



# Florida Onsite Sewage Nitrogen Reduction Strategies Study

Task C.16

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

**Progress Report**

June 2012

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**HAZEN AND SAWYER**  
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In association with



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Applied Environmental Technology

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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:**

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**June 2012**

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

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### **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**

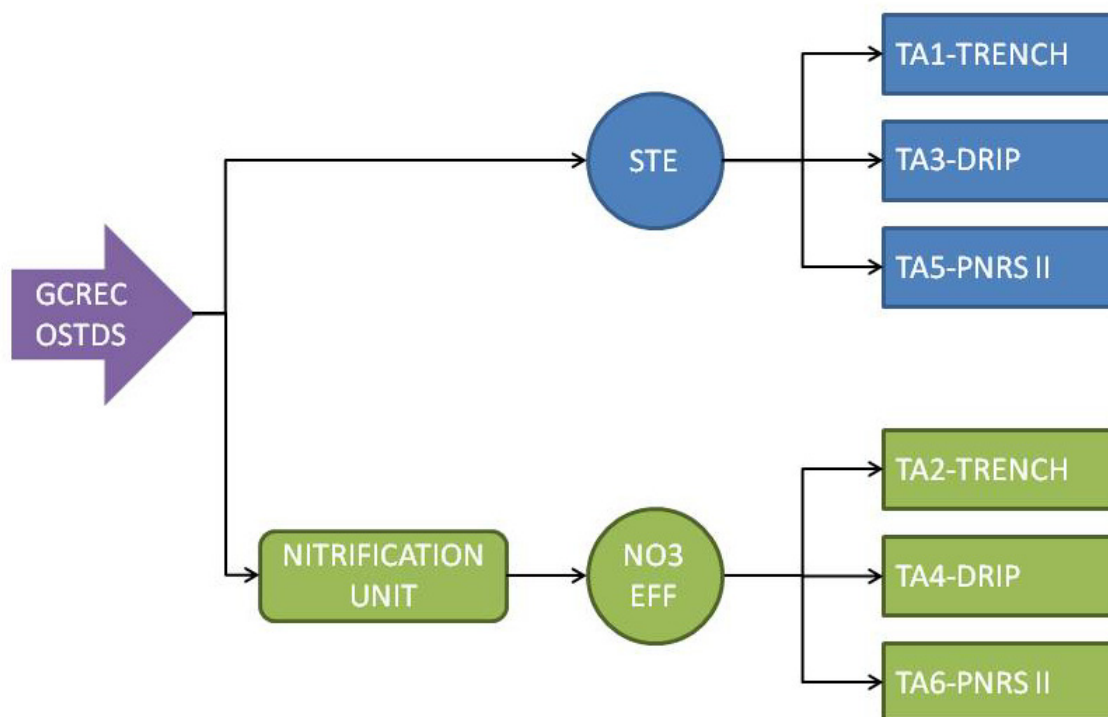
The S&GW test facility is located at the University of Florida Gulf Coast Research and Education Center (GCREC) in southeast Hillsborough County, Florida. The specially designed pilot-scale test areas representative of typical mounded onsite sewage treatment and disposal systems enables controlled testing 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 in-situ 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, C.10, 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**

<b>Test Area ID</b>	<b>Effluent Quality</b>	<b>Design HLR (gpd/ft<sup>2</sup>)</b>	<b>Soil Treatment Unit Design</b>
TA1	STE	0.8	pressure dosed mound <sup>1</sup> , gravel trench
TA2	nitrified effluent	0.8	pressure dosed mound <sup>1</sup> , 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

<sup>1</sup>pressure 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

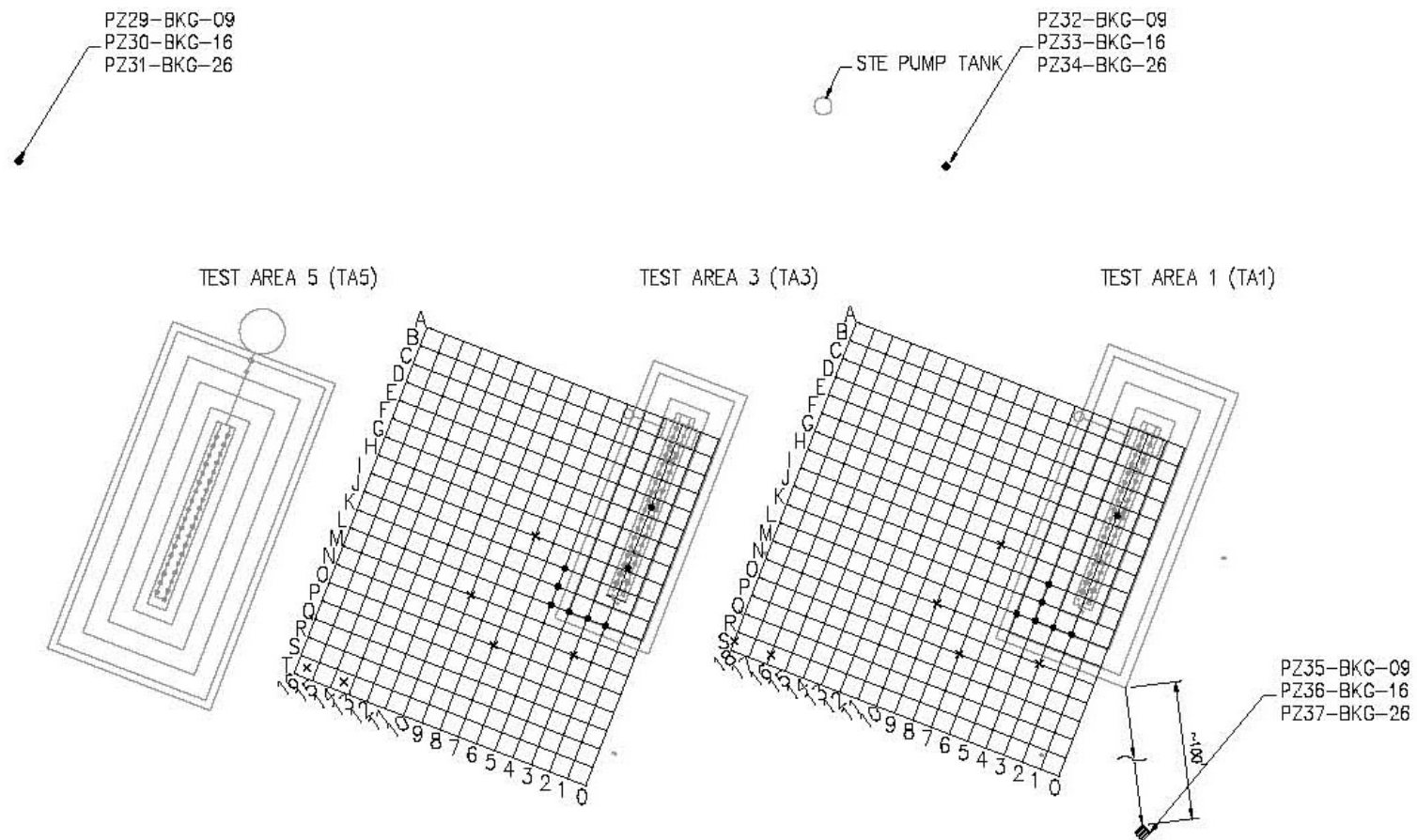
The test areas are equipped with varying levels of unsaturated and shallow saturated zone monitoring instrumentation. The instrumentation includes suction lysimeters, stainless steel pan lysimeters, soil moisture probes, and tensiometers located at various depths below the bottom of the gravel or below 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**

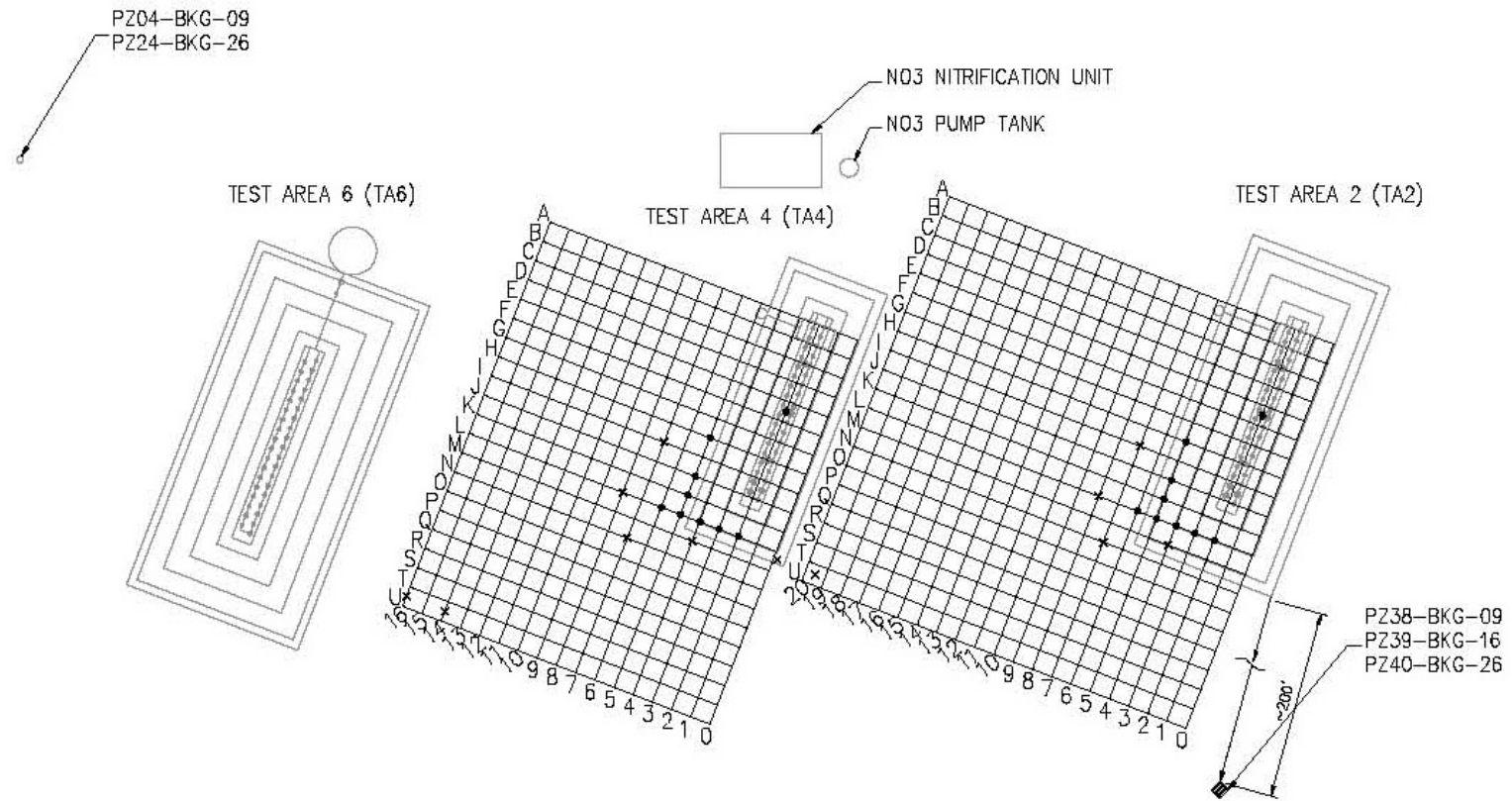
Saturated zone monitoring will include groundwater quality, depth of groundwater table, and gradient (i.e. water level). A sampling network for groundwater screening was developed for each of the test areas as depicted in Figures 2 and 3. Transect lines A through U are parallel to the northern edge of 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 ¾-in. diameter PVC standpipe piezometers downgradient of the test area. A complete list of all installed monitoring devices is included in Appendix A.

