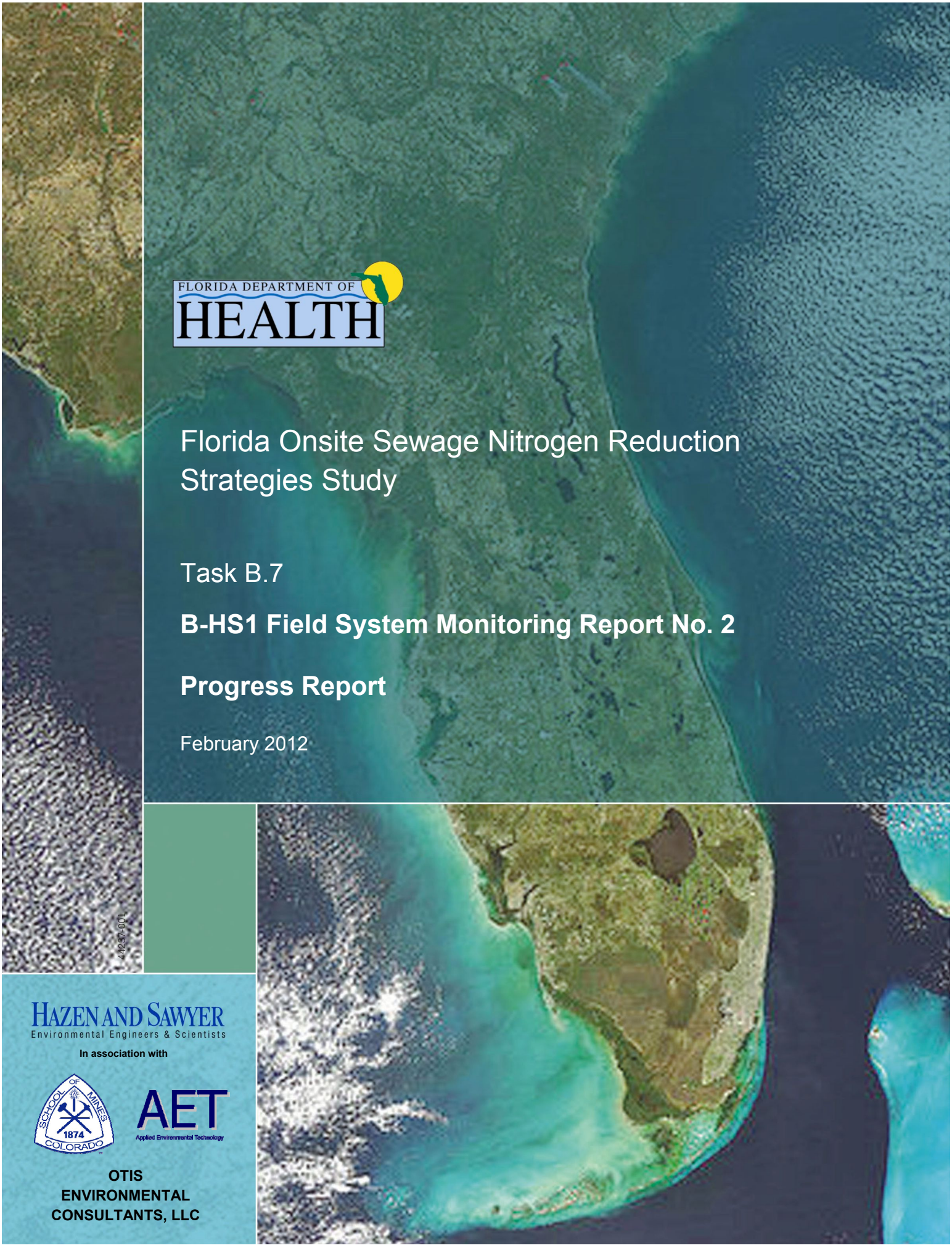

FLORIDA DEPARTMENT OF HEALTH

# Florida Onsite Sewage Nitrogen Reduction Strategies Study

## Task B.7

## B-HS1 Field System Monitoring Report No. 2

## Progress Report

February 2012

4423-001


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. 2

**Prepared for:**

Florida Department of Health
Division of Environmental Health
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**February 2012**

**Prepared by:**

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# B-HS1 Field System
# Monitoring Report No. 2

## 1.0 Background

Task B of the Florida Onsite Sewage Nitrogen Reduction Strategies Study (FOSNRS) includes performing field experiments to critically evaluate the performance of nitrogen removal technologies that were identified in FOSNRS Task A.9. To meet this objective, full scale treatment systems are being installed at various residential sites in Florida and monitored over an extended timeframe under actual onsite conditions. The Task B Quality Assurance Project Plan (Task B.5) documents the objectives, monitoring framework, sample frequency and duration, and analytical methods to be used at the home sites. This report documents the second sample event of 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 second B-HS1 monitoring and sampling event conducted on January 25, 2012. 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 (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.

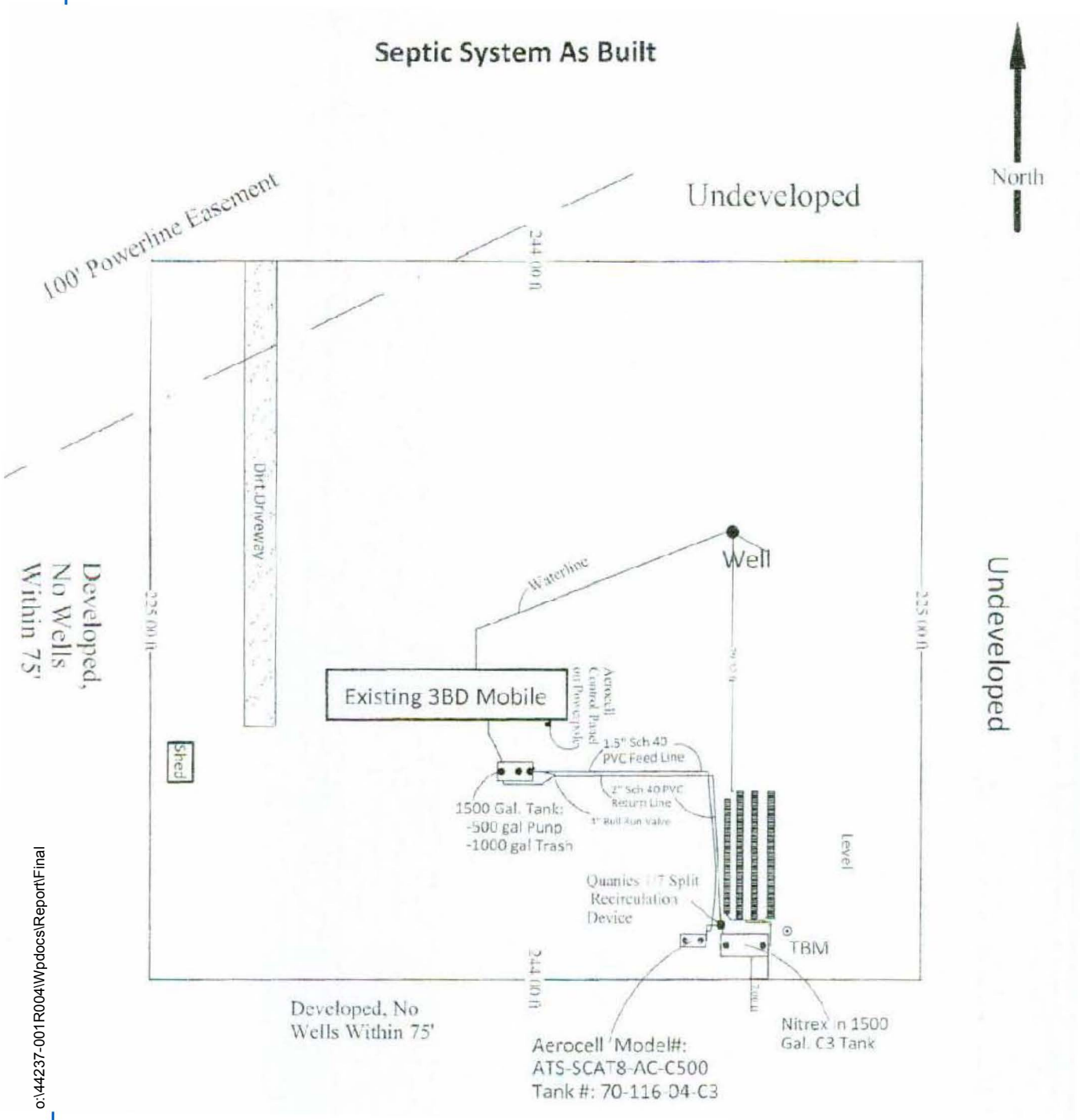



**Figure 1**
**B-HS1 Site Schematic**

## 3.2 Modifications to Test System

### 3.2.1 Split Recirculation Device

The split recirculation device showed signs of malfunction and leaks during the first sample event and needed to be fixed or replaced. The vendor replaced the device on December 9, 2011. The new device is depicted in Figure 2. No other modifications were made to the treatment system.

