FLORIDA DEPARTMENT OF HEALTH

Florida Onsite Sewage Nitrogen Reduction Strategies Study

Task B.7

B-HS1 Field System Monitoring Report No. 1

Revised Progress Report

February 2012

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HAZEN AND SAWYER
Environmental Engineers & Scientists

In association with

SCHOOL OF MINES 1874 COLORADO

AET
Applied Environmental Technology

OTIS ENVIRONMENTAL CONSULTANTS, LLC

Florida Onsite Sewage Nitrogen Reduction Strategies Study

TASK B.7
PROGRESS REPORT

B-HS1 Field System Monitoring Report No. 1

Prepared for:

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

FDOH Contract CORCL

January 2012

Prepared by:

HAZEN AND SAWYER
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1.0 Background

Task B of the Florida Onsite Sewage Nitrogen Reduction Strategies Study (FOSNRS) includes performing field experiments to critically evaluate the performance of nitrogen removal technologies that were identified in FOSNRS Task A.9. To meet this objective, full scale treatment systems are being installed at various residential sites in Florida and monitored over an extended timeframe under actual onsite conditions. The Task B Quality Assurance Project Plan (Task B.5) documents the objectives, monitoring framework, sample frequency and duration, and analytical methods to be used at the home sites. This report documents the first sample event of a passive nitrogen reduction system at a home site in Wakulla County, Florida (site B-HS1).

2.0 Purpose

This monitoring report documents data collected from the first B-HS1 monitoring and sampling event conducted on October 26, 2011. This monitoring event consisted of collecting flow measurements from the household water use meter and the treatment system internal water meter, recording electricity use, field parameter monitoring, collection of water samples from the treatment system, and sample analyses by a NELAC certified laboratory.

3.0 Materials and Methods

3.1 Project Site

The B-HS1 field site is located in Wakulla County, FL. The onsite sewage treatment and disposal system (OSTDS) for the single family residence was installed in June 2011. Design and construction details were presented previously in the Task B.6 document. The B-HS1 system consists of a 1,500 gallon two chamber concrete tank with a 1,000 gallon primary treatment tank (primary chamber) and a 500 gallon pump chamber (pump chamber); an Aerocell™ unsaturated media filter; and a 1,500 gallon single chamber upflow tank containing Nitrex™ media. Treated effluent from the Nitrex™ unit is discharged to a soil dispersal system (or drainfield) consisting of four Infiltrator trenches.

Three of the four Infiltrator trenches are 40 feet in length, and the fourth is 36 feet. Based on average wastewater flow and tank volumes, there is over a ten day transit time through the treatment system prior to dispersal. Figure 1 is a site schematic showing the system components and layout of the installation.

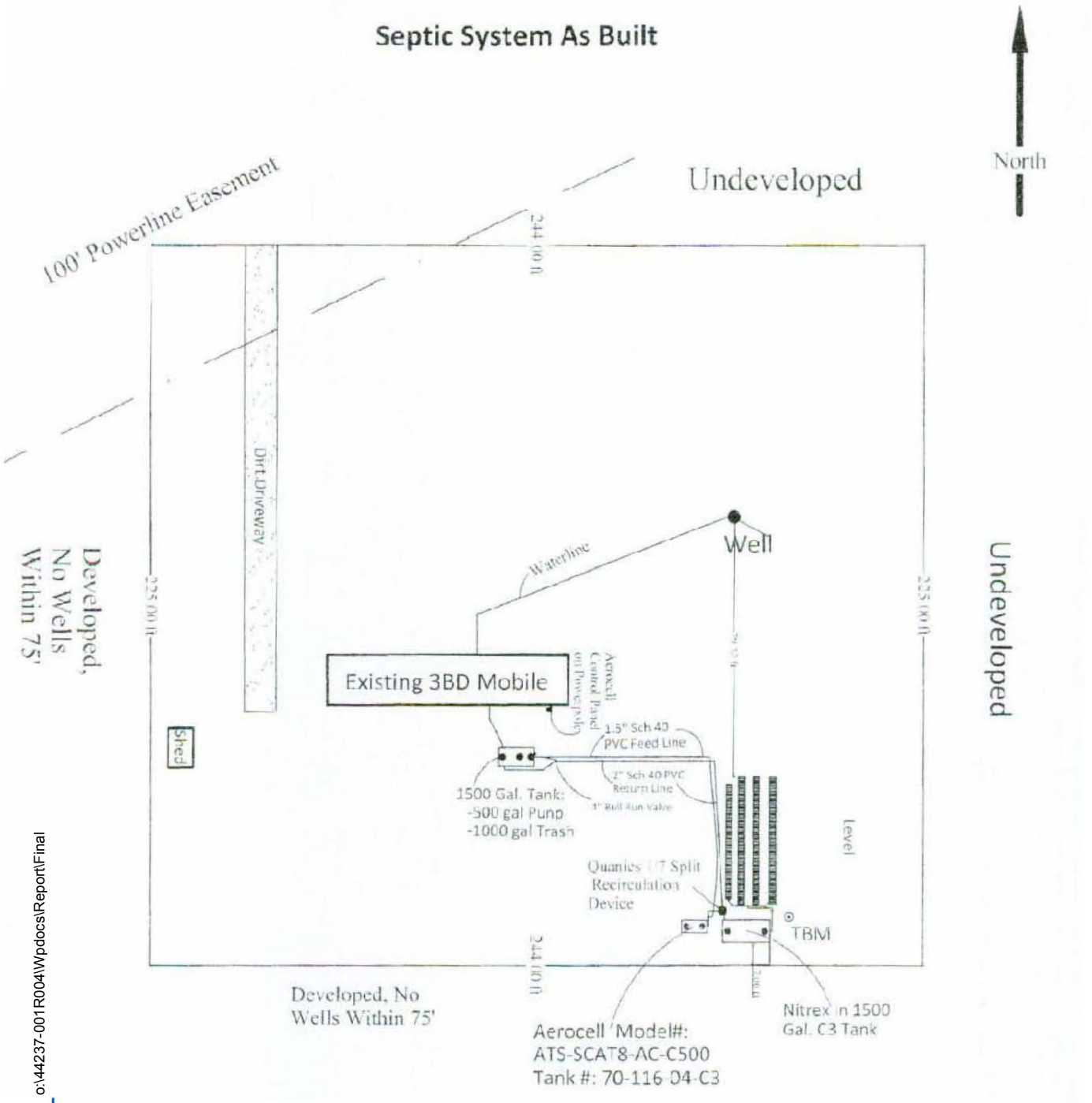

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Figure 1
B-HS1 Site Schematic

3.2 Monitoring and Sample Locations and Identification

The four monitoring points are shown in Figure 2. The first monitoring point, B-HS1-STE, is the effluent from the first chamber of the primary tank, which is referred to as primary effluent or septic tank effluent (STE). Monitoring point B-HS1-STE represents the influent to the remainder of the onsite nitrogen reduction system. The second sample (B-HS1-PUMP) was collected approximately 1.5 feet below the surface of the second chamber of the tank which serves as the pump chamber and also receives effluent recirculation flow from the Aerocell™ unsaturated biofilter.

