FLORIDA DEPARTMENT OF HEALTH

Florida Onsite Sewage Nitrogen Reduction Strategies Study

Task A.26

PNRS II Test Facility Data Summary Report No. 6

Progress Report

June 2011

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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 A.26
PROGRESS REPORT

PNRS II Test Facility
Data Summary 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

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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 data summary report documents data that was collected in the PNRS II monitoring and sampling event which was conducted May 19, 2011. The corresponding sample event report was submitted as Sample Event Report No. 6, May 2011, as a deliverable under Task A.25. The 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, 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

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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.

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 Replace (UNSAT-PS1) with Clinoptilolite (UNSAT-CL5)

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-IS-2 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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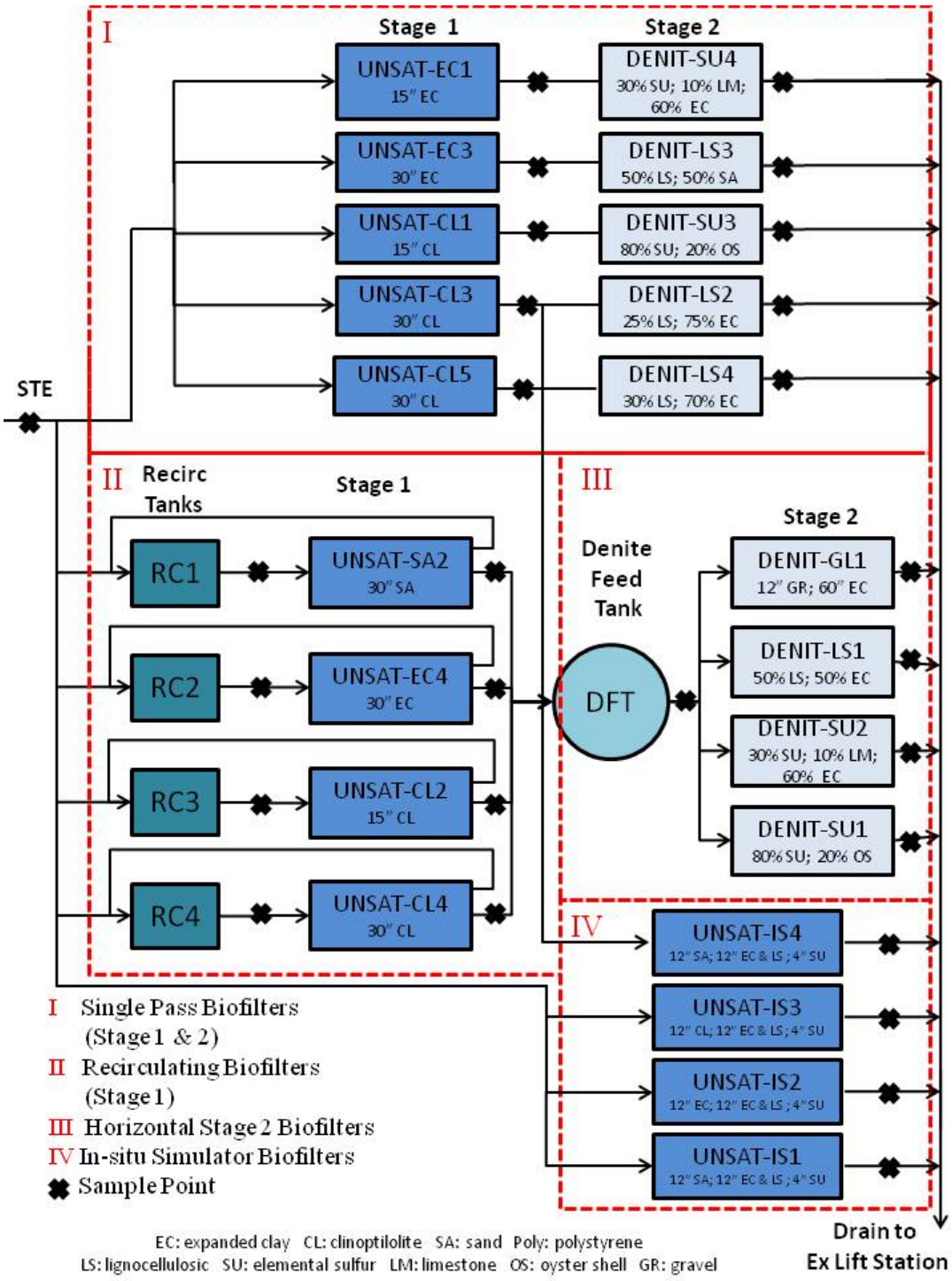

Figure 1
PNRS II Test Facility System Schematic

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Table 1
PNRS II Sample Identification

Group (Figure 1)	Sample Location	Sample Identification
	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

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3.4 Operational Monitoring

Start-up of the PNRS II test facility occurred on May 17, 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. 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 on facility operations.

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3.5 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-SU3 effluent, DENIT-LS2 effluent, and DENIT-LS3 effluent. Additionally, laboratory split samples were collected immediately subsequent to the regular samples from the same composite sample. The laboratory split sample containers for this event were filled with PNRS II T1-STE effluent and DFT.

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

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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_3-N), nitrate nitrogen, (NO_3-N), nitrite nitrogen (NO_2-N), carbonaceous biochemical oxygen demand ($CBOD_5$), 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_4) and hydrogen sulfide (H_2S). Table 2 lists the analytical parameters, analytical methods, and detection limits for these analyses.

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

Analytical Parameter	Method of Analysis	Laboratory Detection Limit (mg/L)
Total Alkalinity as $CaCO_3$	SM 2320B	2 mg/L
Total Kjeldahl Nitrogen (TKN-N)	EPA351.2	0.05 mg/L
Ammonia Nitrogen (NH_3-N)	EPA350.1	0.01 mg/L
Nitrate/Nitrite Nitrogen (NO_X-N)	EPA353.2	0.01 mg/L
Carbonaceous BOD ($CBOD_5$)	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_4)	EPA300.0	0.2 mg/L
Hydrogen Sulfide Unionized (H_2S)	SM4500S F	0.01 mg/L
Sulfide	SM4500S F	0.1 mg/L

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3.6 Flow Monitoring

Flow rates for all PNRS II systems were calibrated at initial start-up. The flow rates are then measured and recorded at each sampling event and adjusted as necessary to maintain flow rates consistent with the experimental design following the sampling event. Flow volumes are measured just after sampling and field analyses and represent the flow rates in effect during the water quality monitoring. Flow rates are then adjusted as necessary to correspond to the target flow rates in the experimental design. For this Sampling Event, influent flow volumes were measured on May 19, 2011 following the sampling event and reported in the Sampling Event No. 6 Report. Flow monitoring results are presented in Appendix C.

4.0 Results and Discussion

4.1 Operational Monitoring

Start up of the PNRS II test facility occurred on May 17, 2010. The test systems have been operated continuously since the May 17th start up, with the exception of occasional power interruptions or outages (see operation and maintenance log). The power interruptions were of relatively short duration. For the most part, operation of the pilot biofilters was fully and automatically resumed when power was restored. The only exceptions are the three peristaltic pumps: Pump 5 which supplies the two In-Situ simulators UNSAT-IS1 and IS2, Pump 10 which supplies the two column In-Situ simulators UNSAT-IS3 and IS4, and Pump 11 which supplies the four horizontal flow denitrification biofilters. Initially, the peristaltic pumps displayed an error message and required manual restarting upon disruption of the power supply; their off times were somewhat longer than the other system pumps. The peristaltic pump settings were saved through the power outage, and the same pump operation was resumed once the error code was acknowledged. The peristaltic pumps have since been reprogrammed to start automatically in the event of temporary discontinuance of the power supply. Appendix A provides the operation and maintenance log which includes actions taken since start-up. Appendix B provides summary tables of the PLC recorded data of daily runtimes and flows for the test facility between March 17th and May 18th (Day 304 through Day 366 since start-up) used to check general pump operation and performance.

The recycle rates to the recirculating systems are monitored and recorded in the PLC as Pumps 6, 7, 8, and 9 flows. The data shows that the recycle flows are very close to the

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initially set 44 gpd rate for Pumps 6, 7, 8 and 9, indicating that the desired recycle ratio of approximately 3:1 is being met.

4.2 Water Quality Analyses

Water quality analytical results for Sample Event No. 6 are listed in Table 3. Quality Control samples, including field blanks, equipment blanks, and external duplicate and lab split samples are also included in this table. Results for the blanks were examined for obvious problems with sample contamination or improper decontamination of sampling equipment. Duplicate and split samples were examined for reproducibility, and where the differences were significant relative to the sample value, the laboratory was notified and requested to verify accuracy in reporting and reanalysis of the sample was requested if warranted. Significant difference determinations for the various lab analyses were based upon a review of reproducibility data in Standard Methods and EPA guidelines as well as on experience of the project team and data accuracy requirements for this project.

Table 4 shows the results of the QC sampling for this sample event, and a calculation of the percent difference between the sample value and the duplicate/split samples. The sample results that are highlighted in this table were forwarded back to the laboratories for verification and potential reanalysis. Any changes to these data from this verification will be reflected in the next data summary report.

A summary of the water quality data collected to date for the PNRS II systems is presented in Table 5. The following discussion summarizes these results. The laboratory report containing the raw analytical data is included in Appendix D.

Influent Water Quality Most water quality characteristics of STE collected in Sample Event 6 remained closer to typical STE composition than were STE samples collected earlier in the PNRS II study. However, sample Event 6 STE $CBOD_5$ was very low, below the range generally expected for domestic STE. The measured STE total nitrogen (TN) concentration was 40 mg/L, which is within the range that has been typically reported for Florida single family residence STE, but lower than previous samples from the GCREC system. The performance of the various biofilter systems 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.

Group I Single Pass Biofilters Effluent NH_3-N levels were below 0.01 mg/L for all five Stage 1 single pass biofilters and all DO levels were greater than 5.7 mg/L (Table 3).

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TSS and $CBOD_5$ were 2 mg/L or below in all effluents. Organic N ranged from 2.0 to 3.7 mg/L in these same five systems. NO_x increased significantly in all Stage 1 biofilter effluents corresponding to the decrease in TKN from nitrification. The five single pass biofilters performed exceptionally well in removing suspended solids and $CBOD_5$ and in converting ammonium to oxidized nitrogen.

Effluent NO_X-N was less than 0.12 mg/L in three of the five Stage 2 single pass denitrification biofilters, including two with elemental sulfur and one with new lignocellulosic media. Two of the three lignocellulosic biofilters with new media (DENIT-LS2 and DENIT-LS3) exhibited incomplete denitrification with effluent NO_x-N of 22.8 and 16.8 mg/L, respectively.

Group II Stage 1 Recirculating Biofilters NH_3-N levels were at or below 0.06 mg/L for all four recirculating Stage 1 biofilters which contain clinoptilolite, expanded clay, and sand media. Effluent DO was 4.5 to 7.9 mg/L. Effluent NO_x-N ranged from 14 to 22 mg/L and organic N from 2.0 to 12.0 mg/L for these four recirculating Stage 1 biofilters. The nitrification performance of these biofilters was quite acceptable and TN reduction from recirculation (pre-denitrification) averaged 41%. TSS and $CBOD_5$ were 7 mg/L or below in all effluents.

Group III Stage 2 Horizontal Biofilters Influent NOx-N to these biofilters (from the denite feed tank (DFT)) was 17 mg/L. Effluent NO_x-N was 0.06 mg/L and less in all four Stage 2 horizontal biofilters. The low NO_x-N were accompanied by < 0.1 mg/L DO and ORP of -267 to –323 mV. All horizontal biofilters were highly effective in producing a reducing environment and achieving their NO_x-N reduction goals. DENIT-LS1 with the new lignocellulosic media exhibited complete denitrification, with effluent NO_x-N less than 0.03 mg/L. DENIT-LS1 continued to exhibit slightly elevated effluent levels of oxidizable organic matter and TSS.

Group IV In-Situ Simulator Systems For UNSAT-IS2, effluent TKN and NH_3-N were 12 and 30 mg/L, respectively, indicating incomplete ammonification and nitrification. $CBOD_5$ reduction was also incomplete as evidenced by effluent $CBOD_5$ of 19 mg/L. All four in-situ simulator systems exhibited low effluent NO_x-N of less than 1.3 mg/L. In-situ simulator effluent SO_4 concentrations were 200, 54, 300 and 190 mg/L, for IS1, IS2, IS3 and IS4 respectively. For IS3-SP and IS4-SP, the sample taken above the denitrification media saturated sulfur layer, NH_3-N was 0.45 and 0.23 mg/L, respectively, indicating fairly complete nitrification by this point in the media sequence.

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UNSAT-IS 4 receives a nitrified influent from UNSAT-CL3 with NO_3-N of 23 and NO_3-N was 20 mg/L at the monitoring point above the sulfur layer. This suggests that the majority of nitrate removal was occurring in the sulfur layer.

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Table 3
Water Quality Analytical Results

Group (Figure 1)	Sample ID	Media Composition	Analytical Laboratory	Sample Date/Time	Sample Type	Temp (°C)	pH	Total Alkalinity (mg/L)	DO (mg/L)	ORP (mV)	Specific Conductance (µS)	TSS (mg/L)	$CBOD_5$ (mg/L)	TN (mg/L N)[1]	TKN (mg/L N)	Organic N (mg/L N)[2]	NH_3-N (mg/L N)	NO_3-N (mg/L N)	NO_2-N (mg/L N)	NOx (mg/L N)	TIN (mg/L N)[3]	TP (mg/L)	Sulfide (mg/L)	H_2S (mg/L)	SO_4 (mg/L)	Fecal (Ct/100 mL)
	STE Sample																									
	PNRS II STE-Tank 1		Southern	5/19/11 12:15	G	25.1	7.6	380	2	-243.5	960	467	47	40.04	40	8.00	32	0.03	0.01	0.04	32.04		9.1	1.7	24	9400
	PNRS II STE-Tank 1-D		Southern	5/19/11 12:15	G	25.1	7.6	400	2	-243.5	960	473	59	41.04	41	8.00	33	0.03	0.01	0.04	33.04					9900
	PNRS II STE-Tank 1-D2		Pace	5/19/11 12:15	G	25.1	7.6	347	2	-243.5	960	256	44.8	56.74	56.5	3.70	52.8	0.12	0.12	0.24	53.04	5.4		1.8	32.9	
	Stage 1 Single Pass Biofilters Effluent																									
	UNSAT-EC1	15" Expanded Clay	Southern	5/19/11 10:00	G	23.5	7.2	170	6.3	50.3	900	1	2	24.01	2	2.00	0.005	22	0.01	22.01	22.02				61	20
	UNSAT-EC3	30" Expanded Clay	Southern	5/19/11 10:00	G	23.5	7.1	190	5.7	42.7	940	2	2	24.01	2	2.00	0.005	22	0.01	22.01	22.02					1
	UNSAT-CL1	15" Clinoptilolite	Southern	5/19/11 10:00	G	23.5	7.4	160	6.9	35.2	980	1	2	25.71	2.7	2.70	0.005	23	0.01	23.01	23.02				61	20
	UNSAT-CL3	30" Clinoptilolite	Southern	5/19/11 10:00	G	22.9	7.5	260	7.6	32.3	1120	1	2	26.71	3.7	3.70	0.005	23	0.01	23.01	23.02					1
	UNSAT-CL5	30" Clinoptilolite	Southern	5/19/11 10:00	G	23.5	7.9	280	6.9	18.4	1130	1	2	24.51	2.5	2.50	0.005	22	0.01	22.01	22.02					24
I	**Stage 2 Single Pass Upflow Biofilters Effluent**																									
	DENIT-SU4	10% Limestone; 30% Sulfur; 60% Expanded Clay	Southern	5/19/11 9:00	G	21.1	7.4		0.1	-239.9	1220	2	2	1.72	1.6	0.83	0.77	0.11	0.01	0.12	0.89		0.21	0.05	420	1
	DENIT-LS3-REV	50% New Lignocellulosic; 50% Sand	Southern	5/19/11 9:00	G	21.1	7.7	300	4.2	-72.5	940	1	2	19.76	3	1.60	1.4	16	0.76	16.76	18.16					1
	DENIT-LS3-REV-D	50% New Lignocellulosic; 50% Sand	Southern	5/19/11 9:00	G	21.1	7.7	300	4.2	-72.5	940	4	2	20.04	3.3	0.40	2.9	16	0.74	16.74	19.64					1
	DENIT-SU3	80% Sulfur; 20% Oyster Shell	Southern	5/19/11 9:00	G	20.8	7.4	200	0.1	-248.9	1380	1	7	3.01	2.9	0.20	2.7	0.1	0.01	0.11	2.81				520	1
	DENIT-SU3-D	80% Sulfur; 20% Oyster Shell	Southern	5/19/11 9:00	G	20.8	7.4	200	0.1	-248.9	1380	1	3	2.03	2	0.60	1.4	0.02	0.01	0.03	1.43					1
	DENIT-LS2-REV	25% New Lignocellulosic; 75% Expanded Clay	Southern	5/19/11 9:00	G	20.2	7.9	240	3.1	-54.9	1100	2	2	26.26	3.5	3.45	0.05	22	0.76	22.76	22.81					1
	DENIT-LS2-REV-D	25% New Lignocellulosic; 75% Expanded Clay	Southern	5/19/11 9:00	G	20.1	7.9	340	3.1	-54.9	1100	1	2	26.02	3.3	3.26	0.044	22	0.72	22.72	22.76					1
	DENIT-LS4-REV	30% New Lignocellulosic; 70% Expanded Clay	Southern	5/19/11 9:00	G	19.9	8.1	380	0.6	-106.5	1080	5	7	1.52	1.5	1.50	0.005	0.01	0.01	0.02	0.03					1
	Recirculation Tanks Effluent																									
	RC1		Southern	5/19/11 11:30	G	23.4	7.5	200	0.1	26.4	750	3	2	21.88	8.7	0.70	8	13	0.18	13.18	21.18					460
	RC2		Southern	5/19/11 11:00	G	21.2	7.5	170	0.7	-7	770	5	2	27.34	10	4.60	5.4	17	0.34	17.34	22.74					370
	RC3		Southern	5/19/11 10:30	G	21.9	7.4	190	0.1	3	780	7	4	33.13	16	7.20	8.8	17	0.13	17.13	25.93					560
II	RC4		Southern	5/19/11 10:45	G	21.7	7.5	270	0.1	-4.6	800	5	8	28.06	21	9.00	12	6.2	0.86	7.06	19.06					8600
	Stage 1 Recirculating Biofilters Effluent																									
	UNSAT-CL4	30" Clinoptilolite	Southern	5/19/11 9:50	G	22.2	7.4	210	7.6	7.8	750	3	2	26.01	12	12.00	0.005	14	0.01	14.01	14.02					18
	UNSAT-CL2	15" Clinoptilolite	Southern	5/19/11 9:50	G	22.8	7.3	130	6.8	22.2	740	6	2	25.21	3.2	3.19	0.008	22	0.01	22.01	22.02					20
	UNSAT-EC4	30" Expanded Clay	Southern	5/19/11 10:05	G	22.7	7.3	130	7.9	30.6	710	7	2	22.61	2.6	2.60	0.005	20	0.01	20.01	20.02					1
	UNSAT-SA2	30" Sand	Southern	5/19/11 9:50	G	22.5	7.1	140	4.5	27.4	760	7	2	21.11	2.1	2.04	0.062	19	0.01	19.01	19.07					21
	Denite Feed Tank (Tank 3)																									
	DFT		Southern	5/19/11 12:00	G	21.2	7.5	170	7.5	35.1	770	3	2	20.21	3.2	3.20	0.005	17	0.01	17.01	17.02	11			60	11
	DFT-D		Pace	5/19/11 12:05	G	21.2	7.5	167	7.5	35.1	770	5	2	22.38	0.55	0.53	0.02	21.8	0.025	21.825	21.85	4.9		1	68	
III	**Stage 2 Horizontal Biofilters Effluent**																									
	DENIT-SU1	80% Sulfur; 20% Oyster Shell	Southern	5/19/11 8:00	G	16.9	7.2	200	0.1	-323.1	1000	3	2	2.96	2.9	1.60	1.3	0.05	0.01	0.06	1.36				270	1
	DENIT-SU2	10% Limestone; 30% Sulfur; 60% Expanded Clay	Southern	5/19/11 8:00	G	16.7	7.1	260	0.1	-309.9	1010	3	24	3.53	3.5	1.90	1.6	0.02	0.01	0.03	1.63		17	7.4	260	1
	DENIT-LS1-REV	50% New Lignocellulosic; 50% Expanded Clay	Southern	5/19/11 8:00	G	16.1	7.3	220	0.1	-301.8	700	6	29	27.03	27	27.00	0.005	0.02	0.01	0.03	0.04					1
	DENIT-GL1	12" Gravel; 60" Expanded Clay	Southern	5/19/11 8:00	G	16.4	6.8	400	0.1	-267.3	850	2	15	1.94	1.9	0.20	1.7	0.03	0.01	0.04	1.74					1000
	In-situ Simulator Biofilters Effluent																									
	UNSAT-IS1 (receives STE)	4" Coarse Sand; 8" Fine Sand; 12" Mix (60% EC, 40% New Ligno); 4" Sulfur	Southern	5/19/11 11:25	G	24.1	7.3	240	2.4	-51.7	810	8	4	4.60	3.3	2.93	0.37	0.48	0.82	1.3	1.67				200	1
	UNSAT-IS2 (receives STE)	4" EC>1.53mm; 8" EC As-Is; 12" Mix (60% EC, 40% New Ligno); 4" Sulfur	Southern	5/19/11 11:25	G	24.4	7.3	320	4.7	-23.1	850	7	19	42.04	42	12.00	30	0.03	0.01	0.04	30.04				54	19
IV	UNSAT-IS3-SP (receives STE)	Above 4" Sulfur layer	Southern	5/19/11 8:45	G	18.2	7.1	410		-100.3	1000	4	3	15.22	2.8	2.35	0.45	12	0.42	12.42	12.87				88	1
	UNSAT-IS3 (receives STE)	4" CL 8X14; 8" CL 16X50; 12" Mix (60% EC, 40% New Ligno); 4" Sulfur	Southern	5/17/11 9:10	G	12	7.38	390		97.5	1395	8	6	3.63	3.6	2.00	1.6	0.02	0.01	0.03	1.63				300	9
	UNSAT-IS4-SP (receives UNSAT-CL3 NO_3)	Above 4" Sulfur layer	Southern	5/19/11 8:45	G	17.5	7	220		-150.1	1140	4	2	23.10	2.6	2.37	0.23	20	0.5	20.5	20.73				100	1
	UNSAT-IS4 (receives UNSAT-CL3 NO_3)	4" Coarse Sand; 8" Fine Sand; 12" Mix (60% EC, 40% New Ligno); 4" Sulfur	Southern	5/17/11 9:15	G	14.3	7.13	530		76.1	1379	34	38	2.43	2.4	2.32	0.076	0.02	0.01	0.03	0.11				190	1
	Field Blank	Reagent Water	Southern	5/19/11 9:45		19.9	7	11	7.4	-54.2	5	1	2	0.07	0.05	0.04	0.008	0.01	0.01	0.02	0.03					1
	Equipment Blank	Reagent Water - Cleaned STE Bottle #1	Southern	5/19/11 9:45		19.4	7.5	11	8.2	-14.4	5	1	2	0.07	0.05	0.05	0.005	0.01	0.01	0.02	0.03					

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
EC: expanded clay, CL: clinoptilolite, PS: polystyrene, SU: elemental sulfur, LS: lignocellulosic, GL: glycerol, OS: oyster shell, NS: sodium sesquicarbonate, GR: gravel
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 too many colonies were present. The numberic value represents the dilution factor times the maximum reportable number of colonies.
Purple-shaded data points indicate results based upon colony counts outside the method indicated ideal range.
Blue-shaded data points indicate matrix spike was outside typical range. All other QC criteria were acceptable.

PRELIMINARY

Table 4
Sample Event No. 6 External QC Sample Results

Sample ID	Total Alkalinity (mg/L)		TSS (mg/L)		$CBOD_5$ (mg/L)		TKN (mg/L N)		NH_3-N (mg/L N)		NO_3-N (mg/L N)		NO_2-N (mg/L N)		SO_4 (mg/L)		Fecal	
	Value	% diff	Value	% diff	Value	% diff	Value	% diff	Value	% diff	Value	% diff	Value	% diff	Value	% diff	Value	% diff
STE Lab	380		467		47		40		32		0.03		0.01		24		9400	
STE Dup	400	5.3%	473	1.3%	59	25.5%	41	2.5%	33	3.1%	0.03	N/A	0.01	MDL			9900	
STE Split	347	-8.7%	256	-45.2%	44.8	-4.7%	56.5	41.3%	52.8	65.0%	0.12	MDL	0.12	MDL	32.9	37.1%		
LS3 Lab	300		1		2		3		1.4		16		0.76				1	
LS3 Dup	300	0.0%	4	300.0%	2	MDL	3.3	10.0%	2.9	107.1%	16	0.0%	0.74	-2.6%			1	
SU3 Lab	200		1		7		2.9		2.7		0.1		0.01		520		1	
SU3 Dup	200	0.0%	1	0.0%	3	-57.1%	2	-31.0%	1.4	-48.1%	0.02	-80.0%	0.01	MDL			1	
LS2 Lab	240		2		2		3.5		0.05		22		0.76				1	
LS2 Dup	340	41.7%	1	-50.0%	2	MDL	3.3	-5.7%	0.044	-12.0%	22	0.0%	0.72	-5.3%			1	
DFT Lab	170		3		2		3.2		0.005		17		0.01		60		11	
DFT Split	167	-1.8%	5	MDL	2	MDL	0.55	-82.8%	0.02	MDL	21.8	28.2%	0.025	MDL	68	13.3%		
Field Blank	11		1		2		0.05		0.008		0.01		0.01				1	
Equipment Blank	11		1		2		0.05		0.005		0.01		0.01					

[1]STE lab sample and duplicate sample agree, therefore the STE split sample is eliminated.

