

ENVIRONMENTAL CONSULTANTS, LLC

Florida Onsite Sewage Nitrogen Reduction Strategies Study

TASK C.16 PROGRESS REPORT

S&GW Test Facility Sample Event Report No. 1

Prepared for:

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

FDOH Contract CORCL

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Prepared by:



In Association With:





S&GW Test Facility Monitoring Sample Event Report No. 1

1.0 Background

Task C of the Florida Onsite Sewage Nitrogen Reduction Strategies Study includes monitoring at field sites in Florida to evaluate nitrogen reduction in soil and groundwater, to assess groundwater impacts from various onsite wastewater systems, and to provide data for parameter estimation, verification, and validation of models developed in Task D. The controlled pilot-scale testing and field monitoring at the Gulf Coast Research and Education Center (GCREC) soil and groundwater (S&GW) test facility is being monitored for a range of operating conditions and to determine mechanisms critical for nitrogen reduction. The Task C.5 QAPP documents the objectives, monitoring framework, sample frequency and duration, and analytical methods to be used at the GCREC S&GW test facility.

2.0 Purpose

This sample event report documents data collected from the first S&GW test facility monitoring and sampling event conducted June 18, 2012 through June 21, 2012. This monitoring event consisted of measurement of flowrates dosed to the system, groundwater elevation measured within the standpipe piezometers, measurement of field parameters, and collection of unsaturated and groundwater samples and their analyses by a NELAC certified laboratory.

3.0 Materials and Methods

3.1 Project Site

The S&GW test facility is located at the University of Florida Gulf Coast Research and Education Center (GCREC) in southeast Hillsborough County, Florida. The specially designed pilot-scale test areas representative of typical mounded onsite sewage treatment and disposal systems enables controlled testing and evaluation of nitrogen reduction in soil and groundwater. Four test areas were established receiving either septic tank effluent (STE) or nitrified effluent delivered to the soil via a pressure dosed mound with a gravel trench or a mound with drip dispersal system (Table 1). In addition, two insitu passive nitrogen reduction mounded systems (PNRS II) are being tested specifically

for wastewater treatment performance. The source of the influent wastewater is the septic tank effluent from the existing onsite wastewater system serving the GCREC (Figure 1). Details of the design and construction of the S&GW test facility were presented previously in Task C.6, C.7, C.8, C10, C.11, C.12, A.15 and A.17 documents. As shown in Figure 1, two separate feed systems supply the test areas with wastewater, each system supplies either STE or nitrified effluent to 3 test areas.

Table 1 S&GW Test Facility Test Areas

Test Area ID	Effluent Quality	(gpa/ft ⁻)			
TA1	STE	0.8	pressure dosed mound ¹ , gravel trench		
TA2	nitrified effluent	0.8	pressure dosed mound ¹ , gravel trench		
TA3	STE	0.8	mound with drip dispersal		
TA4	nitrified effluent	0.8	mound with drip dispersal		
TA5	in situ STE effluent (Task A PNRS II)	0.8	mounded drip dispersal over denitrification media		
TA6	in situ nitrified effluent (Task A PNRS II)	0.8	mounded drip dispersal over denitrification media		

¹pressure dosed via drip tubing in gravel trench to maintain uniform application along trench length.

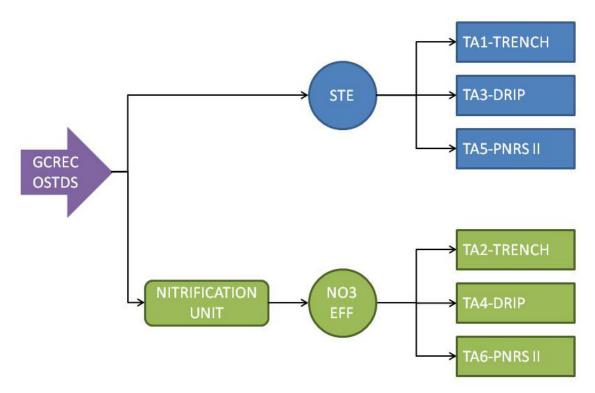


Figure 1 S&GW Test Facility System Schematic

3.2 Monitoring and Sampling Locations and Identification

Each test area is monitored for operational conditions, unsaturated and saturated nitrogen concentrations, soil properties, groundwater properties, and weather conditions. The PNRS II systems are monitored primarily for wastewater treatment performance, especially related to nitrogen reduction, and are not monitored as intensely for soil and groundwater parameters.

3.2.1 Unsaturated Zone Monitoring

The test areas are equipped with varying levels of unsaturated and shallow saturated zone monitoring instrumentation. The instrumentation includes suction lysimeters, stainless steel pan lysimeters, soil moisture probes, and tensiometers located at various depths below the bottom of the gravel or below the drip emitters. A complete list of all installed monitoring devices and associated sample identification is included in Appendix A.

3.2.2 Saturated Monitoring

Saturated zone monitoring will include groundwater quality, depth of groundwater table, and gradient (i.e. water level). A sampling network for groundwater screening was developed for each of the test areas as depicted in Figures 2 and 3. Transect lines A through U are parallel to the northern edge of the mound and increase (higher letter identification) moving southward from the mound. Transect lines 0 through 20 (numbered from east to west) are perpendicular to the northern edge of the mound. Groundwater monitoring points were installed in November 2011, March 2012, and May 2012. Standpipe piezometers were installed using either hand or drilling methods. Standpipe piezometers consist of either ¾-in., 1-in., or 2-in. diameter PVC with 1-ft, 2.5-ft, 5-ft, or 10-ft long 0.010 slot PVC screens and PVC riser extending to the ground surface (refer to the Task C QAPP and Task C.10/C.11/C.12 Progress Report for additional detail).

3.2.3 Sample Locations and Identification

Each monitoring location has been assigned a unique identification indicating the type of monitoring point (LY = lysimeter, PZ = standpipe piezometer, T = tensiometer, SM = soil moisture, OBS = observation port, etc.), grid location (self explanatory), and depth below ground surface (bottom of the well screen in feet). For example TA1-PZ-11-J4 is a test area 1, standpipe piezometer sampler located 11' below natural ground surface on the grid at J4. Schematics of the STE and nitrified systems monitoring network are shown in Figures 2 and 3, in addition detailed schematics of the STE systems and nitrified effluent systems are provided in Appendix A. Figure 4 depicts a typical schematic of the test area instrumentation. Figure 5 shows a photograph of the instrumented test area 3 with installed 3/4-in. diameter PVC standpipe piezometers downgradient of the test area. A complete list of all installed monitoring devices is included in Appendix A.

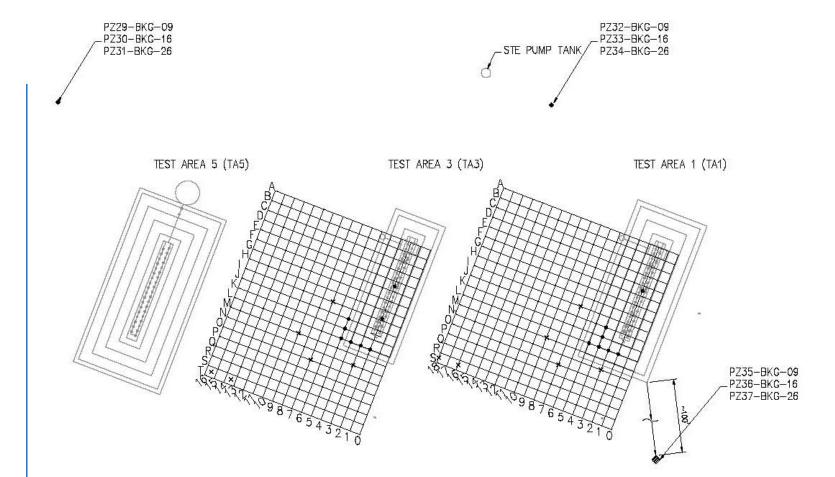


Figure 2
Schematic of STE System
S&GW Test Facility Monitoring Network

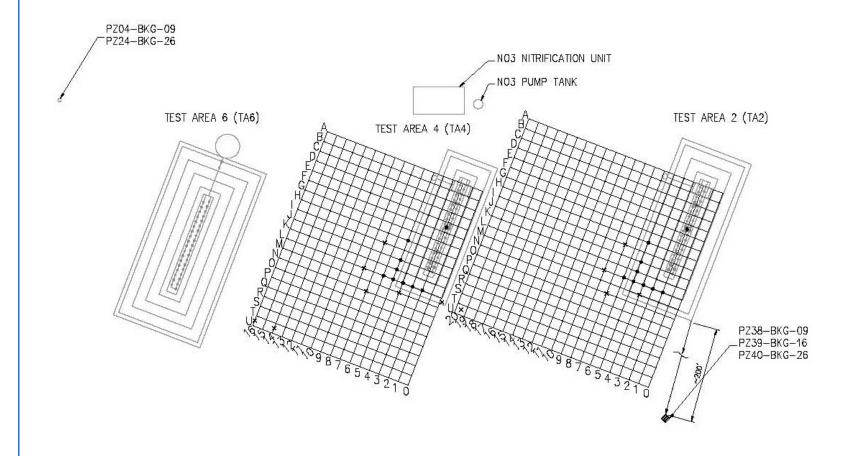


Figure 3
Schematic of Nitrified Effluent System
S&GW Test Facility Monitoring Network

Figure 4
Typical Instrumentation of Test Area, Top View (example Test Area 3)

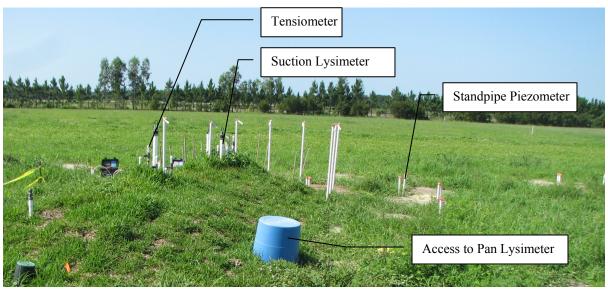


Figure 5
Photo of Instrumented Test Area 3

3.3 Operational Monitoring

Operational conditions include effluent quality, hydraulic loading rate to the soil, and ponding on the soil infiltrative surface or at the fill/natural soil interface. The STE and nitrified effluent quality was monitored weekly for the first month following start-up as summarized in Appendix B. The STE quality is characteristic of typical household STE quality. However, the nitrification unit is not operating correctly as indicated by the low nitrate concentration in the nitrified effluent.

3.3.1 Flow Monitoring

The feed and return flows were measured, recorded, and adjusted as necessary to maintain flow rates consistent with the experimental design following the sample event. Each of the two systems has wastewater flow measured via two flow meters; one (1) flow meter located on the feed line to the three test areas, and; one (1) flow meter located on the return line to the dose tank. The flow meters were installed in November 2011. Table 2 summarizes the recorded wastewater flow data since start-up occurred May 9, 2012. The drip lines are automatically scoured (field flushed) every 25 dosing cycles. The field flush volume bypasses the return flow meter but not the feed flow meter, therefore the field flush volume must be accounted for when determining the dosed volume (Table 2).

The target dose volume to each of the test areas is 32 gallons per day which equates to 96 gallons per day for each system. The total recorded flow for the STE system was within the 15% operational target that is considered acceptable. The NO3 system was +26.2% of the target volume. After evaluating the recorded flow, flow testing and adjustment was conducted on the NO3 system.

Table 2
S&GW Test Facility Measured Wastewater Flow Data

	Flow Meter Totalized Feed to Mounds (gallons)	Flow Meter Totalized Return from Mounds (gallons)	Number of Field Flush Occurrences (#)	Average Recorded Flow (gpd)	RE% Measured/ Target (%)				
STE System	STE System								
5/9/12 2:35 PM	13,733.08	5,188.14	15						
6/18/12 3:10 PM	20,987.62	8,620.71	24	93.36	-2.8%				
NO3 System									
5/9/12 3:22 PM	38,415.90	33,861.96	25						
6/18/12 3:05 PM	63,382.59	53,711.43	34	121.15	26.2%				

3.3.2 Meteorological Monitoring

A weather station is located at the GCREC facility with weather conditions recorded every minute and stored on a private website. Table 3 provides the recorded meteorological data daily averages leading up to and during the sample event. Appendix C provides summary tables of the average monthly recorded meteorological data.

Table 3
Meteorological Data Daily Averages Measured June 14, 2012 – June 22, 2012

Date	Temp Avg 60 cm (°F)	Temp Avg 2m (°F)	Temp Avg 10 m (°F)	Temp Soil Avg -10 cm (°F)	Dewpoint Avg 2m (°F)	Relative Humidity Avg 2m (%)	Rain Total 2m (in)	Wind Speed Avg 10m (mph)	ET (in)
June 14, 2012	78.52	79.17	78.52	82.68	73.40	84	0	5.64	0.16
June 15, 2012	76.11	76.78	76.06	81.78	71.26	85	0.02	5.93	0.16
June 16, 2012	78.80	79.48	78.47	81.94	68.89	73	0	9.87	0.22
June 17, 2012	76.82	77.62	76.94	81.88	66.81	72	0	8.09	0.21
June 18, 2012	76.81	77.45	77.14	81.97	65.96	71	0	8.63	0.20
June 19, 2012	75.51	76.30	75.97	81.57	67.14	75	0	9.60	0.16
June 20, 2012	75.73	76.44	75.81	80.78	72.55	88	0.27	9.95	0.11
June 21, 2012	77.40	77.95	77.21	80.44	74.29	89	0.13	7.61	0.14
June 22, 2012	77.25	77.75	77.01	80.55	74.76	91	0.40	6.26	0.13

3.3.3 Soil Moisture Monitoring

In situ soil tension and soil moisture measurements are collected for model development in Task D. Soil moisture tension is monitored in two test areas (TA1 and TA3) in two locations (center and south side of the mound). Tensiometers are installed at 5 depths as specified in Appendix D. Tensiometers have a ceramic cup and tube assembly equipped with a pressure transducer. The pressure transducer allows for precise measurement of the soil water potential. The tensiometers are automated to enable recording of soil moisture tension at 15 minute intervals to evaluate short-term changes in soil moisture status associated with wastewater dosing events. The daily averages are presented in Appendix D.

Soil moisture is measured through SentekTM sensor access tubes. Volumetric soil moisture content is measured by responses to changes in the dielectric constant of the soil. Soil moisture content was collected daily (Appendix E). No ponding was observed within the test area observation ports.

3.4 Soil Characteristics

During the instrumentation of the S&GW test facility, soil cores were collected at two locations MM (located between TA2 and TA5) and TT (north of the tracer test area). At location MM a continuous soil core was collected to the confining Hawthorn clay layer. The shallow soil cores will provide information on vadose zone properties, and the deep soil core will provide a general idea of the soil properties within the aquifer. The information will be used when determining appropriate parameters to be used in model development. In addition, a test pit was dug south of the S&GW test facility and east of the GCREC mound into the spodic layer approximately 6 feet below ground surface (Figure 6).

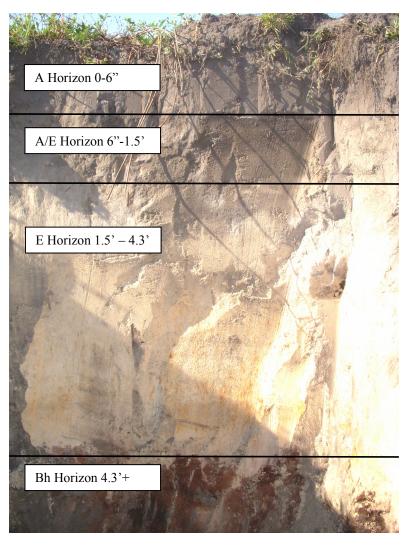


Figure 6
Photograph of Test Pit Soil Profile

3.5 Groundwater Elevation Measurements

Groundwater level measurements are used to determine hydraulic gradients, directions of flow, rates of flow, locations of groundwater recharge and discharge, the amount of water in storage, the change in storage over time, and aquifer hydraulic characteristics. Groundwater levels were measured using a hand-cranked steel tape graduated in feet, to the nearest 0.01 ft. Groundwater elevations are monitored at the site primarily to determine the direction and gradient of flow.