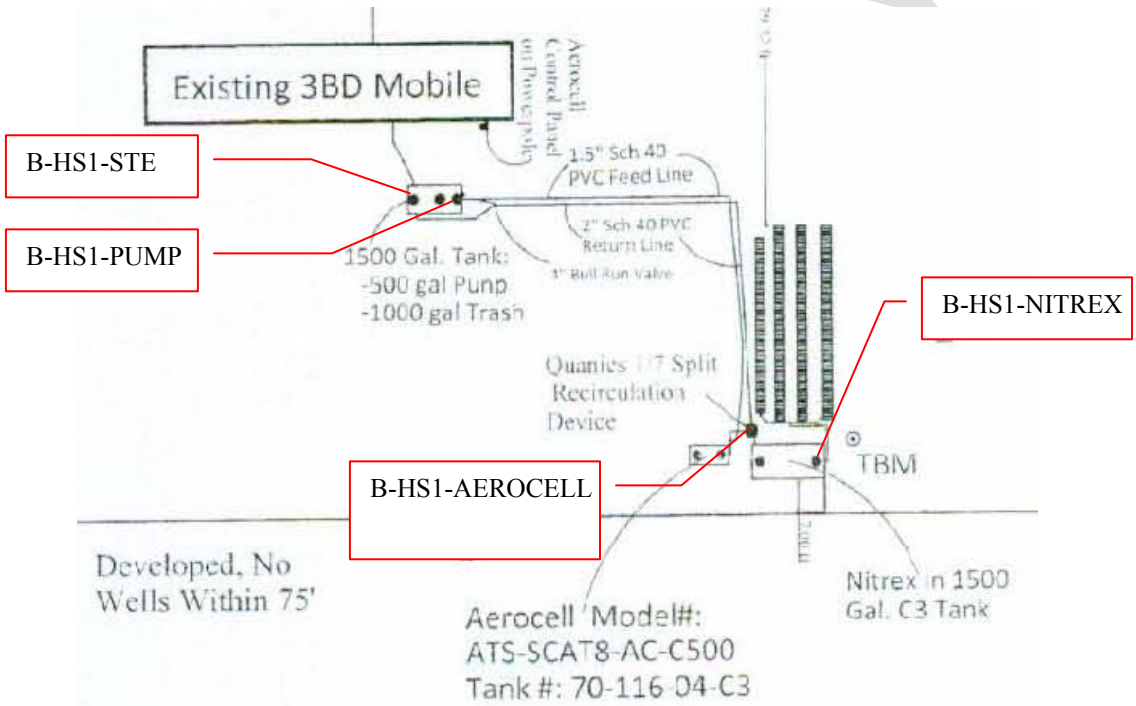


Figure 2
B-HS1 Sample Locations

The pump discharges wastewater to the top of the unsaturated Aerocell™ chamber, after which the wastewater flows into an adjustable split recirculation device which allows for a portion of the Aerocell™ effluent to be sent back to the pump chamber. The remainder of the Aerocell™ effluent proceeds to the Nitrex™ tank. The third monitoring location is from the middle of the split recirculation device (B-HS1-AEROCELL) and represents Aerocell™ effluent (Figure 3).

Figure 3
Recirculation Device (B-HS1-AEROCELL sample)

The forth monitoring location was collected from the Nitrex™ tank sample tube that is connected to the Nitrex™ effluent piping which is located on the bottom of the tank (Figure 4). This represents the final effluent from the treatment system prior to being discharged to the soil infiltration system, or drainfield.

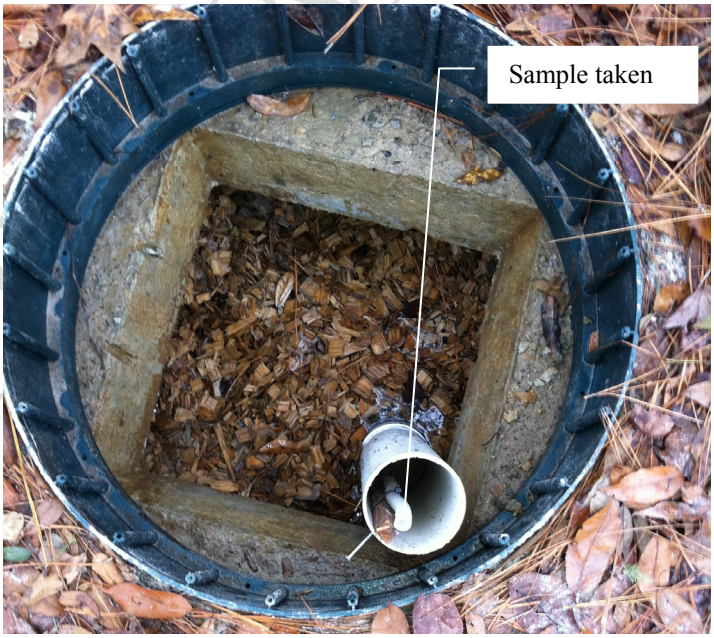


Figure 4
Nitrex™ Tank (B-HS1-NITREX sample)

3.3 Operational Monitoring

Start-up of the system occurred on June 10, 2011 and the system has operated continually since that time. The water meter for the house and the Aerocell™ flow meter were read and recorded on October 26, 2011 for this first sampling event. The Aerocell™ flow meter was installed on the line leading from the pump/recirculation tank to the Aerocell™ chamber. At this location, the Aerocell™ flow meter records the cumulative flow in gallons pumped from the pump chamber. The flow meter measurement includes both the forward wastewater flow from the household and the recirculation flow. The control panel includes telemetry where reports are generated regarding alarms, pump cycles, etc. using a Vericomm panel system.

3.4 Energy, Chemical and/or Additives Consumption

Energy consumption was monitored using an electrical meter installed between the main power box for the house and the control panel. The electrical meter records the cumulative power usage of the system (i.e. pump) in kilowatt-hours. The recirculation pump in the pump chamber is the sole electrical component. There are no chemicals added to the system. However, the Nitrex™ media is a "reactive" media which will be consumed during operation. The Nitrex™ tank was initially filled with 42 inches of media.

3.5 Water Quality Sample Collection and Analyses

Influent, intermediate, and effluent water quality samples from the system were collected October 26, 2011 for water quality analysis. The four monitoring samples are B-HS1-STE, B-HS1-PUMP, B-HS1-AEROCELL, and B-HS1-NITREX as described in Section 3.2. A peristaltic pump was used to collect samples directly into the analysis-specific containers after sufficient flushing of the tubing had occurred. Field parameters were then recorded. The sampling tube was placed approximately 1.5 feet below the surface in the STE and pump chamber samples and at mid-depth in the split recirculation device.