PRELIMINARY

Table 5
Summary of Water Quality Data

Sample ID	Media Composition	Date of Start-up	Statistical Parameter	Temp (°C)	pH	Total Alkalinity (mg/L)	DO (mg/L)	ORP (mV)	Specific Conductance (µS)	TDS (mg/L)	TSS (mg/L)	$CBOD_5$ (mg/L)	COD (mg/L)	TN (mg/L N)[1]	TKN (mg/L N)	Organic N (mg/L N)[2]	NH3-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)	Sulfide (mg/L)	H_2S (mg/L)	SO_4 (mg/L)	Fecal (Ct/100 mL)
STE Sample																											
STE-Tank 1		5/17/2010	n	9	9	8	7	6	9	7	9	9	5	8	9	8	8	3	4	8	8	3	NS	5	5	5	5
			MEAN	24.43	-	347.50	1.45	-253.25	1032.56	390.00	97.78	65.89	266.00	57.91	58.00	9.63	48.25	0.03	0.02	0.04	48.29	9.00		12.26	5.44	22.18	-
			STD. DEV.	4.53	-	78.51	1.31	29.61	199.11	80.42	142.51	28.52	67.31	19.81	18.53	3.62	19.51	0.02	0.01	0.02	19.51	3.49		4.88	4.39	14.38	-
			MIN	13.70	6.40	210.00	0.04	-308.90	649.00	240.00	15.00	22.00	210.00	30.03	30.00	5.00	20.00	0.02	0.01	0.01	20.02	6.60		5.20	1.20	2.90	80.00
			MAX	28.30	7.60	430.00	2.80	-231.70	1250.00	470.00	467.00	94.00	380.00	80.01	80.00	15.00	67.00	0.05	0.04	0.06	67.01	13.00		16.00	12.00	38.00	77000.00
Stage 1 Single Pass Biofilters Effluent																											
UNSAT-EC1	15" Expanded Clay	5/17/2010	n	6	6	6	6	5	6	5	6	6	4	6	6	6	6	3	3	6	6	1	1	3	3	6	3
			MEAN	19.55	-	151.67	6.96	71.60	980.00	648.00	1.17	2.00	15.25	44.72	3.53	3.02	0.51	41.33	0.04	41.19	41.70	3.90	1.00	0.42	0.04	57.83	-
			STD. DEV.	8.88	-	26.39	0.55	48.63	197.09	170.35	0.41	0.00	5.12	18.73	1.16	0.98	0.78	17.79	0.06	17.66	18.06	-	-	0.50	0.03	7.76	-
			MIN	7.80	6.70	110.00	6.30	25.70	617.00	350.00	1.00	2.00	10.00	21.20	2.00	2.00	0.01	22.00	0.01	19.00	19.01	3.90	1.00	0.10	0.01	46.00	1.00
			MAX	28.60	7.25	180.00	7.90	137.50	1150.00	770.00	2.00	2.00	22.00	66.80	4.80	4.29	1.70	57.00	0.11	62.00	63.30	3.90	1.00	1.00	0.06	67.00	3900.00
UNSAT-EC3	30" Expanded Clay	5/17/2010	n	6	6	6	6	5	6	5	6	6	4	6	6	6	6	3	3	6	6	1	1	NS	NS	NS	3
			MEAN	19.82	-	177.33	6.69	65.12	1040.67	696.00	1.50	2.00	13.25	46.04	3.20	2.79	0.41	38.33	0.01	42.84	43.25	3.90	1.50				-
			STD. DEV.	9.26	-	52.10	0.76	42.79	191.20	166.82	0.55	0.00	3.20	23.38	1.04	0.64	0.98	14.36	0.00	22.35	23.18	-	-				-
			MIN	6.30	6.80	84.00	5.70	22.20	712.00	410.00	1.00	2.00	10.00	21.20	2.00	2.00	0.01	22.00	0.01	19.00	19.01	3.90	1.50				1.00
			MAX	29.20	7.34	220.00	7.90	117.00	1250.00	850.00	2.00	2.00	16.00	85.90	4.90	3.50	2.40	49.00	0.01	81.00	83.40	3.90	1.50				4.00
UNSAT-CL1	15" Clinoptilolite	5/17/2010	n	6	6	6	6	5	6	5	6	6	4	6	6	6	6	3	3	6	6	1	1	3	3	6	3
			MEAN	19.37	-	206.67	6.37	59.98	1105.17	716.00	2.17	2.00	17.00	40.98	3.12	3.10	0.01	42.33	0.06	37.86	37.88	8.00	1.80	0.47	0.03	54.67	-
			STD. DEV.	9.97	-	35.02	1.78	47.54	156.26	147.24	2.40	0.00	5.29	20.56	1.02	1.02	0.01	26.86	0.09	19.66	19.67	-	-	0.47	0.04	10.09	-
			MIN	5.80	7.10	160.00	3.53	10.70	857.00	470.00	1.00	2.00	10.00	20.70	2.60	2.60	0.01	23.00	0.01	18.00	18.01	8.00	1.80	0.10	0.01	37.00	12.00
			MAX	29.50	8.30	250.00	8.80	116.20	1271.00	850.00	7.00	2.00	22.00	78.21	5.20	5.18	0.02	73.00	0.16	73.01	73.03	8.00	1.80	1.00	0.08	62.00	100.00
UNSAT-CL3	30" Clinoptilolite	5/17/2010	n	6	6	6	6	5	6	5	6	6	4	6	6	6	6	3	3	6	6	1	1	NS	NS	NS	3
			MEAN	19.85	-	281.67	7.76	49.00	1198.67	776.00	1.33	2.00	20.00	47.02	3.17	3.15	0.01	42.33	0.03	43.85	43.86	6.80	3.00				-
			STD. DEV.	8.45	-	37.64	1.09	40.73	151.07	127.59	0.52	0.00	6.68	23.22	0.56	0.56	0.01	20.03	0.03	23.44	23.44	-	-				-
			MIN	8.30	7.30	230.00	6.85	8.20	974.00	550.00	1.00	2.00	13.00	22.80	2.70	2.68	0.01	23.00	0.01	20.00	20.01	6.80	3.00				1.00
			MAX	28.70	8.64	340.00	9.90	100.50	1388.00	850.00	2.00	2.00	29.00	82.70	4.00	3.99	0.03	63.00	0.07	80.00	80.01	6.80	3.00				110.00
UNSAT-CL5	30" Clinoptilolite	5/17/2010	n	1	1	1	1	1	1	NS	1	1	NS	1	1	1	1	1	1	1	1	NS	NS	NS	NS	NS	1
			MEAN	23.50	-	280.00	6.90	18.40	1130.00		1.00	2.00		24.51	2.50	2.50	0.01	22.00	0.01	22.01	22.02						-
			STD. DEV.	-	-	-	-	-	-		-	-		-	-	-	-	-	-	-	-						-
			MIN	23.50	7.90	280.00	6.90	18.40	1130.00		1.00	2.00		24.51	2.50	2.50	0.01	22.00	0.01	22.01	22.02						24.00
			MAX	23.50	7.90	280.00	6.90	18.40	1130.00		1.00	2.00		24.51	2.50	2.50	0.01	22.00	0.01	22.01	22.02						24.00
UNSAT-PS1 (old)	30" Polystyrene	5/17/2010	n	2	2	2	2	1	2	2	2	2	1	2	2	2	2	NS	NS	2	2	1	NS	NS	NS	NS	1
			MEAN	27.80	-	220.00	2.60	60.00	804.50	345.00	3.00	4.35	48.00	43.25	34.50	8.30	26.20			8.75	34.95	5.90					-
			STD. DEV.	1.13	-	84.85	0.14	-	290.62	106.07	1.41	1.91	-	25.39	26.16	1.84	28.00			0.78	27.22	-					-
			MIN	27.00	7.28	160.00	2.50	60.00	599.00	270.00	2.00	3.00	48.00	25.30	16.00	7.00	6.40			8.20	15.70	5.90					930.00
			MAX	28.60	7.60	280.00	2.70	60.00	1010.00	420.00	4.00	5.70	48.00	61.20	53.00	9.60	46.00			9.30	54.20	5.90					930.00
Stage 2 Single Pass Upflow Biofilters Effluent																											
DENIT-SU4 (old)	80% Sulfur; 20% Sodium Sesqui.	5/17/2010	n	2	2	2	2	1	2	2	2	2	1	2	2	2	2	NS	NS	2	2	1	NS	2	2	2	1
			MEAN	27.60	-	145.00	0.15	-106.60	1162.00	755.00	1.00	2.95	22.00	1.09	1.04	0.83	0.21			0.05	0.26	3.20		0.95	0.31	405.00	-
			STD. DEV.	0.71	-	7.07	0.07	-	329.51	275.77	0.00	1.34	-	0.43	0.37	0.23	0.15			0.06	0.21	-		1.20	0.42	205.06	-
			MIN	27.10	6.60	140.00	0.10	-106.60	929.00	560.00	1.00	2.00	22.00	0.78	0.77	0.67	0.10			0.01	0.11	3.20		0.10	0.01	260.00	1.00
			MAX	28.10	7.30	150.00	0.20	-106.60	1395.00	950.00	1.00	3.90	22.00	1.39	1.30	0.99	0.31			0.09	0.40	3.20		1.80	0.60	550.00	1.00
DENIT-SU4 (new)	10% Limestone; 30% Sulfur; 60% Expanded Clay	10/25/2010	n	5	5	4	5	5	5	3	4	4	3	4	4	4	4	3	3	4	4	NS	1	4	4	4	2
			MEAN	16.66	-	165.00	2.76	-110.22	1410.00	1066.67	2.75	2.00	21.67	1.32	1.25	0.93	0.32	0.08	0.02	0.08	0.40		1.30	0.59	0.13	477.50	-
			STD. DEV.	6.00	-	110.91	3.28	152.76	174.29	57.74	2.22	0.00	9.61	0.33	0.29	0.14	0.30	0.05	0.01	0.06	0.34		-	0.48	0.11	69.46	-
			MIN	7.00	6.80	0.00	0.10	-239.90	1220.00	1000.00	1.00	2.00	13.00	0.91	0.89	0.79	0.10	0.02	0.01	0.02	0.12		1.30	0.14	0.05	420.00	1.00
			MAX	21.10	7.40	240.00	7.80	138.00	1659.00	1100.00	6.00	2.00	32.00	1.72	1.60	1.10	0.77	0.11	0.03	0.13	0.89		1.30	1.00	0.29	560.00	3.00
DENIT-LS3 (old)	50% Lignocellulosic; 50% Sand	5/17/2010	n	5	5	4	5	4	5	4	4	4	3	4	4	4	4	1	1	4	4	1	NS	NS	NS	NS	2
			MEAN	19.92	-	220.00	2.80	56.70	1118.20	670.00	1.25	4.50	18.67	26.47	2.95	2.54	0.41	43.00	0.05	23.52	23.92	3.30					-
			STD. DEV.	8.87	-	16.33	2.24	147.89	267.06	210.87	0.50	5.00	9.29	18.43	1.03	1.17	0.42	-	-	18.28	17.86	-					-
			MIN	6.60	6.70	200.00	0.10	-79.00	695.00	370.00	1.00	2.00	11.00	2.01	2.00	1.05	0.01	43.00	0.05	0.01	0.96	3.30					1.00
			MAX	28.10	7.70	240.00	5.40	259.30	1432.00	840.00	2.00	12.00	29.00	45.35	4.30	3.78	0.95	43.00	0.05	43.05	43.06	3.30					1.00
DENIT-LS3 (new)	50% New Lignocellulosic; 50% Sand	1/28/2011	n	2	2	2	2	2	2	1	2	2	1	2	2	2	2	2	2	2	2	NS	1	NS	NS	NS	1
			MEAN	19.20	-	355.00	2.50	-183.55	983.50	720.00	1.50	61.00	320.00	10.72	2.30	1.23	1.07	8.03	0.39	8.42	9.49		2.60				-
			STD. DEV.	2.69	-	77.78	2.40	157.05	61.52	-	0.71	83.44	-	12.79	0.99	0.52	0.47	11.27	0.53	11.80	12.27		-				-
			MIN	17.30	7.40	300.00	0.80	-294.60	940.00	720.00	1.00	2.00	320.00	1.67	1.60	0.86	0.74	0.06	0.01	0.07	0.81		2.60				1.00
			MAX	21.10	7.70	410.00	4.20	-72.50	1027.00	720.00	2.00	120.00	320.00	19.76	3.00	1.60	1.40	16.00	0.76	16.76	18.16		2.60				1.00
DENIT-SU3	80% Sulfur; 20% Oyster Shell	5/17/2010	n	7	7	6	7	6	7	5	6	6	4	6	6	6	6	3	3	6	6	1	1	3	3	6	3
			MEAN	19.71	-	235.00	1.60	-235.67	1470.43	1002.00	6.17	6.00	38.50	2.60	2.55	1.42	1.14	0.04	0.02	0.05	1.18	6.20	2.30	4.70	2.38	481.67	-
			STD. DEV.	7.63	-	43.24	2.87	42.34	131.19	183.08	6.18	4.47	9.81	0.52	0.52	0.74	0.85	0.05	0.02	0.04	0.88	-	-	2.30	1.89	114.79	-
			MIN	6.90	6.70	170.00	0.10	-285.20	1257.00	710.00	1.00	2.00	26.00	1.85	1.80	0.20	0.46	0.01	0.01	0.01	0.47	6.20	2.30	2.40	0.85	340.00	1.00
			MAX	28.40	7.60	280.00	7.70	-180.00	1655.00	1200.00	16.00	13.00	50.00	3.02	3.00	2.24	2.70	0.10	0.04	0.11	2.81	6.20	2.30	7.00	4.50	650.00	6.00

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Table 5 (con't)
Summary of Water Quality Data

Sample ID	Media Composition	Date of Start-up	Statistical Parameter	Temp (°C)	pH	Total Alkalinity (mg/L)	DO (mg/L)	ORP (mV)	Specific Conductance (µS)	TDS (mg/L)	TSS (mg/L)	$CBOD_5$ (mg/L)	COD (mg/L)	TN (mg/L N)[1]	TKN (mg/L N)	Organic N (mg/L N)[2]	NH3-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)	Sulfide (mg/L)	H_2S (mg/L)	SO_4 (mg/L)	Fecal (Ct/100 mL)
DENIT-LS2 (original)	50% Lignocellulosic; 50% Expanded Clay	5/17/2010	n	2	2	2	2	1	2	2	2	2	1	2	2	2	2	NS	NS	2	2	1	NS	NS	NS	NS	1
			MEAN	27.25	-	375.00	2.10	-11.50	1223.00	680.00	5.00	3.75	24.00	17.45	2.25	1.99	0.27			15.20	15.47	5.70					-
			STD. DEV.	0.07	-	7.07	2.83	-	318.20	240.42	5.66	2.47	-	20.72	1.20	1.15	0.05			19.52	19.57	-					-
			MIN	27.20	7.80	370.00	0.10	-11.50	998.00	510.00	1.00	2.00	24.00	2.80	1.40	1.17	0.23			1.40	1.63	5.70					1.00
			MAX	27.30	8.14	380.00	4.10	-11.50	1448.00	850.00	9.00	5.50	24.00	32.10	3.10	2.80	0.30			29.00	29.30	5.70					1.00
DENIT-LS2 (old)	25% Lignocellulosic; 75% Expanded Clay	10/25/2010	n	3	3	2	3	3	3	2	2	2	2	2	2	2	2	1	1	2	2	NS	NS	NS	NS	NS	1
			MEAN	15.43	-	330.00	4.47	66.37	1315.67	820.00	1.50	2.00	21.00	31.79	3.25	3.16	0.09	41.00	0.07	28.54	28.63						-
			STD. DEV.	7.68	-	14.14	0.47	199.09	124.24	56.57	0.71	0.00	7.07	16.95	0.78	0.77	0.01	-	-	17.73	17.72						-
			MIN	6.80	7.30	320.00	4.10	-135.00	1200.00	780.00	1.00	2.00	16.00	19.80	2.70	2.62	0.09	41.00	0.07	16.00	16.10						1.00
			MAX	21.50	7.61	340.00	5.00	263.10	1447.00	860.00	2.00	2.00	26.00	43.77	3.80	3.70	0.10	41.00	0.07	41.07	41.16						1.00
DENIT-LS2 (new)	25% New Lignocellulosic; 75% Expanded Clay	1/28/2011	n	2	2	2	2	2	2	1	2	2	1	2	2	2	2	2	2	2	2	NS	1	NS	NS	NS	1
			MEAN	17.25	-	295.00	3.25	-77.00	1088.50	710.00	3.00	2.00	39.00	22.38	3.75	2.83	0.93	17.00	1.63	18.63	19.56		2.80				-
			STD. DEV.	4.17	-	77.78	0.21	31.25	16.26	-	1.41	0.00	-	5.49	0.35	0.88	1.24	7.07	1.23	5.84	4.60		-				-
			MIN	14.30	7.90	240.00	3.10	-99.10	1077.00	710.00	2.00	2.00	39.00	18.50	3.50	2.20	0.05	12.00	0.76	14.50	16.30		2.80				1.00
			MAX	20.20	8.00	350.00	3.40	-54.90	1100.00	710.00	4.00	2.00	39.00	26.26	4.00	3.45	1.80	22.00	2.50	22.76	22.81		2.80				1.00
DENIT-LS4 (old)	30% Lignocellulosic; 70% Expanded Clay	5/17/2010	n	5	5	4	5	4	5	4	4	4	3	4	4	4	4	1	1	4	4	1	NS	NS	NS	NS	2
			MEAN	20.12	-	242.50	2.28	-49.78	897.40	410.00	30.50	4.28	25.67	31.84	28.50	12.68	15.83	3.10	0.29	3.34	19.17	6.90					-
			STD. DEV.	8.35	-	80.98	2.14	95.34	197.05	95.57	58.34	3.35	8.14	24.75	25.96	14.41	12.06	-	-	4.58	12.19	-					-
			MIN	7.40	7.30	180.00	0.40	-137.80	618.00	270.00	1.00	2.00	20.00	14.01	12.00	2.50	5.80	3.10	0.29	0.01	5.81	6.90					1.00
			MAX	28.10	7.62	360.00	5.20	81.00	1120.00	480.00	118.00	9.10	35.00	67.17	67.00	34.00	33.00	3.10	0.29	9.80	33.17	6.90					12.00
DENIT-LS4 (new)	30% New Lignocellulosic; 70% Expanded Clay	1/28/2011	n	2	2	2	2	2	2	1	2	2	1	2	2	2	2	2	2	2	2	NS	1	NS	NS	NS	1
			MEAN	18.05	-	315.00	0.60	-151.00	957.50	450.00	7.50	4.50	90.00	7.78	7.75	0.75	7.00	0.02	0.01	0.03	7.03		2.20				-
			STD. DEV.	2.62	-	91.92	0.00	62.93	173.24	-	3.54	3.54	-	8.85	8.84	1.06	9.90	0.01	0.00	0.01	9.90		-				-
			MIN	16.20	7.70	250.00	0.60	-195.50	835.00	450.00	5.00	2.00	90.00	1.52	1.50	0.00	0.01	0.01	0.01	0.02	0.03		2.20				1.00
			MAX	19.90	8.10	380.00	0.60	-106.50	1080.00	450.00	10.00	7.00	90.00	14.03	14.00	1.50	14.00	0.02	0.01	0.03	14.03		2.20				1.00
Recirculation Tanks Effluent																											
RC1		5/17/2010	n	6	6	6	5	5	6	5	6	6	4	6	6	6	6	3	3	6	6	1	1	NS	NS	NS	3
			MEAN	21.50	-	186.67	0.81	-23.10	873.67	502.00	3.33	4.30	30.00	34.30	13.95	3.67	10.28	16.00	0.70	20.35	30.64	5.80	3.20				-
			STD. DEV.	8.81	-	17.51	0.97	75.16	149.91	98.84	2.34	3.63	6.27	11.55	3.20	3.23	2.83	4.36	0.63	9.14	11.52	-	-				-
			MIN	7.20	7.20	160.00	0.03	-128.30	637.00	330.00	1.00	2.00	22.00	21.88	8.70	0.70	5.70	13.00	0.18	12.00	17.70	5.80	3.20				114.00
			MAX	30.80	7.50	210.00	2.10	57.00	1011.00	580.00	7.00	11.00	37.00	53.00	17.00	9.30	13.00	21.00	1.40	36.00	49.00	5.80	3.20				8200.00
RC2		5/17/2010	n	6	6	6	5	5	6	5	6	6	4	6	6	6	6	3	3	6	6	1	1	NS	NS	NS	3
			MEAN	21.17	-	180.00	1.02	-25.80	900.67	522.00	2.83	4.17	33.50	33.96	14.50	3.88	10.62	18.67	0.59	19.46	30.08	4.20	3.40				-
			STD. DEV.	8.60	-	24.49	1.02	64.04	146.50	102.81	1.47	3.37	7.05	6.98	3.21	3.63	4.19	3.79	0.53	5.03	8.56	-	-				-
			MIN	7.40	7.10	140.00	0.10	-108.20	679.00	340.00	1.00	2.00	24.00	27.00	10.00	0.00	5.30	16.00	0.22	12.00	17.30	4.20	3.40				99.00
			MAX	30.50	7.50	210.00	2.50	58.50	1031.00	590.00	5.00	9.00	41.00	43.00	19.00	9.70	15.00	23.00	1.20	24.20	38.00	4.20	3.40				9100.00
RC3		5/17/2010	n	6	6	6	5	5	6	5	6	6	4	6	6	6	6	3	3	6	6	1	1	NS	NS	NS	3
			MEAN	20.92	-	210.00	1.20	16.12	937.17	514.00	6.83	6.38	49.25	33.92	15.17	4.83	10.33	14.67	2.51	18.76	29.09	6.40	6.60				-
			STD. DEV.	8.40	-	34.64	1.04	56.20	145.62	90.72	3.87	3.88	9.25	6.42	2.71	4.07	3.57	2.08	2.44	7.41	8.42	-	-				-
			MIN	7.40	6.90	160.00	0.10	-47.20	760.00	360.00	1.00	2.00	39.00	27.00	12.00	0.00	5.50	13.00	0.13	11.00	16.50	6.40	6.60				109.00
			MAX	30.20	7.61	260.00	2.30	89.00	1128.00	590.00	13.00	12.00	61.00	45.00	19.00	10.50	16.00	17.00	5.00	33.00	41.70	6.40	6.60				13000.00
RC4		5/17/2010	n	6	6	6	5	5	6	5	6	6	4	6	6	6	6	3	3	6	6	1	1	NS	NS	NS	3
			MEAN	20.97	-	250.00	0.50	-14.56	960.67	534.00	9.00	4.95	39.75	30.90	17.83	6.68	11.15	5.45	2.02	13.07	24.22	6.70	6.10				-
			STD. DEV.	8.12	-	41.95	0.80	81.07	140.98	97.88	7.43	2.80	14.77	4.83	4.45	4.00	3.68	4.97	1.35	8.78	8.49	-	-				-
			MIN	8.30	7.30	180.00	0.00	-121.90	800.00	400.00	2.00	2.70	26.00	25.84	11.00	2.00	5.50	0.14	0.86	1.84	14.84	6.70	6.10				112.00
			MAX	30.40	7.80	290.00	1.90	73.00	1112.00	620.00	21.00	9.00	57.00	38.00	24.00	11.00	16.00	10.00	3.50	27.00	35.40	6.70	6.10				8700.00
RC5		5/17/2010	n	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	NS	1	NS	NS	NS	1
			MEAN	15.47	-	236.67	1.77	-25.80	956.00	473.33	11.00	8.67	58.33	38.17	28.00	3.33	24.67	5.75	2.50	10.17	34.83		5.70				-
			STD. DEV.	7.11	-	20.82	1.42	110.83	84.07	30.55	5.20	7.02	2.31	6.30	3.61	2.52	2.89	0.78	1.27	3.34	6.22		-				-
			MIN	7.90	7.10	220.00	0.50	-120.70	888.00	440.00	8.00	2.00	57.00	32.60	24.00	1.00	23.00	5.20	1.60	7.90	30.90		5.70				12700.00
			MAX	22.00	7.40	260.00	3.30	96.00	1050.00	500.00	17.00	16.00	61.00	45.00	31.00	6.00	28.00	6.30	3.40	14.00	42.00		5.70				12700.00