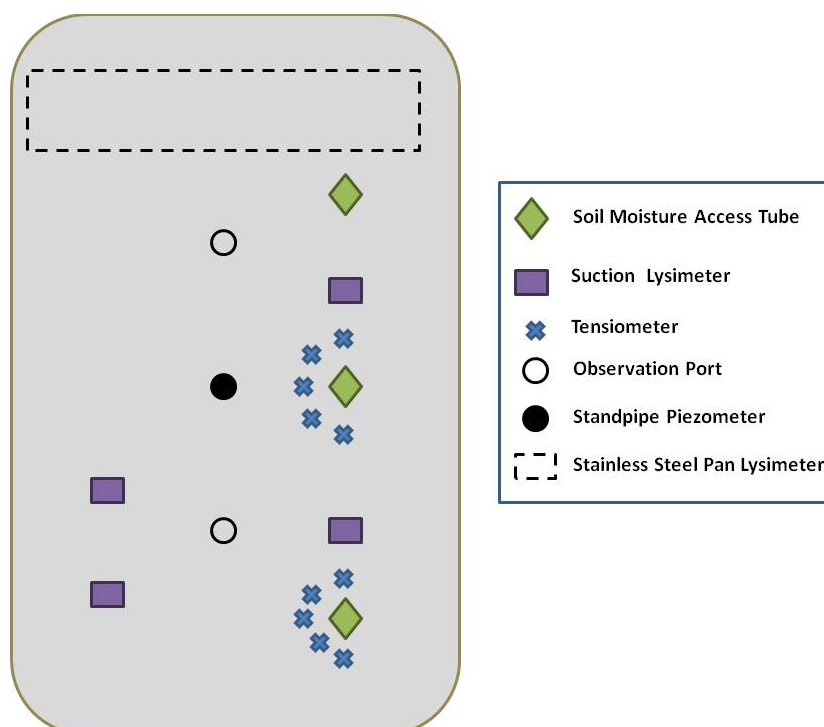


**Figure 2**  
**Schematic of STE System**  
**S&GW Test Facility Monitoring Network**

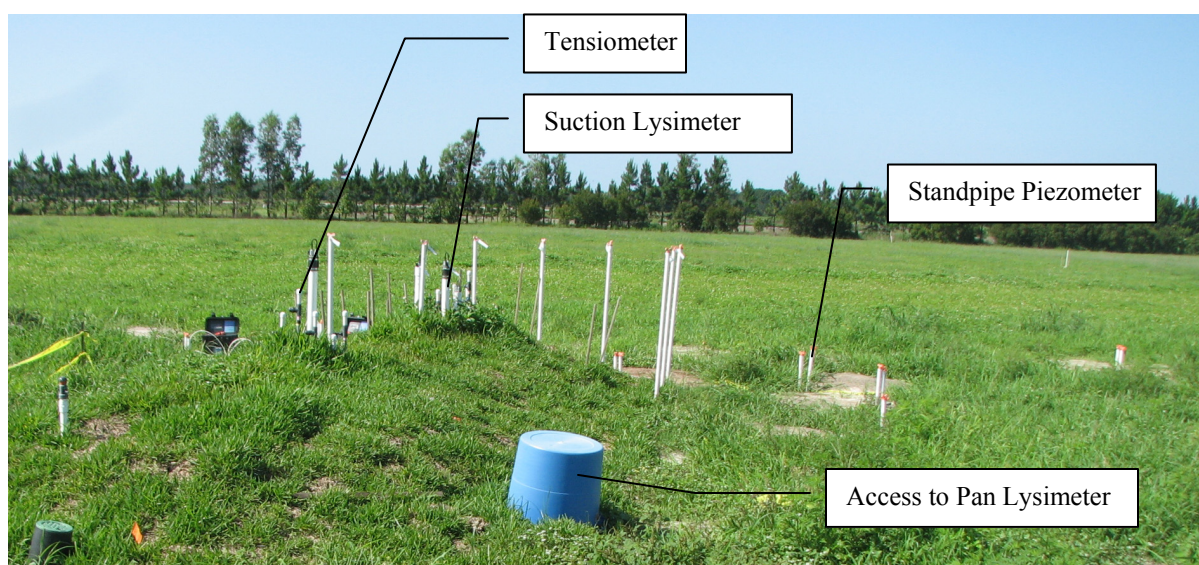


**Figure 3**  
**Schematic of Nitrified Effluent System**  
**S&GW Test Facility Monitoring Network**





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



**Figure 5**  
**Photo of Instrumented Test Area 3**

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### 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 NO<sub>3</sub> system was +26.2% of the target volume. After evaluating the recorded flow, flow testing and adjustment was conducted on the NO<sub>3</sub> 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					
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

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### 3.3.3 Soil Moisture Monitoring

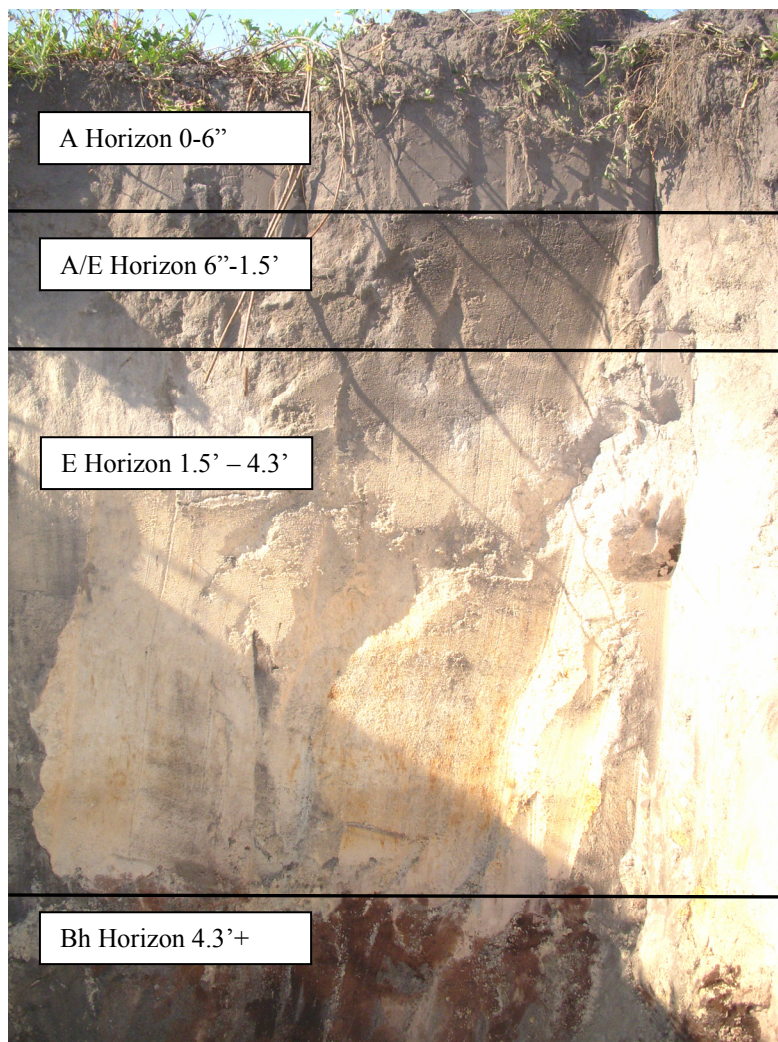
In situ soil tension and soil moisture measurements are collected for model development in Task D. Soil moisture tension is monitored in two test areas (TA1 and TA3) in two locations (center and south side of the mound). Tensiometers are installed at 5 depths as specified in Appendix D. Tensiometers 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 Sentek<sup>TM</sup> 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.

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### 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 micro-purged 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.