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 laboratory. 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 using external sample

collection reservoirs. The influent, intermediate, and effluent samples were analyzed by the laboratory for: total alkalinity, total Kjeldahl nitrogen (TKN-N), ammonia nitrogen (NH_3-N), nitrate/nitrite nitrogen (NO_X-N), total phosphorus (TP), orthophosphate (Ortho P), carbonaceous biochemical oxygen demand ($CBOD_5$), chemical oxygen demand (COD), total suspended solids (TSS), total volatile solids (TVS), fecal coliform (fecal), and E.coli. All analyses were performed by independent and fully certified analytical laboratories (Southern Analytical Laboratory and Ackuritlabs, Inc.). Table 1 lists the analytical parameters, analytical methods, and detection limits for these analyses.

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

Analytical Parameter	Method of Analysis	Method Detection Limit (mg/L)
Total Alkalinity as $CaCO_3$	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/Nitrite Nitrogen (NO_X-N)	EPA 353.2	0.01 mg/L
Total Phosphorus (TP)	SM 4500P-E	0.01 mg/L
Orthophosphate as P (Ortho P)	EPA 300.0	0.01 mg/L
Carbonaceous Biological Oxygen Demand ($CBOD_5$)	SM5210B	2 mg/L
Total Solids (TS)	EPA 160.3	.01 % by wt
Total Suspended Solids (TSS)	SM 2540D	1 mg/L
Total Volatile Solids (TVS)	SM 2540E	10 mg/L
Fecal Coliform (fecal)	SM9222D	2 ct/100mL
E.coli	EPA1603	2 ct/100mL

4.0 Results and Discussion

4.1 Operational Monitoring

The B-HS1 field site flow meter readings, recycle ratio, and average daily water use for the period since start-up are summarized in Table 2. The operation and maintenance log which includes actions taken for the period since start-up is provided in Appendix B. Summary tables of the Vericomm PLC recorded data are provided in Appendix C. These include daily and cumulative pump runtime and system alarms that are used to check general pump operation and performance.

Table 2
Summary of System Flow Rates

Date and Time Read	House Water Meter Reading	Average Daily Household Flow, Q	Aerocell™ Flow Meter Reading	Average Daily Flow Total Q + R	Recycle Ratio
	Cumulative Volume (gallons)	Gallons/ day	Cumulative Volume (gallons)	Gallons/ day	Recycle: Forward Flow
6/8/2011 14:10	0.0	0.0	0.0	0.0	
6/9/2011 17:10	87.3	77.6	2.1	0.0	0.0 : 1
6/10/2011 12:25	148.2	75.9	629.2	668.9	7.8 : 1
7/6/2011 11:20	2,884.8	105.4	35,025.2	1,325.2	11.6 : 1
7/7/2011 17:10	3,088.6	164.0	38,272.2	2,612.1	14.9 : 1
7/19/2011 10:30	4,254.0	99.4	40,756.0	212.0	1.1 : 1
9/13/2011	9,904.0	101.7	60,840.0	361.5	2.6 : 1
10/26/2011 8:24	13,804.7	90.0	118,640.9	1,333.3	13.8 : 1
Total average to date		98.8		854.9	7.7 : 1

[1]Household (Q) + Recirculation (R)

The split recirculation device controls the fraction of Aerocell™ effluent that is recirculated and the fraction sent to the Nitrex™ tank. The split recirculation device was initially set so that 5 parts went back to the pump chamber and 1 part went to the Nitrex™ tank (5:1 recycle ratio). During the period since start-up, the household flow average was 98.8 gallons per day with periods of higher and lower flows. The average flow to the Aerocell™ unit was 854.9 gallons per day with a corresponding average recycle ratio of 7.7:1. The recycle ratio varied from the anticipated 5:1 ratio because the split recirculation device did not function as intended. In addition, during the sample event number 1, leaks were detected from the split recirculation device and the vendor was notified. The leaks were minor and most likely did not change the target settings for recycle ratio.

4.2 Energy, Chemical and/or Additives Consumption

Energy consumption is monitored using an electrical meter installed between the main power box for the house and the control panel to record cumulative power usage of the pump in kilowatt-hours. The recorded system electrical use for the period since start-up is summarized in Table 3.

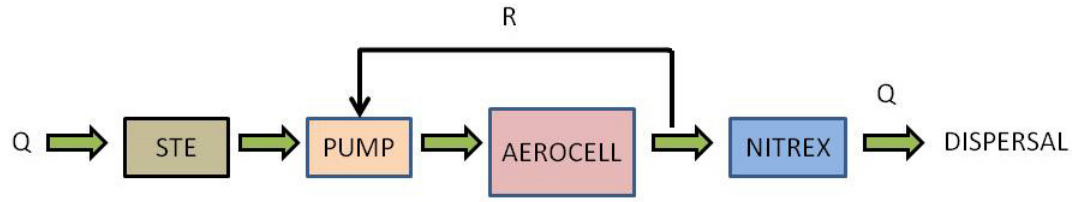
Table 3
Summary of System Electrical Use

Date and Time Read	Electrical Meter Reading	Average Daily Electrical Use	Average Electrical Use per Gallon Pumped to Aerocell
	Cumulative (kWh)	(kWh/day)	(kWh/gal)
6/9/2011 17:10	1	0.00	
6/10/2011 12:25	2	1.25	0.002
7/6/2011 11:30	40	1.46	0.001
7/7/2011 19:30	44	3.00	0.001
7/19/2011 11:00	49	0.43	0.002
9/13/2011	74	0.45	0.001
10/26/2011 8:27	80	0.14	0.000
Total average to date		0.57	0.001

For the period since start-up, the average electrical use was 0.57 kWh per day. The higher readings in July were likely caused by the sticky floats attributed to the pump vault which was removed October 17, 2011. The average electrical use per gallon pumped to the Aerocell™ for the period since start-up is 0.001 kWh per gallon.

4.3 Water Quality

Water quality analytical results, for Sample Event No. 1, are listed in Table 4. The laboratory report containing the raw analytical data is included in Appendix A. The following discussion summarizes the water quality analytical results. The performance of the various system components was compared by considering the changes through treatment of nitrogen species (TKN-N, NH_3-N, and NO_X-N), as well as supporting water quality parameters. The nitrogen results are graphically displayed in Figure 5.



TKN mg N/L	73	35	23	10
NH_3 mg N/L	55	31	20	4.4
NO_x mg N/L	0	0.3	3.2	0
TN mg N/L	73	35.3	26.2	10

Figure 5
Graphical Representation of Nitrogen Results

Septic Tank Effluent (STE) Quality: The water quality characteristics of STE collected in Sample Event 1 were within the typical range generally expected for domestic STE. The measured STE total nitrogen (TN) concentration was 73 mg/L, which is within the high end of the range that has been typically reported for Florida single family residence STE.

Pump Chamber and Aerocell™ Effluent: The pump chamber and Aerocell™ effluent NH_3-N levels were 31 mg/L and 20 mg/L with DO levels at 0.71 and 2.85 mg/L respectively (Table 3). TSS and $CBOD_5$ were equal to or below 31 mg/L. Organic N was equal to or below 4 mg/L in both samples. The pump chamber effluent NO_x-N was 0.27 mg/L, and Aerocell™ effluent NO_x-N was 3.2 mg/L. These results indicate some denitrification in the recirculation chamber but incomplete nitrification in the Aerocell™. The Aerocell™ biofilter was not performing as intended in converting ammonium to oxidized nitrogen. This was the first sample event, and adjustments to Aerocell™ operation are being made prior to the next sample event to remedy this situation. However, effluent TN in both samples was less than the influent TN, indicating that denitrification is occurring. A nearly two-thirds removal of TN occurred through the Aerocell™ unit.