PRELIMINARY

Table 5 (con't)
Summary of Water Quality Data

Sample ID	Media Composition	Date of Start-up	Statistical Parameter	Temp (°C)	pH	Total Alkalinity (mg/L)	DO (mg/L)	ORP (mV)	Specific Conductance (µS)	TDS (mg/L)	TSS (mg/L)	$CBOD_5$ (mg/L)	COD (mg/L)	TN (mg/L N)[1]	TKN (mg/L N)	Organic N (mg/L N)[2]	NH3-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)	Sulfide (mg/L)	H_2S (mg/L)	SO_4 (mg/L)	Fecal (Ct/100 mL)
Stage 1 Recirculating Biofilters Effluent																											
UNSAT-CL4	30" Clinoptilolite	5/17/2010	n	6	6	6	6	5	6	5	6	6	4	6	6	6	6	3	3	6	6	1	1	NS	NS	NS	3
			MEAN	20.45	-	191.67	8.06	10.68	942.33	616.00	2.50	2.00	13.25	33.01	4.00	3.99	0.01	27.67	0.06	29.01	29.02	7.60	4.90				-
			STD. DEV.	8.57	-	54.56	1.47	63.76	151.34	81.73	2.81	0.00	2.06	12.95	3.93	3.93	0.01	11.93	0.08	14.52	14.52	-	-				-
			MIN	7.90	6.72	110.00	7.10	-98.20	750.00	480.00	1.00	2.00	11.00	10.30	2.10	2.09	0.01	14.00	0.01	7.90	7.92	7.60	4.90				1.00
			MAX	29.30	8.20	270.00	11.00	55.50	1174.00	680.00	8.00	2.00	16.00	45.10	12.00	12.00	0.02	36.00	0.15	43.00	43.01	7.60	4.90				18.00
UNSAT-CL2	15" Clinoptilolite	5/17/2010	n	6	6	6	6	5	6	5	6	6	4	6	6	6	6	3	3	6	6	1	1	NS	NS	NS	3
			MEAN	19.58	-	163.33	6.02	-6.92	910.17	588.00	2.33	2.17	21.00	35.32	2.58	2.57	0.01	28.33	0.13	32.73	32.74	7.10	2.30				-
			STD. DEV.	8.69	-	35.02	1.72	58.99	126.29	84.68	1.97	0.41	3.46	14.28	0.52	0.52	0.01	7.09	0.11	14.21	14.21	-	-				-
			MIN	6.00	7.00	120.00	2.90	-88.90	740.00	440.00	1.00	2.00	16.00	17.10	2.00	1.98	0.01	22.00	0.01	15.00	15.01	7.10	2.30				4.00
			MAX	27.10	7.85	200.00	7.90	50.20	1050.00	650.00	6.00	3.00	24.00	56.30	3.20	3.19	0.02	36.00	0.23	54.00	54.01	7.10	2.30				730.00
UNSAT-EC4	30" Expanded Clay	5/17/2010	n	6	6	6	6	5	6	5	6	6	4	6	6	6	6	3	3	6	6	1	1	NS	NS	NS	3
			MEAN	20.45	-	136.67	7.90	9.38	863.33	568.00	2.17	2.00	14.25	34.52	2.43	2.42	0.01	29.00	0.17	32.09	32.10	3.80	1.80				-
			STD. DEV.	8.16	-	17.51	1.12	65.50	145.68	125.18	2.40	0.00	3.50	12.41	0.33	0.33	0.01	8.54	0.28	12.30	12.30	-	-				-
			MIN	7.00	6.90	110.00	6.90	-88.80	661.00	350.00	1.00	2.00	10.00	18.90	1.90	1.89	0.01	20.00	0.01	17.00	17.01	3.80	1.80				1.00
			MAX	28.50	7.30	160.00	10.00	78.80	1000.00	660.00	7.00	2.00	18.00	52.30	2.90	2.89	0.04	37.00	0.50	50.00	50.01	3.80	1.80				21.00
UNSAT-SA2	30" Sand	5/17/2010	n	6	6	6	6	5	6	5	6	6	4	6	6	6	6	3	3	6	6	1	1	NS	NS	NS	3
			MEAN	20.03	-	128.33	6.86	13.36	834.33	537.60	4.00	2.17	17.25	30.81	2.85	2.59	0.26	25.33	0.24	27.96	28.21	6.30	2.10				-
			STD. DEV.	8.37	-	17.22	1.71	62.82	131.71	121.53	5.02	0.41	3.77	9.35	0.58	0.48	0.35	6.51	0.40	8.80	8.93	-	-				-
			MIN	6.20	6.04	110.00	4.50	-70.80	604.00	330.00	1.00	2.00	13.00	19.20	2.10	2.04	0.01	19.00	0.01	17.00	17.01	6.30	2.10				1.00
			MAX	28.20	7.10	150.00	9.60	89.20	953.00	638.00	13.00	3.00	22.00	41.50	3.50	3.29	0.74	32.00	0.71	38.00	38.74	6.30	2.10				41.00
UNSAT-PS1 (new recirc)	30" Polystyrene	10/22/2010	n	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	NS	1	NS	NS	NS	1
			MEAN	14.90	-	176.67	4.53	3.87	908.33	510.00	5.33	6.00	47.33	52.33	20.33	3.00	17.33	11.50	1.50	32.00	49.33		2.20				-
			STD. DEV.	9.00	-	40.41	3.65	75.36	55.75	34.64	3.51	5.29	7.23	39.57	6.66	3.46	3.21	2.12	0.28	32.95	36.10		-				-
			MIN	5.80	7.20	130.00	0.60	-49.90	845.00	490.00	2.00	2.00	39.00	28.30	16.00	1.00	15.00	10.00	1.30	11.30	27.30		2.20				9500.00
			MAX	23.80	7.30	200.00	7.80	90.00	950.00	550.00	9.00	12.00	52.00	98.00	28.00	7.00	21.00	13.00	1.70	70.00	91.00		2.20				9500.00
Pump 15 Tank (DENIT-LS4 Influent)		10/22/2010	n	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	NS	1	NS	NS	NS	1
			MEAN	14.77	-	196.67	4.83	-3.87	901.33	513.33	3.67	5.67	39.67	37.73	22.00	3.33	18.67	12.00	1.09	15.73	34.39		3.80				-
			STD. DEV.	8.52	-	5.77	3.34	22.85	68.01	35.12	2.52	3.79	6.11	4.41	1.73	1.15	2.89	1.41	0.16	4.65	4.61		-				-
			MIN	5.00	7.00	190.00	1.00	-26.90	834.00	480.00	1.00	3.00	33.00	33.20	21.00	2.00	17.00	11.00	0.98	12.20	29.20		3.80				3900.00
			MAX	20.70	7.40	200.00	7.10	18.80	970.00	550.00	6.00	10.00	45.00	42.00	24.00	4.00	22.00	13.00	1.20	21.00	38.00		3.80				3900.00
Denite Feed Tank (Tank 3)																											
DFT		5/17/2010	n	6	6	6	6	5	6	5	6	6	4	6	6	6	6	3	3	6	6	3	1	4	4	6	3
			MEAN	19.98	-	160.00	7.97	17.50	892.50	576.00	1.33	2.00	27.00	29.41	3.07	3.01	0.05	28.00	0.03	26.35	26.40	8.87	1.90	0.65	0.16	59.00	-
			STD. DEV.	7.79	-	24.49	0.97	38.48	113.38	107.14	0.82	0.00	12.81	10.73	0.40	0.38	0.06	10.54	0.03	10.90	10.88	2.26	-	0.66	0.25	8.29	-
			MIN	6.40	7.00	130.00	7.31	-40.90	744.00	390.00	1.00	2.00	18.00	19.50	2.40	2.35	0.01	17.00	0.01	16.00	16.17	6.50	1.90	0.10	0.01	46.00	1.00
			MAX	28.10	8.06	200.00	9.80	62.20	1020.00	660.00	3.00	2.00	46.00	42.80	3.50	3.33	0.17	38.00	0.06	40.00	40.01	11.00	1.90	1.40	0.53	67.00	22.00
Stage 2 Horizontal Biofilters Effluent																											
DENIT-SU1	80% Sulfur; 20% Oyster Shell	5/17/2010	n	6	6	6	6	5	6	5	6	6	4	6	6	6	6	3	3	6	6	1	1	3	3	6	3
			MEAN	17.48	-	223.33	0.61	-284.68	1208.17	842.00	1.50	13.33	45.00	2.54	2.43	1.08	1.35	0.07	0.09	0.11	1.46	5.00	2.90	23.67	10.73	325.00	-
			STD. DEV.	11.61	-	20.66	0.65	37.47	163.71	132.74	0.84	10.78	17.11	0.40	0.38	0.71	0.69	0.03	0.13	0.13	0.60	-	-	6.11	1.42	82.89	-
			MIN	0.20	6.80	200.00	0.10	-323.10	1000.00	660.00	1.00	2.00	22.00	2.04	1.90	0.30	0.46	0.05	0.01	0.01	0.81	5.00	2.90	17.00	9.20	230.00	1.00
			MAX	28.00	7.20	250.00	1.60	-231.20	1473.00	1000.00	3.00	26.00	63.00	2.96	2.90	2.14	2.40	0.11	0.24	0.35	2.44	5.00	2.90	29.00	12.00	450.00	5.00
DENIT-SU2 (old)	80% Sulfur; 20% Sodium Sesqui.	5/17/2010	n	2	2	2	2	1	2	2	2	2	1	2	2	2	2	NS	NS	2	2	1	NS	2	2	2	1
			MEAN	26.35	-	235.00	0.87	-279.00	1400.00	810.00	1.50	12.45	50.00	4.11	1.50	1.04	0.47			2.61	3.08	4.80		7.05	3.36	305.00	-
			STD. DEV.	2.19	-	35.36	0.52	-	2.83	169.71	0.71	10.68	-	3.24	0.42	0.22	0.64			3.66	3.02	-		9.83	4.73	233.35	-
			MIN	24.80	7.00	210.00	0.50	-279.00	1398.00	690.00	1.00	4.90	50.00	1.83	1.20	0.88	0.01			0.03	0.95	4.80		0.10	0.01	140.00	1.00
			MAX	27.90	9.08	260.00	1.23	-279.00	1402.00	930.00	2.00	20.00	50.00	6.40	1.80	1.19	0.92			5.20	5.21	4.80		14.00	6.70	470.00	1.00
DENIT-SU2 (new)	10% Limestone; 30% Sulfur; 60% Expanded Clay	10/25/2010	n	4	4	4	4	4	4	3	4	4	3	4	4	4	4	3	3	4	4	NS	1	4	4	4	2
			MEAN	11.95	-	215.00	0.60	-220.13	1196.50	893.33	3.50	8.50	29.67	1.59	1.56	0.98	0.58	0.01	0.02	0.04	0.61		2.00	7.53	3.43	362.50	-
			STD. DEV.	11.34	-	31.09	0.69	95.54	155.64	136.14	3.11	10.50	15.31	1.30	1.30	0.62	0.70	0.01	0.02	0.02	0.70		-	6.90	3.07	103.40	-
			MIN	0.30	6.80	190.00	0.10	-309.90	1010.00	740.00	1.00	2.00	18.00	0.77	0.74	0.52	0.03	0.01	0.01	0.02	0.06		2.00	1.00	0.01	260.00	1.00
			MAX	25.50	7.10	260.00	1.60	-90.00	1350.00	1000.00	8.00	24.00	47.00	3.53	3.50	1.90	1.60	0.02	0.05	0.06	1.63		2.00	17.00	7.40	490.00	3.00
DENIT-LS1 (old)	50% Lignocellulosic; 50% Expanded Clay	5/17/2010	n	5	5	5	5	4	5	4	5	5	3	5	5	5	5	1	1	5	5	1	NS	NS	NS	NS	2
			MEAN	17.60	-	226.00	0.49	-127.05	931.20	507.50	1.00	13.18	26.00	16.33	2.10	1.80	0.30	22.00	0.10	14.23	14.53	0.46					-
			STD. DEV.	10.95	-	26.08	0.40	81.47	123.69	95.35	0.00	23.95	15.62	14.21	0.56	0.89	0.39	-	-	13.79	13.43	-					-
			MIN	0.30	6.88	190.00	0.09	-199.70	738.00	370.00	1.00	2.00	16.00	1.54	1.50	0.74	0.01	22.00	0.10	0.01	0.71	0.46					1.00
			MAX	27.30	7.70	250.00	1.10	-15.40	1076.00	590.00	1.00	56.00	44.00	33.70	2.70	2.70	0.76	22.00	0.10	31.00	31.02	0.46					1.00
DENIT-LS1 (new)	50% New Lignocellulosic; 50% Expanded Clay	1/28/2011	n	2	2	2	2	2	2	1	2	2	1	2	2	2	2	2	2	2	2	NS	1	NS	NS	NS	1
			MEAN	10.35	-	270.00	0.10	-286.65	793.00	630.00	13.00	89.50	320.00	14.43	14.40	14.09	0.31	0.02	0.01	0.03	0.33		2.00				-
			STD. DEV.	8.13	-	70.71	0.00	21.43	131.52	-	9.90	85.56	-	17.83	17.82	18.25	0.43	0.01	0.00	0.01	0.42		-				-
			MIN	4.60	7.30	220.00	0.10	-301.80	700.00	630.00	6.00	29.00	320.00	1.82	1.80	1.19	0.01	0.01	0.01	0.02	0.04		2.00				1.00
			MAX	16.10	7.40	320.00	0.10	-271.50	886.00	630.00	20.00	150.00	320.00	27.03	27.00	27.00	0.61	0.02	0.01	0.03	0.63		2.00				1.00
DENIT-GL1	12" Gravel; 60" Expanded Clay	5/17/2010	n	6	6	6	6	5	6	5	6	6	5	6	6	6	6	3	3	7	6	1	1	NS	NS	NS	3
			MEAN	15.77	-	401.67	0.59	-217.98	1026.17	640.00	18.50	147.67	256.80	14.66	13.82	6.74	7.07	0.05	0.02	0.73	7.92	2.90	3.00				-
			STD. DEV.	11.33	-	144.00	0.59	43.30	330.68	320.62	39.94	324.75	471.81	25.27	25.63	14.83	10.92	0.05	0.02	1.75	10.56	-	-				-
			MIN	0.30	6.40	220.00	0.10	-267.30	794.00	380.00	1.00	2.00	22.00	1.94	1.90	0.20	0.88	0.01	0.01	0.02	0.95	2.90	3.00				1.00
			MAX	27.80	7.96	660.00	1.54	-174.90	1686.00	1200.00	100.00	810.00	1100.00	66.08	66.00	37.00	29.00	0.11	0.04	4.70	29.08	2.90	3.00				1000.00

DRAFT - INTERNAL USE ONLY

Table 5 (con't)
Summary of Water Quality Data

Sample ID	Media Composition	Date of Start-up	Statistical Parameter	Temp (°C)	pH	Total Alkalinity (mg/L)	DO (mg/L)	ORP (mV)	Specific Conductance (µS)	TDS (mg/L)	TSS (mg/L)	$CBOD_5$ (mg/L)	COD (mg/L)	TN (mg/L N)[1]	TKN (mg/L N)	Organic N (mg/L N)[2]	NH3-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)	Sulfide (mg/L)	H_2S (mg/L)	SO_4 (mg/L)	Fecal (Ct/100 mL)
In-situ Simulator Biofilters Effluent																											
UNSAT-IS1 (receives STE) (old)	15" Sand; 12" Mix (45% EC, 35% Ligno, 20% Sulfur)	5/17/2010	n	6	6	6	6	5	6	6	6	6	4	6	6	6	6	1	1	6	6	2	NS	5	5	6	3
			MEAN	20.77	-	306.67	0.79	-73.86	1391.83	783.33	23.83	16.37	82.25	37.19	37.07	2.74	34.32	0.08	0.29	0.12	34.45	1.45		2.14	1.17	304.83	-
			STD. DEV.	10.85	-	111.30	0.89	180.35	513.74	420.13	43.82	24.19	26.71	31.01	30.94	2.73	28.41	-	-	0.13	28.48	0.35		2.18	1.12	405.77	-
			MIN	1.20	6.39	130.00	0.10	-246.20	1120.00	480.00	2.00	2.00	57.00	0.43	0.41	0.00	0.05	0.08	0.29	0.02	0.07	1.20		0.10	0.01	7.00	1.00
			MAX	29.70	7.07	430.00	1.95	221.60	2438.00	1600.00	113.00	65.00	120.00	75.04	75.00	6.00	69.00	0.08	0.29	0.37	69.04	1.70		4.70	2.80	1100.00	10.00
UNSAT-IS1 (receives STE) (new)	4" Coarse Sand; 8" Fine Sand; 12" Mix (60% EC, 40% New Ligno); 4" Sulfur	1/28/2011	n	2	2	2	NS	NS	2	1	2	2	1	2	2	2	2	2	2	2	2	NS	1	NS	NS	2	1
			MEAN	17.40	-	320.00			904.50	660.00	5.00	62.00	240.00	6.78	6.10	1.57	4.54	0.27	0.42	0.68	5.22		5.20			110.00	-
			STD. DEV.	9.48	-	113.14			133.64	-	4.24	82.02	-	3.08	3.96	1.93	5.89	0.00	0.00	0.88	5.01		-			127.28	-
			MIN	10.70	7.30	240.00			810.00	660.00	2.00	4.00	240.00	4.60	3.30	0.20	0.37	0.05	0.01	0.06	1.67		5.20			20.00	1.00
			MAX	24.10	7.30	400.00			999.00	660.00	8.00	120.00	240.00	8.96	8.90	2.93	8.70	0.48	0.82	1.30	8.76		5.20			200.00	1.00
UNSAT-IS2 (receives DFT NO_3) (old)	12" Sand; 12" Mix (45% EC, 35% Ligno, 20% Sulfur)	5/17/2010	n	6	6	6	6	5	6	6	6	6	4	6	6	6	6	1	1	6	6	2	NS	5	5	6	3
			MEAN	21.35	-	176.67	1.03	-192.82	1474.83	1178.33	48.33	5.52	25.25	1.10	1.04	0.61	0.44	0.01	0.21	0.06	0.50	4.25		0.58	0.13	608.33	-
			STD. DEV.	9.09	-	40.33	1.43	41.23	1097.70	897.81	45.11	4.47	16.76	0.37	0.35	0.32	0.28	-	-	0.08	0.32	3.89		0.46	0.26	588.20	-
			MIN	6.20	6.14	100.00	0.09	-234.50	365.00	700.00	1.00	2.00	13.00	0.63	0.62	0.40	0.11	0.01	0.21	0.01	0.12	1.50		0.10	0.01	250.00	1.00
			MAX	30.00	6.80	210.00	3.90	-130.00	3506.00	3000.00	108.00	13.00	50.00	1.52	1.50	1.24	0.80	0.01	0.21	0.22	0.85	7.00		1.00	0.60	1800.00	1.00
UNSAT-IS2-SP (receives STE) (new)	Sample Port above 4" Sulfur layer	1/28/2011	n	1	1	1	1	1	1	1	1	1	1	1	1	1	1	NS	NS	1	1	NS	1	NS	NS	1	NS
			MEAN	25.80	-	69.00	0.50	-57.90	970.00	510.00	2.00	13.00	63.00	46.90	3.90	3.33	0.57			43.00	43.57		5.20			58.00	
			STD. DEV.	-	-	-	-	-	-	-	-	-	-	-	-	-	-			-	-		-			-	
			MIN	25.80	6.60	69.00	0.50	-57.90	970.00	510.00	2.00	13.00	63.00	46.90	3.90	3.33	0.57			43.00	43.57		5.20			58.00	
			MAX	25.80	6.60	69.00	0.50	-57.90	970.00	510.00	2.00	13.00	63.00	46.90	3.90	3.33	0.57			43.00	43.57		5.20			58.00	
UNSAT-IS2 (receives STE) (new)	4" EC>1.53mm; 8" EC ; 12" Mix (60% EC, 40% New Ligno); 4" Sulfur	1/28/2011	n	2	2	2	NS	NS	2	1	2	2	1	2	2	2	2	2	2	2	2	NS	1	NS	NS	2	1
			MEAN	18.10	-	255.00			913.50	670.00	8.50	11.00	82.00	27.33	23.15	7.97	15.19	0.38	3.81	4.18	19.37		0.68			132.00	-
			STD. DEV.	0.00	-	91.92			89.80	-	2.12	11.31	-	20.80	26.66	5.71	20.95	0.49	5.37	5.85	15.10		-			110.31	-
			MIN	11.80	7.30	190.00			850.00	670.00	7.00	3.00	82.00	12.62	4.30	3.93	0.37	0.03	0.01	0.04	8.69		0.68			54.00	19.00
			MAX	24.40	7.40	320.00			977.00	670.00	10.00	19.00	82.00	42.04	42.00	12.00	30.00	0.72	7.60	8.32	30.04		0.68			210.00	19.00
UNSAT-IS3-SP (receives STE) (old)	Sample Port above 3" Sulfur layer	10/18/2010	n	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	NS	NS	NS	NS	1	NS
			MEAN	4.00	-	210.00	12.00	39.20	980.00	600.00	3.00	2.00	26.00	7.70	1.80	1.76	0.04	3.70	2.20	5.90	5.94					130.00	
			STD. DEV.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					-	
			MIN	4.00	7.50	210.00	12.00	39.20	980.00	600.00	3.00	2.00	26.00	7.70	1.80	1.76	0.04	3.70	2.20	5.90	5.94					130.00	
			MAX	4.00	7.50	210.00	12.00	39.20	980.00	600.00	3.00	2.00	26.00	7.70	1.80	1.76	0.04	3.70	2.20	5.90	5.94					130.00	
UNSAT-IS3 (receives STE) (old)	12" Sand; 10" Mix (60% EC, 40% Ligno); 3" Sulfur)	10/18/2010	n	3	3	3	3	3	3	2	2	3	2	3	3	3	3	1	1	3	3	NS	NS	1	1	3	NS
			MEAN	13.00	-	283.33	0.46	155.33	1410.00	1575.00	7.00	3.00	38.50	37.00	4.90	1.10	3.80	24.00	8.30	32.10	35.90			1.00	0.01	183.33	
			STD. DEV.	5.14	-	15.28	0.05	17.54	88.10	1025.30	4.24	1.00	10.61	2.95	1.30	1.56	2.51	-	-	4.00	3.57			-	-	92.92	
			MIN	8.70	6.67	270.00	0.43	136.50	1331.00	850.00	4.00	2.00	31.00	34.40	4.10	0.20	1.20	24.00	8.30	28.00	33.50			1.00	0.01	120.00	
			MAX	18.70	6.97	300.00	0.52	171.20	1505.00	2300.00	10.00	4.00	46.00	40.20	6.40	2.90	6.20	24.00	8.30	36.00	40.00			1.00	0.01	290.00	
UNSAT-IS3-SP (receives STE) (new)	Sample Port above 4" Sulfur layer	1/28/2011	n	2	2	2	NS	NS	2	1	2	2	1	2	2	2	2	2	2	2	2	NS	1	NS	NS	2	1
			MEAN	12.20	-	455.00			1134.50	910.00	3.00	2.50	120.00	12.23	3.00	2.68	0.33	8.90	0.33	9.23	9.55		3.50			93.00	-
			STD. DEV.	8.49	-	63.64			190.21	-	1.41	0.71	-	4.24	0.28	0.46	0.18	4.38	0.13	4.52	4.70		-			7.07	-
			MIN	6.20	7.10	410.00			1000.00	910.00	2.00	2.00	120.00	9.23	2.80	2.35	0.20	5.80	0.23	6.03	6.23		3.50			88.00	1.00
			MAX	18.20	7.60	500.00			1269.00	910.00	4.00	3.00	120.00	15.22	3.20	3.00	0.45	12.00	0.42	12.42	12.87		3.50			98.00	1.00
UNSAT-IS3 (receives STE) (new)	4" CL 8X14; 8" CL 16X50; 12" Mix (60% EC, 40% New Ligno); 4" Sulfur	1/28/2011	n	2	2	2	NS	2	2	1	2	2	1	2	2	2	2	2	2	2	2	NS	1	NS	NS	2	1
			MEAN	12.70	-	385.00		8.95	1438.00	990.00	4.50	4.50	96.00	3.08	3.05	1.40	1.65	0.02	0.01	0.03	1.68		2.30			250.00	-
			STD. DEV.	0.99	-	7.07		125.23	60.81	-	4.95	2.12	-	0.78	0.78	0.85	0.07	0.01	0.00	0.01	0.06		-			70.71	-
			MIN	12.00	7.38	380.00		-79.60	1395.00	990.00	1.00	3.00	96.00	2.52	2.50	0.80	1.60	0.01	0.01	0.02	1.63		2.30			200.00	9.00
			MAX	13.40	7.74	390.00		97.50	1481.00	990.00	8.00	6.00	96.00	3.63	3.60	2.00	1.70	0.02	0.01	0.03	1.72		2.30			300.00	9.00

PRELIMINARY

Table 5 (con't)
Summary of Water Quality Data

Sample ID	Media Composition	Date of Start-up	Statistical Parameter	Temp (°C)	pH	Total Alkalinity (mg/L)	DO (mg/L)	ORP (mV)	Specific Conductance (µS)	TDS (mg/L)	TSS (mg/L)	$CBOD_5$ (mg/L)	COD (mg/L)	TN (mg/L N)[1]	TKN (mg/L N)	Organic N (mg/L N)[2]	NH3-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)	Sulfide (mg/L)	H_2S (mg/L)	SO_4 (mg/L)	Fecal (Ct/100 mL)
UNSAT-IS4-SP (receives DFT NO_3) (old)	Sample Port above 3" Sulfur layer	10/18/2010	n	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	NS	NS	NS	NS	1	NS
			MEAN	5.10	-	100.00	12.00	35.10	1050.00	710.00	1.00	2.00	22.00	52.40	3.50	3.40	0.10	46.00	2.90	48.90	49.00					92.00	
			STD. DEV.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					-	
			MIN	5.10	6.60	100.00	12.00	35.10	1050.00	710.00	1.00	2.00	22.00	52.40	3.50	3.40	0.10	46.00	2.90	48.90	49.00					92.00	
			MAX	5.10	6.60	100.00	12.00	35.10	1050.00	710.00	1.00	2.00	22.00	52.40	3.50	3.40	0.10	46.00	2.90	48.90	49.00					92.00	
UNSAT-IS4 (receives DFT NO_3) (old)	12" Sand; 10" Mix (60% EC, 40% Ligno); 3" Sulfur)	10/18/2010	n	3	3	3	3	3	3	1	1	2	2	4	4	4	4	1	1	4	4	NS	NS	NS	NS	4	NS
			MEAN	12.77	-	246.67	3.59	160.90	707.34	620.00	7.00	2.00	32.00	16.17	1.49	1.42	0.07	0.11	0.01	14.68	14.75					307.50	
			STD. DEV.	5.05	-	41.63	4.65	16.15	616.33	-	-	0.00	4.24	18.59	0.56	0.58	0.03	-	-	18.11	18.08					185.90	
			MIN	8.40	7.05	200.00	0.84	150.40	0.01	620.00	7.00	2.00	29.00	0.99	0.87	0.78	0.04	0.11	0.01	0.12	0.21					110.00	
			MAX	18.30	7.48	280.00	8.96	179.50	1129.00	620.00	7.00	2.00	35.00	43.10	2.10	2.06	0.09	0.11	0.01	41.00	41.04					490.00	
UNSAT-IS4-SP (receives UNSAT-CL3 NO_3) (new)	Sample Port above 4" Sulfur layer	1/28/2011	n	2	2	2	NS	NS	2	1	2	2	1	2	2	2	2	2	2	2	2	NS	1	NS	NS	2	1
			MEAN	16.20	-	325.00			1113.50	800.00	12.00	6.00	80.00	16.31	3.05	2.79	0.27	13.00	0.26	13.26	13.52		0.46			110.00	-
			STD. DEV.	1.84	-	148.49			37.48	-	11.31	5.66	-	9.61	0.64	0.59	0.05	9.90	0.35	10.25	10.20		-			14.14	-
			MIN	14.90	7.00	220.00			1087.00	800.00	4.00	2.00	80.00	9.51	2.60	2.37	0.23	6.00	0.01	6.01	6.31		0.46			100.00	1.00
			MAX	17.50	7.40	430.00			1140.00	800.00	20.00	10.00	80.00	23.10	3.50	3.20	0.30	20.00	0.50	20.50	20.73		0.46			120.00	1.00
UNSAT-IS4 (receives UNSAT-CL3 NO_3) (new)	4" Coarse Sand; 8" Fine Sand; 12" Mix (60% EC, 40% New Ligno); 4" Sulfur	1/28/2011	n	2	2	2	NS	2	2	1	2	2	1	2	2	2	2	2	2	2	2	NS	1	NS	NS	2	1
			MEAN	13.25	-	495.00		47.60	1362.50	870.00	39.00	24.00	88.00	6.52	3.60	3.54	0.06	2.31	0.61	2.92	2.97		0.02			180.00	-
			STD. DEV.	1.48	-	49.50		40.31	23.33	-	7.07	19.80	-	5.78	1.70	1.72	0.03	3.24	0.84	4.08	4.05		-			14.14	-
			MIN	12.20	6.99	460.00		19.10	1346.00	870.00	34.00	10.00	88.00	2.43	2.40	2.32	0.04	0.02	0.01	0.03	0.11		0.02			170.00	1.00
			MAX	14.30	7.13	530.00		76.10	1379.00	870.00	44.00	38.00	88.00	10.60	4.80	4.76	0.08	4.60	1.20	5.80	5.84		0.02			190.00	1.00

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

EC: expanded clay, CL: clinoptilolite, PS: polystyrene, SU: elemental sulfur, LS: lignocellulosic, GL: glycerol, OS: oyster shell, NS: sodium sesquicarbonate, GR: gravel

DO - Dissolved oxygen

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 too many colonies were present.

Blue-shaded data points indicate the number is greater than reported value.

Purple-shaded data points indicate results based on colony counts outside the method indicated ideal range.

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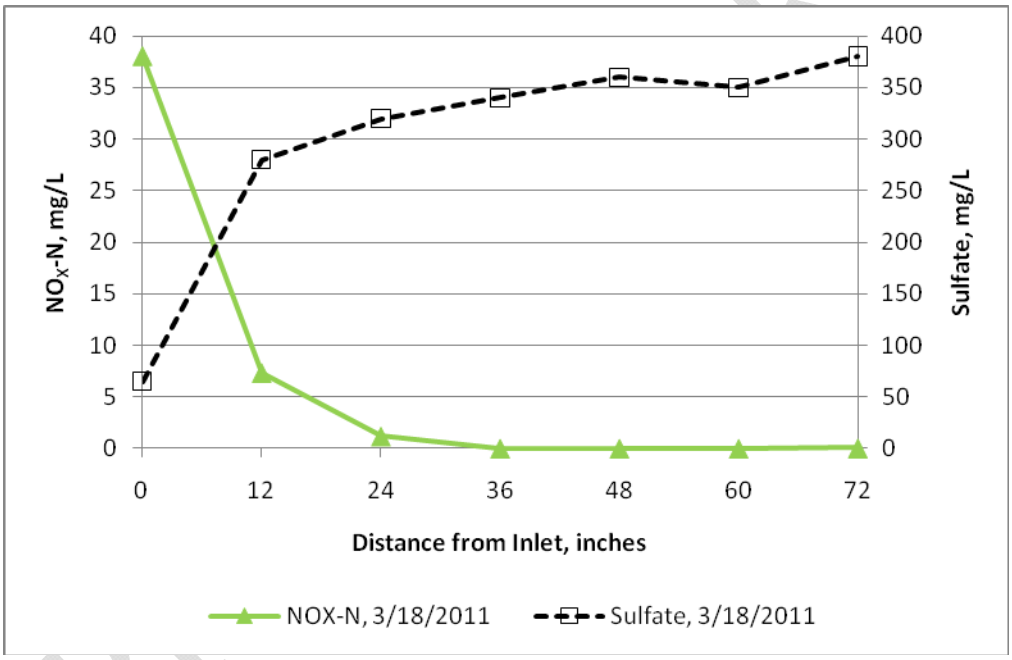
4.3 Stage 2 Denitrification Biofilter Profiles

Sample ports were installed along the depth of the Stage 2 denitrification biofilters to enable longitudinal profiling of nitrogen species and other water quality parameters. The four Stage 2 biofilters that are supplied the common recirculation system Stage 1 effluents (DENIT-SU1, DENIT-SU2, DENIT-LS1 and DENIT-GL1) are configured as 6 inch diameter columns of 72 inch media depth. Sample ports were installed at 12 inch increments along the length of the biofilter, enabling six point longitudinal profiling. Figures 2 through 5 depict the NOx-N and sulfate (if applicable) concentrations along the longitudinal profile of these four biofilters for the sample event on March 18, 2011. As depicted, all the Stage 2 horizontal biofilters reduce the NOx-N concentration to non-detect levels within the first 36 inches.



[1]Biofilter contains 80% sulfur / 20% oyster shell mixture.

Figure 2: DENIT-SU1 Longitudinal Profile

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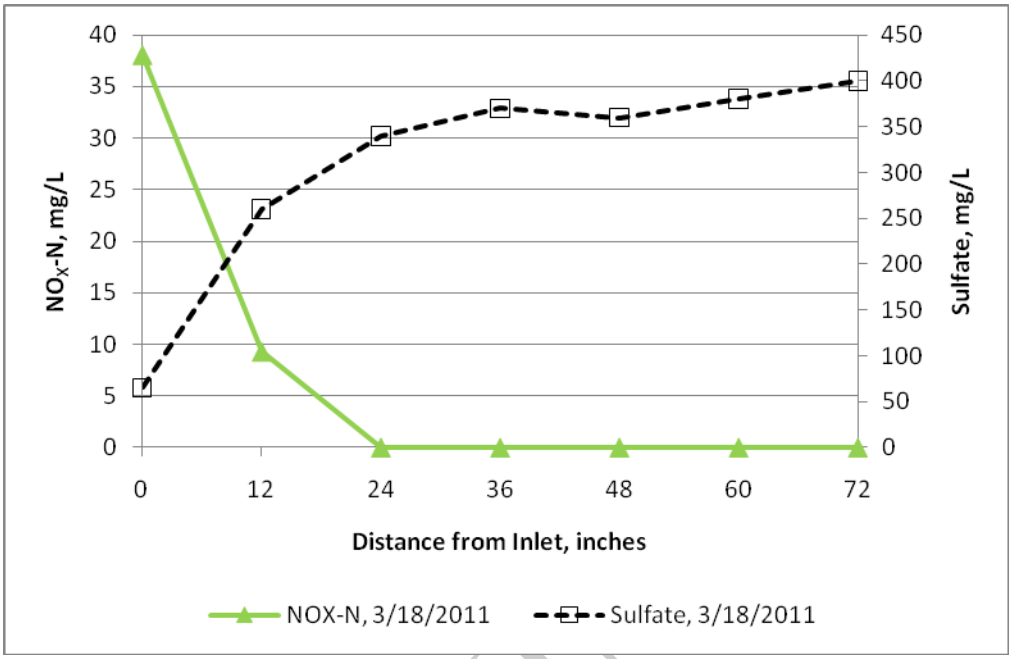

[1]Biofilter contains 10% limestone / 30% sulfur / 60% expanded clay mixture.