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All samples were analyzed by the laboratory for chloride, total Kjeldahl nitrogen (TKN-N), ammonia nitrogen ( $\text{NH}_3\text{-N}$ ), and nitrate/nitrite nitrogen ( $\text{NO}_x\text{-N}$ ). Additionally, for the effluent samples and some of the water samples total alkalinity, carbonaceous biochemical oxygen demand ( $\text{CBOD}_5$ ), 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**

<b>Analytical Parameter</b>	<b>Method of Analysis</b>	<b>Laboratory Detection Limit (mg/L)</b>
Total Alkalinity as CaCO <sub>3</sub>	SM 2320B	2 mg/L
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 <sub>3</sub> -N)	EPA 350.1	0.005 mg/L
Nitrate/Nitrite Nitrogen (NO <sub>x</sub> -N)	EPA 300.0	0.02 mg/L
Total Phosphorus	SM 4500P-E	0.01 mg/L
Carbonaceous Biological Oxygen Demand (CBOD <sub>5</sub> )	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

**Table A.1**  
**S&GW Test Facility Sample 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

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**Table A.1**  
**S&GW Test Facility Sample Identification**

ID Number	Sample Identification	Test Area	Grid Location	Notes
30	TA1-PZ-09-O7	TA1	O7	1"D standpipe piezometer, 5' screen
31	TA1-PZ-16-O7	TA1	O7	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	I7	1"D standpipe piezometer, 5' screen
35	TA1-PZ-16-I7	TA1	I7	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	I7	1"D standpipe piezometer, 5' screen

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**Table A.1**  
**S&GW Test Facility Sample Identification**

ID Number	Sample Identification	Test Area	Grid Location	Notes
62	TA2-PZ-16-I7	TA2	I7	1"D standpipe piezometer, 2.5' screen
63	TA2-PZ-09-L8	TA2	L8	1"D standpipe piezometer, 5' screen
64	TA2-PZ-16-L8	TA2	L8	1"D standpipe piezometer, 2.5' screen
65	TA2-PZ-09-TU19	TA2	TU19	1"D standpipe piezometer, 5' screen
66	TA2-PZ-16-TU19	TA2	TU19	1"D standpipe piezometer, 2.5' screen
67	TA2-PZ-09-TU21	TA2	TU21	1"D standpipe piezometer, 5' screen
68	TA2-PZ-16-TU21	TA2	TU21	1"D standpipe piezometer, 2.5' screen
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" casing
73	TA3-SM-39-C	TA3	Center	2"D soil moisture tube with 6" casing
74	TA3-SM-39-S	TA3	South	2"D soil moisture tube with 6" casing
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' screen
90	TA3-PZ-11-I2	TA3	I2	1"D standpipe piezometer, 5' screen
91	TA3-PZ-10-J5	TA3	J5	1"D standpipe piezometer, 5' screen
92	TA3-PZ-10-K5	TA3	K5	1"D standpipe piezometer, 5' screen
93	TA3-PZ-11-L2	TA3	L2	1"D standpipe piezometer, 5' screen

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**Table A.1**  
**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	O7	1"D standpipe piezometer, 5' screen
100	TA3-PZ-16-O7	TA3	O7	1"D standpipe piezometer, 2.5' screen
101	TA3-PZ-09-I7	TA3	I7	1"D standpipe piezometer, 5' screen
102	TA3-PZ-16-I7	TA3	I7	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

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**Table A.1**  
**S&GW Test Facility Sample Identification**

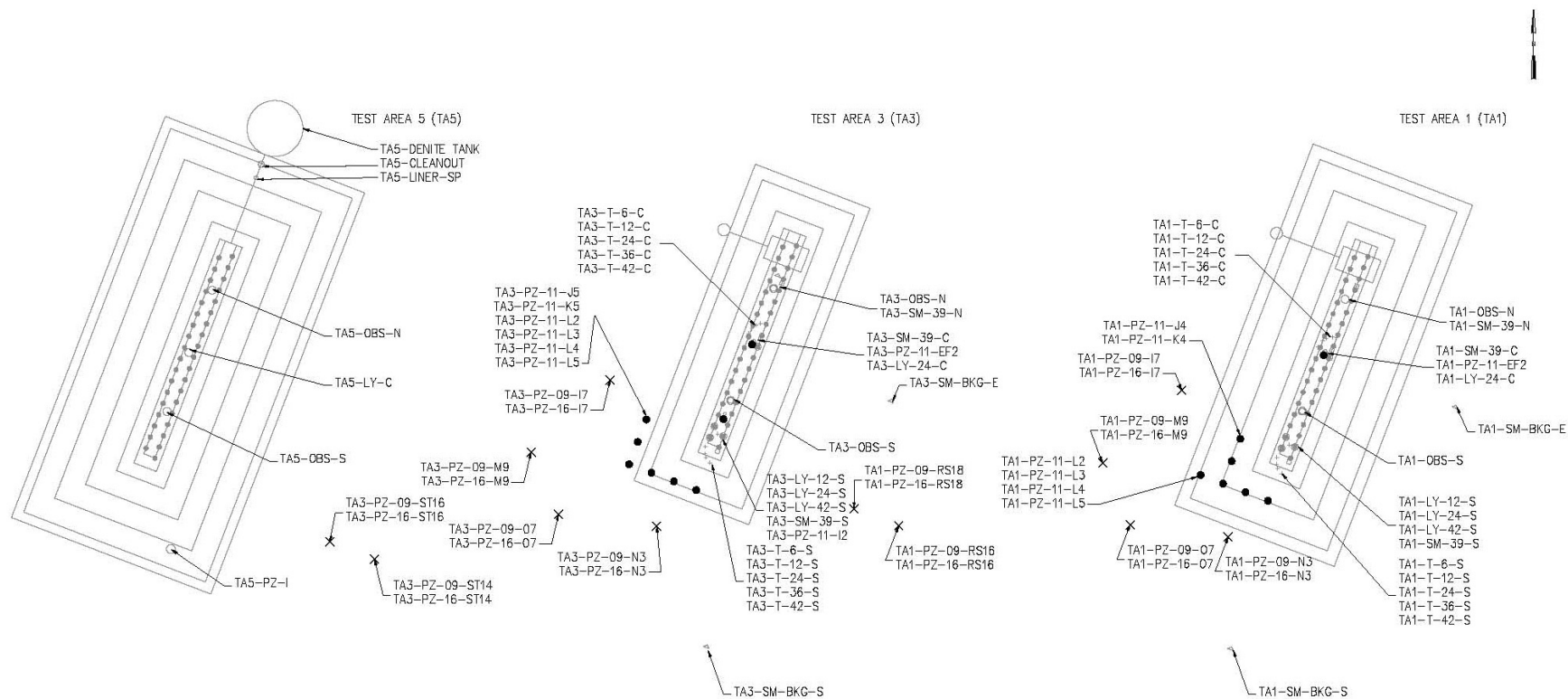
ID Number	Sample Identification	Test Area	Grid Location	Notes
126	TA4-PZ-09-M4	TA4	M4	1"D standpipe piezometer, 5' screen
127	TA4-PZ-16-M4	TA4	M4	1"D standpipe piezometer, 5' screen
128	TA4-PZ-09-N7	TA4	N7	1"D standpipe piezometer, 5' screen
129	TA4-PZ-16-N7	TA4	N7	1"D standpipe piezometer, 5' screen
130	TA4-PZ-09-I7	TA4	I7	1"D standpipe piezometer, 5' screen
131	TA4-PZ-16-I7	TA4	I7	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 mixture 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 mixture 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 ¼"D standpipe piezometer, 5' screen

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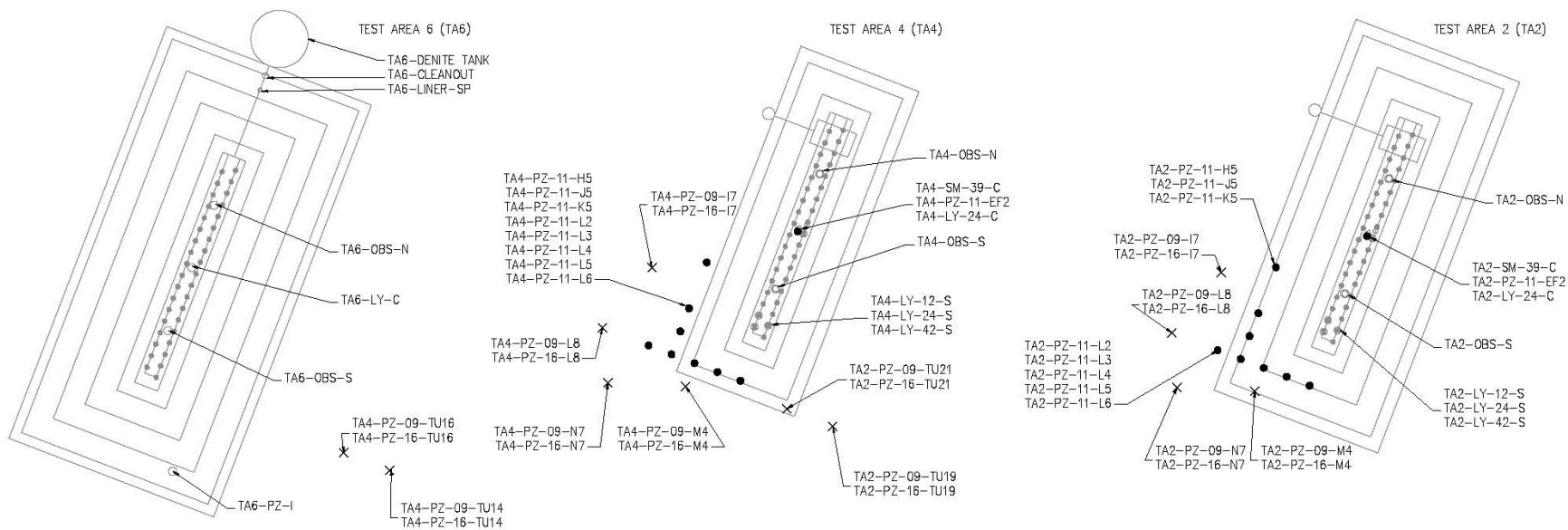
**Table A.1**  
**S&GW Test Facility Sample Identification**

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 ¼"D standpipe piezometer, 5' screen
156	PZ24-BKG-26	BKG		2"D standpipe piezometer, 5' screen
157	PZ29-BKG-09	BKG		¾"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

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**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**

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**Table B.1**  
**S&GW Test Facility Effluent Quality**

Identification	Week	Date	Temp (°C)	pH	Specific Conductance (µS)	DO (mg/L)	ORP	Total Alkalinity (mg/L)	CBOD5 (mg/L)	TN (mg-N/L)	TKN (mg-N/L)	Organic N (mg-N/L)	NH3-N (mg-N/L)	NOx-N (mg-N/L)	TIN (mg-N/L)	TP (mg-P/L)	Chloride (mg/L)	TSS (mg/L)	TS (mg/L)	Fecal (cfu/100 mL)
STE Drip Tank	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
	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			
	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			
NO3 Drip Tank	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
	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			
	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	Date	Anions (mg/L)					Cations (mg/L)						
			F-	NO3-N-	NO2-N-	PO4-P-	SO4-	B	Ca	Fe	Mg	Mn	K	Na
STE Drip Tank	Week 1	5/16/2012 8:50												
	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												
NO3 Drip Tank	Week 1	5/16/2012 9:20												
	Week 2	5/23/2012 9:45												
	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

**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)**

Depth below IS: Date	TA3-Center					TA3-South				
	6"	12"	24"	36"	42"	6"	12"	24"	36"	42"
	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	161.381	188.205	201.142	NR	116.041	153.784	244.108	208.975	51.474
06/15/12	NR	159.363	186.899	200.904	NR	114.498	151.767	257.638	209.806	59.426
06/16/12	NR	157.464	184.881	199.718	NR	113.549	149.749	260.368	209.331	72.363
06/17/12	NR	158.532	186.187	200.311	NR	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	156.158	186.899	202.447	NR	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.