**Figure 2**
**Photo of Split Recirculation Device installed December 9, 2011**

## 3.3 Monitoring and Sample Locations and Identification

The four monitoring points are shown in Figure 3. 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). Samples from monitoring point B-HS1-STE represent the influent to the remainder of the onsite nitrogen reduction system. The second sampling point (B-HS1-PUMP) was approximately 1.5 feet below the surface of the second chamber of the primary tank which serves as the pump chamber and also receives effluent recirculation flow from the Aerocell™ unsaturated biofilter.

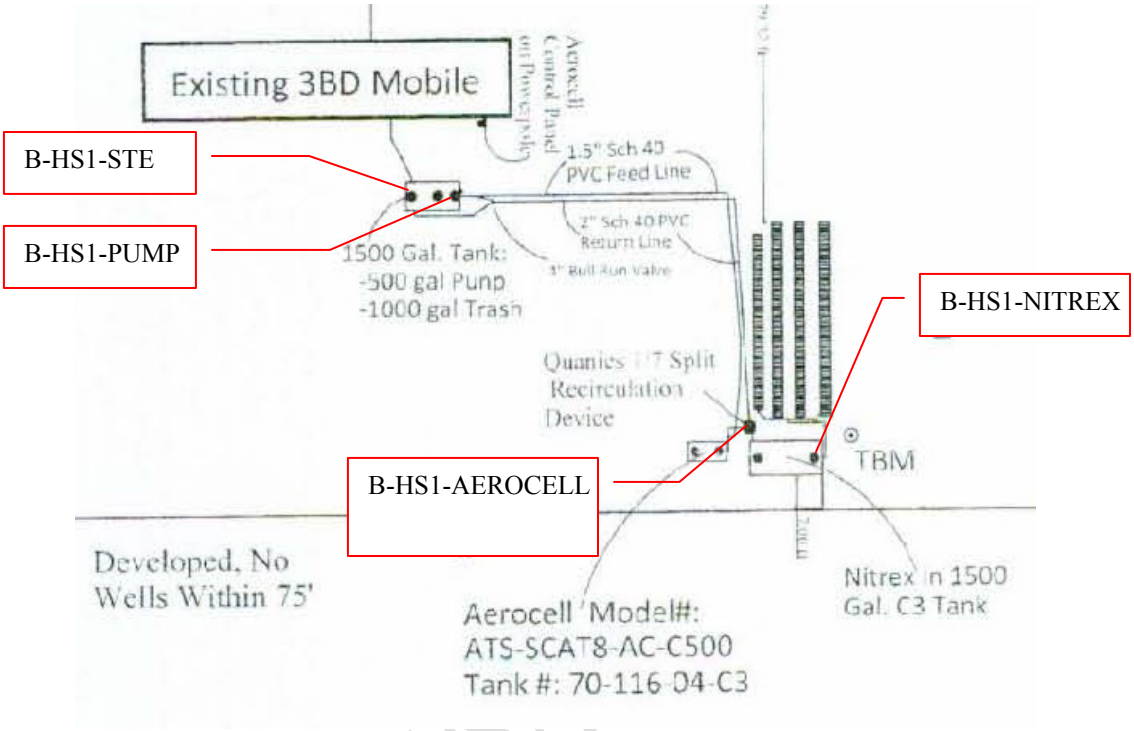



**Figure 3**
**B-HS1 Sample Locations**

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 (Figures 3 and 4).

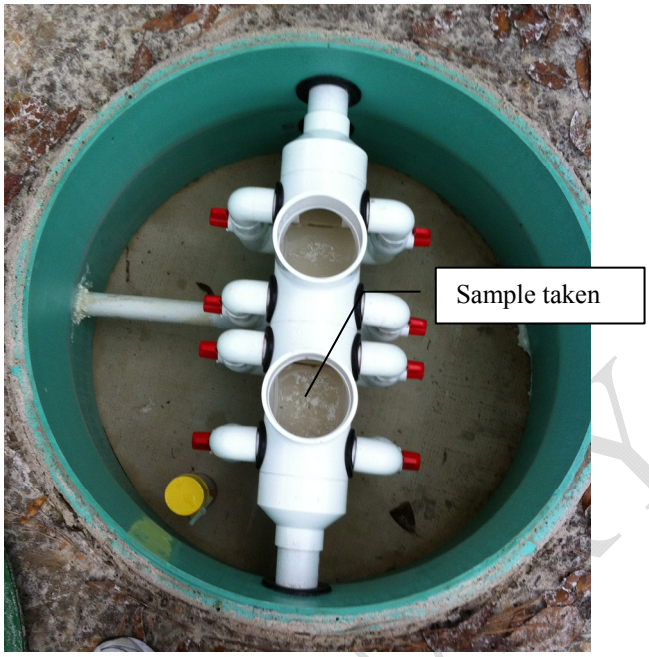



**Figure 4**
**Recirculation Device (B-HS1-AEROCELL sample)**

The forth monitoring location is the Nitrex™ tank sample tube that is connected to the Nitrex™ effluent pipe which is located on the bottom of the Nitrex™ tank (Figure 5). This represents the final effluent from the treatment system prior to being discharged to the soil infiltration system, or drainfield.


**Figure 5**
**Nitrex™ Tank (B-HS1-NITREX sample)**

## 3.4 Operational Monitoring

Start-up of the system occurred on June 10, 2011 and the system has operated continually since that time. For this second sampling event, the water meter for the house and the Aerocell™ flow meter were read and recorded on January 25th and 30th. The Aerocell™ flow meter is located on the line leading from the pump/recirculation tank to the Aerocell™ chamber and records the cumulative flow in gallons pumped from the pump chamber. The measurement of the Aerocell™ flow meter 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, and other information using a Vericomm panel system.

## 3.5 Energy, Chemical and/or Additives Consumption

Energy consumption was monitored using an electrical meter installed between the main power box for the house and the control panel. The electrical meter records the cumulative power usage of the system in kilowatt-hours. The power usage of the system is solely due to the single recirculation pump in the pump chamber. 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.

## 3.6 Water Quality Sample Collection and Analyses

Influent, intermediate, and effluent water quality samples from the system were collected January 25, 2012 for water quality analysis. Samples were collected at each of the four monitoring points described in Section 3.3: B-HS1-STE, B-HS1-PUMP, B-HS1-AEROCELL, and B-HS1-NITREX. 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. 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), volatile suspended solids (VSS), 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 |
| Volatile Suspended Solids (VSS) | SM 2540E | 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 flow meter readings, recycle ratio, and average daily water use for the B-HS1 field site are summarized in Table 2. The operation and maintenance log which includes actions taken since start-up is provided in Appendix B. Summary tables of the Vericomm PLC recorded data are provided in Appendix C. These include daily and 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[1] | 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 | 9904.0 | 101.7 | 60,840.0 | 361.5 | 2.6 : 1 |
| 10/26/2011 8:24 | 13804.7 | 90.0 | 118,640.9 | 1333.3 | 13.8 : 1 |
| 11/30/2011 0:00 | 17673.0 | 111.6 | 125,260.0 | 191.0 | 0.7 : 1 |
| Total average prior to SRD[2] replacement | | 101.3 | | 722.3 | 6.1 : 1 |
| 12/23/2011 0:00 | 20,280.0 | 113.3 | 153,930.0 | 1,246.5 | 10.0 : 1 |
| 1/25/2012 9:00 | 23,871.3 | 107.6 | 192,410.5 | 1,154.4 | 9.7 :1 |
| 1/30/2012 10:10 | 24,443.3 | 113.3 | 198,874.8 | 1,268.5 | 10.2: 1 |
| Total average after SRD[2] replacement | | 108.4 | | 1,169.5 | 9.8 : 1 |
| Total average start-up to 1/30/12 | | 103.6 | | 846.8 | 7.2 : 1 |

[1]Household (Q) + Recirculation (R)
[2]Split recirculation device (SRD) was replaced December 9, 2011.



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). While calibrating the replacement split recirculation device, the vendor increased the recycle ratio target to 10:1 to improve performance of the nitrification unit.

