



# Florida Onsite Sewage Nitrogen Reduction Strategies Study

Task A.25

**PNRS II Test Facility Sample Event Report No. 6**

**Progress Report**

May 2011

44237-001

**HAZEN AND SAWYER**  
Environmental Engineers & Scientists

In association with



**AET**  
Applied Environmental Technology

**OTIS  
ENVIRONMENTAL  
CONSULTANTS, LLC**

# **Florida Onsite Sewage Nitrogen Reduction Strategies Study**

## **TASK A.25 PROGRESS REPORT**

### **PNRS II Test Facility Sample Event Report No. 6**

#### **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

**May 2011**

#### **Prepared by:**

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### **1.0 Background**

Task A of the Florida Onsite Sewage Nitrogen Reduction Strategies Study includes the evaluation of passive treatment systems to remove nitrogen from septic tank effluent. The Passive Nitrogen Removal Study II (PNRS II) is a follow-up to the previous experimental evaluations of passive nitrogen removal technologies conducted in Passive Nitrogen Removal Study I. The objective of the PNRS II study is to extend the field pilot testing of the two-stage biofiltration process that was initiated in PNRS I. A unique test facility was constructed for the purpose of this evaluation. The Task A.15 PNRS II Quality Assurance Project Plan (QAPP) documents the objectives, experimental biofiltration systems, monitoring framework, sample frequency and duration, and analytical methods to be used at the PNRS II Test Facility.

### **2.0 Purpose**

This sample event report documents data collected from the sixth PNRS II monitoring and sampling event which was conducted May 19, 2011. This monitoring event consisted of an assessment and evaluation of PNRS II operation, measurement of flowrates for all systems and flowrate adjustment if warranted, measurement of field parameters, and collection of biofilter influent and effluent samples and their analyses in a NELAC certified laboratory.

### **3.0 Materials and Methods**

#### **3.1 Project Site**

The PNRS II Test Facility is located at the University of Florida Gulf Coast Research and Education Center (GCREC) in southeast Hillsborough County, Florida. The specially designed facility enables the simultaneous operation and performance testing of numerous biofilter treatment trains in parallel using the same wastewater source. The source of the influent wastewater is the septic tank effluent from the existing onsite wastewater system serving the GCREC. Details of the design and construction of the PNRS II test facility were presented previously in Task A.17, A.18, A.19, and A.24 documents.

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### **3.2 Modifications of PNRS II Systems Monitoring and Sampling Locations and Identification**

The results of Sample Event No. 1 through 5 and careful observation of PNRS II systems were used to formulate recommendations for modifications to the test systems at the GCREC pilot facility. The modifications that were made following Sample Event No. 5 are presented in this section. All recommendations were based on the overall goal of PNRS II: to provide functional specifications for modular biofiltration components for passive onsite nitrogen reducing wastewater treatment systems.

#### **3.2.1 Polystyrene Biofilter (UNSAT-PS1)**

In Sample Event 5, the unsaturated recirculating biofilter with polystyrene media (UNSAT-PS1) continued to exhibit poor nitrogen performance as compared to the other stage one media. Performance of the polystyrene media improved after switching to recirculation, and improved further after increasing the recycle rate to 6:1. Although further improvements in performance could result using even higher recycle rates, the energy and control requirements from the system would then not satisfy the “passive” objectives of the project. Therefore, the polystyrene system was replaced with an additional single pass clinoptilolite Stage 1 biofilter. The new clinoptilolite biofilter (UNSAT-CL5) was brought online April 14, 2011. UNSAT-CL5 is a duplicate of UNSAT-CL3, and contains 10 inches of clinoptilolite 8x14 (1.4 - 2.38 mm) underlain by 20 inches of clinoptilolite 16x50 (0.3 -1.2 mm). The directly connected Stage 2 biofilter (DENIT-LS4) was not modified.

### **3.3 Monitoring and Sampling Locations and Identification**

A schematic of the PNRS II test facility is shown in Figure 1. Septic tank effluent (STE) from GCREC is pumped from PNRS II-STE-T1 into the PNRS II systems through five points of entry: Hydro-1, Hydro-2, UNSAT-IS-1, UNSAT-IS2 and UNSAT-IS3. PNRS II biofilters are grouped into the four types of systems shown in Figure 1, Group I, II, III and IV systems. The nomenclature and reactor/sample identification used for the PNRS II test facility sampling events are listed in Table 1. The sample designations listed in Table 1 also largely correspond to the locations at which flow volumes are measured in each sample event.



