Southwest Treatment Area Corrective Measures Implementation Plan

Coliseum Boulevard Plume Site
Montgomery, Alabama

Submitted By:

Alabama Department of Transportation
1409 Coliseum Boulevard
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LIST OF ABBREVIATIONS

ACI	Asphalt Contractors, Inc.
ADEM	Alabama Department of Environmental Management
ADIR	Alabama Department of Industrial Relations
AEIRG	Alabama Environmental Investigations and Remediation Guidance
ALDOT	Alabama Department of Transportation
AMSL	Above Mean Sea Level
ARBCA	Alabama Risk-Based Corrective Action
BDY	Boundary
CBP	Coliseum Boulevard Plume
CM	Corrective Measures
CME	Corrective Measures Evaluation
CMIP	Corrective Measures Implementation Plan
CPT	Cone Penetrometer Testing
EFF	Effectiveness
Fe	Iron
ft	Feet
gpm	gallons per minute
ICM	Interim Corrective Measures
ICP	Institutional Control Plan
LLA	Low-Lying Area
LT	Lower Terrace
LTM	Long-Term Monitoring Plan
µg/L	micrograms per liter
MCL	Maximum Contaminant Level
MGD	million gallons per day
mg/Kg	milligrams per kilogram
MT	Middle Terrace
NMM	North Montgomery Materials, LLC
NO2	Nitrite
NO3	Nitrate
NPDES	National Pollutant Discharge Elimination System
PH-12	Probehole 12 Area
PO4	Phosphate
PSV	Preliminary Screening Value
Redox	Reduction/oxidation
RL	Reporting limit
SO4	Sulfate

SVOC	Semi-Volatile Organic Compound
TCE	Trichloroethylene
TSS	Total Suspended Solids
TVS	Total Volatile Solids
VOCs	Volatile Organic Compounds

1. INTRODUCTION

The Voluntary Settlement Agreement between the Alabama Department of Environmental Management (ADEM) and the Alabama Department of Transportation (ALDOT) for the Coliseum Boulevard Plume (CBP) was executed in December 2011. The Agreement required the submittal and approval of four (4) Corrective Measures Implementation Plans (CMIPs), as follows:

- Kilby Ditch/Low-Lying Area CMIP
- Institutional Control Plan (ICP)
- Long-Term Monitoring Plan (LTM)
- Southwest Treatment Area CMIP

Each of these plans have been approved by ADEM and implemented by ALDOT. This revision is limited to certain operational and maintenance requirements that have changed (since approval of the CMIPs) as the systems have stabilized (for example, locations of monitoring points, frequency of samples, etc.).

1.1. PROJECT OVERVIEW

The CBP is an area of approximately 1,200 acres in north Montgomery, Alabama where the shallow groundwater contains or is predicted to contain trichloroethylene (TCE) by 2039. The CBP extends generally from the Kilby Ditch in the northeast to the former North Montgomery Materials, LLC (NMM) sand and gravel mine in the southwest (see Figure 1-1).

Investigations to assess the extent and nature of the CBP began in 1999. The ALDOT monitors and manages the CBP under regulatory oversight by the ADEM. The ALDOT has implemented the following remedial actions recommended in the “Site-Wide Corrective Measures Evaluation Report, October 2007, Revised July 2008” (CME) for the CBP:

- Control groundwater at the northeast and southwest portions of the CBP;
- Treat surface water containing TCE prior to discharge;
- Restrict access to groundwater via institutional controls; and,
- Restrict access to surface water via engineering controls.

A Corrective Measure Implementation Plan for Kilby Ditch and the Low-lying Area was submitted to ADEM in December 2008 and approved by ADEM in April 2009. These corrective measures (CM) were completed in July 2010, with ongoing maintenance and monitoring.

The Long-Term Monitoring Plan to monitor surface water and groundwater was submitted to ADEM for review and approval in October 2008 and revised and resubmitted in October 2011 based on the Settlement Agreement for Voluntary Response between ADEM and ALDOT effective December 6, 2011.

The Institutional Control Plan (ICP, April 2008), a program of legally enforceable deed restrictions on access to and use of groundwater, was approved by ADEM in April 2009.

Figures 1-2A and 1-2B presents an overview of the investigation reports, corrective measures implementation plans, and monitoring plans and annual reports for this project.

1.2. PURPOSE AND OBJECTIVES

This CMIP for the Southwest Treatment Area (SWTA) outlines ALDOT's plan for the southwest part of the CBP. In April 2009, ALDOT acquired the former North Montgomery Materials sand and gravel mine (NMM, see Figure 1-3) to:

1. Maintain hydraulic control of TCE-containing groundwater in the southwest part of the CBP;

2. Restrict access to the surface water through engineering controls, and;

3. Reduce TCE concentrations in the surface water to meet ADEM’s discharge requirements.

2. SOUTHWEST TREATMENT AREA INVESTIGATIONS

2.1. SOUTHWEST TREATMENT AREA DESCRIPTION

The Southwest Treatment Area is within the former North Montgomery Materials sand and gravel mine at the southwestern extent of the CBP. During its operations, NMM excavated sand and gravel to below the normal water table. Pumps were used within the excavations to remove water that collected within the open pit. The dewatering created a groundwater sink that influenced both direction and rate of flow of the TCE-containing groundwater in the western part of the CBP. After purchasing the property in 2009, ALDOT continued dewatering within the excavation to maintain the groundwater sink.

2.2. FIELD INVESTIGATIONS

Field investigations and interim corrective measures (ICM) within the Southwest Treatment Areas, since April 2008, have focused on:

1. Evaluating water management operations associated with dewatering at the SWTA;

2. Analyzing water samples from the ponds for TCE;

3. Analyzing sediment samples within the ponds for TCE;

4. Analyzing groundwater seep samples for TCE, and

5. Installing monitoring wells, probeholes, and piezometers for water-level measurements and groundwater sampling.

Investigation procedures were in general accordance with the most recent edition of the Alabama Environmental Investigations and Remediation Guidance (AEIRG) and ADEM-approved Plans specific to the CBP. The purpose, approach, methodology and results for each of these activities are discussed in the following sections.

2.2.1. PREVIOUS WATER MANAGEMENT OPERATIONS

The following describes water management operations in the SWTA when the former NMM sand and gravel mine was operational in August 2008 (see Figure 2-1):

1. Dewatering to facilitate sand and gravel mining was occurring in the northern portion of the excavation area in August 2008. The area south of the "Dewatering Pond" was previously mined for sand and gravel;
2. Pumping groundwater from the Dewatering Pond to a "Transfer Pond;"
3. Conveying water in the Transfer Pond, by gravity flow, to the "Wash Water Pond,"
4. Pumping water from the Wash Water Pond to the "Processing Area" to remove (i.e., "wash") fines and silts from the mined sand and gravel;
5. Conveying water from the Processing Area, by gravity flow, to a "Settling Basin" to settle excess fines and silts;
6. Conveying water in the Settling Basin, by gravity flow, back to the Wash Water Pond for potential reuse;
7. Pumping water from the Wash Water Pond to the "South Ponds" with gravity flow to a "Wetland Area" in the southeastern part of the SWTA ; and,
8. Discharging water from the Wetland Area through a City floodgate into the City of Montgomery storm sewer system.

2.2.1.1. WATER PUMPING AND TRANSFER OPERATIONS

Pumping rates of the dewatering and transfer pumps during NMM and ACI mine operations were measured between August 15 and August 21, 2008 using an inductive flow meter (Table 2-1). Both mining operations were discharging into the "South Ponds" during this period. The average discharge from the NMM Dewatering Pond to the Transfer Pond was 940 gallons per minute (gpm), and the average discharge from the Transfer Pond to the South Ponds was 1,100 gpm. Average discharge from ACI to the South Ponds over that same period was 1,015 gpm. Approximately 2.4 million gallons of combined flow from NMM and ACI were measured at the discharge from the "South Ponds" into the "Wetland Area" over a 24-hour period from August 23, 2008 through August 24, 2008.

Using the surface water pumping data during the sand and gravel mining operations, the impact of the surface water dewatering to the groundwater was evaluated in the site-specific groundwater model. The groundwater model estimated an approximate 0.6 million gallon per day discharge from the SWTA dewatering pond would maintain hydraulic control of the CBP until the automated pumping system was installed in April 2012. The current discharge from the SWTA is approximately 1.1 million gallons per day (MGD).

2.2.1.2. SURFACE WATER ELEVATION

Surface water elevations within the former NMM ponds were measured to:

1. Develop an empirical relationship between water levels in the Dewatering Pond and groundwater levels in adjacent monitoring wells and piezometers. This empirical relationship was used to refine calibration of the Site Wide Model (ALDOT, 2008).

2. Determine surface water level responses to pump-cycling and precipitation for use during the correctives measures monitoring period.

The elevations were measured by installing pressure transducers in perforated riser pipes within the Dewatering, Transfer, and South Ponds (Figure 2-2). The top elevation of each riser pipe was surveyed to establish a common datum. Data logging commenced on September 23, 2008 and continues, except for limited interruptions to download data from the transducers.

Prior to the termination of NMM mining operations in April 2009, the pumping schedule for the NMM Dewatering Pond was generally Monday through Friday from 7:00 AM to 4:00 PM. Review of the water-level data for the Dewatering Pond confirmed a week-long cycle of water-level decline during the work week and recovery during the weekend, when the pumps were shut off. Water levels in the Dewatering Pond increased about one foot per day on weekends. The maximum water-level rise was about two feet per day. Precipitation data from the closest gauge, e.g., at the Forest Hills residential weather station, confirmed that precipitation had limited effects on water levels in the Ponds.

2.2.2. POND SAMPLING

Since April 2008 grab samples have been collected monthly from most ponds in the SWTA. The samples were analyzed for volatile organic compounds (VOCs), total suspended solids (TSS), total volatile solids (TVS), sulfate (SO4), nitrite and nitrate (NO2 and NO3), and total iron and phosphate (Fe and PO4). Grab samples also were collected from ponds at ACI in November 2008; April, August, and November 2009; and January and April 2010. The samples were analyzed for VOCs.

The results of the analyses for the SWTA ponds and ACI ponds are presented in Table 2-2 and the sample locations are shown on Figure 2-3. TCE concentrations ranged from non-detect to 9.1 micrograms per Liter (µg/L). The highest TCE concentration (9.1 µg/L) was in the October 2008 sample from the Dewatering Pond. All other VOC concentrations, with the exception of m,p-xylene, were below the laboratory reporting limit (RL) of 1 µg/L. A sample collected in September 2008 from the Dewatering Pond contained 8.5 µg/L m,p-xylenes; however, m,p-xylenes are not a constituent associated with the CBP.

2.2.3. SEDIMENT SAMPLING

Sediment samples were collected at several locations in the SWTA (see Figure 2-4) from July through September 2008 to:

1. Analyze the Pond sediments for TCE;

2. Determine the chemical and physical characteristics of the sedimentary materials within the NMM Ponds;

3. Evaluate available indicators of TCE degradation; and,

4. Establish hydraulic properties of the Settling Basin and South Pond sediments.

The samples were analyzed for VOCs, semi-volatile organic compounds (SVOCs), reduction/oxidation (Redox) potential, pH, percent organic matter, sulfate and sulfide (SO4 and S2), nitrite and nitrate (NO2 and NO3), total iron and phosphate (Fe and PO4), and grain-size distribution by hydrometer, and permeability (see Table 2-3).

There were no VOCs (including TCE) detected in the sediment samples. Sulfide concentrations ranged from 6.6 milligrams per kilogram (mg/Kg) to 16.9 mg/Kg. Nitrate and nitrite concentrations ranged from 3.2 to 25.9 mg/Kg. Sulfate concentrations ranged from 66 mg/Kg to 401 mg/Kg. Phosphate concentrations ranged from 9.1 mg/Kg to 79.3 mg/Kg. These concentrations are within ranges conducive to degradation of TCE.

Across all sampling locations, sediments from within the South Ponds have the smallest grain sizes and a higher content of silt and clay.

2.2.4. SUBSURFACE INVESTIGATION

Subsurface investigations were conducted at the SWTA from July through September 2008 by completing Geoprobe® soil borings at 7 locations, constructing 4 piezometers and 8 monitoring wells, cone penetrometer testing (CPT) at 13 locations, and sample collection. The subsurface investigations were to improve understanding of the SWTA lithologies, determine the bottom elevations of the previous excavations, determine the continuities of lithologic units, and determine the extent of TCE in the SWTA.

The investigations were in general accordance with the most recent edition of ADEM's AEIRG or previously approved ADEM Plans. Interpretations of the subsurface investigations, including mapping the potentiometric surface and TCE distribution, are described in detail in Section 3. Borehole and well-completion logs are provided in Appendix A; their locations are shown on Figure 2-5.

Groundwater levels were measured in all wells and piezometers, within and upgradient of the SWTA. Groundwater samples were collected from designated monitoring wells and analyzed for VOCs and inorganic constituents.

TCE concentrations in the groundwater at the SWTA ranged from non-detect to 226 µg/L. One analyte, 1,1-dichloroethene, ranged from non-detect to 9.6 µg/L. The remaining analytes were below the laboratory RL of 1 µg/L, the Alabama Drinking Water Maximum Contaminant Levels (MCLs), or Alabama Risk-Based Corrective Action (ARBCA) Preliminary Screening Values (PSVs) for these constituents. The results of the TCE distribution investigation are described in detail in Section 3.

Groundwater sampling was conducted quarterly at the SWTA with groundwater quality reported in ALDOT Status Reports. Groundwater quality data from July 2008 through July 2011 are summarized in Table 2-4. Beginning in January 2012, groundwater samples are collected semiannually and reported in the Annual Report. Laboratory reports for the groundwater samples collected from the SWTA are provided in the Status Reports and Annual Reports.

2.2.5. SWTA MINERAL RESOURCE EVALUATION

In December 2013, ALDOT installed seven geotechnical borings to evaluate mineral resources in the northern portion of the SWTA. Three of these borings were converted to piezometers for measurements of water levels. A groundwater sample was collected from each of the three piezometers on December 3, 2013 for verification/calibration of the groundwater model. Boring logs and analytical results are included in Appendix C.

2.2.6. SEEPAGE FACE SAMPLES

Groundwater seeps at the Dewatering Pond were sampled from April 2008 through July 2011. Table 2-5 presents the analytical results for these samples. Locations of the seep samples are shown on Figure 2-5.

All seep samples collected from the first sampling event on April 22, 2008, contained TCE at concentrations ranging from 1.2 to 28.9 µg/L (see data for Seepage "A" location) (Table 2-5). However, TCE concentrations have not been detected in any of the samples since December 2009. Seep sampling was discontinued from the seepage face in January 2011 due to the reclamation activities and disturbance of the seepage face. Instead, water from the seeps is collected in the Dewatering Pond and sampled near the pump intake.

3. SOUTHWEST TREATMENT AREA GEOLOGY AND HYDROGEOLOGY

The geology and hydrogeology within the SWTA were interpreted by examining information obtained from ongoing sample collection and investigations described in Section 2, investigations previously completed within other portions of the CBP, and regional and local studies completed by the Alabama and United States Geological Survey. This Section presents the SWTA geology and hydrogeology within the context of the site wide geologic and hydrogeologic features of the CBP.

3.1. STRATIGRAPHY WITHIN THE COLISEUM BOULEVARD PLUME

The CBP is within the Alluvial-Deltaic Plain District of the East Gulf Coastal Plain physiographic section (Sapp and Emplaincourt, 1975). The geology and groundwater resources in this District were discussed in detail in the Site Wide Corrective Measures Evaluation (ALDOT, 2008) and the Conceptual Geology and Hydrogeology Report for the Coliseum Boulevard Plume (TTL, 2001).