Prior to the split recirculation device replacement, the household flow average was 101.3 gallons per day with periods of higher and lower flows. The average flow to the Aerocell™ unit was 722.3 gallons per day with a corresponding average recycle ratio of 6.1:1. Following the split recirculation device replacement, the household flow average was 108.4 gallons per day, and the average flow to the Aerocell™ unit was 1,169.5 gallons

per day with a corresponding average recycle ratio of 9.8:1. The household flow average between start-up and January 30, 2012 was 103.6 gallons per day, and the average flow to the Aerocell™ unit was 846.8 gallons per day with a corresponding average recycle ratio of 7.2:1

## 4.2 Energy, Chemical and/or Additives Consumption

Energy consumption is monitored using an electrical meter installed between the main power box for the house and the control panel to record cumulative power usage of the pump in kilowatt-hours. The recorded electrical use for the system is summarized in Table 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 | | |
| 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 prior to SRD[1] replacement | | 0.57 | 0.001 |
| 1/25/2012 8:30 | 268 | 2.07 | 0.002 |
| 1/30/2012 10:26 | 286 | 3.54 | 0.003 |
| Total average start-up to 1/30/12 | | 1.21 | 0.002 |

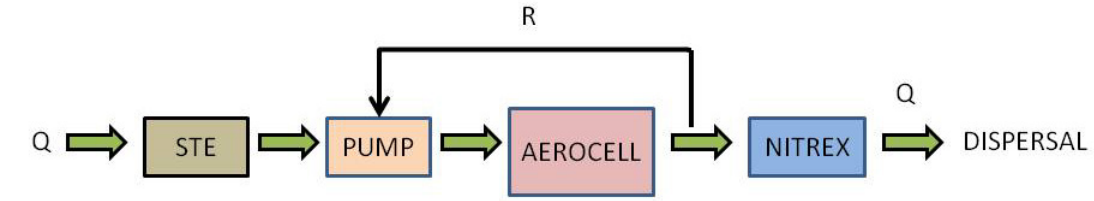
[1]Split recirculation device (SRD) was replaced December 9, 2011.

The total average electrical use through January 30, 2012 was 1.21 kWh per day. The higher readings following the split recirculation device replacement are attributed to the increased pump runtime due to the increased target recycle ratio. The average electrical use per gallon pumped to the Aerocell™ is 0.002 kWh per gallon.

## 4.3 Water Quality

Water quality analytical results, for Sample Event No. 2, 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 6. A summary of the water quality data collected to date for the test system is presented in Table 5.




| | | | | |
|---|---|---|---|---|
| TKN mg N/L | 77 | 6.3 | 2.4 | 4.9 |
| $NH_3$ mg N/L | 67 | 5 | 0.1 | 3.4 |
| $NO_x$ mg N/L | 0.3 | 47.5 | 52.3 | 0.2 |
| TN mg N/L | 77.3 | 53.8 | 54.7 | 5.1 |

**Figure 6**
**Graphical Representation of Nitrogen Results**

***Septic Tank Effluent (STE) Quality:*** The water quality characteristics of STE collected in Sample Event 2 were within the typical range generally expected for domestic STE. The measured STE total nitrogen (TN) concentration was 77 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 5 mg/L and 0.083 mg/L with DO levels at 2.21 and 3.46 mg/L respectively (Table 4). TSS and $CBOD_5$ were equal to or below 5 mg/L. Organic N was below 2.5 mg/L in both samples. The pump chamber effluent $NO_x$-N was 47.53 mg/L, and Aerocell™ effluent $NO_x$-N was 52.27 mg/L. These results indicate some denitrification was occurring in the recirculation chamber, and relatively complete nitrification in the Aerocell™. The Aerocell™ biofilter was performing as intended in converting ammonium to oxidized nitrogen, and the results indicate that the adjustments to Aerocell™ operation following the first sample event remedied the incomplete nitrification situation.

***Nitrex™ Effluent:*** Effluent $NO_x$-N from the Nitrex™ unit was 0.15 mg/L. The low $NO_x$-N was accompanied by 0.66 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 5.05 mg/L and 3.4 mg/L, respectively, indicating that some ammonium may have been generated within the Nitrex™ tank. Final total nitrogen in the treatment system effluent was dominated by reduced nitrogen forms which largely determined the 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) | VSS (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) | $NO_3$-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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-HS1-STE | 1/25/2012 12:00 | G | 19.8 | 6.93 | 540 | 0.08 | -49 | 1159 | 59 | 44 | 230 | 30 | 380 | 77.3 | 77 | 10 | 67 | 0.06 | 0.24 | 0.3 | 67.3 | 8.9 | 2.6 | 800,000 | 740,000 |
| B-HS1-PUMP | 1/25/2012 11:45 | G | 18.4 | 6.16 | 110 | 2.21 | 90 | 906 | 5 | 3 | 290 | 3 | 34 | 53.83 | 6.3 | 1.3 | 5 | 47 | 0.53 | 47.53 | 52.53 | 9.3 | 1.3 | 27,000 | 25,000 |
| B-HS1-AEROCELL | 1/25/2012 11:37 | G | 18.4 | 5.82 | 86 | 3.46 | 43 | 900 | 1 | 1.5 | 230 | 2 | 18 | 54.67 | 2.4 | 2.317 | 0.083 | 52 | 0.27 | 52.27 | 52.353 | 9.2 | 0.66 | 90 | 80 |
| B-HS1-NITREX | 1/25/2012 11:25 | G | 16.9 | 6.33 | 360 | 0.66 | -154 | 821 | 2 | 9.5 | 63 | 35 | 79 | 5.05 | 4.9 | 1.5 | 3.4 | 0.14 | 0.01 | 0.15 | 3.55 | 8.7 | 1.6 | 10 | 6 |

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.

# Table 5
# Summary of Water Quality Data

| Sample ID | Statistical Parameter | Temp (°C) | pH | Total Alkalinity (mg/L) | DO (mg/L) | ORP (mV) | Specific Conductance (µS) | TSS (mg/L) | VSS (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) | NH4-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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-HS1-STE | n | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| | MEAN | 20.25 | 6.96 | 570.00 | 0.07 | -143.50 | 1165.50 | 56.00 | 44.00 | 210.00 | 75.00 | 275.00 | 75.16 | 75.00 | 14.00 | 61.00 | 78.00 | 0.06 | 0.24 | 0.16 | 61.16 | 9.45 | 3.30 | 510,000 | 455,000 |
| | STD. DEV. | 0.64 | 0.04 | 42.43 | 0.02 | 133.64 | 9.19 | 4.24 | | 28.28 | 63.64 | 148.49 | 3.03 | 2.83 | 5.66 | 8.49 | 11.31 | | | 0.21 | 8.69 | 0.78 | 0.99 | 410,122 | 403,051 |
| | MIN | 19.80 | 6.93 | 540.00 | 0.05 | -238.00 | 1159.00 | 53.00 | 44.00 | 190.00 | 30.00 | 170.00 | 73.01 | 73.00 | 10.00 | 55.00 | 70.00 | 0.06 | 0.24 | 0.01 | 55.01 | 8.90 | 2.60 | 220,000 | 170,000 |
| | MAX | 20.70 | 6.99 | 600.00 | 0.08 | -49.00 | 1172.00 | 59.00 | 44.00 | 230.00 | 120.00 | 380.00 | 77.30 | 77.00 | 18.00 | 67.00 | 86.00 | 0.06 | 0.24 | 0.30 | 67.30 | 10.00 | 4.00 | 800,000 | 740,000 |
| B-HS1-PUMP | n | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| | MEAN | 19.10 | 6.60 | 290.00 | 1.46 | 55.50 | 919.00 | 9.50 | 3.00 | 195.00 | 12.50 | 62.00 | 44.55 | 20.65 | 2.65 | 18.00 | 23.20 | 47.00 | 0.53 | 23.90 | 41.90 | 9.40 | 2.10 | 53,500 | 37,500 |
| | STD. DEV. | 0.99 | 0.62 | 254.56 | 1.06 | 48.79 | 18.38 | 6.36 | | 134.35 | 13.44 | 39.60 | 13.12 | 20.29 | 1.91 | 18.38 | 23.76 | | | 33.42 | 15.03 | 0.14 | 1.13 | 37,477 | 17,678 |
| | MIN | 18.40 | 6.16 | 110.00 | 0.71 | 21.00 | 906.00 | 5.00 | 3.00 | 100.00 | 3.00 | 34.00 | 35.27 | 6.30 | 1.30 | 5.00 | 6.40 | 47.00 | 0.53 | 0.27 | 31.27 | 9.30 | 1.30 | 27,000 | 25,000 |
| | MAX | 19.80 | 7.03 | 470.00 | 2.21 | 90.00 | 932.00 | 14.00 | 3.00 | 290.00 | 22.00 | 90.00 | 53.83 | 35.00 | 4.00 | 31.00 | 40.00 | 47.00 | 0.53 | 47.53 | 52.53 | 9.50 | 2.90 | 80,000 | 50,000 |
| B-HS1-AEROCELL | n | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| | MEAN | 17.95 | 6.36 | 233.00 | 3.16 | 50.00 | 883.50 | 9.50 | 1.50 | 200.00 | 16.50 | 39.50 | 40.44 | 12.70 | 2.66 | 10.04 | 13.06 | 52.00 | 0.27 | 27.74 | 37.78 | 9.40 | 1.58 | 17,545 | 15,540 |
| | STD. DEV. | 0.64 | 0.76 | 207.89 | 0.43 | 9.90 | 23.33 | 12.02 | | 42.43 | 20.51 | 30.41 | 20.13 | 14.57 | 0.48 | 14.08 | 18.31 | | | 34.70 | 20.61 | 0.28 | 1.30 | 24,685 | 21,864 |
| | MIN | 17.50 | 5.82 | 86.00 | 2.85 | 43.00 | 867.00 | 1.00 | 1.50 | 170.00 | 2.00 | 18.00 | 26.20 | 2.40 | 2.32 | 0.08 | 0.11 | 52.00 | 0.27 | 3.20 | 23.20 | 9.20 | 0.66 | 90 | 80 |
| | MAX | 18.40 | 6.89 | 380.00 | 3.46 | 57.00 | 900.00 | 18.00 | 1.50 | 230.00 | 31.00 | 61.00 | 54.67 | 23.00 | 3.00 | 20.00 | 26.00 | 52.00 | 0.27 | 52.27 | 52.35 | 9.60 | 2.50 | 35,000 | 31,000 |
| B-HS1-NITREX | n | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| | MEAN | 17.55 | 6.04 | 415.00 | 0.85 | -14.00 | 850.50 | 4.00 | 9.50 | 101.50 | 72.50 | 124.50 | 7.53 | 7.45 | 3.55 | 3.90 | 4.95 | 0.14 | 0.01 | 0.08 | 3.98 | 7.80 | 2.40 | 305 | 303 |
| | STD. DEV. | 0.92 | 0.41 | 77.78 | 0.26 | 197.99 | 41.72 | 2.83 | | 54.45 | 53.03 | 64.35 | 3.51 | 3.61 | 2.90 | 0.71 | 0.92 | | | 0.10 | 0.61 | 1.27 | 1.13 | 417 | 420 |
| | MIN | 16.90 | 5.75 | 360.00 | 0.66 | -154.00 | 821.00 | 2.00 | 9.50 | 63.00 | 35.00 | 79.00 | 5.05 | 4.90 | 1.50 | 3.40 | 4.30 | 0.14 | 0.01 | 0.01 | 3.55 | 6.90 | 1.60 | 10 | 6 |
| | MAX | 18.20 | 6.33 | 470.00 | 1.03 | 126.00 | 880.00 | 6.00 | 9.50 | 140.00 | 110.00 | 170.00 | 10.01 | 10.00 | 5.60 | 4.40 | 5.60 | 0.14 | 0.01 | 0.15 | 4.41 | 8.70 | 3.20 | 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. 2: Summary and Recommendations

