1.0		92	90-115		
Surrogate: Dichloroacetate	0.923			mg/L	1.0		92	90-115		
Surrogate: Dichloroacetate	0.923			mg/L	1.0		92	90-115		
Surrogate: Dichloroacetate	0.923			mg/L	1.0		92	90-115		
LCS (BE40827-BS1)					Prepared & Analyzed: 05/10/14 02:17					
Orthophosphate as P	0.879	0.040	0.010	mg/L	0.90		98	85-115		
Nitrite (as N)	1.52	0.04	0.01	mg/L	1.4		109	85-115		
Nitrate (as N)	1.91	0.04	0.01	mg/L	1.7		112	85-115		
Chloride	3.04	0.20	0.050	mg/L	3.0		101	85-115		
Surrogate: Dichloroacetate	1.15			mg/L	1.0		115	90-115		
Surrogate: Dichloroacetate	1.15			mg/L	1.0		115	90-115		
Surrogate: Dichloroacetate	1.15			mg/L	1.0		115	90-115		
Surrogate: Dichloroacetate	1.15			mg/L	1.0		115	90-115		
LCS Dup (BE40827-BSD1)					Prepared & Analyzed: 05/10/14 02:29					
Orthophosphate as P	0.881	0.040	0.010	mg/L	0.90		98	85-115	0.2	200
Chloride	3.06	0.20	0.050	mg/L	3.0		102	85-115	0.7	200
Nitrate (as N)	1.90	0.04	0.01	mg/L	1.7		112	85-115	0.1	200
Nitrite (as N)	1.52	0.04	0.01	mg/L	1.4		109	85-115	0.1	200
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		

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June 11, 2014
Work Order: 1404447

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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Batch BE40827 - Ion Chromatography 300.0 Prep

Matrix Spike (BE40827-MS1)		Source: 1404447-28			Prepared & Analyzed: 05/10/14 03:37					
Chloride	7.56	0.20	0.050	mg/L	3.0	4.61	98	80-120		
Nitrate (as N)	1.90	0.04	0.01	mg/L	1.7	0.225	99	85-115		
Orthophosphate as P	0.813	0.040	0.010	mg/L	0.90	ND	90	85-115		
Nitrite (as N)	1.37	0.04	0.01	mg/L	1.4	ND	98	85-115		
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		
Surrogate: Dichloroacetate	1.12			mg/L	1.0		112	90-115		

Matrix Spike (BE40827-MS2)		Source: 1404795-01			Prepared & Analyzed: 05/10/14 05:19					
Nitrate (as N)	6.86	0.04	0.01	mg/L	1.7	4.95	112	85-115		
Chloride	34.6	0.20	0.050	mg/L	3.0	31.3	110	80-120		
Orthophosphate as P	0.876	0.040	0.010	mg/L	0.90	ND	97	85-115		
Nitrite (as N)	1.48	0.04	0.01	mg/L	1.4	ND	105	85-115		
Surrogate: Dichloroacetate	0.934			mg/L	1.0		93	90-115		
Surrogate: Dichloroacetate	0.934			mg/L	1.0		93	90-115		
Surrogate: Dichloroacetate	0.934			mg/L	1.0		93	90-115		
Surrogate: Dichloroacetate	0.934			mg/L	1.0		93	90-115		

Batch BE40910 - BOD

Blank (BE40910-BLK1)		Prepared: 05/09/14 Analyzed: 05/14/14 08:26								
Carbonaceous BOD	2 U	2	2	mg/L						
Blank (BE40910-BLK2)		Prepared: 05/09/14 Analyzed: 05/14/14 08:26								
Carbonaceous BOD	2 U	2	2	mg/L						

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June 11, 2014
Work Order: 1404447

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE40910 - BOD										
LCS (BE40910-BS1)					Prepared: 05/09/14 Analyzed: 05/14/14 08:26					
Carbonaceous BOD	213	2	2	mg/L	200		107	85-115		
LCS (BE40910-BS2)					Prepared: 05/09/14 Analyzed: 05/14/14 08:26					
Carbonaceous BOD	186	2	2	mg/L	200		93	85-115		
LCS Dup (BE40910-BSD1)					Prepared: 05/09/14 Analyzed: 05/14/14 08:26					
Carbonaceous BOD	184	2	2	mg/L	200		92	85-115	15	200
LCS Dup (BE40910-BSD2)					Prepared: 05/09/14 Analyzed: 05/14/14 08:26					
Carbonaceous BOD	180	2	2	mg/L	200		90	85-115	3	200
Duplicate (BE40910-DUP1)					Source: 1404803-01 Prepared: 05/09/14 Analyzed: 05/14/14 08:26					
Carbonaceous BOD	140	2	2	mg/L		130			6	25
Duplicate (BE40910-DUP2)					Source: 1404849-01 Prepared: 05/09/14 Analyzed: 05/14/14 08:26					
Carbonaceous BOD	330	2	2	mg/L		330			1	25
Batch BE40916 - Ammonia by SEAL										
Blank (BE40916-BLK1)					Prepared & Analyzed: 05/09/14 15:51					
Ammonia as N	0.009 U	0.040	0.009	mg/L						
LCS (BE40916-BS1)					Prepared & Analyzed: 05/09/14 14:45					
Ammonia as N	0.51	0.040	0.009	mg/L	0.50		101	90-110		
Matrix Spike (BE40916-MS1)					Source: 1404447-26 Prepared & Analyzed: 05/09/14 14:47					
Ammonia as N	0.50	0.040	0.009	mg/L	0.50	ND	99	90-110		

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June 11, 2014
Work Order: 1404447