Near surface sediments at the CBP Site have been divided into a “Shallow Zone” and a “Deep Zone”. Shallow Zone sediments comprise Pleistocene terrace and upper Eutaw Formation deposits. The Pleistocene terrace deposits in the Shallow Zone correspond to two of the three terrace deposits (lower, middle, and upper) described in USGS Water Supply Paper 1606 (Knowles *et.al.*, 1963). The middle terrace deposits are between 180 and 280 feet (ft) above mean sea level (AMSL) and include the Probehole 12 Area (PH12), West and Main Kilby Ditches, and the Montgomery Zoo (see Figure 3-1). The lower terrace (LT) deposits are below 180 ft AMSL and include the SWTA and Low-Lying Area (LLA). The water table aquifer is within the Shallow Zone.

Deep Zone sediments comprise lower Eutaw and upper Gordo deposits that collectively represent the Gordo Confining Unit.

The marker for the base of the Shallow Zone (e.g., top of the Deep Zone) is the clay that has been referred to throughout CBP reports as “the first distinct clay beneath the water table” and is the top of the Gordo Confining Unit. A generalized stratigraphic section of these units is provided as Figure 3-2. More detailed descriptions of the lithologic characteristics of the Shallow and Deep Zone sediments are provided below.

3.1.1. MIDDLE TERRACE SHALLOW ZONE SEDIMENTS

The middle terrace (MT) deposits comprise Pleistocene clays, silty sands, and sand and gravels that overlie fine to medium grained glauconitic sands of the upper Eutaw Formation in the following general sequence from surface to depth:

MT-1	Pleistocene: surficial sandy clay (unsaturated)
MT-2	Pleistocene: fine to coarse sand (unsaturated except in the northeast part of the CBP)
MT-3	Pleistocene: fine to very coarse sand and gravel (partially saturated to unsaturated)
MT-4	Upper Eutaw Formation: fine to medium glauconitic sand (upper Eutaw Formation and comprises the majority of the Shallow Zone). Typical hydraulic conductivity is 14 ft/day.
MT-5	Upper Eutaw Formation: medium to coarse glauconitic sand. Typical hydraulic conductivity is 66 ft/day.
FDC	Lower Eutaw Formation: First Distinct Clay, fine sandy clay

The water table aquifer is within the MT-3 through MT-5 deposits. Average transmissivity for the middle terrace area in the SWTA, based on a saturated thickness of MT-4 and MT-5, is approximately 1,200 ft2/day.

3.1.2. LOWER TERRACE SHALLOW ZONE SEDIMENTS

As noted in the Section 3.1 discussion of Shallow Zone sediments, the PH-12 Area, West and Main Kilby Ditches, and the Montgomery Zoo are underlain by MT deposits. In contrast, the Shallow Zone sediments beneath the SWTA are all LT deposits. There are two principal sands, the First and Second Sands, which are separated by a clay with silt and organic matter beneath the SWTA. Base of the Shallow Zone, from west to east, is between 86 ft and 124 ft AMSL. In particular, the top of the First Distinct Clay that defines the base of the Shallow Zone is 106 to 108 ft AMSL at the Dewatering Pond.

These sediments are in the following general sequence from the surface to depth:

- LT-1 Pleistocene: Fine-grained, silty, sandy, clay (unsaturated except in southeast part of the SWTA)
- LT-2 Pleistocene: First Sand: Fine to medium sand and gravel (generally less than 2 feet of saturated thickness due to the former mine dewatering)
- LT-3 Pleistocene: Clay with silt and organic matter
- LT-4 Pleistocene: Second Sand: Fine to coarse sand and gravel (saturated). Typical hydraulic conductivity is 180 ft/day.
- LT-5 Pleistocene: Second Sand: Silty fine to medium silty sand (saturated). Typical hydraulic conductivity is 14 ft/day.
- FDC Lower Eutaw Formation: First Distinct Clay, brownish- yellow, light brownish-gray, or light gray fine sandy clay

The Shallow Zone Eutaw sands, MT-4 and MT-5, present in the middle terrace are absent in the lower terrace.

Average transmissivity for these sediments within the SWTA, based on saturated thickness of the Second Sand (LT-4 and LT-5), is approximately 4,000 ft2/day.

The sequence of sediments comprising the water table aquifer in the SWTA and the relationship between the lower and middle terrace deposits are illustrated on Figure 3-3.

3.1.3. DEEP ZONE SEDIMENTS

Deep Zone sediments comprise the lower Eutaw Formation and upper Gordo Formation. The First Distinct Clay is the marker between the base of the upper Eutaw Formation and the top of the lower Eutaw Formation. This clay, which underlies the entire CBP and extends beyond the Alabama River, dips westward at about 40 ft/mile.

The lower Eutaw Formation and the upper Gordo Formation collectively form the Gordo Confining Unit. This Unit comprises silty clays and clayey silts with isolated sandy silt and silty sand lenses. The confining unit prevents downward migration of TCE to the underlying Gordo Aquifer (see Figure 3-2).

3.2. SOUTHWEST TREATMENT AREA GROUNDWATER FLOW

Crucial to understanding and modeling groundwater flow within the southwest part of the CBP and within the SWTA is a sedimentary transition between the eastern MT Shallow Zone sediments and the western LT Shallow Zone sediments. The stratigraphic configuration of this Transition Zone is shown on the northeast to southwest cross-section of Figure 3-3. The location of the Transition Zone is shown on the planimetric view of Figure 3-1. The investigations with monitoring wells, probeholes, and piezometers were directed primarily toward understanding and quantifying the stratigraphic and hydrologic characteristics of this transition.

The hydrogeologic characteristics of the eastern, transitional, and western Shallow Zone sediments were incorporated into the Site Wide groundwater flow model. The model was calibrated so that the effects of pre-dewatering natural groundwater flow and mine dewatering could be understood. Then, the model was used to predict the effects of current pumping at the SWTA Dewatering Pond.

Pre-dewatering natural groundwater flow in the western part of the CBP was generally west-northwest from the ALDOT Central Complex (at Fairground Road) to the Alabama River. Dewatering at the southwestern sand and gravel mines then created a groundwater sink that reoriented groundwater flow to the present day southwesterly direction. The model predicted average groundwater velocity from the CBP towards the Dewatering Pond under present day conditions is approximately 1.5 ft/day for an approximate travel time of 1 to 3 years between the SWTA east property boundary and the Dewatering Pond.

Prior to installation of the automated pumping system in April 2012, pumping by ALDOT at the Dewatering Pond was approximately 600,000 gallons/day which maintained a water level within the pond of about 120 ft AMSL. The current pumping rate of approximately 1.1 MGD maintains a water level of approximately 116 ft AMSL. This pumping/dewatering has lowered the water table to below the First Sand and prevents further westerly migration of the CBP. There is a thin and intermittent perched saturated zone within the First Sand, but TCE has not been detected in groundwater samples from this perched zone. TCE has been detected only in samples from the Second Sand.

3.3. OCCURRENCE AND DISTRIBUTION OF TCE IN THE SOUTHWEST TREATMENT AREA

3.3.1. CURRENT TCE DISTRIBUTION IN GROUNDWATER

The current distribution of dissolved TCE in groundwater in the SWTA was affected by past shifts in groundwater flow caused by the changes in the locations and elevations of dewatering associated with the former sand and gravel mine operations. For example, dewatering associated with the former NMM operations was initiated in an area south of the current Dewatering Pond. As the material was extracted, the dewatering operations shifted north. Consequently, TCE is currently drawn toward an area slightly north of the initial dewatering operations (Figure 3-4). This more northern location is better positioned to capture the western portion of the CBP.

3.3.2. FUTURE TCE IN GROUNDWATER

The corrective measure selected in the CME Report (ALDOT, 2008) for the Southwest Treatment Area was “continued groundwater dewatering and hydraulic control” from the sand and gravel mine area. The effectiveness of this corrective measure was evaluated by using the Site Wide Model, as described in the CME Report. When the CME was completed, NMM was actively mining its property and the groundwater modeling scenarios were based on a variety of “build-out” options for the mine. These options included continued excavation of the sand and gravel with corresponding increases eastward and northward expansions of the NMM Dewatering Pond and a scenario whereby all dewatering eventually ceased.

With ALDOT’s purchase of NMM property in April 2009 and subsequent control of dewatering operations, the effectiveness of hydraulic capture of the western part of the CBP was re-evaluated by using the Site Wide groundwater model. First, the Site Wide model was updated to include information obtained from the Southwest Treatment Area Investigations, including:

- Surface topography through 2009;
- Surface water elevations through 2010;
- Hydrostratigraphic framework for the Shallow Zone;
- Hydrologic characteristics of the Shallow Zone soils; and,
- Extent of TCE in the Shallow Zone through 2010.

3.3.2.1. SITE WIDE MODEL SCENARIO

Using the Site Wide Model, the operational scenario where Dewatering Pond elevations are maintained at 120 ft AMSL was evaluated. For this scenario, the Dewatering Pond was modeled with its current configuration (2011). Three model runs to predict movement of the CBP over a thirty-year period were executed for each scenario:

Run 1. Low recharge based on 85% of normal precipitation;

Run 2. Normal recharge based on normal precipitation; and,

Run 3. High recharge based on 115% of normal precipitation.

Normal precipitation is the average precipitation based on rainfall data from the Montgomery area (Montgomery Station MGM, 1948-2005).

Maximum predicted TCE concentrations in the groundwater for worst case assumptions over a thirty year period for low recharge/below normal precipitation and high recharge/above normal precipitation are presented on Figure 3-5 and Figure 3-6, respectively. The model predicts that the western part of the CBP will be captured by the Dewatering Pond.

4. SOUTHWEST TREATMENT AREA CORRECTIVE MEASURES

4.1. ENGINEERING CONTROLS

Engineering controls to restrict or minimize potential contact with water that contains TCE in the Southwest Treatment Area are discussed in this Section. Implementation of these control measures is discussed in Section 4.2.

4.1.1. HYDRAULIC CONTROL

ALDOT has determined that groundwater in the western part of the CBP can be controlled by maintaining the water levels in the SWTA Dewatering Pond at levels at or below approximately 120 ft AMSL. Thus, ALDOT will maintain the dewatering system and water conveyance ponds for this corrective measure. The hydraulic-control layout for this corrective measure is presented in Figure 4-1.

4.1.1.1. HYDRAULIC CONTROL PONDS

Hydraulic control of the CBP in the Southwest Treatment Area will be accomplished by using the following system components:

- Dewatering Pond: Maintain the water level at or below approximately 120 feet AMSL. Pump water from the Dewatering Pond to the Transfer Pond.

  Transfer Pond: Pump water from the Transfer Pond to the Discharge Pond for discharge and/or the Auxiliary Treatment Basin for recirculation and treatment.

  Auxiliary Treatment Basin (formerly NMM Settling Basin): After treatment in the Auxiliary Treatment Basin, the water gravity flows back to the Transfer Pond.

- Discharge Pond: Provide final treatment prior to gravity flow discharge to the natural wetland at the southern part of the site. Discharge from the pond is via a rip-rap lined ditch (Discharge Ditch). The compliance point, DSN001 for the National Pollutant Discharge Elimination System

(NPDES) permit is located at the end of the Discharge Ditch.

- Natural Wetland: The southern part of the SWTA includes a natural wetland covering approximately 18 acres. Water collects in the wetland and ultimately discharges through a flood-gate owned by the City of Montgomery at the southwestern property boundary.

4.1.1.2. HYDRAULIC CONTROL SYSTEM MONITORING

ALDOT will monitor the dewatering system and maintain operational records to evaluate the efficiency and effectiveness of this hydraulic-control measure. Operational monitoring will include:

- Measure flows from the Dewatering Pond to the Transfer Pond, Transfer Pond to the Sediment Basin, and Transfer Pond to the Discharge Pond.

- Survey the bottoms and tops of the bank elevations of the Dewatering and Transfer Ponds, as needed, to determine sediment accumulations in the Ponds.

- Record water levels in the Dewatering, Transfer, and Discharge Ponds using pressure transducers. Staff gauges will be monitored to provide back-up measurements if a transducer fails.

- Measure groundwater levels semi-annually in the following monitoring wells and piezometers: PZ-18, PZ-19, PZ-20, PZ-21R, PZ-26, P-1, P-2, P-3, P-4, MW-260, MW261, MW-262, MW-263, MW-264, MW-265, and Boundary Wells BDY-11R, BDY-12, BDY-13, and BDY-14.

- Rainfall events will be monitored and gauged to the nearest 0.01 inch.

4.1.2. PROPERTY CONTROL

The bounds of the SWTA are secured with a chain-link security fence with locking gates. Previously mined areas (e.g., open areas without vegetative cover) have been reclaimed in accordance with Alabama Department of Industrial Relations requirements. Maintenance of the roads and ponds will continue during the corrective measures monitoring period.

4.2. CONTROL MEASURES IMPLEMENTED THROUGH 2012

Following ALDOT's purchase of the former North Montgomery Materials sand and gravel mine in 2009, the following components of the SWTA Corrective Measures have been or are in the process of being implemented:

Security Measures:
- Approximately 21,800 linear feet of perimeter fencing with locking gates.
- Daily inspection of fencing and facility interior.

General Site Improvements:
- Land reclamation completed and approved by Alabama Department of Industrial Relations.
- Slopes re-graded and vegetated to stabilize for the correctives measures monitoring period.
- Storm water conveyances re-graded and improved to reduce storm water flow into the Dewatering and Transfer Ponds, reduce erosion, and improve sediment control.

Dewatering Pond:
- Open water area within the pond has been deepened to maintain water levels at or below 120 ft AMSL.
- The Dobbs pump was replaced with an ABS pump system for compatibility with the Transfer Pond and telemetry system that was installed in May 2012 (see Appendix B for pump specifications). The Dobbs pump has been retained to provide backup for redundancy.
- Flow meters were installed to display instantaneous flow and total flow.
- Piping to the Transfer Pond was repaired and replaced.

- Outfall discharge to Transfer Pond was elevated and rip- rap added to outfall to provide increased aeration.

Transfer Pond:
- Single pump (Godwin) system replaced with a dual pump (ABS) system (see Appendix B for pump specifications).
- Flow meter to be installed to display instantaneous flow and total flow.

Discharge Pond
- Constructed spring 2011.
- Pond capacity is approximately 600,000 gallons. Design plans are provided in Appendix B and described below:
- Provides treatment through:
  - Forebay with deep pool area to provide sediment control and extended retention time.
  - Wetland bench planted with cattails constructed as three cells separated by low berms to maximize retention time.
  - Deep pool area at discharge for extended retention time.
  - 890 linear foot rip-rap lined discharge channel to provide additional retention time.

Automated Pump Control System (design information provided in Appendix B) consisting of:
- Level controller for the Discharge Pond pump to be installed that turns the pump on and off at specified minimum and maximum elevations.
- Level controller for the two Transfer Pond pumps to be installed that sequentially turn the pumps on and off based on elevations, including high level operations of both pumps for high flow conditions.
- Telemetry system for remote access to pump operation to be installed. The secure access telemetry system includes: remote pump station operation, automated alarms and alerts, real time

monitoring, and electronic record storage of pump operation statistics.

Auxiliary Treatment Basin (formerly Settling Basin) Modifications:

- T-valve and piping to the basin added to allow diversion of flow if additional treatment is required.
- Diversion berm added to the basin to increase retention time.

Monitoring:

- Routine water level monitoring conducted since 2009 is described in Section 4.1.1.2.
- Routine water quality monitoring conducted since 2009 is described in Section 6.

Permits

- The former NPDES permit for the mining operation was terminated on August 30, 2011. A new NPDES permit (ALD0081167) was issued on August 19, 2011. The permit was modified on July 31, 2013 to move the compliance point from the Flood Gate to the confluence of the Discharge Ditch with the natural wetland.
- The Department of Industrial Relations Inspector's Acceptance of Reclamation for the former mining operation was issued on March 25, 2011.

5. PERMITS AND APPROVALS

5.1. PERMIT REQUIREMENTS

ALDOT has and will continue to obtain all necessary permits and approvals prior to implementing treatment enhancements. ALDOT maintains an NPDES permit (AL0081167) for discharges from the SWTA.