3.6 Water Quality Sample Collection and Analyses

Effluent, groundwater, and soil moisture samples were collected June 18, 2012 through June 21, 2012 for water quality analysis. A peristaltic pump was used to collect STE and nitrified effluent by placing the suction inlet tubing in the mid section of the clear liquid phase in the effluent holding tanks. Similarly, sample was collected from the PNRS II Tank 1, which supplies STE to the S&GW test facility nitrification unit and STE dose tank. The effluent was directed into the analysis-specific containers supplied by the analytical laboratory. Field parameters (temperature (Temp), pH, specific conductance (SC), oxidation-reduction potential (ORP) and dissolved oxygen (DO)) were measured using portable electronic probes with probe tips placed directly into the tanks.

Groundwater samples were obtained using a peristaltic pump and dedicated standpipe piezometer tubing. Prior to groundwater sample collection, the piezometer was micropurged using low-flow purging and sampling methods. Micropurging continued until water quality indicators (temp, pH, SC, DO and turbidity) were stabilized (three consecutive measurements within the limits). Groundwater sample was then collected into the analysis-specific containers.

Soil moisture samples from the suction lysimeters were also collected using a peristaltic pump and dedicated tubing. The tubing routed the samples directly into analysis-specific containers after sufficient flushing of the tubing had occurred. Field parameters (Temp, pH, SC, ORP, DO) were then recorded in an external reservoir.

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, provided in Appendix F, supplied by the laboratory.

In addition, equipment blank, field blank, and field sample duplicates were taken. The equipment blank was collected by pumping deionized water (provided by the laboratory) through the cleaned pump tubing. These samples were then analyzed for the same parameters as the GW samples. One field blank was collected by filling sample containers with deionized 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.

All samples were analyzed by the laboratory for chloride, total Kjeldahl nitrogen (TKN-N), ammonia nitrogen (NH $_3$ -N), and nitrate/nitrite nitrogen (NO $_X$ -N). Additionally, for the effluent samples and some of the water samples total alkalinity, carbonaceous biochemical oxygen demand (CBOD $_5$), total phosphorus (TP), total solids (TS), total suspended solids (TSS), fecal coliform (fecal), anions and cations were included. At some of the water sample locations chemical oxygen demand (COD) and dissolved organic carbon (DOC) were included. For the two in-situ passive nitrogen reduction mounded systems (TA5 and TA6) samples sulfate was also included. All analyses were performed by an independent and fully certified analytical laboratory (Southern Analytical Laboratory). Table 4 lists the analytical parameters, analytical methods, and detection limits for these analyses.

Table 4
Analytical Parameters, Method of Analysis, and Detection Limits

Analytical Parameters, Method of Analys	is, and Detection Limits	
Analytical Parameter	Method of Analysis	Laboratory Detection Limit (mg/L)
Total Alkalinity as CaCO ₃	SM 2320B	2 mg/L
Chemical Oxygen Demand (COD)	EPA 410.4	10 mg/L
Total Kjeldahl Nitrogen (TKN-N)	EPA 351.2	0.05 mg/L
Ammonia Nitrogen (NH ₃ -N)	EPA 350.1	0.005 mg/L
Nitrate/Nitrite Nitrogen (NO _X -N)	EPA 300.0	0.02 mg/L
Total Phosphorus	SM 4500P-E	0.01 mg/L
Carbonaceous Biological Oxygen Demand (CBOD ₅)	SM 5210B	2 mg/L
Total Solids (TS)	EPA 160.3	0.01% by wt
Total Suspended Solids (TSS)	SM 2540D	1 mg/L
Dissolved Organic Carbon (DOC)	SM 5310B	0.5 mg/L
Fecal Coliform (fecal)	SM 9222D	2 ct/100 mL
Anions		
Fluoride	EPA 300.0	0.01 mg/L
Chloride	EPA 300.0	0.05 mg/L
Nitrate-N	EPA 300.0	0.01 mg/L
Nitrite-N	EPA 300.0	0.01 mg/L
Orthophosphate-P	EPA 300.0	0.01 mg/L
Sulfate	EPA 300.0	0.20 mg/L
Cations		
Boron	EPA 200.7	0.05 mg/L
Calcium	EPA 200.7	0.01 mg/L
Iron	EPA 200.7	0.02 mg/L
Magnesium	EPA 200.7	0.01 mg/L
Manganese	EPA 200.7	0.001 mg/L
Potassium	EPA 200.7	0.01 mg/L
Sodium	EPA 200.7	0.01 mg/L

4.0 Results

Once analytical results are obtained from the laboratory, S&GW Test Facility Data Summary Report No. 1 (Task C17) will be prepared describing the results from this sampling event. The groundwater elevations have been monitored at the S&GW test facility, however the top elevations of the standpipe piezometers have not been surveyed at this time. Therefore, the groundwater elevations and associated surficial groundwater contours will be provided in the Task C17 report.

4.1 Water Quality Analyses

4.1.1 Field Parameters

Field parameters (temperature, pH, dissolved oxygen (DO), and specific conductivity) were measured at all the sampling locations during the June 2012 sampling event. The complete field parameter data set is included in Appendix G.



Appendix A: S&GW Test Facility Sample Identification

	00011 1		mty Campic	e identification
ID Number	Sample Identification	Test Area	Grid Location	Notes
1	TA1-PAN-12-N	TA1	North	2' x 3.3' SST pan lysimeter
2	TA1-OBS-N	TA1	North	4"D observation port with slots
3	TA1-OBS-S	TA1	South	4"D observation port without slots
4	TA1-SM-39-N	TA1	North	2"D soil moisture tube with 6" casing
5	TA1-SM-39-C	TA1	Center	2"D soil moisture tube with 6" casing
6	TA1-SM-39-S	TA1	South	2"D soil moisture tube with 6" casing
7	TA1-PZ-11-EF2	TA1	EF2	1"D standpipe piezometer, 5' screen
8	TA1-LY-24-C	TA1	Center	2"D suction lysimeter, 9" cup
9	TA1-LY-12-S	TA1	South	2"D suction lysimeter, 9" cup
10	TA1-LY-24-S	TA1	South	2"D suction lysimeter, 9" cup
11	TA1-LY-42-S	TA1	South	2"D suction lysimeter, 9" cup
12	TA1-T-6-C	TA1	Center	tensiometer
13	TA1-T-12-C	TA1	Center	tensiometer
14	TA1-T-24-C	TA1	Center	tensiometer
15	TA1-T-36-C	TA1	Center	tensiometer
16	TA1-T-42-C	TA1	Center	tensiometer
17	TA1-T-6-S	TA1	South	tensiometer
18	TA1-T-12-S	TA1	South	tensiometer
19	TA1-T-24-S	TA1	South	tensiometer
20	TA1-T-36-S	TA1	South	tensiometer
21	TA1-T-42-S	TA1	South	tensiometer
22	TA1-PZ-11-J4	TA1	J4	1"D standpipe piezometer, 5' screen
23	TA1-PZ-11-K4	TA1	K4	1"D standpipe piezometer, 5' screen
24	TA1-PZ-11-L2	TA1	L2	1"D standpipe piezometer, 5' screen
25	TA1-PZ-11-L3	TA1	L3	1"D standpipe piezometer, 5' screen
26	TA1-PZ-11-L4	TA1	L4	1"D standpipe piezometer, 5' screen
27	TA1-PZ-11-L5	TA1	L5	1"D standpipe piezometer, 5' screen
28	TA1-PZ-09-N3	TA1	N3	1"D standpipe piezometer, 5' screen
29	TA1-PZ-16-N3	TA1	N3	1"D standpipe piezometer, 2.5' screen

S&GW Test Facility Sample Identification											
ID Number	Sample Identification	Test Area	Grid Location	Notes							
30	TA1-PZ-09-07	TA1	07	1"D standpipe piezometer, 5' screen							
31	TA1-PZ-16-07	TA1	07	1"D standpipe piezometer, 2.5' screen							
32	TA1-PZ-09-M9	TA1	M9	1"D standpipe piezometer, 5' screen							
33	TA1-PZ-16-M9	TA1	M9	1"D standpipe piezometer, 2.5' screen							
34	TA1-PZ-09-I7	TA1	17	1"D standpipe piezometer, 5' screen							
35	TA1-PZ-16-I7	TA1	17	1"D standpipe piezometer, 2.5' screen							
36	TA1-PZ-09-RS16	TA1	RS16	1"D standpipe piezometer, 5' screen							
37	TA1-PZ-16-RS16	TA1	RS16	1"D standpipe piezometer, 2.5' screen							
38	TA1-PZ-09-RS18	TA1	RS18	1"D standpipe piezometer, 5' screen							
39	TA1-PZ-16-RS18	TA1	RS18	1"D standpipe piezometer, 2.5' screen							
40	TA2-PAN-12-N	TA2	North	2' x 3.3' SST pan lysimeter							
41	TA2-OBS-N	TA2	North	4"D observation port with slots							
42	TA2-OBS-S	TA2	South	4"D observation port without slots							
43	TA2-SM-39-C	TA2	Center	2"D soil moisture tube with 6" casing							
44	TA2-PZ-10-EF2	TA2	EF2	1"D standpipe piezometer, 5' screen							
45	TA2-LY-24-C	TA2	Center	2"D suction lysimeter, 9" cup							
46	TA2-LY-12-S	TA2	South	2"D suction lysimeter, 9" cup							
47	TA2-LY-24-S	TA2	South	2"D suction lysimeter, 9" cup							
48	TA2-LY-42-S	TA2	South	2"D suction lysimeter, 9" cup							
49	TA2-PZ-10-H5	TA2	H5	1"D standpipe piezometer, 5' screen							
50	TA2-PZ-10-J5	TA2	J5	1"D standpipe piezometer, 5' screen							
51	TA2-PZ-10-K5	TA2	K5	1"D standpipe piezometer, 5' screen							
52	TA2-PZ-10-L2	TA2	L2	1"D standpipe piezometer, 5' screen							
53	TA2-PZ-10-L3	TA2	L3	1"D standpipe piezometer, 5' screen							
54	TA2-PZ-10-L4	TA2	L4	1"D standpipe piezometer, 5' screen							
55	TA2-PZ-10-L5	TA2	L5	1"D standpipe piezometer, 5' screen							
56	TA2-PZ-10-L6	TA2	L6	1"D standpipe piezometer, 5' screen							
57	TA2-PZ-09-M4	TA2	M4	1"D standpipe piezometer, 5' screen							
58	TA2-PZ-16-M4	TA2	M4	1"D standpipe piezometer, 2.5' screen							
59	TA2-PZ-09-N7	TA2	N7	1"D standpipe piezometer, 5' screen							
60	TA2-PZ-16-N7	TA2	N7	1"D standpipe piezometer, 2.5' screen							
61	TA2-PZ-09-I7	TA2	17	1"D standpipe piezometer, 5' screen							

ID NumberSample IdentificationTest AreaGrid LocationNotes62TA2-PZ-16-I7TA2I71"D standpipe piezometer, 2.5' screen63TA2-PZ-09-L8TA2L81"D standpipe piezometer, 5' screen64TA2-PZ-16-L8TA2L81"D standpipe piezometer, 2.5' screen65TA2-PZ-09-TU19TA2TU191"D standpipe piezometer, 5' screen66TA2-PZ-16-TU19TA2TU191"D standpipe piezometer, 2.5' screen67TA2-PZ-09-TU21TA2TU211"D standpipe piezometer, 5' screen68TA2-PZ-16-TU21TA2TU211"D standpipe piezometer, 2.5' screen69TA3-PAN-12-NTA3North2' x 3.3' SST pan lysimeter
63TA2-PZ-09-L8TA2L81"D standpipe piezometer, 5' scree64TA2-PZ-16-L8TA2L81"D standpipe piezometer, 2.5' scree65TA2-PZ-09-TU19TA2TU191"D standpipe piezometer, 5' scree66TA2-PZ-16-TU19TA2TU191"D standpipe piezometer, 2.5' scree67TA2-PZ-09-TU21TA2TU211"D standpipe piezometer, 5' scree68TA2-PZ-16-TU21TA2TU211"D standpipe piezometer, 2.5' scree
64 TA2-PZ-16-L8 TA2 L8 1"D standpipe piezometer, 2.5' scree 65 TA2-PZ-09-TU19 TA2 TU19 1"D standpipe piezometer, 5' scree 66 TA2-PZ-16-TU19 TA2 TU19 1"D standpipe piezometer, 2.5' scree 67 TA2-PZ-09-TU21 TA2 TU21 1"D standpipe piezometer, 5' scree 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' scree
65 TA2-PZ-09-TU19 TA2 TU19 1"D standpipe piezometer, 5' scree 66 TA2-PZ-16-TU19 TA2 TU19 1"D standpipe piezometer, 2.5' scree 67 TA2-PZ-09-TU21 TA2 TU21 1"D standpipe piezometer, 5' scree 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' scree 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' scree 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe
66 TA2-PZ-16-TU19 TA2 TU19 1"D standpipe piezometer, 2.5' scree 67 TA2-PZ-09-TU21 TA2 TU21 1"D standpipe piezometer, 5' scree 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' scree 10 to 10
67 TA2-PZ-09-TU21 TA2 TU21 1"D standpipe piezometer, 5' scree 68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' scree
68 TA2-PZ-16-TU21 TA2 TU21 1"D standpipe piezometer, 2.5' screen
60 TA3 DAN 12 N TA3 North 2' v 3 3' SST pag highester
69 TA3-PAN-12-N TA3 North 2' x 3.3' SST pan lysimeter
70 TA3-OBS-N TA3 North 4"D observation port with slots
71 TA3-OBS-S TA3 South 4"D observation port without slots
72 TA3-SM-39-N TA3 North 2"D soil moisture tube with 6" casir
73 TA3-SM-39-C TA3 Center 2"D soil moisture tube with 6" casin
74 TA3-SM-39-S TA3 South 2"D soil moisture tube with 6" casin
75 TA3-LY-24-C TA3 Center 2"D suction lysimeter, 9" cup
76 TA3-LY-12-S TA3 South 2"D suction lysimeter, 9" cup
77 TA3-LY-24-S TA3 South 2"D suction lysimeter, 9" cup
78 TA3-LY-42-S TA3 South 2"D suction lysimeter, 9" cup
79 TA3-T-6-C TA3 Center tensiometer
80 TA3-T-12-C TA3 Center tensiometer
81 TA3-T-24-C TA3 Center tensiometer
82 TA3-T-36-C TA3 Center tensiometer
83 TA3-T-42-C TA3 Center tensiometer
84 TA3-T-6-S TA3 South tensiometer
85 TA3-T-12-S TA3 South tensiometer
86 TA3-T-24-S TA3 South tensiometer
87 TA3-T-36-S TA3 South tensiometer
88 TA3-T-42-S TA3 South tensiometer
89 TA3-PZ-11-EF2 TA3 EF2 1"D standpipe piezometer, 5' scree
90 TA3-PZ-11-I2 TA3 I2 1"D standpipe piezometer, 5' scree
91 TA3-PZ-10-J5 TA3 J5 1"D standpipe piezometer, 5' scree
92 TA3-PZ-10-K5 TA3 K5 1"D standpipe piezometer, 5' scree
93 TA3-PZ-11-L2 TA3 L2 1"D standpipe piezometer, 5' scree