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE40916 - Ammonia by SEAL										
Matrix Spike Dup (BE40916-MSD1)		Source: 1404447-26			Prepared & Analyzed: 05/09/14 14:49					
Ammonia as N	0.50	0.040	0.009	mg/L	0.50	ND	100	90-110	1	10
Batch BE41316 - TSS prep										
Blank (BE41316-BLK1)		Prepared: 05/09/14 Analyzed: 05/12/14 17:30								
Volatile Suspended Solids	1 U	1		mg/L						
Total Suspended Solids	1 U	1	1	mg/L						
Blank (BE41316-BLK2)		Prepared: 05/09/14 Analyzed: 05/12/14 17:30								
Volatile Suspended Solids	1 U	1		mg/L						
Total Suspended Solids	1 U	1	1	mg/L						
LCS (BE41316-BS1)		Prepared: 05/09/14 Analyzed: 05/12/14 17:30								
Total Suspended Solids	50.5	1	1	mg/L	50		101	85-115		
LCS (BE41316-BS2)		Prepared: 05/09/14 Analyzed: 05/12/14 17:30								
Total Suspended Solids	48.5	1	1	mg/L	50		97	85-115		
Duplicate (BE41316-DUP1)		Source: 1404340-01			Prepared: 05/09/14 Analyzed: 05/12/14 17:30					
Total Suspended Solids	46.0	1	1	mg/L		42.0			9	30
Volatile Suspended Solids	40.0	1		mg/L		38.0			5	20
Duplicate (BE41316-DUP2)		Source: 1404522-03			Prepared: 05/09/14 Analyzed: 05/12/14 17:30					
Total Suspended Solids	2,310	1	1	mg/L		2300			0.4	30
Volatile Suspended Solids	1,960	1		mg/L		1960			0.4	20

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE41435 - alkalinity										
Blank (BE41435-BLK1)					Prepared & Analyzed: 05/15/14 11:56					
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
LCS (BE41435-BS1)					Prepared & Analyzed: 05/15/14 12:02					
Total Alkalinity	120	8.0	2.0	mg/L	120		100	90-110		
Matrix Spike (BE41435-MS1)					Source: 1404604-01		Prepared & Analyzed: 05/15/14 15:09			
Total Alkalinity	270	8.0	2.0	mg/L	120	150	98	80-120		
Matrix Spike Dup (BE41435-MSD1)					Source: 1404604-01		Prepared & Analyzed: 05/15/14 15:18			
Total Alkalinity	280	8.0	2.0	mg/L	120	150	103	80-120	2	26
Batch BE41449 - COD prep										
Blank (BE41449-BLK1)					Prepared & Analyzed: 05/14/14 16:05					
Chemical Oxygen Demand	10 U	25	10	mg/L						
LCS (BE41449-BS1)					Prepared & Analyzed: 05/14/14 16:05					
Chemical Oxygen Demand	50	25	10	mg/L	50		100	90-110		
Matrix Spike (BE41449-MS1)					Source: 1404340-09		Prepared & Analyzed: 05/14/14 16:05			
Chemical Oxygen Demand	50	25	10	mg/L	50	ND	100	85-115		
Matrix Spike Dup (BE41449-MSD1)					Source: 1404340-09		Prepared & Analyzed: 05/14/14 16:05			
Chemical Oxygen Demand	50	25	10	mg/L	50	ND	100	85-115	0	32
Batch BE41609 - TSS prep										
Blank (BE41609-BLK1)					Prepared & Analyzed: 05/10/14 17:10					
Total Suspended Solids	1 U	1	1	mg/L						

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE41609 - TSS prep										
LCS (BE41609-BS1)					Prepared & Analyzed: 05/10/14 17:10					
Total Suspended Solids	47.5	1	1	mg/L	50		95	85-115		
Duplicate (BE41609-DUP1)					Source: 1404784-01 Prepared & Analyzed: 05/10/14 17:10					
Total Suspended Solids	156	1	1	mg/L		158			1	30
Batch BE41930 - Ion Chromatography 300.0 Prep										
Blank (BE41930-BLK1)					Prepared & Analyzed: 05/20/14 14:22					
Chloride	0.050 U	0.20	0.050	mg/L						
Surrogate: Dichloroacetate	1.06			mg/L	1.0		106	90-115		
LCS (BE41930-BS1)					Prepared & Analyzed: 05/20/14 14:31					
Chloride	2.88	0.20	0.050	mg/L	3.0		96	85-115		
Surrogate: Dichloroacetate	1.11			mg/L	1.0		111	90-115		
LCS Dup (BE41930-BSD1)					Prepared & Analyzed: 05/20/14 14:40					
Chloride	2.86	0.20	0.050	mg/L	3.0		95	85-115	0.7	200
Surrogate: Dichloroacetate	1.05			mg/L	1.0		105	90-115		
Matrix Spike (BE41930-MS1)					Source: 1404563-01 Prepared & Analyzed: 05/21/14 10:48					
Chloride	198	2.0	0.50	mg/L	30	170	95	80-120		
Surrogate: Dichloroacetate	1.04			mg/L	1.0		104	90-115		
Matrix Spike (BE41930-MS2)					Source: 1404447-03 Prepared & Analyzed: 05/20/14 19:35					
Chloride	302	2.0	0.50	mg/L	30	272	100	80-120		
Surrogate: Dichloroacetate	1.15			mg/L	1.0		115	90-115		