In accordance with Alabama Department of Industrial Relations (ADIR) requirements, the existing ponds at the SWTA have been designated "Industrial" use as part of the corrective measures for the CBP. Additionally, ALDOT has reclaimed previously mined areas using permanent native grasses in accordance with ADIR land reclamation requirements.

5.2. EROSION AND SEDIMENT CONTROL

ALDOT will comply with established guidelines for erosion and sediment control, including:

- General Requirements for Erosion and Sediment Control on ALDOT Projects;
- ADEM Administrative Code R. 335-6-12; and,
- Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas.

6. SOUTHWEST TREATMENT AREA MONITORING

6.1. SURFACE WATER MONITORING

Corrective-measure effectiveness will be monitored at the following SWTA sites (see Figure 6-1 and Table 6-1):

- SWA-1: Dewatering Pond
- SWA-2: Transfer Pond
- SWA-3: Inlet structure at Discharge Pond from Transfer Pond
- SWA-4: Outlet structure at Discharge Pond

These sites will be sampled quarterly.

Compliance point samples (DSN001) will be collected at the permitted NPDES outfall for the SWTA at the confluence of the Discharge Ditch with the natural wetland.

The NPDES permit requires flow and pH measurements and collection of samples for TCE once every two weeks.

Voluntary surface water samples are collected on a periodic basis at FG and O1. These sample locations are downstream of compliance point DSN001. Samples collected at FG are used to monitoring water quality discharged to the city of Montgomery storm water conveyance to Cypress Creek. Water quality from storm water entering the natural wetlands along portions of Lower Wetumpka Road is monitored at O1. ALDOT has elected to continue voluntary monitoring at these locations; however, these sample locations may be discontinued in the future.

6.2. GROUNDWATER MONITORING

Groundwater monitoring in the SWTA is described in the Long Term Monitoring Plan for the CBP. Groundwater monitoring in the SWTA will include Effectiveness monitoring wells (EFF) and Boundary (BDY) monitoring wells.

Groundwater elevations will be compared to model–predicted elevations to verify capture of the western part of the CBP by the dewatering system. A model review will be conducted at five (5) year intervals to verify the site-wide model, evaluate the effectiveness of the corrective measures, and evaluate the hydraulic-control system. Additionally, ALDOT will evaluate the need to update the model if one or more of the following is identified:

- A previously unknown and active residential, commercial, or industrial well.
- A change in dewatering operations at nearby mines.
- Any other event that may significantly alter the configuration of the CBP.

Any proposed modification to the dewatering and treatment system will be submitted to ADEM for approval.

6.3. INSPECTIONS

A formal inspection will be conducted at the SWTA monthly. More frequent informal inspections will be conducted when personnel are on site for sampling or to observe pump operations. A telemetry system was installed in 2012 that provides remote pump station operation, automated alarms and alerts, real time monitoring, and electronic record storage of pump operation statistics.

6.4. REPORTING

The SWTA corrective-measure effectiveness will be evaluated continually and documented in an Annual Report to ADEM in accordance with the Long-Term Monitoring Plan for the CBP. At a minimum, data that verify the control and capture of the southwest part of the CBP and compliance with TCE discharge limits will be presented in the Corrective Measures Effectiveness Annual Report. Recommendations for optimizing or modifying corrective measures also may be discussed in the Annual Report. ALDOT will collect surface water samples quarterly and provide results in the Annual Report. Reports of NPDES compliance will be submitted as required by the permit.

7. REFERENCES

ALDOT, 2008. Site-Wide Corrective Measures Evaluation: Coliseum Boulevard Plume. Montgomery, AL October 2007.

Knowles, D.B., Reade, H.L., and Scott, J.C., 1963. Geology and Groundwater Resources of Montgomery County, Alabama. USGS Water Supply Paper 1606.

Sapp, C. D., and Emplaincourt, Jacques, 1975. Physiographic regions of Alabama: Alabama Geological Survey Map 168.

TTL, 2001. Conceptual Geology and Hydrogeology Based on Investigations through March 2001: Coliseum Boulevard Plume Site. Montgomery AL. May 9, 2001.

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Tables

Southwest Treatment Area Corrective Measures Implementation Plan

COLISEUM BOULEVARD PLUME SITE
MONTGOMERY, ALABAMA

DEPARTMENT OF TRANSPORTATION

Table 2-1

Flow Measurements Summary

Site	Location	Pipe	Estimated Flow[1]	Measured Flow[2]		Model Predicted[3]	
		Diameter	GPM[4]	GPM	MGD[5]	MGD	MG/WK[6]
NMM	Dewatering Pond to Transfer Pond	8"	1,200	940			
NMM	Wash Water Pond to South Ponds	8"	1,500	1,110			
ACI	ACI Dewatering Pond to South Ponds	No Pipe	1,200	1,015			
				Total Discharge From South Ponds	**2.40[7]**	**2.50**	**12.50**

NOTES:

1 Based on pump curves and estimated operation schedule provided by NMM operator

2 Measured using inductive flow meter on August 15th through 21st, 2008

3 Estimated as groundwater extracted from pit using re-calibrated Site-Wide Model

4 GPM – Gallons Per Minute

5 MGD – Million Gallons Per Day

6 MG/WK – Million Gallons Per Week

7 Measured over a 24 hour period using a flow meter on August 23rd through August 24th, 2008

Table 2-2
Analytical Results for Surface Water Samples Collected in the Southwest Treatment Area (Separated by Sampling Event)

Sample Location (Sample ID)	Date	TCE (µg/L)	m,p-Xylene (µg/L)	Other VOCs (µg/L)
Dewatering Pond (DWP)	7/31/2008	2.4	<1	<1
Transfer Pond (DTP)	7/31/2008	<1	<1	<1
Wash Water Pond (WWP)	7/31/2008	<1	<1	<1
Settling Basin	7/31/2008	<1	<1	<1
End of Discharge Pipe	7/31/2008	<1	<1	<1
South Pond	7/31/2008	<1	<1	<1
Dewatering Pond (DWP)	9/19/2008	3.5	8.5	<1
Transfer Pond (DTP)	9/19/2008	1.0	<1	<1
Wash Water Pond (WWP)	9/19/2008	<1	<1	<1
Settling Basin	9/19/2008	<1	<1	<1
End of Discharge Pipe	9/19/2008	NS	NS	NS
South Pond	9/19/2008	NS	NS	NS
Dewatering Pond (DWP)	10/29/2008	9.1	<1	<1
Transfer Pond (DTP)	10/29/2008	1.4	<1	<1
Wash Water Pond (WWP)	10/29/2008	<1	<1	<1
Settling Basin	10/29/2008	NS	NS	NS
End of Discharge Pipe	10/29/2008	<1	<1	<1
South Pond	10/29/2008	<1	<1	<1
Asphalt Contractors Long Pond-N	11/05/2008	1	<1	<1
Asphalt Contractors Long Pond-C	11/05/2008	<1	<1	<1
Asphalt Contractors Long Pond-S	11/05/2008	<1	<1	<1
Asphalt Contractors Dewatering Pond	11/05/2008	<1	<1	<1
Dewatering Pond (DWP)	11/17/2008	<1	<1	<1
Transfer Pond (DTP)	11/17/2008	<1	<1	<1
Wash Water Pond (WWP)	11/17/2008	<1	<1	<1
Settling Basin	11/17/2008	<1	<1	<1
End of Discharge Pipe	11/17/2008	<1	<1	<1
South Pond	11/17/2008	<1	<1	<1
Dewatering Pond (DWP)	1/28/2009	2.3	<1	<1

Table 2-2 Continued
Analytical Results for Surface Water Samples Collected in the Southwest Treatment Area (Separated by Sampling Event)

Sample Location (Sample ID)	Date	TCE (µg/L)	m,p-Xylene (µg/L)	Other VOCs (µg/L)
Transfer Pond (DTP)	1/28/2009	1	<1	<1
Wash Water Pond (WWP)	1/28/2009	<1	<1	<1
Settling Basin	1/28/2009	<1	<1	<1
End of Discharge Pipe	1/28/2009	NS	NS	NS
South Pond	1/28/2009	<1	<1	<1
Dewatering Pond (DWP)	2/13/2009	<1	<1	<1
Transfer Pond (DTP)	2/13/2009	<1	<1	<1
Wash Water Pond (WWP)	2/13/2009	<1	<1	<1
Settling Basin	2/13/2009	<1	<1	<1
End of Discharge Pipe	2/13/2009	<1	<1	<1
South Pond	2/13/2009	<1	<1	<1
Dewatering Pond (DWP)	3/3/2009	<1	<1	<1
Transfer Pond (DTP)	3/3/2009	<1	<1	<1
Wash Water Pond (WWP)	3/3/2009	<1	<1	<1
End of Discharge Pipe	3/3/2009	<1	<1	<1
South Pond	3/3/2009	<1	<1	<1
Asphalt Contractors Long Pond-N	4/10/2009	<1	<1	<1
Asphalt Contractors Long Pond-2	4/10/2009	<1	<1	<1
Asphalt Contractors Long Pond-3	4/10/2009	<1	<1	<1
Asphalt Contractors Dewatering Pond	4/10/2009	<1	<1	<1
Dewatering Pond (DWP)	4/10/2009	<1	<1	<1
Transfer Pond (DTP)	4/10/2009	<1	<1	<1
Wash Water Pond (WWP)	4/10/2009	<1	<1	<1
End of Discharge Pipe	4/10/2009	<1	<1	<1
South Pond	4/10/2009	<1	<1	<1
Dewatering Pond (DWP)	5/15/2009	1.8	<1	<1
Transfer Pond (DTP)	5/15/2009	<1	<1	<1
Wash Water Pond (WWP)	5/15/2009	<1	<1	<1

Table 2-2 Continued
Analytical Results for Surface Water Samples Collected in the Southwest Treatment Area (Separated by Sampling Event)

Sample Location (Sample ID)	Date	TCE (µg/L)	m,p-Xylene (µg/L)	Other VOCs (µg/L)
End of Discharge Pipe	5/15/2009	<1	<1	<1
South Pond	5/15/2009	<1	<1	<1
Dewatering Pond (DWP)	6/1/2009	1.4	<1	<1
Transfer Pond (DTP)	6/1/2009	<1	<1	<1
Wash Water Pond (WWP)	6/1/2009	<1	<1	<1
End of Discharge Pipe	6/1/2009	<1	<1	<1
South Pond	6/1/2009	<1	<1	<1
Dewatering Pond (DWP)	7/7/2009	3.9	<1	<1
Transfer Pond (DTP)	7/7/2009	2.3	<1	<1
Wash Water Pond (WWP)	7/7/2009	<1	<1	<1
End of Discharge Pipe	7/7/2009	<1	<1	<1
South Pond	7/7/2009	<1	<1	<1
Dewatering Pond (DWP)	8/4/2009	4.8	<1	<1
Transfer Pond (DTP)	8/4/2009	1.1	<1	<1
Wash Water Pond (WWP)	8/4/2009	<1	<1	<1
End of Discharge Pipe	8/4/2009	<1	<1	<1
South Pond	8/4/2009	<1	<1	<1
Asphalt Contractors Long Pond-N	8/26/2009	<1	<1	<1
Asphalt Contractors Long Pond-C	8/26/2009	<1	<1	<1
Asphalt Contractors Long Pond-S	8/26/2009	<1	<1	<1
Asphalt Contractors Dewatering Pond	8/26/2009	<1	<1	<1
Dewatering Pond (DWP)	9/10/2009	<1	<1	<1
Transfer Pond (DTP)	9/10/2009	2.1	<1	<1
Wash Water Pond (WWP)	9/10/2009	1.2	<1	<1
End of Discharge Pipe	9/10/2009	<1	<1	<1
South Pond	9/10/2009	<1	<1	<1
Dewatering Pond (DWP)	10/9/2009	3.3	2.4	<1
Transfer Pond (DTP)	10/9/2009	2.7	2.3	<1

Table 2-2 Continued
Analytical Results for Surface Water Samples Collected in the Southwest Treatment Area (Separated by Sampling Event)

Sample Location (Sample ID)	Date	TCE (µg/L)	m,p-Xylene (µg/L)	Other VOCs (µg/L)
Wash Water Pond (WWP)	10/9/2009	1.3	<1	<1
End of Discharge Pipe	10/9/2009	1.2	<1	<1
South Pond	10/9/2009	<1	<1	<1
Dewatering Pond (DWP)	11/3/2009	<1	<1	<1
Transfer Pond (DTP)	11/3/2009	1.9	<1	<1
Wash Water Pond (WWP)	11/3/2009	<1	<1	<1
End of Discharge Pipe	11/3/2009	<1	<1	<1
South Pond	11/3/2009	<1	<1	<1
Asphalt Contractors Long Pond-N	11/2/2009	<1	<1	<1
Asphalt Contractors Long Pond-C	11/2/2009	<1	<1	<1
Asphalt Contractors Long Pond-S	11/2/2009	<1	<1	<1
Asphalt Contractors Dewatering Pond	11/2/2009	<1	<1	<1
Dewatering Pond (DWP)	12/4/2009	1.3	<1	<1
Transfer Pond (DTP)	12/4/2009	1.6	<1	<1
Wash Water Pond (WWP)	12/4/2009	<1	<1	<1
End of Discharge Pipe	12/4/2009	<1	<1	<1
South Pond	12/4/2009	<1	<1	<1
Dewatering Pond (DWP)	1/4/2010	<1	<1	<1
Transfer Pond (DTP)	1/4/2010	<1	<1	<1
Wash Water Pond (WWP)	1/4/2010	<1	<1	<1
End of Discharge Pipe	1/4/2010	<1	<1	<1
South Pond	1/4/2010	<1	<1	<1
Asphalt Contractors Long Pond-N	1/4/2010	<1	<1	<1
Asphalt Contractors Long Pond-C	1/4/2010	<1	<1	<1
Asphalt Contractors Long Pond-S	1/4/2010	<1	<1	<1
Asphalt Contractors Dewatering Pond	1/4/2010	<1	<1	<1
Dewatering Pond (DWP)	2/16/2010	<1	<1	<1
Transfer Pond (DTP)	2/16/2010	<1	<1	<1
Wash Water Pond (WWP)	2/16/2010	<1	<1	<1

Table 2-2 Continued

Analytical Results for Surface Water Samples Collected in the Southwest Treatment Area (Separated by Sampling Event)

Sample Location (Sample ID)	Date	TCE (µg/L)	m,p-Xylene (µg/L)	Other VOCs (µg/L)
End of Discharge Pipe	2/16/2010	<1	<1	<1
South Pond	2/16/2010	<1	<1	<1
Dewatering Pond (DWP)	3/4/2010	<1	<1	<1
Transfer Pond (DTP)	3/4/2010	1	<1	<1
Wash Water Pond (WWP)	3/4/2010	<1	<1	<1
End of Discharge Pipe	3/4/2010	<1	<1	<1
South Pond	3/4/2010	<1	<1	<1
Dewatering Pond (DWP)	4/2/2010	2.7	<1	<1
Transfer Pond (DTP)	4/2/2010	3.3	<1	<1
Wash Water Pond (WWP)	4/2/2010	<1	<1	<1
End of Discharge Pipe	4/2/2010	<1	<1	<1
South Pond	4/2/2010	<1	<1	<1
Asphalt Contractors Long Pond-N	4/2/2010	<1	<1	<1
Asphalt Contractors Long Pond-C	4/2/2010	<1	<1	<1
Asphalt Contractors Long Pond-S	4/2/2010	<1	<1	<1
Asphalt Contractors Dewatering Pond	4/2/2010	<1	<1	<1
Dewatering Pond (DWP)	5/5/2010	2.1	<1	<1
Transfer Pond (DTP)	5/5/2010	1.6	<1	<1
Wash Water Pond (WWP)	5/5/2010	<1	<1	<1
End of Discharge Pipe	5/5/2010	<1	<1	<1
South Pond	5/5/2010	<1	<1	<1
Dewatering Pond (DWP)	6/2/2010	<1	<1	<1
Transfer Pond (DTP)	6/2/2010	<1	<1	<1
Wash Water Pond (WWP)	6/2/2010	<1	<1	<1
End of Discharge Pipe	6/2/2010	<1	<1	<1
South Pond	6/2/2010	<1	<1	<1
Dewatering Pond (DWP)	7/8/2010	2.5	<1	<1
Transfer Pond (DTP)	7/8/2010	3.1	<1	<1
Wash Water Pond (WWP)	7/8/2010	<1	<1	<1