S&GW Test Facility Sample Identification											
ID Number	Sample Identification	Test Area	Grid Location	Notes							
94	TA3-PZ-11-L3	TA3	L3	1"D standpipe piezometer, 5' screen							
95	TA3-PZ-11-L4	TA3	L4	1"D standpipe piezometer, 5' screen							
96	TA3-PZ-10-L5	TA3	L5	1"D standpipe piezometer, 5' screen							
97	TA3-PZ-09-N3	TA3	N3	1"D standpipe piezometer, 5' screen							
98	TA3-PZ-16-N3	TA3	N3	1"D standpipe piezometer, 2.5' screen							
99	TA3-PZ-09-O7	TA3	07	1"D standpipe piezometer, 5' screen							
100	TA3-PZ-16-07	TA3	07	1"D standpipe piezometer, 2.5' screen							
101	TA3-PZ-09-I7	TA3	17	1"D standpipe piezometer, 5' screen							
102	TA3-PZ-16-I7	TA3	17	1"D standpipe piezometer, 2.5' screen							
103	TA3-PZ-09-M9	TA3	M9	1"D standpipe piezometer, 5' screen							
104	TA3-PZ-16-M9	TA3	M9	1"D standpipe piezometer, 2.5' screen							
105	TA3-PZ-09-ST14	TA3	ST14	1"D standpipe piezometer, 5' screen							
106	TA3-PZ-16-ST14	TA3	ST14	1"D standpipe piezometer, 2.5' screen							
107	TA3-PZ-09-ST16	TA3	ST16	1"D standpipe piezometer, 5' screen							
108	TA3-PZ-16-ST16	TA3	ST16	1"D standpipe piezometer, 2.5' screen							
109	TA4-PAN-12-N	TA4	North	2' x 3.3' SST pan lysimeter							
110	TA4-OBS-N	TA4	North	4"D observation port with slots							
111	TA4-OBS-S	TA4	South	4"D observation port without slots							
112	TA4-SM-39-C	TA4	Center	2"D soil moisture tube with 6" casing							
113	TA4-LY-24-C	TA4	Center	2"D suction lysimeter, 9" cup							
114	TA4-LY-12-S	TA4	South	2"D suction lysimeter, 9" cup							
115	TA4-LY-24-S	TA4	South	2"D suction lysimeter, 9" cup							
116	TA4-LY-42-S	TA4	South	2"D suction lysimeter, 9" cup							
117	TA4-PZ-11-EF2	TA4	EF2	1"D standpipe piezometer, 5' screen							
118	TA4-PZ-10-H5	TA4	H5	1"D standpipe piezometer, 5' screen							
119	TA4-PZ-10-J5	TA4	J5	1"D standpipe piezometer, 5' screen							
120	TA4-PZ-10-K5	TA4	K5	1"D standpipe piezometer, 5' screen							
121	TA4-PZ-11-L2	TA4	L2	1"D standpipe piezometer, 5' screen							
122	TA4-PZ-11-L3	TA4	L3	1"D standpipe piezometer, 5' screen							
123	TA4-PZ-11-L4	TA4	L4	1"D standpipe piezometer, 5' screen							
124	TA4-PZ-11-L5	TA4	L5	1"D standpipe piezometer, 5' screen							
125	TA4-PZ-11-L6	TA4	L6	1"D standpipe piezometer, 5' screen							

S&GW Test Facility Sample Identification											
ID Number	Sample Identification	Test Area	Grid Location	Notes							
126	TA4-PZ-09-M4	TA4	M4	1"D standpipe piezometer, 5' screen							
127	TA4-PZ-16-M4	TA4	M4	1"D standpipe piezometer, 5' screen							
128	TA4-PZ-09-N7	TA4	N7	1"D standpipe piezometer, 5' screen							
129	TA4-PZ-16-N7	TA4	N7	1"D standpipe piezometer, 5' screen							
130	TA4-PZ-09-I7	TA4	17	1"D standpipe piezometer, 5' screen							
131	TA4-PZ-16-I7	TA4	17	1"D standpipe piezometer, 5' screen							
132	TA4-PZ-09-L8	TA4	L8	1"D standpipe piezometer, 5' screen							
133	TA4-PZ-16-L8	TA4	L8	1"D standpipe piezometer, 5' screen							
134	TA4-PZ-09-TU14	TA4	TU14	1"D standpipe piezometer, 5' screen							
135	TA4-PZ-16-TU14	TA4	TU14	1"D standpipe piezometer, 5' screen							
136	TA4-PZ-09-TU16	TA4	TU16	1"D standpipe piezometer, 5' screen							
137	TA4-PZ-16-TU16	TA4	TU16	1"D standpipe piezometer, 5' screen							
138	TA5-OBS-N	TA5	North	3"D observation port connected to collection pipe at bottom of sloped liner							
139	TA5-OBS-S	TA5	South	3"D observation port connected to collection pipe at bottom of sloped liner							
140	TA5-OBS-I	TA5	Center	3"D observation port connected to collection pipe at bottom of sloped liner							
141	TA5-PZ-I	TA5	South	1"D standpipe piezometer, 5' screen south of infiltrator							
142	TA5-LY-C	TA5	Center	2"D suction lysimeter, 9" cup at mix- ture and sand interface							
143	TA5-LINER-SP	TA5	North	3"D sample port							
144	TA5-Denite Tank	TA5	North								
145	TA6-OBS-N	TA6	North	3"D observation port connected to collection pipe at bottom of sloped liner							
146	TA6-OBS-S	TA6	South	3"D observation port connected to collection pipe at bottom of sloped liner							
147	TA6-OBS-I	TA6	Center	3"D observation port connected to collection pipe at bottom of sloped liner							
148	TA6-PZ-I	TA6	South	1"D standpipe piezometer, 5' screen south of infiltrator							
149	TA6-LY-C	TA6	Center	2"D suction lysimeter, 9" cup at mix- ture and sand interface							
150	TA6-LINER-SP	TA6	North	3"D sample port							
151	TA6-Denite Tank	TA6	North								
152	PZ01-BKG-09	BKG		1 1/4"D standpipe piezometer, 5' screen							

ID Number	Sample Identification	Test Area	Grid Location	Notes
153	LY01-BKG-24	BKG		2"D suction lysimeter, 9" cup
154	LY02-BKG-42	BKG		2"D suction lysimeter, 9" cup
155	PZ04-BKG-09	BKG		1 1/4"D standpipe piezometer, 5' screen
156	PZ24-BKG-26	BKG		2"D standpipe piezometer, 5' screen
157	PZ29-BKG-09	BKG		³ / ₄ "D standpipe piezometer, 5' screen
158	PZ30-BKG-16	BKG		1"D standpipe piezometer, 5' screen
159	PZ31-BKG-26	BKG		1"D standpipe piezometer, 5' screen
160	PZ32-BKG-09	BKG		1"D standpipe piezometer, 5' screen
161	PZ33-BKG-16	BKG		1"D standpipe piezometer, 5' screen
162	PZ34-BKG-26	BKG		1"D standpipe piezometer, 5' screen
163	PZ35-BKG-09	BKG		1"D standpipe piezometer, 5' screen
164	PZ36-BKG-16	BKG		1"D standpipe piezometer, 5' screen
165	PZ37-BKG-26	BKG		1"D standpipe piezometer, 5' screen
166	PZ38-BKG-09	BKG		1"D standpipe piezometer, 5' screen
167	PZ39-BKG-16	BKG		1"D standpipe piezometer, 5' screen
168	PZ40-BKG-26	BKG		1"D standpipe piezometer, 5' screen
169	GCREC Pump Station			GCREC mound lift station
170	PNRS II STE-Tank 1			PNRS II Tank 1
171	STE Pump Tank			STE effluent dose tank
172	NO3 Pump Tank			Nitrified effluent dose tank

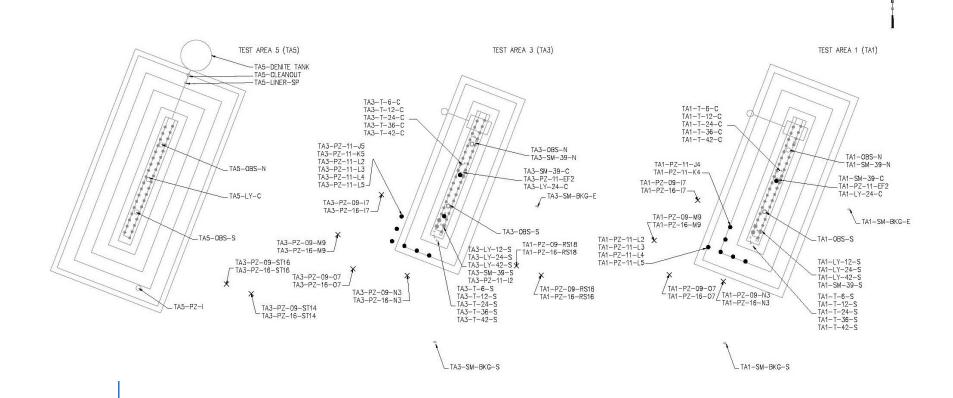


Figure A.1 S&GW Test Facility System Schematic of TA1, TA3, and TA5 (STE System)

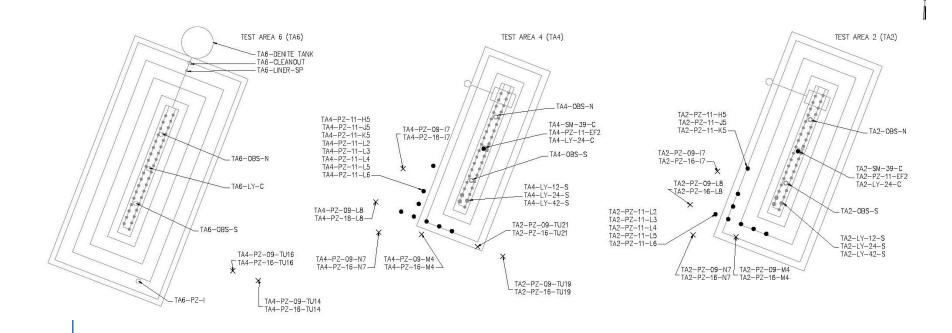


Figure A.2 S&GW Test Facility System Schematic of TA2, TA4, and TA6 (Nitrified Effluent System)



Appendix B: S&GW Test Facility Effluent Quality Data

Table B.1
S&GW Test Facility Effluent Quality

					Specific			Total												
			Temp		Conductance	DO		Alkalinity	CBOD5	TN	TKN	Organic N	NH3-N	NOx-N	TIN	TP	Chloride	TSS	TS	Fecal
Identification	Week	Date	(°C)	pН	(μS)	(mg/L)	ORP	(mg/L)	(mg/L)	(mg-N/L)	(mg-N/L)	(mg-N/L)	(mg-N/L)	(mg-N/L)	(mg-N/L)	(mg-P/L)	(mg/L)	(mg/L)	(mg/L)	(cfu/100 mL)
	Week 1	5/16/2012 8:50	27.4	7.47	1,066	0.1	-236.1	340	66	52.0	52	1	51	0.02	51.0	6.7	78	24	500	80,000
STE Drip Tank	Week 2	5/23/2012 9:55	28.3	7.25	1,068	0.1	-388.2			58.0	58	4	54	0.01	54.0		63			
31E DIID Talik	Week 3	5/30/2012 9:13		6.93	1,006	0.1	-389.8	370	61	63.0	63	15	48	0.03	48.0	5.5	48	24	400	80,000
	Week 4	6/6/2012 9:15	27.8	7.26	1,216	0.1	-298.7			74.0	74	6	68	0.04	68.0		68			
	Week 1	5/16/2012 9:20	27.3	7.86	1,036	0.6	46.1	320	11	51.3	51	3	48	0.27	48.3	6.0	72	6	500	56,000
NO3 Drip Tank	Week 2	5/23/2012 9:45	28.1	7.70	1,037	0.1	-151.9			72.2	72	21	51	0.22	51.2		61			
INOS DITP TANK	Week 3	5/30/2012 9:50		7.57	1,025	4.8	-25.4	300	25	63.1	56	15	41	7.10	48.1	4.6	64	8	400	46,000
	Week 4	6/6/2012 8:45	27.3	7.53	1,177	0.2	82.7			65.2	65	2	63	0.16	63.2		72			

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 numeric value represents the dilution factor times the maximum reportable number of colonies.

Table B.2
S&GW Test Facility Effluent Quality Anions and Cations

Identification	Week	Week Date			Anions (mg/L)			Cations (mg/L)							
identification	entineation week	Date	F-	NO3-N-	NO2-N-	PO4-P-	SO4-	В	Ca	Fe	Mg	Mn	K	Na	
	Week 1	5/16/2012 8:50													
ISTE Drip Tank	Week 2	5/23/2012 9:55													
	Week 3	5/30/2012 9:13	1.8	0.01	0.01	5	29	0.15	51	0.16		0.028	16	40	
	Week 4	6/6/2012 9:15													
	Week 1	5/16/2012 9:20													
NO3 Drip Tank	Week 2	5/23/2012 9:45													
NO3 Drip Tank	Week 3	5/30/2012 9:50	0.41	0.35	7.1	5	53	0.12	49	0.079	17		22		
	Week 4	6/6/2012 8:45													

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



Appendix C: GCREC Weather Station Data

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Table C.1
Monthly Recorded Meteorological Data

Period	60cm T avg (°F)	60cm T min (°F)	60cm T max (°F)	Tsoil avg - 10cm (°F)	Tsoil min(avg) -10cm (°F)	Tsoil max(avg) -10cm (°F)	2m DewPt avg (°F)	Relative Humidity avg 2m (%)	2m Rain total (in)	2m Rain max over 15min (in)	10m Wind avg (mph)	10m Wind max (mph)	WDir avg 10m (deg)	ET avg (in)
Jan-10	53.10	23.97	82.38	59.67	51.13	66.63	44.57	76	3.19	0.57	7.60	32.80	348	0.05
Feb-10	53.75	30.84	78.96	59.86	54.32	65.75	43.97	74	2.22	0.47	7.85	36.13	348	0.07
Mar-10	59.24	32.89	82.26	62.09	55.31	68.11	48.75	73	6.15	0.44	8.25	38.27	289	0.10
Apr-10	69.78	44.74	88.54	70.78	63.00	75.72	59.50	74	2.79	0.52	7.46	44.17	94	0.15
May-10	77.78	62.37	93.63	79.11	73.17	83.97	68.62	77	0.89	0.13	6.75	31.10	126	0.18
Jun-10	80.91	65.84	99.09	82.32	76.69	88.63	72.87	80	8.25	1.30	5.85	50.47	116	0.19
Jul-10	80.67	68.00	96.21	82.58	77.49	87.03	74.05	82	7.30	0.48	5.95	35.37	103	0.18
Aug-10	80.54	70.59	96.87	82.63	79.11	87.85	75.03	85	13.51	1.74	5.78	43.53	154	0.16
Sep-10	78.91	63.43	95.88	80.83	78.17	83.39	72.11	82	3.42	0.55	6.33	41.60	84	0.16
Oct-10	71.98	51.24	93.00	74.97	71.83	78.62	61.55	73	0.01	0.01	5.56	32.00	31	0.11
Nov-10	65.75	39.95	86.77	69.47	64.33	75.34	56.97	76	1.24	0.16	6.52	30.53	55	0.07
Dec-10	50.64	22.86	78.37	60.71	54.61	71.33	39.83	71	0.50	0.05	7.33	36.77	354	0.04
Jan-11	57.65	29.23	79.54	61.34	56.86	65.07	49.01	77	4.13	0.49	7.08	44.07	319	0.06
Feb-11	62.95	34.76	85.21	63.94	57.76	69.58	54.40	78	0.47	0.07	6.38	35.57	75	0.09
Mar-11	66.56	39.12	88.66	68.35	61.45	73.83	56.59	75	6.89	0.47	7.41	44.13	82	0.12
Apr-11	73.3	46.33	93.02	74.09	66.49	79.99	62.81	73	0.94	0.31	6.67	26.67	126	0.17
May-11	76.07	50.68	96.04	78.67	73.58	84.22	64.22	71	1.05	0.28	6.61	44.47	105	0.19
Jun-11	79.5	63.07	98.83	81.83	76.96	87.12	69.97	76	4.86	0.43	6.08	37.53	102	0.18
Jul-11	79.99	67.69	95.81	81.75	76.95	86.11	73.58	83	9.1	1.1	4.94	34.03	124	0.17
Aug-11	80.86	70.93	96.66	83.11	79.95	86.43	75.37	84	8.78	0.7	5.49	44.5	205	0.16
Sep-11	78.55	65.46	94.33	80.78	78.64	83.43	72.56	83	2.5	0.29	5.24	33.17	83	0.14
Oct-11	70.37	47.93	86.68	75.32	70.48	79.56	63.16	79	4.3	0.16	7.15	34.47	41	0.1
Nov-11	66.41	44.49	85.91	71.16	66.72	74.77	60.12	81	0.59	0.07	7.72	28.07	55	0.08