## 5.1 Summary

The results of the second sampling event serve to provide the basis upon which to make system adjustments and modifications. The Sample Event No. 2 results indicate that:

- Septic tank effluent (STE) quality is characteristic of typical household STE quality.
- The Aerocell™ biofilter was effective in converting ammonium to oxidized nitrogen. The ammonium levels in the Nitrex™ effluent indicate possible ammonium production within the unit.
- The total nitrogen concentration in the final effluent from the total treatment system was approximately 5 mg/L.
- Final effluent TN was dominated by reduced nitrogen forms of organic and ammonium indicating incomplete nitrification.

## 5.2 Recommendations

The next sample event should provide continued insight to system performance following the operational adjustments that have been made to date.

# Appendix A: Laboratory Report

**SOUTHERN ANALYTICAL LABORATORIES, INC.**
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**Tampa, FL 33619**

**March 14, 2012**
**Work Order: 1200675**
**Revised Report**

## Laboratory Report

**Project Name** **Wakulla County B-HS1-SE#2**

| | |
|---|---|
| Sample Description | **B-HS1-STE** |
| Matrix | **Wastewater** |
| SAL Sample Number | **1200675-01** |
| Date/Time Collected | **01/25/12 12:00** |
| Collected by | **Client** |
| Date/Time Received | **01/26/12 09:00** |

| Parameters | Units | Results * | Method | PQL | MDL | Prepared | Analyzed | By |
|---|---|---|---|---|---|---|---|---|
| **Client Provided Field Data** | | | | | | | | |
| pH | | 6.93 | | | | | | |
| Temperature | | 19.8 °C | | | | | | |
| Conductivity | | 1159 uohms | | | | | | |
| **Inorganics** | | | | | | | | |
| Ammonia as N | mg/L | 67 | EPA 350.1 | 4.0 | 0.95 | 01/30/12 09:06 | 01/30/12 13:49 | MMF |
| Ammonium as NH4 | mg/L | 86 | EPA 350.1 | 0.01 | 0.005 | 02/02/12 11:01 | 02/02/12 11:11 | MMF |
| Carbonaceous BOD | mg/L | 30 | SM 5210B | 2 | 2 | 01/26/12 11:27 | 01/31/12 14:46 | MEJ |
| Chemical Oxygen Demand | mg/L | 380 | EPA 410.4 | 25 | 10 | 01/30/12 08:30 | 01/30/12 15:42 | LAS |
| Nitrate (as N) | mg/L | 0.06 | EPA 300.0 | 0.04 | 0.01 | | 01/26/12 17:55 | JAG |
| Nitrite (as N) | mg/L | 0.24 | EPA 300.0 | 0.04 | 0.01 | | 01/26/12 17:55 | JAG |
| Orthophosphate as P | mg/L | 2.6 | EPA 300.0 | 0.040 | 0.010 | | 01/26/12 17:55 | JAG |
| Phosphorous - Total as P | mg/L | 8.9 | SM 4500P-E | 0.20 | 0.050 | 01/26/12 11:20 | 01/27/12 12:52 | MMF |
| Total Alkalinity | mg/L | 540 | SM 2320B | 8.0 | 2.0 | | 01/31/12 16:29 | SCD |
| Total Kjeldahl Nitrogen | mg/L | 77 | EPA 351.2 | 0.20 | 0.05 | 01/30/12 08:44 | 01/31/12 14:27 | MMF |
| Total Suspended Solids | mg/L | 59 | SM 2540D | 1 | 1 | 01/26/12 14:06 | 01/27/12 14:39 | LAS |
| Total Volatile Solids | mg/L | 230 | SM 2540E** | 10 | 10 | 02/01/12 08:48 | 02/01/12 16:30 | LAS |
| Volatile Suspended Solids | mg/L | 44 | SM 2540E** | 1.0 | 1.0 | 02/22/12 13:36 | 02/24/12 08:37 | LAS |

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**Tampa, FL 33619**

**March 14, 2012**
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**Revised Report**

## Laboratory Report

**Project Name** **Wakulla County B-HS1-SE#2**

| | |
|---|---|
| Sample Description | **B-HS1-PUMP** |
| Matrix | **Wastewater** |
| SAL Sample Number | **1200675-02** |
| Date/Time Collected | **01/25/12 11:45** |
| Collected by | **Client** |
| Date/Time Received | **01/26/12 09:00** |

| Parameters | Units | Results * | Method | PQL | MDL | Prepared | Analyzed | By |
|---|---|---|---|---|---|---|---|---|
| **Client Provided Field Data** | | | | | | | | |
| pH | | 6.16 | | | | | | |
| Temperature | | 18.4 °C | | | | | | |
| Conductivity | | 906 uohms | | | | | | |
| **Inorganics** | | | | | | | | |
| Ammonia as N | mg/L | 5.0 | EPA 350.1 | 0.40 | 0.095 | 01/30/12 09:06 | 01/30/12 13:14 | MMF |
| Ammonium as NH4 | mg/L | 6.4 | EPA 350.1 | 0.01 | 0.005 | 02/02/12 11:01 | 02/02/12 11:11 | MMF |
| Carbonaceous BOD | mg/L | 3 | SM 5210B | 2 | 2 | 01/26/12 11:27 | 01/31/12 14:46 | MEJ |
| Chemical Oxygen Demand | mg/L | 34 | EPA 410.4 | 25 | 10 | 01/30/12 08:30 | 01/30/12 15:42 | LAS |
| Nitrate (as N) | mg/L | 47 | EPA 300.0 | 0.04 | 0.01 | | 01/26/12 12:53 | JAG |
| Nitrite (as N) | mg/L | 0.53 | EPA 300.0 | 0.04 | 0.01 | | 01/26/12 17:55 | JAG |
| Orthophosphate as P | mg/L | 1.3 | EPA 300.0 | 0.040 | 0.010 | | 01/26/12 17:55 | JAG |
| Phosphorous - Total as P | mg/L | 9.3 | SM 4500P-E | 0.20 | 0.050 | 01/26/12 11:20 | 01/27/12 12:53 | MMF |
| Total Alkalinity | mg/L | 110 | SM 2320B | 8.0 | 2.0 | | 01/31/12 16:29 | SCD |
| Total Kjeldahl Nitrogen | mg/L | 6.3 | EPA 351.2 | 0.20 | 0.05 | 01/30/12 08:44 | 01/31/12 15:12 | MMF |
| Total Suspended Solids | mg/L | 5 | SM 2540D | 1 | 1 | 01/26/12 14:06 | 01/27/12 14:39 | LAS |
| Total Volatile Solids | mg/L | 290 | SM 2540E** | 10 | 10 | 02/01/12 08:48 | 02/01/12 16:30 | LAS |
| Volatile Suspended Solids | mg/L | 3.0 | SM 2540E** | 1.0 | 1.0 | 02/22/12 13:36 | 02/24/12 08:37 | LAS |