Nitrex™ Effluent: Effluent NO_x-N from the Nitrex™ unit was below the detection limit. The low NO_x-N was accompanied by 1.03 mg/L DO. The Nitrex™ system was effective in producing a reducing environment and achieving the NO_x-N reduction goals. However, the total nitrogen and ammonium levels in Nitrex™ effluent were 10.01 mg/L and 4.4 mg/L, respectively, indicating that some ammonium was carried over from the Aerocell™ effluent. Additionally, it appeared that substantial ammonium removal occurred across

the Nitrex™ system. Final total nitrogen in the treatment system effluent was dominated by reduced nitrogen forms which limited overall removal efficiency and effluent N achieved by the system.

Table 4
Water Quality Analytical Results

Sample ID	Sample Date/Time	Sample Type	Temp (°C)	pH	Total Alkalinity (mg/L)	DO (mg/L)	ORP (mV)	Specific Conductance (µS)	TSS (mg/L)	TVS (mg/L)	$CBOD_5$ (mg/L)	COD	TN (mg/L N)[1]	TKN (mg/L N)	Organic N (mg/L N)[2]	NH_3-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)
B-HS1-STE	10/26/2011 9:40	G	20.7	6.99	600	0.05	-238	1172	53	190	120	170	73.01	73	18	55	0.01	55.01	10	4	220,000	170,000
B-HS1-PUMP	10/26/2011 9:25	G	19.8	7.03	470	0.71	21	932	14	100	22	90	35.27	35	4	31	0.27	31.27	9.5	2.9	80,000	50,000
B-HS1-AEROCELL	10/26/2011 9:10	G	17.5	6.89	380	2.85	57	867	18	170	31	61	26.2	23	3	20	3.2	23.2	9.6	2.5	35,000	31,000
B-HS1-NITREX	10/26/2011 8:55	G	18.2	5.75	470	1.03	126	880	6	140	110	170	10.01	10	5.6	4.4	0.01	4.41	6.9	3.2	600	600

Notes:

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

[2]Organic Nitrogen (ON) is a calculated value equal to the difference of TKN and NH_3.

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

D.O. - Dissolved oxygen

G - Grab sample

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

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

Orange - shaded data points indicate results based upon colony counts exceeding the ideal range of 20-60 colonies per plate.

5.0 B-HS1 Sample Event No. 1: Summary and Recommendations

5.1 Summary

The first sampling event results presented herein are preliminary. The Aerocell™ unit operation was still being adjusted to optimize nitrification. In addition, there were significant fluctuations in operation during the period since start-up. The sampling results from this period illustrate the potential problems in starting up such a system. It is assumed that once operations are stabilized, consistent operational parameters will be seen at future sample events. The results of the first sampling event serve to provide the basis upon which to make system adjustments and modifications. The Sample Event No. 1 results indicate that:

- Septic tank effluent (STE) quality is characteristic of typical household STE quality;
- The Aerocell™ biofilter was not performing as intended in converting all ammonium to oxidized nitrogen. The ammonium levels in the Nitrex™ effluent indicate that some ammonium was carried over from the Aerocell™ effluent.
- The total nitrogen concentration in the final effluent from the total treatment system was approximately 10 mg/L.
- Final effluent TN is dominated by reduced nitrogen forms of organic and ammonium indicating incomplete nitrification.

5.2 Recommendations

Careful observation of the B-HS1 system and the results of Sample Event No. 1 were used to formulate recommendations for adjustments and modifications to the test system.

5.2.1 Split Recirculation Device Leaks

The split recirculation device is showing signs of malfunction and leaks and needs to be fixed or replaced. The vendor has been notified.

5.2.2 Aerocell™ Nitrification

As previously discussed, the Aerocell™ biofilter was not performing as intended in converting all ammonium to oxidized nitrogen. The incomplete nitrification can likely be attributed to the operational malfunctions associated with the sticky floats and split recirculation device. There is over a ten day transit time through the treatment system prior to dispersal; therefore, the next sample event should provide better insight to system performance following completion of the operational adjustments that have been made to date.

Appendix A: Laboratory Report

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

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

December 5, 2011
Work Order: 1108051
Revised Report

Laboratory Report

Project Name **Wakulla County-B-HS1 SE#1**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	By
Sample Description		**B-HS1-STE**						
Matrix		**Groundwater**						
SAL Sample Number		**1108051-01**						
Date/Time Collected		**10/26/11 09:40**						
Collected by		**Client**						
Date/Time Received		**10/27/11 09:15**						
Inorganics								
Ammonia as N	mg/L	55	EPA 350.1	1.0	0.25		11/15/11 15:38	MMF
Ammonium as NH4	mg/L	70	EPA 350.1	0.01	0.005		11/16/11 10:36	MEJ
Carbonaceous BOD	mg/L	120	SM 5210B	2	2	10/27/11 12:30	11/02/11 11:28	JAG
Chemical Oxygen Demand	mg/L	170	EPA 410.4	25	10	10/28/11 08:45	10/28/11 12:28	ARP
Orthophosphate as P	mg/L	4.0	EPA 300.0	0.040	0.010		10/27/11 19:45	MEJ
Phosphorous - Total as P	mg/L	10	SM 4500P-E	0.040	0.010	11/01/11 09:43	11/08/11 17:52	MMF
Total Alkalinity	mg/L	600	SM 2320B	8.0	2.0	11/01/11 10:34	11/01/11 12:18	JAG
Total Kjeldahl Nitrogen	mg/L	73	EPA 351.2	0.20	0.05	11/01/11 12:24	11/07/11 08:56	MEJ
Total Suspended Solids	mg/L	53	SM 2540D	1	1	10/27/11 13:47	10/28/11 12:43	LAS
Total Volatile Solids	mg/L	190	SM 2540E**			10/31/11 10:24	11/01/11 13:53	LAS
Nitrate+Nitrite (N)	mg/L	0.01 U	EPA 353.2	0.04	0.01		11/14/11 11:13	MEJ