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Table C.1 (continued) Monthly Recorded Meteorological Data

Period	60cm T avg (°F)	60cm T min (°F)	60cm T max (°F)	Tsoil avg - 10cm (°F)	Tsoil min(avg) -10cm (°F)	Tsoil max(avg) -10cm (°F)	2m DewPt avg (°F)	Relative Humidity avg 2m (%)	2m Rain total (in)	2m Rain max over 15min (in)	10m Wind avg (mph)	10m Wind max (mph)	WDir avg 10m (deg)	ET avg (in)
Dec-11	63.74	35.42	83.71	67.9	63	70.56	57.81	82	0.3	0.14	6.97	28.97	59	0.06
Jan-12	59.3	26.7	83.62	64.12	58.57	68.29	50.83	75	0.9	0.24	6.04	32.7	74	0.06
Feb-12	65.64	30.52	87.03	67.99	60.26	73.8	58.53	79	0.56	0.15	7.16	33.63	78	0.09
Mar-12	69.95	34.99	89.82	72.76	66.65	77.52	61.14	75	0.84	0.13	7.89	66.43	103	0.13
Apr-12	70.64	41.32	90.45	75.54	69.37	79.43	60.69	73	1.35	0.57	6.9	32.53	100	0.15
May-12	77.16	58.59	95.18	80.8	76.24	86.18	68.04	75	1.84	0.26	6.64	34.03	137	0.18
Jun-12	77.36	63.64	93.15	80.26	75.94	85.24	72.28	84	14.87	0.66	7.5	40.57	140	0.15



Appendix D: S&GW Test Facility Tensiometer Data

Table D.1
S&GW Test Facility Daily Average Tensiometer Data (mbar)

			TA3-Center			TA3-South						
Depth below IS:	6"	12"	24"	36"	42"	6" 12" 24" 36"			36"	42"		
Date	mbar	mbar	mbar	mbar	mbar	mbar	mbar	mbar	mbar	mbar		
05/09/12	108.089	146.070	168.146	183.220	NR	111.768	146.070	195.801	207.670	26.668		
05/10/12	106.783	139.660	156.633	175.030	NR	110.700	141.559	185.712	205.059	25.481		
05/11/12	112.836	152.004	165.772	177.048	NR	116.397	150.224	181.795	196.988	25.599		
05/12/12	111.650	152.479	174.199	186.306	NR	115.092	151.529	193.427	203.160	36.044		
05/13/12	112.006	152.835	174.793	188.679	NR	115.804	151.411	197.225	206.839	40.436		
05/14/12	109.988	152.242	173.250	188.086	NR	113.786	150.105	196.632	208.026	48.269		
05/15/12	109.751	151.648	172.775	186.543	NR	113.667	150.105	195.682	208.857	46.251		
05/16/12	111.768	152.954	174.080	187.018	NR	114.854	151.292	196.394	209.331	34.501		
05/17/12	106.665	147.731	169.452	182.864	NR	108.564	145.358	191.765	206.958	71.176		
05/18/12	110.344	118.771	154.141	168.502	NR	113.193	141.559	162.449	187.374	52.779		
05/19/12	113.549	158.176	173.843	183.694	NR	116.278	152.954	183.576	191.528	39.367		
05/20/12	112.243	156.633	177.166	189.510	NR	115.922	154.141	195.089	202.091	39.367		
05/21/12	112.362	156.158	177.285	190.222	NR	116.160	153.784	198.412	206.127	38.655		
05/22/12	112.718	155.209	178.116	191.409	NR	115.922	154.022	202.210	209.331	47.913		
05/23/12	113.193	154.734	178.947	192.003	NR	115.566	153.310	205.652	212.299	47.676		
05/25/12	116.160	156.158	181.795	195.089	NR	117.347	155.565	207.907	216.097	34.145		
05/26/12	114.854	150.342	178.472	193.308	NR	116.278	153.310	203.872	215.503	35.569		
05/27/12	130.403	174.555	188.442	198.887	NR	130.403	163.754	213.486	216.809	38.774		
05/28/12	155.090	208.026	204.940	209.687	NR	145.595	190.104	223.456	219.895	43.165		
05/29/12	125.655	185.119	213.960	217.046	NR	124.112	159.244	232.832	223.218	63.105		
05/30/12	117.228	164.941	202.447	217.877	NR	118.652	150.936	229.034	217.758	77.467		
05/31/12	115.922	162.449	204.228	218.114	NR	115.566	161.618	205.652	217.640	60.494		
06/01/12	106.308	140.016	173.250	205.889	NR	107.733	144.645	227.728	222.269	60.138		
06/02/12	101.442	138.355	148.087	169.808	NR	103.341	134.201	187.611	193.071	96.101		
06/03/12	113.311	160.787	175.386	186.306	NR	115.566	153.903	182.151	174.555	75.924		
06/04/12	114.498	160.550	184.881	196.632	NR	116.991	156.396	220.844	197.225	60.969		
06/05/12	114.498	159.244	185.119	197.700	NR	115.804	153.903	226.067	202.803	64.292		
06/06/12	112.955	157.939	183.576	197.225	NR	113.786	152.954	227.016	204.584	71.176		
06/07/12	109.038	153.191	177.641	193.427	NR	110.225	146.070	233.782	205.415	87.318		
06/08/12	105.122	145.595	154.141	172.894	NR	107.021	135.031	217.996	182.982	92.540		
06/09/12	110.107	154.378	161.381	175.149	NR	111.887	143.696	169.214	169.096	85.300		
06/10/12	114.854	160.431	168.739	179.540	NR	117.347	151.055	197.462	171.351	69.871		
06/11/12	116.516	164.585	185.000	196.157	NR	118.296	157.227	233.663	193.427	61.325		
06/12/12	11.713	162.805	187.136	199.718	NR	117.940	156.514	232.120	201.854	56.696		
06/13/12	NR	161.737	186.780	199.955	NR	116.753	154.853	249.686	206.245	54.678		
06/14/12	NR NR	161.381	188.205	201.142	NR ND	116.041	153.784	244.108	208.975	51.474		
06/15/12		159.363	186.899	200.904	NR ND	114.498	151.767	257.638	209.806	59.426		
06/16/12	NR NB	157.464	184.881	199.718	NR ND	113.549	149.749	260.368	209.331	72.363		
06/17/12	NR NB	158.532	186.187	200.311	NR ND	114.973	151.648	238.885	211.230	65.123		
06/18/12	NR	156.752	187.730	201.973	NR	114.735	152.716	235.799	211.705	70.464		
06/19/12	NR NB	156.158	186.899	202.447	NR ND	114.617	152.004	231.883	212.417	70.939		
06/20/12	NR	154.022	185.831	201.735	NR	112.836	151.292	241.971	212.536	82.808		

NAN (not-a-number) indicates an exceptional occurrence in datalogger function or processing occurred (an invalid measurement).

NR indicates no reading occurred

EM indicates an equipment malfunction occurred. We are in the process of troubleshooting the problem.

Table D.1
S&GW Test Facility Daily Average Tensiometer Data (mbar)

			TA1-Center			TA1-South							
Depth below I	S: 6"	12"	24" 36" 42"			6"	12"	24"	36"	42"			
Date	mbar	mbar	mbar	mbar	mbar	mbar	mbar	mbar	mbar	mbar			
05/09,	/12 137.049	154.853	19.665	235.325	192.834	130.284	EM	EM	EM	EM			
05/10,	/12 130.046	147.969	23.107	234.138	259.300	128.622	EM	EM	EM	EM			
05/11,	/12 132.183	146.426	27.498	225.829	251.704	134.913	EM	EM	EM	EM			
05/12,	/12 135.506	154.497	50.287	230.340	255.383	134.319	EM	EM	EM	EM			
05/13,	/12 135.388	156.633	50.524	234.256	259.893	135.031	EM	EM	EM	EM			
05/14,	/12 136.456	157.108	49.931	235.562	227.728	133.845	EM	EM	EM	EM			
05/15,	/12 134.794	156.158	49.931	236.037	191.409	133.726	EM	EM	EM	EM			
05/16,	/12 134.319	155.327	49.575	235.799	227.966	134.319	EM	EM	EM	EN			
05/17,	/12 130.403	152.598	43.878	234.612	206.839	129.572	EM	EM	EM	EM			
05/18,	/12 125.536	140.847	53.135	224.286	265.234	129.097	EM	EM	EM	EM			
05/19,	/12 130.759	153.191	52.898	227.016	247.906	134.438	EM	EM	EM	EM			
05/20,	/12 131.233	155.684	50.406	232.595	107.258	134.438	EM	EM	EM	EM			
05/21,	/12 129.928	155.446	34.264	235.918	49.100	133.726	EM	EM	EM	EM			
05/22,	/12 128.860	153.310	19.783	237.817	178.472	133.607	EM	EM	EM	EM			
05/23,	/12 128.622	153.072	37.231	239.360	226.898	134.082	EM	EM	EM	EM			
05/25,	/12 130.759	156.633	40.079	241.734	179.303	135.269	EM	EM	EM	EM			
05/26,	/12 131.708	154.141	37.587	241.615	180.965	134.201	EM	EM	EM	EM			
05/27,	/12 143.340	159.363	45.777	241.734	210.637	144.527	EM	EM	EM	EM			
05/28,	/12 159.838	174.199	47.320	245.413	269.151	151.411	EM	EM	EM	EM			
05/29,	/12 174.555	183.576	48.625	248.499	271.881	152.360	EM	EM	EM	EM			
05/30,	/12 182.389	188.561	49.456	250.992	274.136	147.969	EM	EM	EM	EM			
05/31,	/12 181.439	191.053	49.456	253.721	276.985	139.067	EM	EM	EM	EN			
06/01,	/12 175.030	188.679	48.388	254.552	277.934	125.299	EM	EM	EM	EM			
06/02,	/12 143.933	151.529	49.219	235.799	264.166	120.670	EM	EM	EM	EM			
06/03,	/12 139.067	154.022	50.524	220.607	245.532	133.607	EM	EM	EM	EM			
06/04,	/12 142.746	161.618	36.875	234.850	258.469	135.506	EM	EM	EM	EM			
06/05,	/12 142.390	161.025	30.703	238.885	262.742	134.557	EM	EM	EM	EM			
06/06,		159.007	28.210	239.123	263.217	134.082	EM	EM	EM	EM			
06/07,	/12 137.761	155.090	17.884	238.292	262.386	130.996	EM	EM	EM	EM			
06/08,	/12 126.961	138.236	17.291	226.660	253.484	124.468	EM	EM	EM	EM			
06/09,		141.559	32.009	217.284	243.514	128.266	EM	EM	EM	EN			
06/10,		146.426	49.812	216.572	242.565	133.251	EM	EM	EM	EN			
06/11,	_	160.550	36.400	229.865	250.517	136.812	EM	EM	EM	EN			
06/12,	/12 NAN	162.924	22.988	233.544	252.772	137.405	EM	EM	EM	EN			
06/13,	/12 NAN	162.924	23.225	236.155	254.434	136.337	EM	EM	EM	EN			
06/14,	/12 NAN	161.855	27.261	237.224	255.739	136.931	EM	EM	EM	EN			
06/15,	/12 NAN	159.956	38.299	237.936	257.638	136.931	EM	EM	EM	EN			
06/16,	_	157.939	46.963	237.817	258.350	135.625	EM	EM	EM	EN			
06/17,	_	158.057	50.049	239.123	259.537	136.693	EM	EM	EM	EN			
06/18,	/12 NAN	159.363	46.489	239.716	261.080	136.931	EM	EM	EM	EN			
06/19,		159.838	46.963	241.378	262.861	136.100	EM	EM	EM	EN			
06/20,	/12 250.517	159.244	48.981	241.496	263.810	135.031	EM	EM	EM	EM			

NAN (not-a-number) indicates an exceptional occurrence in datalogger function or processing occurred (an invalid measurement).

NR indicates no reading occurred.

EM indicates an equipment malfunction occurred. We are in the process of troubleshooting the problem.