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## Laboratory Report

**Project Name** **Wakulla County B-HS1-SE#2**

| | |
|---|---|
| Sample Description | **B-HS1-AEROCELL** |
| Matrix | **Wastewater** |
| SAL Sample Number | **1200675-03** |
| Date/Time Collected | **01/25/12 11:37** |
| Collected by | **Client** |
| Date/Time Received | **01/26/12 09:00** |

| Parameters | Units | Results * | Method | PQL | MDL | Prepared | Analyzed | By |
|---|---|---|---|---|---|---|---|---|
| **Client Provided Field Data** | | | | | | | | |
| pH | | 5.82 | | | | | | |
| Temperature | | 18.4 °C | | | | | | |
| Conductivity | | 900 uohms | | | | | | |
| **Inorganics** | | | | | | | | |
| Ammonia as N | mg/L | 0.083 | EPA 350.1 | 0.040 | 0.009 | 01/30/12 09:06 | 01/30/12 11:52 | MMF |
| Ammonium as NH4 | mg/L | 0.11 | EPA 350.1 | 0.01 | 0.005 | 02/02/12 11:01 | 02/02/12 11:11 | MMF |
| Carbonaceous BOD | mg/L | 2 U | SM 5210B | 2 | 2 | 01/26/12 11:27 | 01/31/12 14:46 | MEJ |
| Chemical Oxygen Demand | mg/L | 18 I | EPA 410.4 | 25 | 10 | 01/30/12 08:30 | 01/30/12 15:42 | LAS |
| Nitrate (as N) | mg/L | 52 | EPA 300.0 | 0.04 | 0.01 | | 01/26/12 12:53 | JAG |
| Nitrite (as N) | mg/L | 0.27 | EPA 300.0 | 0.04 | 0.01 | | 01/26/12 17:55 | JAG |
| Orthophosphate as P | mg/L | 0.66 | EPA 300.0 | 0.040 | 0.010 | | 01/26/12 17:55 | JAG |
| Phosphorous - Total as P | mg/L | 9.2 | SM 4500P-E | 0.20 | 0.050 | 01/26/12 11:20 | 01/27/12 12:54 | MMF |
| Total Alkalinity | mg/L | 86 | SM 2320B | 8.0 | 2.0 | | 01/31/12 16:29 | SCD |
| Total Kjeldahl Nitrogen | mg/L | 2.4 | EPA 351.2 | 0.20 | 0.05 | 01/30/12 08:41 | 01/31/12 11:13 | MMF |
| Total Suspended Solids | mg/L | 1 | SM 2540D | 1 | 1 | 01/26/12 14:06 | 01/27/12 14:39 | LAS |
| Total Volatile Solids | mg/L | 230 | SM 2540E** | 10 | 10 | 02/01/12 08:48 | 02/01/12 16:30 | LAS |
| Volatile Suspended Solids | mg/L | 1.5 | SM 2540E** | 1.0 | 1.0 | 02/22/12 13:36 | 02/24/12 08:37 | LAS |

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**March 14, 2012**
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**Revised Report**

## Laboratory Report

**Project Name** **Wakulla County B-HS1-SE#2**

| | |
|---|---|
| Sample Description | **B-HS1-NITREX** |
| Matrix | **Wastewater** |
| SAL Sample Number | **1200675-04** |
| Date/Time Collected | **01/25/12 11:25** |
| Collected by | **Client** |
| Date/Time Received | **01/26/12 09:00** |

| Parameters | Units | Results * | Method | PQL | MDL | Prepared | Analyzed | By |
|---|---|---|---|---|---|---|---|---|
| **Client Provided Field Data** | | | | | | | | |
| pH | | 6.33 | | | | | | |
| Temperature | | 16.9 °C | | | | | | |
| Conductivity | | 821 uohms | | | | | | |
| **Inorganics** | | | | | | | | |
| Ammonia as N | mg/L | 3.4 | EPA 350.1 | 0.40 | 0.095 | 01/30/12 09:06 | 01/30/12 13:16 | MMF |
| Ammonium as NH4 | mg/L | 4.3 | EPA 350.1 | 0.01 | 0.005 | 02/02/12 11:01 | 02/02/12 11:11 | MMF |
| Carbonaceous BOD | mg/L | 35 | SM 5210B | 2 | 2 | 01/26/12 11:27 | 01/31/12 14:46 | MEJ |
| Chemical Oxygen Demand | mg/L | 79 | EPA 410.4 | 25 | 10 | 01/30/12 08:30 | 01/30/12 15:42 | LAS |
| Nitrate (as N) | mg/L | 0.14 | EPA 300.0 | 0.04 | 0.01 | | 01/26/12 17:55 | JAG |
| Nitrite (as N) | mg/L | 0.01 U | EPA 300.0 | 0.04 | 0.01 | | 01/26/12 17:55 | JAG |
| Orthophosphate as P | mg/L | 1.6 | EPA 300.0 | 0.040 | 0.010 | | 01/26/12 17:55 | JAG |
| Phosphorous - Total as P | mg/L | 8.7 | SM 4500P-E | 0.20 | 0.050 | 01/26/12 11:20 | 01/27/12 12:55 | MMF |
| Total Alkalinity | mg/L | 360 | SM 2320B | 8.0 | 2.0 | | 01/31/12 16:29 | SCD |
| Total Kjeldahl Nitrogen | mg/L | 4.9 | EPA 351.2 | 0.20 | 0.05 | 01/30/12 08:41 | 01/31/12 11:14 | MMF |
| Total Suspended Solids | mg/L | 2 | SM 2540D | 1 | 1 | 01/26/12 14:06 | 01/27/12 14:39 | LAS |
| Total Volatile Solids | mg/L | 63 | SM 2540E** | 10 | 10 | 02/01/12 08:48 | 02/01/12 16:30 | LAS |
| Volatile Suspended Solids | mg/L | 9.5 | SM 2540E** | 1.0 | 1.0 | 02/22/12 13:36 | 02/24/12 08:37 | LAS |

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**Inorganics - Quality Control**

| Analyte | Result | PQL | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch BA22622 - Ion Chromatography 300.0 Prep** | | | | | | | | | | |
| **Blank (BA22622-BLK1)** | | | | | Prepared & Analyzed: 01/26/12 | | | | | |
| Nitrate (as N) | 0.01 U | 0.04 | 0.01 | mg/L | | | | | | |
| Nitrite (as N) | 0.01 U | 0.04 | 0.01 | mg/L | | | | | | |
| Orthophosphate as P | 0.010 U | 0.040 | 0.010 | mg/L | | | | | | |
| **LCS (BA22622-BS1)** | | | | | Prepared & Analyzed: 01/26/12 | | | | | |
| Nitrate (as N) | 1.53 | 0.04 | 0.01 | mg/L | 1.7 | | 90 | 85-115 | | |
| Orthophosphate as P | 0.904 | 0.040 | 0.010 | mg/L | 0.90 | | 100 | 85-115 | | |
| Nitrite (as N) | 1.31 | 0.04 | 0.01 | mg/L | 1.4 | | 94 | 85-115 | | |
| **LCS Dup (BA22622-BSD1)** | | | | | Prepared & Analyzed: 01/26/12 | | | | | |
| Orthophosphate as P | 0.819 | 0.040 | 0.010 | mg/L | 0.90 | | 91 | 85-115 | 10 | 200 |
| Nitrate (as N) | 1.55 | 0.04 | 0.01 | mg/L | 1.7 | | 91 | 85-115 | 1 | 200 |
| Nitrite (as N) | 1.34 | 0.04 | 0.01 | mg/L | 1.4 | | 96 | 85-115 | 2 | 200 |
| **Matrix Spike (BA22622-MS1)** | | **Source: 1200492-04** | | | Prepared & Analyzed: 01/26/12 | | | | | |
| Orthophosphate as P | 8.65 | 0.040 | 0.010 | mg/L | 9.0 | | 96 | 85-115 | | |
| Nitrite (as N) | 13.0 | 0.04 | 0.01 | mg/L | 14 | | 93 | 85-115 | | |
| Nitrate (as N) | 19.6 | 0.04 | 0.01 | mg/L | 17 | 3.86 | 93 | 85-115 | | |
| **Matrix Spike (BA22622-MS2)** | | **Source: 1200921-02** | | | Prepared & Analyzed: 01/26/12 | | | | | |
| Nitrate (as N) | 1,540 | 0.04 | 0.01 | mg/L | 1700 | ND | 91 | 85-115 | | |
| Orthophosphate as P | 856 | 0.040 | 0.010 | mg/L | 900 | ND | 95 | 85-115 | | |
| Nitrite (as N) | 1,260 | 0.04 | 0.01 | mg/L | 1400 | ND | 90 | 85-115 | | |
| **Batch BA22625 - Digestion for TP by EPA 365.2/SM4500PE** | | | | | | | | | | |
| **Blank (BA22625-BLK1)** | | | | | Prepared: 01/26/12 Analyzed: 01/27/12 | | | | | |
| Phosphorous - Total as P | 0.010 U | 0.040 | 0.010 | 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 BA22625 - Digestion for TP by EPA 365.2/SM4500PE** | | | | | | | | | | |
| **LCS (BA22625-BS1)** | | | | | Prepared: 01/26/12 Analyzed: 01/27/12 | | | | | |
| Phosphorous - Total as P | 0.797 | 0.040 | 0.010 | mg/L | 0.80 | | 100 | 90-110 | | |
| **Matrix Spike (BA22625-MS1)** | | **Source: 1200927-07** | | | Prepared: 01/26/12 Analyzed: 01/27/12 | | | | | |
| Phosphorous - Total as P | 0.917 | 0.040 | 0.010 | mg/L | 1.0 | 0.0795 | 84 | 75-125 | | |
| **Matrix Spike Dup (BA22625-MSD1)** | | **Source: 1200927-07** | | | Prepared: 01/26/12 Analyzed: 01/27/12 | | | | | |
| Phosphorous - Total as P | 0.876 | 0.040 | 0.010 | mg/L | 1.0 | 0.0795 | 80 | 75-125 | 5 | 25 |
| **Batch BA22630 - BOD** | | | | | | | | | | |
| **Blank (BA22630-BLK1)** | | | | | Prepared: 01/26/12 Analyzed: 01/31/12 | | | | | |
| Carbonaceous BOD | 2 U | 2 | 2 | mg/L | | | | | | |
| **Blank (BA22630-BLK2)** | | | | | Prepared: 01/26/12 Analyzed: 01/31/12 | | | | | |
| Carbonaceous BOD | 2 U | 2 | 2 | mg/L | | | | | | |
| **LCS (BA22630-BS1)** | | | | | Prepared: 01/26/12 Analyzed: 01/31/12 | | | | | |
| Carbonaceous BOD | 179 | 2 | 2 | mg/L | 200 | | 90 | 85-115 | | |
| **LCS (BA22630-BS2)** | | | | | Prepared: 01/26/12 Analyzed: 01/31/12 | | | | | |
| Carbonaceous BOD | 203 | 2 | 2 | mg/L | 200 | | 101 | 85-115 | | |
| **LCS Dup (BA22630-BSD1)** | | | | | Prepared: 01/26/12 Analyzed: 01/31/12 | | | | | |
| Carbonaceous BOD | 180 | 2 | 2 | mg/L | 200 | | 90 | 85-115 | 0.6 | 200 |
| **LCS Dup (BA22630-BSD2)** | | | | | Prepared: 01/26/12 Analyzed: 01/31/12 | | | | | |
| Carbonaceous BOD | 205 | 2 | 2 | mg/L | 200 | | 102 | 85-115 | 1 | 200 |