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PNRS II TEST FACILITY SAMPLE EVENT REPORT NO. 6

**Table 1**  
**PNRS II Sample Identification**

<b>Group (Figure 1)</b>	<b>Sample Location</b>	<b>Sample Identification</b>
	STE PNRS II Storage Tank 1	PNRS II-STE-T1
I	Stage 1 Single Pass Biofilters	UNSAT-EC1
		UNSAT-EC3
		UNSAT-CL1
		UNSAT-CL3
		UNSAT-CL5
	Stage 2 Single Pass Upflow Biofilters	DENIT-SU4
		DENIT-LS3
		DENIT-SU3
		DENIT-LS2
		DENIT-LS4
II	Recirculation Tanks	RC1
		RC2
		RC3
		RC4
	Stage 1 Recirculating Biofilters	UNSAT-SA2
		UNSAT-EC4
		UNSAT-CL2
		UNSAT-CL4
III	Denite Feed Collection Tank	DFT
	Stage 2 Horizontal Biofilters	UNSAT-SU1
		UNSAT-SU2
		UNSAT-LS1
		UNSAT-GL1
IV	In-Situ In-Tank Simulator Single Pass Biofilter	UNSAT-IS1
		UNSAT-IS2
		UNSAT-IS3
		UNSAT-IS4
	In-Situ In-Tank Simulator Single Pass Biofilter Sample Port (below EC & LS mixture and above SU layer)	UNSAT-IS1-SP
		UNSAT-IS2-SP
		UNSAT-IS3-SP
		UNSAT-IS4-SP

### 3.3 Operational Monitoring

Start-up of the PNRS II test facility occurred on May 17<sup>th</sup>, 2010 and all systems have operated continually since that time. The entire facility operation is checked at least once per week and a detailed log of operational observations and activities is maintained. In addition, the programmable logic controller (PLC) which controls many of the dosing and pump controls also records pump run times and flow data from flow meters at the facility, and these data can provide useful insight into facility operations. Appendix A provides

summary tables of the PLC recorded data of daily runtimes and flows for the test facility between March 17<sup>th</sup> and May 18<sup>th</sup> (Day 304 through Day 366 since start-up) used to check general pump operation and performance.

### 3.4 Water Quality Sample Collection and Analyses

Influent and effluent water quality samples from the PNRS II test systems for Sample Event 6 were collected May 19, 2011. A sample of STE was collected from the feed line connecting STE Storage Tank 1 (PNRS II-STE-T1) to Hydrosplitter 1 which supplies STE to the single pass Stage 1 biofilters (Figure 1). A manual dose event was initiated on the control panel until sufficient STE sample volume was collected in a clean sample container. Stage 1, 2, and in-situ simulator biofilter and recirculation tank effluents were each sampled by directing the entire flow from the biofilter into a large, clean sample container over a period of time sufficient to obtain the desired sample volume (approximately 3.5 liters). Sample containers were immediately placed in coolers on ice prior to subdivision of the composited sample.

The composite samples in the 3.5 liter sample containers were then subdivided into analysis-specific sample containers. 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 D, were used to document the transfer of samples from field personnel to the analytical laboratory. One chain of custody form was filled out for each set of samples and placed inside the cooler.

Equipment blank, field blank, and field sample duplicates were taken. The equipment blank was collected using a previously cleaned STE sample collection bottle. The bottle was filled with distilled water provided by the laboratory and allowed to sit for eight minutes. The sample containers were then analyzed for the same parameters as the samples. The field blank was collected by filling sample containers with distilled water that had been transported from the laboratory into the field along with other sample containers. The field sample duplicates were collected immediately subsequent to the regular samples from the same composite sample. The duplicate sample containers for this event were filled with PNRS II T1-STE effluent, DENIT-LS3, DENIT-SU3 effluent, and DENIT-LS2 effluent. Additionally, laboratory split samples were collected immediately subsequent to the regular samples from the same composite samples. The laboratory split sample containers for this event were filled with PNRS II T1-STE effluent and DFT effluent.