Table 2-2 Continued

Analytical Results for Surface Water Samples Collected in the Southwest Treatment Area (Separated by Sampling Event)

Sample Location (Sample ID)	Date	TCE (µg/L)	m,p-Xylene (µg/L)	Other VOCs (µg/L)
End of Discharge Pipe	7/8/2010	<1	<1	<1
South Pond	7/8/2010	<1	<1	<1
Dewatering Pond (DWP)	8/4/2010	1.6	<1	<1
Transfer Pond (DTP)	8/4/2010	4.0	<1	<1
Wash Water Pond (WWP)	8/4/2010	<1	<1	<1
End of Discharge Pipe	8/4/2010	<1	<1	<1
South Pond	8/4/2010	<1	<1	<1
Dewatering Pond (DWP)	9/3/2010	2.6	<1	<1
Transfer Pond (DTP)	9/3/2010	2.6	<1	<1
Wash Water Pond (WWP)	9/3/2010	<1	<1	<1
End of Discharge Pipe	9/3/2010	<1	<1	<1
South Pond	9/3/2010	<1	<1	<1
Dewatering Pond (DWP)	10/5/2010	2.1	<1	<1
Transfer Pond (DTP)	10/5/2010	<1	<1	<1
Wash Water Pond (WWP)	10/5/2010	<1	<1	<1
End of Discharge Pipe	10/5/2010	<1	<1	<1
South Pond	10/5/2010	<1	<1	<1
Dewatering Pond (SA-1)	11/3/2010	1.6	<1	<1
Transfer Pond (SA-2)	11/3/2010	<1	<1	<1
Wash water Pond (SA-3)	11/3/2010	<1	<1	<1
End of Discharge Pipe (SA-4)	11/3/2010	<1	<1	<1
South Pond (SA-5)	11/3/2010	<1	<1	<1
Dewatering Pond (SA-1)	12/7/2010	1.1	<1	<1
Transfer Pond (SA-2)	12/7/2010	<1	<1	<1
Wash water Pond (SA-3)	12/7/2010	<1	<1	<1
End of Discharge Pipe (SA-4)	12/7/2010	<1	<1	<1
South Pond (SA-5)	12/7/2010	<1	<1	<1
Dewatering Pond (SA-1)	1/12/2011	1.3	<1	<1

Table 2-2 Continued
Analytical Results for Surface Water Samples Collected in the Southwest Treatment Area (Separated by Sampling Event)

Sample Location (Sample ID)	Date	TCE (µg/L)	m,p-Xylene (µg/L)	Other VOCs (µg/L)
Transfer Pond (SA-2)	1/12/2011	<1	<1	<1
Wash water Pond (SA-3)	1/12/2011	<1	<1	<1
End of Discharge Pipe (SA-4)	1/12/2011	<1	<1	<1
South Pond (SA-5)	1/12/2011	<1	<1	<1
Dewatering Pond (SA-1)	2/10/2011	2.1	<1	<1
Transfer Pond (SA-2)	2/10/2011	<1	<1	<1
Wash water Pond (SA-3)	2/10/2011	<1	<1	<1
End of Discharge Pipe (SA-4)	2/10/2011	<1	<1	<1
South Pond (SA-5)	2/10/2011	<1	<1	<1
Dewatering Pond (SA-1)	3/3/2011	2.8	<1	<1
Transfer Pond (SA-2)	3/3/2011	1.3	<1	<1
Wash water Pond (SA-3)	3/3/2011	<1	<1	<1
End of Discharge Pipe (SA-4)	3/3/2011	<1	<1	<1
South Pond (SA-5)	3/3/2011	<1	<1	<1
Dewatering Pond (SA-1)	4/7/2011	1.2	<1	<1
Transfer Pond (SA-2)	4/7/2011	<1	<1	<1
Wash water Pond (SA-3)	4/7/2011	<1	<1	<1
End of Discharge Pipe (SA-4)	4/7/2011	<1	<1	<1
South Pond (SA-5)	4/7/2011	<1	<1	<1
Dewatering Pond (SA-1)	5/6/2011	3.2	NS	NS
Transfer Pond (SA-2)	5/6/2011	<1	NS	NS
Wash water Pond (SA-3)	5/6/2011	<1	NS	NS
End of Discharge Pipe (SA-4)	5/6/2011	<1	NS	NS
South Pond (SA-5)	5/6/2011	<1	NS	NS
Dewatering Pond (SA-1)	6/2/2011	4.0	NS	NS
Transfer Pond (SA-2)	6/2/2011	2.5	NS	NS
Wash water Pond (SA-3)	6/2/2011	<1	NS	NS
End of Discharge Pipe (SA-4)	6/2/2011	<1	NS	NS

Table 2-2 Continued
Analytical Results for Surface Water Samples Collected in the Southwest Treatment Area (Separated by Sampling Event)

Sample Location (Sample ID)	Date	TCE (µg/L)	m,p-Xylene (µg/L)	Other VOCs (µg/L)
South Pond (SA-5)	6/2/2011	<1	NS	NS
Dewatering Pond (SA-1)	7/1/2011	2.7	NS	NS
Transfer Pond (SA-2)	7/1/2011	<1	NS	NS
Wash water Pond (SA-3)	7/1/2011	<1	NS	NS
End of Discharge Pipe (SA-4)	7/1/2011	<1	NS	NS
South Pond (SA-5)	7/1/2011	<1	NS	NS
Dewatering Pond (SWA-1)	8/10/2011	1.2	NS	NS
Transfer Pond (SWA-2)	8/10/2011	<1	NS	NS
Inlet Structure at Discharge Pond from Transfer Pond (SWA-3)	8/10/2011	<1	NS	NS
Outlet Structure at Discharge Pond (SWA-4)	8/10/2011	<1	NS	NS
Discharge to Wetland (SWA-5)	8/10/2011	<1	NS	NS
Dewatering Pond (SWA-1)	8/26/2011	2.5	NS	NS
Transfer Pond (SWA-2)	8/26/2011	<1	NS	NS
Inlet Structure at Discharge Pond from Transfer Pond (SWA-3)	8/26/2011	<1	NS	NS
Outlet Structure at Discharge Pond (SWA-4)	8/26/2011	<1	NS	NS
Discharge to Wetland (SWA-5)	8/26/2011	<1	NS	NS
Dewatering Pond (SWA-1)	9/8/2011	1.1	NS	NS
Transfer Pond (SWA-2)	9/8/2011	<1	NS	NS
Inlet Structure at Discharge Pond from Transfer Pond (SWA-3)	9/8/2011	<1	NS	NS
Outlet Structure at Discharge Pond (SWA-4)	9/8/2011	<1	NS	NS
Discharge to Wetland (SWA-5)	9/8/2011	<1	NS	NS
Dewatering Pond (SWA-1)	9/19/2011	2.8	NS	NS
Transfer Pond (SWA-2)	9/19/2011	1.1	NS	NS
Inlet Structure at Discharge Pond from Transfer Pond (SWA-3)	9/19/2011	<1	NS	NS
Outlet Structure at Discharge Pond (SWA-4)	9/19/2011	<1	NS	NS

Table 2-2 Continued

Analytical Results for Surface Water Samples Collected in the Southwest Treatment Area (Separated by Sampling Event)

Sample Location (Sample ID)	Date	TCE (µg/L)	m,p-Xylene (µg/L)	Other VOCs (µg/L)
Discharge to Wetland (SWA-5)	9/19/2011	<1	NS	NS
Dewatering Pond (SWA-1)	10/5/2011	2.0	NS	NS
Transfer Pond (SWA-2)	10/5/2011	<1	NS	NS
Inlet Structure at Discharge Pond from Transfer Pond (SWA-3)	10/5/2011	<1	NS	NS
Outlet Structure at Discharge Pond (SWA-4)	10/5/2011	<1	NS	NS
Discharge to Wetland (SWA-5)	10/5/2011	<1	NS	NS
Dewatering Pond (SWA-1)	10/18/2011	2.1	NS	NS
Transfer Pond (SWA-2)	10/18/2011	1.1	NS	NS
Inlet Structure at Discharge Pond from Transfer Pond (SWA-3)	10/18/2011	<1	NS	NS
Outlet Structure at Discharge Pond (SWA-4)	10/18/2011	<1	NS	NS
Discharge to Wetland (SWA-5)	10/18/2011	<1	NS	NS

Notes:

NS = Not Sampled

Reporting Limit = 1 µg/L

As of August 2011 SA-1 and SA-2 sample locations for Southwest Area have been renamed SWA-1 and SWA-2, respectively, to reflect the transition from Southwest Area to Southwest Treatment Area. Accordingly, SA-3 through SA-5 sample locations for the Southwest Area have been renamed, SWA-3 through SWA-5, respectively; and relocated to include the Southwest Treatment Areas newly constructed Discharge Pond. (Reference Figures).

SWA-1 = Dewatering Pond

SWA-2 = Transfer Pond

SWA-3 = Inlet Structure at Discharge Pond from Transfer Pond

SWA-4 = Outlet Structure at Discharge Pond

SWA-5 = Discharge to wetland

Table 2-3
Analytical Results for Sediment Samples

Location	Sample	Date	VOC (µg/Kg)	SVOC (µg/Kg)	Sulfide (mg/Kg)	Iron (mg/Kg)	Organic Carbon (% by wt)	Nitrate/Nitrite as N (mg/Kg)	pH SU	Phosphate, total as P (mg/Kg)	Sulfate as SO_4 (mg/Kg)	% Solids
Dewatering Pond	A	8/4/2008	<RL	<RL	<RL	8,800	2.1	25.9	5.26	36	170	ND
	B	8/4/2008	<RL	<RL	<RL	5,600	1	17.8	5.66	25.9	121	ND
	C	8/4/2008	<RL	<RL	<RL	4,720	1.2	20.3	5.25	32.6	88	ND
Upstream Silt Basin	A	8/5/2008	<RL	<RL	<RL	3,410	0.4	4	5.85	17.2	121	ND
	B	8/5/2008	<RL	<RL	<RL	2,950	0.3	4	5.45	12.3	75	ND
	C	8/5/2008	<RL	<RL	<RL	2,410	1.4	4.7	5.3	9.3	148	ND
Downstream Silt Basin	A	8/4/2008	<RL	<RL	<RL	10,700	3.6	16.1	6.31	79.1	216	ND
	B	8/4/2008	<RL	<RL	<RL	5,010	1.8	18	5.36	35.3	401	ND
	C	8/4/2008	<RL	<RL	<RL	9,070	2.1	19.4	5.38	65	193	ND
South Ponds	A	8/6/2008	<RL	<RL	<RL	3,180	9	3.6	6.6	18.8	74	ND
	B	8/6/2008	<RL	<RL	<RL	19,000	0.6	3.4	5.37	178	66	ND
	C	9/23/2008	<RL	<RL	6.6	1,460	0.4	<RL	6.65	17.3	67	83.6
	D	9/23/2008	<RL	<RL	46.2	14,400	8.8	<RL	6.67	138	210	33.5
	E	9/23/2008	<RL	<RL	16.9	9,120	5.5	<RL	6.44	58.9	111	63.8

Notes:
ND = No data available or not sampled
RL = reporting limit
wt = weight
Reporting limit varies for the various analytes and samples collected, see Status Reports for exact values

Table 2-4
Analytical Results for Groundwater Samples

Location	Date	TCE (µg/L)	1,1-DCE (µg/L)	Carbon Tetrachloride (µg/L)	Chloroform (µg/L)	Chloromethane (µg/L)
PZ-18	7/30/2008	<RL	<RL	<RL	<RL	<RL
PZ-19	7/30/2008	<RL	<RL	<RL	<RL	<RL
PZ-20	7/29/2008	27.4	5	1.1	1	<RL
PZ-21	7/29/2008	22.8	1.6	<RL	3.9	<RL
PZ-18	9/18/2008	<RL	<RL	<RL	<RL	<RL
PZ-19	9/25/2008	<RL	<RL	<RL	<RL	<RL
PZ-20	9/25/2008	28.6	8	3.5	<RL	<RL
PZ-20 Shallow	9/13/2008	<RL	<RL	<RL	<RL	2.1
PZ-21	9/25/2008	25	3.8	<RL	3.6	<RL
MW-221C	9/18/2008	54.5	4.5	1.2	4.7	<RL
MW-259	9/17/2008	<RL	<RL	<RL	3.4	<RL
MW-260	9/19/2008	1.1	<RL	<RL	2.1	<RL
MW-261	9/19/2008	<RL	<RL	<RL	<RL	<RL
MW-262	9/26/2008	3.4	4.2	<RL	11.8	<RL
MW-263	9/24/2008	141	1.1	<RL	8.6	<RL
MW-264	9/25/2008	47.2	2.8	<RL	<RL	<RL
MW-265	9/25/2008	21.2	11.6	3.9	3.5	<RL
PZ-18	1/19/2009	<RL	<RL	<RL	<RL	<RL
PZ-19	1/14/2009	<RL	<RL	<RL	<RL	<RL
PZ-20	1/15/2009	28.7	6.2	<RL	1.1	<RL
PZ-21	1/27/2009	24.5	2.7	<RL	2.3	<RL
MW-259	1/23/2009	<RL	<RL	<RL	<RL	<RL
MW-260	1/14/2009	1.2	<RL	<RL	<RL	<RL
MW-261	1/14/2009	<RL	<RL	<RL	<RL	<RL
MW-262	1/15/2009	2.3	2.4	<RL	2.8	<RL
MW-263	1/26/2009	218	1.8	<RL	1.2	<RL
MW-264	1/26/2009	48.9	2.4	<RL	1.6	<RL
MW-265	1/26/2009	23.3	10.2	1.3	1.1	<RL
MW-221C	1/23/2009	53.3	4.1	<RL	1.2	<RL
PZ-18	4/14/2009	<RL	<RL	<RL	<RL	<RL
PZ-19	4/15/2009	<RL	<RL	<RL	<RL	<RL
PZ-20	4/16/2009	27.5	7.2	1.2	1.4	<RL
PZ-21	4/16/2009	28.9	4.3	<RL	2.2	<RL