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**Inorganics - Quality Control**

| Analyte | Result | PQL | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch BA22630 - BOD** | | | | | | | | | | |
| **Duplicate (BA22630-DUP1)** | | **Source: 1200927-03** | | | Prepared: 01/26/12 Analyzed: 01/31/12 | | | | | |
| Carbonaceous BOD | 2 U | 2 | 2 | mg/L | | ND | | | | 25 |
| **Duplicate (BA22630-DUP2)** | | **Source: 1200773-01** | | | Prepared: 01/26/12 Analyzed: 01/31/12 | | | | | |
| Carbonaceous BOD | 100 | 2 | 2 | mg/L | | 110 | | | 6 | 25 |
| **Batch BA22644 - TSS prep** | | | | | | | | | | |
| **Blank (BA22644-BLK1)** | | | | | Prepared: 01/26/12 Analyzed: 01/27/12 | | | | | |
| Total Suspended Solids | 1 U | 1 | 1 | mg/L | | | | | | |
| **LCS (BA22644-BS1)** | | | | | Prepared: 01/26/12 Analyzed: 01/27/12 | | | | | |
| Total Suspended Solids | 49.0 | 1 | 1 | mg/L | 50 | | 98 | 85-115 | | |
| **Duplicate (BA22644-DUP1)** | | **Source: 1200675-03** | | | Prepared: 01/26/12 Analyzed: 01/27/12 | | | | | |
| Total Suspended Solids | 1.00 | 1 | 1 | mg/L | | 1.00 | | | 0 | 30 |
| **Duplicate (BA22644-DUP2)** | | **Source: 1200931-01** | | | Prepared: 01/26/12 Analyzed: 01/27/12 | | | | | |
| Total Suspended Solids | 233 | 1 | 1 | mg/L | | 220 | | | 6 | 30 |
| **Batch BA22706 - Ammonia by SEAL** | | | | | | | | | | |
| **Blank (BA22706-BLK1)** | | | | | Prepared & Analyzed: 01/30/12 | | | | | |
| Ammonia as N | 0.009 U | 0.040 | 0.009 | mg/L | | | | | | |
| **LCS (BA22706-BS1)** | | | | | Prepared & Analyzed: 01/30/12 | | | | | |
| Ammonia as N | 0.49 | 0.040 | 0.009 | mg/L | 0.50 | | 97 | 90-110 | | |

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**Inorganics - Quality Control**

| Analyte | Result | PQL | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch BA22706 - Ammonia by SEAL** | | | | | | | | | | |
| **Matrix Spike (BA22706-MS1)** | | **Source: 1200279-01** | | | Prepared & Analyzed: 01/30/12 | | | | | |
| Ammonia as N | 1.1 | 0.080 | 0.019 | mg/L | 0.50 | 0.59 | 105 | 90-110 | | |
| **Matrix Spike Dup (BA22706-MSD1)** | | **Source: 1200279-01** | | | Prepared & Analyzed: 01/30/12 | | | | | |
| Ammonia as N | 1.1 | 0.080 | 0.019 | mg/L | 0.50 | 0.59 | 93 | 90-110 | 6 | 10 |
| **Batch BA23003 - Digestion for TKN by EPA 351.2** | | | | | | | | | | |
| **Blank (BA23003-BLK1)** | | | | | Prepared: 01/30/12 Analyzed: 01/31/12 | | | | | |
| Total Kjeldahl Nitrogen | 0.05 U | 0.20 | 0.05 | mg/L | | | | | | |
| **LCS (BA23003-BS1)** | | | | | Prepared: 01/30/12 Analyzed: 01/31/12 | | | | | |
| Total Kjeldahl Nitrogen | 2.57 | 0.20 | 0.05 | mg/L | 2.5 | | 102 | 90-110 | | |
| **Duplicate (BA23003-DUP1)** | | **Source: 1200351-05** | | | Prepared: 01/30/12 Analyzed: 01/31/12 | | | | | |
| Total Kjeldahl Nitrogen | 29.1 | 0.20 | 0.05 | mg/L | | 29.9 | | | 3 | 20 |
| **Matrix Spike (BA23003-MS1)** | | **Source: 1200967-07** | | | Prepared: 01/30/12 Analyzed: 01/31/12 | | | | | |
| Total Kjeldahl Nitrogen | 3.41 | 0.20 | 0.05 | mg/L | 2.5 | 0.554 | 113 | 80-120 | | |
| **Matrix Spike Dup (BA23003-MSD1)** | | **Source: 1200967-07** | | | Prepared: 01/30/12 Analyzed: 01/31/12 | | | | | |
| Total Kjeldahl Nitrogen | 3.08 | 0.20 | 0.05 | mg/L | 2.5 | 0.554 | 100 | 80-120 | 10 | 20 |
| **Batch BA23004 - Digestion for TKN by EPA 351.2** | | | | | | | | | | |
| **Blank (BA23004-BLK1)** | | | | | Prepared: 01/30/12 Analyzed: 01/31/12 | | | | | |
| Total Kjeldahl Nitrogen | 0.05 U | 0.20 | 0.05 | mg/L | | | | | | |