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE41934 - COD prep										
Blank (BE41934-BLK1)					Prepared & Analyzed: 05/19/14 14:11					
Chemical Oxygen Demand	10 U	25	10	mg/L						
LCS (BE41934-BS1)					Prepared & Analyzed: 05/19/14 14:11					
Chemical Oxygen Demand	50	25	10	mg/L	50		100	90-110		
Matrix Spike (BE41934-MS1)					Source: 1404393-01 Prepared & Analyzed: 05/19/14 14:11					
Chemical Oxygen Demand	60	25	10	mg/L	50	10	100	85-115		
Matrix Spike Dup (BE41934-MSD1)					Source: 1404393-01 Prepared & Analyzed: 05/19/14 14:11					
Chemical Oxygen Demand	56	25	10	mg/L	50	10	92	85-115	7	32
Batch BE42004 - Ammonia by SEAL										
Blank (BE42004-BLK1)					Prepared & Analyzed: 05/20/14 11:50					
Ammonia as N	0.009 U	0.040	0.009	mg/L						
LCS (BE42004-BS1)					Prepared & Analyzed: 05/20/14 11:52					
Ammonia as N	0.53	0.040	0.009	mg/L	0.50		105	90-110		
Matrix Spike (BE42004-MS1)					Source: 1404849-07 Prepared & Analyzed: 05/20/14 14:10					
Ammonia as N	0.54	0.040	0.009	mg/L	0.50	0.077	93	90-110		
Matrix Spike (BE42004-MS2)					Source: 1404912-07 Prepared & Analyzed: 05/20/14 12:19					
Ammonia as N	0.61	0.040	0.009	mg/L	0.50	0.080	105	90-110		
Matrix Spike Dup (BE42004-MSD1)					Source: 1404849-07 Prepared & Analyzed: 05/20/14 11:56					
Ammonia as N	0.53	0.040	0.009	mg/L	0.50	0.077	91	90-110	2	10

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE42004 - Ammonia by SEAL										
Matrix Spike Dup (BE42004-MSD2)		Source: 1404912-07			Prepared & Analyzed: 05/20/14 12:21					
Ammonia as N	0.62	0.040	0.009	mg/L	0.50	0.080	108	90-110	2	10
Batch BE42010 - VSS Prep										
Blank (BE42010-BLK1)		Prepared: 05/10/14 Analyzed: 05/11/14 09:47								
Volatile Suspended Solids	1 U	1		mg/L						
Duplicate (BE42010-DUP1)		Source: 1404447-01			Prepared: 05/10/14 Analyzed: 05/11/14 09:47					
Total Suspended Solids	42.5	1	1	mg/L		38.5			10	30
Volatile Suspended Solids	38.5	1		mg/L		40.5			5	20
Batch BE42018 - Ammonia by SEAL										
Blank (BE42018-BLK1)		Prepared & Analyzed: 05/20/14 15:01								
Ammonia as N	0.009 U	0.040	0.009	mg/L						
LCS (BE42018-BS1)		Prepared & Analyzed: 05/20/14 15:03								
Ammonia as N	0.53	0.040	0.009	mg/L	0.50		105	90-110		
Matrix Spike (BE42018-MS1)		Source: 1404340-09			Prepared & Analyzed: 05/20/14 15:05					
Ammonia as N	0.51	0.040	0.009	mg/L	0.50	ND	102	90-110		
Matrix Spike (BE42018-MS2)		Source: 1405046-07			Prepared & Analyzed: 05/20/14 15:29					
Ammonia as N	0.54	0.040	0.009	mg/L	0.50	0.057	97	90-110		
Matrix Spike Dup (BE42018-MSD1)		Source: 1404340-09			Prepared & Analyzed: 05/20/14 15:07					
Ammonia as N	0.54	0.040	0.009	mg/L	0.50	ND	107	90-110	4	10

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE42018 - Ammonia by SEAL										
Matrix Spike Dup (BE42018-MSD2)		Source: 1405046-07			Prepared & Analyzed: 05/20/14 15:31					
Ammonia as N	0.55	0.040	0.009	mg/L	0.50	0.057	99	90-110	2	10
Batch BE42025 - Ion Chromatography 300.0 Prep										
Blank (BE42025-BLK1)		Prepared & Analyzed: 05/21/14 09:19								
Chloride	0.050 U	0.20	0.050	mg/L						
Surrogate: Dichloroacetate	0.969			mg/L	1.0		97	90-115		
LCS (BE42025-BS1)		Prepared & Analyzed: 05/21/14 09:49								
Chloride	2.79	0.20	0.050	mg/L	3.0		93	85-115		
Surrogate: Dichloroacetate	0.962			mg/L	1.0		96	90-115		
LCS Dup (BE42025-BSD1)		Prepared & Analyzed: 05/21/14 09:58								
Chloride	2.80	0.20	0.050	mg/L	3.0		93	85-115	0.5	200
Surrogate: Dichloroacetate	0.983			mg/L	1.0		98	90-115		
Matrix Spike (BE42025-MS1)		Source: 1405201-04			Prepared & Analyzed: 05/21/14 13:38					
Chloride	30.0 L	0.20	0.050	mg/L	3.0	54.0	NR	80-120		
Surrogate: Dichloroacetate	0.985			mg/L	1.0		98	90-115		
Matrix Spike (BE42025-MS2)		Source: 1404447-08			Prepared & Analyzed: 05/22/14 11:44					
Chloride	682	20	5.0	mg/L	300	402	93	80-120		
Nitrite (as N)	152	4.0	1.0	mg/L	140	ND	108	85-115		
Nitrate (as N)	166	4.0	1.0	mg/L	170	ND	98	85-115		
Surrogate: Dichloroacetate	0.965			mg/L	1.0		96	90-115		
Surrogate: Dichloroacetate	0.965			mg/L	1.0		96	90-115		
Surrogate: Dichloroacetate	0.965			mg/L	1.0		96	90-115		