Sample Description		**B-HS1-AEROCELL**						
Matrix		**Groundwater**						
SAL Sample Number		**1108051-02**						
Date/Time Collected		**10/26/11 09:10**						
Collected by		**Client**						
Date/Time Received		**10/27/11 09:15**						
Inorganics								
Ammonia as N	mg/L	20	EPA 350.1	1.0	0.25		11/15/11 15:40	MMF
Ammonium as NH4	mg/L	26	EPA 350.1	0.01	0.005		11/16/11 10:36	MEJ
Carbonaceous BOD	mg/L	31	SM 5210B	2	2	10/27/11 12:30	11/02/11 11:28	JAG
Chemical Oxygen Demand	mg/L	61	EPA 410.4	25	10	10/28/11 08:45	10/28/11 12:28	ARP
Orthophosphate as P	mg/L	2.5	EPA 300.0	0.040	0.010		10/27/11 19:45	MEJ
Phosphorous - Total as P	mg/L	9.6	SM 4500P-E	0.20	0.050	11/01/11 09:43	11/08/11 17:53	MMF
Total Alkalinity	mg/L	380	SM 2320B	8.0	2.0	11/01/11 10:34	11/01/11 12:18	JAG
Total Kjeldahl Nitrogen	mg/L	23	EPA 351.2	0.20	0.05	11/01/11 12:24	11/07/11 08:56	MEJ
Total Suspended Solids	mg/L	18	SM 2540D	1	1	10/27/11 13:47	10/28/11 12:43	LAS
Total Volatile Solids	mg/L	170	SM 2540E**			10/31/11 10:24	11/01/11 13:53	LAS
Nitrate+Nitrite (N)	mg/L	3.2	EPA 353.2	1.0	0.25		11/14/11 12:12	MEJ

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Project Name **Wakulla County-B-HS1 SE#1**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	By
Sample Description		**B-HS1-NITREX**						
Matrix		**Groundwater**						
SAL Sample Number		**1108051-03**						
Date/Time Collected		**10/26/11 08:55**						
Collected by		**Client**						
Date/Time Received		**10/27/11 09:15**						
Inorganics								
Ammonia as N	mg/L	4.4	EPA 350.1	0.20	0.050		11/15/11 15:15	MMF
Ammonium as NH4	mg/L	5.6	EPA 350.1	0.01	0.005		11/16/11 10:36	MEJ
Carbonaceous BOD	mg/L	110	SM 5210B	2	2	10/27/11 12:30	11/02/11 11:28	JAG
Chemical Oxygen Demand	mg/L	170	EPA 410.4	25	10	10/28/11 08:45	10/28/11 12:28	ARP
Orthophosphate as P	mg/L	3.2	EPA 300.0	0.040	0.010		10/27/11 19:45	MEJ
Phosphorous - Total as P	mg/L	6.9	SM 4500P-E	0.20	0.050	11/01/11 09:43	11/08/11 17:54	MMF
Total Alkalinity	mg/L	470	SM 2320B	8.0	2.0	11/01/11 10:34	11/01/11 12:18	JAG
Total Kjeldahl Nitrogen	mg/L	10	EPA 351.2	0.20	0.05	11/01/11 12:24	11/07/11 08:56	MEJ
Total Suspended Solids	mg/L	6	SM 2540D	1	1	10/27/11 13:47	10/28/11 12:43	LAS
Total Volatile Solids	mg/L	140	SM 2540E**			10/31/11 10:24	11/01/11 13:53	LAS
Nitrate+Nitrite (N)	mg/L	0.01 U	EPA 353.2	0.04	0.01		11/14/11 11:18	MEJ

Sample Description		**B-HS1-PUMP**						
Matrix		**Groundwater**						
SAL Sample Number		**1108051-04**						
Date/Time Collected		**10/26/11 09:25**						
Collected by		**Client**						
Date/Time Received		**10/27/11 09:15**						
Inorganics								
Ammonia as N	mg/L	31	EPA 350.1	1.0	0.25		11/15/11 15:42	MMF
Ammonium as NH4	mg/L	40	EPA 350.1	0.01	0.005		11/16/11 10:36	MEJ
Carbonaceous BOD	mg/L	22	SM 5210B	2	2	10/27/11 12:30	11/02/11 11:28	JAG
Chemical Oxygen Demand	mg/L	90	EPA 410.4	25	10	10/28/11 08:45	10/28/11 12:28	ARP
Orthophosphate as P	mg/L	2.9	EPA 300.0	0.040	0.010		10/27/11 19:45	MEJ
Phosphorous - Total as P	mg/L	9.5	SM 4500P-E	0.20	0.050	11/01/11 09:43	11/08/11 17:55	MMF
Total Alkalinity	mg/L	470	SM 2320B	8.0	2.0	11/01/11 10:34	11/01/11 12:18	JAG
Total Kjeldahl Nitrogen	mg/L	35	EPA 351.2	0.20	0.05	11/01/11 12:24	11/07/11 08:56	MEJ
Total Suspended Solids	mg/L	14	SM 2540D	1	1	10/27/11 13:47	10/28/11 12:43	LAS
Total Volatile Solids	mg/L	100	SM 2540E**			10/31/11 10:24	11/01/11 13:53	LAS
Nitrate+Nitrite (N)	mg/L	0.27	EPA 353.2	0.04	0.01		11/14/11 11:20	MEJ

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Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BJ12629 - Ion Chromatography 300.0 Prep										
Blank (BJ12629-BLK1)					Prepared & Analyzed: 10/27/11					
Orthophosphate as P	0.010 U	0.040	0.010	mg/L						
LCS (BJ12629-BS1)					Prepared & Analyzed: 10/27/11					
Orthophosphate as P	0.918	0.040	0.010	mg/L	0.90		102	85-115		
LCS Dup (BJ12629-BSD1)					Prepared & Analyzed: 10/27/11					
Orthophosphate as P	0.939	0.040	0.010	mg/L	0.90		104	85-115	2	200
Matrix Spike (BJ12629-MS1)		**Source: 1109665-01**			Prepared & Analyzed: 10/27/11					
Orthophosphate as P	90.6	0.040	0.010	mg/L	90	ND	101	85-115		
Matrix Spike (BJ12629-MS2)		**Source: 1109455-04**			Prepared & Analyzed: 10/27/11					
Orthophosphate as P	935	0.040	0.010	mg/L	900	ND	104	85-115		
Batch BJ12710 - BOD										
Blank (BJ12710-BLK1)					Prepared: 10/27/11 Analyzed: 11/02/11					
Carbonaceous BOD	2 U	2	2	mg/L						
LCS (BJ12710-BS1)					Prepared: 10/27/11 Analyzed: 11/02/11					
Carbonaceous BOD	194	2	2	mg/L	200		97	85-115		
LCS Dup (BJ12710-BSD1)					Prepared: 10/27/11 Analyzed: 11/02/11					
Carbonaceous BOD	197	2	2	mg/L	200		99	85-115	2	200
Duplicate (BJ12710-DUP1)		**Source: 1108820-01**			Prepared: 10/27/11 Analyzed: 11/02/11					
Carbonaceous BOD	2 U	2	2	mg/L		ND				25