Field parameters were measured using portable electronic probes and included temperature (Temp), dissolved oxygen (DO), oxidation-reduction potential (ORP), pH, and specific conductance. Temperature (Temp), dissolved oxygen (DO), and oxidation-reduction potential (ORP) were measured with probe tips placed in flow through samplers located directly in the outlet pipe at each sample location. Specific conductance and pH were measured using external sample collection reservoirs. Field parameter results are listed in Appendix B. The influent and effluent samples were analyzed by the laboratory for: total alkalinity, total Kjeldahl nitrogen (TKN-N), ammonia nitrogen (NH<sub>3</sub>-N), nitrate nitrogen, (NO<sub>3</sub>-N), nitrite nitrogen (NO<sub>2</sub>-N), carbonaceous biochemical oxygen demand (CBOD<sub>5</sub>), total suspended solids (TSS), and fecal coliform (fecal). For some of the denitrification biofilters containing elemental sulfur media, influent and effluent sample analyses were also conducted for sulfate (SO<sub>4</sub>) and hydrogen sulfide (H<sub>2</sub>S). Table 2 lists the analytical parameters, analytical methods, and detection limits for these analyses.

**Table 2**  
**Analytical Parameters, Method of Analysis, and Detection Limits**

<b>Analytical Parameter</b>	<b>Method of Analysis</b>	<b>Laboratory Detection Limit (mg/L)</b>
Total Alkalinity as CaCO <sub>3</sub>	SM 2320B	2 mg/L
Total Kjeldahl Nitrogen (TKN-N)	EPA351.2	0.05 mg/L
Ammonia Nitrogen (NH <sub>3</sub> -N)	EPA350.1	0.01 mg/L
Nitrite (NO <sub>2</sub> -N)	EPA300.0	0.01 mg/L
Nitrate (NO <sub>3</sub> -N)	EPA300.0	0.01 mg/L
Carbonaceous BOD (CBOD <sub>5</sub> )	SM 5210B	2 mg/L
Total Dissolved Solids (TDS)	SM 2540C	10 mg/L
Total Suspended Solids (TSS)	SM 2540D	1 mg/L
Chemical Oxygen Demand (COD)	EPA 410.4	10 mg/L
Orthophosphate as P	EPA 300.0	0.01 mg/L
Total Phosphorus (TP)	SM 4500PE	0.01 mg/L
Fecal Coliform (fecal)	SM9222D	1 ct/100mL
Sulfate (SO <sub>4</sub> )	EPA300.0	0.2 mg/L
Hydrogen Sulfide Unionized (H <sub>2</sub> S)	SM4500S F	0.01 mg/L
Sulfide	SM4500S F	0.1 mg/L

### 3.5 Flow Monitoring

Flow rates for all PNRS II systems were calibrated at initial start-up. The flow rates are measured at each sampling event and adjusted as necessary to maintain flow rates consistent with the experimental design. Flow measurements and adjustments are made after collection of liquid samples and field parameter analyses.



A flow test was conducted May 19, 2011. These flow measurements are considered to represent those in effect leading up to and during Sample Event 6. The measured volumes and relative errors between measured and target flow rates are presented in Appendix C, Table 1. For the Group I systems, the measured STE inputs to the five Stage 1 biofilters were within 6% of the target volume. Measured effluent volumes for Stage 1 single pass biofilters (Stage 2 influent) for the five biofilters were within 9% of the target volume (Table C.1).

For the Group II systems, all measured STE volumes to the Stage 1 recirculation tanks were within 11% of target volumes. The four recycle flow volumes as recorded by the PLC were within 3% of target volumes based on the experimental design recycle ratio of 3.0. The calculated recycle ratios (i.e. recycle flow volume divided by the STE flow volume) for the four recirculation systems were within 10% of the target recycle ratio of 3.0.

For Group III systems, the measured influent volumes to the Stage 2 horizontal denitrification biofilters were all within 3% of target.

For Group IV biofilters, the measured influent volumes were all within 10% of the target. UNSAT-IS1 measured influent volume was within 4% of the target volume. The UNSAT-IS2 measured influent volume was within 1% of the target volume. The UNSAT-IS3 and UNSAT-IS4 measured influent volumes were within 9% of target volumes.

After evaluating the influent flow test results, no maintenance items were required.