Figure 3: DENIT-SU2 Longitudinal Profile

[1]Biofilter contains 50% new lignocellulosic / 50% expanded clay mixture.

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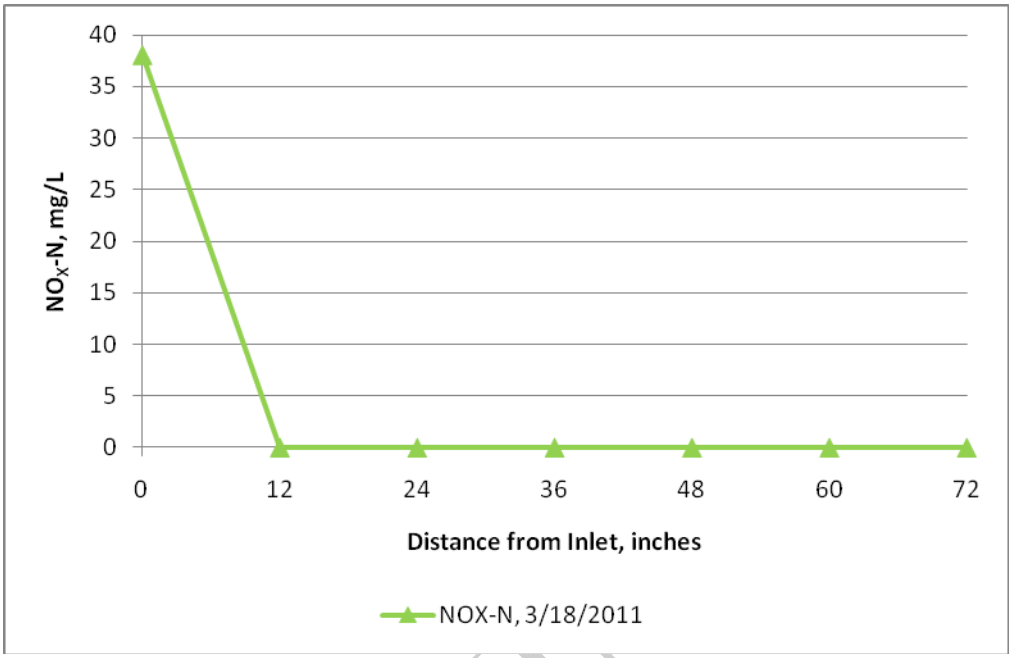
Figure 4: DENIT-LS1 Longitudinal Profile



[1]Biofilter contains 12" gravel, 60" expanded clay, glycerol is added to influent.

Figure 5: DENIT-GL1 Longitudinal Profile

The five Stage 2 biofilters that are directly connected to the single pass Stage 1 biofilters (DENIT-SU3, DENIT-SU4, DENIT-LS2, DENIT-LS3 and DENIT-LS4) are configured as 22 inch diameter circular upflow filters of 24 inch media depth. Sample ports were installed at 3, 7, 12, and 18 inch increments along the length of the biofilter, enabling five point longitudinal profiling. Figures 6 through 10 depict the NOx-N and sulfate (if applicable) concentrations along the longitudinal profile of these five biofilters for the sample event on March 18, 2011. As depicted in Figures 6 and 7, both the Stage 2 upflow biofilters which contain sulfur media reduce the NOx-N concentration to non-detect levels within the first 7 inches. Two of the three lignocellulosic upflow biofilters reduce the NOx-N concentration to non-detect levels within the first 12 inches (Figures 9 and 10). DENIT-LS2 does not reduce the NOx-N concentration to non-detect levels throughout the entire depth of the biofilter (Figure 8).

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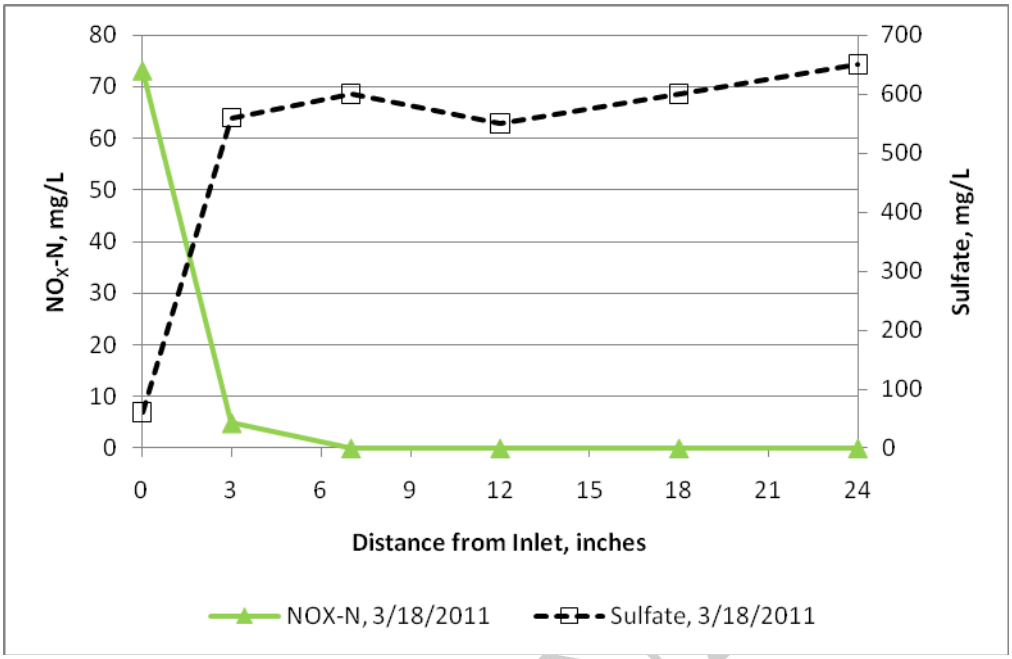
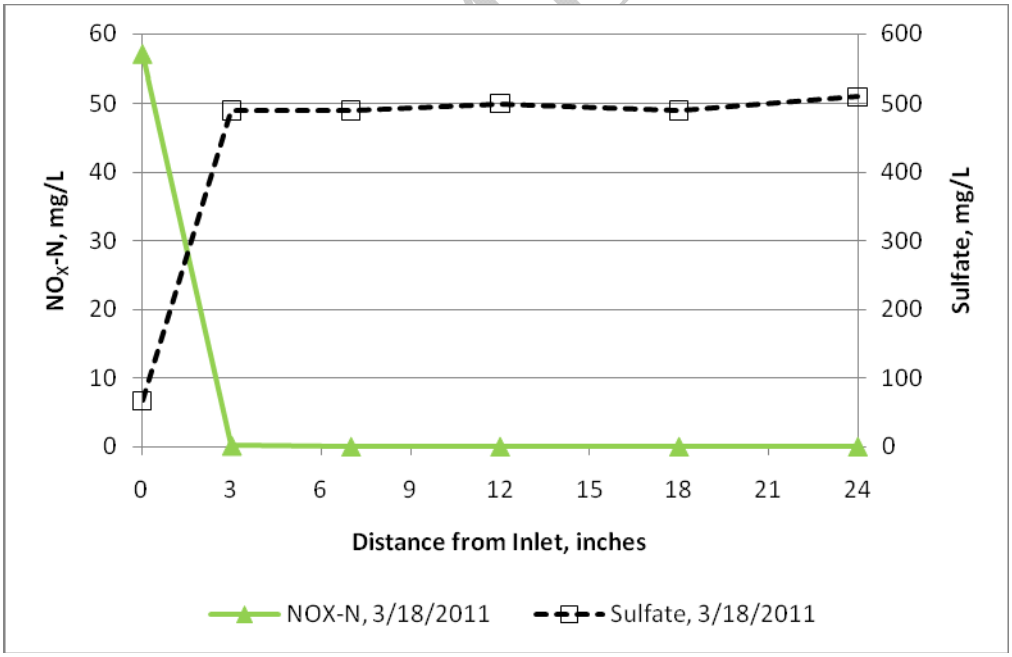


[1]Biofilter contains 80% sulfur / 20% oyster shell mixture.

Figure 6: DENIT-SU3 Longitudinal Profile



[1]Biofilter contains 10% limestone / 30% sulfur / 60% expanded clay mixture.

Figure 7: DENIT-SU4 Longitudinal Profile

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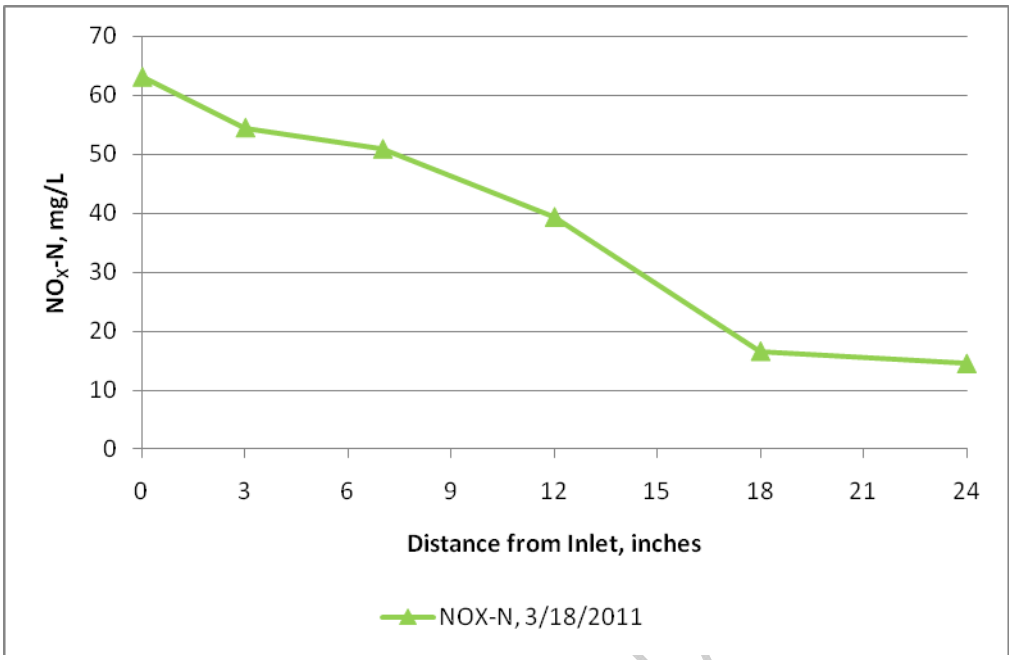

[1]Biofilter contains 25% new lignocellulosic / 75% expanded clay mixture.

Figure 8: DENIT-LS2 Longitudinal Profile

[1]Biofilter contains 50% new lignocellulosic / 50% sand mixture.

Figure 9: DENIT-LS3 Longitudinal Profile

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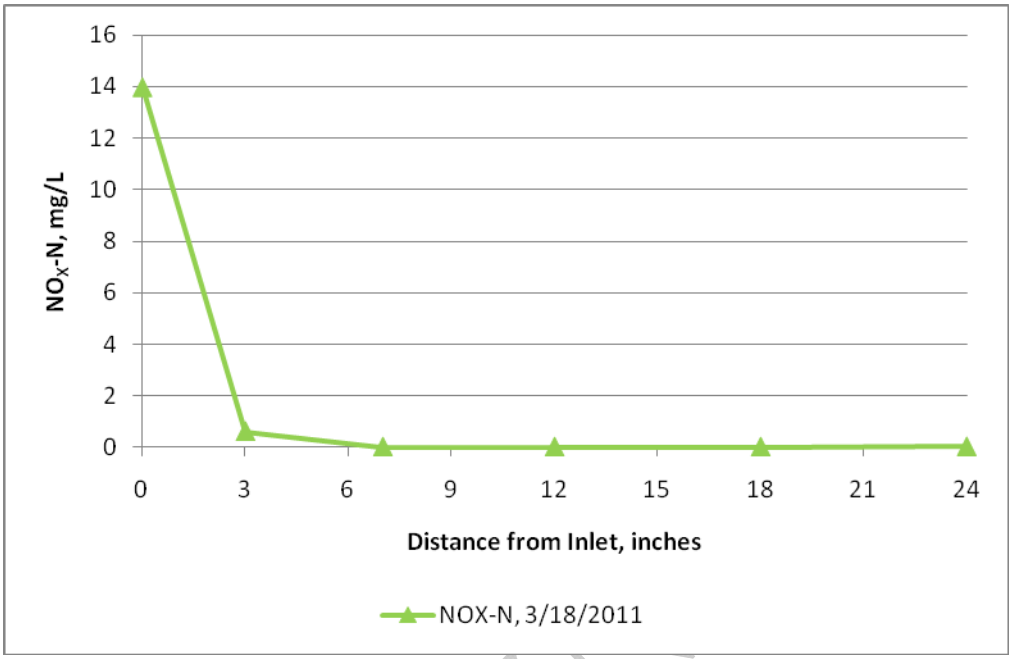

[1]Biofilter contains 30% new lignocellulosic / 70% expanded clay mixture.

Figure 10: DENIT-LS4 Longitudinal Profile

4.4 Flow Monitoring

Influent and effluent flows were measured, recorded, and adjusted as necessary to maintain flow rates consistent with the experimental design following the sampling event. Flow measurements and adjustments are made following 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.

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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.

5.0 PNRS II Sample Event No. 6: Summary and Recommendations

5.1 Summary

The results of the sixth sampling event serve to confirm that the experimental systems are functioning as intended and provide the basis upon which to make system adjustments and modifications. The Sample Event No. 6 results indicate that:

- Delivered flowrates to all biofilters continued to be within 15% of target;
- Septic tank effluent (STE) quality supplied to PNRS II systems has been reasonably characteristic of typical household STE quality due to system modifications, but concentrations of $CBOD_5$ and nitrogen decreased in this sample event;
- All nine Stage 1 unsaturated biofilters produced effluent NH_3-N of 0.06 mg/L or less;
- Seven out of nine Stage 2 saturated biofilters produced effluent NO_x-N of 0.12 mg/L or less;

These results provide continuing support of the nitrogen reduction potential of the PNRS II biofiltration systems. Where expected or desired PNRS II outcomes are not being achieved, they appear to be due to tractable issues can be addressed, as discussed in the following sections.

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5.2 Recommendations

Careful observation of PNRS II systems and the results of Sample Events No. 1 through 6 were used to formulate recommendations for adjustments and modifications to the test systems and the GCREC pilot facility. The issues to be addressed, recommended modifications and their rationale, and expected outcomes are presented below. Recommendations are made for each of the PNRS II performance issues that have been identified. It is believed that each issue can be resolved by implementing the recommendations. All recommendations are based on the overriding PNRS II goal of providing functional specifications for modular biofiltration components for passive onsite nitrogen reducing treatment systems. The project team will continuously evaluate all PNRS II results including those that particularly result from implementation of the recommendations and make further adaptations as needed.

5.2.1 Quality of STE

The GCREC septic tank effluent $CBOD_5$ and nitrogen in Sample Event 6 were lower than in previous sample events. Possible reasons are dilution of STE parameters levels in the GCREC collection systems, however, TSS concentrations were much higher than previous sample events. Continued monitoring of the quality of STE supplied to the PNRS II systems and an investigation into STE generation at GCREC including possible factors that could contribute to low or high parameter values is recommended.

5.2.2 DENIT-LS2 and DENIT-LS3

The DENIT-LS2 and DENIT-LS3 upflow denitrification biofilters with new lignocellulosic media showed limited NO_x reduction in Sample Event 6. Possible reasons include not enough media, toxicity (release of toxic material from lignocellulosic material itself) or short circuiting. Continued monitoring is recommended.

5.2.3 Modify Operation

A track record of acceptable performance has been established for many PNRS II systems and increased flowrates are recommended. These are:

Stage 1 Biofilters

- Expanded clay and clinoptilolite media
  - increase loading rates:
    -Single pass: 3 gal/ft^2-day to 5 gal/ft^2-day STE
    -Recycle: 3 gal/ft^2-day to 6 gal/ft^2-day STE

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Stage 2 Biofilters

- Sulfur
  - increase loading rates:
    -Single pass coupled: single pass Stage 1 effluent
    5.6 to 9.3 gal/ft^2-day; 25.7 to 15.4 hour mean pore water residence time (MPWRT)
    -Horizontal: Stage 1 w/recycle combined effluent
    10 to 20 gal/ft^2-day; 43 to 21.5 hour MPWRT

- Glycerol
  - increase loading rate:
    -10 to 20 gal/ft^2-day; 43 to 21.5 hour MPWRT

These flowrates will be implemented following this sample event.

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Appendix A: Operation & Maintenance Log

Table A.1
Operation and Maintenance Log

Date	Description
5/17/2010	Start-up
5/20/2010	Pump 1 not in Auto, LL float alarm, refilled Tank 1 to HIGH float
5/24/2010	Glycerol batch #1 prepared (125 mL glycerol; 1875 mL DI water), feed rate ~ 8 mL/dose
5/26/2010	LL float alarm, refilled Tank 1 to HIGH float
6/1/2010	Replaced glycerol tubing
6/4/2010	LL float alarm, refilled Tank 1 to HIGH float, determined that LOW float is faulty
	Revised floats so that old Low Float is now High float
	Revised program installed so that only LOW Float turns on/off Pump 1
6/8/2010	Glycerol batch #2 prepared (125 mL glycerol; 1875 mL DI water), feed rate ~ 8 mL/dose
6/18/2010	Pump 1 screen cleaned with hose
6/21/2010	Pump 5 and 11 Error Code 18, cleared alarm and restarted pumps
	Pump 8 was on "OFF", turned back to "AUTO"
6/22/2010	Pump 5 had turned off, turned back on at 9:32 am
6/28/2010	Pump 5 and 11 Error Code 18, cleared alarm and restarted pumps
	Replaced glycerol tubing, kink in top, added elbow
	Russ replaced existing GCREC mound Pump 2 ~ 11:00 am
	All Systems Flow Check
7/1/2010	Sample Event #1
7/2/2010	Pump 1 screen cleaned with hose
7/8/2010	Glycerol tubing had released to bottom of container, replaced with polyethylene tubing
	Tank 1 LOW Float alarm, revised magnet distance to shorten Pump 1 runtime
	Pump 1 screen cleaned with hose
7/12/2010	Pump 5 Error Code 18, cleared alarm and restarted pump
7/14/2010	UPS beeping, problem with receptacle, temporary fix with extension cord
7/15/2010	Electrician fixed receptacle
7/16/2010	Per Dr. Stanley all condensate flow diverted from septic system
	Russ fixed existing GCREC Mound Pump 2 which had not been running
	Pump 5 and 11 Error Code 18, cleared alarm and restarted pumps
	Glycerol batch #3 prepared (125 mL glycerol; 1875 mL DI water), feed rate ~ 8 mL/dose
	Capillary mat added to PS-1

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7/19/2010	IS 1 changed discharge (rotated 180°) now 15 inches of saturation from bottom of tank
7/20/2010	IS 2 changed discharge (rotated 180°) now 15 inches of saturation from bottom of tank
7/26/2010	Removed PS1 capillary mat from inside mesh bag, replaced with new mat on top of bag
	Glycerol batch #4 (70 mL glycerol; 1930 mL DI water), feed rate ~ 10 mL/dose
8/3/2010	Glycerol batch #5 (70 mL glycerol; 1930 mL DI water), feed rate ~ 10 mL/dose
8/4/2010	Cleaned crosses in Stage 1 Recirculating Biofilters
	Added tees to outlet of RC1 and RC4 tanks to alleviate blockage build-up
	Replaced Hydrosplitter 1 & 2 tubing
	Replaced Stage 2 horizontal tubing from Pump 11
	Cleaned Stage 2 horizontal sample ports
	Lowered Pump 1 Low Float 2 wraps to decrease volume in tank(decrease residence time)
8/10/2010	Glycerol batch #6 (70 mL glycerol; 1930 mL DI water), feed rate ~ 10 mL/dose
	Raised Pump 1 Low Float 1 wrap because float down was below the hole
8/12/2010	Revised tubing connection at top of In-Situ simulator tanks to elbow
8/17/2010	Glycerol batch #7 (70 mL glycerol; 1930 mL DI water), feed rate ~ 10 mL/dose
	Added tees to outlet in RC2 and RC3 tanks as well
	Revised RC tanks discharge piping to flexible hose
8/19/2010	Pump 5 and 11 Error Code 18, cleared alarm and restarted pumps
8/23/2010	Possible leak detected at Recirc Tank #2 for P7
8/27/2010	Glycerol batch #8 (70 mL glycerol; 1930 mL DI water), feed rate ~ 10 mL/dose
8/31/2010	Sample Event #2
9/1/2010	Replaced elbow for Recirc Tank #2 (STE tubing) to fix leak
	All Systems Flow Check
9/7/2010	Glycerol batch #9 (70 mL glycerol; 1930 DI water), feed rate ~ 10 mL/dose
	Removed PS1 capillary mat
9/9/2010	Replaced Pump 5 pump tubing
9/10/2010	Cut the LS4 inlet pipe and used a drain snake to unclog both elbows
9/13/2010	Glycerol batch #10 (70 mL glycerol; 1980 DI water), feed rate ~ 10 mL/dose
9/17/2010	Modified Pump 7 runtime to 15 seconds per dose
9/21/2010	Reconnected the glycerol tubing between bottle and pump head which had separated
	Added sample ports to recirculation pump tank discharge lines for flow measurement
9/28/2010	Glycerol batch #11 (70 mL glycerol; 1930 DI water), feed rate ~ 10 mL/dose
	New clear glycerol bottle with graduated sides, replaced tubing
10/5/2010	Pump 5 and 11 Error Code 18, cleared alarm and restarted pumps
10/6/2010	Glycerol batch #12 (30 mL glycerol; 1970 DI water), feed rate ~ 10 mL/dose
10/7/2010	Pump 5 and 11 Error Code 18, cleared alarm and restarted pumps

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10/8/2010	Modified Pump 1 discharge pipe to extend through Tank 1 hole in baffle wall
10/11/2010	DENIT-GL-1 nitrified STE influent tubing had disconnected, reattached
	Calibrated IS1 and IS2 tubing
	Calibrated Stage 2 horizontal tubing
10/14/2010	Glycerol batch #13 (30 mL glycerol; 1970 DI water), feed rate ~ 10 mL/dose
	Built new in-situ columns IS3 and IS4
10/15/2010	Unclogged PS1 discharge pipe
	Cleaned Pump 1 intake screen
	Lowered Pump 1 Low Float 1 wrap to decrease volume in tank
10/18/2010	Completed IS3 and IS4 piping, started dosing @ 9:30 am
	Added 3” coarse sand to UNSAT-IS1 for complete nitrification
10/19/2010	Started dye test DENIT-LS2 and DENIT-LS3
	Lowered Pump 1 Low Float 1 wrap to decrease volume in tank(to decrease residence time)
10/20/2010	Calibrated IS3 and IS4 tubing
	Glycerol batch #14 (15 mL glycerol; 985 DI water), feed rate ~ 10 mL/dose
10/22/2010	Moved Pump 1 to effluent baffle tee of existing GCREC Tank 1
	Converted UNSAT-PS1 to recirculating biofilter
10/25/2010	Glycerol batch #15 (15 mL glycerol; 985 DI water), feed rate ~ 10 mL/dose
	DENIT-SU4 media ~5.5" below initial level
	Removed DENIT-SU4, DENIT-SU2 and DENIT-LS2 media
	Cleaned tanks
	Replaced DENIT-SU2 media (30% sulfur, 10% limestone, 60% expanded clay mixture)
	Replaced DENIT-SU4 media (30% sulfur, 10% limestone, 60% expanded clay mixture)
	Replaced DENIT-LS2 media (25% lignocellulosic, 75% expanded clay mixture)
10/27/2010	Glycerol batch #16 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
11/1/2010	Glycerol batch #17 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
11/5/2010	Glycerol batch #18 (27 mL glycerol; 986.5 DI water), feed rate ~ 10 mL/dose
11/10/2010	Sample Event #3
11/11/2010	Glycerol batch #19 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
11/18/2010	Glued UNSAT-IS3 and UNSAT-IS4 discharge piping to stop potential leaks
	Glycerol batch #20 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
	Calibrated UNSAT-IS3 and IS4 tubing
11/19/2010	All Systems Flow Check
11/24/2010	Glycerol batch #21 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
11/29/2010	Glycerol batch #22 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
	Threaded and glued UNSAT-IS3 and UNSAT-IS4 petcock valves

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12/1/2010	Tank 1 low-low float alarm activated, high float had activated in Tank 1 preventing Pump 1 to run. Cleared both alarms
12/3/2010	Cleared plug in DENIT-LS4 influent piping
	Replaced Hydrosplitter 1 & 2 tubing
	Replaced Pump 11 pump and system tubing
	Replaced Pump 5 pump and system tubing
	Glycerol batch #23 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
12/7/2010	Hydrosplitter 1 Flow Check
	Calibrated UNSAT-IS3 and IS4 tubing
12/10/2010	Glycerol batch #24 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
12/13/2010	Pump 5 and 11 Error Code 18, cleared alarm and restarted pumps
12/14/2010	Increased Pump 15 runtime to 6:1 recycle rate
12/17/2010	Glycerol batch #25 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
12/22/2010	UNSAT-IS3 and IS4 effluent samples sent to Southern
12/23/2010	DENIT-LS4, LS2, SU3, LS3, and SU4 effluent sample to Southern
	Glycerol batch #26 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
12/27/2010	Pump 5 and 11 Error Code 18, cleared alarm and restarted pumps
12/30/2010	Hydrosplitter 1 Flow Check
	Glycerol batch #27 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
	All Systems Flow Check
1/6/2011	Glycerol batch #28 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
1/11/2011	UNSAT-IS3 and IS4 effluent Sample Event #4 samples sent to Southern
	Ponding at surface of UNSAT-IS1 and IS2
	Cleared line blockage at outlet from UNSAT-IS1 and IS2
1/13/2011	Sample Event #4
	Glycerol batch #29 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
1/14/2011	Stage 2 Profile Samples sent to Southern
1/17/2011	Pump 5 and 11 Error Code 18, cleared alarm and restarted pumps
	All Systems Flow Check
	Cleaned all recirculation system Stage 1 distribution pipes with tap water
	Pump 7 was air locked - restarted
1/18/2011	Hydrosplitter 1 Flow Check - calibration
1/21/2011	Glycerol batch #30 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
1/25/2011	Disassembled and cleaned UNSAT-IS1, IS2, IS3, IS4; DENIT-LS1, LS2, LS3, LS4
1/26/2011	Pump 5 and 11 Error Code 18, cleared alarm and restarted pumps
	Installed new media UNSAT-IS1, IS2
	Installed new media DENIT-LS1

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1/28/2011	Installed new media UNSAT-IS3, IS4
	Installed new media DENIT-LS2,LS3, LS4
	Replaced Pump 5 pump & system tubing
	Replaced Pump 10 pump & system tubing
1/31/2011	Recalibrated Pump 5 & 10
	Glycerol batch #31 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
2/2/2011	UNSAT-IS Flow Check
2/8/2011	Glycerol batch #32 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
2/16/2011	All Systems Flow Check
	Glycerol batch #33 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
	Cleaned all recirculation system Stage 1 distribution pipes with tap water
2/22/2011	Glycerol batch #34 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
3/2/2011	Glycerol batch #35 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
3/4/2011	Cleaned Pump 1 intake screen
	Glycerol batch #36 (13.5 mL glycerol; 1000 DI water), feed rate ~ 10 mL/dose
3/14/2011	Glycerol batch #37 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
	Pump 9 airlocked
	Started IS3 and IS4 sample collection
3/15/2011	Collected IS3 and IS4 sample
3/17/2011	Sample Event #5
3/18/2011	Stage 2 Profile Samples sent to Southern
3/21/2011	Glycerol batch #38 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
3/23/2011	All Systems Flow Check
	Pump 9 airlocked
3/28/2011	Glycerol batch #39 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
4/2/2011	PLC Panel power failure - completely turned off
	Pump 5 and 11 Error Code 18, cleared alarm and restarted pumps
4/6/2011	Glycerol batch #40 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
4/8/2011	Calibrated Hydrosplitters 1 and 2
	Replaced Hydrosplitter 1 & 2 tubing
	Adjusted Pump 4 and 14 runtimes
4/14/2011	Glycerol batch #41 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
	Revised UNSAT-PS1 Stage 1 media from polystyrene to clinoptilolite
4/21/2011	Glycerol batch #42 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
4/28/2011	Glycerol batch #43 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
5/5/2011	Glycerol batch #44 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose

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5/11/2011	Flow check
	Glycerol batch #45 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
5/18/2011	Glycerol batch #46 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
5/19/2011	Sample Event #6
	All Systems Flow Test
5/26/2011	Glycerol batch #47 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
5/31/2011	Increased Pump 14 runtime to 6 gpd/SF loading rate for recirc systems
	Increased Pump 6-9 runtime to 5:1 recycle ratio
	Cleaned all recirculation system Stage 1 distribution pipes with tap water
	Releveled top layer of media within recirculation sytem Stage 1 biofilters
6/3/2011	Glycerol batch #48 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose
6/6/2011	Cleaned flowmeters on discharge line of Pump 4 and 14
6/9/2011	Glycerol batch #49 (27 mL glycerol; 1973 DI water), feed rate ~ 10 mL/dose

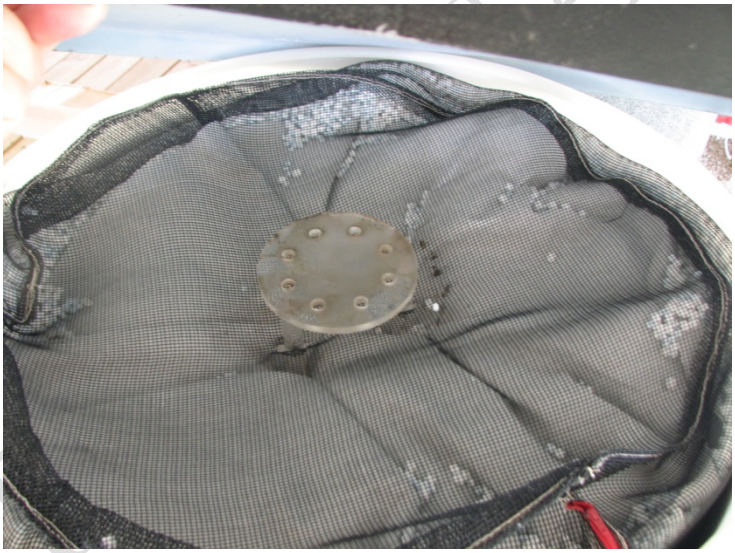

Figure A.1
Capillary Mat Installed above Polystyrene Media 7/16/10

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Figure A.2
Revised In-situ Simulators Discharge Piping 7/20/10

Figure A.3
RC1 Outlet Tee 8/4/10

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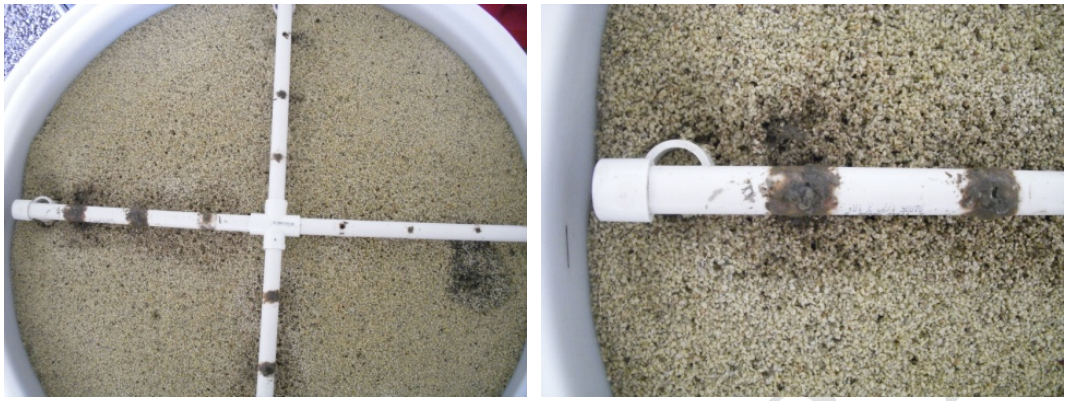

Figure A.4
UNSAT-CL4 before Cleaning 8/4/10

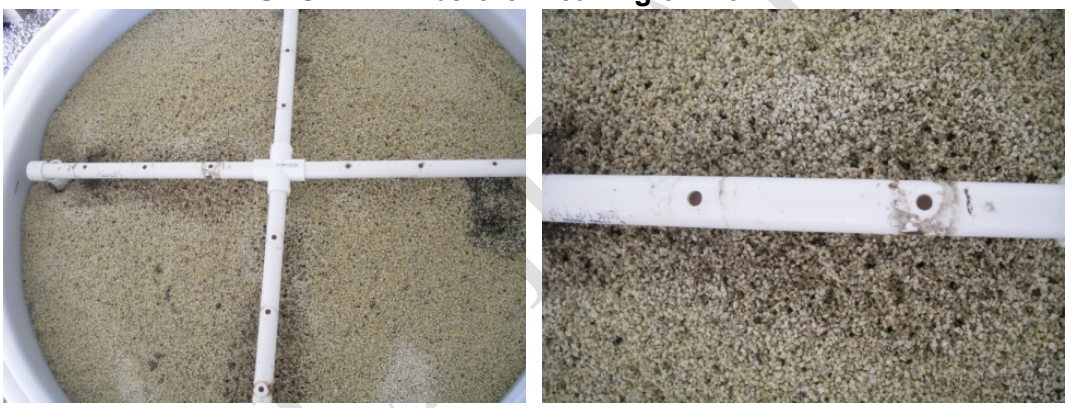

Figure A.5
UNSAT-CL4 after Cleaning 8/4/10

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Figure A.6
Unclogging UNSAT-LS4 Influent Pipe 9/10/10

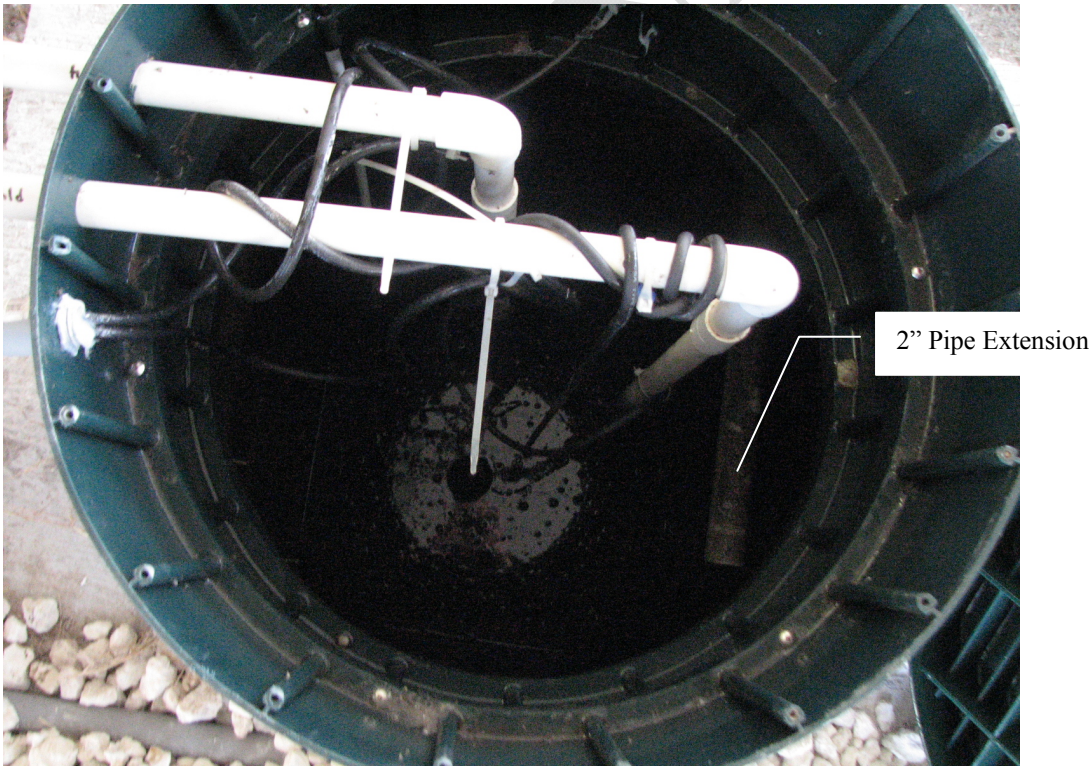

Figure A.7
2” Pipe Extension into PNRS II Tank 1 Pump Chamber 10/8/10

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Figure A.8
UNSAT-IS3 and UNSAT-IS4 Columns 10/14/10

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Appendix B: PLC Data Tables

Table B.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[1] (%)
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%

[1]Relative Error = (Recorded Flow – Target Flow)/ Target Flow *100

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Table B.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[1] (%)
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%

[1]Relative Error = (Recorded Runtime – Target Runtime)/ Target Runtime *100

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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

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Appendix D: Laboratory Report

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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

June 3, 2011
Work Order: 1104232

Laboratory Report

Project Name **PNRS II**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	By
Sample Description		**PNRS II STE-TI**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-01**						
Date/Time Collected		**05/19/11 12:15**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 14:05**						
Field Parameters								
pH	SU	7.6	DEP FT1100	0.1	0.1		05/19/11 12:15	TDD
Water Temperature	°C	25.1	DEP FT1400	0.1	0.1		05/19/11 12:15	TDD
Specific conductance	umhos/cm	960	DEP FT1200	0.1	0.1		05/19/11 12:15	TDD
Dissolved Oxygen	mg/L	2.0	DEP FT1500	0.1	0.1		05/19/11 12:15	TDD
Inorganics								
Hydrogen Sulfide (Unionized)	mg/L	1.7	SM 4550SF	0.04	0.01	05/24/11 11:45	05/24/11 11:46	MMF
Ammonia as N	mg/L	32	EPA 350.1	0.010	0.005		05/24/11 16:47	SMD
Carbonaceous BOD	mg/L	47	SM 5210B	2	2	05/20/11 16:50	05/25/11 15:20	MEJ
Nitrate (as N)	mg/L	0.03 I	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Sulfate	mg/L	24	EPA 300.0	0.60	0.20		05/20/11 03:44	MEJ
Sulfide	mg/L	9.1	SM 4500SF	0.40	0.10		05/24/11 11:43	MMF
Total Alkalinity	mg/L	380	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	40	EPA 351.2	0.20	0.05	05/25/11 09:38	05/25/11 10:47	SMD
Total Suspended Solids	mg/L	467	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	9,400	SM 9222D	1	1	05/19/11 15:35	05/20/11 15:10	MEJ

Sample Description		**PNRS II STE-T1-D**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-02**						
Date/Time Collected		**05/19/11 12:15**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 14:05**						
Field Parameters								
pH	SU	7.6	DEP FT1100	0.1	0.1		05/19/11 12:15	TDD
Water Temperature	°C	25.1	DEP FT1400	0.1	0.1		05/19/11 12:15	TDD
Specific conductance	umhos/cm	960	DEP FT1200	0.1	0.1		05/19/11 12:15	TDD
Dissolved Oxygen	mg/L	2.0	DEP FT1500	0.1	0.1		05/19/11 12:15	TDD
Inorganics								
Ammonia as N	mg/L	33	EPA 350.1	0.010	0.005		05/24/11 16:47	SMD
Carbonaceous BOD	mg/L	59	SM 5210B	2	2	05/20/11 16:50	05/25/11 15:20	MEJ
Nitrate (as N)	mg/L	0.03 I	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Total Alkalinity	mg/L	400	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	41	EPA 351.2	0.20	0.05	05/25/11 09:38	05/25/11 10:47	SMD
Total Suspended Solids	mg/L	473	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG

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

June 3, 2011
Work Order: 1104232

Laboratory Report

Project Name **PNRS II**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	By
Sample Description		**PNRS II STE-T1-D**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-02**						
Date/Time Collected		**05/19/11 12:15**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 14:05**						
Microbiology								
Fecal Coliforms	CFU/100 ml	9,900	SM 9222D	1	1	05/19/11 15:35	05/20/11 15:10	MEJ
Sample Description		**UNSAT-EC1**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-03**						
Date/Time Collected		**05/19/11 10:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.2	DEP FT1100	0.1	0.1		05/19/11 10:00	TDD
Water Temperature	°C	23.5	DEP FT1400	0.1	0.1		05/19/11 10:00	TDD
Specific conductance	umhos/cm	900	DEP FT1200	0.1	0.1		05/19/11 10:00	TDD
Dissolved Oxygen	mg/L	6.3	DEP FT1500	0.1	0.1		05/19/11 10:00	TDD
Inorganics								
Ammonia as N	mg/L	0.005 U	EPA 350.1	0.010	0.005		05/24/11 16:47	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	22	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Sulfate	mg/L	61	EPA 300.0	0.60	0.20		05/20/11 03:44	MEJ
Total Alkalinity	mg/L	170	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	2.0	EPA 351.2	0.20	0.05	05/25/11 09:38	05/25/11 10:47	SMD
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	20	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ
Sample Description		**UNSAT-EC3**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-04**						
Date/Time Collected		**05/19/11 10:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.1	DEP FT1100	0.1	0.1		05/19/11 10:00	TDD
Water Temperature	°C	23.5	DEP FT1400	0.1	0.1		05/19/11 10:00	TDD
Specific conductance	umhos/cm	940	DEP FT1200	0.1	0.1		05/19/11 10:00	TDD
Dissolved Oxygen	mg/L	5.7	DEP FT1500	0.1	0.1		05/19/11 10:00	TDD

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Laboratory Report

Project Name **PNRS II**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	By
Sample Description		**UNSAT-EC3**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-04**						
Date/Time Collected		**05/19/11 10:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Inorganics								
Ammonia as N	mg/L	0.005 U	EPA 350.1	0.010	0.005		05/24/11 16:47	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	22	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Total Alkalinity	mg/L	190	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	2.0	EPA 351.2	0.20	0.05	05/25/11 09:38	05/25/11 10:47	SMD
Total Suspended Solids	mg/L	2	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ
Sample Description		**UNSAT-CL1**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-05**						
Date/Time Collected		**05/19/11 10:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.4	DEP FT1100	0.1	0.1		05/19/11 10:00	TDD
Water Temperature	°C	23.5	DEP FT1400	0.1	0.1		05/19/11 10:00	TDD
Specific conductance	umhos/cm	980	DEP FT1200	0.1	0.1		05/19/11 10:00	TDD
Dissolved Oxygen	mg/L	6.9	DEP FT1500	0.1	0.1		05/19/11 10:00	TDD
Inorganics								
Ammonia as N	mg/L	0.005 I	EPA 350.1	0.010	0.005		05/24/11 16:47	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	23	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Sulfate	mg/L	61	EPA 300.0	0.60	0.20		05/20/11 03:44	MEJ
Total Alkalinity	mg/L	160	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	2.7	EPA 351.2	0.20	0.05	05/25/11 09:38	05/25/11 10:47	SMD
Total Suspended Solids	mg/L	1	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	20	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ

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Laboratory Report

Project Name **PNRS II**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	By
Sample Description		**UNSAT-CL3**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-06**						
Date/Time Collected		**05/19/11 10:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.5	DEP FT1100	0.1	0.1		05/19/11 10:00	TDD
Water Temperature	°C	22.9	DEP FT1400	0.1	0.1		05/19/11 10:00	TDD
Specific conductance	umhos/cm	1,120	DEP FT1200	0.1	0.1		05/19/11 10:00	TDD
Dissolved Oxygen	mg/L	7.6	DEP FT1500	0.1	0.1		05/19/11 10:00	TDD
Inorganics								
Ammonia as N	mg/L	0.005 U	EPA 350.1	0.010	0.005		05/24/11 16:47	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	23	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Total Alkalinity	mg/L	260	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	3.7	EPA 351.2	0.20	0.05	05/25/11 09:38	05/25/11 10:47	SMD
Total Suspended Solids	mg/L	1	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ

Sample Description		**UNSAT-CL5**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-07**						
Date/Time Collected		**05/19/11 10:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.9	DEP FT1100	0.1	0.1		05/19/11 10:00	TDD
Water Temperature	°C	23.5	DEP FT1400	0.1	0.1		05/19/11 10:00	TDD
Specific conductance	umhos/cm	1,130	DEP FT1200	0.1	0.1		05/19/11 10:00	TDD
Dissolved Oxygen	mg/L	6.9	DEP FT1500	0.1	0.1		05/19/11 10:00	TDD
Inorganics								
Ammonia as N	mg/L	0.005 U	EPA 350.1	0.010	0.005		05/24/11 16:47	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	22	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Total Alkalinity	mg/L	280	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	2.5	EPA 351.2	0.20	0.05	05/25/11 09:38	05/25/11 10:47	SMD
Total Suspended Solids	mg/L	1	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	24	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ

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

June 3, 2011
Work Order: 1104232

Laboratory Report

Project Name **PNRS II**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	By
Sample Description		**DENIT-SU4**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-08**						
Date/Time Collected		**05/19/11 09:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.4	DEP FT1100	0.1	0.1		05/19/11 09:00	TDD
Water Temperature	°C	21.1	DEP FT1400	0.1	0.1		05/19/11 09:00	TDD
Specific conductance	umhos/cm	1,220	DEP FT1200	0.1	0.1		05/19/11 09:00	TDD
Dissolved Oxygen	mg/L	0.1 U	DEP FT1500	0.1	0.1		05/19/11 09:00	TDD
Inorganics								
Hydrogen Sulfide (Unionized)	mg/L	0.05	SM 4550SF	0.04	0.01	05/24/11 11:45	05/24/11 11:46	MMF
Ammonia as N	mg/L	0.77	EPA 350.1	0.010	0.005		05/24/11 16:47	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	0.11	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Sulfate	mg/L	420	EPA 300.0	0.60	0.20		05/25/11 00:28	MEJ
Sulfide	mg/L	0.21 I	SM 4500SF	0.40	0.10		05/24/11 11:43	MMF
Total Kjeldahl Nitrogen	mg/L	1.6	EPA 351.2	0.20	0.05	05/25/11 09:38	05/25/11 10:47	SMD
Total Suspended Solids	mg/L	2	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ
Sample Description		**DENIT-LS3**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-09**						
Date/Time Collected		**05/19/11 09:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.7	DEP FT1100	0.1	0.1		05/19/11 09:00	TDD
Water Temperature	°C	21.1	DEP FT1400	0.1	0.1		05/19/11 09:00	TDD
Specific conductance	umhos/cm	940	DEP FT1200	0.1	0.1		05/19/11 09:00	TDD
Dissolved Oxygen	mg/L	4.2	DEP FT1500	0.1	0.1		05/19/11 09:00	TDD
Inorganics								
Ammonia as N	mg/L	1.4	EPA 350.1	0.010	0.005		05/24/11 16:47	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	16	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Nitrite (as N)	mg/L	0.76	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Total Alkalinity	mg/L	300	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	3.0	EPA 351.2	0.20	0.05	05/25/11 09:38	05/25/11 10:47	SMD
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								

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Sample Description		**DENIT-LS3**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-09**						
Date/Time Collected		**05/19/11 09:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ
Sample Description		**LS3-D**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-10**						
Date/Time Collected		**05/19/11 09:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.7	DEP FT1100	0.1	0.1		05/19/11 09:00	TDD
Water Temperature	°C	21.1	DEP FT1400	0.1	0.1		05/19/11 09:00	TDD
Specific conductance	umhos/cm	940	DEP FT1200	0.1	0.1		05/19/11 09:00	TDD
Dissolved Oxygen	mg/L	4.2	DEP FT1500	0.1	0.1		05/19/11 09:00	TDD
Inorganics								
Ammonia as N	mg/L	2.9	EPA 350.1	0.010	0.005		05/24/11 16:47	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	16	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Nitrite (as N)	mg/L	0.74	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Total Alkalinity	mg/L	300	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	3.3	EPA 351.2	0.20	0.05	05/25/11 09:38	05/25/11 10:47	SMD
Total Suspended Solids	mg/L	4	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ
Sample Description		**DENIT-SU3**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-11**						
Date/Time Collected		**05/19/11 09:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.4	DEP FT1100	0.1	0.1		05/19/11 09:00	TDD
Water Temperature	°C	20.8	DEP FT1400	0.1	0.1		05/19/11 09:00	TDD
Specific conductance	umhos/cm	1,380	DEP FT1200	0.1	0.1		05/19/11 09:00	TDD
Dissolved Oxygen	mg/L	0.1 U	DEP FT1500	0.1	0.1		05/19/11 09:00	TDD
Inorganics								
Ammonia as N	mg/L	2.7	EPA 350.1	0.010	0.005		05/24/11 16:47	SMD

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Sample Description		**DENIT-SU3**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-11**						
Date/Time Collected		**05/19/11 09:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Carbonaceous BOD	mg/L	7	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	0.10	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Sulfate	mg/L	520	EPA 300.0	0.60	0.20		05/25/11 00:28	MEJ
Total Alkalinity	mg/L	200	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	2.9	EPA 351.2	0.20	0.05	05/25/11 09:38	05/25/11 10:47	SMD
Total Suspended Solids	mg/L	1	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ
Sample Description		**SU3-D**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-12**						
Date/Time Collected		**05/19/11 09:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.4	DEP FT1100	0.1	0.1		05/19/11 09:00	TDD
Water Temperature	°C	20.8	DEP FT1400	0.1	0.1		05/19/11 09:00	TDD
Specific conductance	umhos/cm	1,380	DEP FT1200	0.1	0.1		05/19/11 09:00	TDD
Dissolved Oxygen	mg/L	0.1 U	DEP FT1500	0.1	0.1		05/19/11 09:00	TDD
Inorganics								
Ammonia as N	mg/L	1.4	EPA 350.1	0.010	0.005		05/24/11 16:47	SMD
Carbonaceous BOD	mg/L	3	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	0.02 I	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Total Alkalinity	mg/L	200	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	2.0	EPA 351.2	0.20	0.05	05/25/11 09:38	05/25/11 10:47	SMD
Total Suspended Solids	mg/L	1	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ

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Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	By
Sample Description		**DENIT-LS2**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-13**						
Date/Time Collected		**05/19/11 09:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.9	DEP FT1100	0.1	0.1		05/19/11 09:00	TDD
Water Temperature	°C	20.2	DEP FT1400	0.1	0.1		05/19/11 09:00	TDD
Specific conductance	umhos/cm	1,100	DEP FT1200	0.1	0.1		05/19/11 09:00	TDD
Dissolved Oxygen	mg/L	3.1	DEP FT1500	0.1	0.1		05/19/11 09:00	TDD
Inorganics								
Ammonia as N	mg/L	0.050	EPA 350.1	0.010	0.005		05/24/11 16:47	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	22	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Nitrite (as N)	mg/L	0.76	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Total Alkalinity	mg/L	240	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	3.5	EPA 351.2	0.20	0.05	05/25/11 09:38	05/25/11 10:47	SMD
Total Suspended Solids	mg/L	2	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ
Sample Description		**LS2-D**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-14**						
Date/Time Collected		**05/19/11 09:00**						
Collected by		**Client**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.9	DEP FT1100	0.1	0.1		05/19/11 09:00	TDD
Water Temperature	°C	20.1	DEP FT1400	0.1	0.1		05/19/11 09:00	TDD
Specific conductance	umhos/cm	1,100	DEP FT1200	0.1	0.1		05/19/11 09:00	TDD
Dissolved Oxygen	mg/L	3.1	DEP FT1500	0.1	0.1		05/19/11 09:00	TDD
Inorganics								
Ammonia as N	mg/L	0.044	EPA 350.1	0.010	0.005		05/24/11 16:47	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	22	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Nitrite (as N)	mg/L	0.72	EPA 300.0	0.04	0.01		05/20/11 03:44	MEJ
Total Alkalinity	mg/L	340	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	3.3	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	1	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ

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Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	By
Sample Description		**DENIT-LS4**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-15**						
Date/Time Collected		**05/19/11 09:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	8.1	DEP FT1100	0.1	0.1		05/19/11 09:00	TDD
Water Temperature	°C	19.9	DEP FT1400	0.1	0.1		05/19/11 09:00	TDD
Specific conductance	umhos/cm	1,080	DEP FT1200	0.1	0.1		05/19/11 09:00	TDD
Dissolved Oxygen	mg/L	0.6	DEP FT1500	0.1	0.1		05/19/11 09:00	TDD
Inorganics								
Ammonia as N	mg/L	0.005 U	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	7	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Total Alkalinity	mg/L	380	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	1.5	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	5	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ
Sample Description		**RC1**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-16**						
Date/Time Collected		**05/19/11 11:30**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 14:05**						
Field Parameters								
pH	SU	7.5	DEP FT1100	0.1	0.1		05/19/11 11:30	TDD
Water Temperature	°C	23.4	DEP FT1400	0.1	0.1		05/19/11 11:30	TDD
Specific conductance	umhos/cm	750	DEP FT1200	0.1	0.1		05/19/11 11:30	TDD
Dissolved Oxygen	mg/L	0.1 U	DEP FT1500	0.1	0.1		05/19/11 11:30	TDD
Inorganics								
Ammonia as N	mg/L	8.0	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	2	SM 5210B	2	2	05/20/11 16:50	05/25/11 15:20	MEJ
Nitrate (as N)	mg/L	13	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.18	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Total Alkalinity	mg/L	200	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	8.7	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	3	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	460	SM 9222D	1	1	05/19/11 15:35	05/20/11 15:10	MEJ

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Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	By
Sample Description		**RC2**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-17**						
Date/Time Collected		**05/19/11 11:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 14:05**						
Field Parameters								
pH	SU	7.5	DEP FT1100	0.1	0.1		05/19/11 11:00	TDD
Water Temperature	°C	21.2	DEP FT1400	0.1	0.1		05/19/11 11:00	TDD
Specific conductance	umhos/cm	770	DEP FT1200	0.1	0.1		05/19/11 11:00	TDD
Dissolved Oxygen	mg/L	0.7	DEP FT1500	0.1	0.1		05/19/11 11:00	TDD
Inorganics								
Ammonia as N	mg/L	5.4	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/20/11 16:50	05/25/11 15:20	MEJ
Nitrate (as N)	mg/L	17	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.34	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Total Alkalinity	mg/L	170	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	10	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	5	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	370	SM 9222D	1	1	05/19/11 15:35	05/20/11 15:10	MEJ
Sample Description		**RC3**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-18**						
Date/Time Collected		**05/19/11 10:30**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 14:05**						
Field Parameters								
pH	SU	7.4	DEP FT1100	0.1	0.1		05/19/11 10:30	TDD
Water Temperature	°C	21.9	DEP FT1400	0.1	0.1		05/19/11 10:30	TDD
Specific conductance	umhos/cm	780	DEP FT1200	0.1	0.1		05/19/11 10:30	TDD
Dissolved Oxygen	mg/L	0.1 U	DEP FT1500	0.1	0.1		05/19/11 10:30	TDD
Inorganics								
Ammonia as N	mg/L	8.8	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	4	SM 5210B	2	2	05/20/11 16:50	05/25/11 15:20	MEJ
Nitrate (as N)	mg/L	17	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.13	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Total Alkalinity	mg/L	190	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	16	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	7	SM 2540D	1	1	05/23/11 09:40	05/24/11 09:55	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	560	SM 9222D	1	1	05/19/11 15:35	05/20/11 15:10	MEJ