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Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BJ12719 - TSS prep										
Blank (BJ12719-BLK1)					Prepared: 10/27/11 Analyzed: 10/28/11					
Total Suspended Solids	1 U	1	1	mg/L						
LCS (BJ12719-BS1)					Prepared: 10/27/11 Analyzed: 10/28/11					
Total Suspended Solids	46.0	1	1	mg/L	50		92	85-115		
Duplicate (BJ12719-DUP1)		**Source: 1108051-02**			Prepared: 10/27/11 Analyzed: 10/28/11					
Total Suspended Solids	18.5	1	1	mg/L		18.5			0	30
Duplicate (BJ12719-DUP2)		**Source: 1109919-01**			Prepared: 10/27/11 Analyzed: 10/28/11					
Total Suspended Solids	192	1	1	mg/L		194			1	30
Batch BJ12815 - COD prep										
Blank (BJ12815-BLK1)					Prepared & Analyzed: 10/28/11					
Chemical Oxygen Demand	10 U	25	10	mg/L						
LCS (BJ12815-BS1)					Prepared & Analyzed: 10/28/11					
Chemical Oxygen Demand	53	25	10	mg/L	50		106	90-110		
Matrix Spike (BJ12815-MS1)		**Source: 1108051-01**			Prepared & Analyzed: 10/28/11					
Chemical Oxygen Demand	220	25	10	mg/L	50	170	106	85-115		
Matrix Spike Dup (BJ12815-MSD1)		**Source: 1108051-01**			Prepared & Analyzed: 10/28/11					
Chemical Oxygen Demand	220	25	10	mg/L	50	170	106	85-115	0	32
Batch BJ13107 - TVS Prep										
Blank (BJ13107-BLK1)					Prepared: 10/31/11 Analyzed: 11/01/11					
Total Volatile Solids	0.00			mg/L						

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Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BJ13107 - TVS Prep										
Duplicate (BJ13107-DUP1)		**Source: 1108051-01**			Prepared: 10/31/11 Analyzed: 11/01/11					
Total Volatile Solids	193			mg/L		193			0	20
Batch BK10105 - Digestion for TP by EPA 365.2/SM4500PE										
Blank (BK10105-BLK1)					Prepared: 11/01/11 Analyzed: 11/08/11					
Phosphorous - Total as P	0.010 U	0.040	0.010	mg/L						
LCS (BK10105-BS1)					Prepared: 11/01/11 Analyzed: 11/08/11					
Phosphorous - Total as P	0.541	0.040	0.010	mg/L	0.50		108	90-110		
Matrix Spike (BK10105-MS1)		**Source: 1109580-01**			Prepared: 11/01/11 Analyzed: 11/08/11					
Phosphorous - Total as P	0.853	0.040	0.010	mg/L	0.50	0.159	139	75-125		
Matrix Spike Dup (BK10105-MSD1)		**Source: 1109580-01**			Prepared: 11/01/11 Analyzed: 11/08/11					
Phosphorous - Total as P	0.773	0.040	0.010	mg/L	0.50	0.159	123	75-125	10	25
Batch BK10121 - alkalinity										
Blank (BK10121-BLK1)					Prepared & Analyzed: 11/01/11					
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
LCS (BK10121-BS1)					Prepared & Analyzed: 11/01/11					
Total Alkalinity	130	8.0	2.0	mg/L	120		100	90-110		
Matrix Spike (BK10121-MS1)		**Source: 1108051-02**			Prepared & Analyzed: 11/01/11					
Total Alkalinity	490	8.0	2.0	mg/L	120	380	92	80-120		

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Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BK10121 - alkalinity										
Matrix Spike Dup (BK10121-MSD1)		**Source: 1108051-02**			Prepared & Analyzed: 11/01/11					
Total Alkalinity	490	8.0	2.0	mg/L	120	380	92	80-120	0	26
Batch BK10124 - Digestion for TKN by EPA 351.2										
Blank (BK10124-BLK1)					Prepared: 11/01/11 Analyzed: 11/07/11					
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
LCS (BK10124-BS1)					Prepared: 11/01/11 Analyzed: 11/07/11					
Total Kjeldahl Nitrogen	2.62	0.20	0.05	mg/L	2.5		104	90-110		
Matrix Spike (BK10124-MS1)		**Source: 1109544-02**			Prepared: 11/01/11 Analyzed: 11/07/11					
Total Kjeldahl Nitrogen	3.50	0.20	0.05	mg/L	2.5	1.21	90	80-120		
Matrix Spike Dup (BK10124-MSD1)		**Source: 1109544-02**			Prepared: 11/01/11 Analyzed: 11/07/11					
Total Kjeldahl Nitrogen	3.77	0.20	0.05	mg/L	2.5	1.21	101	80-120	7	20
Batch BK10836 - Nitrate 353.2 by seal										
Blank (BK10836-BLK1)					Prepared & Analyzed: 11/14/11					
Nitrate+Nitrite (N)	0.01 U	0.04	0.01	mg/L						
LCS (BK10836-BS1)					Prepared & Analyzed: 11/14/11					
Nitrate+Nitrite (N)	0.833	0.04	0.01	mg/L	0.80		104	90-110		
Matrix Spike (BK10836-MS1)		**Source: 1109730-02**			Prepared & Analyzed: 11/14/11					
Nitrate+Nitrite (N)	1.46	0.04	0.01	mg/L	1.0	0.456	101	77-119		

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BK10836 - Nitrate 353.2 by seal										
Matrix Spike Dup (BK10836-MSD1)		**Source: 1109730-02**			Prepared & Analyzed: 11/14/11					
Nitrate+Nitrite (N)	1.39	0.04	0.01	mg/L	1.0	0.456	93	77-119	5	20
Batch BK11505 - Ammonia by SEAL										
Blank (BK11505-BLK1)					Prepared & Analyzed: 11/15/11					
Ammonia as N	0.010 U	0.040	0.010	mg/L						
LCS (BK11505-BS1)					Prepared & Analyzed: 11/15/11					
Ammonia as N	0.53	0.040	0.010	mg/L	0.50		106	90-110		
Matrix Spike (BK11505-MS1)		**Source: 1110132-07**			Prepared & Analyzed: 11/15/11					
Ammonia as N	0.54	0.040	0.010	mg/L	0.50	0.023	103	90-110		
Matrix Spike Dup (BK11505-MSD1)		**Source: 1110132-07**			Prepared & Analyzed: 11/15/11					
Ammonia as N	0.53	0.040	0.010	mg/L	0.50	0.023	102	90-110	1	10

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

Hazen and Sawyer
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* Qualifiers, Notes and Definitions

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

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

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

Test results in this report meet all the requirements of the NELAC standards. Any applicable qualifiers are shown below.
Questions regarding this report should be directed to Client Services at 813-855-1844.

SOUTHERN ANALYTICAL LABORATORIES, INC.