## Appendix A: PLC Data

**Table A.1**  
**Summary of PLC Recorded Daily Flows**  
**(3/17/11 – 5/18/11)**

Date Range		Average Recorded Flow (gpd)	Std. Dev.	MIN (gpd)	MAX (gpd)	Target Flow (gpd)	Relative Error <sup>1</sup> (%)
3/17/11-5/18/11	Pump 4 to Hydro 1	72	5.65	48	87	73.7	-2.9%
	Pump 14 to Hydro 2	58	3.21	44	73	58.9	-1.8%
	Pump 6 to Recirc. System 1	43	2.26	35	58	44.2	-1.6%
	Pump 7 to Recirc. System 2	45	2.51	35	61	44.2	1.4%
	Pump 8 to Recirc. System 3	43	2.24	35	58	44.2	-1.9%
	Pump 9 to Recirc. System 4	39	12.7	0	59	44.2	-10.9%

<sup>1</sup>Relative Error = (Recorded Flow – Target Flow)/ Target Flow \*100

**Table A.2**  
**Summary of PLC Recorded Daily Runtimes**  
**(3/17/11 – 5/18/11)**

Date Range		Average Recorded Daily Runtime (min/day)	Std. Dev.	MIN (min)	MAX (min)	Target Daily Runtime (min)	Relative Error <sup>1</sup> (%)
3/17/11-5/18/11	Pump 4 to Hydro 1	17.9	1.1	16.0	25.0	17.2	3.8%
	Pump 14 to Hydro 2	11.7	0.7	10.0	14.0	11.6	0.8%
	Pump 6 to Recirc. System 1	6.4	0.6	6.0	9.0	6.0	6.8%
	Pump 7 to Recirc. System 2	6.4	0.6	5.0	9.0	6.0	6.8%
	Pump 8 to Recirc. System 3	6.4	0.6	6.0	9.0	6.0	6.8%
	Pump 9 to Recirc. System 4	6.4	0.6	6.0	9.0	6.0	7.1%

<sup>1</sup>Relative Error = (Recorded Runtime – Target Runtime)/ Target Runtime \*100

<sup>2</sup>Pump 4 Runtime was increased to increase UNSAT-PS1 STE influent volume to target level

## Appendix B: Field Parameter Analyses

**Table B.1**  
**Field Parameter Results**  
**(May 19, 2011)**

Sample Identification	pH	Temperature (°C)	Specific Conductance (µS)	Dissolved Oxygen (mg/L)	ORP (mV)
<b>STE</b>					
STE-Tank 1	7.6	25.1	960	2.0	-243.5
STE-Tank 1-D	7.6	25.1	960	2.0	-243.5
<b>Stage 1 Single Pass Biofilter Effluent</b>					
UNSAT-EC1	7.2	23.5	900	6.3	50.3
UNSAT-EC3	7.1	23.5	940	5.7	42.7
UNSAT-CL1	7.4	23.5	980	6.9	35.2
UNSAT-CL3	7.5	22.9	1,120	7.6	32.3
UNSAT-CL5	7.9	23.5	1,130	6.9	18.4
<b>Stage 2 Single Pass Upflow Biofilter Effluent</b>					
DENIT-SU4	7.4	21.1	1,220	0.1	-239.9
DENIT-LS3	7.7	21.1	940	4.2	-72.5
DENIT-LS3-D	7.7	21.1	940	4.2	-72.5
DENIT-SU3	7.4	20.8	1,380	0.1	-252.5
DENIT-SU3-D	7.4	20.8	1,380	0.1	-252.5
DENIT-LS2	7.9	20.2	1,100	3.0	-54.9
DENIT-LS2-D	7.9	20.2	1,100	3.0	-54.9
DENIT-LS4	8.1	19.9	1,080	0.6	-106.5
<b>Recirculation Tank Effluent</b>					
RC1	7.5	23.4	750	0.1	26.4
RC2	7.5	21.2	770	0.7	-7.0
RC3	7.4	21.9	780	0.1	3.0
RC4	7.5	21.7	800	0.1	-4.6
<b>Stage 1 Recirculating Biofilter Effluent</b>					
UNSAT-CL4	7.4	22.2	750	7.6	7.8
UNSAT-CL2	7.3	22.8	740	6.8	22.2
UNSAT-EC4	7.3	22.7	710	7.9	30.6
UNSAT-SA2	7.1	27.4	760	4.5	27.4