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

**March 14, 2012**
**Work Order: 1200675**
**Revised Report**

**Inorganics - Quality Control**

| Analyte | Result | PQL | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch BA23004 - Digestion for TKN by EPA 351.2** | | | | | | | | | | |
| **LCS (BA23004-BS1)** | | | | | Prepared: 01/30/12 Analyzed: 01/31/12 | | | | | |
| Total Kjeldahl Nitrogen | 2.63 | 0.20 | 0.05 | mg/L | 2.5 | | 104 | 90-110 | | |
| **Matrix Spike (BA23004-MS1)** | | **Source: 1200707-01** | | | Prepared: 01/30/12 Analyzed: 01/31/12 | | | | | |
| Total Kjeldahl Nitrogen | 3.72 | 0.20 | 0.05 | mg/L | 2.5 | 0.767 | 117 | 80-120 | | |
| **Matrix Spike Dup (BA23004-MSD1)** | | **Source: 1200707-01** | | | Prepared: 01/30/12 Analyzed: 01/31/12 | | | | | |
| Total Kjeldahl Nitrogen | 3.46 | 0.20 | 0.05 | mg/L | 2.5 | 0.767 | 106 | 80-120 | 7 | 20 |
| **Batch BA23029 - Ion Chromatography 300.0 Prep** | | | | | | | | | | |
| **Blank (BA23029-BLK1)** | | | | | Prepared & Analyzed: 01/30/12 | | | | | |
| Nitrate (as N) | 0.01 U | 0.04 | 0.01 | mg/L | | | | | | |
| **LCS (BA23029-BS1)** | | | | | Prepared & Analyzed: 01/30/12 | | | | | |
| Nitrate (as N) | 1.58 | 0.04 | 0.01 | mg/L | 1.7 | | 93 | 85-115 | | |
| **LCS Dup (BA23029-BSD1)** | | | | | Prepared & Analyzed: 01/30/12 | | | | | |
| Nitrate (as N) | 1.55 | 0.04 | 0.01 | mg/L | 1.7 | | 91 | 85-115 | 2 | 200 |
| **Matrix Spike (BA23029-MS1)** | | **Source: 1200710-01** | | | Prepared & Analyzed: 01/30/12 | | | | | |
| Nitrate (as N) | 16.0 | 0.04 | 0.01 | mg/L | 17 | 0.493 | 91 | 85-115 | | |
| **Matrix Spike (BA23029-MS2)** | | **Source: 1200710-09** | | | Prepared & Analyzed: 01/30/12 | | | | | |
| Nitrate (as N) | 1.61 | 0.04 | 0.01 | mg/L | 1.7 | ND | 95 | 85-115 | | |
| **Batch BA23042 - COD prep** | | | | | | | | | | |
| **Blank (BA23042-BLK1)** | | | | | Prepared & Analyzed: 01/30/12 | | | | | |
| Chemical Oxygen Demand | 10 U | 25 | 10 | 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 BA23042 - COD prep** | | | | | | | | | | |
| **LCS (BA23042-BS1)** | | | | | Prepared & Analyzed: 01/30/12 | | | | | |
| Chemical Oxygen Demand | 48 | 25 | 10 | mg/L | 50 | | 96 | 90-110 | | |
| **Matrix Spike (BA23042-MS1)** | | **Source: 1200675-02** | | | Prepared & Analyzed: 01/30/12 | | | | | |
| Chemical Oxygen Demand | 86 | 25 | 10 | mg/L | 50 | 34 | 104 | 85-115 | | |
| **Matrix Spike Dup (BA23042-MSD1)** | | **Source: 1200675-02** | | | Prepared & Analyzed: 01/30/12 | | | | | |
| Chemical Oxygen Demand | 83 | 25 | 10 | mg/L | 50 | 34 | 98 | 85-115 | 4 | 32 |
| **Batch BA23129 - alkalinity** | | | | | | | | | | |
| **Blank (BA23129-BLK1)** | | | | | Prepared & Analyzed: 01/31/12 | | | | | |
| Total Alkalinity | 2.0 U | 8.0 | 2.0 | mg/L | | | | | | |
| **LCS (BA23129-BS1)** | | | | | Prepared & Analyzed: 01/31/12 | | | | | |
| Total Alkalinity | 130 | 8.0 | 2.0 | mg/L | 120 | | 108 | 90-110 | | |
| **Matrix Spike (BA23129-MS1)** | | **Source: 1200902-04** | | | Prepared & Analyzed: 01/31/12 | | | | | |
| Total Alkalinity | 280 | 8.0 | 2.0 | mg/L | 120 | 170 | 86 | 80-120 | | |
| **Matrix Spike Dup (BA23129-MSD1)** | | **Source: 1200902-04** | | | Prepared & Analyzed: 01/31/12 | | | | | |
| Total Alkalinity | 280 | 8.0 | 2.0 | mg/L | 120 | 170 | 86 | 80-120 | 0 | 26 |
| **Batch BB20104 - TVS Prep** | | | | | | | | | | |
| **Blank (BB20104-BLK1)** | | | | | Prepared & Analyzed: 02/01/12 | | | | | |
| Total Volatile Solids | 0.00 | | | mg/L | | | | | | |

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**Tampa, FL 33619**

**March 14, 2012**
**Work Order: 1200675**
**Revised Report**

**Inorganics - Quality Control**

| Analyte | Result | PQL | MDL | Units | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch BB20104 - TVS Prep** | | | | | | | | | | |
| **Duplicate (BB20104-DUP1)** | | **Source: 1200675-04** | | | Prepared & Analyzed: 02/01/12 | | | | | |
| Total Volatile Solids | 63.3 | | | mg/L | | 63.3 | | | 0.08 | 20 |
| **Batch BB22222 - TVS Prep** | | | | | | | | | | |
| **Blank (BB22222-BLK1)** | | | | | Prepared: 02/22/12 Analyzed: 02/24/12 | | | | | |
| Volatile Suspended Solids | 1.0 U | 1.0 | | mg/L | | | | | | |
| **Duplicate (BB22222-DUP1)** | | **Source: 1200675-02** | | | Prepared: 02/22/12 Analyzed: 02/24/12 | | | | | |
| Volatile Suspended Solids | 3.00 | 1.0 | | mg/L | | 3.00 | | | 0 | 20 |

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

**March 14, 2012**
**Work Order: 1200675**
**Revised Report**

## * 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. 1200675

| Client Name | Contact / Phone: |
|---|---|
| Hazan and Sawyer | Josephin Edeback-Hirst 813-630-4498 |
| **Project Name / Location** | jedeback@hazanandsawyer.com |
| Wakulla County-B-HS1 SE#2 | |

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 Alkalinity, $NO_2$, $NO_3$, TSS, VSS, CBOD, OP | 250mL P, $H_2SO_4$ TKN, $NH_4$, COD, TP | | | | Field Temp | Field Cond | Field pH | No. of Containers (Total per each location) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 | B-HS1-STE | 1/25/12 | 12:00 | WW | | X | 1 | 1 | | | | 19.8 | 1159 | 6.93 | 6 |
| 02 | B-HS1-PUMP | 1/25/12 | 11:45 | WW | | X | 1 | 1 | | | | 18.4 | 906 | 6.16 | 6 |
| 03 | B-HS1-AEROCELL | 1/25/12 | 11:37 | WW | | X | 1 | 1 | | | | 18.4 | 900 | 5.82 | 6 |
| 04 | B-HS1-NITREX | 1/25/12 | 11:25 | WW | | X | 1 | 1 | | | | 16.9 | 821 | 6.33 | 6 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |

| Containers Prepared/ Relinquished: | Date/Time: | Received: | Date/Time: |
|---|---|---|---|
| RB | 1005 1/19/12 | | |
| Relinquished: | Date/Time: 13:00 1/25/12 | Received: fedex | Date/Time: |
| Relinquished: fedex | Date/Time: | Received: | Date/Time: 1-26-12 900 |
| 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 1.9 (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**

**1200675**



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 #:** **20856**
Report Date: January 31, 2012
NELAC#: E81350
FDEPQA#: 920087G
Project#: 211296
Sampled By: Harmon Harden
Sample Site: [redacted] Drive Septic System
Sample Date: 01-25-12

Table 1. Samples received 01-25-12.

| Units: | Fecal Coliform # colonies/100 mL | Dilution Factor | *E. coli* # colonies/100 mL | Dilution Factor |
|---|---|---|---|---|
| Methodology: | SM 9222D | | EPA 1603 | |
| Detection Limit: | 2.0 | | 2.0 | |
| Analysis Date: | 01-25-12 | | 01-25-12 | |
| Analysis Time: | 13:45 | | 13:45 | |
| Analyst: | AL | | AL | |
| Sample Location/Time: | | | | |
| Lab Number: | | | | |
| Nitrex Tank, 11:25 #107739 | 10 | 2 | 6 | 2 |
| Aerocell Tank, 11:37 #107740 | **90** | 10 | **80** | 10 |
| Pump Tank, 11:45 #107741 | 27,000 | 1000 | 25,000 | 1000 |
| STE Tank, 12:00 #107742 | **800,000** | 100,000 | **740,000** | 10,000 |

Data Qualifiers that may apply:
B = Colony count exceeded the ideal of 20-60 (fecal coliform) or 20-80 (*E. coli*) colonies per plate.