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

SAL Project No. 1108051

Client Name: Hazan and Sawyer	Contact / Phone: Josephin Edeback-Hirst 813-630-4498
Project Name / Location: Wakulla County B-HS1 SE#1	jedeback@hazanandsawyer.com
Samplers: (Signature)	

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

SAL Use Only Sample No.	Sample Description	Date	Time	Matrix	Composite	Grab	1LP, Cool Total Alkalinity, TSS, VSS, CBOD	250mL P, H_2SO_4 TKN, NH_4, NOx, COD, TP, Ortho P	~~125mL P, $Na_2S_2O_3$ Mcoil Blue Pr A, FC~~	DO NOT RUN FC-MF collected by mistake - CB 10-27-11		Field Temp	Field Cond	Field pH	No. of Containers (Total per each location)
01	B-HS1-STE	10/26/11	9:40	WW		X	1	1	4			20.7	1172	6.99	6
02	B-HS1-AEROCELL	10/26/11	9:10	WW		X	1	1	4			17.5	867	6.89	6
03	B-HS1-NITREX	10/26/11	8:55	WW		X	1	1	4			18.2	880	5.75	6
04	B-HS1-~~DRAINFIELD~~ Pump	10/26/11	9:25	WW		X	1	1	4			19.8	~~7.03~~ 932	7.03	6

Containers Prepared/ Relinquished:	Date/Time: 1100 9/9/11	Received:	Date/Time:
Relinquished:	Date/Time: 11:45 10/26/11	Received: FED EX	Date/Time:
Relinquished: FEDEX	Date/Time:	Received:	Date/Time: 10/27/11 0915
Relinquished:	Date/Time:	Received:	Date/Time:
Relinquished:	Date/Time:	Received:	Date/Time:

Seal intact? Y N N/A

Samples intact upon arrival? Y N N/A

Received on ice? Temp 1.2 Y N N/A

Proper preservatives indicated? Y N N/A

Rec'd within holding time? Y N N/A

Volatiles rec'd w/out headspace Y N N/A

Proper containers used? Y N N/A

Instructions / Remarks

1108051

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

Chain of Custody

Ackuritlabs, Inc.

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

Environmental Services Section

REPORT OF MICROBIOLOGICAL ANALYSIS

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

Report #:	**20117**
Report Date:	November 1, 2011
NELAC#:	E81350
FDEPQA#:	920087G
Project#:	211296
Sampled By:	Harmon Harden
Sample Site:	Septic Tank
Sample Date:	10-26-11

Table 1. Samples received 10-26-11.

	Fecal Coliform	Dilution	*E. coli*	Dilution
Units:	# colonies/100 mL	Factor	# colonies/100 mL	Factor
Methodology:	SM 9222D		EPA 1603	
Detection Limit:	2.0		2.0	
Analysis Date:	10-26-11		10-26-11	
Analysis Time:	12:30		12:30	
Analyst:	TA		TA	
Sample Location/Time:				
Lab Number:				
Nitrex Tank #105853	**600**	10	**600**	10
Aerocell Tank #105854	**35,000**	1000	**31,000**	1000
Pump Tank #105855	**80,000 B**	1000	**50,000**	1000
STE Tank #105856	**220,000**	10,000	**170,000**	10,000

Data Qualifiers that may apply:
B = Results based upon colony counts exceeding the ideal range of 20 – 60 colonies per plate.

Data Release Authorization:
Sample integrity and reliability certified by lab personnel prior to analysis. All quality assurance samples met quali unless otherwise specified. The reported analytical results relate only to the sample submitted. This report shall n except in full, without the written approval of Ackuritlabs. Please contact the undersigned at the above phone num questions regarding this report.

11-1-11

Todd J. Acker, Laboratory Director

Ackuritlabs, Inc.

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

№ 020117

CHAIN OF CUSTODY RECORD

Page 1 of 1

CLIENT NAME & ADDRESS: Hazen + Sawyer	LAB PROJECT #: 211296
PROJECT NAME:	CONTACT PERSON: Harmen

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

PRECLEANED CONTAINERS RELINQUISHED BY:	DATE: 10-25-11	TIME: 1640	RECEIVED BY:	DATE:	TIME:
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:

SAMPLE COLLECTION 2011

SAMPLERS: (PRINT NAME) Harmen Harden

SAMPLERS: (SIGNATURE)

FIELD ID NUMBER	DATE MM/DD/YY	TIME	STATION LOCATION/NUMBER	MATRIX	GRAB OR COMPOSITE	NO. OF CONTAINERS	ANALYSES REQUESTED: Fecal Coli									LAB ID#
#1	10-26-11	0855	Nitrex tank	ww	G	1	V	Y								105853
#2	10-26-11	0910	Aerocell tank													105854
#3	10-26-11	0925	Pump tank													105855
#4	10-26-11	0940	STE tank													105856

COMMENTS:

SAMPLES RECEIVED: ICED (Y) / N

TEMP: 18.0 °C HOLD TIME (Y) / N PROPER PRESERVATION (Y) / N

RELINQUISHED BY(SIGNATURE) / AFFILIATION / DATE & TIME: Hazen & Sawyer 10:00 10/26/11	RECEIVED BY(SIGNATURE) / AFFILIATION / DATE & TIME: Mark Busby / ACK 1000 10-26-11
RELINQUISHED BY(SIGNATURE) / AFFILIATION / DATE & TIME: Mark Busby / ACK 10-26-11 0945	RECEIVED BY(SIGNATURE) / AFFILIATION / DATE & TIME: 10-26-11 1030
RELINQUISHED BY(SIGNATURE) / AFFILIATION / DATE & TIME:	RECEIVED BY(SIGNATURE) / AFFILIATION / DATE & TIME:

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MATRIX TYPES:

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

Appendix B: Operation & Maintenance Log

Table B.1
Operation and Maintenance Log

Date	Description
6/10/11	Start-up of system
7/6/11	Homeowner reported that over the weekend the alarm kept sounding.
7/7/11	Contractor made site visit. The flow splitter device was adjusted. Some of the recirculation tubes seemed to be too low. Recirculation rate higher than intended. The wiring was not done correctly at install. Contractor rewired panel. Noted that the Nitrex sampling port has water which indicates that the Nitrex tank is now full.
7/19/11	Override float still triggering alarm. Contractor raised override float up, because of the float error. Contractor read water meter and adjusted flow splitter again. Contractor also checked the pump rate which is reading low. Pump flow rate measured at 12.5 gallons per minute.
8/18/11	Vericomm system panel installed to replace existing control panel. Drainfield observation ports installed.
9/13/11	FDOH collected samples. Contractor checked system and detected that a malfunction of the dosing floats for the pump causes a lack of dosing to the Aerocell unit.
9/20/11	Contractor checked system.
10/17/11	New sampling port for Nitrex sample installed by contractor. A tee was placed in the outlet pipe, so that a sample is taken directly from the effluent pipe. The pump vault was causing the floats to get stuck. Contractor removed pump vault within the second chamber of the primary tank.
10/26/11	Monitoring sample event No.1. Leaks apparent on Aerocell split recirculation device. Water level within the split recirc device approximately 1-inch below return tubes. Sand was noted in the return pipe leading into the pump chamber.