Appendix E: S&GW Test Facility Soil Moisture Data

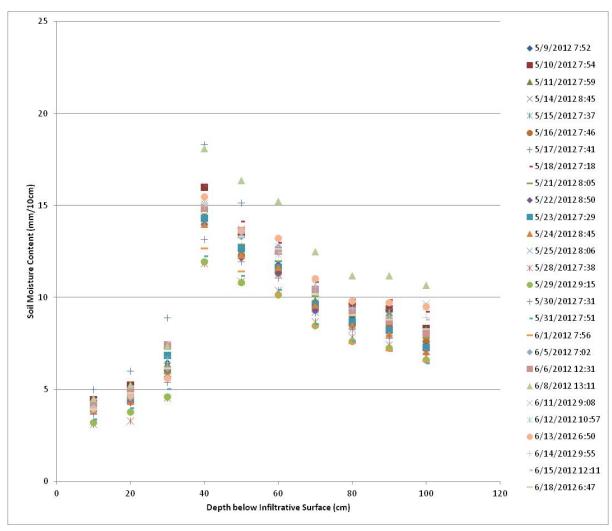


Figure E.1
Soil Moisture Test Area 1 North

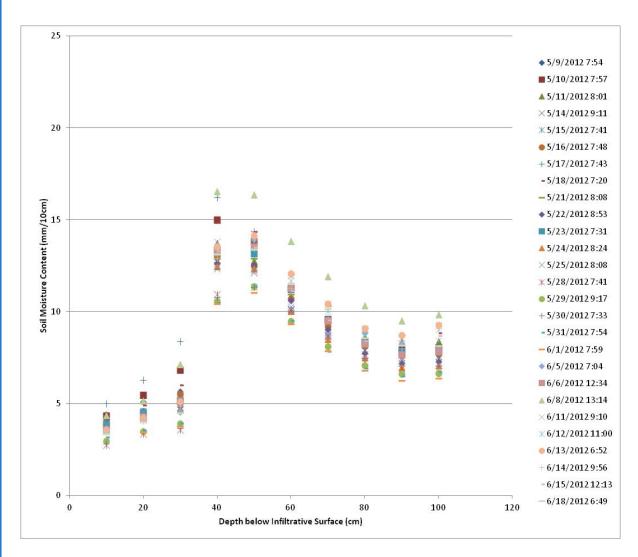


Figure E.2 Soil Moisture Test Area 1 Center

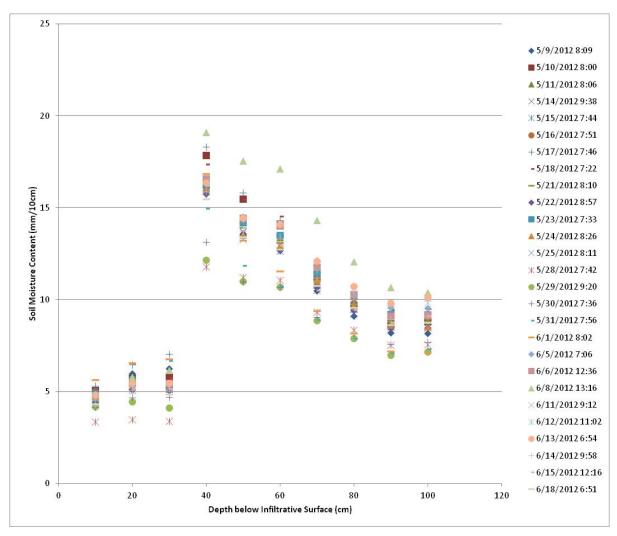


Figure E.3 Soil Moisture Test Area 1 South

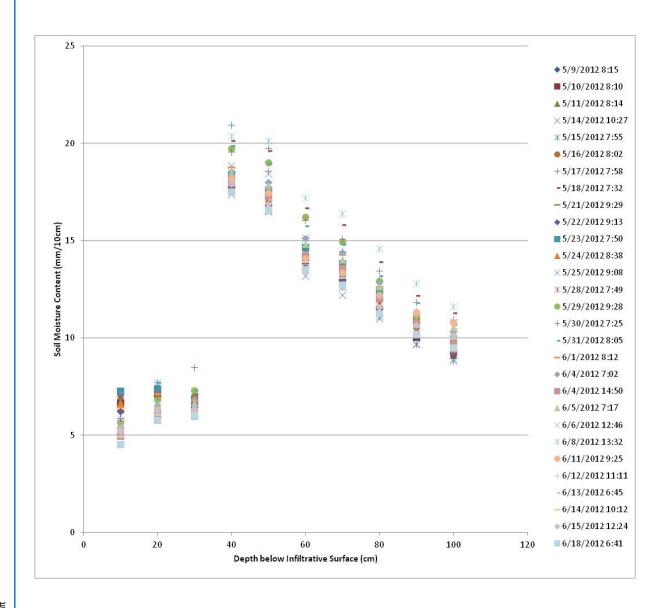


Figure E.4
Soil Moisture Test Area 2 Center

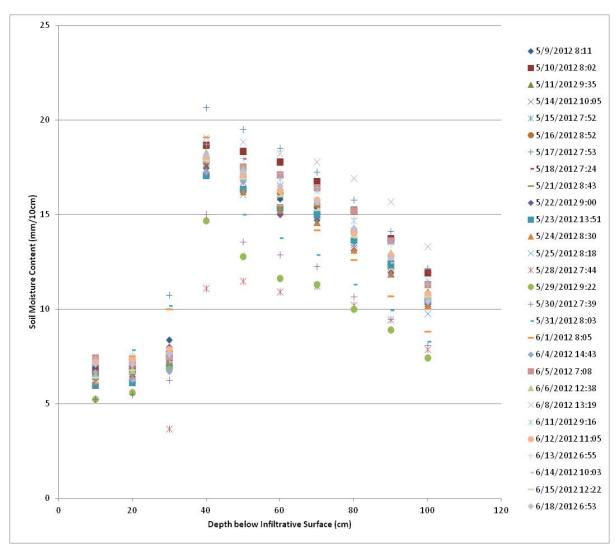


Figure E.5
Soil Moisture Test Area 3 North

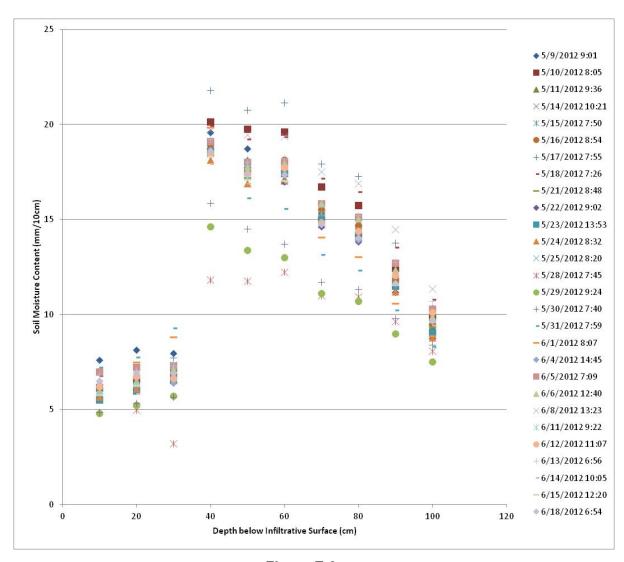


Figure E.6
Soil Moisture Test Area 3 Center

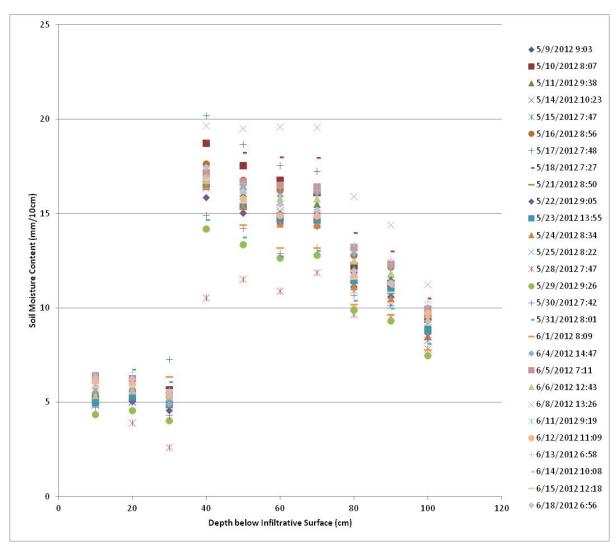


Figure E.7
Soil Moisture Test Area 3 South

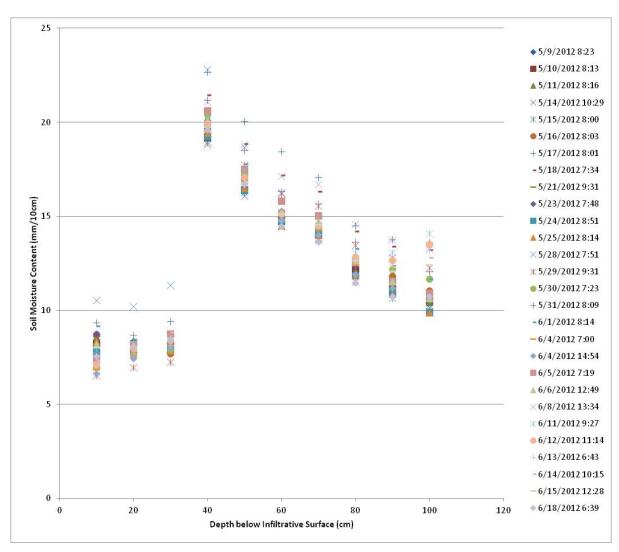


Figure E.8
Soil Moisture Test Area 4 Center



Appendix F: Chain of Custody Forms



SOUTHERN ANALYTICAL LABORATORIES, INC. 110 BAYNEW BOULEVARD, OLD SMAR, FL. 34677 813-855-1844 fax 813-855-2218

Client Name							Contact / Phone	hone:									
Project Name / Location	Hazen and Sawyer																
•	Tool Coulity, Or 444 (Oct.																
Sampler (Signature)	S&GW Test Facility SE #1 (Set 2)		ŀ														
A Company of the Comp							PAR	AMETER /	PARAMETER / CONTAINER DESCRIPTION	A DESCRI	NOIL						
Matrix Codes: DW-Drinking Water WWV-Wastewater						-outnO	вИ										
SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water			*09		EO ₂ S ₂	Е, NO ₃ , (_	* 0\$				Alkalinit	ю		erute	tivity	
Sample Description	Date	Matrix Composite	Grab 250mL P, H ₂ 3	TKN, Nox, NP 1LP, Cool Cl, Alkalinity,	TSS 125mLP, Na: FC-MF	1LP, Cool P, SO ₄	250mL P, HN B, Ca, Fe, Mg	250mL P, H ₂ 5 TKN, NH ₄ 1LP, Cool	720WF b' H ⁵ 2 700 NO ³ ' CI	TKN, NOx, NF	LKM' NH⁴' CC 520ШГ Ь' Н ⁵ 2	ILP, Cool VO ₂ , NO ₃ , CI,	250mLaG, Co OOC	Hq bləi	neqmeT blei	oubnoO blei	Od plei:
01 TA4-PZ-11-L5 -	6111 July 1724	GW	_				1							7	18	4. H	1.92
, 02 TA4-PZ-11-L6 *	6/19/12 1058.	GW	×						_	-				5.2	26.0	2.75	1.60
03 TA4-PZ-09-M4 \	9560 71 619	GW	×						_	-				T	, 0	ی	031
04 TA4-PZ-16-M4 ·	0201 11 10	GW							_	-				3	ω,	27.122	6.19
05 TA4-PZ-09-N7 ·	CA12 0854 0	GW							_	-					18.7	0.138	. 03
6 06 TA4-PZ-16-N7 ·	1260 21619	GW							-	-					-		0,14
, 07 TA-PZ-09-17 *	0 2101 71619	GW		_			-		-	1				5.9	8	_	411
08 TA4-PZ-16-I7 *	61912 1032 G	GW							1	1				55	15.0	አነ ንշ	0.16
° 09 TA4-PZ-09-L8	0 906	GW							1	1				4 h '9	12.52	286	89'0
· 10 TA4-PZ-16-LB ·	V 094	GW							_	-				10	_	łτ≂	0,17
3 11 TA4-PZ-09-TU14	6119/12 0738 G	GW							-	-				す	9	#	3
12 TA4-PZ-16-TU14 1	2580 1	ΒW	_						-	-				4.0	6.75	_	5
(Manch)	Record	Date		018		Seal intact?	ct2		Q N N	Instruct	Instructions / Remarks	arks:	, -,	۲,4 ۲	25.5	₩. J}]	21.0
Relinquished Date/Time: 1800	Receipt of the Control of the Contro	Date	187	5		Samples	Samples intact upon arrival? Received on ice? Temp	ival?	y								
Reilhquished: Date/Time:	Received:	Date/	. I.E			Proper p	Proper preservatives indicated?		v Z 2 Q	-							
Reinquished: Date/Time:	Received:	Date/Time;	ime:			Rec'd wi	Rec'd within holding time? Volatiles rec'd w/out headspace'		N N Z N Z N X								
Relinquished: Date/Time:	Received:	Date/T	ime:			Proper co	Proper containers used?	ę Ç	z								
Chain of Custody as Rev Date 11140011		-								_							

SOUTHERN ANALYTICAL LABORATORIES, INC. 1108AWEVEVERDE, OLDSMAR, FL 34877 813855-1844 fex 813-855-2218

Client Name			!					3	Contact / Phone:	Je:									
	Hazen and Sawyer			į															T
Project Name / Location			í																
1	S&GW Test Facility SE #1 (Set 2)	SE #1 (Set	2)	ļ				-											
Samplers: (Signature)									PARAM	ETER / CC	PARAMETER / CONTAINER DESCRIPTION	DESCRIPT	NO			-	-	-	
Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Studge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water							120203		9, Mn, K, Na		*OS				loo				-
)ate	əmi	xhteN	Composite	LKN' NOX' NI 176' COOI	CI, Alkalinity,	ISSML P, Na	71, NO ₂ , NO ₃ , NO ₃ , NO ₃ , NO ₃ ,		1LP, Cool	TKN, NOx, 1 250mL P, H; NO ₂ , NO ₃ , C	ILP, Cool	250mL P, H TKN, NH₄, C	1LP, Cool CI, SO4	S50mLaG, (DOC	Field pH Field Temp	pnoO blei1		Field DO
3 TAA-DZ-00-T116 ;	12	3/2		+				,			 	-			5	5.2 h.	5.00.3	_	0°.
	2180 21619	2000	AS	×							-	-			S	9 42 5	6 251.2	_	٥ چ
15	ر رحمی	350	ΜS	×							-			-			1	_	- [
* 16 TA5-LY-C `	8/10	9	GW	×						-					9	\$2 59°9	ত	380 6	6.33
4 TAS-LINER-SP 3	1699	88	МЭ	×						-						+	+	+	
	17/90	1315	ww	×							-			-	-	+	+	+	T
19 TAS-Denite Tank-DUP 6		\overline{a}	ww	×										-			+	+	1
1	ONY X	178	16 0 201-	×							-	_		-	2	,	Ť.	-	₹.
21 TA6-LY-C \$	9119	pribo	δW	×				-					-		3	-	<u>.</u>	\sim	Sti
TA6-LINER-SP	2/02/	210	GW	×						-	-				9,		3	J	- 1
TA6-Denite Tank		Shal	ww	×							-			-	اف	3	1301 6	7	٤٩
PZ01-BKG-09 V	8c/19 14	Ohn	МĐ	×							-	-			ካ	32 28	7 [1]	9	3
I.⊆ ∃.	7	3	<u>-</u> ۱	Date/Time	, 18 j	60		Seal intact?				Instructi	Instructions / Remarks:	arks:					
Date	Received			Date/Time	15			Samples in	Samples intact upon arrival?		₹ Z Z								
Color 1 61912	五五五	tark		0	2/19	کے		Received o	Received on ice? Temp_	ĺ	O N N/A								
Reinharen 16.30	Refeived	0	1	Date/Time	<u> </u>	اه	ì	Proper pres	Proper preservatives indicated?		Ø NA								
1970 12 Patentino		3	7	3	À	٥		Rec'd withi	Rec'd within holding time?		N N/A								
Aelinqualred.								Volatiles re	Volatiles rec'd w/out headspace'		© z \≻								
Relinquished: Date/Time:	Received:			Date/Time				Proper con	Proper containers used?		Ž N N								
Chair of Custody as Rev.Dala 111901											Chain of Custody	ustody							

SOUTHERN ANALYTICAL LABORATORIES, INC. 110 BAWIEW BOULEVARD, OLD SMAR, FL 34677 B13-855-1844 fax 813-855-2218

Client Name								Contact / Phone	Phone:			9						
Haze	Hazen and Sawyer									813-630-		4448						
	S&GW Test Eacility SE #1 (Set 2)	7F #1 (Set 2)																
Samplers: (Signature)	Ž	1 1001 = 1																
		\	ļ			ļ		PAR	AMETER /	PARAMETER / CONTAINER DESCRIPTION	R DESCRI	PTION						
Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water						[£] O ^z S	Alkalinity		[†] O:	⁷ O				lo		ənute	tivity	
	ate	emi atrix	omposite	rab 50mL P, H ₂ S <n, nh<="" nox,="" td=""><td>P, Cool Ralinity, Cool</td><td>SomL P, Na_z</td><td>Р, Соо! , ИО₂, ИО₃,</td><td>60mL P, HNG Ca, Fe, Mg</td><td>0mL P, H₂5</td><td>.P, Cool .P, Cool .P, Cool</td><td>(N, NOx, NH</td><td>(M' MH⁴' CC 0WF b' H⁵8</td><td>P, Cool Alkalinity</td><td>OmlaG, Co</td><td>Hq ble</td><td>negmeT ble</td><td>onpuoO pje</td><td>OO PI</td></n,>	P, Cool Ralinity, Cool	SomL P, Na _z	Р, Соо! , ИО ₂ , ИО ₃ ,	60mL P, HNG Ca, Fe, Mg	0mL P, H ₂ 5	.P, Cool .P, Cool .P, Cool	(N, NOx, NH	(M' MH⁴' CC 0WF b' H ⁵ 8	P, Cool Alkalinity	OmlaG, Co	Hq ble	negmeT ble	onpuoO pje	OO PI
25 LY01-BKG-24 '	711		0	5	11	:L			ш	N		52	CI		╁		6	に でな
26 LY02-BKG-42 6/18/12 dry		ΑĐ		×							-	-			+-	_		?
3 27 PZ04-BKG-09 ,	6/14/12 8	क्रव्यर Gw		×							-				5,09	36.2	49.7 4	4.39
4 28 PZ-24-BKG-26 ·	6/19/12 8:9:30	.930 GW		×							-					15.3	Γ	2.44
29 PZ24-BKG-26-DUP ·	c/11/12	9:35 GW		×							-					_		44,6
30 PZ-29-BKG09 、	01:01 21/61/9	3:16 GW		×									-			1	$\overline{}$	1,72
1 31 PZ30-BKG-16 .	419/12 10	10:40 GW		×						-			1		_	1	~	035
32 PZ31-BKG-26 V	6/19/12 11:35	.35 GW		×									-				321	1,22
33 PZ31-BKG-26-DUP >	Oh:11/21/19	. Oh :		×						,			-		507	e.	一元	7.7
34 PZ32-BKG09 、	6/19/12 12:10	MS CM		×									-		4.36 5	29,2 18		4,9
35 PZ33-BKG-16 `	6 rilla	13.40 GW		×									-			27,072	270	J
36 PZ34-BKG-26 .	धामारा । ।	15 GW		×						1			1		_	168 376		3
Reinquisid Am All Services	Xecelly X	•	Date/Tim	•	/320		Seal intact?	ct?		ØN N ≻	Instruc	Instructions / Remarks:	arks:					
Kelinquispa	Received		Date/Time:		1/1 K00		Samples	Samples intact upon arrival?		§ ≥ 2								
	如如	1		3	10/5/20		Received	Received on ice? Temp.		N N N								
Kelindwahed: Date/Time:	Received:		Date/Time	ime:			Proper pr	Proper preservatives indicated?		N N N N								
Relinquished: Date/Time:	Received:		Date/Time	ime:			Rec'd wil	Rec'd within holding time?	me?	N NA								
Relinquished: Date/Time:	Received:		Date/Time	ine:			Volume V	Volatiles rec o w /our neadspace Proper containers used?	dspace	z z								
		į																