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Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	By
Sample Description		**RC4**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-19**						
Date/Time Collected		**05/19/11 10:45**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 14:05**						
Field Parameters								
pH	SU	7.5	DEP FT1100	0.1	0.1		05/19/11 10:45	TDD
Water Temperature	°C	21.7	DEP FT1400	0.1	0.1		05/19/11 10:45	TDD
Specific conductance	umhos/cm	800	DEP FT1200	0.1	0.1		05/19/11 10:45	TDD
Dissolved Oxygen	mg/L	0.1 U	DEP FT1500	0.1	0.1		05/19/11 10:45	TDD
Inorganics								
Ammonia as N	mg/L	12	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	8	SM 5210B	2	2	05/20/11 16:50	05/25/11 15:20	MEJ
Nitrate (as N)	mg/L	6.2	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.86	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Total Alkalinity	mg/L	270	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	21	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	5	SM 2540D	1	1	05/24/11 10:57	05/25/11 09:54	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	8,600	SM 9222D	1	1	05/19/11 15:35	05/20/11 15:10	MEJ
Sample Description		**UNSAT-CL4**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-20**						
Date/Time Collected		**05/19/11 09:50**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.4	DEP FT1100	0.1	0.1		05/19/11 09:50	TDD
Water Temperature	°C	22.2	DEP FT1400	0.1	0.1		05/19/11 09:50	TDD
Specific conductance	umhos/cm	750	DEP FT1200	0.1	0.1		05/19/11 09:50	TDD
Dissolved Oxygen	mg/L	7.6	DEP FT1500	0.1	0.1		05/19/11 09:50	TDD
Inorganics								
Ammonia as N	mg/L	0.005 U	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	14	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Total Alkalinity	mg/L	210	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	12	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	3	SM 2540D	1	1	05/24/11 10:57	05/25/11 09:54	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	18	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ

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Sample Description		**UNSAT-CL2**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-21**						
Date/Time Collected		**05/19/11 09:50**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.3	DEP FT1100	0.1	0.1		05/19/11 09:50	TDD
Water Temperature	°C	22.8	DEP FT1400	0.1	0.1		05/19/11 09:50	TDD
Specific conductance	umhos/cm	740	DEP FT1200	0.1	0.1		05/19/11 09:50	TDD
Dissolved Oxygen	mg/L	6.8	DEP FT1500	0.1	0.1		05/19/11 09:50	TDD
Inorganics								
Ammonia as N	mg/L	0.008 I	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	22	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Total Alkalinity	mg/L	130	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	3.2	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	6	SM 2540D	1	1	05/24/11 10:57	05/25/11 09:54	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	20	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ
Sample Description		**UNSAT-EC4**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-22**						
Date/Time Collected		**05/19/11 10:05**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.3	DEP FT1100	0.1	0.1		05/19/11 10:05	TDD
Water Temperature	°C	22.7	DEP FT1400	0.1	0.1		05/19/11 10:05	TDD
Specific conductance	umhos/cm	710	DEP FT1200	0.1	0.1		05/19/11 10:05	TDD
Dissolved Oxygen	mg/L	7.9	DEP FT1500	0.1	0.1		05/19/11 10:05	TDD
Inorganics								
Ammonia as N	mg/L	0.005 U	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	20	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Total Alkalinity	mg/L	130	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	2.6	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	7	SM 2540D	1	1	05/24/11 10:57	05/25/11 09:54	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ

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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

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Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	By
Sample Description		**UNSAT-SA2**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-23**						
Date/Time Collected		**05/19/11 09:50**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.1	DEP FT1100	0.1	0.1		05/19/11 09:50	TDD
Water Temperature	°C	22.5	DEP FT1400	0.1	0.1		05/19/11 09:50	TDD
Specific conductance	umhos/cm	760	DEP FT1200	0.1	0.1		05/19/11 09:50	TDD
Dissolved Oxygen	mg/L	4.5	DEP FT1500	0.1	0.1		05/19/11 09:50	TDD
Inorganics								
Ammonia as N	mg/L	0.062	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	19	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Total Alkalinity	mg/L	140	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	2.1	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	7	SM 2540D	1	1	05/24/11 10:57	05/25/11 09:54	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	21	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ
Sample Description		**DFT**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-24**						
Date/Time Collected		**05/19/11 12:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 14:05**						
Field Parameters								
pH	SU	7.5	DEP FT1100	0.1	0.1		05/19/11 12:00	TDD
Water Temperature	°C	21.2	DEP FT1400	0.1	0.1		05/19/11 12:00	TDD
Specific conductance	umhos/cm	770	DEP FT1200	0.1	0.1		05/19/11 12:00	TDD
Dissolved Oxygen	mg/L	7.5	DEP FT1500	0.1	0.1		05/19/11 12:00	TDD
Inorganics								
Ammonia as N	mg/L	0.005 U	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/20/11 16:50	05/25/11 15:20	MEJ
Nitrate (as N)	mg/L	17	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Phosphorous - Total as P	mg/L	11	SM 4500P-E	0.040	0.010	05/23/11 09:44	05/26/11 09:46	SMD
Sulfate	mg/L	60	EPA 300.0	0.60	0.20		05/20/11 20:17	MEJ
Total Alkalinity	mg/L	170	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	3.2	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	3	SM 2540D	1	1	05/24/11 10:57	05/25/11 09:54	JAG
Microbiology								

Hazen and Sawyer
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Tampa, FL 33619

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Sample Description		**DFT**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-24**						
Date/Time Collected		**05/19/11 12:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 14:05**						
Fecal Coliforms	CFU/100 ml	11	SM 9222D	1	1	05/19/11 15:35	05/20/11 15:10	MEJ
Sample Description		**DENIT-SU1**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-25**						
Date/Time Collected		**05/19/11 08:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.2	DEP FT1100	0.1	0.1		05/19/11 08:00	TDD
Water Temperature	°C	16.9	DEP FT1400	0.1	0.1		05/19/11 08:00	TDD
Specific conductance	umhos/cm	1,000	DEP FT1200	0.1	0.1		05/19/11 08:00	TDD
Dissolved Oxygen	mg/L	0.1 U	DEP FT1500	0.1	0.1		05/19/11 08:00	TDD
Inorganics								
Ammonia as N	mg/L	1.3	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	0.05	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Sulfate	mg/L	270	EPA 300.0	0.60	0.20		05/25/11 00:28	MEJ
Total Alkalinity	mg/L	200	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	2.9	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	3	SM 2540D	1	1	05/24/11 10:57	05/25/11 09:54	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ
Sample Description		**DENIT-SU2**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-26**						
Date/Time Collected		**05/19/11 08:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.1	DEP FT1100	0.1	0.1		05/19/11 08:00	TDD
Water Temperature	°C	16.7	DEP FT1400	0.1	0.1		05/19/11 08:00	TDD
Specific conductance	umhos/cm	1,010	DEP FT1200	0.1	0.1		05/19/11 08:00	TDD
Dissolved Oxygen	mg/L	0.1 U	DEP FT1500	0.1	0.1		05/19/11 08:00	TDD
Inorganics								

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Sample Description		**DENIT-SU2**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-26**						
Date/Time Collected		**05/19/11 08:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Hydrogen Sulfide (Unionized)	mg/L	7.4	SM 4550SF	0.04	0.01	05/24/11 11:45	05/24/11 11:46	MMF
Ammonia as N	mg/L	1.6	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	24	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	0.02 I	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Sulfate	mg/L	260	EPA 300.0	0.60	0.20		05/25/11 00:28	MEJ
Sulfide	mg/L	17	SM 4500SF	0.40	0.10		05/24/11 11:43	MMF
Total Alkalinity	mg/L	260	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	3.5	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	3	SM 2540D	1	1	05/24/11 10:57	05/25/11 09:54	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ
Sample Description		**DENIT-LS1**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-27**						
Date/Time Collected		**05/19/11 08:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.3	DEP FT1100	0.1	0.1		05/19/11 08:00	TDD
Water Temperature	°C	16.1	DEP FT1400	0.1	0.1		05/19/11 08:00	TDD
Specific conductance	umhos/cm	700	DEP FT1200	0.1	0.1		05/19/11 08:00	TDD
Dissolved Oxygen	mg/L	0.1 U	DEP FT1500	0.1	0.1		05/19/11 08:00	TDD
Inorganics								
Ammonia as N	mg/L	0.005 U	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	29	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	0.02 I	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Total Alkalinity	mg/L	220	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	27	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	6	SM 2540D	1	1	05/24/11 10:57	05/25/11 09:54	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ

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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

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Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	By
Sample Description		**DENIT-GL1**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-28**						
Date/Time Collected		**05/19/11 08:00**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	6.8	DEP FT1100	0.1	0.1		05/19/11 08:00	TDD
Water Temperature	°C	16.4	DEP FT1400	0.1	0.1		05/19/11 08:00	TDD
Specific conductance	umhos/cm	850	DEP FT1200	0.1	0.1		05/19/11 08:00	TDD
Dissolved Oxygen	mg/L	0.1 U	DEP FT1500	0.1	0.1		05/19/11 08:00	TDD
Inorganics								
Ammonia as N	mg/L	1.7	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	15	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	0.03 I	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Total Alkalinity	mg/L	400	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	1.9	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	2	SM 2540D	1	1	05/24/11 10:57	05/25/11 09:54	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1,000 Z	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ
Sample Description		**UNSAT-IS1**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-30**						
Date/Time Collected		**05/19/11 11:25**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 14:05**						
Field Parameters								
pH	SU	7.3	DEP FT1100	0.1	0.1		05/19/11 11:25	TDD
Water Temperature	°C	24.1	DEP FT1400	0.1	0.1		05/19/11 11:25	TDD
Specific conductance	umhos/cm	810	DEP FT1200	0.1	0.1		05/19/11 11:25	TDD
Dissolved Oxygen	mg/L	2.4	DEP FT1500	0.1	0.1		05/19/11 11:25	TDD
Inorganics								
Ammonia as N	mg/L	0.37	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	4	SM 5210B	2	2	05/20/11 16:50	05/25/11 15:20	MEJ
Nitrate (as N)	mg/L	0.48	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.82	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Sulfate	mg/L	200	EPA 300.0	0.60	0.20		05/25/11 00:28	MEJ
Total Alkalinity	mg/L	240	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	3.3	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	8	SM 2540D	1	1	05/24/11 10:57	05/25/11 09:54	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1	SM 9222D	1	1	05/19/11 15:35	05/20/11 15:10	MEJ

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Sample Description		**UNSAT-IS2**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-32**						
Date/Time Collected		**05/19/11 11:25**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 14:05**						
Field Parameters								
pH	SU	7.3	DEP FT1100	0.1	0.1		05/19/11 11:25	TDD
Water Temperature	°C	24.4	DEP FT1400	0.1	0.1		05/19/11 11:25	TDD
Specific conductance	umhos/cm	850	DEP FT1200	0.1	0.1		05/19/11 11:25	TDD
Dissolved Oxygen	mg/L	4.7	DEP FT1500	0.1	0.1		05/19/11 11:25	TDD
Inorganics								
Ammonia as N	mg/L	30	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	19	SM 5210B	2	2	05/20/11 16:50	05/25/11 15:20	MEJ
Nitrate (as N)	mg/L	0.03 I	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Sulfate	mg/L	54	EPA 300.0	0.60	0.20		05/20/11 20:17	MEJ
Total Alkalinity	mg/L	320	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	42	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	7	SM 2540D	1	1	05/24/11 10:57	05/25/11 09:54	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	19	SM 9222D	1	1	05/19/11 15:35	05/20/11 15:10	MEJ
Sample Description		**UNSAT-IS3-SP**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-33**						
Date/Time Collected		**05/19/11 08:45**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.1	DEP FT1100	0.1	0.1		05/19/11 08:45	TDD
Water Temperature	°C	18.2	DEP FT1400	0.1	0.1		05/19/11 08:45	TDD
Specific conductance	umhos/cm	1,000	DEP FT1200	0.1	0.1		05/19/11 08:45	TDD
Inorganics								
Ammonia as N	mg/L	0.45	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	3	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	12	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.42	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Sulfate	mg/L	88	EPA 300.0	0.60	0.20		05/20/11 20:17	MEJ
Total Alkalinity	mg/L	410	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	2.8	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	4	SM 2540D	1	1	05/24/11 10:57	05/25/11 09:54	JAG
Microbiology								

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Sample Description		**UNSAT-IS3-SP**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-33**						
Date/Time Collected		**05/19/11 08:45**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ
Sample Description		**UNSAT-IS4-SP**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-34**						
Date/Time Collected		**05/19/11 08:45**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.0	DEP FT1100	0.1	0.1		05/19/11 08:45	TDD
Water Temperature	°C	17.5	DEP FT1400	0.1	0.1		05/19/11 08:45	TDD
Specific conductance	umhos/cm	1,140	DEP FT1200	0.1	0.1		05/19/11 08:45	TDD
Inorganics								
Ammonia as N	mg/L	0.23	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	20	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.50	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Sulfate	mg/L	100	EPA 300.0	0.60	0.20		05/25/11 00:28	MEJ
Total Alkalinity	mg/L	220	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	2.6	EPA 351.2	0.20	0.05	05/25/11 09:41	05/27/11 09:11	SMD
Total Suspended Solids	mg/L	4	SM 2540D	1	1	05/24/11 10:57	05/25/11 09:54	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ
Sample Description		**FB**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-35**						
Date/Time Collected		**05/19/11 09:45**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.0	DEP FT1100	0.1	0.1		05/19/11 09:45	TDD
Water Temperature	°C	19.9	DEP FT1400	0.1	0.1		05/19/11 09:45	TDD
Specific conductance	umhos/cm	5	DEP FT1200	0.1	0.1		05/19/11 09:45	TDD
Dissolved Oxygen	mg/L	7.4	DEP FT1500	0.1	0.1		05/19/11 09:45	TDD
Inorganics								
Ammonia as N	mg/L	0.008 I	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD

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Laboratory Report

Project Name **PNRS II**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	By
Sample Description		**FB**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-35**						
Date/Time Collected		**05/19/11 09:45**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/20/11 20:17	MEJ
Total Alkalinity	mg/L	11	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	0.05 U,J5	EPA 351.2	0.20	0.05	05/26/11 17:09	05/31/11 14:32	SMD
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	05/24/11 10:57	05/25/11 09:54	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/19/11 14:00	05/20/11 15:00	MEJ
Sample Description		**EB**						
Matrix		**Wastewater**						
SAL Sample Number		**1104232-36**						
Date/Time Collected		**05/19/11 09:45**						
Collected by		**Thomas Drunasky**						
Date/Time Received		**05/19/11 12:10**						
Field Parameters								
pH	SU	7.5	DEP FT1100	0.1	0.1		05/19/11 09:45	TDD
Water Temperature	°C	19.4	DEP FT1400	0.1	0.1		05/19/11 09:45	TDD
Specific conductance	umhos/cm	5	DEP FT1200	0.1	0.1		05/19/11 09:45	TDD
Dissolved Oxygen	mg/L	8.2	DEP FT1500	0.1	0.1		05/19/11 09:45	TDD
Inorganics								
Ammonia as N	mg/L	0.005 I	EPA 350.1	0.010	0.005		05/27/11 09:30	SMD
Carbonaceous BOD	mg/L	2 U	SM 5210B	2	2	05/19/11 16:15	05/24/11 16:30	MEJ
Nitrate (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/21/11 04:30	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/21/11 04:30	MEJ
Total Alkalinity	mg/L	11	SM 2320B	8.0	2.0		05/24/11 13:00	MMF
Total Kjeldahl Nitrogen	mg/L	0.05 U	EPA 351.2	0.20	0.05	05/26/11 17:09	05/31/11 14:32	SMD
Total Suspended Solids	mg/L	1 U	SM 2540D	1	1	05/24/11 10:57	05/25/11 09:54	JAG

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE11921 - BOD										
Blank (BE11921-BLK1)					Prepared: 05/19/11 Analyzed: 05/24/11					
Carbonaceous BOD	2 U	2	2	mg/L						
LCS (BE11921-BS1)					Prepared: 05/19/11 Analyzed: 05/24/11					
Carbonaceous BOD	199	2	2	mg/L	200		99	85-115		
LCS Dup (BE11921-BSD1)					Prepared: 05/19/11 Analyzed: 05/24/11					
Carbonaceous BOD	202	2	2	mg/L	200		101	85-115	1	10
Duplicate (BE11921-DUP1)		**Source: 1104339-04**			Prepared: 05/19/11 Analyzed: 05/24/11					
Carbonaceous BOD	2 U	2	2	mg/L		ND				25
Batch BE11923 - Ion Chromatography 300.0 Prep										
Blank (BE11923-BLK1)					Prepared & Analyzed: 05/20/11					
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Sulfate	0.20 U	0.60	0.20	mg/L						
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
LCS (BE11923-BS1)					Prepared & Analyzed: 05/20/11					
Sulfate	9.00	0.60	0.20	mg/L	9.0		100	85-115		
Nitrite (as N)	1.37	0.04	0.01	mg/L	1.4		98	85-115		
Nitrate (as N)	1.81	0.04	0.01	mg/L	1.7		106	85-115		
LCS Dup (BE11923-BSD1)					Prepared & Analyzed: 05/20/11					
Sulfate	8.81	0.60	0.20	mg/L	9.0		98	85-115	2	200
Nitrate (as N)	1.75	0.04	0.01	mg/L	1.7		103	85-115	3	200
Nitrite (as N)	1.32	0.04	0.01	mg/L	1.4		94	85-115	4	200

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE11923 - Ion Chromatography 300.0 Prep										
Matrix Spike (BE11923-MS1)		**Source: 1104232-04**			Prepared & Analyzed: 05/20/11					
Nitrate (as N)	22.4 +O	0.04	0.01	mg/L	1.7	22.2	12	85-115		
Sulfate	73.2	0.60	0.20	mg/L	9.0	64.0	102	85-115		
Nitrite (as N)	1.44	0.04	0.01	mg/L	1.4	ND	103	85-115		
Matrix Spike (BE11923-MS2)		**Source: 1104232-14**			Prepared & Analyzed: 05/20/11					
Sulfate	76.2	0.60	0.20	mg/L	9.0	66.4	109	85-115		
Nitrite (as N)	2.12	0.04	0.01	mg/L	1.4	0.719	100	85-115		
Nitrate (as N)	22.2 +O	0.04	0.01	mg/L	1.7	21.9	18	85-115		
Batch BE12017 - Ion Chromatography 300.0 Prep										
Blank (BE12017-BLK1)					Prepared & Analyzed: 05/20/11					
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Sulfate	0.20 U	0.60	0.20	mg/L						
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
LCS (BE12017-BS1)					Prepared & Analyzed: 05/20/11					
Sulfate	8.32	0.60	0.20	mg/L	9.0		92	85-115		
Nitrate (as N)	1.59	0.04	0.01	mg/L	1.7		94	85-115		
Nitrite (as N)	1.36	0.04	0.01	mg/L	1.4		97	85-115		
LCS Dup (BE12017-BSD1)					Prepared & Analyzed: 05/20/11					
Nitrate (as N)	1.58	0.04	0.01	mg/L	1.7		93	85-115	0.6	200
Sulfate	8.22	0.60	0.20	mg/L	9.0		91	85-115	1	200
Nitrite (as N)	1.36	0.04	0.01	mg/L	1.4		97	85-115	0	200
Matrix Spike (BE12017-MS1)		**Source: 1104232-23**			Prepared & Analyzed: 05/20/11					
Sulfate	68.5 +O	0.60	0.20	mg/L	9.0	55.9	140	85-115		
Nitrite (as N)	1.47	0.04	0.01	mg/L	1.4	ND	105	85-115		
Nitrate (as N)	20.6 +O	0.04	0.01	mg/L	1.7	19.4	71	85-115		

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Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE12017 - Ion Chromatography 300.0 Prep										
Matrix Spike (BE12017-MS2)		**Source: 1104232-35**			Prepared & Analyzed: 05/20/11					
Sulfate	8.45	0.60	0.20	mg/L	9.0	ND	94	85-115		
Nitrite (as N)	1.37	0.04	0.01	mg/L	1.4	ND	98	85-115		
Nitrate (as N)	1.59	0.04	0.01	mg/L	1.7	ND	94	85-115		
Batch BE12018 - Ion Chromatography 300.0 Prep										
Blank (BE12018-BLK1)					Prepared & Analyzed: 05/21/11					
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
LCS (BE12018-BS1)					Prepared & Analyzed: 05/21/11					
Nitrite (as N)	1.35	0.04	0.01	mg/L	1.4		96	85-115		
Nitrate (as N)	1.58	0.04	0.01	mg/L	1.7		93	85-115		
LCS Dup (BE12018-BSD1)					Prepared & Analyzed: 05/21/11					
Nitrite (as N)	1.35	0.04	0.01	mg/L	1.4		96	85-115	0	200
Nitrate (as N)	1.58	0.04	0.01	mg/L	1.7		93	85-115	0	10
Matrix Spike (BE12018-MS2)		**Source: 1104321-01**			Prepared & Analyzed: 05/21/11					
Nitrite (as N)	13.8	0.04	0.01	mg/L	14	ND	99	85-115		
Nitrate (as N)	17.1	0.04	0.01	mg/L	17	1.77	90	85-115		
Batch BE12026 - BOD										
Blank (BE12026-BLK1)					Prepared: 05/20/11 Analyzed: 05/25/11					
Carbonaceous BOD	2 U	2	2	mg/L						

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Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE12026 - BOD										
LCS (BE12026-BS1)					Prepared: 05/20/11	Analyzed: 05/25/11				
Carbonaceous BOD	193	2	2	mg/L	200		97	85-115		
LCS Dup (BE12026-BSD1)					Prepared: 05/20/11	Analyzed: 05/25/11				
Carbonaceous BOD	194	2	2	mg/L	200		97	85-115	0.3	200
Duplicate (BE12026-DUP1)		**Source: 1104430-04**			Prepared: 05/20/11	Analyzed: 05/25/11				
Carbonaceous BOD	2 U	2	2	mg/L		ND				25
Batch BE12316 - TSS prep										
Blank (BE12316-BLK1)					Prepared: 05/23/11	Analyzed: 05/24/11				
Total Suspended Solids	1 U	1	1	mg/L						
LCS (BE12316-BS1)					Prepared: 05/23/11	Analyzed: 05/24/11				
Total Suspended Solids	43.0	1	1	mg/L	50		86	85-115		
LCS (BE12316-BS2)					Prepared: 05/23/11	Analyzed: 05/24/11				
Total Suspended Solids	43.0	1	1	mg/L	50		86	85-115		
LCS (BE12316-BS3)					Prepared: 05/23/11	Analyzed: 05/24/11				
Total Suspended Solids	44.0	1	1	mg/L	50		88	85-115		
LCS (BE12316-BS4)					Prepared: 05/23/11	Analyzed: 05/24/11				
Total Suspended Solids	43.5	1	1	mg/L	50		87	85-115		
LCS (BE12316-BS5)					Prepared: 05/23/11	Analyzed: 05/24/11				
Total Suspended Solids	43.0	1	1	mg/L	50		86	85-115		

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Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE12316 - TSS prep										
Duplicate (BE12316-DUP1)		**Source: 1103843-01**			Prepared: 05/23/11 Analyzed: 05/24/11					
Total Suspended Solids	23.5	1	1	mg/L		25.0			6	30
Duplicate (BE12316-DUP2)		**Source: 1104199-01**			Prepared: 05/23/11 Analyzed: 05/24/11					
Total Suspended Solids	1 U	1	1	mg/L		ND				30
Batch BE12319 - Digestion for TP by EPA 365.2/SM4500PE										
Blank (BE12319-BLK1)					Prepared: 05/23/11 Analyzed: 05/26/11					
Phosphorous - Total as P	0.010 U	0.040	0.010	mg/L						
LCS (BE12319-BS1)					Prepared: 05/23/11 Analyzed: 05/26/11					
Phosphorous - Total as P	0.522	0.040	0.010	mg/L	0.50		104	90-110		
Matrix Spike (BE12319-MS1)		**Source: 1104390-07**			Prepared: 05/23/11 Analyzed: 05/26/11					
Phosphorous - Total as P	0.557	0.040	0.010	mg/L	0.50	0.113	89	75-125		
Matrix Spike Dup (BE12319-MSD1)		**Source: 1104390-07**			Prepared: 05/23/11 Analyzed: 05/26/11					
Phosphorous - Total as P	0.579	0.040	0.010	mg/L	0.50	0.113	93	75-125	4	25
Batch BE12351 - Ion Chromatography 300.0 Prep										
Blank (BE12351-BLK1)					Prepared & Analyzed: 05/25/11					
Sulfate	0.20 U	0.60	0.20	mg/L						
LCS (BE12351-BS1)					Prepared & Analyzed: 05/25/11					
Sulfate	8.74	0.60	0.20	mg/L	9.0		97	85-115		

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE12351 - Ion Chromatography 300.0 Prep										
LCS Dup (BE12351-BSD1)					Prepared & Analyzed: 05/25/11					
Sulfate	9.04	0.60	0.20	mg/L	9.0		100	85-115	3	200
Matrix Spike (BE12351-MS1)		**Source: 1104232-25**			Prepared & Analyzed: 05/25/11					
Sulfate	368	0.60	0.20	mg/L	90	272	107	85-115		
Matrix Spike (BE12351-MS2)		**Source: 1103760-01**			Prepared & Analyzed: 05/25/11					
Sulfate	93.5	0.60	0.20	mg/L	90	ND	104	85-115		
Batch BE12406 - TSS prep										
Blank (BE12406-BLK1)					Prepared: 05/24/11 Analyzed: 05/25/11					
Total Suspended Solids	1 U	1	1	mg/L						
LCS (BE12406-BS1)					Prepared: 05/24/11 Analyzed: 05/25/11					
Total Suspended Solids	53.5	1	1	mg/L	50		107	85-115		
Duplicate (BE12406-DUP1)		**Source: 1104101-01**			Prepared: 05/24/11 Analyzed: 05/25/11					
Total Suspended Solids	36.0	1	1	mg/L		36.0			0	30
Duplicate (BE12406-DUP2)		**Source: 1104258-01**			Prepared: 05/24/11 Analyzed: 05/25/11					
Total Suspended Solids	211	1	1	mg/L		223			6	30
Batch BE12408 - Ammonia by SEAL										
Blank (BE12408-BLK1)					Prepared & Analyzed: 05/24/11					
Ammonia as N	0.005 U	0.010	0.005	mg/L						

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Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE12408 - Ammonia by SEAL										
Blank (BE12408-BLK2)					Prepared & Analyzed: 05/24/11					
Ammonia as N	0.005 U	0.010	0.005	mg/L						
LCS (BE12408-BS1)					Prepared & Analyzed: 05/24/11					
Ammonia as N	0.55	0.010	0.005	mg/L	0.50		110	90-110		
LCS (BE12408-BS2)					Prepared & Analyzed: 05/24/11					
Ammonia as N	0.55	0.010	0.005	mg/L	0.50		109	90-110		
Matrix Spike (BE12408-MS1)		**Source: 1104203-11**			Prepared & Analyzed: 05/24/11					
Ammonia as N	0.45	0.010	0.005	mg/L	0.50	ND	91	90-110		
Matrix Spike (BE12408-MS2)		**Source: 1104339-01**			Prepared & Analyzed: 05/24/11					
Ammonia as N	0.47 J5	0.010	0.005	mg/L	0.50	0.026	89	90-110		
Matrix Spike Dup (BE12408-MSD1)		**Source: 1104203-11**			Prepared & Analyzed: 05/24/11					
Ammonia as N	0.45	0.010	0.005	mg/L	0.50	ND	91	90-110	0.2	10
Matrix Spike Dup (BE12408-MSD2)		**Source: 1104339-01**			Prepared & Analyzed: 05/24/11					
Ammonia as N	0.48 J5	0.010	0.005	mg/L	0.50	0.026	90	90-110	0.4	10
Batch BE12410 - Sulfide prep										
Blank (BE12410-BLK1)					Prepared & Analyzed: 05/24/11					
Sulfide	0.10 U	0.40	0.10	mg/L						
LCS (BE12410-BS1)					Prepared & Analyzed: 05/24/11					
Sulfide	4.64	0.40	0.10	mg/L	5.0		93	85-115		