Appendix C: Vericomm PLC Data

System Status			26-Oct-11	5-Oct-11	5-Sep-11	24-Aug-11
Point	Description	Status	Value	Value	Value	Value
1	Alarm Status	Automatic	OK	OK	OK	OK
2	Alert Status	Automatic	OK	OK	OK	OK
3	System Mode	Automatic	Normal	Normal	Normal	Normal
5	Timer Mode	Automatic	Off	Normal	Off	Normal
6	Active Off Time	Automatic	14.0 Minutes	14.0 Minutes	14.0 Minutes	9.0 Minutes
7	Active On Time	Automatic	1.5 Minutes	1.5 Minutes	1.5 Minutes	1.1 Minutes
9	Pump Mode	Automatic	Off	OffCycl	Off	OffCycl
10	Pump Status	Automatic	Off	Off	Off	Off
12	Pump Cycles Today	Automatic	4.0 Cycles	9.0 Cycles	0.0 Cycles	4.0 Cycles
13	Override Cycles Today	Automatic	0.0 Cycles	0.0 Cycles	0.0 Cycles	4.0 Cycles
14	Pump Run Time Today	Automatic	6.1 Minutes	13.6 Minutes	0.0 Minutes	12.1 Minutes
Settings						
Point	Description	Status	Value	Value	Value	Value
17	Off Cycle Time	Constant/Setpoint	14.0 Minutes	14.0 Minutes	14.0 Minutes	9.0 Minutes
18	On Cycle Time	Constant/Setpoint	1.5 Minutes	1.5 Minutes	1.5 Minutes	1.1 Minutes
19	Override Off Cycle Time	Constant/Setpoint	7.0 Minutes	8.0 Minutes	10.0 Minutes	9.0 Minutes
20	Override On Cycle Time	Constant/Setpoint	1.7 Minutes	2.5 Minutes	2.0 Minutes	4.0 Minutes
21	Minimum Override Cycles	Automatic	3.0 Cycles	3.0 Cycles	3.0 Cycles	3.0 Cycles
23	Override Cycle Limit per Day	Constant/Setpoint	21.0 Cycles	21.0 Cycles	21.0 Cycles	21.0 Cycles
24	Time Limit per Day	Constant/Setpoint	200.0 Minutes	200.0 Minutes	200.0 Minutes	200.0 Minutes
25	High Level Pump Test	Automatic	2.0 Minutes	2.0 Minutes	2.0 Minutes	2.0 Minutes
28	Alarm Update Interval	Timing Override	240.0 Minutes	120.0 Minutes	120.0 Minutes	120.0 Minutes
29	Page Delay	Automatic	960.0 Minutes	960.0 Minutes	960.0 Minutes	960.0 Minutes
30	Page Interval	Automatic	30.0 Minutes	30.0 Minutes	30.0 Minutes	30.0 Minutes
31	Local Alarm Delay	Constant/Setpoint	1140.0 Minutes	1140.0 Minutes	1140.0 Minutes	5.0 Minutes
32	Local Reactivate Delay	Automatic	120.0 Minutes	120.0 Minutes	120.0 Minutes	120.0 Minutes
Troubleshooting						
Point	Description	Status	Value	Value	Value	Value
33	Top Float Status	Automatic	OK	OK	OK	OK
34	Middle Float Status	Automatic	OK	OK	OK	OK
35	Bottom Float Status	Automatic	OK	OK	OK	OK
37	Contactor Status	Automatic	OK	OK	OK	OK
38	Pump Status	Automatic	OK	OK	OK	OK
40	Filter Status	Automatic	OK	OK	OK	OK
41	Tank Status	Automatic	OK	OK	OK	OK
43	Power Status	Automatic	OK	OK	OK	OK
Flow Data						
Point	Description	Status	Value	Value	Value	Value
49	Pump Run Time Today	Automatic	6.1 Minutes	13.6 Minutes	0.0 Minutes	12.1 Minutes
50	Override Cycles Today	Automatic	0.0	0.0	0.0	4.0
51	Pump Cycles Today	Automatic	4.0 Cycles	9.0 Cycles	0.0 Cycles	4.0 Cycles
52	Average Run Time per Cycle Today	Automatic	1.5 Minutes	1.5 Minutes	0.0 Minutes	3.0 Minutes
54	Brownouts Today	Automatic	0.0	0.0	0.0	3.0

System Status			26-Oct-11	5-Oct-11	5-Sep-11	24-Aug-11
30-Day History Data						
Point	Description	Status	Value	Value	Value	Value
65	30 Day Average Run Time per Day	Automatic	87.7 Minutes	107.8 Minutes	31.6 Minutes	0.0 Minutes
66	30 Day Average Override Cycles per Day	Automatic	3.5 Cycles	8.3 Cycles	0.3 Cycles	0.0 Cycles
67	30 Day Average Cycles per Day	Automatic	57.4 Cycles	68.1 Cycles	27.9 Cycles	0.0 Cycles
68	30 Day Average Run Time per Cycle	Automatic	1.5 Minutes	1.6 Minutes	1.1 Minutes	0.0 Minutes
71	30 Day Total Pump Run Time	Automatic	2630.7 Minutes	3234.4 Minutes	379.0 Minutes	0.0 Minutes
72	30 Day Total Override Cycles	Automatic	105.0 Cycles	250.0 Cycles	4.0 Cycles	0.0 Cycles
73	30 Day Total Cycles	Automatic	1721.0 Cycles	2044.0 Cycles	335.0 Cycles	0.0 Cycles
76	30 Day Total Brownouts	Automatic	1.0	0.0	3.0	0.0
Totalized Pump Data						
Point	Description	Status	Value	Value	Value	Value
82	Pump Total Run Time	Automatic	83.2 Hours	60.5 Hours	6.3 Hours	0.2 Hours
83	Pump Total Cycles	Automatic	3271.0 Cycles	2390.0 Cycles	335.0 Cycles	4.0 Cycles
Miscellaneous						
Point	Description	Status	Value	Value	Value	Value
145	Pump On Auto	Automatic	Off	Off	Off	Off
147	Pump Test Today	Automatic	Off	Off	Off	Off
148	Pump Check Enable	Automatic	Off	Off	Off	Off
149	Total Override Cycles	Automatic	0.0	0.0	0.0	0.0
150	High Level Condition	Automatic	Off	Off	Off	Off
151	Leak Check Enable	Automatic	Off	On	Off	On
152	Brownout State	Automatic	Off	Off	Off	Off
153	Test Mode	Automatic	Off	Off	Off	Off
Alarm Points						
Point	Description	Status	Value	Value	Value	Value
161	General Alarm	Automatic	Off	Off	Off	Off
162	New Alarm	Automatic	Off	Off	Off	Off
163	Update Central Enable	Automatic	On	On	On	Off
167	Page Alarm Start	Automatic	Off	Off	Off	Off
168	Pager Signal	Override Off	Off	Off	Off	Off
169	Local Alarm Start	Automatic	Off	Off	Off	Off
170	Local Alarm Silence	Automatic	Off	Off	Off	Off
Inputs & Outputs						
Point	Description	Status	Value	Value	Value	Value
177	High Level/Override Timer Float Input	Automatic	Off	Off	Off	Off
178	Timer Float Input	Automatic	Off	On	Off	On
179	Redundant Off Float & Low Level Alarm Input	Automatic	On	On	On	On
181	Push To Silence Input	Automatic	Off	Off	Off	Off
182	Auxiliary Contact Input	Automatic	Off	Off	Off	Off
186	Pump Output	Automatic	Off	Off	Off	Off
188	Alarm Light Output	Automatic	Off	Off	Off	Off
189	Audible Alarm Output	Override Off	Off	Off	Off	Off