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

Depth below IS:	TA1-Center					TA1-South				
	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	EM
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	EM
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
06/06/12	140.373	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
06/09/12	NAN	141.559	32.009	217.284	243.514	128.266	EM	EM	EM	EM
06/10/12	NAN	146.426	49.812	216.572	242.565	133.251	EM	EM	EM	EM
06/11/12	NAN	160.550	36.400	229.865	250.517	136.812	EM	EM	EM	EM
06/12/12	NAN	162.924	22.988	233.544	252.772	137.405	EM	EM	EM	EM
06/13/12	NAN	162.924	23.225	236.155	254.434	136.337	EM	EM	EM	EM
06/14/12	NAN	161.855	27.261	237.224	255.739	136.931	EM	EM	EM	EM
06/15/12	NAN	159.956	38.299	237.936	257.638	136.931	EM	EM	EM	EM
06/16/12	NAN	157.939	46.963	237.817	258.350	135.625	EM	EM	EM	EM
06/17/12	233.307	158.057	50.049	239.123	259.537	136.693	EM	EM	EM	EM
06/18/12	NAN	159.363	46.489	239.716	261.080	136.931	EM	EM	EM	EM
06/19/12	274.967	159.838	46.963	241.378	262.861	136.100	EM	EM	EM	EM
06/20/12	250.517	159.244	48.981	241.496	263.810	135.031	EM	EM	EM	EM

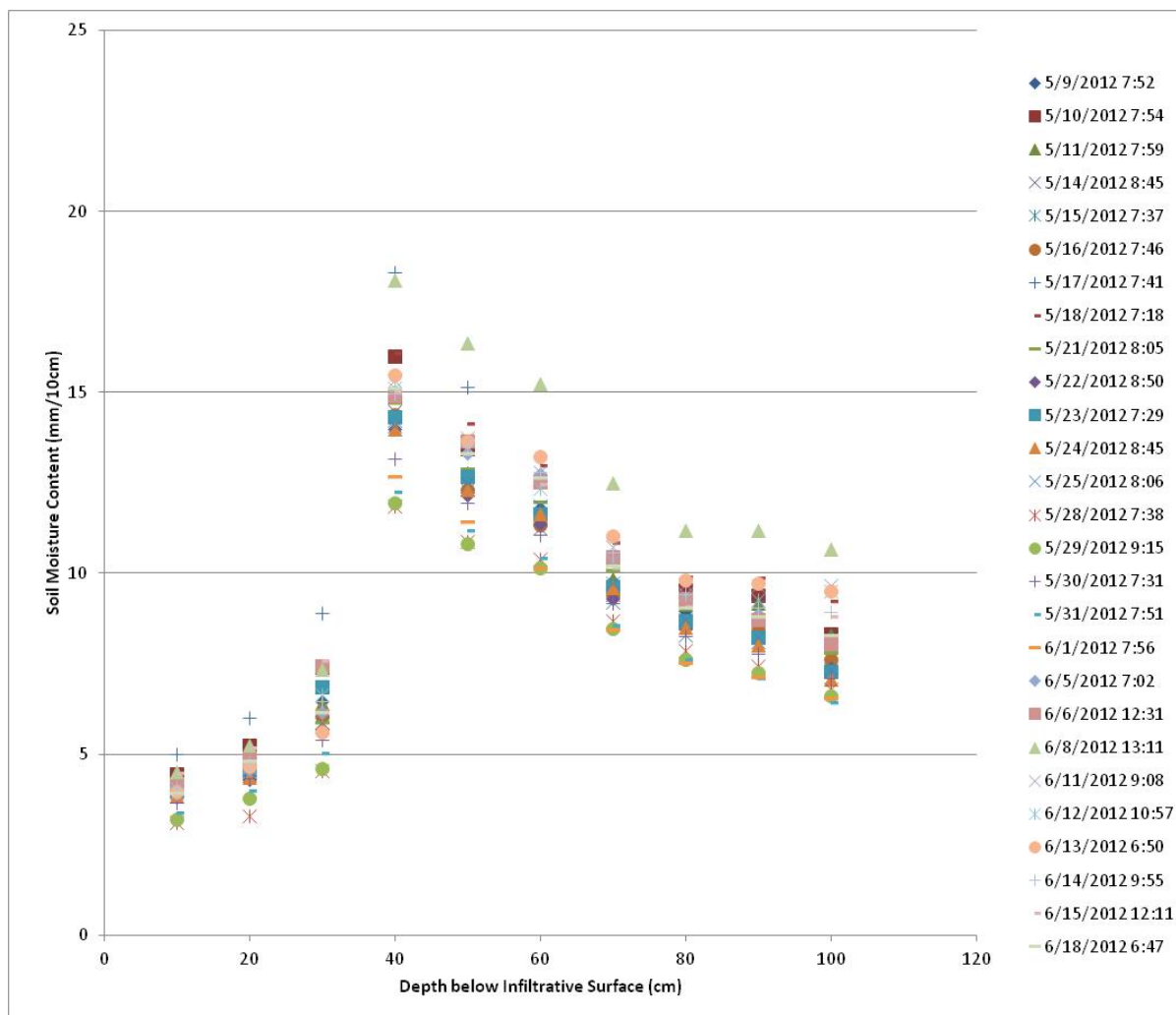
NAN (not-a-number) indicates an exceptional occurrence in datalogger function or processing occurred (an invalid measurement).

NR indicates no reading occurred.

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

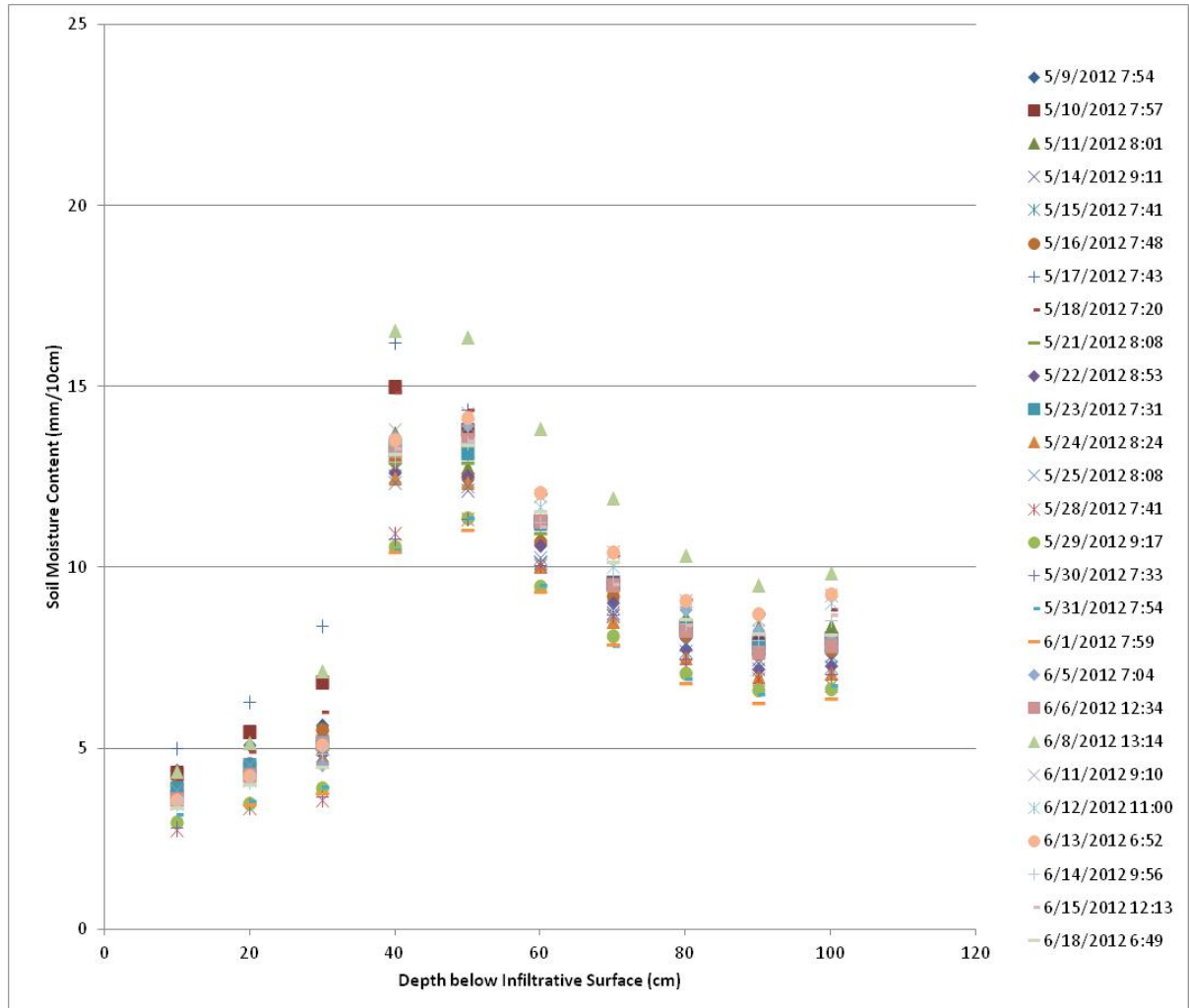
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## Appendix E: S&GW Test Facility Soil Moisture Data