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Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE12410 - Sulfide prep										
Matrix Spike (BE12410-MS1)		**Source: 1103843-01**			Prepared & Analyzed: 05/24/11					
Sulfide	6.25	0.40	0.10	mg/L	5.0	1.42	97	85-115		
Matrix Spike Dup (BE12410-MSD1)		**Source: 1103843-01**			Prepared & Analyzed: 05/24/11					
Sulfide	6.25	0.40	0.10	mg/L	5.0	1.42	97	85-115	0	14
Batch BE12501 - alkalinity										
Blank (BE12501-BLK1)					Prepared & Analyzed: 05/24/11					
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
Blank (BE12501-BLK2)					Prepared & Analyzed: 05/24/11					
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
LCS (BE12501-BS1)					Prepared & Analyzed: 05/24/11					
Total Alkalinity	130	8.0	2.0	mg/L	120		107	90-110		
LCS (BE12501-BS2)					Prepared & Analyzed: 05/24/11					
Total Alkalinity	130	8.0	2.0	mg/L	120		107	90-110		
Matrix Spike (BE12501-MS1)		**Source: 1104232-20**			Prepared & Analyzed: 05/24/11					
Total Alkalinity	330	8.0	2.0	mg/L	120	210	98	80-120		
Matrix Spike (BE12501-MS2)		**Source: 1104232-36**			Prepared & Analyzed: 05/24/11					
Total Alkalinity	120	8.0	2.0	mg/L	120	11	89	80-120		
Matrix Spike Dup (BE12501-MSD1)		**Source: 1104232-20**			Prepared & Analyzed: 05/24/11					
Total Alkalinity	330	8.0	2.0	mg/L	120	210	98	80-120	0	26

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Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE12501 - alkalinity										
Matrix Spike Dup (BE12501-MSD2)		**Source: 1104232-36**			Prepared & Analyzed: 05/24/11					
Total Alkalinity	120	8.0	2.0	mg/L	120	11	89	80-120	0	26
Batch BE12502 - Digestion for TKN by EPA 351.2										
Blank (BE12502-BLK1)					Prepared & Analyzed: 05/25/11					
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
LCS (BE12502-BS1)					Prepared & Analyzed: 05/25/11					
Total Kjeldahl Nitrogen	2.61	0.20	0.05	mg/L	2.5		104	90-110		
Matrix Spike (BE12502-MS1)		**Source: 1103567-07**			Prepared & Analyzed: 05/25/11					
Total Kjeldahl Nitrogen	3.58	0.20	0.05	mg/L	2.5	0.739	114	80-120		
Matrix Spike Dup (BE12502-MSD1)		**Source: 1103567-07**			Prepared & Analyzed: 05/25/11					
Total Kjeldahl Nitrogen	3.18	0.20	0.05	mg/L	2.5	0.739	98	80-120	12	20
Batch BE12503 - Digestion for TKN by EPA 351.2										
Blank (BE12503-BLK1)					Prepared: 05/25/11 Analyzed: 05/27/11					
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
LCS (BE12503-BS1)					Prepared: 05/25/11 Analyzed: 05/27/11					
Total Kjeldahl Nitrogen	2.45	0.20	0.05	mg/L	2.5		98	90-110		
Matrix Spike (BE12503-MS1)		**Source: 1104338-07**			Prepared: 05/25/11 Analyzed: 05/27/11					
Total Kjeldahl Nitrogen	3.56	0.20	0.05	mg/L	2.5	0.805	110	80-120		

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

June 3, 2011
Work Order: 1104232

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE12503 - Digestion for TKN by EPA 351.2										
Matrix Spike Dup (BE12503-MSD1)		**Source: 1104338-07**			Prepared: 05/25/11 Analyzed: 05/27/11					
Total Kjeldahl Nitrogen	3.58	0.20	0.05	mg/L	2.5	0.805	111	80-120	0.5	20
Batch BE12625 - Ammonia by SEAL										
Blank (BE12625-BLK1)					Prepared & Analyzed: 05/27/11					
Ammonia as N	0.005 U	0.010	0.005	mg/L						
Blank (BE12625-BLK2)					Prepared & Analyzed: 05/27/11					
Ammonia as N	0.005 U	0.010	0.005	mg/L						
LCS (BE12625-BS1)					Prepared & Analyzed: 05/27/11					
Ammonia as N	0.48	0.010	0.005	mg/L	0.50		97	90-110		
LCS (BE12625-BS2)					Prepared & Analyzed: 05/27/11					
Ammonia as N	0.47	0.010	0.005	mg/L	0.50		93	90-110		
Matrix Spike (BE12625-MS1)		**Source: 1104232-36**			Prepared & Analyzed: 05/27/11					
Ammonia as N	0.46	0.010	0.005	mg/L	0.50	0.005	90	90-110		
Matrix Spike (BE12625-MS2)		**Source: 1104261-01**			Prepared & Analyzed: 05/27/11					
Ammonia as N	0.48 J5	0.010	0.005	mg/L	0.50	0.080	80	90-110		
Matrix Spike Dup (BE12625-MSD1)		**Source: 1104232-36**			Prepared & Analyzed: 05/27/11					
Ammonia as N	0.46	0.010	0.005	mg/L	0.50	0.005	92	90-110	2	10
Matrix Spike Dup (BE12625-MSD2)		**Source: 1104261-01**			Prepared & Analyzed: 05/27/11					
Ammonia as N	0.50 J5	0.010	0.005	mg/L	0.50	0.080	83	90-110	3	10

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June 3, 2011
Work Order: 1104232

Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE12626 - Digestion for TKN by EPA 351.2										
Blank (BE12626-BLK1)					Prepared: 05/26/11	Analyzed: 05/31/11				
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
LCS (BE12626-BS1)					Prepared: 05/26/11	Analyzed: 05/31/11				
Total Kjeldahl Nitrogen	2.59	0.20	0.05	mg/L	2.5		103	90-110		
Matrix Spike (BE12626-MS1)		**Source: 1104232-35**			Prepared: 05/26/11	Analyzed: 05/31/11				
Total Kjeldahl Nitrogen	3.40 J5	0.20	0.05	mg/L	2.5	ND	136	80-120		
Matrix Spike Dup (BE12626-MSD1)		**Source: 1104232-35**			Prepared: 05/26/11	Analyzed: 05/31/11				
Total Kjeldahl Nitrogen	3.45 J5	0.20	0.05	mg/L	2.5	ND	138	80-120	2	20

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June 3, 2011
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Microbiology - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE11915 - FC-MF										
Blank (BE11915-BLK1)					Prepared: 05/19/11	Analyzed: 05/20/11				
Fecal Coliforms	1 U	1	1	CFU/100 ml						
Duplicate (BE11915-DUP1)		**Source: 1104252-02**			Prepared: 05/19/11	Analyzed: 05/20/11				
Fecal Coliforms	1 U	1	1	CFU/100 ml		ND				200
Duplicate (BE11915-DUP2)		**Source: 1104232-05**			Prepared: 05/19/11	Analyzed: 05/20/11				
Fecal Coliforms	20.0	1	1	CFU/100 ml		20.0			0	200
Duplicate (BE11915-DUP3)		**Source: 1104232-21**			Prepared: 05/19/11	Analyzed: 05/20/11				
Fecal Coliforms	20.0	1	1	CFU/100 ml		20.0			0	200
Batch BE11919 - FC-MF										
Blank (BE11919-BLK1)					Prepared: 05/19/11	Analyzed: 05/20/11				
Fecal Coliforms	1 U	1	1	CFU/100 ml						
Duplicate (BE11919-DUP1)		**Source: 1104232-01**			Prepared: 05/19/11	Analyzed: 05/20/11				
Fecal Coliforms	8,400	1	1	CFU/100 ml		9400			11	200

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June 3, 2011
Work Order: 1104232

* 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.

Z	Too many colonies were present for accurate counting.
J5	Matrix spike of this sample was outside typical range. All other QC criteria were acceptable.
+O	Matrix spike source sample was over the reccommended range for the method.

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)	

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

PARAMETER / CONTAINER DESCRIPTION

SAL Use Only Sample No.	Sample Description	Date	Time	Matrix	Composite	Grab	500ml P, Cool Alkalinity, CBOD, TSS	500ml P, Cool SO4	500ml P, Zn Acetate/NaOH Hydrogen Sulfide No Headspace	125ml P, H2SO4 TKN, NH3, NO3,NO2	125ml P, Na2S2O3, Fecal Coliforms	Field pH	Field Temp	Field Cond	Field DO
01	PNRS II STE-T1	5/19/11	1215	WW		X	1	1	1	1	1	7.6	25.1	960	2.0
02	PNRS II STE-T1-D		1215	WW		X	1			1	1	7.6	25.1	960	2.0
03	UNSAT-EC1		1000	WW		X	1	1		1	1	7.2	23.5	900	6.3
04	UNSAT-EC3		1000	WW		X	1			1	1	7.1	23.5	940	5.7
05	UNSAT-CL1		1000	WW		X	1	1		1	1	7.4	23.5	980	6.9
06	UNSAT-CL3		1000	WW		X	1			1	1	7.5	22.9	1,120	7.6
07	UNSAT-CL5		1000	WW		X	1			1	1	7.9	23.5	1,130	6.9
08	DENIT-SU4		0900	WW		X	1	1	1	1	1	7.4	21.1	1,220	0.1
09	DENIT-LS3		0900	WW		X	1			1	1	7.7	21.1	940	4.2
10	LS3-D		0900	WW		X	1			1	1	7.7	21.1	940	4.2
11	DENIT-SU3		0900	WW		X	1	1		1	1	7.4	20.8	1,380	0.1
12	SU3-D		0900	WW		X	1			1	1	7.4	20.8	1,380	0.1

Containers Prepared/ Relinquished:	Date/Time:	Received:	Date/Time:
HH	1500 5-18-11		5/18/11 1500
	5/19/11 1100		5/19/11 1100
	5/19/11 1405		

Seal intact? Y N N/A
Samples intact upon arrival? Y N N/A
Received on ice? Temp_____ 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

STE-T1, STE-T1-D
- FECAL LIKELY > 1,000,000

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

Chain of Custody

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)

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

PARAMETER / CONTAINER DESCRIPTION

SAL Use Only Sample No.	Sample Description	Date	Time	Matrix	Composite	Grab	500ml P, Cool Alkalinity, CBOD, TSS	500ml P, Cool SO4	500ml P, Zn Acetate/NaOH Hydrogen Sulfide No Headspace	125ml P, H2SO4 TKN, NH3, NO3,NO2	125ml P, Na2S2O3 Fecal Coliforms	Field pH	Field Temp	Field Cond	Field DO
13	DENIT-LS2	5/19/11	0900	WW		X	1			1	1	7.9	20.2	1,100	3.1
14	LS2-D		0900	WW		X	1			1	1	7.9	20.1	1,100	3.1
15	DENIT-LS4		0900	WW		X	1			1	1	8.1	19.9	1,080	0.6
16	RC1		1130	WW		X	1			1	1	7.5	23.4	750	0.1
17	RC2		1100	WW		X	1			1	1	7.5	21.2	770	0.7
18	RC3		1030	WW		X	1			1	1	7.4	21.9	780	0.1
19	RC4		1045	WW		X	1			1	1	7.5	21.7	800	0.1
20	UNSAT-CL4		0950	WW		X	1			1	1	7.4	22.2	750	7.6
21	UNSAT-CL2		0950	WW		X	1			1	1	7.3	22.8	740	6.8
22	UNSAT-EC4		1005	WW		X	1			1	1	7.3	22.7	710	7.9
23	UNSAT-SA2		0950	WW		X	1		5/24/11 WW	1	1	7.1	22.5	760	4.5
24	DFT		1200	WW		X	1	1	1	1	1	7.5	21.2	770	7.5

Relinquished:	Date/Time:	Received:	Date/Time:
Containers Prepared/ Relinquished: HH	1500 5-18-11	5/18/11	1500
5/19/11	1100		1100 5/19/11
5/19/11	1405		

Seal intact? N N/A

Samples intact upon arrival? Y N N/A

Received on ice? Temp___ Y N N/A

Proper preservatives indicat Y N N/A

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

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

Proper containers used? Y N N/A

Instructions / Remarks

Total Phos. Should be added to DFT only (sample .24 only).

RC-1, RC-2, RC-3, RC-4, & FECAL - LIKELY > 1,000,000

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

Chain of Custody

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)

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

PARAMETER / CONTAINER DESCRIPTION

SAL Use Only Sample No.	Sample Description	Date	Time	Matrix	Composite	Grab	500ml P, Cool Alkalinity, CBOD, TSS	500ml P, Cool SO4	500ml P, Zn Acetate/NaOH Hydrogen Sulfide No Headspace	125ml P, H2SO4 TKN, NH3, NO3,NO2	125ml P, Na2S2O3 Fecal Coliforms	Field pH	Field Temp	Field Cond	Field DO
25	DENIT-SU1	5/19/11	0800	WW		X	1	1		1	1	7.2	16.9	1,000	0.1
26	DENIT-SU2		0800	WW		X	1	1	1	1	1	7.1	16.7	1,010	0.1
27	DENIT-LS1		0800	WW		X	1			1	1	7.3	16.1	700	0.1
28	DENIT-GL1		0800	WW		X	1			1	1	6.8	16.4	850	0.1
29	UNSAT-IS1-SP		—	WW		X	1	1		1	1	—	—	—	—
30	UNSAT-IS1		1125	WW		X	1	1		1	1	7.3	24.1	810	2.4
31	UNSAT-IS2-SP		—	WW		X	1			1	1	—	—	—	—
32	UNSAT-IS2		1125	WW		X	1			1	1	7.3	24.4	850	4.7
33	UNSAT-IS3-SP		0845	WW		X	1	1		1	1	7.1	18.2	1,000	~~6.6~~ N/A
34	UNSAT-IS4-SP		0845	WW		X	1	1		1	1	7.0	17.5	1,140	N/A
35	FB		0945	WW		X	1			1	Too shipl. 1	~~7.8~~ 7.0	19.9	5	7.4
36	EB		0945	WW		X	1			1		7.5	19.4	5	8.2

Relinquished:	Date/Time:	Received:	Date/Time:
Containers Prepared/ Relinquished:	5-18-11 1500		5/18/11 1500
	5/19/11 1100		5/19/11 1100
	5/19/11 1405		

Seal intact? Y N N/A

Samples intact upon arrival? Y N N/A

Received on ice? Temp_____ 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

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

Chain of Custody

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
jedeback@hazanandsawyer.com

Project Name / Location: PNRS II Wastewater System Analyses

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

PARAMETER / CONTAINER DESCRIPTION

SAL Use Only Sample No.	Sample Description	Date	Time	Matrix	Composite	Grab	500ml P, Cool Alkalinity, CBOD, TSS SO4	500ml P, Cool SO4	500ml P, Zn Acetate/NaOH Hydrogen Sulfide No Headspace	125ml P, H2SO4 TKN, NH3, NO3,NO2	125ml P, Na2S2O3, Fecal Coliforms	Field pH	Field Temp	Field Cond	Field DO
01	PNRS II STE-T1	5/19/11	1215	WW		X	1	✗	1	1	1	7.6	25.1	960	2.0
02	PNRS II STE-T1-D	↓	1215	WW		X	1			1	1	7.6	25.1	960	2.0
03	UNSAT-EC1		1000	WW		X	1	✗		1	1	7.2	23.5	900	6.3
04	UNSAT-EC3		1000	WW		X	1			1	1	7.1	23.5	940	5.7
05	UNSAT-CL1		1000	WW		X	1	✗		1	1	7.4	23.5	980	6.9
06	UNSAT-CL3		1000	WW		X	1			1	1	7.5	22.9	1,120	7.6
07	UNSAT-CL5		1000	WW		X	1			1	1	7.9	23.5	1,130	6.9
08	DENIT-SU4		0900	WW		X	✗ 1	✗	1	1	1	7.4	21.1	1,220	0.1
09	DENIT-LS3		0900	WW		X	1			1	1	7.7	21.1	940	4.2
10	LS3-D		0900	WW		X	1			1	1	7.7	21.1	940	4.2
11	DENIT-SU3		0900	WW		X	1	✗		1	1	7.4	20.8	1,380	0.1
12	SU3-D	↓	0900	WW		X	1	✗		1	1	7.4	20.8	1,380	0.1

Relinquished:	Date/Time:	Received:	Date/Time:
Containers Prepared/ Relinquished: HH	1500 5-18-11		5/18/11 1500
	5/19/11 1100		1100 5/19/11
	5/19/11 1405		

Seal intact? Y N N/A
Samples intact upon arrival? Y N N/A
Received on ice? Temp_____ 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

STE-T1, STE-T1-D
- Fecal Likely > 1,000,000

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

Chain of Custody

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

jedeback@hazanandsawyer.com

Project Name / Location: PNRS II Wastewater System Analyses

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

PARAMETER / CONTAINER DESCRIPTION

SAL Use Only Sample No.	Sample Description	Date	Time	Matrix	Composite	Grab	500ml P, Cool Alkalinity, CBOD, TSS SO4	500ml P, Cool SO4	500ml P, Zn Acetate/NaOH Hydrogen Sulfide No Headspace	125ml P, H2SO4 TKN, NH3, NO3,NO2	125ml P, Na2S2O3 Fecal Coliforms	Field pH	Field Temp	Field Cond	Field DO
13	DENIT-LS2	5/19/11	0900	WW		X	1			1	1	7.9	20.2	1,100	3.1
14	LS2-D		0900	WW		X	1			1	1	7.9	20.1	1,100	3.1
15	DENIT-LS4		0900	WW		X	1			1	1	8.1	19.9	1,080	0.6
16	RC1		1130	WW		X	1			1	1	7.5	23.4	750	0.1
17	RC2		1100	WW		X	1			1	1	7.5	21.2	770	0.7
18	RC3		1030	WW		X	1			1	1	7.4	21.9	780	0.1
19	RC4		1045	WW		X	1			1	1	7.5	21.7	800	0.1
20	UNSAT-CL4		0950	WW		X	1			1	1	7.4	22.2	750	7.6
21	UNSAT-CL2		0950	WW		X	1			1	1	7.3	22.8	740	6.8
22	UNSAT-EC4		1005	WW		X	1			1	1	7.3	22.7	710	7.9
23	UNSAT-SA2		0950	WW		X	1	5/24/11 NO	5/24/11 NO	1	1	7.1	22.5	760	4.5
24	DFT		1200	WW		X	1	1	1	1	1	7.5	21.2	770	7.5

Relinquished:	Date/Time:	Received:	Date/Time:
Containers Prepared/ Relinquished: HH	5-18-11 1500	5/18/11	1500
5/19/11	1100		1100 5/19/11
5/19/11	1405		

Seal intact? N N/A

Samples intact upon arrival? Y N N/A

Received on ice? Temp___ Y N N/A

Proper preservatives indicat Y N N/A

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

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

Proper containers used? Y N N/A

Instructions / Remarks

Total Phos. Should be added to DFT only (sample .24 only).

RC-1, RC-2, RC-3, RC-4, & FECAL - LIKELY > 1,000,000

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

Chain of Custody

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

jedeback@hazanandsawyer.com

Project Name / Location: PNRS II Wastewater System Analyses

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

PARAMETER / CONTAINER DESCRIPTION

SAL Use Only Sample No.	Sample Description	Date	Time	Matrix	Composite	Grab	500ml P, Cool Alkalinity, CBOD, TSS SO4	500ml P, Cool SO4	500ml P, Zn Acetate/NaOH Hydrogen Sulfide No Headspace	125ml P, H2SO4 TKN, NH3, NO3,NO2	125ml P, Na2S2O3 Fecal Coliforms	Field pH	Field Temp	Field Cond	Field DO
25	DENIT-SU1	5/19/11	0800	WW		X	1	✗		1	1	7.2	16.9	1,000	0.1
26	DENIT-SU2		0800	WW		X	1	✗	1	1	1	7.1	16.7	1,010	0.1
27	DENIT-LS1		0800	WW		X	1			1	1	7.3	16.1	700	0.1
28	DENIT-GL1		0800	WW		X	1			1	1	6.8	16.4	850	0.1
29	UNSAT-IS1-SP		—	WW		X	1	✗		1	1	—	—	—	—
30	UNSAT-IS1		1125	WW		X	1	✗		1	1	7.3	24.1	810	2.4
31	UNSAT-IS2-SP		—	WW		X	1			1	1	—	—	—	—
32	UNSAT-IS2		1125	WW		X	1			1	1	7.3	24.4	850	4.7
33	UNSAT-IS3-SP		0845	WW		X	1	✗		1	1	7.1	18.2	1,000	~~6.6~~ N/A
34	UNSAT-IS4-SP		0845	WW		X	1	✗		1	1	7.0	17.5	1,140	N/A
35	FB		0945	WW		X	1	✗		1	Tot Coli. 1	7.80	19.9	5	7.4
36	EB		0945	WW		X	1			1		7.5	19.4	5	8.2

Relinquished:	Date/Time:	Received:	Date/Time:
Containers Prepared/ Relinquished:	5-18-11 1500		5/18/11 1500
	5/19/11 1100		5/19/11 1100
	5/19/11 1405		

Seal intact? Y N N/A

Samples intact upon arrival? Y N N/A

Received on ice? Temp_____ 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

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

Chain of Custody

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

June 2, 2011
Work Order: 1104231
Revised Report

Laboratory Report

Project Name **PNRS II**

Parameters	Units	Results *	Method	PQL	MDL	Prepared	Analyzed	By
Sample Description		**UNSAT-IS3**						
Matrix		**Wastewater**						
SAL Sample Number		**1104231-01**						
Date/Time Collected		**05/17/11 09:10**						
Collected by		**Josephine Edeback-Hirst**						
Date/Time Received		**05/17/11 13:00**						
Inorganics								
Ammonia as N	mg/L	1.6	EPA 350.1	0.010	0.005		05/20/11 14:43	SMD
Carbonaceous BOD	mg/L	6	SM 5210B	2	2	05/18/11 16:23	05/23/11 13:57	MMF
Nitrate (as N)	mg/L	0.02 I	EPA 300.0	0.04	0.01		05/18/11 22:40	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/18/11 22:40	MEJ
Sulfate	mg/L	300	EPA 300.0	0.60	0.20		05/24/11 15:41	MEJ
Total Alkalinity	mg/L	390	SM 2320B	8.0	2.0		05/18/11 08:56	MMF
Total Kjeldahl Nitrogen	mg/L	3.6	EPA 351.2	0.20	0.05	05/20/11 10:53	05/23/11 15:47	SMD
Total Suspended Solids	mg/L	8	SM 2540D	1	1	05/19/11 10:30	05/20/11 09:37	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	9	SM 9222D	1	1	05/17/11 15:30	05/18/11 14:30	JMK

Sample Description		**UNSAT-IS4**						
Matrix		**Wastewater**						
SAL Sample Number		**1104231-02**						
Date/Time Collected		**05/17/11 09:15**						
Collected by		**Josephine Edeback-Hirst**						
Date/Time Received		**05/17/11 13:00**						
Inorganics								
Ammonia as N	mg/L	0.076	EPA 350.1	0.010	0.005		05/20/11 14:43	SMD
Carbonaceous BOD	mg/L	38	SM 5210B	2	2	05/18/11 16:23	05/23/11 13:57	MMF
Nitrate (as N)	mg/L	0.02 I	EPA 300.0	0.04	0.01		05/18/11 22:40	MEJ
Nitrite (as N)	mg/L	0.01 U	EPA 300.0	0.04	0.01		05/18/11 22:40	MEJ
Sulfate	mg/L	190	EPA 300.0	0.60	0.20		05/24/11 15:41	MEJ
Total Alkalinity	mg/L	530	SM 2320B	8.0	2.0		05/18/11 08:56	MMF
Total Kjeldahl Nitrogen	mg/L	2.4	EPA 351.2	0.20	0.05	05/20/11 10:53	05/23/11 15:47	SMD
Total Suspended Solids	mg/L	34	SM 2540D	1	1	05/19/11 10:30	05/20/11 09:37	JAG
Microbiology								
Fecal Coliforms	CFU/100 ml	1 U	SM 9222D	1	1	05/17/11 15:30	05/18/11 14:30	JMK

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE11737 - Ion Chromatography 300.0 Prep										
Blank (BE11737-BLK1)					Prepared & Analyzed: 05/18/11					
Nitrate (as N)	0.01 U	0.04	0.01	mg/L						
Nitrite (as N)	0.01 U	0.04	0.01	mg/L						
LCS (BE11737-BS1)					Prepared & Analyzed: 05/18/11					
Nitrate (as N)	1.80	0.04	0.01	mg/L	1.7		106	85-115		
Nitrite (as N)	1.39	0.04	0.01	mg/L	1.4		99	85-115		
LCS Dup (BE11737-BSD1)					Prepared & Analyzed: 05/18/11					
Nitrite (as N)	1.32	0.04	0.01	mg/L	1.4		94	85-115	5	200
Nitrate (as N)	1.76	0.04	0.01	mg/L	1.7		104	85-115	2	10
Matrix Spike (BE11737-MS1)		**Source: 1104196-09**			Prepared & Analyzed: 05/18/11					
Nitrite (as N)	1.39	0.04	0.01	mg/L	1.4	ND	99	85-115		
Nitrate (as N)	1.78	0.04	0.01	mg/L	1.7	ND	105	85-115		
Matrix Spike (BE11737-MS2)		**Source: 1104316-02**			Prepared & Analyzed: 05/18/11					
Nitrate (as N)	18.9	0.04	0.01	mg/L	17	0.193	110	85-115		
Nitrite (as N)	13.8	0.04	0.01	mg/L	14	ND	99	85-115		
Batch BE11803 - alkalinity										
Blank (BE11803-BLK1)					Prepared & Analyzed: 05/18/11					
Total Alkalinity	2.0 U	8.0	2.0	mg/L						
LCS (BE11803-BS1)					Prepared & Analyzed: 05/18/11					
Total Alkalinity	130	8.0	2.0	mg/L	120		107	90-110		26

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE11803 - alkalinity										
LCS (BE11803-BS2)					Prepared & Analyzed: 05/18/11					
Total Alkalinity	130	8.0	2.0	mg/L	120		107	90-110		26
LCS (BE11803-BS3)					Prepared & Analyzed: 05/18/11					
Total Alkalinity	130	8.0	2.0	mg/L	120		107	90-110		26
LCS (BE11803-BS4)					Prepared & Analyzed: 05/18/11					
Total Alkalinity	130	8.0	2.0	mg/L	120		107	90-110		26
LCS (BE11803-BS5)					Prepared & Analyzed: 05/18/11					
Total Alkalinity	120	8.0	2.0	mg/L	120		98	90-110		26
Matrix Spike (BE11803-MS1)		**Source: 1104231-02**			Prepared & Analyzed: 05/18/11					
Total Alkalinity	630	8.0	2.0	mg/L	120	530	80	80-120		26
Matrix Spike Dup (BE11803-MSD1)		**Source: 1104231-02**			Prepared & Analyzed: 05/18/11					
Total Alkalinity	630	8.0	2.0	mg/L	120	530	80	80-120	0	26
Batch BE11828 - BOD										
Blank (BE11828-BLK1)					Prepared: 05/18/11 Analyzed: 05/23/11					
Carbonaceous BOD	2 U	2	2	mg/L						
LCS (BE11828-BS1)					Prepared: 05/18/11 Analyzed: 05/23/11					
Carbonaceous BOD	183	2	2	mg/L	200		92	85-115		
LCS Dup (BE11828-BSD1)					Prepared: 05/18/11 Analyzed: 05/23/11					
Carbonaceous BOD	195	2	2	mg/L	200		98	85-115	6	10

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE11828 - BOD										
Duplicate (BE11828-DUP1)		**Source: 1103553-01**			Prepared: 05/18/11	Analyzed: 05/23/11				
Carbonaceous BOD	170	2	2	mg/L		170			3	25
Batch BE11905 - TSS prep										
Blank (BE11905-BLK1)					Prepared: 05/19/11	Analyzed: 05/20/11				
Total Suspended Solids	1 U	1	1	mg/L						
LCS (BE11905-BS1)					Prepared: 05/19/11	Analyzed: 05/20/11				
Total Suspended Solids	47.0	1	1	mg/L	50		94	85-115		
Duplicate (BE11905-DUP1)		**Source: 1103761-01**			Prepared: 05/19/11	Analyzed: 05/20/11				
Total Suspended Solids	996	1	1	mg/L		1010			1	30
Duplicate (BE11905-DUP2)		**Source: 1104338-03**			Prepared: 05/19/11	Analyzed: 05/20/11				
Total Suspended Solids	1.00	1	1	mg/L		1.00			0	30
Batch BE12009 - Digestion for TKN by EPA 351.2										
Blank (BE12009-BLK1)					Prepared: 05/20/11	Analyzed: 05/23/11				
Total Kjeldahl Nitrogen	0.05 U	0.20	0.05	mg/L						
LCS (BE12009-BS1)					Prepared: 05/20/11	Analyzed: 05/23/11				
Total Kjeldahl Nitrogen	2.50	0.20	0.05	mg/L	2.5		100	90-110		
Matrix Spike (BE12009-MS1)		**Source: 1104267-01**			Prepared: 05/20/11	Analyzed: 05/23/11				
Total Kjeldahl Nitrogen	2.31	0.20	0.05	mg/L	2.5	ND	92	80-120		