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE42037 - COD prep										
Blank (BE42037-BLK1)					Prepared: 05/20/14 Analyzed: 05/21/14 08:00					
Chemical Oxygen Demand	10 U	25	10	mg/L						
LCS (BE42037-BS1)					Prepared: 05/20/14 Analyzed: 05/21/14 08:00					
Chemical Oxygen Demand	49	25	10	mg/L	50		98	90-110		
Matrix Spike (BE42037-MS1)					Source: 1404447-07		Prepared: 05/20/14 Analyzed: 05/21/14 08:00			
Chemical Oxygen Demand	70	25	10	mg/L	50	27	86	85-115		
Matrix Spike Dup (BE42037-MSD1)					Source: 1404447-07		Prepared: 05/20/14 Analyzed: 05/21/14 08:00			
Chemical Oxygen Demand	70	25	10	mg/L	50	27	86	85-115	0	32
Batch BE42110 - Ion Chromatography 300.0 Prep										
Blank (BE42110-BLK1)					Prepared & Analyzed: 05/22/14 14:01					
Chloride	0.050 U	0.20	0.050	mg/L						
Surrogate: Dichloroacetate	0.957			mg/L	1.0		96	90-115		
LCS (BE42110-BS1)					Prepared & Analyzed: 05/22/14 14:18					
Chloride	2.77	0.20	0.050	mg/L	3.0		92	85-115		
Surrogate: Dichloroacetate	0.980			mg/L	1.0		98	90-115		
LCS Dup (BE42110-BSD1)					Prepared & Analyzed: 05/22/14 14:28					
Chloride	2.75	0.20	0.050	mg/L	3.0		92	85-115	0.5	200
Surrogate: Dichloroacetate	0.958			mg/L	1.0		96	90-115		
Matrix Spike (BE42110-MS1)					Source: 1405185-09		Prepared & Analyzed: 05/22/14 16:27			
Chloride	14.4	0.20	0.050	mg/L	3.0	11.2	108	80-120		
Surrogate: Dichloroacetate	1.04			mg/L	1.0		104	90-115		

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Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE42110 - Ion Chromatography 300.0 Prep										
Matrix Spike (BE42110-MS2)		Source: 1404447-21			Prepared & Analyzed: 05/22/14 18:48					
Chloride	618	20	5.0	mg/L	300	338	93	80-120		
Nitrate (as N)	191	4.0	1.0	mg/L	170	0.288	112	85-115		
Surrogate: Dichloroacetate	1.05			mg/L	1.0		105	90-115		
Surrogate: Dichloroacetate	1.05			mg/L	1.0		105	90-115		
Batch BE42343 - Ion Chromatography 300.0 Prep										
Blank (BE42343-BLK1)		Prepared & Analyzed: 05/24/14 15:27								
Chloride	0.050 U	0.20	0.050	mg/L						
Surrogate: Dichloroacetate	0.901			mg/L	1.0		90	90-115		
LCS (BE42343-BS1)		Prepared & Analyzed: 05/24/14 15:37								
Chloride	2.74	0.20	0.050	mg/L	3.0		91	85-115		
Surrogate: Dichloroacetate	0.970			mg/L	1.0		97	90-115		
LCS Dup (BE42343-BSD1)		Prepared & Analyzed: 05/24/14 15:46								
Chloride	2.73	0.20	0.050	mg/L	3.0		91	85-115	0.5	200
Surrogate: Dichloroacetate	0.965			mg/L	1.0		96	90-115		
Matrix Spike (BE42343-MS1)		Source: 1405064-02			Prepared & Analyzed: 05/27/14 10:34					
Chloride	30.0 L	0.20	0.050	mg/L	3.0	34.8	NR	80-120		
Surrogate: Dichloroacetate	1.14			mg/L	1.0		114	90-115		
Matrix Spike (BE42343-MS2)		Source: 1404793-01			Prepared & Analyzed: 05/24/14 19:31					
Chloride	84.1	2.0	0.50	mg/L	30	56.6	92	80-120		
Surrogate: Dichloroacetate	1.10			mg/L	1.0		110	90-115		

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE42826 - Digestion for TP and TKN										
Blank (BE42826-BLK1)					Prepared: 05/28/14 Analyzed: 05/30/14 11:52					
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 (BE42826-BS1)					Prepared: 05/28/14 Analyzed: 05/30/14 11:53					
Total Kjeldahl Nitrogen	1.01	0.20	0.05	mg/L	1.0		101	90-110		
Phosphorous - Total as P	0.543	0.040	0.010	mg/L	0.50		109	90-110		
Matrix Spike (BE42826-MS1)					Source: 1404340-09		Prepared: 05/28/14 Analyzed: 05/30/14 11:54			
Total Kjeldahl Nitrogen	1.05	0.20	0.05	mg/L	1.0	ND	105	90-110		
Phosphorous - Total as P	0.515	0.040	0.010	mg/L	0.50	ND	103	90-110		
Matrix Spike (BE42826-MS2)					Source: 1405104-07		Prepared: 05/28/14 Analyzed: 05/30/14 12:06			
Phosphorous - Total as P	0.543	0.040	0.010	mg/L	0.50	0.0639	96	90-110		
Total Kjeldahl Nitrogen	1.53	0.20	0.05	mg/L	1.0	0.588	94	90-110		
Matrix Spike Dup (BE42826-MSD1)					Source: 1404340-09		Prepared: 05/28/14 Analyzed: 05/30/14 11:55			
Phosphorous - Total as P	0.489	0.040	0.010	mg/L	0.50	ND	98	90-110	5	25
Total Kjeldahl Nitrogen	1.06	0.20	0.05	mg/L	1.0	ND	106	90-110	1	20
Matrix Spike Dup (BE42826-MSD2)					Source: 1405104-07		Prepared: 05/28/14 Analyzed: 05/30/14 12:07			
Phosphorous - Total as P	0.521	0.040	0.010	mg/L	0.50	0.0639	91	90-110	4	25
Total Kjeldahl Nitrogen	1.54	0.20	0.05	mg/L	1.0	0.588	95	90-110	0.7	20
Batch BE42901 - Digestion for TP and TKN										
Blank (BE42901-BLK1)					Prepared: 05/29/14 Analyzed: 05/30/14 12:27					
Phosphorous - Total as P	0.0150 I	0.040	0.010	mg/L						
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						