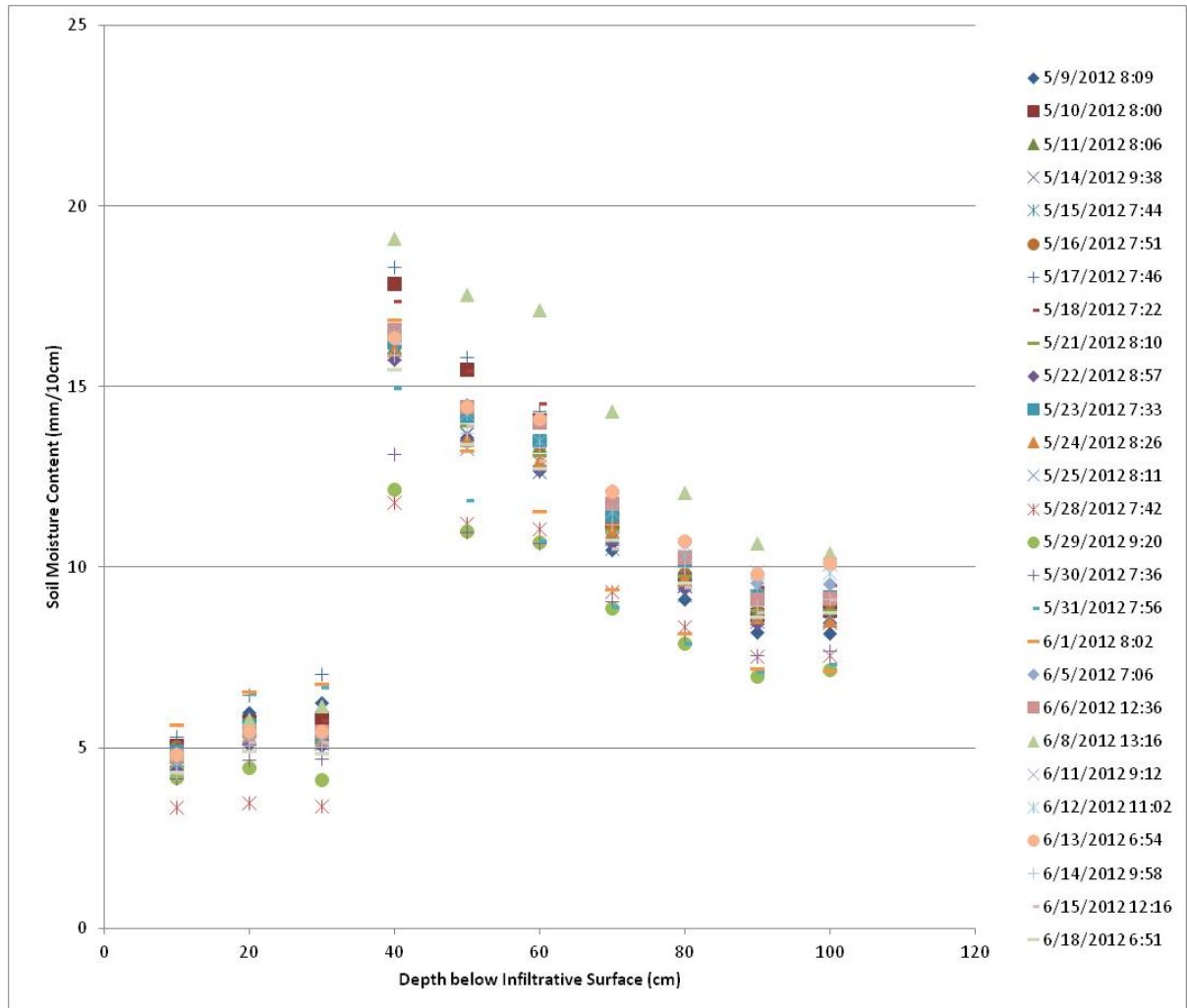
**Figure E.1**  
**Soil Moisture Test Area 1 North**

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**Figure E.2**  
**Soil Moisture Test Area 1 Center**

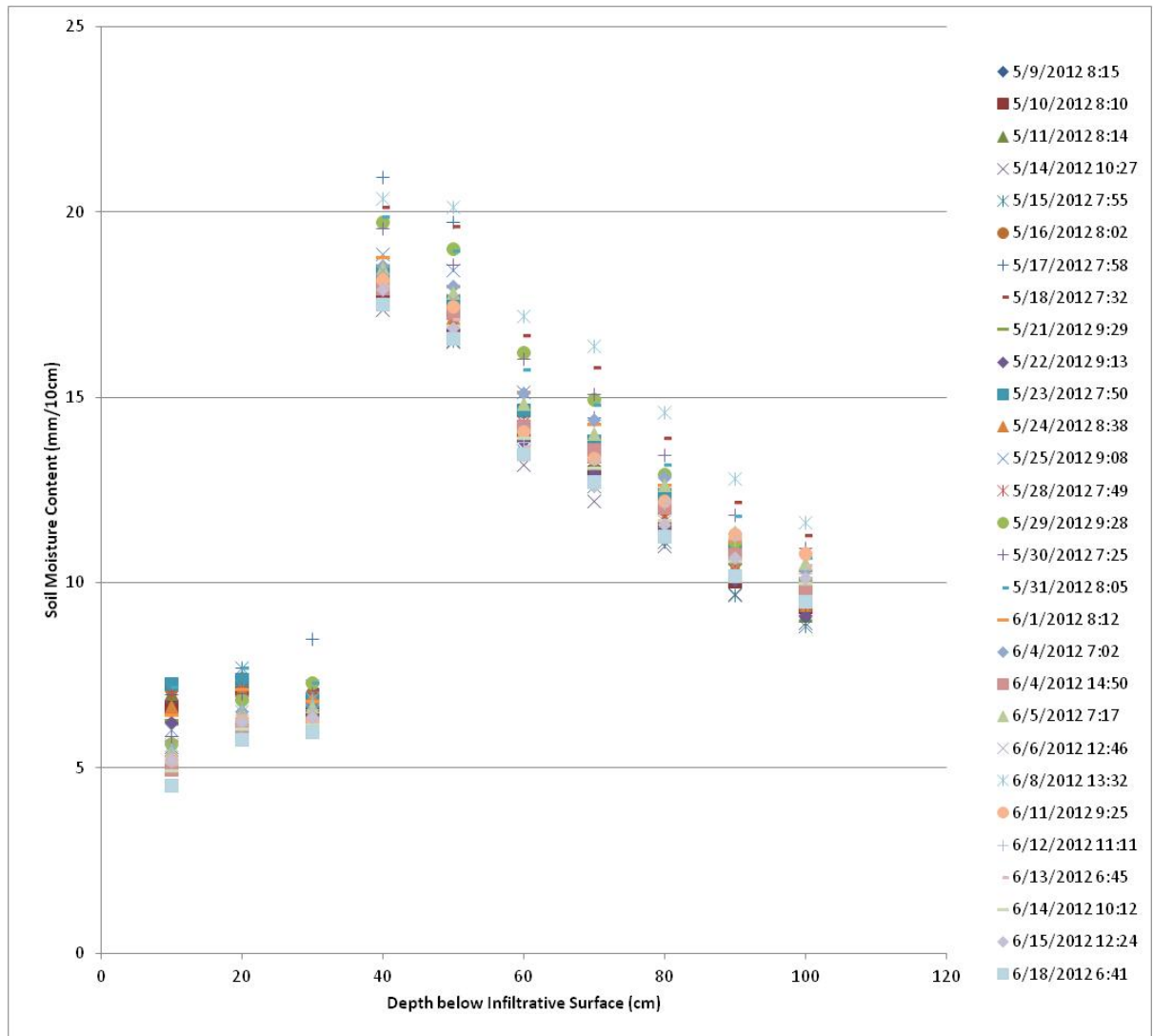
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**Figure E.3**  
**Soil Moisture Test Area 1 South**