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

1-31-12

**Todd J. Acker, Laboratory Director**

# Ackuritlabs, Inc.

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

№ 20856

## CHAIN OF CUSTODY RECORD

Page 1 of 1

CLIENT NAME & ADDRESS: Hazen & Sawyer

LAB PROJECT #: 211296

PROJECT NAME: [redacted] Septic System

CONTACT PERSON: Harmen

| SAMPLE CONTAINERS | PRESERVATIVE | | | | | | | | | PLASTIC CONTAINERS | | | | | | | | GLASS CONTAINERS | | | | | | | TRIP BLANK | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 | | | | |
| 4 | | | | | | | X | | | X | | | | | | | | | | | | | | | | |

PRECLEANED CONTAINERS RELINQUISHED BY: Mark Busby — DATE: — TIME: — RECEIVED BY: Mark Busby — DATE: — TIME:

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

**SAMPLE COLLECTION** 2012

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 (E.coli) | LAB ID# |
|---|---|---|---|---|---|---|---|---|
| #1 | 1-25-12 | 1125 | Nitrex Tank | WW | G | 1 | X | 107739 |
| #2 | ↓ | 1137 | Aerocell Tank | ↓ | ↓ | ↓ | ↓ | 107740 |
| 3 | | 1145 | Pump Tank | | | | | 107741 |
| 4 | | 1200 | STE Tank | | | | | 107742 |

COMMENTS:

SAMPLES RECEIVED: ICED (Y) N — TEMP: 14.8 °C — HOLD TIME (Y) N — PROPER PRESERVATION (Y) N

RELINQUISHED BY(SIGNATURE) / AFFILIATION / DATE & TIME: MARK Busby / ACK / 1-25-12 1250

RECEIVED BY(SIGNATURE) / AFFILIATION / DATE & TIME: 1-25-12 1250

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

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

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

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



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

# 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.<br>Some of the recirculation tubes seemed to be too low.<br>Recirculation rate higher than intended.<br>The wiring was not done correctly at install. Contractor rewired panel.<br>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.<br>Contractor raised override float up, because of the float error.<br>Contractor read water meter and adjusted flow splitter again.<br>Contractor also checked the pump rate which is reading low.<br>Pump flow rate measured at 12.5 gallons per minute. |
| 8/18/11 | Vericomm system panel installed to replace existing control panel.<br>Drainfield observation ports installed. |
| 9/13/11 | FDOH collected samples.<br>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.<br>A tee was placed in the outlet pipe, so that a sample is taken directly from the effluent pipe.<br>The pump vault was causing the floats to get stuck.<br>Contractor removed pump vault within the second chamber of the primary tank. |
| 10/26/11 | Monitoring sample event No.1.<br>Leaks apparent on Aerocell split recirculation device.<br>Water level within the split recirc device approximately 1-inch below return tubes.<br>Sand was noted in the return pipe leading into the pump chamber. |
| 11/30/11 | Contractor checked system. |
| 12/9/11 | Replacement of splitter recirculation device by vendor. |
| 12/23/11 | Vendor checked system. |
| 1/25/12 | Monitoring sample event No.2.<br>Observed within 1 of 4 drainfield observation ports 0.25 inch of ponded water |
| 1/30/12 | Recorded flows to verify recycle ratio.<br>Observed within 1 of 4 drainfield observation ports 0.25 inch of ponded water |

# Appendix C: Vericomm PLC Data

| System Status | | | 25-Jan-12 | 5-Jan-12 | 8-Dec-11 | 5-Nov-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 | Normal | Normal | Off | Off |
| 6 | Active Off Time | Automatic | 15.0 Minutes | 15.0 Minutes | 15.0 Minutes | 14.0 Minutes |
| 7 | Active On Time | Automatic | 2.0 Minutes | 2.0 Minutes | 2.0 Minutes | 1.5 Minutes |
| 9 | Pump Mode | Automatic | OffCycl | OffCycl | Off | Off |
| 10 | Pump Status | Automatic | Off | Off | Off | Off |
| 12 | Pump Cycles Today | Automatic | 32.0 Cycles | 8.0 Cycles | 17.0 Cycles | 0.0 Cycles |
| 13 | Override Cycles Today | Automatic | 0.0 Cycles | 0.0 Cycles | 0.0 Cycles | 0.0 Cycles |
| 14 | Pump Run Time Today | Automatic | 64.5 Minutes | 16.2 Minutes | 34.3 Minutes | 0.0 Minutes |
| Settings | | | | | | |
| Point | Description | Status | Value | Value | Value | Value |
| 17 | Off Cycle Time | Constant/Setpoint | 15.0 Minutes | 15.0 Minutes | 15.0 Minutes | 14.0 Minutes |
| 18 | On Cycle Time | Constant/Setpoint | 2.0 Minutes | 2.0 Minutes | 2.0 Minutes | 1.5 Minutes |
| 19 | Override Off Cycle Time | Constant/Setpoint | 7.0 Minutes | 7.0 Minutes | 7.0 Minutes | 7.0 Minutes |
| 20 | Override On Cycle Time | Constant/Setpoint | 1.7 Minutes | 1.7 Minutes | 1.7 Minutes | 1.7 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 | 120.0 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 | 1140.0 Minutes |
| 32 | Local Reactivate Delay | Automatic | 120.0 Minutes | 120.0 Minutes | 120.0 Minutes | 120.0 Minutes |
| Troubleshooting | | | | | | |
| Point | Description | Status | Value | Value | Value | Value |
| 33 | Top Float Status | Automatic | OK | OK | OK | OK |
| 34 | Middle Float Status | Automatic | OK | OK | OK | OK |
| 35 | Bottom Float Status | Automatic | OK | OK | OK | OK |
| 37 | Contactor Status | Automatic | OK | OK | OK | OK |
| 38 | Pump Status | Automatic | OK | OK | OK | OK |
| 40 | Filter Status | Automatic | OK | OK | OK | OK |
| 41 | Tank Status | Automatic | OK | OK | OK | OK |
| 43 | Power Status | Automatic | OK | OK | OK | OK |
| Flow Data | | | | | | |
| Point | Description | Status | Value | Value | Value | Value |
| 49 | Pump Run Time Today | Automatic | 64.5 Minutes | 16.2 Minutes | 34.3 Minutes | 0.0 Minutes |
| 50 | Override Cycles Today | Automatic | 0.0 | 0.0 | 0.0 | 0.0 |
| 51 | Pump Cycles Today | Automatic | 32.0 Cycles | 8.0 Cycles | 17.0 Cycles | 0.0 Cycles |
| 52 | Average Run Time per Cycle Today | Automatic | 2.0 Minutes | 2.0 Minutes | 2.0 Minutes | 0.0 Minutes |
| 54 | Brownouts Today | Automatic | 0.0 | 0.0 | 0.0 | 0.0 |

| System Status | | | 25-Jan-12 | 5-Jan-12 | 8-Dec-11 | 5-Nov-11 |
|---|---|---|---|---|---|---|
| 30-Day History Data | | | | | | |
| Point | Description | Status | Value | Value | Value | Value |
| 65 | 30 Day Average Run Time per Day | Automatic | 103.2 Minutes | 109.1 Minutes | 31.7 Minutes | 45.8 Minutes |
| 66 | 30 Day Average Override Cycles per Day | Automatic | 0.0 Cycles | 0.0 Cycles | 0.0 Cycles | 3.1 Cycles |
| 67 | 30 Day Average Cycles per Day | Automatic | 51.2 Cycles | 54.1 Cycles | 17.6 Cycles | 29.9 Cycles |
| 68 | 30 Day Average Run Time per Cycle | Automatic | 2.0 Minutes | 2.0 Minutes | 1.8 Minutes | 1.5 Minutes |
| 71 | 30 Day Total Pump Run Time | Automatic | 3096.9 Minutes | 3271.5 Minutes | 950.0 Minutes | 1374.7 Minutes |
| 72 | 30 Day Total Override Cycles | Automatic | 0.0 Cycles | 0.0 Cycles | 0.0 Cycles | 93.0 Cycles |
| 73 | 30 Day Total Cycles | Automatic | 1536.0 Cycles | 1622.0 Cycles | 528.0 Cycles | 898.0 Cycles |
| 76 | 30 Day Total Brownouts | Automatic | 0.0 | 0.0 | 0.0 | 1.0 |
| Totalized Pump Data | | | | | | |
| Point | Description | Status | Value | Value | Value | Value |
| 82 | Pump Total Run Time | Automatic | 189.5 Hours | 154.1 Hours | 102.9 Hours | 85.8 Hours |
| 83 | Pump Total Cycles | Automatic | 6526.0 Cycles | 5472.0 Cycles | 3949.0 Cycles | 3376.0 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 | On | On | Off | Off |
| 152 | Brownout State | Automatic | Off | Off | Off | Off |
| 153 | Test Mode | Automatic | Off | Off | Off | Off |
| Alarm Points | | | | | | |
| Point | Description | Status | Value | Value | Value | Value |
| 161 | General Alarm | Automatic | Off | Off | Off | Off |
| 162 | New Alarm | Automatic | Off | Off | Off | Off |
| 163 | Update Central Enable | Automatic | On | On | On | On |
| 167 | Page Alarm Start | Automatic | Off | Off | Off | Off |
| 168 | Pager Signal | Override Off | Off | Off | Off | Off |
| 169 | Local Alarm Start | Automatic | Off | Off | Off | Off |
| 170 | Local Alarm Silence | Automatic | Off | Off | Off | Off |
| Inputs & Outputs | | | | | | |
| Point | Description | Status | Value | Value | Value | Value |
| 177 | High Level/Override Timer Float Input | Automatic | Off | Off | Off | Off |
| 178 | Timer Float Input | Automatic | On | On | Off | Off |
| 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 |