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE12009 - Digestion for TKN by EPA 351.2										
Matrix Spike Dup (BE12009-MSD1)		**Source: 1104267-01**			Prepared: 05/20/11 Analyzed: 05/23/11					
Total Kjeldahl Nitrogen	2.52	0.20	0.05	mg/L	2.5	ND	101	80-120	9	20
Batch BE12012 - Ammonia by SEAL										
Blank (BE12012-BLK1)					Prepared & Analyzed: 05/20/11					
Ammonia as N	0.005 U	0.010	0.005	mg/L						
LCS (BE12012-BS1)					Prepared & Analyzed: 05/20/11					
Ammonia as N	0.49	0.010	0.005	mg/L	0.50		99	90-110		
Matrix Spike (BE12012-MS1)		**Source: 1104197-01**			Prepared & Analyzed: 05/20/11					
Ammonia as N	0.47	0.010	0.005	mg/L	0.50	0.006	93	90-110		
Matrix Spike Dup (BE12012-MSD1)		**Source: 1104197-01**			Prepared & Analyzed: 05/20/11					
Ammonia as N	0.48	0.010	0.005	mg/L	0.50	0.006	94	90-110	1	10
Batch BE12350 - Ion Chromatography 300.0 Prep										
Blank (BE12350-BLK1)					Prepared & Analyzed: 05/24/11					
Sulfate	0.20 U	0.60	0.20	mg/L						
LCS (BE12350-BS1)					Prepared & Analyzed: 05/24/11					
Sulfate	9.12	0.60	0.20	mg/L	9.0		101	85-115		
LCS Dup (BE12350-BSD1)					Prepared & Analyzed: 05/24/11					
Sulfate	9.08	0.60	0.20	mg/L	9.0		101	85-115	0.4	200

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Inorganics - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE12350 - Ion Chromatography 300.0 Prep										
Matrix Spike (BE12350-MS1)		**Source: 1104197-07**			Prepared & Analyzed: 05/24/11					
Sulfate	105	0.60	0.20	mg/L	90	9.87	106	85-115		
Matrix Spike (BE12350-MS2)		**Source: 1104087-09**			Prepared & Analyzed: 05/24/11					
Sulfate	102	0.60	0.20	mg/L	90	9.10	103	85-115		

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Microbiology - Quality Control

Analyte	Result	PQL	MDL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch BE11727 - FC-MF										
Blank (BE11727-BLK1)					Prepared: 05/17/11	Analyzed: 05/18/11				
Fecal Coliforms	1 U	1	1	CFU/100 ml						
Duplicate (BE11727-DUP1)		**Source: 1104196-03**			Prepared: 05/17/11	Analyzed: 05/18/11				
Fecal Coliforms	1 U	1	1	CFU/100 ml		ND				200
Duplicate (BE11727-DUP2)		**Source: 1104242-02**			Prepared: 05/17/11	Analyzed: 05/18/11				
Fecal Coliforms	1 U	1	1	CFU/100 ml		ND				200

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. 1104231

Client Name: Hazan and Sawyer

Contact / Phone: Josephin Edeback-Hirst 813-630-4498
jedeback@hazanandsawyer.com

Project Name / Location: PNRS II Wastewater System Analyses

Samplers: (Signature) Josephin Hirst

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

PARAMETER / CONTAINER DESCRIPTION

SAL Use Only Sample No.	Sample Description	Date	Time	Matrix	Composite	Grab	500mL P, Cool Alk, CBOD, TSS, NO_2, NO_3, SO_4	125ml P, H_2SO_4 TKN, NH_3	125mL P, Sterile, $Na_2S_2O_3$ Fecal Coliforms (MF)				ORP (Client meter)	Field pH	Field Temp	Field Cond	Field DO
01	UNSAT-IS3	5/17/11	9:10am	WW		X	1	1	1				97.5	7.38	12.0	1395	
02	UNSAT-IS4	5/17/11	9:15am	WW		X	1	1	1				76.1	7.13	14.3	1379	

Relinquished	Date/Time	Received	Date/Time
Containers Prepared/ Relinquished: HH	Date/Time: 1600 5-13-11	Received: Josephin Hirst	Date/Time: 5/16/11 1:00pm
Relinquished: Josephin Hirst	Date/Time: 1120 5/17/11	Received: [illegible]	Date/Time: 5/17/11 1120
Relinquished: courier	Date/Time:	Received: K Medment	Date/Time: 1300 5/17/11
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_____	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

1104231

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Rev.Date 11/19/01

Chain of Custody

Pace Analytical Services, Inc.
8 East Tower Circle
Ormond Beach, FL 32174
(386)672-5668

May 27, 2011

Ms. Josefin Edebeck-Hirst
Hazen and Sawyer, P.C
10002 Princess Palm Avenue
Suite 200
Tampa, FL 33619

RE: Project: PNRSII SE#6
Pace Project No.: 3530933

Dear Ms. Edebeck-Hirst:
Enclosed are the analytical results for sample(s) received by the laboratory on May 20, 2011. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Sakina Mckenzie

sakina.mckenzie@pacelabs.com
Project Manager

Enclosures

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CERTIFICATIONS

Project: PNRSII SE#6
Pace Project No.: 3530933

Ormond Beach Certification IDs
8 East Tower Circle, Ormond Beach, FL 32174
Alabama Certification #: 41320
Arizona Certification #: AZ0735
Colorado Certification: FL NELAC Reciprocity
Connecticut Certification #: PH 0216
Florida Certification #: E83079
Georgia Certification #: 955
Guam Certification: FL NELAC Reciprocity
Hawaii Certification: FL NELAC Reciprocity
Kansas Certification #: E-10383
Kentucky Certification #: 90050
Louisiana Certification #: LA090012
Louisiana Environmental Certificate #: 05007
Maine Certification #: FL1264
Massachusetts Certification #: M-FL1264
Michigan Certification #: 9911
Mississippi Certification: FL NELAC Reciprocity
Montana Certification #: Cert 0074
Nevada Certification: FL NELAC Reciprocity
New Hampshire Certification #: 2958
New Jersey Certification #: FL765
New York Certification #: 11608
North Carolina Environmental Certificate #: 667
North Carolina Certification #: 12710
Pennsylvania Certification #: 68-547
Puerto Rico Certification #: FL01264
Tennessee Certification #: TN02974
Texas Certification: FL NELAC Reciprocity
Virginia Certification #: 00432
Wyoming Certification: FL NELAC Reciprocity

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SAMPLE SUMMARY

Project: PNRSII SE#6
Pace Project No.: 3530933

Lab ID	Sample ID	Matrix	Date Collected	Date Received
3530933001	**DFT**	Water	05/19/11 12:05	05/20/11 07:30
3530933002	**STE-PNRSII-T1**	Water	05/19/11 12:15	05/20/11 07:30

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SAMPLE ANALYTE COUNT

Project: PNRSII SE#6
Pace Project No.: 3530933

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
3530933001	**DFT**		SMM	3	PASI-O
		SM 2320B	HEA	1	PASI-O
		SM 2540D	AIS	1	PASI-O
		SM 4500-S2F	IRL	1	PASI-O
		SM 5210B	MBS	1	PASI-O
		EPA 300.0	KDM	3	PASI-O
		EPA 300.0	KDM	1	PASI-O
		EPA 350.1	AMD	1	PASI-O
		EPA 351.2	AMD	1	PASI-O
		EPA 365.4	AMD	1	PASI-O
		EPA 410.4	MMD	1	PASI-O
3530933002	**STE-PNRSII-T1**		SMM	3	PASI-O
		SM 2320B	HEA	1	PASI-O
		SM 2540D	AIS	1	PASI-O
		SM 4500-S2F	IRL	1	PASI-O
		SM 5210B	MBS	1	PASI-O
		EPA 300.0	KDM	2	PASI-O
		EPA 300.0	KDM	1	PASI-O
		EPA 350.1	AMD	1	PASI-O
		EPA 351.2	AMD	1	PASI-O
		EPA 365.4	AMD	1	PASI-O
		EPA 410.4	MMD	1	PASI-O

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ANALYTICAL RESULTS

Project: PNRSII SE#6
Pace Project No.: 3530933

Sample: DFT **Lab ID: 3530933001** Collected: 05/19/11 12:05 Received: 05/20/11 07:30 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Field Data	Analytical Method:								
Field pH	**7.5**	Std. Units			1		05/20/11 10:15		
Field Temperature	**21.2**	deg C			1		05/20/11 10:15		
Field Specific Conductance	**770**	umhos/cm			1		05/20/11 10:15		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**167**	mg/L	5.0	5.0	1		05/24/11 14:55		
2540D Total Suspended Solids	Analytical Method: SM 2540D								
Total Suspended Solids	**5.0U**	mg/L	5.0	5.0	1		05/23/11 08:17		
4500S2F Hydrogen Sulfide	Analytical Method: SM 4500-S2F								
Un-ionized Hydrogen Sulfide	**1.0U**	mg/L	1.0	1.0	1		05/21/11 17:55		
5210B cBOD, 5 day	Analytical Method: SM 5210B Preparation Method: SM 5210B								
Carbonaceous BOD, 5 day	**2.0U**	mg/L	2.0	2.0	1	05/20/11 12:08	05/25/11 08:55		
300.0 IC Anions	Analytical Method: EPA 300.0								
Nitrate as N	**21.8**	mg/L	0.25	0.12	5		05/20/11 18:21	14797-55-8	
Nitrite as N	**0.025U**	mg/L	0.050	0.025	1		05/20/11 15:19	14797-65-0	
Orthophosphate as P	**5.0**	mg/L	0.10	0.050	1		05/20/11 15:19		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Sulfate	**68.0**	mg/L	5.0	2.5	1		05/20/11 15:19	14808-79-8	
350.1 Ammonia	Analytical Method: EPA 350.1								
Nitrogen, Ammonia	**0.020U**	mg/L	0.050	0.020	1		05/23/11 11:47	7664-41-7	
351.2 Total Kjeldahl Nitrogen	Analytical Method: EPA 351.2 Preparation Method: EPA 351.2								
Nitrogen, Kjeldahl, Total	**0.55**	mg/L	0.50	0.25	1	05/23/11 07:40	05/26/11 10:03	7727-37-9	
365.4 Phosphorus, Total	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4								
Phosphorus, Total (as P)	**4.9**	mg/L	0.10	0.050	1	05/23/11 07:40	05/26/11 10:03	7723-14-0	
410.4 COD	Analytical Method: EPA 410.4								
Chemical Oxygen Demand	**12.5U**	mg/L	25.0	12.5	1		05/26/11 13:35		

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ANALYTICAL RESULTS

Project: PNRSII SE#6
Pace Project No.: 3530933

Sample: STE-PNRSII-T1 **Lab ID: 3530933002** Collected: 05/19/11 12:15 Received: 05/20/11 07:30 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Field Data	Analytical Method:								
Field pH	**7.6**	Std. Units			1		05/20/11 10:15		
Field Temperature	**25.1**	deg C			1		05/20/11 10:15		
Field Specific Conductance	**960**	umhos/cm			1		05/20/11 10:15		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**347**	mg/L	5.0	5.0	1		05/24/11 15:16		
2540D Total Suspended Solids	Analytical Method: SM 2540D								
Total Suspended Solids	**256**	mg/L	40.0	40.0	1		05/23/11 08:17		
4500S2F Hydrogen Sulfide	Analytical Method: SM 4500-S2F								
Un-ionized Hydrogen Sulfide	**1.8**	mg/L	1.0	1.0	1		05/21/11 17:55		
5210B cBOD, 5 day	Analytical Method: SM 5210B	Preparation Method: SM 5210B							
Carbonaceous BOD, 5 day	**44.8**	mg/L	2.0	2.0	1	05/20/11 12:08	05/25/11 08:56		
300.0 IC Anions	Analytical Method: EPA 300.0								
Nitrate as N	**0.12U**	mg/L	0.25	0.12	5		05/20/11 15:31	14797-55-8	
Nitrite as N	**0.12U**	mg/L	0.25	0.12	5		05/20/11 15:31	14797-65-0	
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Sulfate	**32.9**	mg/L	25.0	12.5	5		05/20/11 15:31	14808-79-8	
350.1 Ammonia	Analytical Method: EPA 350.1								
Nitrogen, Ammonia	**52.8**	mg/L	0.50	0.20	10		05/23/11 13:00	7664-41-7	
351.2 Total Kjeldahl Nitrogen	Analytical Method: EPA 351.2	Preparation Method: EPA 351.2							
Nitrogen, Kjeldahl, Total	**56.5**	mg/L	1.0	0.50	1	05/23/11 07:40	05/26/11 10:04	7727-37-9	
365.4 Phosphorus, Total	Analytical Method: EPA 365.4	Preparation Method: EPA 365.4							
Phosphorus, Total (as P)	**5.4**	mg/L	0.20	0.10	1	05/23/11 07:40	05/26/11 10:04	7723-14-0	
410.4 COD	Analytical Method: EPA 410.4								
Chemical Oxygen Demand	**134**	mg/L	25.0	12.5	1		05/26/11 13:35		

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(386)672-5668

QUALITY CONTROL DATA

Project: PNRSII SE#6
Pace Project No.: 3530933

QC Batch: WET/8661 — Analysis Method: SM 2320B
QC Batch Method: SM 2320B — Analysis Description: 2320B Alkalinity
Associated Lab Samples: 3530933001, 3530933002

METHOD BLANK: 206652 — Matrix: Water
Associated Lab Samples: 3530933001, 3530933002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	5.0U	5.0	05/24/11 14:42	

LABORATORY CONTROL SAMPLE: 206653

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	250	240	96	90-110	

MATRIX SPIKE SAMPLE: 206655

Parameter	Units	3530933001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	167	250	401	94	90-110	

MATRIX SPIKE SAMPLE: 206657

Parameter	Units	3531046001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	150	250	240	36	90-110	J(M1)

SAMPLE DUPLICATE: 206654

Parameter	Units	3530933001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	167	168	.9	20	

SAMPLE DUPLICATE: 206656

Parameter	Units	3531046001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	150	151	.7	20	

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QUALITY CONTROL DATA

Project: PNRSII SE#6
Pace Project No.: 3530933

QC Batch: WET/8643 | Analysis Method: SM 2540D
QC Batch Method: SM 2540D | Analysis Description: 2540D Total Suspended Solids
Associated Lab Samples: 3530933001, 3530933002

METHOD BLANK: 206163 | Matrix: Water
Associated Lab Samples: 3530933001, 3530933002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Suspended Solids	mg/L	5.0U	5.0	05/23/11 08:17	

LABORATORY CONTROL SAMPLE: 206164

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Suspended Solids	mg/L	80	82.0	102	90-110	

SAMPLE DUPLICATE: 206165

Parameter	Units	3530891003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	5.0U	5.0U		20	

SAMPLE DUPLICATE: 206166

Parameter	Units	3530989001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	5.0U	5.0U		20	

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QUALITY CONTROL DATA

Project: PNRSII SE#6
Pace Project No.: 3530933

QC Batch: WET/8624 | Analysis Method: SM 5210B
QC Batch Method: SM 5210B | Analysis Description: 5210B cBOD, 5 day
Associated Lab Samples: 3530933001, 3530933002

METHOD BLANK: 205454 | Matrix: Water
Associated Lab Samples: 3530933001, 3530933002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Carbonaceous BOD, 5 day	mg/L	2.0U	2.0	05/25/11 08:43	

LABORATORY CONTROL SAMPLE: 205455

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Carbonaceous BOD, 5 day	mg/L	198	200	101	85-115	

SAMPLE DUPLICATE: 205894

Parameter	Units	3530892003 Result	Dup Result	RPD	Max RPD	Qualifiers
Carbonaceous BOD, 5 day	mg/L	221	218	1	20	

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QUALITY CONTROL DATA

Project: PNRSII SE#6
Pace Project No.: 3530933

QC Batch: WETA/10278 | Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 | Analysis Description: 300.0 IC Anions
Associated Lab Samples: 3530933001, 3530933002

METHOD BLANK: 205950 | Matrix: Water
Associated Lab Samples: 3530933001, 3530933002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrate as N	mg/L	0.025U	0.050	05/20/11 10:40	
Nitrite as N	mg/L	0.025U	0.050	05/20/11 10:40	
Orthophosphate as P	mg/L	0.050U	0.10	05/20/11 10:40	

LABORATORY CONTROL SAMPLE: 205951

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrate as N	mg/L	5	5.2	104	90-110	
Nitrite as N	mg/L	5	5.2	105	90-110	
Orthophosphate as P	mg/L	10	10.6	106	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 205952 205953

Parameter	Units	3530932002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrate as N	mg/L	0.050U	10	10	10.1	10.1	101	101	90-110	.001	20	
Nitrite as N	mg/L	0.050U	10	10	8.8	8.7	88	87	90-110	1	20	J(M1)
Orthophosphate as P	mg/L	0.10U	20	20	19.5	19.6	98	98	90-110	.4	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 205954 205955

Parameter	Units	3530932011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrate as N	mg/L	0.12U	25	25	25.3	25.3	101	101	90-110	.1	20	
Nitrite as N	mg/L	0.12U	25	25	23.1	23.1	92	93	90-110	.2	20	
Orthophosphate as P	mg/L	0.25U	50	50	49.4	49.6	99	99	90-110	.4	20	

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QUALITY CONTROL DATA

Project: PNRSII SE#6
Pace Project No.: 3530933

QC Batch: WETA/10279 | Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 | Analysis Description: 300.0 IC Anions
Associated Lab Samples: 3530933001, 3530933002

METHOD BLANK: 205956 | Matrix: Water
Associated Lab Samples: 3530933001, 3530933002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfate	mg/L	2.5U	5.0	05/20/11 10:40	

LABORATORY CONTROL SAMPLE: 205957

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	50	52.2	104	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 205958 205959

Parameter	Units	3530932002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfate	mg/L	55.5	100	100	170	170	114	114	90-110	.1	20	J(M1)

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 205960 205961

Parameter	Units	3530932011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfate	mg/L	12.5U	250	250	254	254	102	102	90-110	.1	20	

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QUALITY CONTROL DATA

Project: PNRSII SE#6
Pace Project No.: 3530933

QC Batch: WETA/10284 | Analysis Method: EPA 350.1
QC Batch Method: EPA 350.1 | Analysis Description: 350.1 Ammonia
Associated Lab Samples: 3530933001, 3530933002

METHOD BLANK: 206179 | Matrix: Water
Associated Lab Samples: 3530933001, 3530933002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Ammonia	mg/L	0.020U	0.050	05/23/11 11:20	

LABORATORY CONTROL SAMPLE: 206180

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/L	1	1.0	103	90-110	

MATRIX SPIKE SAMPLE: 206182

Parameter	Units	3530932010 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/L	44.1	5	42.3	-36	90-110	J(M1)

SAMPLE DUPLICATE: 206181

Parameter	Units	3530932010 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, Ammonia	mg/L	44.1	39.7	10	20	

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QUALITY CONTROL DATA

Project: PNRSII SE#6
Pace Project No.: 3530933

QC Batch: WETA/10288 | Analysis Method: EPA 351.2
QC Batch Method: EPA 351.2 | Analysis Description: 351.2 TKN
Associated Lab Samples: 3530933001, 3530933002

METHOD BLANK: 206246 | Matrix: Water
Associated Lab Samples: 3530933001, 3530933002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	0.25U	0.50	05/26/11 09:48	

LABORATORY CONTROL SAMPLE: 206247

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	20	20.7	104	90-110	

MATRIX SPIKE SAMPLE: 206249

Parameter	Units	3530875016 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	0.81	20	21.4	103	90-110	

SAMPLE DUPLICATE: 206248

Parameter	Units	3530875016 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, Kjeldahl, Total	mg/L	0.81	0.87	7	20	

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QUALITY CONTROL DATA

Project: PNRSII SE#6
Pace Project No.: 3530933

QC Batch: WETA/10289 | Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 | Analysis Description: 365.4 Phosphorus
Associated Lab Samples: 3530933001, 3530933002

METHOD BLANK: 206250 | Matrix: Water
Associated Lab Samples: 3530933001, 3530933002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus, Total (as P)	mg/L	0.050U	0.10	05/26/11 10:43	

LABORATORY CONTROL SAMPLE: 206251

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus, Total (as P)	mg/L	4	4.0	101	90-110	

MATRIX SPIKE SAMPLE: 206253

Parameter	Units	3530875016 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus, Total (as P)	mg/L	0.48	4	4.4	99	80-120	

SAMPLE DUPLICATE: 206252

Parameter	Units	3530875016 Result	Dup Result	RPD	Max RPD	Qualifiers
Phosphorus, Total (as P)	mg/L	0.48	0.48	.5	20	

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QUALITY CONTROL DATA

Project: PNRSII SE#6
Pace Project No.: 3530933

QC Batch: WETA/10368 | Analysis Method: EPA 410.4
QC Batch Method: EPA 410.4 | Analysis Description: 410.4 COD
Associated Lab Samples: 3530933001, 3530933002

METHOD BLANK: 207633 | Matrix: Water
Associated Lab Samples: 3530933001, 3530933002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chemical Oxygen Demand	mg/L	12.5U	25.0	05/26/11 13:35	

LABORATORY CONTROL SAMPLE: 207634

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chemical Oxygen Demand	mg/L	500	516	103	90-110	

MATRIX SPIKE SAMPLE: 207636

Parameter	Units	3530844001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chemical Oxygen Demand	mg/L	287	500	689	80	90-110	

SAMPLE DUPLICATE: 207635

Parameter	Units	3530844001 Result	Dup Result	RPD	Max RPD	Qualifiers
Chemical Oxygen Demand	mg/L	287	284	.8	20	

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QUALIFIERS

Project: PNRSII SE#6
Pace Project No.: 3530933

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

LABORATORIES

PASI-O	Pace Analytical Services - Ormond Beach

ANALYTE QUALIFIERS

J(M1)	Estimated Value. Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: PNRSII SE#6
Pace Project No.: 3530933

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
3530933001	**DFT**		FLD/		
3530933002	**STE-PNRSII-T1**		FLD/		
3530933001	**DFT**	SM 2320B	WET/8661		
3530933002	**STE-PNRSII-T1**	SM 2320B	WET/8661		
3530933001	**DFT**	SM 2540D	WET/8643		
3530933002	**STE-PNRSII-T1**	SM 2540D	WET/8643		
3530933001	**DFT**	SM 4500-S2F	WET/8637		
3530933002	**STE-PNRSII-T1**	SM 4500-S2F	WET/8637		
3530933001	**DFT**	SM 5210B	WET/8624	SM 5210B	WET/8668
3530933002	**STE-PNRSII-T1**	SM 5210B	WET/8624	SM 5210B	WET/8668
3530933001	**DFT**	EPA 300.0	WETA/10278		
3530933002	**STE-PNRSII-T1**	EPA 300.0	WETA/10278		
3530933001	**DFT**	EPA 300.0	WETA/10279		
3530933002	**STE-PNRSII-T1**	EPA 300.0	WETA/10279		
3530933001	**DFT**	EPA 350.1	WETA/10284		
3530933002	**STE-PNRSII-T1**	EPA 350.1	WETA/10284		
3530933001	**DFT**	EPA 351.2	WETA/10288	EPA 351.2	WETA/10355
3530933002	**STE-PNRSII-T1**	EPA 351.2	WETA/10288	EPA 351.2	WETA/10355
3530933001	**DFT**	EPA 365.4	WETA/10289	EPA 365.4	WETA/10356
3530933002	**STE-PNRSII-T1**	EPA 365.4	WETA/10289	EPA 365.4	WETA/10356
3530933001	**DFT**	EPA 410.4	WETA/10368		
3530933002	**STE-PNRSII-T1**	EPA 410.4	WETA/10368		

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

3530933

Page: 1 of 1

1456447

Section A Required Client Information:

Company: Hazen and Sawyer
Address: 10002 Princess Palm Ave Suite 200, Tampa, FL 33619
Email To: jedeback@hazenandsawyer.com
Phone: 813-630-4498 Fax: 813-630-1967
Requested Due Date/TAT:

Section B Required Project Information:

Report To: Joscelin Edeback-Hirst
Copy To:
Purchase Order No.: 44237-001 Task 100
Project Name: PNRS II SE #6
Project Number: 44237-001

Section C Invoice Information:

Attention: Joscelin Hirst
Company Name: Hazen & Sawyer
Address: same
Pace Quote Reference:
Pace Project Manager: Sakina
Pace Profile #:

REGULATORY AGENCY: ☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER ☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: GCREC FL

Section D Required Client Information

Matrix Codes (MATRIX / CODE): Drinking Water DW, Water WT, Waste Water WW, Product P, Soil/Solid SL, Oil OL, Wipe WP, Air AR, Tissue TS, Other OT

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED Composite Start Date	Composite Start Time	Composite End/Grab Date	Composite End/Grab Time	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	NH_3-N	NO_3-N	NO_2-N	TKN	Total Alkalinity	TSS	CBOD	OP	SO_4	COD	TP	Total Sulfide	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	DFT	WW	G			5/19	12:05	21	5										✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		21.2°C 7.5pH 770uS
2	STE-PNRS II-T1	WW	G			5/19	12:15	25	5										✓	✓	✓	✓	✓	✓	✓	·	✓	✓	✓	✓		25.1°C 7.6pH 960uS
3	↳ high fecal likely																															
4	> 1M																															
5																																
6																																
7																																
8																																
9																																
10																																
11																																
12																																

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
Complete Containers	D. Pace	5-11-11	18:00	Joscelin Hirst	5-13-11	1:00pm
Joscelin Hirst	Joscelin Hirst	5-19-11	1:33pm	Rick Vadnais	5-19-11	1:35
[illegible]	Rick Vadnais	5-19-11	14:04	[illegible] PACE	5.19.11	14:04
	Blue Steak	5.19.11	18:00	K. Hayden	5/20/11	0730

SAMPLE CONDITIONS: Temp in °C: -0.9; Received on Ice (Y/N): Y; Custody Sealed Cooler (Y/N): T-73; Samples Intact (Y/N):

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Joscelin Hirst

SIGNATURE of SAMPLER: Joscelin Hirst

DATE Signed (MM/DD/YY): 05/19/11

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

Sample Condition Upon Receipt Form (SCUR)

Table Number: _____

Pace Analytical

Client Name: HAZEN & SAWYER Project # 35 30933

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☑ Commercial ☐ Pace ☐ Other _____

Tracking # _____

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☑ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other _____

Date and Initials of person examining contents: R.H. 3/30/11

Thermometer Used T73 Type of Ice: (Wet) Blue None

Cooler Temperature °C -0.6 (Visual) -0.3 (Correction Factor) -0.9 (Actual)

(Temp should be above freezing to 0°-6°C). If below 0°C, then was sample frozen?

☐ Yes ☑ No

Receipt of samples satisfactory: ☐ Yes ☐ No

Rush TAT requested on COC:

If yes, then all conditions below were met:	If no, then mark box & describe issue (use comments area if necessary):
Chain of Custody Present	☐
Chain of Custody Filled Out	☐
Relinquished Signature & Sampler Name COC	☐
Samples Arrived within Hold Time	☐
Sufficient Volume	☐
Correct Containers Used	☐
Containers Intact	☐
Sample Labels match COC (sample IDs & date/time of collection)	☐ No Labels: ☐ No Time/Date on Labels: ☐
All containers needing preservation are found to be in compliance with EPA recommendation.	☐
No Headspace in VOA Vials (>6mm):	☐

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____

Comments/ Resolution (use back for additional comments): _____

Project Manager Review: _____ Date: 5/20/2011

Finished Product Information Only

F.P. Sample ID: _____

Production Code: _____

Date/Time Opened: _____

Number of Unopened Bottles Remaining: _____

Extra Sample in Shed: Yes No

Size & Qty of Bottles Received

_____ x 5 Gal
_____ x 2.5 Gal
_____ x 1 Gal
_____ x 1 Liter
_____ x 500 mL
_____ x 250 mL
_____ x Other: _____