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Sample Identification	pH	Temperature (°C)	Specific Conductance (µS)	Dissolved Oxygen (mg/L)	ORP (mV)
<b>Denite Feed Tank (Tank 3)</b>					
DFT	7.5	21.2	770	7.5	35.1
DFT-D	7.5	21.2	770	7.5	35.1
<b>Stage 2 Horizontal Biofilters Effluent</b>					
DENIT-SU1	7.2	16.9	1,000	0.1	-323.1
DENIT-SU2	7.1	16.7	1,010	0.1	-309.9
DENIT-LS1	7.3	16.1	700	0.1	-301.8
DENIT-GL1	6.8	16.4	850	0.1	-267.3
<b>In-situ Simulator Biofilter Effluent</b>					
UNSAT-IS1 (STE)	7.3	24.1	810	2.4	-51.7
UNSAT-IS2 (STE)	7.3	24.4	850	4.7	-23.1
UNSAT-IS3-SP (STE)	7.1	18.2	1,000	NR <sup>1</sup>	-100.3
UNSAT-IS3 (STE)	7.4	12.0	1,395	NR <sup>1</sup>	97.5
UNSAT-IS4-SP (Nitrified STE)	7.0	17.5	1,140	NR <sup>1</sup>	-150.1
UNSAT-IS4 (Nitrified STE)	7.1	14.3	1,379	NR <sup>1</sup>	76.1
<b>Blanks</b>					
Field Blank	7.0	19.9	5	7.4	-40.6
Equipment Blank	7.5	19.4	5	8.2	-14.4

<sup>1</sup>NR = No reading was taken.



## **Appendix C: Flow Test Results**

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**Table C.1  
Flow Test Results**

Group (Figure 1)	Biofilter/Flow	Target Input			Measured Input		Recycle Ratio		
		Target Input Volume	Dose/day	Target Input Volume	Measured Input Volume	Relative Error (%)	Target Recycle Ratio (RR)	Calculated Recycle Ratio (RR)	Relative Error (%)
		(mL/day)	(Dose/day)	(mL/dose)	(mL/dose)	(Measured Input - Target Input) / Target Input * 100	Volume Recycle / Volume STE	Volume Recycle / Volume STE	Measured RR - Target RR / Measured RR * 100
1	Stage 1 Single Pass Biofilters (Hydrosplitter 1)								
	Date				5/19/11 3:00 PM				
	UNSAT-CL5	55,656	24	2,319	2,280	-1.7%			
	UNSAT-CL3				2,250	-3.0%			
	UNSAT-CL1				2,380	2.6%			
	UNSAT-EC3				2,190	-5.6%			
	UNSAT-EC1				2,220	-4.3%			
	Mean				2,264	-2.4%			
	Stage 2 Single Pass Upflow Biofilters								
	Date				5/19/2011 2:00 3:00 pm				
	DENIT-LS4	55,656	24	2,319	2,330	0.5%			
	DENIT-LS2				2,310	-0.4%			
	DENIT-SU3				2,300	-0.8%			
	DENIT-LS3				2,260	-2.5%			
	DENIT-SU4				2,120	-8.6%			
	Mean				2,264	-2.4%			
2	Stage 1 Recirculating Biofilters (Hydrosplitter 2)								
	Date				5/19/2011 STE 1:30 pm				
	RC1 : UNSAT-SA2	55,656	24	2,319	2,180	-6.0%			
	RC2 : UNSAT-EC4				2,100	-9.4%			
	RC3 : UNSAT-CL2				2,245	-3.2%			
	RC4 : UNSAT-CL4				2,065	-11.0%			
	Mean				2,148	-7.4%			
	Stage 1 Recirculating Biofilters (Recycle)				Flowmeter R 5/18/2011				
	RC1 : UNSAT-SA2	166,968	24	6,957	6,781	-2.5%	3:1	3.11	3.6%
	RC2 : UNSAT-EC4				6,939	-0.3%		3.30	9.2%
	RC3 : UNSAT-CL2				6,781	-2.5%		3.02	0.7%
	RC4 : UNSAT-CL4				6,781	-2.5%		3.28	8.6%
	Mean				6,821	-2.0%		3.18	5.5%
	Stage 1 Recirculating Biofilters (Hydrosplitter + Recycle)								
	RC1 : UNSAT-SA2	222,624	24	9,276	8,961	-3.4%			
	RC2 : UNSAT-EC4				9,039	-2.6%			
	RC3 : UNSAT-CL2				9,026	-2.7%			
	RC4 : UNSAT-CL4				8,846	-4.6%			
	Mean				8,968	-3.3%			
3	Horizontal Denitrification Biofilters								
	Date				5/19/11 2:20 PM				
	DENIT-SU1	7,409	24	308.7	310	0.4%			
	DENIT-SU2				305	-1.2%			
	DENIT-GL1				300	-2.8%			
	DENIT-LS1				302	-2.2%			
	Mean				304	-1.4%			
4	In-Situ Simulators								
	Date				5/19/11 2:10 PM				
	UNSAT-IS1 (STE)	20,160	24	840	810	-3.6%			
	UNSAT-IS2 (Nitrified STE)	20,640	24	860	865	0.6%			
	UNSAT-IS3 (STE)	893	24	37	34	-8.6%			
	UNSAT-IS4 (Nitrified STE)				36	-3.2%			