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



SOUTHERN ANALYTICAL LABORATORIES, INC. 110 BAYVIEW BOULEVARD, OLD SMAR, FL. 34677 8134655-1844 fx 8134855-2218

Client Name								Contact	Contact / Phone:	313	0817 6 1. 510	9110	3					
	Hazen and Sawyer									817	5		0					
Project Name / Location	C.P.C.W. Toet Eacility QE #1 (Cat 2)	CE #1 (Cot	6															
	I EST L'ACIIITÀ	190 H 20		F				-										
comp comp	~							P,	ARAMETE	ER / CONT	PARAMETER / CONTAINER DESCRIPTION	SCRIPTIC	Z					
Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water				708	qT , ₄ l		linity, SO₄, F,	⁵ O	*O\$						loc	eruter		
Sample Description	Date	əmiT	Matrix Composite	Grab 250mL P, H ₂ 9	1LP, Cool	CI, Alkalinity, TSS 125mL P, Na		OP, Alkalinity 250mL P, HN B, Ca, Fe, Mg	250mL P, H₂ 250mL P, H₂	1LP, Cool	1КИ' ИОХ' И 520ШГ Ь' Н ⁵ 3	11P, Cool	250mL P, H₂8	1LP, Cool Cl, Alkalinity	S50mLaG, Co	Field pH Field Tempe	Field Condu	Field DO
37 PZ35-BKG09 '	21/61/9	12:12	GW	×							1			1	5,	5.45 26.9	9 823	10.24
38 PZ36-BKG-16 ·	04:51 21/61/9		GW	×							1			1	5.	F.36 24.2	7 254	86.0
39 PZ37-BKG-26	6/19/12	01:31	GW	×							1			1	5.20	25.5	5 333	99-1 8
40 PZ38-BKG09 v	21,02,0)	830	GW	×							1			1	C 9		225 2	2 0,1
* 41 PZ39-BKG-16.	82012 905		GW	×							1			1	<i>(a)</i>	615 24.6	9hE 9	10,6
, 42 PZ40-BKG-26 *	1020	955	GW	×							1			-	4	5/12 18.4	bLC b	1 1.88
, 43 FB-Tap ;	1c/30		DW	×							1			-		H		
44 FB-DI •		1500	~	×							1			1				
, 45 EB.	>	acto	- X	×			1	-					1		1			
Containers Prepared/ Relinquished:	Receive		<u>~</u> \	Date/Time:	£,	02	Seal	Seal intact?		z ≻	(2)	nstruction	Instructions / Remarks:	.;			:	
Religious 1800			- D	Date/Time:	1000	i	Same	Samples intact upon arrival?	on arrival?	N N	ΑN							
74	皇	J		Š	3		Rece	Received on ice? Temp	Тетр	- ON NA	N/A							
Relinguated: 1630	Right A	Jun 1	٦	1	2000		<u></u>	Proper preservatives indicated?	res indicate	N C O	ΑĀ							
Relinquished: Date/Time:	Recei	3	Da	Date/Time:	2		P. Sec.	Rec'd within holding time?	ng time?	ON NA	∀.X							
district district or control of the							Volati	Volatiles rec'd w/out headspace' Y N	out headsp	y ≻ ese	Œ)	•	•					
Relinquished: Date/Time:	Received:		<u>©</u>	Date/Time:			Prope	Proper containers used?	¿pəsn	N NA	K X							
Chain d'Custody.kk Rev.Date 11/1901	-						-			δ̈	Chain of Custody	- Apo						



SOUTHERN ANALYTICAL LABORATORIES, INC. 1100BAWEW BOLLEVARD, OLDSMAR, FL 34877 813-855-1844 fax 813-855-2218

Client Name									ľ	Contact / Phone	hone:									
in the second se	Hazen	Hazen and Sawyer	yer						1											
Project Name / Location	WESS	Toet Fac	C.S.G.W Tost Facility QF #1 (Cot 1)	Set 1)																
Samplers: (Signature)	No.			X																
	`. /	\ \ 	١,	2	ŀ					PAR	PARAMETER / CONTAINER DESCRIPTION	CONTAIN	ER DESC	RIPTION						
Matrix Codes: DW-Drinking Water VWV-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Grounwater SA-Saline Water O-Other	-Wastewater dge SO-Soil Water O-Other er						CBOD, TS,	[€] O ^z S ^z	СВОD, ТS, Олћо-Р, SO ₄	j, Mn, K, Na	*os							enuter	ctivity	
Sample Description	ription	ətsC	əmiT	xinteM	Composite Grab	250mL P., H ₂ 5	1LP, Cool TSS TSS	125mL P, Na _. FC-MF	1LP, Cool CI, Alkalinity, TSS, F, NO ₃ ,	250mL P, HN B, Ca, Fe, Mg	250mL P, H ₂ 5 TKN, NH ₄ 1LP, Cod	NO ₂ , NO ₃ , CI	1LP, Cool	CI 	TKN, NH4, CC 1LP, Cool NO NO CI	DOC S20m[96' C9 MO ^S ' NO ^{3'} CI	Field pH	eqmeT blei	ubno⊃ blei∓	Field DO
D1 PNRS II STE-Tank 1 -		211290	-	^												-	9	27.0	1164	S S
• 02 STE Pump Tank ·			0041	W	×	-		7	-	-							7.1	18.1	1911	0.41
8 03 STE Pump Tank-DUP			1405	ww	×	-		2	-	-							7.1	78.7	116T	40
1 04 NO3 Pump Tank			1415	*	×	1	-	2									47	812	なら	なら
05 NO3 Pump Tank-DUP ~			1450	ww	×		1	2									7.4	812	1154	0.54
: 06 TA1-PAN-12-N				GW	×						1	1								
1 07 TA1-PZ-11-EF2		11zgO	062112/0955	gw.	×								1	1			4.5	25.52	85H	6.32
, 08 TA1-PZ-11-EF2-DUP			1000	GW	×								1	1			>	^	→	*
, 09 TA1-LY-24-C		200	OCO 118 1315	Νg	×						-	-								
, 10 TA1-LY-12-S ·		81/30	3081	GW	×									1	1	-				
6 x TA1-LY-24-S		81/90	981 S	GW	×									1	1					
17 1 TA1-LY-42-S .		<u>8</u> /90	器 /	GW	×						-	1								
Containers Prepared/ Relinquished	Date/Time: 6-(2-(2)	Received:			Date/Time	ej.			Seal intact?	ct?		z		Instructions / Remarks	emarks:					
Reinquished:	Date/Time:	Received	 		Date/Time	i di			Samples Received	Samples intact upon arrival? Received on ice? Temp	arrival? mp	X X X X X								
Refinquished:	Date/Time:	Received:			Date/Time	ie.			Proper pr	Proper preservatives indicated?	indicated?	× N/A								
Relinquished:	Date/Time:	Received			Date/Time	ا ا			Rec'd wi	Rec'd within holding time? Volatiles rec'd w/out headspace	time? headspace	× × ×								
Relinquished:	Date/Time:	Received:			Date/Time:	نة			Proper co	Proper containers used?	¿pa	¥ Z ≻								
													$\frac{1}{2}$							

Chain of Custody

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

SOUTHERN ANALYTICAL LABORATORIES, INC. 110 BAYVIEW BOLLEVARD, OLDSMAR, FL. 34877 813-855-1844 18x 813-855-2218

Client Name	Hazen	Hazen and Sawyer							Contact / Phone	Phone:	\$13,	. 630	813-630-4478	78					
Project Name / Location	W.C.	tilion I	(t tog) t# 30 stilling 3 too T MO 80	=						,									
Samplers: (Signature)		lest radilly) OE #1 (OE		\mid														
ARB)	2				\dashv				PAF	ZAMETER	PARAMETER / CONTAINER DESCRIPTION	ER DESCF	UPTION			-	-	-	
Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SC-Soil GW-Groundwater SA-Saline Water O-Other	-Wastewater dge SO-Soil Water O-Other er				ros	dΤ ,₄H	· · · · · · · · · · · · · · · · · · ·	СВОD, ТS, Олљ-Р, SO,	_	*os				l, Alkalinity	loo		orndere	rctivity	
Sample Description	aription	əfeQ	əmiT	XintsM Composite	Grab S50mL P, H ₂	TKN, Nox, N 1LP, Cool Cl, Alkalinity,	TSS 125mL P, Na FC-MF	1LP, Cool CI, Alkalinity, TSS, F, NO ₃	250mL P, H) B, Ca, Fe, M	ТКИ' ИН ⁴ 120ШГ Б' Н ^Σ	1LP, Cool NO ₂ , NO ₃ , C 250mL P, H ₂	ТКИ, ИОх, <i>N</i> 1∟Р, С₀оі	CI 250mL P, H ₂ TKN, NH ₄ , C	1LP, Cool 1Co, NO₃, C	250mLaG, C DOC	Field pH	qme1 blei7	Field Condu	Field DO
, 18 \3 TA1-PZ-11-J4		6/20h7.	38:31	GW	×							-				ų, ų	27.2	300	3,47
A		21/02/9	3 2 3 3 3 3 3 3 3 3 3 3	W _O	×							-				ለ.የ	4 15%	289	3.21
8 TA1-PZ-11-L2,		21019	Shbl	GW	×							-				Q, Q	15.6 1	676	5.66
T		5211 21929	1425	MS.	×							1					552	310 11	4.91
22 1 TA1-PZ-11-L4		3000 2110X	0405	ВW	×							1				4,4	1	44	4.38
33 18 TA1-PZ-11-L4-DUP ,		>	2180	GW	×							1 1				¥	/	7	7
34 10 TA1-PZ-11-L5 .		2102	1345	GW	×							-				y.60	142	308	2.80
1 05 TA1-PZ-09-N3 ·		delto	(SS)	ВW	×							-							
TA1-PZ-16-N3		DEZ112 1152	1152	GW	×							1				5.7	24.9	5.912	0.63
JA 12 TA1-PZ-09-07 .		0451 0000	1540	GW	×														
K		Sen 21152	1132	GW	×							_				5.8	15.02	268.4	0.22
29 Jan TA1-PZ-09-M9		26/20	Qe'y	ВW	×							1							
Containers Prepared/ Relinquisher	Oste/Time 2-10	Kee Kee	þ	Δ	Date/Time:	2	0201	Seal intact?	lact?		Y N WA	Instr	Instructions / Remarks:	marks:					
Belinquispent	Date/Time: 1/20	Referen		T-	Date/Time:	250	1056	Sample	Samples intact upon arrival?	n arrival?	N N								
	62012	土土	Sur	3	2-20	39	i	Receive	Received on ice? Temp	Temp	V N N.A								
Relinquismed:	Date/Time:	Received:		Δ	Date/Time:			Proper	preservativ	Proper preservatives indicated?	Y N N'A								
Relinquished:	Date/Time:	Received:			Date/Time:			Rec'd v	Rec'd within holding time? Volatiles rec'd w/out head	Rec'd within holding time? Volatiles rec'd w/out headspace	N N Y								
Refinquished:	Date/Time:	Received:		٥	Date/Time:			Proper	Proper containers used?	sed?	Z >								
Chain of Custody,xls Rey,Date 11/19/01				-							Chain o	Chain of Custody			İ				

SOUTHERN ANALYTICAL LABORATORIES, INC. 1100 BAYNEW BOULEVARD, OLDSWAR, FL. 34877 813-855-1844 fax 813-855-278

	Hazen	Hazen and Sawver																	
Project Name / Location													İ						
7	S&GW	Test Facility	S&GW Test Facility SE #1 (Set 1)																
Samplers: (Signature)	1		ļ						PAF	ZAMETER	/ CONTA	INER DE	PARAMETER / CONTAINER DESCRIPTION	7		ŀ			
Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other	odes: WWV-WastewaterSludge SO-Soil aline Water O-Other Water					4T ,≱H		CBOD, TS,		*os							enutere	nctivity	<u></u>
Sample	Sample Description	Date	əmiT	Matrix Composite	Grab	250mL P, H ₂ TKN, Nox, N 1LP, Cool	CI, Alkalinity. 125ml P, Us FC-MF	1LP, Cool	250mL P, HI	250™L P, H ₂ 750™L P, H ₂	1LP, Cool	250mL P, H, TKN, NOx, N	1LP, Cool Cl 250mL P, H	TKN, NH ₄ , C	NO ₂ , NO ₃ , C	Field pH	Field Temp	Field Cond	Field DO
75 TA1-PZ-16-M9		211290	4121	GW	×							1	1			6.9	Ť	3 7248	0.17
_		1500 1500		GW GW	×							-	1			56	, 75.7	7 415	1.95
		O62172 174	_	gw Gw	×							1	1			6.2		7.25.7	0.32
		45 80 2112 DO 54	<u> </u>	ΛS	×							-	-			6,2	25.6	214.1	1.25
		21150	<u></u>	MS.	×							-	-			2.3	\neg	\$ 455.L	100
76 TA1-PZ-09-RS18		0621120914		GW	×							-	-	_		હ	\$:52 5		¥.62
X TA1-PZ-16-RS18 .		X80 211200		GW	×							-	-			<u>``</u>	248	7.3%	1,162
72 TA2-PAN-12-N				GW	×					-	-					_	4		
TA2-PZ-10-EF2		260110290		ΛĐ	×							,	-			† †	1 256	~	-
TA2-PZ-10-EF2-DUP \	-	9260219290	<u> </u>	Α̈́	×							1	-			ラ	7	7	<u>ح</u>
36 TA2-LY-24-C ·		3/20	_	ΑS	×					1	1						4		
36 TA2-LY-12-S +		8/90	1889	GW.	×									-	-			_	
Containers Prepared Relinquished:	Color Color	Received		ő	Date/Time:		1023	Seal	Seal intact?		z		instructions / Remarks:	/ Remarks					
elinquisted:	Date/Time: /630	Receive	2/1/10	٥	ate/Time:	Date/Time: 1630		Samp	Samples intact upon arrival? Received on ice? Temp	on arrival? Temp	z z z z >- >	۷ ×							
Relinquished:	Date/Time:	Received:		_ <u> </u>	Date/Time:	2		, T	:		:								
								Prope	Proper preservatives indicated?	es Indicated	z ≻	∢							
Relinquished:	Date/Time:	Received:		٥	Date/Time:			Rec'd Volati	Rec'd within holding time? Volatiles rec'd w/out headspace	ig time? ut headspac	z z >	¥ ¥							
Relinquished:	Date/Time:	Received:		ă	Date/Time:			T	Proper containers used?	deed?	z ≻	¥ Ž							