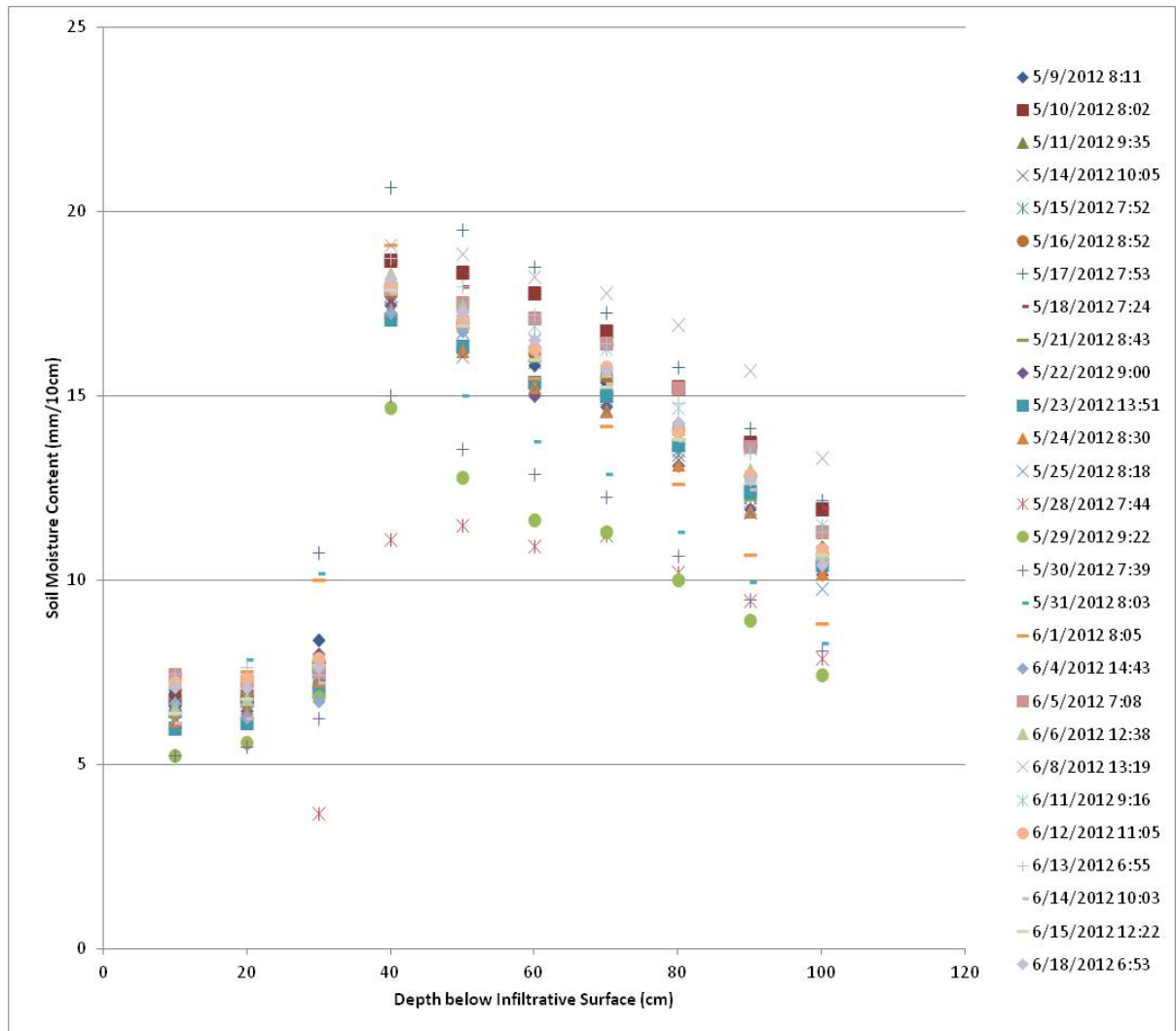
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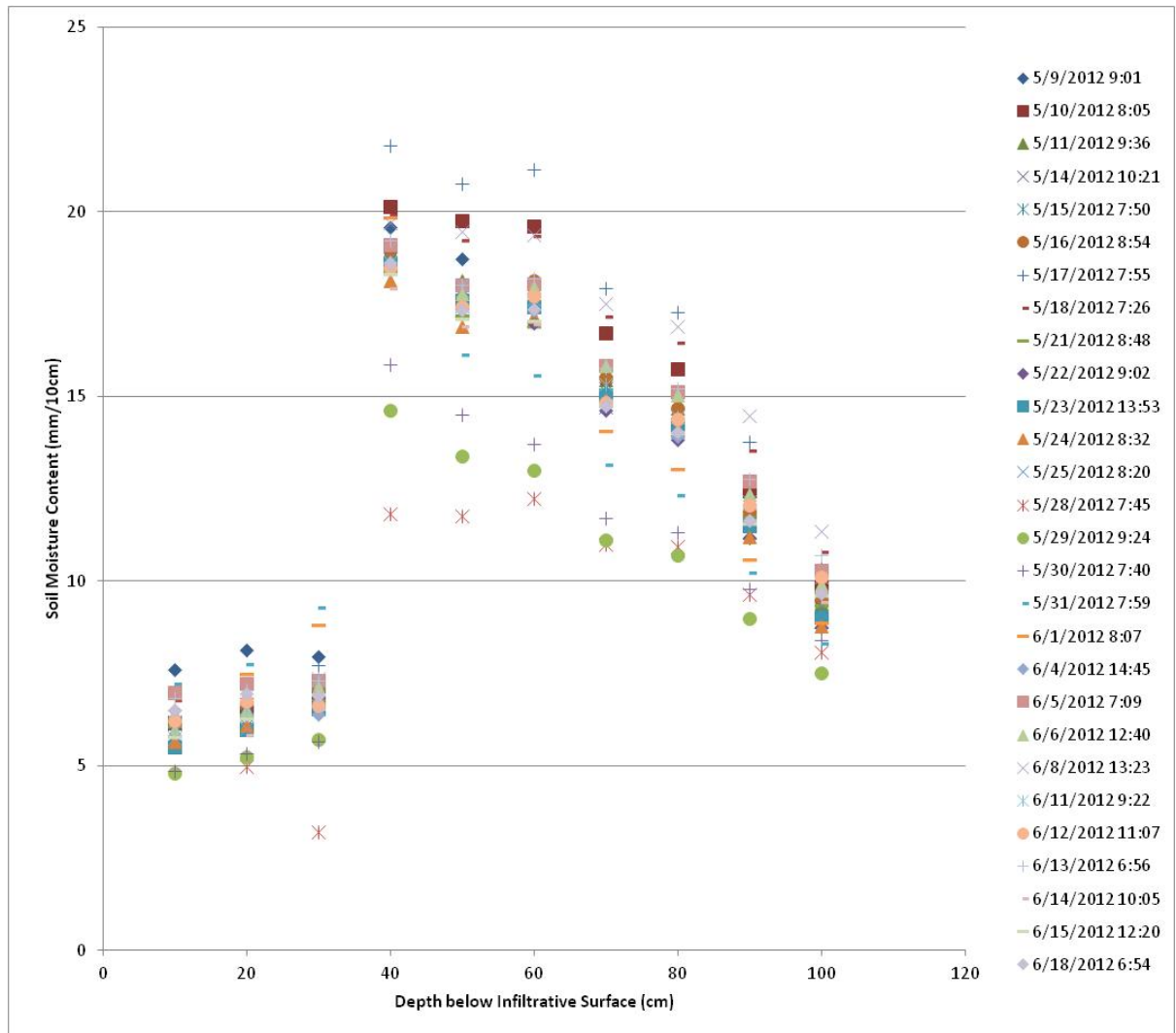
**Figure E.4**  
**Soil Moisture Test Area 2 Center**

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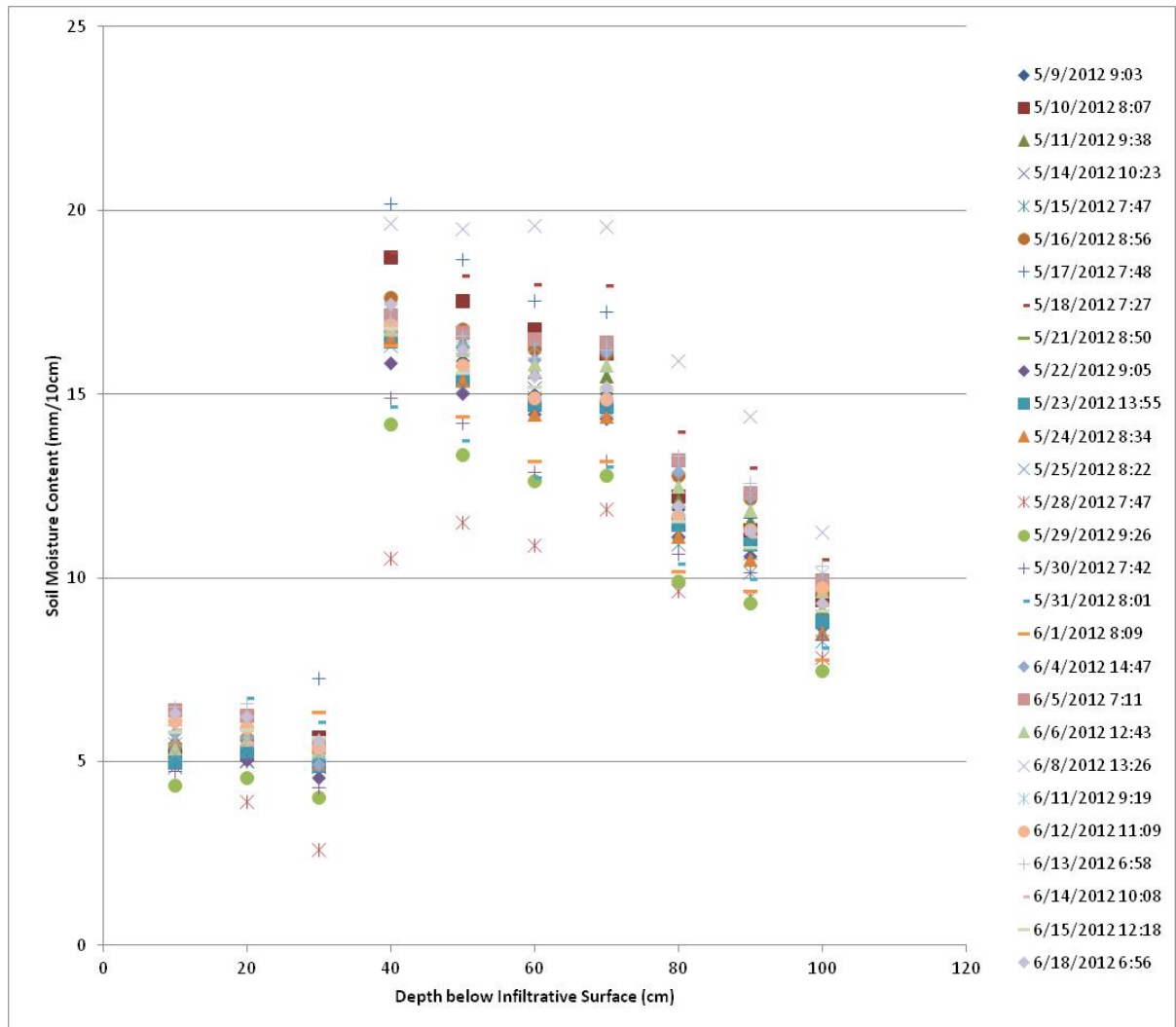
**Figure E.5**  
**Soil Moisture Test Area 3 North**