Notes: Yellow-shaded cells are measured values; grey-shaded cells are calculated values



## **Appendix D: Chain of Custody Forms**









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# **SOUTHERN ANALYTICAL LABORATORIES, INC.**

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

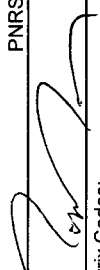





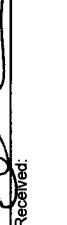

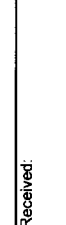

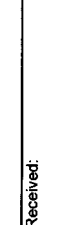
SAL Project No. 1104232

Client Name <b>Hazan and Sawyer</b>		Contact / Phone: Josephin Edeback-Hirst 813-630-4498 jedeback@hazanandsawyer.com																		
Project Name / Location <b>PNRS II Wastewater System Analyses</b>																				
Samplers: (Signature) 																				
SAL Use Only Sample No.	Sample Description	Date	Time	Matrix	PARAMETER / CONTAINER DESCRIPTION										Field DO					
					Composite	Grab	500ml P, Cool	SO4	500ml P, Zn	Acetate/NaOH	Hydrogen Sulfide	125ml P, H2SO4	TKN, NH3, NO3, NO2	125ml P, Na2S2O3, Fecal Coliforms		Field pH	Field Temp	Field Cond		
01	PNRS II STE-T1	5/19/11	1215	WW		X		1	1		1				7.6	25.1	960	2.0		
02	PNRS II STE-T1-D		1215	WW		X		1							7.6	25.1	960	2.0		
03	UNSAT-EC1		1000	WW		X		1	1						7.2	23.5	900	6.3		
04	UNSAT-EC3		1000	WW		X		1							7.1	23.5	940	5.7		
05	UNSAT-CL1		1000	WW		X		1	1						7.4	23.5	980	6.9		
06	UNSAT-CL3		1000	WW		X		1							7.5	22.9	1120	7.6		
07	UNSAT-CL5		1000	WW		X		1							7.9	23.5	1130	6.9		
08	DENIT-SU4		0900	WW		X			1						7.4	21.1	1220	0.1		
09	DENIT-LS3		0900	WW		X		1							7.7	21.1	940	4.2		
10	LS3-D		0900	WW		X		1							7.7	21.1	940	4.2		
11	DENIT-SU3		0900	WW		X		1	1						7.4	20.8	1380	0.1		
12	SU3-D		0900	WW		X		1							7.4	20.8	1380	0.1		
Containers Prepared/Relinquished:		Date/Time: 5-18-11 1500	Received: 	Date/Time: 5/18/11 1500	Seal intact? <input checked="" type="checkbox"/> Y <input checked="" type="checkbox"/> N <input checked="" type="checkbox"/> N														Instructions / Remarks  STE-T1, STE-T1-D - Fecal Coliforms 1,000,000	
Relinquished:		Date/Time: 5-18-11 1100	Received: 	Date/Time: 5/18/11 1100	Samples intact upon arrival? <input checked="" type="checkbox"/> Y <input checked="" type="checkbox"/> N <input checked="" type="checkbox"/> N															
Relinquished:		Date/Time: 5-19-11 1405	Received: 	Date/Time: 5/19/11	Received on ice? Temp: _____															
Relinquished:		Date/Time: 5-19-11 1405	Received: 	Date/Time: 5/19/11	Proper preservatives indicated? <input checked="" type="checkbox"/> Y <input checked="" type="checkbox"/> N <input checked="" type="checkbox"/> N															
Relinquished:		Date/Time: 5-19-11 1405	Received: 	Date/Time: 5/19/11	Rec'd within holding time? <input checked="" type="checkbox"/> Y <input checked="" type="checkbox"/> N <input checked="" type="checkbox"/> N															
Relinquished:		Date/Time: 5-19-11 1405	Received: 	Date/Time: 5/19/11	Volatiles rec'd w/out headspace? <input checked="" type="checkbox"/> Y <input checked="" type="checkbox"/> N <input checked="" type="checkbox"/> N															
Relinquished:		Date/Time: 5-19-11 1405	Received: 	Date/Time: 5/19/11	Proper containers used? <input checked="" type="checkbox"/> Y <input checked="" type="checkbox"/> N <input checked="" type="checkbox"/> N															