SOUTHERN ANALYTICAL LABORATORIES, INC. 110 BAWNEW BOLLEVARD, OLD SWAR, FL 34677 813-855-1844 fex 813-855-2218

Client Name	Hazen	Hazen and Sawyer							Contact / Phone:	/ Phone:									
Project Name / Location																			
	2 S&GW	S&GW Test Facility SE #1 (Set 1)	y SE #1 (Se	13	-														
Samplers: (Signature)) h								/d	PARAMETER / CONTAINER DESCRIPTION	/ CONTAIN	VER DESC	RIPTION						
Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other	odes: WWV-WastewaterSludge SO-Soil iline Water O-Other Water				*os	ч, тР Свор, т <i>в,</i>		CBOD, TS,	, Ortho-P, SO ₄ 4O ₃ g, Mn, K, Na	[†] OS							ərutsıə	nctivity	
Sample	Samule Description	ətsC	əmil	xintsiv	Composite Grab 250mL P, H ₂	TKN, Nox, N 1LP, Cool Cl. Alkalinity.	TSS 125mL P, Na FC-MF	1LP, Cool Cl, Alkalinity	250mL P, HI	250mL P, H ₄ TKN, NH ₄	1LP, Cool NO ₂ , NO ₃ , C	1FP, Cool TKN, NOx, 1 250mL P, H	CI 	TKN, NH ₄ , C	NO ₂ , NO ₃ , C	Field pH	Field Temp	Field Cond	Field DO
42 x TA21 4.248		No NS	450	_	×		_						_	_		وج	8.80	hs6	2
43 6 TA2-1 Y-42-S		>	ठ	⊗	×					-	-					946)		ઉતેક	5.4
1		160010101	0817	ΑS	×							-	_			43	25.5	690h	3
		067012 0837	0837	ΜĐ	×							-	_			4٠۴	25.7	નાા.૧	8
		8580 110700	8888	MS.	×							-	_			4.3	1257	411.8	3.54
TA2-PZ-10-1.2		21029	8 50	AS S	×							-				<u>ሳ</u> ነ	25.6	8-yzh	4:60
48 46 TA2-PZ-10-13 ·		620120910	0410	Q.W	×							-	-			5،۲	25.5	418.4	2.18
7		2480/1029	2480	GW	×							-	1			<u>۱</u> ۰۸	75.9	200	27.2
1		676 0376	0376	ΜΘ	×							-	1			4.8	158	ઝુ	1.1
*		670110806	6806	MS MS	×							-	_			ر. د	75.4	2746	339
7		1290 1105	2560	ΜΘ	×							-	_			6.0	23.7	की.व	0.51
M8 TA2-P7-16-M4 .		2029	010		×							-	-			77	24.7	Z:0h2	0.14
] <u>=</u> =	Date/Time:	Received	1	1 1	Date/Time:	2	122	Seal	Seal intact?		YN N		Instructions / Remarks:	emarks:		•			
Relinquished	Date/Time: 1/20	Reserved			Date/Time: 11.5	7/32/	1	Sam	Samples intact upon arrival?	on arrival?	Z >								
d	- 1	10000000000000000000000000000000000000	Market	٠ ا	36	ģ ģ		See See	Received on ice? Temp	Temp	Y N NA								
Relinquished:	Date/Time:	Received:		Δ	Date/Time:			Prop	er preservat	Proper preservatives indicated?	7 Y N WA								
Relinquished:	Date/Time:	Received:			Date/Time:			Rec'o	Rec'd within holding time? Volatiles rec'd w/out head	Rec'd within holding time? Volatiles rec'd w/out headspace	N N N N N N N N N N N N N N N N N N N	٠							
Relinquished:	Date/Time:	Received:			Date/Time:			<u></u>	Proper containers used?	s used?	₹ Z ≻								
Chain of Custody.xls Rev.Date 11/19/01											Chain	Chain of Custody							



SOUTHERN ANALYTICAL LABORATORIES, INC. 110 BAYVIEW BOLLEVARD, OLDSMAR, FL. 34877 813-855-1844 fex 813-855-2218

Client Name									Contact / Phone	Phone:									
		Hazen and Sawyer														:			
Project Name / Location	e / Location																		
	1	S&GW Test Facility SE #1 (Set 1)	SE #1 (Set	1)	-														
Samplers: (Signature)	ignature)								PAR	AMETER,	PARAMETER / CONTAINER DESCRIPTION	ER DESCF	NOILL						
DW. SW.! GW-Gr	Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water				709	9T ,,		CBOD, TS, Ortho-P, SO ₄	SIA N OM r	[†] OS	709	^⁵ H		, Alkalinity	loc		erutar	ctivity	
	Sample Description	Date	əmiT	xirtsM	Composite Grab 250mL P, H ₂ 0	TKN, Nox, NI 1LP, Cool	EC-ME 1SQWF b' NS 128	1LP, Cool Cl, Alkalinity, TSS, F, NO ₃ ,	8, Ca, Fe, Mg	1 TKN' NH [‡] 1 TKN' NH [‡]	1250mL P, H ₂ 1 11P, Cool 12F, Cool	ТКИ, ИОх, И 1∟Р, С₀оі	CI CI	1LP, Cool NO ₂ , NO ₃ , CI	DOC 220mLaG, Co	Field pH	Field Tempe	ubnoO blei3	Field DO
SH S TAZ-PZ	TA2-PZ-09-N7 ·	211170	9170	GW	×							1 1				6,3 1	<u>ካ ኃ</u> ን	403.4 6.	. Y
57 28 THEFT	+5 61 912 92 TA MERIZARA	1/029	3756	ΜĐ	×							1				, ц	2 7.12	1.0/2	634
56 x 1A2-PZ-09-17		1 216 99	bhS	GW	×							1 1				5.7 [24.13	381.1Z	92.
56 M TALPET 18-17	TA2PZ 16 N7	St 106912 1438	1438	ВW	×							1 1				6,1	25.12	2	6.14
58 ps 1A2-PZ	TA2-PZ-09-L8	5151 21b190	1513	GW	×							1 1				6,3	10.9 1€	475.03	3.78
59 st 1A2-PZ	TA2-PZ-16-L8 .	DEAN	1330	GW	×							1				6.8 h	2 b.m	225.8 0	0119
186	TA2-PZ-09-TU19 ·	POH12 1409	404	GW	×							1				1 9'h	1152	13.4 1	1,15
æ	TA2-PZ-16-TU19 ·	216190	1434	GW	×							1 1				5.5	П	189.10	22.0
(2) of TA2-PZ	TA2-PZ-09-TU21 `		14.24	GW	×							-				4.6 19	4.3	68.50	6,32
103 se TAZ-PZ	TA2-PZ-16-TU21 ·	218120	015)	GW	×							1			-	5.2 1	25.2	184.60	0.15
(g4 Pg TA3-PA	TA3-PAN-12-N			ВW	×					-	-								
35 80 TA3-LY-24-C	r-24-C ·	81/070	1001	GW	×					1	1								
Containers Prepared/ Relinquished:	wed by Color of Color	Received	J	<u> </u>	Date/Time:	251.25 51.57		Seal intact?	act?		(§) ≥ ≻ (Instructions / Remarks:	arks:					
Refinguish d.	Date/Time: 1800		} }	\	Date/Time:	003/2/		Sample	Samples intact upon arrival? Received on ice? Temp	1) Ø								
Refinquished:	Date/Time: /630	Received:			Date/Time:	1630	'	Proper t	reservative	s indicated?	Proper preservatives indicated? 2 N WA								
Relinquished:	Date/Time:	Received:		1	Date/Time:	5		Rec'd w	Rec'd within holding time? Volatiles rec'd w/out head	i time? t headspace	Rec'd within holding time? SN NA Volatiles rec'd w/out headspace YN PRO								
Relinquished:	Date/Time:	Received:		Δ	Date/Time:			Proper (Proper containers used?	¿pes	z O								
Chain of Custody.xls Rev.Date 11/19/01								-			Chain of	Chain of Custody							



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

604 75.2 Lield DO तु ठ्र 730 ield Conductivity イベ 253 36.9 enutaneqmeT blei .3 5 Hq blai7 で DOC 250mLaG, Cool $1\Gamma P$, Coolnstructions / Remarks: TKN, NH4, COD, TP S50mL P, H₂SO₄ PARAMETER / CONTAINER DESCRIPTION 1LP, Cool LKN' NOX' NH 250mL P, H₂SO₄ X X Y N/A ž χ Y N WA YN N'A ž z z 4O⁵¹ NO³¹ CI ILP, Cool Volatiles rec'd w/out headspace Proper preservatives indicated? TKN, NH Samples intact upon arrival? Contact / Phone: Rec'd within holding time? 250mLP, H₂SO₄ Proper containers used? B, Ca, Fe, Mg, Mn, K, Na Received on ice? 250mL P, HNO3 Seal intact? P, 504, 1.02, 9 Cl, Alkalinity, F, NO3, Ortho-ILP Cool EC-ME 125mLP, Na₂S₂O₃ SST CI, Alkalinity, CBOD, TS, ILP, Cool TKN, Nox, NH₄, TP 250mLP, H₂SO₄ و etizoqmo5 8 ΘW ĕ ĠW δ βW GW ΘW ĞΜ 8 ΘW Θ¥ XittsM S&GW Test Facility SE #1 (Set 1) SS 01 1436 1436 오크 22 0221/200 87 55 14 55 18 62012 Orto [3[3 1433 å, 128 əwii 112029 2000 <u>8</u> R/B 2029 or fa Hazen and Sawyer Date 616 12 10 x 20 (COS) DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water 21/200 062112 Sample Description TA3-PZ-11-EF2-DUP -A3-LY-12-S-DUP Project Name / Location TA3-PZ-11-EF2 TA3-PZ-11-L4 > Samplers: (Signature) TA3-PZ-10-J5 FA3-PZ-10-K5 FA3-PZ-11-L2 FA3-PZ-11-L3 FA3-LY-24-S TA3-PZ-11-12 FA3-LY-42-S TA3-LY-12-S Client Name Chain of Custody.ds Rev.Date 11/19/01 . . . 6 6 6 7 . 代代を上 300

SOUTHERN ANALYTICAL LABORATORIES, INC. 1108AYVIEW BUULEVARD, OLDSWAR, R. 34877 81348551844 16x 813485878

Client Name	Hazen	Hazen and Sawver							Contact / Phone	Phone:							:		
Project Name / Location	WEJYS	S&GW Test Facility SF #1 (Set 1)	S. H. T.S.	Ę															
Samplers: (Signature)	<u> </u>																		
					+		-	-	PAR	AMETER/	PARAMETER / CONTAINER DESCRIPTION	R DESCRI	NOL.				ŀ	ŀ	
Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Grounwater SA-Saline Water O-Other R-Reagent Water	Nastewater Ige SC-Soil Vater O-Other				708	9 T ,₄H		, F, ИО ₃ , Опћо	9, Mn, K, Na	*os		PH1		ı), Alkalinity	loo;			ncrivity	
Sample Description	iotion	etsC	əmiT	xinteM	Composite Grab 260mL P., H ₂	TKN, Nox, N 1LP, Cool Cl, Alkalinity	FC-MF 125mL P, Na 125mL P, Na	1LP, Cool	250mL P, HI	TKN, NH, 250mL P. H.	11P, Cool NO ₂ , NO ₃ , C	TKN, NOx, 1 1LP, Cool 	1ΚΝ' ΝΗ [¢] ' C 120ШΓ Ь' Η	1LP, Cool NO ₂ , NO ₃ , C	Z20mLaG, C	Hield pH	qmoT blei7	Field Cond	Field DO
78 TA3-PZ-10-15		1,069	146	Ι.	×							-				5.0 25	, ,	38.3	1,68
74 143-PZ-09-N3 '		61012	122	ΜS	×							_)	6,5 25	b.) Oh}	0.37
×		1029	1310	ΑS	×						<u> </u>	1				5.5 24.	J	3020	0.22
14		_		.₩5	×							1			\geq	5,6 76.	0	0 hb9	S S
_			7011	QW GW	×							1				5.7 2	1	_	6.13
. %		21019	1229	GW	×							1 1				7,1 27.	Ó		孙 S
R		1029		QW.	×							-]	6.1 25.	1	28090	0.10
-8	***************************************		421	Q.W	×							-				6.5 76.	\exists	1	0.32
86 61 TA3-PZ-16-M9			ナケニ	GW.	. ×							-			υ J	5.8 25	-	_	0.15
, Z		21029	12	Q.M.	×							_)	12 9. p	.3	758.9 0	6.61
18			174	₹	×							-			<u> </u>	5.3 25	1	268.30	1.27
18			620	χς	×							-			V 3	5.6 26.	2	12:101	1.15
Contain	Date/Time:	Received:			Date/Time:	212	1123	Seal intact?	itact?		N N X	Instru	Instructions / Remarks:	tarks:					
2	Date/Time: 1230	R. G. S.	1	(Date/Time:	(3.5)	0	Sampl	Samples intact upon arrival?	arrival?	× NA								
	6	圣	See L	7	કુ	06-30-N		Receiv	Received on ice? Temp	- du	× NA								
Reinquished	DateTime	Received		<u> </u>	Date/Time:			Proper	Proper preservatives indicated?	s indicated?	Y N/A								
Relinquished:	Date/Time:	Received:			Date/Time:			Rec'd Volatife	Rec'd within holding time? Volatiles rec'd w/out headspace	tirre? headspace	N N Y								
Reimquished:	Date/Time:	Received:			Date/Time:			Proper	Proper containers used?	sed?	N WA								
Chain of Custody ats Rev, Deta 11/1909											Chain of	Chain of Custody							

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SOUTHERN ANALYTICAL LABORATORIES, INC. 110 BAYVIEW BOULEVARD, OLDSMAR, FL 34877 813-855-1844 fex 813-855-2218

Client Name	Hazen	Hazen and Sawyer							Contact / Phone	Phone:									
Project Name / Location	S&GW	Test Facilit	S&GW Test Facility SE #1 (Set 1)	1															
Samplers: (Signature)	$\left \begin{array}{c} \\ \\ \\ \end{array} \right $								PAR	PARAMETER / CONTAINER DESCRIPTION	CONTAINE	R DESCRI	PTION						
Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water	ss: N-Wastewater Iludge SO-Soil e Water O-Other ater							F, NO ₃ , Ortho-	-14 21 -71 -	*os	*os	¢Hi	I .	, Alkalinity	loo			ccivity	
Sample Description	scription	Date	əmiT	xirtsM	Composite Grab	1LP, Cool 1LP, Cool	CI, Alkalinity, TSS 125mL P, Na		P, SO,	11 D Cool 120 TKN, NH4	1LP, Cool NO ₂ , NO ₃ , Cl 250mL P, H ₂	CI 1LP, Cool 	TKN, NH₄, C 250mL P, H₂	1ГЬ' С00! 1ГЬ' С00!	250mLaG, C DOC	Hq bləi7	Field Tempe	Field Condu	Field DO
90 pd TA3-PZ-16-ST16 .		2029	Shol	ВW	×							1				5.4 25.	1	0 h&2	12.0
9 1 26 TA4-PAN-12-N				GW	×					1	1								
97 TA4-LY-24-C ·		S1/010	946	GW	×					-	1						३५.५ पड	430 4	1.18
Ц		8/20	ast	GW	×								1	1	1	6372	77.9 F	4114	F.15
<u> </u>		81/20	<u>000</u>	GW	×								1	1	1 [(5 74 2	27.93	181 3	7.15
95 TA4-LY-24-S '		8/70	P00	GW	×								1	1		53.2×	738 7	-	PS 0
96 of TAALY 42.8		81/20	8101	ΟW	×					1	-				ر,	683 2	-	મ?∮ ફ	50.7
97 DX TA4-PZ-11-EF2		10 PG	901	GW	×							-			3	4.2 W	20 S	5	.6 S
. 98 18 TA4-PZ-11-EF2-DUP .		61912		GW	×							1			3	4.r 4	U.O 532.	7	,65
99 74 TA4-PZ-10-H5		21/4/9	1330	GW	×							1				S.5 W	26.5	326.8 1	1.78
% TA4-PZ-10-J5			1223	GW	×							1				5. 6 26	. 2 333	ć	7.た
96 TA4-PZ-10-K5		>	8511	GW	×						!				8	5.3 26	. 2 393	28	72
Containers Prepared/ Relinquished	Date/Time:	Received			Sate/Time:	Time: 1.712	1123		Seal intact?		N V	Instruc	Instructions / Remarks:	ıarks:					
Delinquisher	Date/Time: (80C)	Refe			ate/Time:	Date/Time: 1800		Samp	Samples intact upon arrival?	arrival?	Y N N∕A								
	21619	型型	7	1	90	01/01/0	4	Recei	Received on ice? Temp	d d	Y N N								
Relingarished:	Date/Time: (630	Received	, 3	-)ate/Time:	Date/Time: 1630	Ì	Prope	Proper preservatives indicated?	indicated?	Y N VA								
Relinquished:	Date/Time:	Received:	2		Date/Time:	te/Time:		Rec'd	Rec'd within holding time? Volatiles rec'd w/out headspace	time? headspace'	X X X X X X								
Relinquished:	Date/Time:	Received:			Date/Time:			- A	Proper containers used?	¿þe	Y N N/A								
Chain of Custody.xls Rev.Date 11/19/01											Chain or	Chain of Custody							