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Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE42901 - Digestion for TP and TKN										
LCS (BE42901-BS1)					Prepared: 05/29/14 Analyzed: 05/30/14 12:28					
Phosphorous - Total as P	0.549	0.040	0.010	mg/L	0.50		110	90-110		
Total Kjeldahl Nitrogen	1.00	0.20	0.05	mg/L	1.0		100	90-110		
Matrix Spike (BE42901-MS1)					Source: 1404447-26		Prepared: 05/29/14 Analyzed: 05/30/14 12:29			
Phosphorous - Total as P	0.518	0.040	0.010	mg/L	0.50	ND	104	90-110		
Total Kjeldahl Nitrogen	1.09	0.20	0.05	mg/L	1.0	ND	109	90-110		
Matrix Spike (BE42901-MS2)					Source: 1405070-02		Prepared: 05/29/14 Analyzed: 05/30/14 12:41			
Total Kjeldahl Nitrogen	1.56	0.20	0.05	mg/L	1.0	0.532	102	90-110		
Phosphorous - Total as P	0.491	0.040	0.010	mg/L	0.50	0.0165	95	90-110		
Matrix Spike Dup (BE42901-MSD1)					Source: 1404447-26		Prepared: 05/29/14 Analyzed: 05/30/14 12:30			
Phosphorous - Total as P	0.546	0.040	0.010	mg/L	0.50	ND	109	90-110	5	25
Total Kjeldahl Nitrogen	1.06	0.20	0.05	mg/L	1.0	ND	106	90-110	3	20
Matrix Spike Dup (BE42901-MSD2)					Source: 1405070-02		Prepared: 05/29/14 Analyzed: 05/30/14 12:42			
Total Kjeldahl Nitrogen	1.52	0.20	0.05	mg/L	1.0	0.532	99	90-110	2	20
Phosphorous - Total as P	0.506	0.040	0.010	mg/L	0.50	0.0165	98	90-110	3	25
Batch BE43101 - Ammonia by SEAL										
Blank (BE43101-BLK1)					Prepared & Analyzed: 05/31/14 09:41					
Ammonia as N	0.009 U	0.040	0.009	mg/L						
LCS (BE43101-BS1)					Prepared & Analyzed: 05/31/14 09:43					
Ammonia as N	0.51	0.040	0.009	mg/L	0.50		102	90-110		

SOUTHERN ANALYTICAL LABORATORIES, INC.

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

June 11, 2014
Work Order: 1404447

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE43101 - Ammonia by SEAL										
Matrix Spike (BE43101-MS1)		Source: 1405183-07			Prepared & Analyzed: 05/31/14 09:45					
Ammonia as N	0.55	0.040	0.009	mg/L	0.50	0.10	90	90-110		
Matrix Spike (BE43101-MS2)		Source: 1405227-07			Prepared & Analyzed: 05/31/14 10:09					
Ammonia as N	0.54	0.040	0.009	mg/L	0.50	0.083	91	90-110		
Matrix Spike Dup (BE43101-MSD1)		Source: 1405183-07			Prepared & Analyzed: 05/31/14 09:47					
Ammonia as N	0.58	0.040	0.009	mg/L	0.50	0.10	96	90-110	5	10
Matrix Spike Dup (BE43101-MSD2)		Source: 1405227-07			Prepared & Analyzed: 05/31/14 12:03					
Ammonia as N	0.55	0.040	0.009	mg/L	0.50	0.083	94	90-110	3	10
Batch BF40523 - Ammonia by SEAL										
Blank (BF40523-BLK1)		Prepared & Analyzed: 06/05/14 16:34								
Ammonia as N	0.009 U	0.040	0.009	mg/L						
LCS (BF40523-BS1)		Prepared & Analyzed: 06/05/14 16:36								
Ammonia as N	0.50	0.040	0.009	mg/L	0.50		99	90-110		
Matrix Spike (BF40523-MS1)		Source: 1405169-02			Prepared & Analyzed: 06/06/14 09:24					
Ammonia as N	0.71	0.040	0.009	mg/L	0.50	0.20	104	90-110		
Matrix Spike Dup (BF40523-MSD1)		Source: 1405169-02			Prepared & Analyzed: 06/06/14 09:26					
Ammonia as N	0.74	0.040	0.009	mg/L	0.50	0.20	109	90-110	3	10

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

June 11, 2014
Work Order: 1404447

Microbiology - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE40828 - FC-MF										
Blank (BE40828-BLK1)					Prepared: 05/08/14 Analyzed: 05/09/14 13:57					
Fecal Coliforms	1 U	1	1	CFU/100 ml						
Duplicate (BE40828-DUP1)					Source: 1404770-02 Prepared: 05/08/14 Analyzed: 05/09/14 13:57					
Fecal Coliforms	1 U	1	1	CFU/100 ml		ND				200
Duplicate (BE40828-DUP2)					Source: 1404771-01 Prepared: 05/08/14 Analyzed: 05/09/14 13:57					
Fecal Coliforms	1 U	1	1	CFU/100 ml		ND				200

Hazen and Sawyer**10002 Princess Palm Ave, Suite 200****Tampa, FL 33619****June 11, 2014****Work Order: 1404447**

*** 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.

L Off-scale high. Result exceeded highest calibration standard.