# **SOUTHERN ANALYTICAL LABORATORIES, INC.**

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

SAL Project No. 1104232

Client Name <b>Hazan and Sawyer</b>		Contact / Phone: Josephin Edeback-Hirst 813-630-4498 jedeback@hazanandsawyer.com														
Project Name / Location <b>PNRS II Wastewater System Analyses</b>																
Samplers: (Signature) 																
SAL Use Only Sample No.	Sample Description	Date	Time	Matrix	Composite	Grab	PARAMETER / CONTAINER DESCRIPTION							Field DO		
							500ml P, Cool SO4	500ml P, Zn Acetate/NaOH Hydrogen Sulfide	125ml P, H2SO4 TKN, NH3, NO3, NO2	125ml P, Na2S2O3 Fecal Coliforms	Field pH	Field Temp	Field Cond			
13	DENIT-LS2	5/19/11	0900	WW		X	1			1	1	1	7.9	20.2	1,100	3.1
14	LS2-D		0900	WW		X	1			1	1	1	7.9	20.1	1,100	3.1
15	DENIT-LS4		0900	WW		X	1			1	1	1	8.1	19.9	1,080	0.6
16	RC1		1130	WW		X	1			1	1	1	7.5	23.4	750	0.1
17	RC2		1100	WW		X	1			1	1	1	7.5	21.2	770	0.7
18	RC3		1030	WW		X	1			1	1	1	7.4	21.9	780	0.1
19	RC4		1045	WW		X	1			1	1	1	7.5	21.7	800	0.1
20	UNSAT-CL4		0950	WW		X	1			1	1	1	7.4	22.2	750	7.6
21	UNSAT-CL2		0950	WW		X	1			1	1	1	7.3	22.8	740	6.8
22	UNSAT-EC4		1005	WW		X	1			1	1	1	7.3	22.7	710	7.9
23	UNSAT-SA2		0950	WW		X	1			1	1	1	7.1	22.5	760	4.5
24	DFT		1200	WW		X	1			1	1	1	7.5	21.2	770	7.5
Containers Prepared/Relinquished:  5-18-11 1500		Received:  5/18/11 1500	Date/Time: 5/18/11 1500				Seal intact? <input checked="" type="checkbox"/>		Samples intact upon arrival? <input checked="" type="checkbox"/>		N/A		Instructions / Remarks			
Relinquished:  5/19/11 1100		Received:  5/19/11 1100	Date/Time: 5/19/11 1100				Received on ice? <input checked="" type="checkbox"/>		Temp: <input checked="" type="checkbox"/>		N/A		Total Phos. Should be added to DFT only (sample .24 only).			
Relinquished:  5/19/11 1405		Received:  5/19/11 1405	Date/Time: 5/19/11 1405				Proper preservatives indicated? <input checked="" type="checkbox"/>		Rec'd within holding time? <input checked="" type="checkbox"/>		N/A		RC-1, RC-2, RC-3, RC-4, 8. Fecal - Lixely 1,000,000			
Relinquished: 		Received: 	Date/Time:				Volatiles rec'd w/out headspace? <input checked="" type="checkbox"/>		Proper containers used? <input checked="" type="checkbox"/>		N/A					
Relinquished: 		Received: 	Date/Time:													