Table 2-4 Continued
Analytical Results for Groundwater Samples

Location	Date	TCE (µg/L)	1,1-DCE (µg/L)	Carbon Tetrachloride (µg/L)	Chloroform (µg/L)	Chloromethane (µg/L)
MW-260	4/15/2009	1.2	<RL	<RL	<RL	<RL
MW-261	4/15/2009	<RL	<RL	<RL	<RL	<RL
MW-262	4/16/2009	2.6	3	<RL	3.9	<RL
MW-263	4/30/2009	226	1.8	<RL	1.2	<RL
MW-264	4/30/2009	60.9	3	<RL	2	<RL
MW-265	5/1/2009	24.5	9.6	1.8	1.4	<RL
MW-221C	4/14/2009	70.4	4.4	1.2	1.2	<RL
PZ-18	10/5/2009	<RL	<RL	<RL	1.2	<RL
PZ-19	10/1/2009	<RL	<RL	<RL	<RL	<RL
PZ-20	10/2/2009	26.8	7.1	3.7	1.4	<RL
PZ-21	10/2/2009	27.4	4.3	3.4	1.5	<RL
PZ-18	1/8/2010	<RL	<RL	<RL	<RL	<RL
PZ-19	1/5/2010	<RL	<RL	<RL	<RL	<RL
PZ-20	1/6/2010	22.3	6.5	1.1	1.4	<RL
PZ-21	1/4/2010	22.3	3.2	<RL	1.3	<RL
MW-260	1/5/2010	<RL	<RL	<RL	<RL	<RL
MW-261	1/5/2010	<RL	<RL	<RL	<RL	<RL
MW-262	1/5/2010	<RL	<RL	<RL	2.4	<RL
MW-263	1/6/2010	118	1	<RL	<RL	<RL
MW-264	1/6/2010	53.1	2.6	<RL	2.2	<RL
MW-265	1/6/2010	12.6	2.1	<RL	<RL	<RL
MW-221C	1/8/2010	23.7	<RL	<RL	1	<RL
PZ-18	4/7/2010	<RL	<RL	<RL	<RL	<RL
PZ-19	4/6/2010	<RL	<RL	<RL	<RL	<RL
PZ-20	4/7/2010	24.5	5.5	1.2	1.4	<RL
PZ-21	4/1/2010	19.5	3	<RL	1.4	<RL
MW-260	4/2/2010	<RL	<RL	<RL	<RL	<RL
MW-261	4/5/2010	<RL	<RL	<RL	<RL	<RL
MW-262	4/1/2010	1.8	1.9	<RL	4.0	<RL
MW-263	4/6/2010	219	1.6	<RL	<RL	<RL
MW-264	4/5/2010	51.9	2.3	<RL	2.1	<RL
MW-265	4/5/2010	2.36	8.2	1.8	1.2	<RL
MW-221C	4/13/2010	60.8	3.8	1	1.3	<RL

Table 2-4 Continued
Analytical Results for Groundwater Samples

Location	Date	TCE (µg/L)	1,1-DCE (µg/L)	Carbon Tetrachloride (µg/L)	Chloroform (µg/L)	Chloromethane (µg/L)
PZ-18	7/15/2010	<RL	<RL	<RL	1.1	<RL
PZ-19	7/14/2010	<RL	<RL	<RL	<RL	<RL
PZ-20	7/14/2010	24.6	9.6	1.2	1.9	<RL
PZ-21R	7/1/2010	<RL	<RL	<RL	<RL	<RL
MW-260	7/1/2010	<RL	<RL	<RL	1.2	<RL
MW-261	7/1/2010	<RL	<RL	<RL	<RL	<RL
MW-262	7/1/2010	2.1	3.1	3.4	4.3	<RL
MW-263	7/14/2010	108	<RL	<RL	<RL	<RL
MW-264	7/14/2010	23.5	1.1	<RL	2.0	<RL
MW-265	7/14/2010	16.5	6.3	<RL	<RL	<RL
MW-221C	7/2/2010	43.9	2.4	4.3	1.2	<RL
PZ-18	10/8/2010	<RL	<RL	<RL	<RL	<RL
PZ-19	10/7/2010	<RL	<RL	<RL	<RL	<RL
PZ-20	10/12/2010	26.7	6.1	1.4	2.1	<RL
PZ-21R	10/7/2010	<RL	<RL	<RL	3.6	<RL
MW-260	10/11/2010	2.4	<RL	<RL	1.2	<RL
MW-261	10/11/2010	<RL	<RL	<RL	<RL	<RL
MW-262	10/11/2010	<RL	<RL	<RL	2.4	<RL
MW-263	10/7/2010	189	1.7	<RL	1	<RL
MW-264	10/12/2010	21.2	<RL	<RL	1.5	<RL
MW-265	10/12/2010	9.5	<RL	<RL	<RL	<RL
MW-221C	10/8/2010	31.8	<RL	<RL	1	<RL
PZ-18	1/7/2011	<RL	<RL	<RL	<RL	<RL
PZ-19	1/13/2011	<RL	<RL	<RL	<RL	<RL
PZ-20	1/13/2011	29.4	7.3	2.4	2.5	<RL
PZ-21R	1/13/2011	<RL	<RL	<RL	4.5	<RL
MW-260	1/11/2011	2.3	<RL	<RL	1.5	<RL
MW-261	1/11/2011	<RL	<RL	<RL	<RL	<RL
MW-262	1/10/2011	1.3	<RL	<RL	3.1	<RL
MW-263	1/11/2011	190	2.1	2.1	1.2	<RL
MW-264	1/13/2011	56.5	2.8	2	3	<RL
MW-265	1/11/2011	11.9	<RL	<RL	<RL	<RL
MW-221C	1/7/2011	29.8	1.5	<RL	<RL	<RL

Table 2-4 Continued
Analytical Results for Groundwater Samples

Location	Date	TCE (µg/L)	1,1-DCE (µg/L)	Carbon Tetrachloride (µg/L)	Chloroform (µg/L)	Chloromethane (µg/L)
PZ-18	4/5/2011	<RL	<RL	<RL	<RL	<RL
PZ-19	4/8/2011	<RL	<RL	<RL	<RL	<RL
PZ-20	4/8/2011	22.8	6.1	<RL	2.2	<RL
PZ-21R	4/7/2011	<RL	<RL	2.4	<RL	<RL
MW-260	4/7/2011	2.2	<RL	<RL	1.4	<RL
MW-261	4/11/2011	<RL	<RL	<RL	<RL	<RL
MW-262	4/8/2011	<RL	<RL	<RL	3.7	<RL
MW-263	4/11/2011	213	1.9	<RL	<RL	<RL
MW-264	4/1/2011	39.6	2.2	<RL	<RL	<RL
MW-265	4/11/2011	14.5	2	<RL	<RL	<RL
MW-221C	4/6/2011	28.3	2	<RL	<RL	<RL
PZ-18	7/8/2011	<RL	<RL	<RL	<RL	<RL
PZ-19	7/11/2011	<RL	<RL	<RL	<RL	<RL
PZ-20	7/12/2011	22.4	2.6	<RL	<RL	<RL
PZ-21R	7/11/2011	<RL	<RL	<RL	<RL	<RL
MW-260	7/12/2011	<RL	<RL	<RL	<RL	<RL
MW-261	7/11/2011	<RL	<RL	<RL	<RL	<RL
MW-262	7/11/2011	1.4	<RL	<RL	<RL	<RL
MW-263	7/12/2011	30	<RL	<RL	<RL	<RL
MW-264	7/12/2011	37.1	<RL	<RL	1.6	<RL
MW-265	7/12/2011	15.3	<RL	<RL	<RL	<RL
MW-221C	7/13/2011	28.1	<RL	<RL	<RL	<RL

Notes:

RL - reporting limit

Reporting limit varies for the various analytes and samples collected, see Status Reports for exact values

Table 2-5
Analytical Results for Groundwater Seeps Collected at Excavation Face Locations

Location*	Date	TCE (µg/L)	Concentration of other VOCs (µg/L)
NMM-1	4/22/2008	27.0	<RL
NMM-2	4/22/2008	4.8	<RL
NMM-3	4/22/2008	7.6	<RL
NMM-4	4/22/2008	28.9	<RL
NMM-9	4/22/2008	25.8	<RL
Seepage A	9/19/2008	11.3	<RL
Seepage B	9/19/2008	13.6	<RL
Seepage C	9/19/2008	9.2	<RL
Seepage A	10/29/2008	9.4	<RL
Seepage B	10/29/2008	4.9	<RL
Seepage C	10/29/2008	4.0	<RL
Seepage A	12/3/2008	7.6	<RL
Seepage B	12/3/2008	7	<RL
Seepage C	12/3/2008	6.8	<RL
Seepage A	1/28/2009	6.2	<RL
Seepage B	1/28/2009	2.6	<RL
Seepage C	1/28/2009	<RL	<RL
Seepage A	2/13/2009	4.1	<RL
Seepage B	2/13/2009	2.1	<RL
Seepage C	2/13/2009	<RL	<RL
Seepage A	3/3/2009	2.3	<RL
Seepage B	3/3/2009	2.1	<RL
Seepage C	3/3/2009	21.5	<RL
Seepage A	4/10/2009	2.2	<RL
Seepage B	4/10/2009	2.3	<RL
Seepage C	4/10/2009	2.0	<RL

Table 2-5 Continued

Analytical Results for Groundwater Seeps Collected at Excavation Face Locations

Location*	Date	TCE (µg/L)	Concentration of other VOCs (µg/L)
Seepage A	6/1/2009	<RL	<RL
Seepage B	6/1/2009	NS	NS
Seepage C	6/1/2009	NS	NS
Seepage A	7/7/2009	<RL	<RL
Seepage B	7/7/2009	NS	NS
Seepage C	7/7/2009	NS	NS
Seepage A	8/4/2009	5.8	<RL
Seepage B	8/4/2009	NS	NS
Seepage C	8/4/2009	NS	NS
Seepage A	9/10/2009	<RL	<RL
Seepage B	9/10/2009	NS	NS
Seepage C	9/10/2009	NS	NS
Seepage A	10/9/2009	<RL	<RL
Seepage B	10/9/2009	NS	NS
Seepage C	10/9/2009	NS	NS
Seepage A	11/17/2009	1.4	<RL
Seepage B	11/17/2009	NS	NS
Seepage C	11/17/2009	8.0	<RL
Seepage A	12/3/2009	NS	NS
Seepage B	12/3/2009	NS	NS
Seepage C	12/3/2009	<RL	<RL
Seep**	1/4/2010	<RL	<RL
Seep	2/16/2010	<RL	<RL
Seep	3/4/2010	<RL	<RL
Seep	4/2/2010	<RL	<RL

Table 2-5 Continued

Analytical Results for Groundwater Seeps Collected at Excavation Face Locations

Location*	Date	TCE (µg/L)	Concentration of other VOCs (µg/L)
Seep	6/2/2010	<RL	<RL
Seep	7/8/2010	<RL	<RL
Seep	8/4/2010	<RL	<RL
Seep	9/3/2010	<RL	<RL
Seep	10/5/2010	<RL	<RL
Seep	11/3/2010	<RL	<RL
Seep	12/7/2010	<RL	<RL
Seep	1/12/2011	<RL	<RL

Notes:

VOCs = Volatile Organic Compounds

RL = Laboratory Reporting Limit (1µg/L for all constituents measured)
*Number and letter identifications do not represent a specific point but rather discrete sampling locations within the excavation face, which was constantly changing during active mining operations
**Seep – one representative location was selected for sample collection at the excavation face beginning in January 2010. Seep sampling ended in January 2011 due to Pond reconfiguration during reclamation.

Table 6-1

Southwest Treatment Area Surface Water Monitoring and Compliance Locations

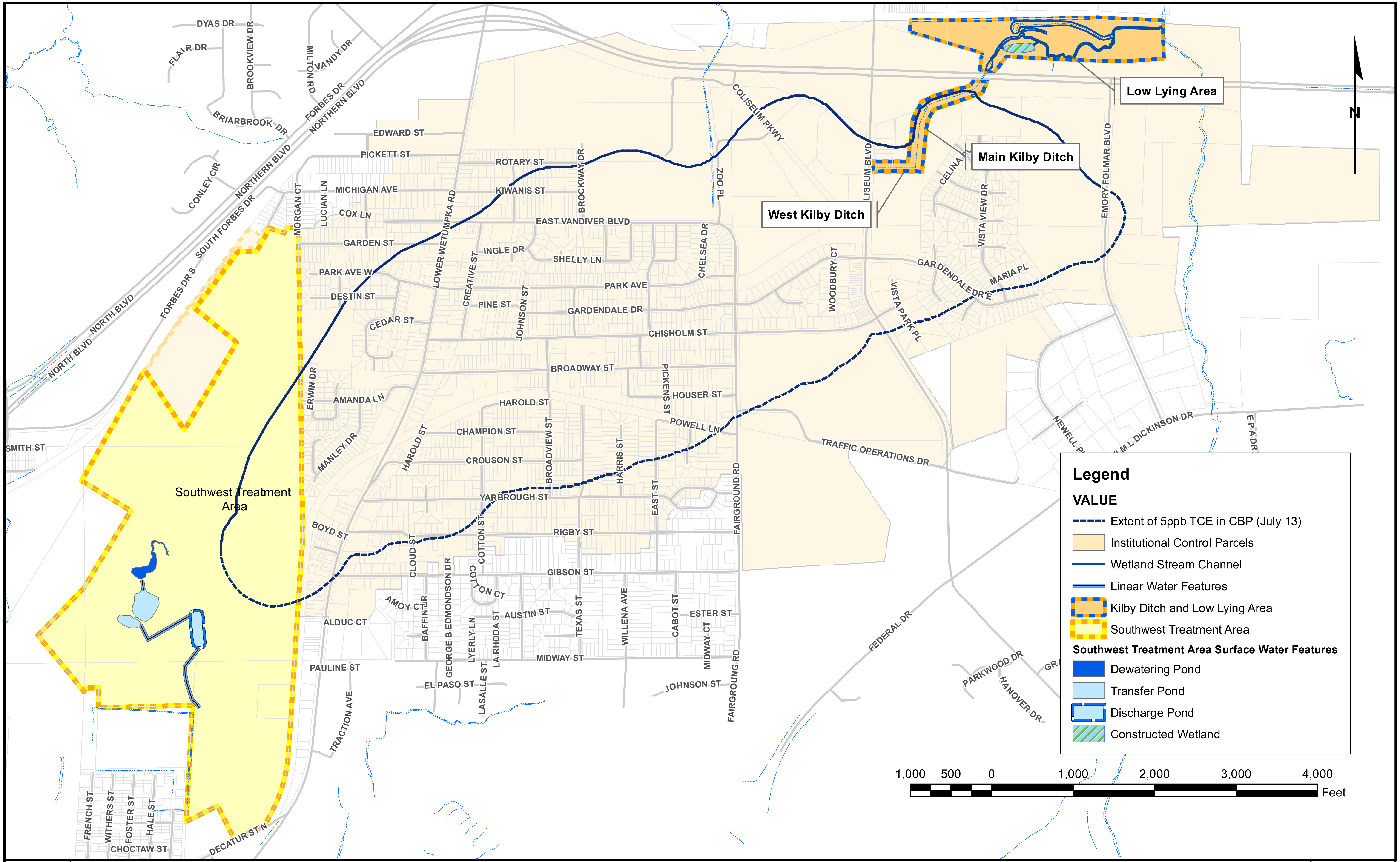
SURFACE WATER COMPLIANCE LOCATIONS	MONITORING SCHEDULE
DSN001	2 weeks
SURFACE WATER MONITORING LOCATIONS	**MONITORING SCHEDULE**
SWA-1: Dewatering Pond	Quarterly
SWA-2: Transfer Pond	Quarterly
SWA-3: Inlet Structure at Discharge Pond from Transfer Pond	Quarterly
SWA-4: Outlet Structure at Discharge Pond	Quarterly
VOLUNTARY SURFACE WATER MONITORING LOCATIONS	**MONITORING SCHEDULE**
FG	Periodic
O1	Periodic