Questions regarding this report should be directed to :

Kathryn Nordmark

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

Kathryn@southernanalyticallabs.com



Client Name		Hazen and Sawyer		Josefin Hirst													
Project Name / Location																	
BHS7 SE#3																	
Samplers: (Signature)		<div style="display: flex; justify-content: space-between;"> <div> </div> <div> </div> </div>															
Matrix Codes: DW-Drinking Water WW-Wastewater SW-Surface Water SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water		PARAMETER / CONTAINER DESCRIPTION															
SAL Use Only	Sample Description	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	125mLP, H ₂ SO ₄ COD, TKN, NH ₃ , TP	125mLP, H ₂ SO ₄ TKN, NH ₃	500mLP, Cool NOx, Cl	125mLP, Cool NOx, Cl	Field pH	Field Temperature	Field Conductivity	Field DO	No. of Containers (Total per each location)
	01 BHS7-PUMP	5/8/14	11:25	WW		X	4	2	1				6.92	23.3	2454	0.01	
	02 BHS7-PUMP-DUP		11:30	WW		X	4	2	1				6.92	23.3	2454	0.01	
	03 NC-BHS7-ST1-SL-01		9:20	WW		X				1	1		5.23	23.7	1284	4.59	
	04 NC-BHS7-ST1-SL-02		9:11	WW		X				1	1		5.04	23.6	1210	4.40	
	05 SC-BHS7-ST1-SL-03		9:38	WW		X				1	1		5.26	24.4	1420	3.95	
	06 SP-BHS7-ST1-DP-01 Dry		9:40	WW		X				1	1						
	07 SC-BHS7-ST1-SL-04		9:30	WW		X	1	2	1				5.11	24.3	1618	3.16	
	08 NC-BHS7-ST2-DP-03		9:25	WW		X				1	1		5.88	23.5	1955	0.15	
	09 NC-BHS7-ST2-DP-03-DUP		9:30	WW		X				1	1		5.88	23.5	1955	0.15	
	10 C-BHS7-ST2-DP-05		10:00	WW		X				1	1		6.12	24.3	1933	0.10	
	11 SE-BHS7-ST2-DP-06		10:50	WW		X				1	1		5.95	23.9	1951	0.18	
	12 SE-BHS7-ST2-DP-06-DUP		10:55	WW		X				1	1		5.95	23.9	1951	0.18	
Containers Prepared/Relinquished:		Date/Time:	Received:	Date/Time:	Seal intact?				<input checked="" type="radio"/> N N/A				Instructions / Remarks:				
Relinquished:		Date/Time:	Received:	Date/Time:	Samples intact upon arrival?				<input checked="" type="radio"/> N N/A								
Relinquished:		Date/Time:	Received:	Date/Time:	Received on ice? Temp _____				<input checked="" type="radio"/> N N/A								
Relinquished:		Date/Time:	Received:	Date/Time:	Proper preservatives indicated?				<input checked="" type="radio"/> N N/A								
Relinquished:		Date/Time:	Received:	Date/Time:	Rec'd w/in holding time?				<input checked="" type="radio"/> N N/A								
Relinquished:		Date/Time:	Received:	Date/Time:	Volatiles rec'd w/out headspace?				<input checked="" type="radio"/> N N/A								
Relinquished:		Date/Time:	Received:	Date/Time:	Proper containers used?				<input checked="" type="radio"/> N N/A				1404447				

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SAL Project No.

Client Name						Hazen and Sawyer								Josefin Hirst						
Project Name / Location																				
BHS7 SE#3																				
Samplers: (Signature) <i>[Handwritten 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	125mLP, H ₂ SO ₄ COD, TKN, NH ₃ , TP	125mLP, H ₂ SO ₄ TKN, NH ₃	500mLP, Cool NOx, Cl	125mLP, Cool NOx, Cl			Field pH	Field Temperature	Field Conductivity	Field DO	No. of Containers (Total per each location)	
SAL Use Only	Sample No.	Sample Description																		
		13	SC-BHS7-ST2-DP-07	5/8/14	10:26	WW	X	4	2	1					6.22	24.4	2074	0.46		
		14	SW-BHS7-ST2-DP-08		11:10	WW	X	4	2	1					6.15	24.3	1816	0.54		
		15	N-BHS7-ST2-OB-01		9:17	WW	X				1	1			5.69	23.4	1867	0.21		
		16	C-BHS7-ST2-OB-02		10:15	WW	X				1	1			6.17	24.2	1957	0.17		
		17	S-BHS7-ST2-OB-03		10:40	WW	X	4	2	1					6.26	25.3	2076	1.23		
		18	NE-BHS7-EFF-SL-06		8:58	WW	X				1	1			5.68	24.6	1073	5.33		
		19	NE-BHS7-EFF-DP-09	Dry		WW	X				1	1								
		20	NW-BHS7-EFF-SL-07		9:02	WW	X				1	1			4.96	23.2	1381	5.80		
		21	NW-BHS7-EFF-DP-10		8:52	WW	X				1		1		5.91	23.6	1722	4.91		
		22	SE-BHS7-EFF-SL-08		10:20	WW	X				1	1			5.14	23.6	1331	4.49		
		23	SE-BHS7-EFF-DP-11		10:25	WW	X				1		1		5.92	24.7	1775	4.34		
		24	SW-BHS7-EFF-SL-09		9:55	WW	X	OK	2	OK					5.63	23.7	555	4.58		
Containers Prepared/ Relinquished:		Date/Time: <i>5-5-14 1200</i>	Received: <i>[Handwritten Signature]</i>		Date/Time: <i>5/6/14 1200</i>		Seal intact? <i>(X) N NA</i>								Instructions / Remarks: <i>1404447</i>					
Relinquished:		Date/Time: <i>5/8/14 1435</i>	Received: <i>[Handwritten Signature]</i>		Date/Time: <i>5/8/14 55</i>		Samples intact upon arrival? <i>(X) N NA</i>													
Relinquished:		Date/Time:	Received:		Date/Time:		Received on ice? Temp _____ <i>(X) N NA</i>													
Relinquished:		Date/Time:	Received:		Date/Time:		Proper preservatives indicated? <i>(X) N NA</i>													
Relinquished:		Date/Time:	Received:		Date/Time:		Rec'd w/in holding time? <i>(X) N NA</i>													
Relinquished:		Date/Time:	Received:		Date/Time:		Volatiles rec'd w/out headspace? <i>Y N (X) NA</i>													
Relinquished:		Date/Time:	Received:		Date/Time:		Proper containers used? <i>(X) N NA</i>													