# SOUTHERN ANALYTICAL LABORATORIES, INC.

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

SAL Project No

1104232

Client Name		Hazan and Sawyer		Contact / Phone:		Josephin Edeback-Hirst 813-630-4498	
Project Name / Location		PNRS II Wastewater System Analyses		jedeback@hazanandsawyer.com			
Samplers: (Signature)				PARAMETER / CONTAINER DESCRIPTION			
Matrix Codes:							
DW-Drinking Water WW-Wastewater							
SW-Surface Water SL-Sludge SO-Soil							
GW-Groundwater SA-Saline Water O-Other							
R-Reagent Water							
SAL Use Only Sample No.	Sample Description	Date	Time	Matrix	Composite	Grab	Field DO
25	DENIT-SU1	5/19/11	0800	WW	X	X	0.1
26	DENIT-SU2		0800	WW	X	X	0.1
27	DENIT-LS1		0800	WW	X	X	0.1
28	DENIT-GL1		0800	WW	X	X	0.1
29	UNSAT-IS1-SP			WW	X	X	
30	UNSAT-IS1		1125	WW	X	X	2.4
31	UNSAT-IS2-SP			WW	X	X	
32	UNSAT-IS2		1125	WW	X	X	4.7
33	UNSAT-IS3-SP		0845	WW	X	X	6.6
34	UNSAT-IS4-SP		0845	WW	X	X	N/A
35	FB		0945	WW	X	X	7.4
36	EB		0945	WW	X	X	8.2
Containers Prepared/Relinquished:		Date/Time: 6-18-11	Received: 5-18-11	Seal intact? Y N NA			
Relinquished:		Date/Time: 5/19/11	Received: 5/18/11	Samples intact upon arrival? Y N NA			
Relinquished:		Date/Time: 5/19/11	Received: 5/19/11	Received on ice? Temp: Y N NA			
Relinquished:		Date/Time: 5/19/11	Received: 5/19/11	Proper preservatives indicated? Y N NA			
Relinquished:		Date/Time: 5/19/11	Received: 5/19/11	Rec'd w/in holding time? Y N NA			
Relinquished:		Date/Time: 5/19/11	Received: 5/19/11	Volatiles rec'd w/out headspace? Y N NA			
Relinquished:		Date/Time: 5/19/11	Received: 5/19/11	Proper containers used? Y N NA			
		Date/Time:	Received:	Instructions / Remarks			

SAL Project No. 1104231

**SAL Project No.**

1104231

## Chain of Custody





8 East Tower Circle  
Ormond Beach, FL 32174  
(386)672-5668

## SAMPLE ACKNOWLEDGMENT

**Samples Submitted By:** Hazen and Sawyer, P.C  
**Client Project ID:** PNRSII SE#6  
**Client PO#:**

**Pace Project Manager:** Sakina Mckenzie  
Phone (386)672-5668  
sakina.mckenzie@pacelabs.com  
**Pace Analytical Project ID:** 3530933  
**Samples Received:** May 20, 2011 07:30 AM  
**Estimated Completion:** June 01, 2011

**CC:** Ms. Josefin Edebeck-Hirst

Customer Sample ID	Pace Analytical Lab ID	Matrix	Date/Time Collected	Method
DFT	3530933001	Water	05/19/11 12:05	2320B Alkalinity 2540D Total Suspended Solids 300.0 IC Anions 300.0 IC Anions 28 Days 350.1 Ammonia 351.2 Total Kjeldahl Nitrogen 365.4 Phosphorus, Total 410.4 COD 4500S2F Hydrogen Sulfide 5210B cBOD, 5 day
STE-PNRSII-T1	3530933002	Water	05/19/11 12:15	2320B Alkalinity 2540D Total Suspended Solids 300.0 IC Anions 300.0 IC Anions 28 Days 350.1 Ammonia 351.2 Total Kjeldahl Nitrogen 365.4 Phosphorus, Total 410.4 COD 4500S2F Hydrogen Sulfide 5210B cBOD, 5 day

Please contact your project manager if you recognize any discrepancy in this form or have any questions about your project.

Thank you for choosing Pace Analytical Services, Inc.