Figures

Southwest Treatment Area
Corrective Measures Implementation Plan

COLISEUM BOULEVARD PLUME SITE
MONTGOMERY, ALABAMA

ALABAMA
DEPARTMENT OF TRANSPORTATION



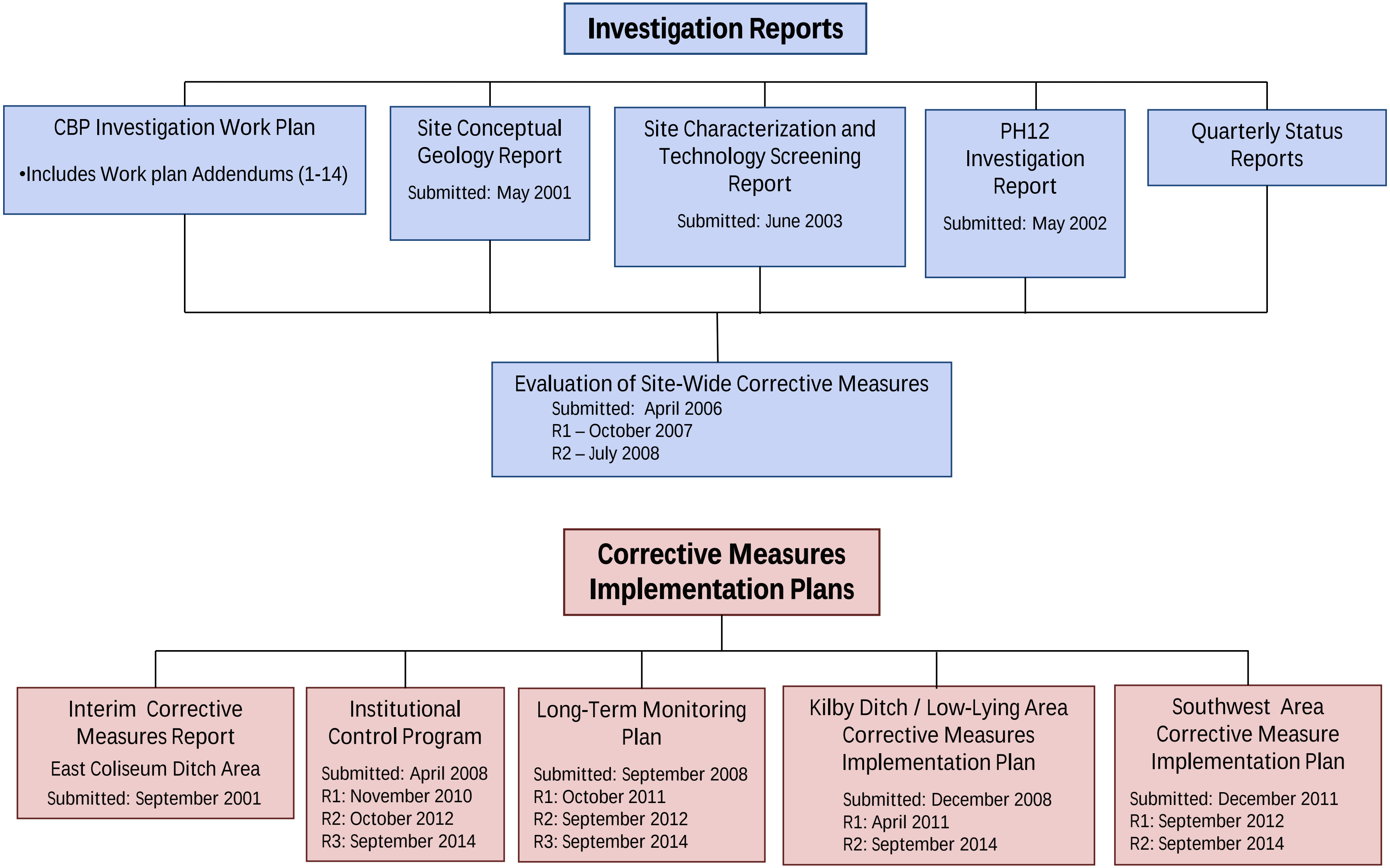
COLISEUM BOULEVARD PLUME

SOUTHWEST TREATMENT AREA CORRECTIVE MEASURES IMPLEMENTATION PLAN

CORRECTIVE MEASURES AREA

September 2014

Figure 1-1



Investigation Reports

CBP Investigation Work Plan

- Includes Work plan Addendums (1-14)

Site Conceptual Geology Report

Submitted: May 2001

Site Characterization and Technology Screening Report

Submitted: June 2003

PH12 Investigation Report

Submitted: May 2002

Quarterly Status Reports

Evaluation of Site-Wide Corrective Measures

Submitted: April 2006
R1 – October 2007
R2 – July 2008

Corrective Measures Implementation Plans

Interim Corrective Measures Report

East Coliseum Ditch Area

Submitted: September 2001

Institutional Control Program

Submitted: April 2008
R1: November 2010
R2: October 2012
R3: September 2014

Long-Term Monitoring Plan

Submitted: September 2008
R1: October 2011
R2: September 2012
R3: September 2014

Kilby Ditch / Low-Lying Area Corrective Measures Implementation Plan

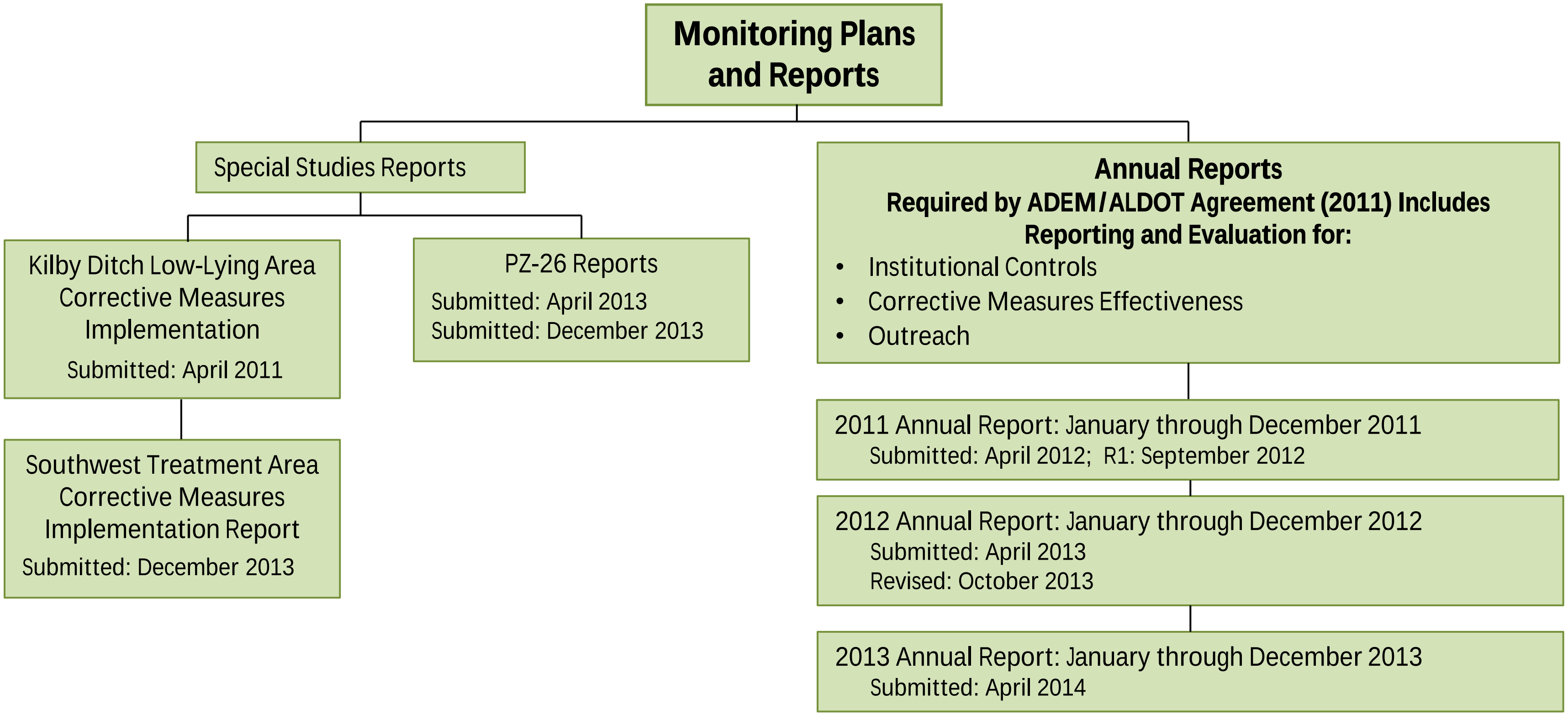
Submitted: December 2008
R1: April 2011
R2: September 2014

Southwest Area Corrective Measure Implementation Plan

Submitted: December 2011
R1: September 2012
R2: September 2014

COLISEUM BOULEVARD PLUME
SOUTHWEST TREATMENT AREA CORRECTIVE MEASURES
IMPLEMENTATION PLAN

FIGURE 1-2A
Overview of Reports and Monitoring Plans



Monitoring Plans and Reports

Special Studies Reports

Kilby Ditch Low-Lying Area Corrective Measures Implementation
Submitted: April 2011

Southwest Treatment Area Corrective Measures Implementation Report
Submitted: December 2013

PZ-26 Reports
Submitted: April 2013
Submitted: December 2013

Annual Reports
Required by ADEM/ALDOT Agreement (2011) Includes Reporting and Evaluation for:

- Institutional Controls
- Corrective Measures Effectiveness
- Outreach

2011 Annual Report: January through December 2011
Submitted: April 2012; R1: September 2012

2012 Annual Report: January through December 2012
Submitted: April 2013
Revised: October 2013

2013 Annual Report: January through December 2013
Submitted: April 2014

DEPARTMENT OF TRANSPORTATION

COLISEUM BOULEVARD PLUME
SOUTHWEST TREATMENT AREA CORRECTIVE MEASURES
IMPLEMENTATION PLAN

FIGURE 1-2B
Overview of Annual and Special Reports

Aerial Photo Source: NRCS NAIP 2012

ALABAMA DEPARTMENT OF TRANSPORTATION

COLISEUM BOULEVARD PLUME
SOUTHWEST TREATMENT AREA CORRECTIVE MEASURES IMPLEMENTATION PLAN

September 2014

Figure 1-3

SOUTHWEST TREATMENT AREA

Aerial Photography Source: NRCS NAIP 2009

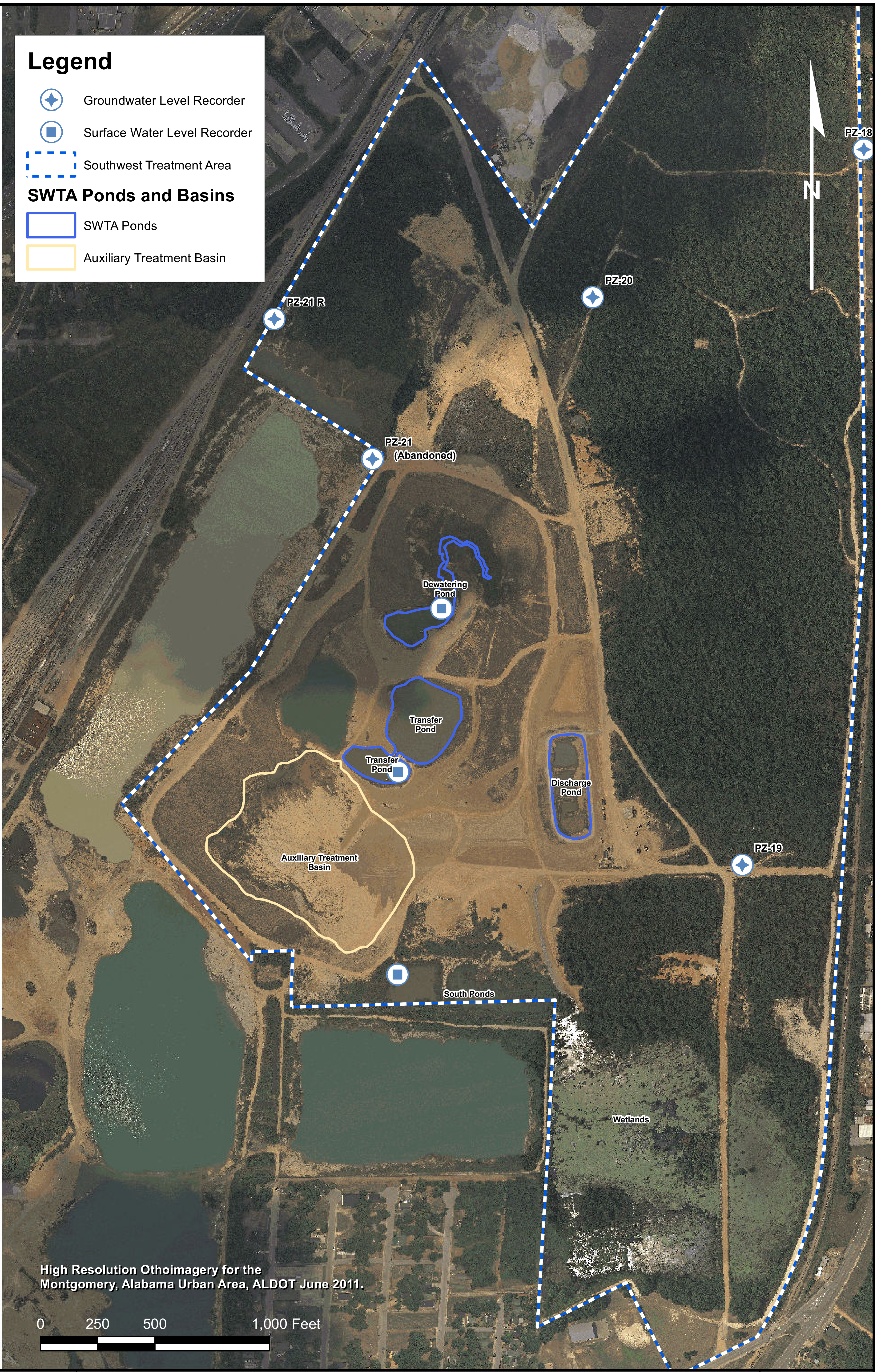
Department Of Transportation

COLISEUM BOULEVARD PLUME
SOUTHWEST TREATMENT AREA CORRECTIVE MEASURES IMPLEMENTATION PLAN

WATER MANAGEMENT IN AUGUST 2008 AT FORMER NMM SITE

September 2014

Figure 2-1



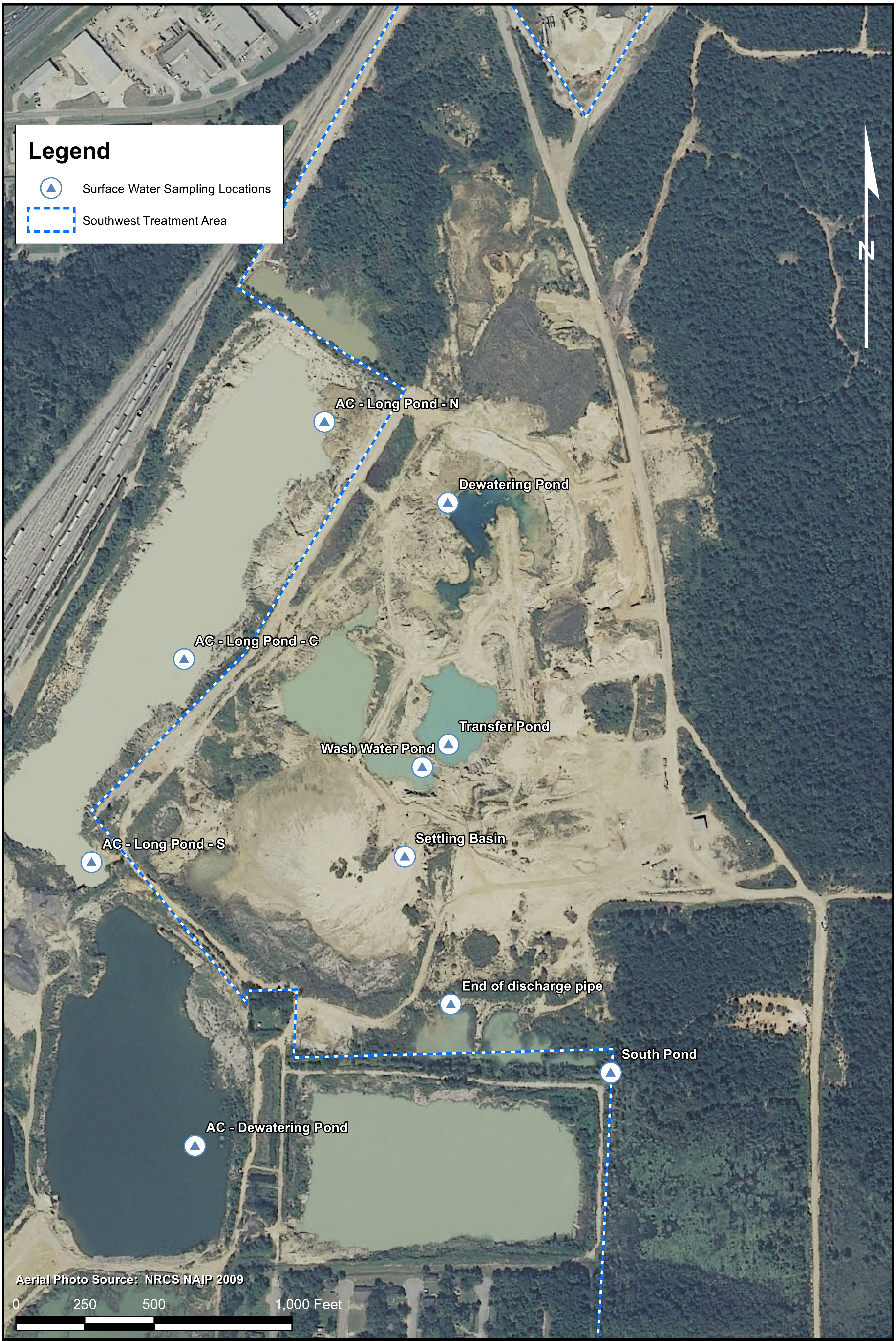
High Resolution Othoimagery for the Montgomery, Alabama Urban Area, ALDOT June 2011.