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



Appendix B: Operation & Maintenance Log

Table B.1
Operation and Maintenance Log

Date	Description
11/13/2013	Construction - Pump tank, liner and lignocellulosic media installed
11/14/2013	Construction - Pump, feed line, laterals, infiltrator chambers installed, wet pressure test
11/15/2013	Construction - final grading, hay and seed applied
11/18/2013	Construction - electrician finished electrical work
11/19/2013	System Start-up
	Bull run valve (BRV) switched from old drainfield to PNRS system
11/26/2013	Site visit. System ok
	Flipped BRV to old drainfield for Thanksgiving holiday ~ 30-40 people staying at the house
12/2/2013	Site visit. System ok
	Flipped BRV back to PNRS system
12/6/2013	Site visit. System ok
	Flipped BRV to old drainfield for holiday party ~ 80 people attending
12/9/2013	Homeowner flipped BRV back to PNRS system
12/10/2013	Site visit. System ok
	Preparation for preliminary sample event
12/12/2013	Preliminary sample event No. 1
1/3/2014	Site visit. System ok
1/17/2014	Preparation for Sample Event No. 1
1/20/2014	Sample Event No. 1
3/5/2014	Site visit. System ok
3/13/2014	Site visit. System ok
3/19/2014	Preparation for Sample Event No. 2
3/20/2014	Sample Event No. 2
4/28/2014	Site visit. System ok
5/7/2014	Preparation for Sample Event No. 3
5/8/2014	Sample Event No. 3

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Appendix C: Weather Station Data

Table C.1
Weather Data

MONTHLY CLIMATOLOGICAL SUMMARY for APRIL 2014												
DAY	Rain	MEAN TEMP (F)	HIGH TEMP (F)	TIME	LOW TEMP (F)	TIME	HEAT DEG DAYS	COOL DEG DAYS	AVG. WIND SPEED (mph)	HIGH WIND SPEED (mph)	TIME	WIND DIR
1	0.00	65.2	86.1	5:30p	45.4	7:00a	6.6	6.8	0.5	08.0	3:00p	SW
2	0.00	69.2	88.6	5:00p	51.9	5:00a	3.9	8.0	0.6	10.0	3:00p	SSW
3	0.00	70.5	90.1	5:30p	54.7	6:00a	2.9	8.3	0.7	10.0	11:30a	SW
4	0.00	71.6	89.0	4:30p	58.5	6:00a	1.6	8.3	0.8	13.0	11:30a	SW
5	0.00	73.1	86.9	3:00p	63.1	2:30a	0.1	8.2	0.4	06.0	11:00a	SW
6	0.00	75.6	90.5	3:30p	64.6	8:00a	0.0	10.6	0.8	10.0	1:00p	SW
7	0.00	76.9	91.6	3:30p	64.3	4:30a	0.0	11.9	1.9	16.0	7:00p	SSW
8	0.09	70.3	77.6	12:30a	59.3	12:00m	0.6	5.9	2.0	14.0	7:00a	SW
9	0.00	64.2	76.3	5:30p	54.3	6:00a	4.0	3.2	0.8	11.0	4:30p	SW
10	0.00	66.1	83.5	4:30p	49.8	6:30a	4.7	5.9	0.7	12.0	3:00p	SSW
11	0.00	67.8	86.2	3:30p	51.5	6:00a	3.8	6.6	0.8	12.0	5:00p	ENE
12	0.00	70.3	86.0	2:00p	58.8	5:00a	2.0	7.4	0.9	13.0	4:00p	ENE
13	0.00	70.9	87.3	2:30p	57.9	4:00a	2.0	7.9	1.0	17.0	12:00p	ENE
14	0.00	74.3	91.0	4:30p	62.4	1:30a	0.3	9.6	1.0	13.0	11:30a	SW
15	0.89	70.7	85.0	11:30a	57.6	12:00m	0.6	6.3	2.2	22.0	12:00p	SW
16	0.00	58.9	72.3	2:00p	44.5	7:30a	7.4	1.3	3.3	21.0	12:30p	NNW
17	0.00	66.6	76.6	5:30p	55.1	2:00a	2.8	4.4	2.4	21.0	4:00p	NE
18	0.40	69.4	79.1	3:30p	65.0	2:00a	0.0	4.4	0.9	19.0	5:00p	SSW
19	0.03	66.7	73.4	1:00p	61.2	11:00p	0.5	2.2	1.3	12.0	9:30a	SW
20	0.02	62.0	67.6	3:00p	58.3	8:30a	3.2	0.2	1.5	12.0	3:00p	NNW
21	0.00	63.9	71.7	2:30p	59.2	3:00a	2.7	1.6	0.6	09.0	1:30p	NNW
22	0.00	67.3	83.5	3:30p	53.7	3:30a	3.4	5.7	0.8	09.0	3:30p	SW
23	0.00	72.0	88.9	5:00p	58.9	7:00a	1.6	8.6	0.6	09.0	2:00p	SW
24	0.00	74.9	91.1	4:00p	62.5	5:00a	0.3	10.2	0.5	11.0	7:30p	SW
25	0.00	74.1	89.0	3:30p	61.4	6:00a	0.5	9.6	1.0	14.0	7:00p	SW
26	0.00	75.4	92.8	6:00p	63.6	7:00a	0.1	10.5	0.6	08.0	10:30a	SW
27	0.00	77.3	95.0	3:30p	61.6	6:00a	0.5	12.8	0.6	11.0	1:30p	SW
28	0.00	79.6	96.8	5:30p	66.3	4:30a	0.0	14.6	0.7	13.0	10:30a	SSW
29	0.45	75.9	94.9	2:30p	67.5	8:30p	0.0	10.9	0.8	17.0	4:30p	SSW
30	0.58	74.0	90.4	2:30p	67.0	5:00a	0.0	9.0	0.6	17.0	3:30p	SSW
	2.46											