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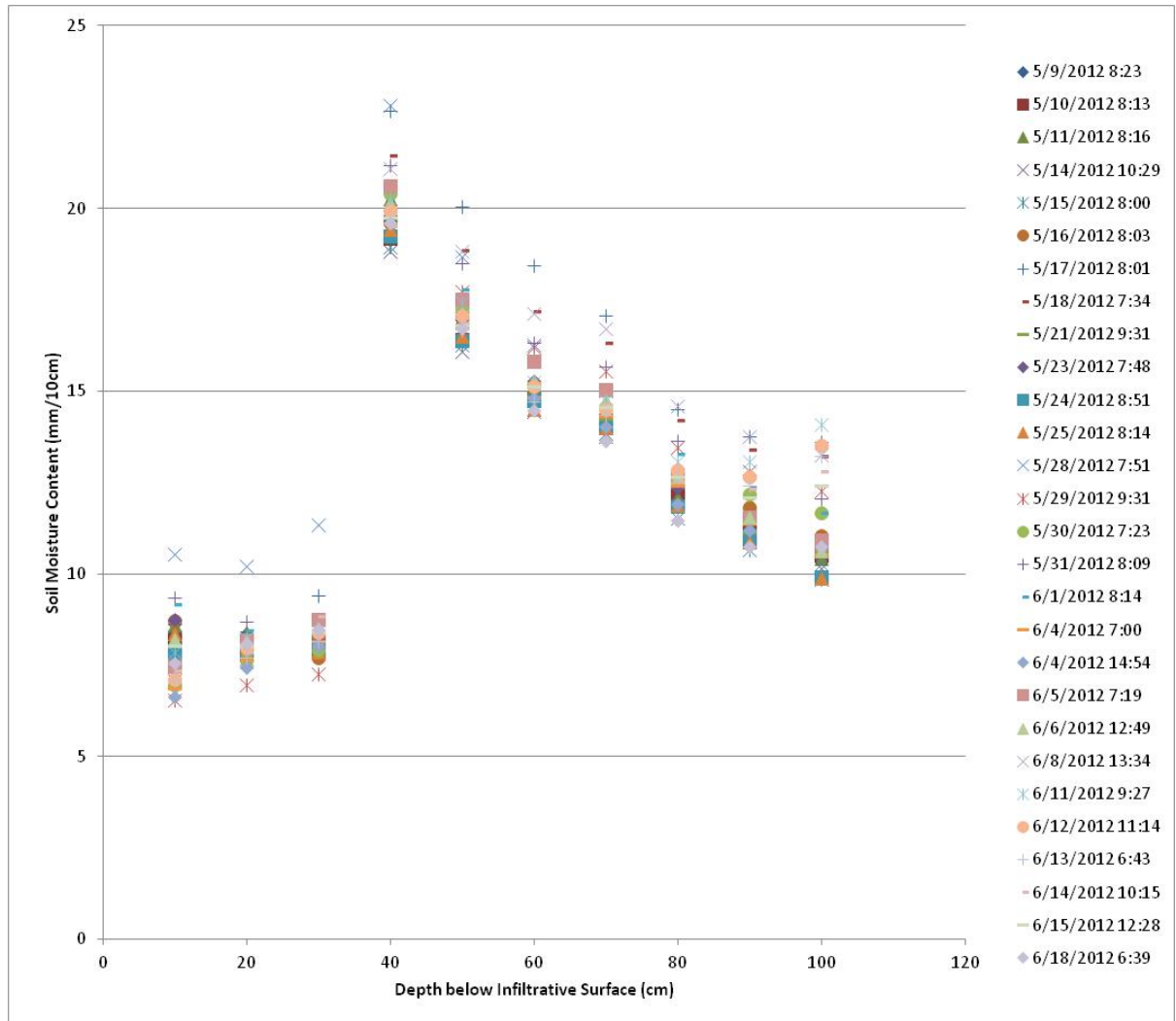
**Figure E.6**  
**Soil Moisture Test Area 3 Center**

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**Figure E.7**  
**Soil Moisture Test Area 3 South**

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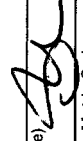


## **Appendix F: Chain of Custody Forms**

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1206568

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

Client Name		Hazen and Sawyer		Contact / Phone:																					
Project Name / Location		S&GW Test Facility SE #1 (Set 2)																							
Samplers: (Signature)		<div style="text-align: center;">         J. Chamberlain     </div>																							
Sample Description	Date	Time	Matrix	PARAMETER / CONTAINER DESCRIPTION																					
Matrix Codes: DW-Drinking Water WW-Wastewater SW-Surface Water SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water				TKN, NOx, NH <sub>4</sub> , TP	1LP, Cool	CI, Alkalinity, F, NO <sub>3</sub> , Ortho-P, SO <sub>4</sub>	250mL P, HNO <sub>3</sub>	TKN, NH <sub>4</sub>	250mL P, H <sub>2</sub> SO <sub>4</sub>	1LP, Cool	NO <sub>2</sub> , NO <sub>3</sub> , Cl	250mL P, H <sub>2</sub> SO <sub>4</sub>	TKN, NOx, NH <sub>4</sub>	1LP, Cool	CI	250mL P, H <sub>2</sub> SO <sub>4</sub>	TKN, NH <sub>4</sub> , COD, TP	1LP, Cool	NO <sub>2</sub> , NO <sub>3</sub> , Cl, Alkalinity	250mL Ag, Cool	DOC	Field pH	Field Temperature	Field Conductivity	Field DO
01 TA4-PZ-11-L5	6/19/12	1124	GW	X											1							5.2	25.9	48.4	1.92
02 TA4-PZ-11-L6	6/19/12	1058	GW	X											1							5.2	26.0	546.6	1.60
03 TA4-PZ-09-M4	6/19/12	0956	GW	X											1							6.7	25.6	636	0.31
04 TA4-PZ-16-M4	6/19/12	1020	GW												1							5.3	24.8	221.8	0.19
05 TA4-PZ-09-N7	6/19/12	0854	GW												1							5.6	25.7	244.0	1.03
06 TA4-PZ-16-N7	6/19/12	0921	GW												1							5.2	25.1	137.3	0.14
07 TA4-PZ-09-I7	6/19/12	1012	GW												1							5.9	25.8	326.3	1.14
08 TA4-PZ-16-I7	6/19/12	1032	GW												1							5.5	25.0	261.4	0.16
09 TA4-PZ-09-L8	6/19/12	0906	GW												1							6.4	25.7	596	0.68
10 TA4-PZ-16-L8	6/19/12	0944	GW												1							5.5	25.1	244.5	0.17
11 TA4-PZ-09-TU14	6/19/12	0738	GW												1							6.0	24.9	499.4	0.12
12 TA4-PZ-16-TU14	6/19/12	0832	GW												1							6.0	24.9	247.4	0.12
Containers Prepared/Relinquished:	Date/Time: 6-14-12 13:10	Received: 6/14/12 1310																				5.4	25.5	196.4	0.12
Relinquished:	Date/Time: 6/14/12 1800	Received: 6/14/12 1800																							
Relinquished:	Date/Time:	Received:																							
Relinquished:	Date/Time:	Received:																							
Relinquished:	Date/Time:	Received:																							

Chain of Custody

Chain of Custody  
Rev. Date 11/19/01

120568

SOUTHERN ANALYTICAL LABORATORIES, INC.

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

Client Name		Hazen and Sawyer		Contact / Phone:	
Project Name / Location		S&GW Test Facility SE #1 (Set 2)			
Samplers: (Signature)				PARAMETER / CONTAINER DESCRIPTION	
Matrix Codes: DW-Drinking Water WW-Wastewater SW-Surface Water SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water					
Sample Description	Date	Time	Matrix	Composite	Grab
13 TA4-PZ-09-TU16	6/12/12	0752	GW	X	
14 TA4-PZ-16-TU16	6/12/12	0812	GW	X	
15 TA5-PZ-1	6/21/12	1134	GW	X	
16 TA5-LY-C	6/18/12	1110	GW	X	
17 TA5-LINER-SP	6/18/12	1050	GW	X	
18 TA5-Denite Tank	6/12/12	1315	WW	X	
19 TA5-Denite Tank-DUP	6/12/12	1320	WW	X	
20 TA6-PZ-1	6/18/12	0924	GW	X	
21 TA6-LY-C	6/18/12	1310	GW	X	
22 TA6-LINER-SP	6/20/12	1045	WW	X	
23 TA6-Denite Tank	6/20/12	1045	WW	X	
24 PZ01-BKG-09	6/19/12	1440	GW	X	
Containers Prepared/Relinquished	Date/Time	Received	Date/Time	Instructions / Remarks	
Relinquished	6/13/12 13:09	6/14/12 1309	6/14/12 1800	Seal intact? Y N <input checked="" type="checkbox"/> N/A	
Relinquished	6/19/12 1100	6/19/12 1100	6/19/12 1100	Samples intact upon arrival? <input checked="" type="checkbox"/> N/A	
Relinquished	6/19/12 1630	6/19/12 1630	6/19/12 1630	Received on ice? Temp <input checked="" type="checkbox"/> N/A	
Relinquished	6/20/12	6/20/12	6/20/12	Proper preservatives indicated? <input checked="" type="checkbox"/> N/A	
Relinquished				Rec'd within holding time? <input checked="" type="checkbox"/> N/A	
Relinquished				Volatiles rec'd w/out headspace? Y N <input checked="" type="checkbox"/> N/A	
Relinquished				Proper containers used? <input checked="" type="checkbox"/> N/A	