COLISEUM BOULEVARD PLUME
SOUTHWEST TREATMENT AREA CORRECTIVE MEASURES IMPLEMENTATION PLAN

LOCATIONS OF WATER LEVEL RECORDERS
(AUGUST 2008 THROUGH DECEMBER 2011)

September 2014

Figure 2-2



COLISEUM BOULEVARD PLUME
SOUTHWEST TREATMENT AREA CORRECTIVE MEASURES IMPLEMENTATION PLAN

LOCATIONS OF HISTORICAL SURFACE WATER SAMPLES (2008-20011)

September 2014

Figure 2-3

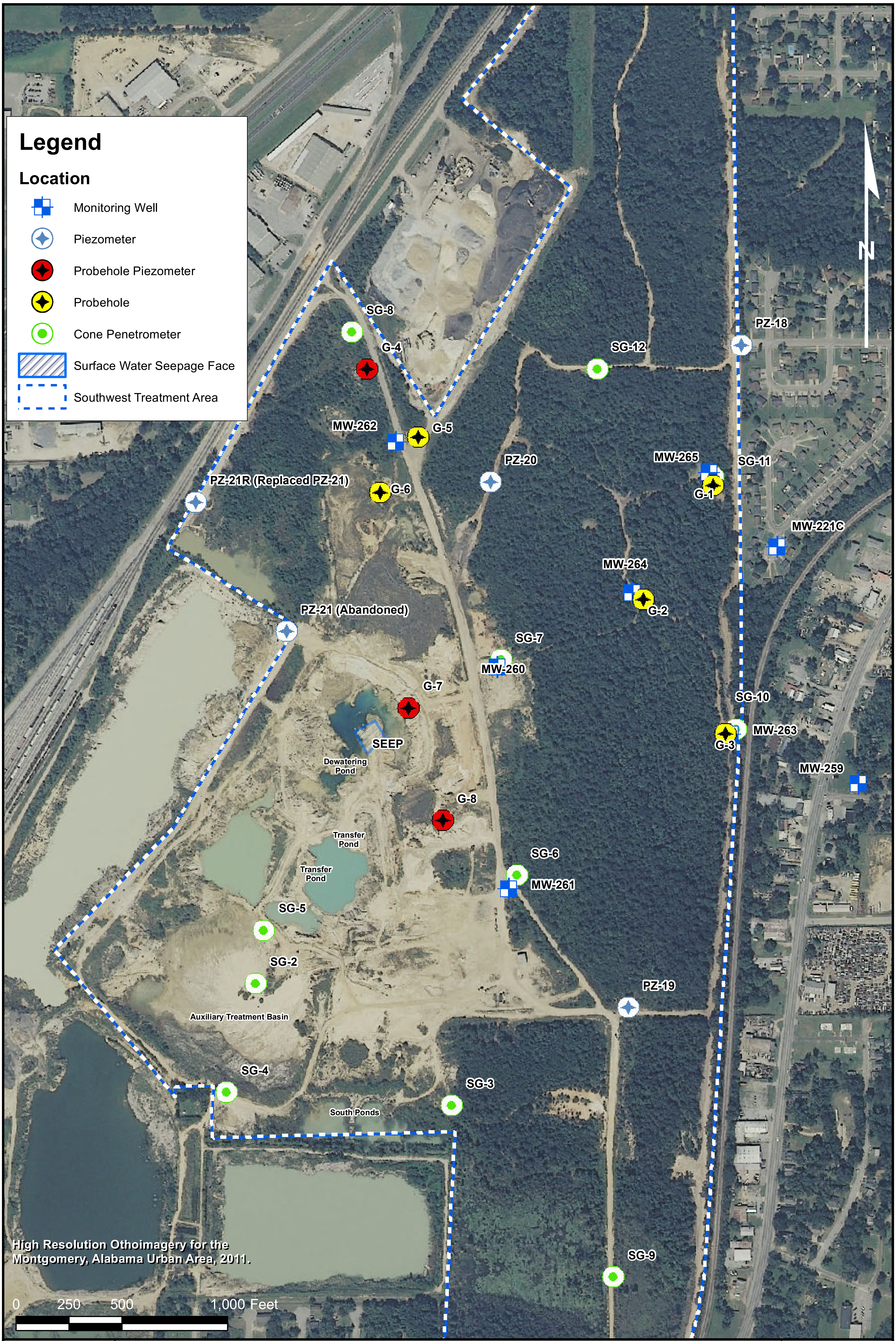
DEPARTMENT OF TRANSPORTATION

COLISEUM BOULEVARD PLUME
SOUTHWEST TREATMENT AREA CORRECTIVE MEASURES IMPLEMENTATION PLAN

LOCATIONS OF HISTORICAL SEDIMENT SAMPLES (JULY 2008 THROUGH SEPTEMBER 2008)

September 2014

Figure 2-4



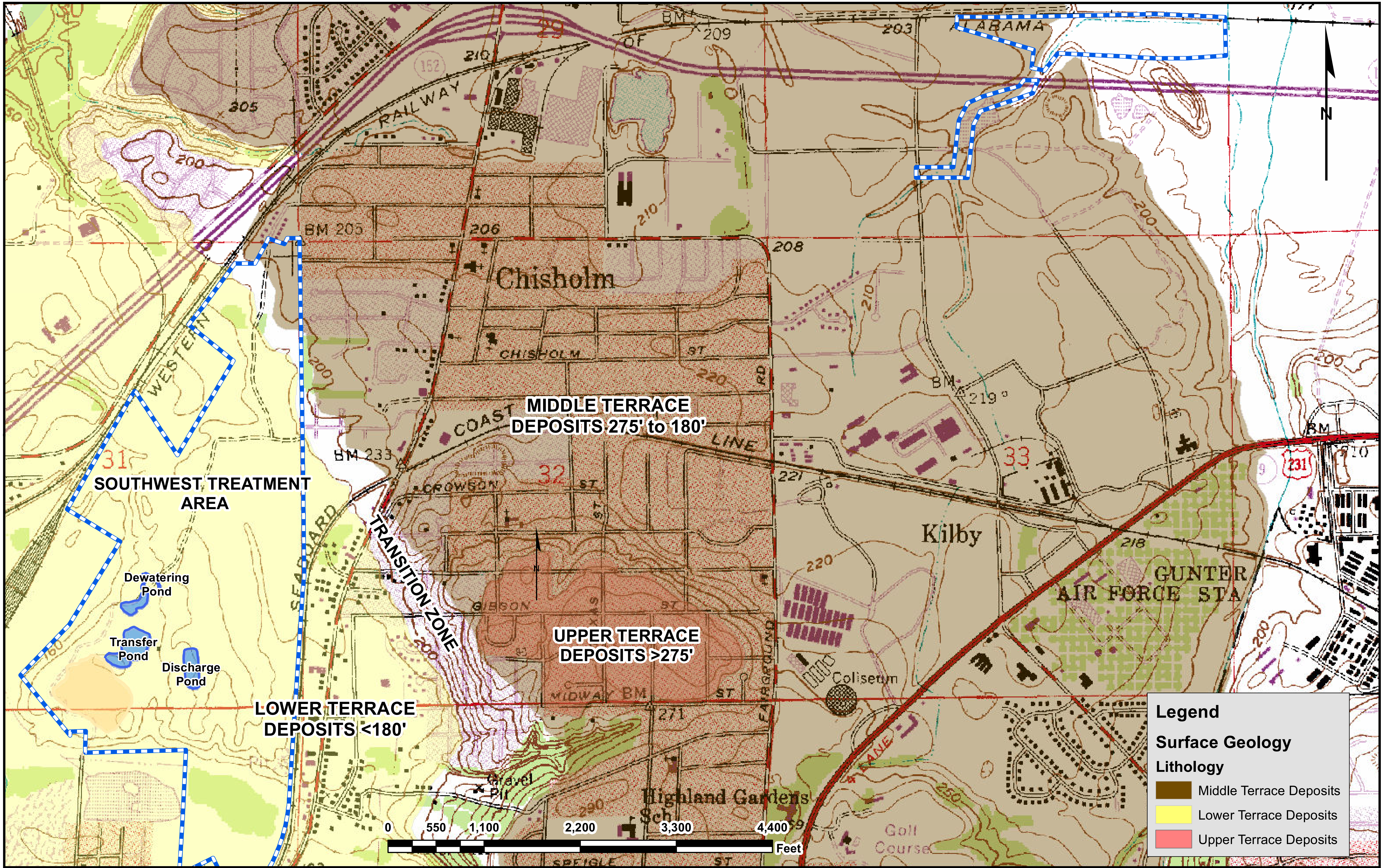
COLISEUM BOULEVARD PLUME

SOUTHWEST TREATMENT AREA CORRECTIVE MEASURES IMPLEMENTATION PLAN

LOCATIONS OF MONITORING WELLS, TEMPORARY PIEZOMETERS, AND PROBEHOLES (FROM 2008 THROUGH 2011)

September 2014

Figure 2-5



COLISEUM BOULEVARD PLUME
SOUTHWEST TREATMENT AREA CORRECTIVE MEASURES IMPLEMENTATION PLAN

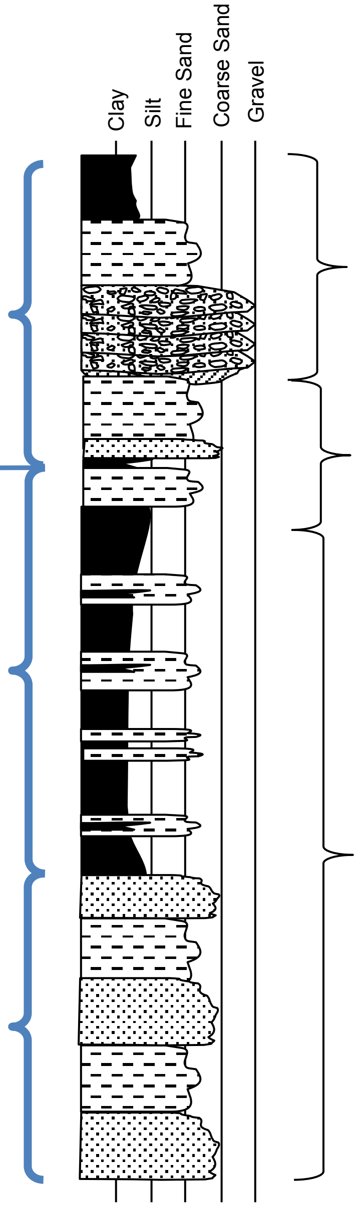
SURFACE GEOLOGY

September 2014

Figure 3-1

HYDROSTRATIGRAPHIC UNIT

GEOLOGIC FORMATION



Water Table Aquifer (Shallow Zone)

First Distinct Clay

Gordo Confining Unit (Deep Zone)