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Table C.1
Weather Station Data (continued)

MONTHLY CLIMATOLOGICAL SUMMARY for MAY 2014												
DAY	Rain	MEAN TEMP (F)	HIGH TEMP (F)	TIME	LOW TEMP (F)	TIME	HEAT DEG DAYS	COOL DEG DAYS	AVG. WIND SPEED	HIGH WIND SPEE	TIME	WIND DIR
1	0.00	77.3	91.2	2:30p	68.1	5:00a	0	12.3	1.1	12.0	11:00a	SW
2	0.32	69.4	72.6	12:30a	65.8	3:00p	0	4.4	0.4	9.0	11:30a	NNW
3	0.75	63.8	69	1:30a	57.0	12:00	2.2	1.0	0.8	13.0	4:00p	NNW
4	0.01	68.9	87.1	4:30p	53.4	7:00a	3.5	7.4	0.7	11.0	12:30p	NW
5	0.00	74.7	93.2	5:30p	58.1	7:00a	1.6	11.3	0.5	7.0	9:30a	SW
6	0.00	75.6	94	4:00p	57.4	6:30a	1.3	11.9	0.4	8.0	5:30p	SSW
7	0.00	77.1	93.7	4:30p	60.0	4:30a	1	13.0	0.8	15.0	4:00p	SSW
8	0.00	79	95	4:30p	63.4	7:00a	0.1	14.1	1.1	13.0	5:00p	SSW
9	0.00	79.3	92.2	3:00p	68.0	6:00a	0	14.3	1.2	15.0	1:30p	SSW
10	0.00	79.2	92.9	5:30p	67.5	6:00a	0	14.2	0.9	18.0	10:00a	SSW
11	0.00	79.9	93.2	6:00p	70.6	12:00	0	14.9	0.8	12.0	9:00a	SSW
12	0.00	76.7	91	2:00p	63.9	5:30a	0.1	11.7	1.0	13.0	7:00p	ENE
13	0.00	77.8	93.1	3:30p	67.4	7:00a	0	12.8	1.4	17.0	5:00p	ENE
14	0.57	76.6	90.1	1:30p	69.9	4:00a	0	11.6	0.8	14.0	9:30a	ENE
15	0.41	77.7	87.3	6:00p	71.8	1:30a	0	12.7	1.2	15.0	9:30a	SW
16	0.00	68.7	82.3	5:30p	56.7	7:30a	1.6	5.3	2.0	14.0	1:30a	NW
17	0.00	67.4	82.3	3:00p	55.3	5:00a	3.5	5.9	1.5	18.0	11:00a	NE
18	0.00	70.3	87.6	4:00p	53.7	5:30a	3.1	8.4	1.2	13.0	11:00a	ENE
19	0.00	73.2	89.8	5:00p	58.0	5:30a	1.6	9.8	1.0	14.0	2:30p	ENE
20	0.00	72.7	85.5	4:30p	59.0	12:00	0.7	8.4	1.4	16.0	2:30p	NE
21	0.00	74.6	93.2	6:30p	56.8	5:00a	2.1	11.7	0.5	12.0	3:00p	E
22	0.00	79	95.8	5:00p	65.8	1:30a	0	14.0	1.1	12.0	1:30p	SW
23	0.00	81.2	97.5	4:30p	66.3	3:30a	0	16.2	1.0	12.0	4:00p	SW
24	0.00	82.9	98.2	4:00p	70.2	7:00a	0	17.9	0.5	8.0	1:00p	SW
25	0.50	77.5	95.4	1:00p	71.6	11:30p	0	12.5	0.5	11.0	8:00p	ENE
26	0.22	76.4	95.2	4:00p	69.0	12:00	0	11.4	0.6	17.0	5:30p	ENE
27	0.01	77.2	93.1	3:30p	66.9	7:00a	0	12.2	0.5	13.0	5:30p	SSW
28	0.00	78	93.7	3:00p	67.1	5:30a	0	13.0	0.5	8.0	2:00p	SSW
29	0.01	78.3	95.8	5:00p	69.2	5:00a	0	13.3	1.0	28.0	6:30p	SSW
30	0.02	75.6	91.4	2:30p	66.1	5:30a	0	10.6	0.5	11.0	4:30p	E
31	0.04	75.6	86.7	11:30a	68.4	5:00a	0	10.6	0.5	11.0	3:00p	ENE
	2.86											

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