Chain of Custody

Chain of Custody as  
Rev Data 11/13/01

# SOUTHERN ANALYTICAL LABORATORIES, INC.

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

200568

Client Name		Hazen and Sawyer		Contact / Phone: 813-630-4498	
Project Name / Location		S&GW Test Facility SE #1 (Set 2)			
Samplers: (Signature) <i>John H. Sawyer</i>		PARAMETER / CONTAINER DESCRIPTION			
Matrix Codes: DW-Drinking Water WW-Wastewater SW-Surface Water SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water					
Sample Description	Date	Time	Matrix	Composite	Grab
25 LY01-BKG-24	6/18/12	14:00	GW		X
26 LY02-BKG-42	6/18/12	dry	GW		X
27 PZ04-BKG-09	6/19/12	8:24	GW		X
28 PZ24-BKG-26	6/19/12	8:30	GW		X
29 PZ24-BKG-26-DUP	6/19/12	9:35	GW		X
30 PZ29-BKG-09	6/19/12	10:10	GW		X
31 PZ30-BKG-16	6/19/12	10:40	GW		X
32 PZ31-BKG-26	6/19/12	11:35	GW		X
33 PZ31-BKG-26-DUP	6/19/12	11:40	GW		X
34 PZ32-BKG-09	6/19/12	12:10	GW		X
35 PZ33-BKG-16	6/19/12	13:40	GW		X
36 PZ34-BKG-26	6/19/12	14:15	GW		X
Containers Prepared/ Relinquished: <i>John H. Sawyer</i>	Date/Time: 6-14-12 9:32	Received: <i>John H. Sawyer</i>	Date/Time: 6-14-12 13:20	Seal intact? Y N <input checked="" type="checkbox"/> N A	Instructions / Remarks:
Relinquished: <i>John H. Sawyer</i>	Date/Time: 6-19-12 1800	Received: <i>John H. Sawyer</i>	Date/Time: 6-19-12 1800	Samples intact upon arrival? Y N <input checked="" type="checkbox"/> N A	
Relinquished: <i>John H. Sawyer</i>	Date/Time: 6-19-12	Received: <i>John H. Sawyer</i>	Date/Time: 6-19-12	Received on ice? Temp: <input checked="" type="checkbox"/> N A	
Relinquished:	Date/Time:	Received:	Date/Time:	Proper preservatives indicated? Y N <input checked="" type="checkbox"/> N A	
Relinquished:	Date/Time:	Received:	Date/Time:	Rec'd within holding time? Y N <input checked="" type="checkbox"/> N A	
Relinquished:	Date/Time:	Received:	Date/Time:	Volatiles rec'd w/out headspace? Y N <input checked="" type="checkbox"/> N A	
				Proper containers used? <input checked="" type="checkbox"/> N A	

Chain of Custody: 4/4  
Rev. Date 11/1/01

## SOUTHERN ANALYTICAL LABORATORIES, INC.

110 BAYVIEW BOULEVARD, OLDSMAR, FL 34677 B1 3-855-1844 Fax B1 3-855-2218

1206568

Client Name		Hazen and Sawyer		Contact / Phone: 813-630-4498	
Project Name / Location		S&GW Test Facility SE #1 (Set 2)			
Samplers: (Signature) <i>gpcas</i>		PARAMETER / CONTAINER DESCRIPTION			
Matrix Codes: DW-Drinking Water WW-Wastewater SW-Surface Water SL-Sludge SO-Soil GW-Groundwater SA-Saline Water O-Other R-Reagent Water		Sample Description	Date	Time	Matrix
					Composite
					Grab
					TKN, NOx, NH <sub>4</sub> , TP
					1LP, Cool
					125mL P, Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>
					FC-MF
					1LP, Cool
					Cl, Alkalinity, SO <sub>4</sub> , F
					OP, Alkalinity
					250mL P, HNO <sub>3</sub>
					B, Ca, Fe, Mg, Mn, K, Na
					250mL P, H <sub>2</sub> SO <sub>4</sub>
					TKN, NH <sub>4</sub>
					1LP, Cool
					NO <sub>2</sub> , NO <sub>3</sub> , Cl
					250mL P, H <sub>2</sub> SO <sub>4</sub>
					TKN, NOx, NH <sub>4</sub>
					1LP, Cool
					Cl
					250mL P, H <sub>2</sub> SO <sub>4</sub>
					TKN, NH <sub>4</sub> , COD, NOx
					1LP, Cool
					Cl, Alkalinity
					250mL P, H <sub>2</sub> SO <sub>4</sub>
					DOC
					Field pH
					Field Temperature
					Field Conductivity
					Field DO

Containers Prepared/Relinquished:	Date/Time: 6-14-12	Received:	Date/Time: 6-14-12	1320	Seal Intact? Y <input checked="" type="radio"/> N <input checked="" type="radio"/>	Instructions / Remarks:
Relinquished:	Date/Time: 13:20	Received:	Date/Time: 18:00	61412	Samples intact upon arrival? Y <input checked="" type="radio"/> N <input checked="" type="radio"/>	
Relinquished:	Date/Time: 6/19/12	Received:	Date/Time: 04/19/12	1630	Received on ice? Temp: <input checked="" type="radio"/> N <input checked="" type="radio"/>	
Relinquished:	Date/Time: 6/20/12	Received:	Date/Time: 1630	66-20-n	Proper preservatives indicated? Y <input checked="" type="radio"/> N <input checked="" type="radio"/>	
Relinquished:	Date/Time: 6/20/12	Received:	Date/Time: 66-20-n		Rec'd within holding time? Y <input checked="" type="radio"/> N <input checked="" type="radio"/>	
Relinquished:	Date/Time: 6/20/12	Received:	Date/Time: 66-20-n		Volatiles rec'd w/out headspace? Y <input checked="" type="radio"/> N <input checked="" type="radio"/>	
Relinquished:	Date/Time: 6/20/12	Received:	Date/Time: 66-20-n		Proper containers used? Y <input checked="" type="radio"/> N <input checked="" type="radio"/>	

Chain of Custody  
Rev. Date 11/19/01

Chain of Custody

120569

120569

120569

### Chain of Custody



813-630-4498

Hazen and Sawyer

10

PARAMETER / CONTAINER DESCRIPTION
-----------------------------------

Instructions / Remarks:

1000

body





### Chain of Custody

**Contact / Phone:**

Hazen and Sawyer

S&amp;GW Test Facility SE #1 (Set 1)

**Samplers: (Signature)**

**Matrix Codes:**  
 W-Water  
 WW-Wastewater  
 SL-Sludge  
 SO-Soil  
 SA-Saline Water  
 O-Other  
 R-Reagent Water

66. 97.  
67. 97.  
68. 97.  
69. 97.  
70. 97.  
71. 97.  
72. 97.  
73. 97.  
74. 97.  
75. 97.  
76. 97.  
77. 97.

Matrix Codes:		Sample Description		Date	Time	Matrix	Composite	Grab	250ml P, H <sub>2</sub> SO <sub>4</sub> TKN, NOx, NH <sub>4</sub> , TP	1LP, Cool Cl, Alkalinity, F, NO <sub>3</sub> , Ortho-P, SO <sub>4</sub> , NO <sub>2</sub>	250ml P, HNO <sub>3</sub> B, Ca, Fe, Mg, Mn, K, Na	250ml P, H <sub>2</sub> SO <sub>4</sub> TKN, NH <sub>4</sub>	1LP, Cool NO <sub>2</sub> , NO <sub>3</sub> , Cl	250ml P, H <sub>2</sub> SO <sub>4</sub> TKN, NOx, NH <sub>4</sub>	1LP, Cool Cl	250ml P, H <sub>2</sub> SO <sub>4</sub> TKN, NH <sub>4</sub> , COD, TP	1LP, Cool NO <sub>2</sub> , NO <sub>3</sub> , Cl, Alkalinity	250ml Ag, Cool DOC	Field pH	Field Temperature	Field Conductivity	Field DO
61	TA3-LY-12-S *			06/18	1128	GW	X	X								1	1		7.11	38.7	744	6.80
62	TA3-LY-12-S-DUP *				1130	GW	X	X								1	1		7.11	38.7	744	6.80
63	TA3-LY-24-S *				1140	GW	X	X								1		1	6.31	38.7	680	6.21
64	TA3-LY-42-S *				1150	GW	X	X				1	1						6.84	36.9	502	6.09
65	TA3-PZ-11-EF2 *	062112 1009		06/18	0610	GW	X	X					1	1	1				45.3	25.7	305.2	2.37
66	TA3-PZ-11-EF2-DUP *	062112 1015		06/18	0619	GW	X	X				1	1	1	1				45.3	25.7	305.2	2.37
67	TA3-PZ-11-H2 *			06/21	949	GW	X	X				1	1	1	1							
68	TA3-PZ-10-J5 *			07/02	1343	GW	X	X				1	1	1	1				5.1	26.0	335.6	2.26
69	TA3-PZ-10-K5 *			07/02	1433	GW	X	X				1	1	1	1				5.0	25.4	320.3	1.79
70	TA3-PZ-11-L2 *			07/02	1350	GW	X	X				1	1	1	1				4.9	26.0	339.7	3.07
71	TA3-PZ-11-L3 *			07/02	1436	GW	X	X				1	1	1	1				4.3	25.3	279.0	2.60
72	TA3-PZ-11-L4 *			06/18	1058	GW	X	X				1	1	1	1							
Containers Prepared/Relinquished:		Date/Time: 6-17-12	Received: 6-17-12	Date/Time: 6-12-12	1123																	
Relinquisher: P. Chambers		Date/Time: 6-11-12	Received: 6-11-12	Date/Time: 6-12-12	1630																	
Relinquisher: [Signature]		Date/Time: 6-20-12	Received: 6-20-12	Date/Time: 06-20-12	1630																	
Relinquisher: [Signature]		Date/Time: 6-20-12	Received: 6-20-12	Date/Time: 06-20-12	1630																	
Relinquished:		Date/Time:	Received:	Date/Time:																		
Relinquished:		Date/Time:	Received:	Date/Time:																		
Relinquished:		Date/Time:	Received:	Date/Time:																		

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

### Chain of Custody









## Appendix G: Field Parameter Analyses

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

ID Number	Sample Identification	Date	Temperature (°C)	pH	Specific Conductance (µS/cm)	Dissolved Oxygen (mg/L)
7	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
9	TA1-LY-12-S	6/18/12 13:25	29.4	6.71	546	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
23	TA1-PZ-11-K4	6/20/12 11:50	26.4	4.38	289	3.21
24	TA1-PZ-11-L2	6/20/12 14:45	25.6	4.42	676	5.86
25	TA1-PZ-11-L3	6/20/12 14:25	25.5	4.52	310	4.91
26	TA1-PZ-11-L4	6/21/12 9:05	25.7	4.43	414	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-O7	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
38	TA1-PZ-09-RS18	6/21/12 8:13	25.8	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
45	TA2-LY-24-C	6/18/12 10:28	27.9	6.36	820	6.26
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	6/18/12 10:58	28.2	6.40	693	5.48

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

ID Number	Sample Identification	Date	Temperature (°C)	pH	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

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

ID Number	Sample Identification	Date	Temperature (°C)	pH	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

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

ID Number	Sample Identification	Date	Temperature (°C)	pH	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

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

ID Number	Sample Identification	Date	Temperature (°C)	pH	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

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