SOUTHERN ANALYTICAL LABORATORIES, INC. 1108 BAYVEVY BUT SHEED, OLD SMAR, FL 34877 BUT 3855-1844 (#X 813-855-2218

Client Name	Hazen	Hazen and Sawyer	.						Contac	Contact / Phone:									
Project Name / Location																			
	S&GV	S&GW Test Facility SE #1 (Set 1)	ity SE #1 (5	Set 1)	ŀ														
Samplers: (Signature)									ď	ARAMETE	R / CONTA	VINER DE	PARAMETER / CONTAINER DESCRIPTION						
Matrix Codes: DW-Drinking Water WW-Wastewater SW-SurfaceWater SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water	astewater je SO-Soil ater O-Other					9Τ , _{\$} ,		F, NO ₃ , Ortho	-14 21 -44	[†] Os		۲۴ ۲ <u>۰</u> ۷۷	70:				anute	tivity	
Sample Description	tion	Date	əmiT	xintsM	Composite Grab	1LP, Cool 1LP, Cool	CI, Alkalinity, TSS 125mL P, Na ₂		P, SO ₄ 250mL P, HN B, Ca, Fe, Mg	ՀՏՕШԼ Ի, H ₂ Տ	1ГЬ' С001 1ГЬ' С001	250mL P, H ₂ S TKN, NOx, NH	1LP, Cool CI 250mL P, H ₂ S	ТКИ, ИН₄, СС 1∟Р, Сооі	NO ₂ , NO ₃ , CI,	Field pH	neqmeT blei¶	Field Conduc	Field DO
A TA4-PZ-11-L2		061112	1045	GW	×							-	-			4.5	<u>8</u> .	8.414	121
96 TA4-PZ-11-L3			171	GW	×							1	-			4.3	25.8	341.8	1.36
96 TA4-PZ-11-L4			1140	ΟW	×							1	1			4.3	0.72	Sath	205
**** P2 - 1/- 1	10te	274178	06 1912 15812	15W	×							+	+			53	7 12 2	255	810
-10-23-14+	4016	26-19-20	3640 0154	->	. >							1	- }			3	83	200	28.0
:01- Ed- HPT 10:	-TS.	06/19	1393		1×							_	_	<u> </u>		5.6		3 (5)	12,
02 TUA -92 -10-KS	. S	51/90			놋							-			ļ	63	_	343.8	9,3
Containers Prepared	Date films: 10 - 10		J		Sate/Time:	2211 612	22	Seal	Seal intact?		z >	¥. E	Instructions / Remarks	Remarks:					
Relinquished:	Date/Time: 100	Received	,		Date/Time:	1800	0	Samp	Samples intact upon arrival?	on arrival?	z >	Ϋ́χ Ž							
	2)619	ロセ	25	Ì	કે	7.4.7		Sec.	Received on ice? Temp	Temp	z >	Ψ.N							
iquisned:	Date/Time:	Kecelved:			ate/Time:			Prope	Proper preservatives indicated?	res indicated	z ≻	¥ Ž							
	Date/Time:	Received:			Jate/Time:			Rec'd	Rec'd within holding time? Volatiles rec'd w/out headspace	ng time? .ut headspac	z z ≻ ≻	N N							
Relinquished:	Date/Time:	Received:			Date/Time:			Pope	Proper containers used?	cpesn.	z >	NA WA							
Chain of Custody.xls Rev.Date 1/19/01											Chair	Chain of Custody							
											;	-							



Appendix G: Field Parameter Analyses

Table G.1 S&GW Test Facility Field Parameter Results (June 18 through June 21, 2012)

Temperature Hq Specific Dissolved ID Sample (°C) Date Conductance Oxygen Identification Number (µS/cm) (mg/L) TA1-PZ-11-EF2 6/21/12 9:55 25.8 4.45 438 6.32 8 TA1-LY-24-C 6/18/12 13:15 32.7 6.65 576 6.19 TA1-LY-12-S 6/18/12 13:25 29.4 6.71 546 9 6.80 10 TA1-LY-24-S 6/18/12 13:36 30.4 6.70 718 6.71 11 TA1-LY-42-S 6/18/12 13:45 33.1 6.69 447 5.75 22 TA1-PZ-11-J4 6/20/12 11:35 27.2 4.40 300 3.44 TA1-PZ-11-K4 4.38 289 23 6/20/12 11:50 26.4 3.21 TA1-PZ-11-L2 25.6 24 6/20/12 14:45 4.42 676 5.86 25 TA1-PZ-11-L3 6/20/12 14:25 25.5 4.52 310 4.91 414 26 TA1-PZ-11-L4 6/21/12 9:05 25.7 4.43 4.38 27 TA1-PZ-11-L5 6/20/12 13:45 27.4 4.63 306 2.80 28 TA1-PZ-09-N3 6/20/12 16:30 27.3 6.63 1,103 4.17 29 TA1-PZ-16-N3 6/21/12 11:51 24.9 5.70 277 0.63 30 TA1-PZ-09-O7 6/20/12 15:40 27.1 5.42 497 1.71 31 TA1-PZ-16-07 6/21/12 11:31 25.0 5.80 268 0.22 32 TA1-PZ-09-M9 6/20/12 15:20 26.4 5.29 309 0.65 33 TA1-PZ-16-M9 6/21/12 12:13 25.3 5.90 275 0.17 34 TA1-PZ-09-I7 6/20/12 15:00 25.7 5.59 415 1.95 35 TA1-PZ-16-I7 6/21/12 13:48 25.3 6.20 319 0.32 36 TA1-PZ-09-RS16 6/21/12 8:53 25.6 6.20 314 1.25 37 TA1-PZ-16-RS16 6/21/12 9:13 24.8 6.20 434 0.01 25.8 38 TA1-PZ-09-RS18 6/21/12 8:13 6.30 338 4.62 39 TA1-PZ-16-RS18 6/21/12 8:33 24.9 6.30 374 0.01 44 TA2-PZ-10-EF2 6/20/12 9:20 25.6 4.40 534 3.57 TA2-LY-24-C 6/18/12 10:28 27.9 6.36 820 6.26 45 46 TA2-LY-12-S 6/18/12 10:39 27.7 6.94 952 6.79 47 TA2-LY-24-S 6/18/12 10:47 28.8 6.73 954 5.10 48 TA2-LY-42-S 28.2 6.40 693 6/18/12 10:58 5.48

Table G.1
S&GW Test Facility Field Parameter Results
(June 18 through June 21, 2012)

(June 18 through June 21, 2012)							
ID Number	Sample Identification	Date	Temperature (°C)	pН	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)	
49	TA2-PZ-10-H5	6/20/12 8:16	25.5	4.30	407	3.14	
50	TA2-PZ-10-J5	6/20/12 8:36	25.7	4.40	412	3.71	
51	TA2-PZ-10-K5	6/20/12 8:57	25.7	4.30	412	3.54	
52	TA2-PZ-10-L2	6/20/12 9:29	25.6	4.60	425	2.60	
53	TA2-PZ-10-L3	6/20/12 9:09	25.5	4.50	418	2.18	
54	TA2-PZ-10-L4	6/20/12 8:41	25.9	4.40	700	2.72	
55	TA2-PZ-10-L5	6/20/12 8:25	25.8	4.80	496	2.71	
56	TA2-PZ-10-L6	6/20/12 8:05	25.9	4.60	375	3.35	
57	TA2-PZ-09-M4	6/20/12 9:51	25.7	6.00	422	0.54	
58	TA2-PZ-16-M4	6/20/12 10:09	24.7	5.70	241	0.14	
59	TA2-PZ-09-N7	6/19/12 14:15	26.6	6.30	403	0.43	
60	TA2-PZ-16-N7	6/19/12 14:37	25.1	6.10	219	0.14	
61	TA2-PZ-09-I7	6/19/12 15:48	26.1	5.70	354	2.26	
62	TA2-PZ-16-I7	6/20/12 7:55	24.6	5.40	210	0.34	
63	TA2-PZ-09-L8	6/19/12 15:12	26.9	6.30	475	3.78	
64	TA2-PZ-16-L8	6/19/12 13:29	24.9	5.80	226	0.14	
65	TA2-PZ-09-TU19	6/19/12 14:08	26.5	4.60	173	1.15	
66	TA2-PZ-16-TU19	6/19/12 14:33	25.3	5.30	189	0.22	
67	TA2-PZ-09-TU21	6/19/12 14:53	26.3	4.60	169	0.32	
68	TA2-PZ-16-TU21	6/19/12 15:19	25.2	5.20	185	0.15	
75	TA3-LY-24-C	6/18/12 11:22	28.7	6.60	630	5.53	
76	TA3-LY-12-S	6/18/12 11:28	28.7	7.11	794	6.80	
77	TA3-LY-24-S	6/18/12 11:40	28.7	6.31	680	6.21	
78	TA3-LY-42-S	6/18/12 11:52	30.9	6.86	502	6.09	
89	TA3-PZ-11-EF2	6/21/12 10:09	25.7	5.30	305	2.37	
90	TA3-PZ-11-I2	6/21/12 9:48	25.5	5.00	382	2.98	
91	TA3-PZ-10-J5	6/20/12 13:42	26.0	5.10	336	2.26	
92	TA3-PZ-10-K5	6/20/12 14:32	25.4	5.00	330	1.79	
93	TA3-PZ-11-L2	6/20/12 13:49	26.0	4.40	340	3.07	
95	TA3-PZ-11-L4	6/21/12 10:37	25.9	5.10	283	2.33	
96	TA3-PZ-10-L5	6/20/12 14:54	25.6	5.00	324	1.68	

Table G.1 S&GW Test Facility Field Parameter Results (June 18 through June 21, 2012)

(June 18 through June 21, 2012)								
ID Number	Sample Identification	Date	Temperature (°C)	pН	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)		
97	TA3-PZ-09-N3	6/20/12 12:26	25.9	6.50	940	0.37		
98	TA3-PZ-16-N3	6/20/12 13:09	24.9	5.50	305	0.22		
99	TA3-PZ-09-O7	6/20/12 10:42	26.0	6.60	894	0.61		
100	TA3-PZ-16-O7	6/20/12 11:01	25.2	5.70	301	0.13		
101	TA3-PZ-09-I7	6/20/12 12:28	27.0	7.10	1,822	3.44		
102	TA3-PZ-16-I7	6/20/12 12:55	25.1	6.10	281	0.10		
103	TA3-PZ-09-M9	6/20/12 11:23	26.1	6.50	1,035	0.32		
104	TA3-PZ-16-M9	6/20/12 11:43	25.1	5.80	284	0.15		
105	TA3-PZ-09-ST14	6/20/12 11:16	26.3	4.60	259	0.69		
106	TA3-PZ-16-ST14	6/20/12 11:41	25.1	5.30	268	0.27		
107	TA3-PZ-09-ST16	6/20/12 10:28	26.2	5.60	404	1.15		
108	TA3-PZ-16-ST16	6/20/12 10:53	25.1	5.40	273	0.21		
113	TA4-LY-24-C	6/18/12 9:46	27.4	7.13	930	4.18		
114	TA4-LY-12-S	6/18/12 9:57	27.9	6.77	781	7.15		
115	TA4-LY-24-S	6/18/12 10:09	29.8	6.83	747	6.89		
116	TA4-LY-42-S	6/18/12 10:18	29.3	6.83	767	6.85		
117	TA4-PZ-11-EF2	6/19/12 12:05	26.0	4.20	332	1.65		
118	TA4-PZ-10-H5	6/19/12 13:29	26.5	5.50	327	1.78		
119	TA4-PZ-10-J5	6/19/12 12:22	26.2	5.60	334	2.42		
120	TA4-PZ-10-K5	6/19/12 11:57	26.2	5.30	394	2.72		
121	TA4-PZ-11-L2	6/19/12 10:44	26.1	4.50	415	1.71		
122	TA4-PZ-11-L3	6/19/12 11:20	25.8	4.30	342	1.36		
123	TA4-PZ-11-L4	6/19/12 11:39	26.0	4.30	420	2.05		
124	TA4-PZ-11-L5	6/19/12 11:23	25.9	5.20	419	1.92		
125	TA4-PZ-11-L6	6/19/12 10:57	26.0	5.20	346	1.60		
126	TA4-PZ-09-M4	6/19/12 9:55	25.6	6.70	636	0.31		
127	TA4-PZ-16-M4	6/19/12 10:19	24.8	5.30	225	0.19		
128	TA4-PZ-09-N7	6/19/12 8:53	25.7	5.60	364	1.03		
129	TA4-PZ-16-N7	6/19/12 9:20	25.1	5.20	237	0.14		
130	TA4-PZ-09-I7	6/19/12 10:11	25.8	5.90	326	1.14		
131	TA4-PZ-16-I7	6/19/12 10:31	25.0	5.50	261	0.16		

Table G.1 S&GW Test Facility Field Parameter Results (June 18 through June 21, 2012)

(June 18 through June 21, 2012)								
ID Number	Sample Identification	Date	Temperature (°C)	pН	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)		
132	TA4-PZ-09-L8	6/19/12 9:05	25.7	6.40	596	0.68		
133	TA4-PZ-16-L8	6/19/12 9:43	25.1	5.50	265	0.17		
134	TA4-PZ-09-TU14	6/19/12 7:37	25.5	5.40	196	0.42		
135	TA4-PZ-16-TU14	6/19/12 8:31	24.9	6.00	297	0.12		
136	TA4-PZ-09-TU16	6/19/12 7:51	25.5	5.40	200	0.85		
137	TA4-PZ-16-TU16	6/19/12 8:11	24.6	5.30	257	0.18		
140	TA5-PZ-I	6/21/12 12:00	26.4	4.19	349	1.34		
141	TA5-LY-C	6/18/12 11:10	28.6	6.63	880	6.38		
142	TA5-LINER-SP	6/21/12 10:50	30.9	6.37	926	4.59		
143	TA5-Denite Tank	6/21/12 13:15		6.50	980	0.10		
146	TA6-PZ-I	6/20/12 10:30	26.4	4.82	317	4.04		
147	TA6-LY-C	6/18/12 9:24	27.8	6.63	788	6.45		
148	TA6-LINER-SP	6/20/12 13:10	27.8	6.59	1,061	6.12		
149	TA6-Denite Tank	6/20/12 10:45	26.9	6.61	1,082	0.10		
150	PZ01-BKG-09	6/19/12 14:40	28.7	4.32	111	0.83		
151	LY01-BKG-24	6/18/12 14:00	30.2	7.17	272	6.54		
153	PZ04-BKG-09	6/19/12 8:24	26.2	5.09	100	4.39		
154	PZ24-BKG-26	6/19/12 9:30	25.3	4.95	286	2.44		
155	PZ29-BKG-09	6/19/12 10:10	26.5	4.86	214	1.72		
156	PZ30-BKG-16	6/19/12 10:40	26.3	5.59	332	0.35		
157	PZ31-BKG-26	6/19/12 11:35	26.6	5.07	321	1.22		
158	PZ32-BKG-09	6/19/12 12:10	29.2	4.36	181	4.91		
159	PZ33-BKG-16	6/19/12 13:40	27.0	5.23	270	0.36		
160	PZ34-BKG-26	6/19/12 14:15	26.5	5.89	331	1.22		
161	PZ35-BKG-09	6/19/12 15:15	26.9	5.95	863	0.24		
162	PZ36-BKG-16	6/19/12 15:40	25.7	5.45	254	0.38		
163	PZ37-BKG-26	6/19/12 16:10	25.5	5.20	333	1.66		
164	PZ38-BKG-09	6/20/12 8:30	25.2	6.23	522	0.17		
165	PZ39-BKG-16	6/20/12 9:05	24.6	6.15	340	0.17		
166	PZ40-BKG-26	6/20/12 9:55	24.9	4.96	279	1.88		
168	PNRS II STE-Tank 1	6/21/12 14:30	27.0	6.96	1,164	0.30		

Table G.1 S&GW Test Facility Field Parameter Results (June 18 through June 21, 2012)

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ID Number	Sample Identification	Date	Temperature (°C)	рН	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)
169	STE Pump Tank	6/21/12 14:00	28.7	7.13	1,167	0.41
170	NO3 Pump Tank	6/21/12 14:15	27.8	7.37	1,154	0.54