Gordo Aquifer

PLEISTOCENE TERRACE DEPOSITS

UPPER EUTAW FORMATION
LOWER EUTAW FORMATION

UPPER GORDO FORMATION

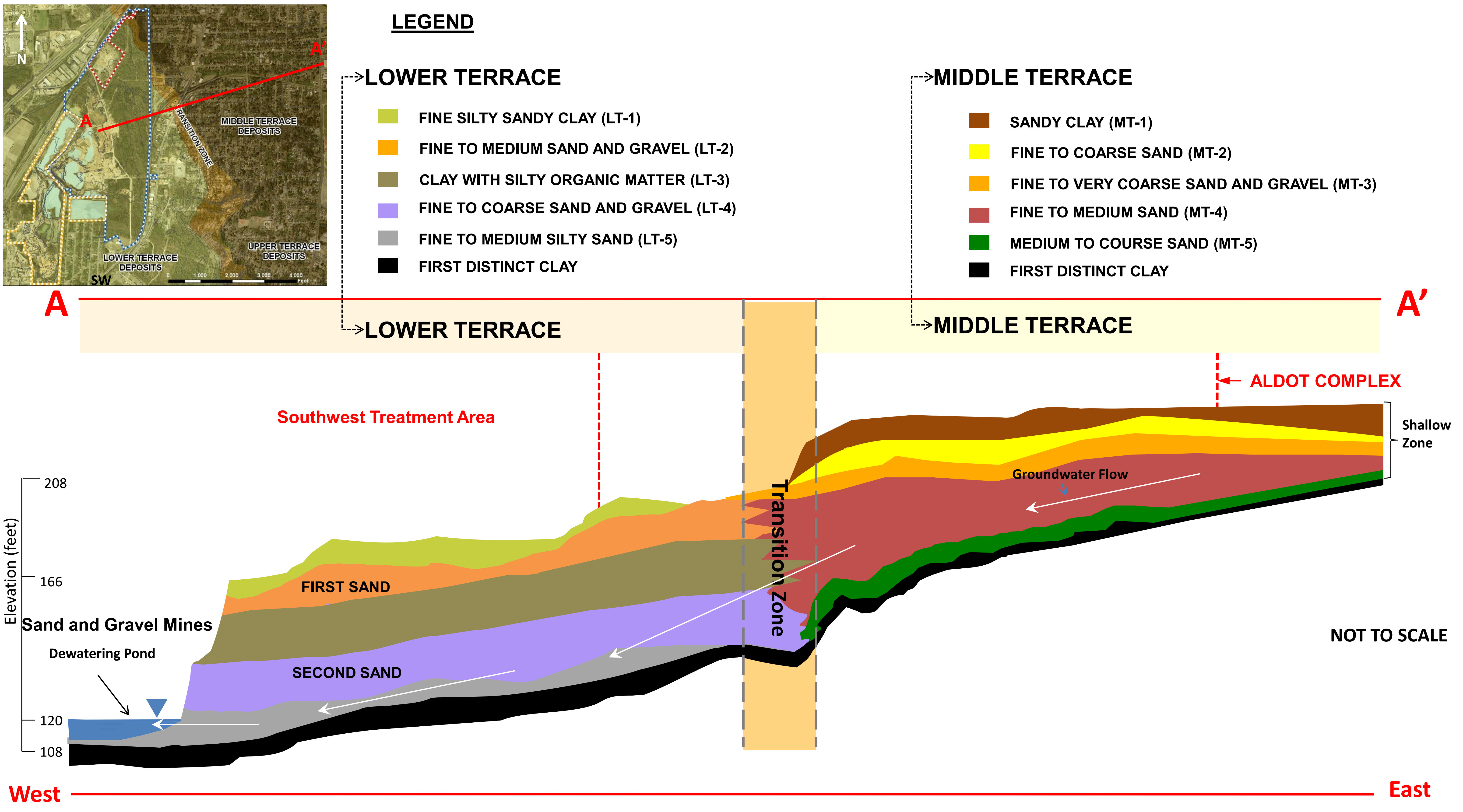
NOT TO SCALE

ALABAMA DEPARTMENT OF TRANSPORTATION
COLISEUM BOULEVARD PLUME
CORRECTIVE MEASURES IMPLEMENTATION PLAN

GENERALIZED STRATIGRAPHIC COLUMN

September 2014

Figure 3-2



Department Of Transportation

COLISEUM BOULEVARD PLUME
SOUTHWEST TREATMENT AREA CORRECTIVE
MEASURES IMPLEMENTATION PLAN

TYPICAL SOUTHWEST-NORTHEAST GEOLOGIC CROSS-SECTION THROUGH THE COLISEUM BOULEVARD PLUME

September 2014

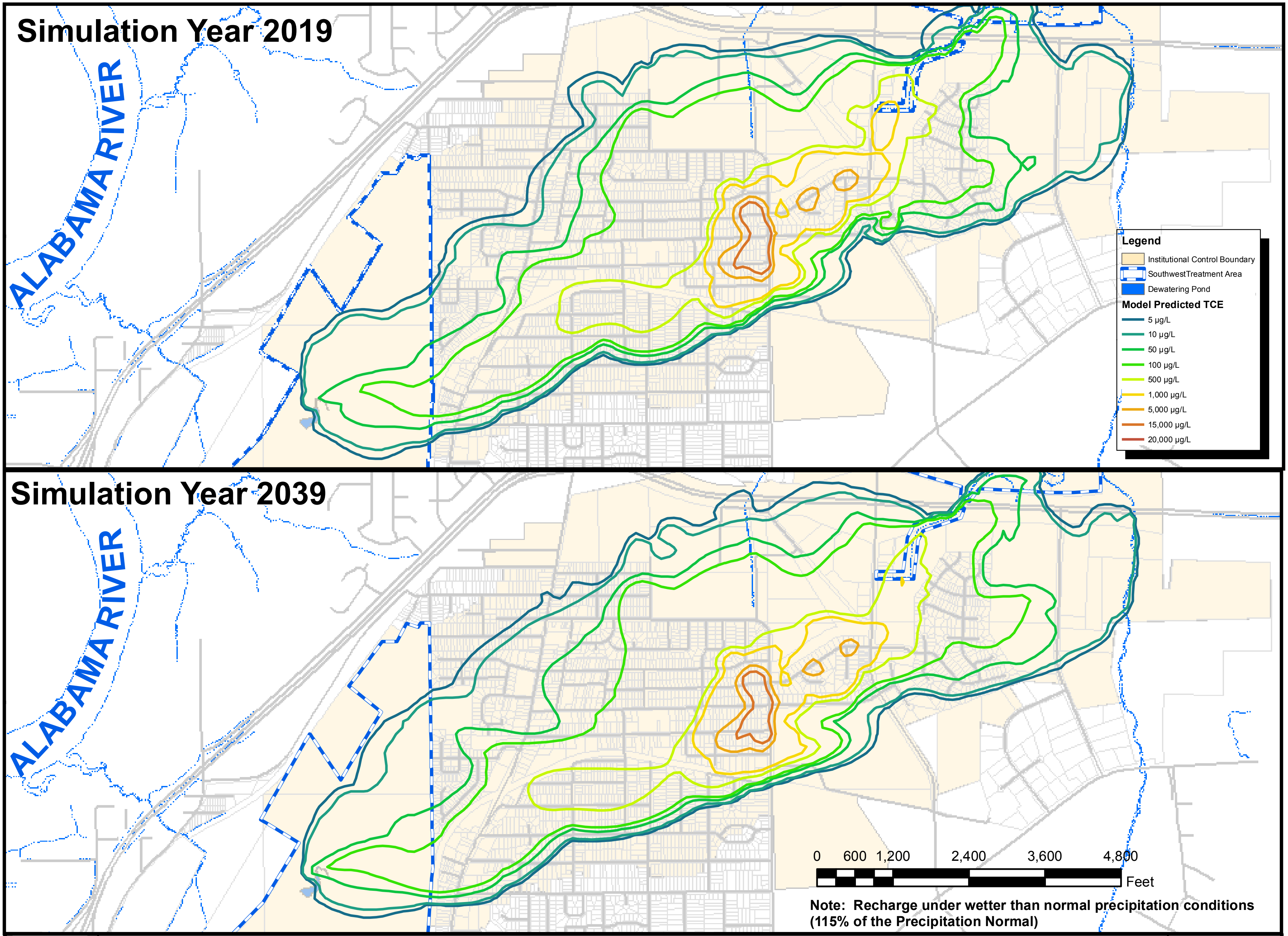
Figure 3-3

COLISEUM BOULEVARD PLUME
SOUTHWEST TREAMENT AREA CORRECTIVE MEASURES IMPLEMENTATION PLAN

GROUNDWATER ELEVATIONS AND TCE CONCENTRATIONS IN GROUNDWATER (FROM OCTOBER 2010 THROUGH JULY 2011)

September 2014

Figure 3-4



Note: Recharge under wetter than normal precipitation conditions (115% of the Precipitation Normal)

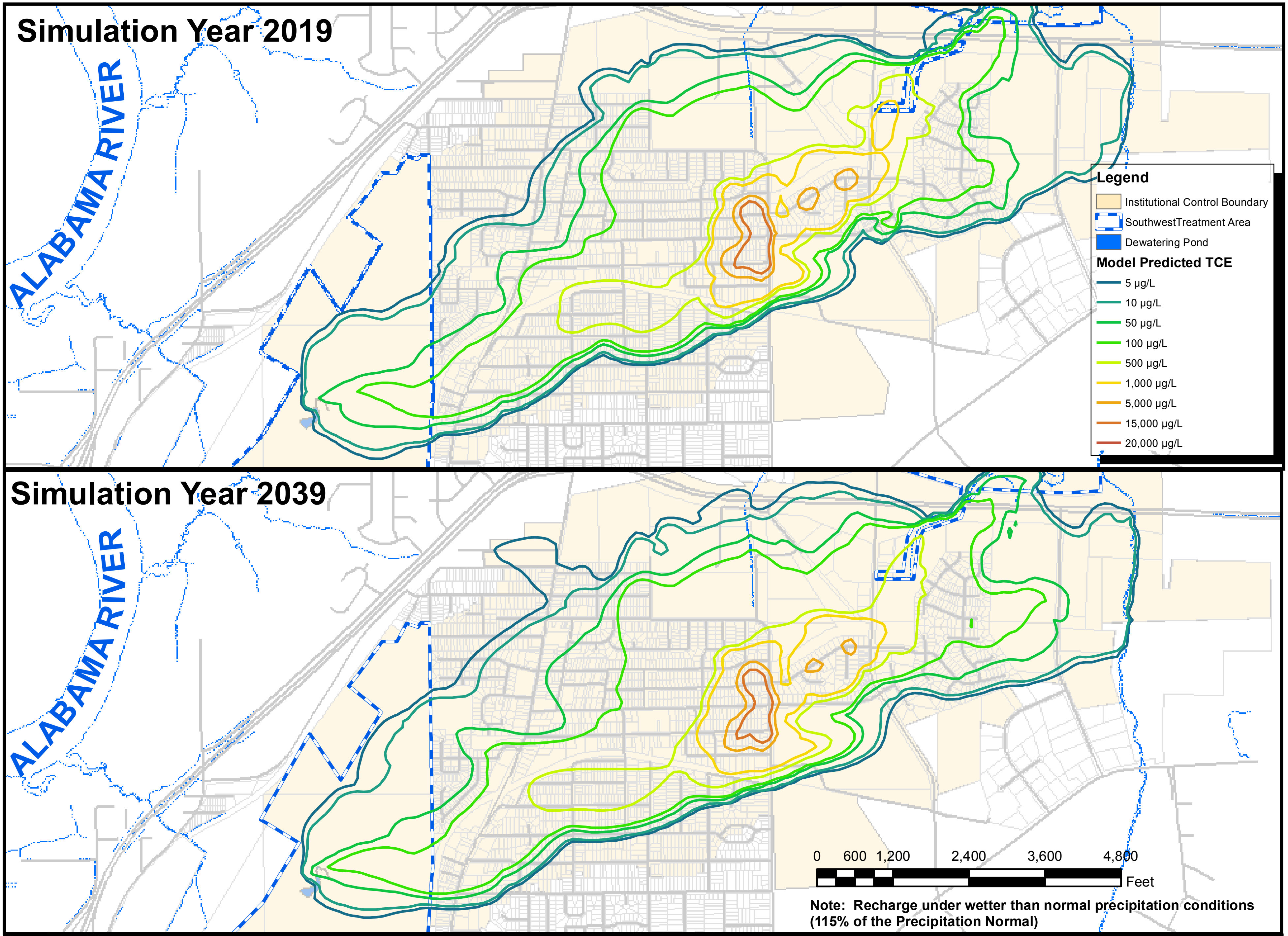
DEPARTMENT OF TRANSPORTATION

COLISEUM BOULEVARD PLUME
SOUTHWEST TREATMENT AREA CORRECTIVE MEASURES IMPLEMENTATION PLAN

MODEL SIMULATION WITH SWTA DEWATERING POND MAINTAINED AT 120 FT MSL (Below Normal Precipitation)

September 2014

Figure 3-5



Note: Recharge under wetter than normal precipitation conditions (115% of the Precipitation Normal)

COLISEUM BOULEVARD PLUME
SOUTHWEST TREATMENT AREA CORRECTIVE MEASURES IMPLEMENTATION PLAN
MODEL SIMULATION WITH SWTA DEWATERING POND MAINTAINED AT 120 FT MSL (Above Normal Precipitation)

September 2014

Figure 3-6

COLISEUM BOULEVARD PLUME
SOUTHWEST TREATMENT AREA CORRECTIVE MEASURES IMPLEMENTATION PLAN

SOUTHWEST TREATMENT AREA CORRECTIVE MEASURES CONFIGURATION

September 2014

Figure 4-1

Aerial Photo Source: NRCS NAIP 2013

COLISEUM BOULEVARD PLUME
SOUTHWEST TREATMENT AREA CORRECTIVE MEASURES IMPLEMENTATION PLAN

SURFACE WATER MONITORING AND COMPLIANCE POINTS

September 2014

Figure 6-1

APPENDIX A

SOIL BORING AND WELL CONSTRUCTION LOGS

Southwest Treatment Area
Corrective Measures Implementation Plan

COLISEUM BOULEVARD PLUME SITE
MONTGOMERY, ALABAMA

ALABAMA

DEPARTMENT OF TRANSPORTATION

ALDOT Project - Coliseum Boulevard

Listing of Coordinates for the Probe Holes, and Piezometer Holes installed by TTL.

Listing of Proposed Holes and Selected Storm Drainage Structures

Coordinates based on Alabama State Plane Coordinate system (east zone)

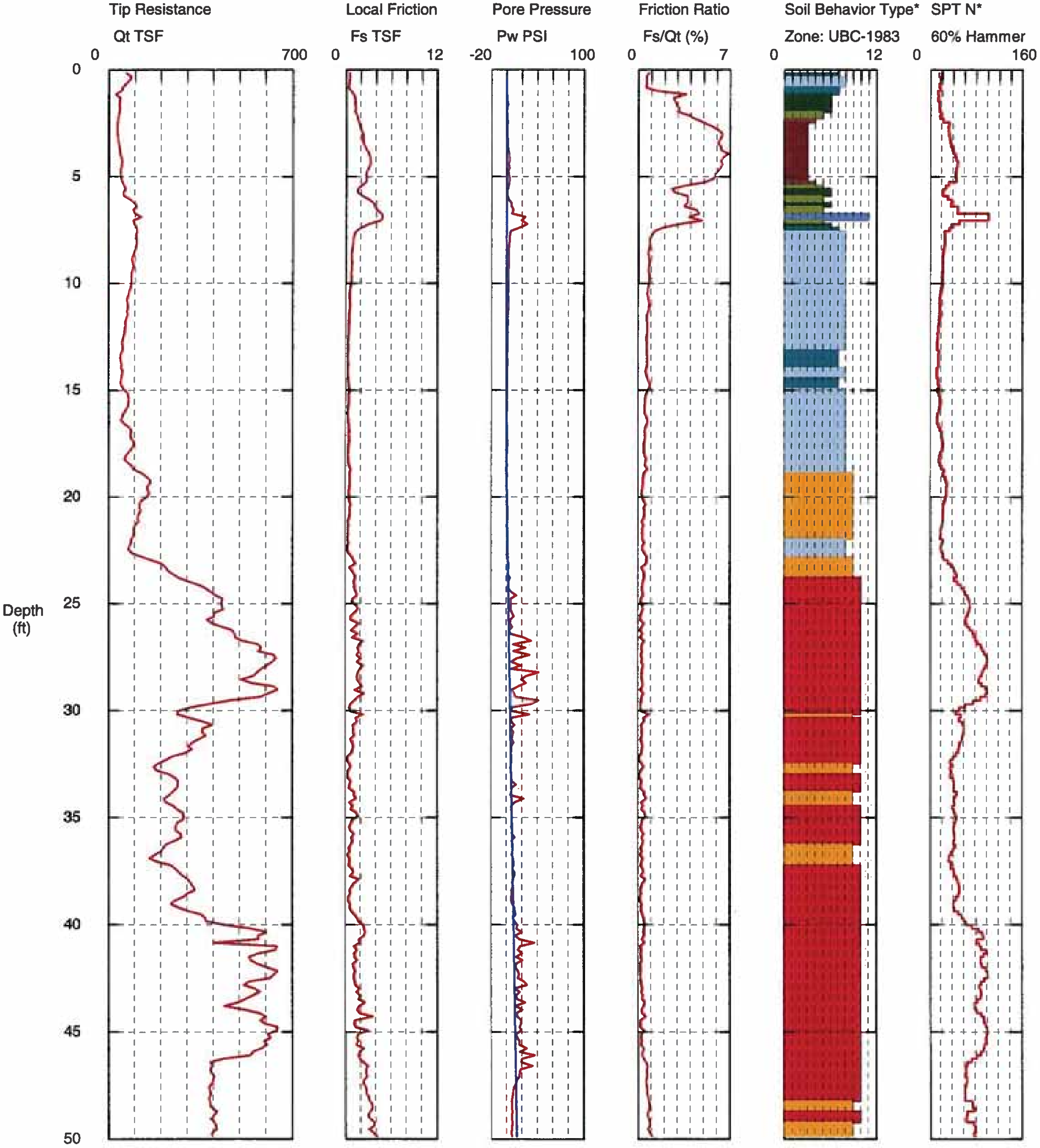
Point Description	Northing (y-coord.)	Easting (x-coord.)	Ring Elev. of Cover	Top of PVC pipe (north edge)	Ground Elev. Adjacent to Location		Speaks' Point No.	Description	Latitude (d m s)	Longitude (d m s)
Additional Data taken on 08.07.2008										
SG-11	694,986.0690	514,751.1740			181.65		13			
SG-12	695,497.0060	514,203.6430			183.49		14			
SG-13	697,489.2010	514,757.8000			204.38		9			
SG-1A	690,495.1150	514,310.3490			160.13		17			
SG-2	692,593.9480	512,591.1260			140.96		5			
SG-3	692,018.8070	513,518.0320			167.39		2			
SG-4	692,081.1730	512,454.2300			169.88		3			
SG-5	692,846.3960	512,630.2320			139.03		4			
SG-6	693,105.6180	513,823.8270			195.47		6			
SG-7	694,122.6320	513,750.9120			188.87		7			
SG-8	695,670.2360	513,044.7800			173.06		8			
SG-9	691,208.7740	514,281.0390			158.89		1			
SG-10	693,796.6271	514,857.1913			182.34					

Revised: August 8, 2008 Added additional auger locations, field data taken on 08-07-2008, boreholes (gravel pit)

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-1a
Cone Used: DSG0780

CPT Date/Time: 7/29/2008 3:47:53 PM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 55.61 feet

Depth Increment = 0.164 feet

1 sensitive fine grained	4 silty clay to clay	7 silty sand to sandy silt	10 gravelly sand to sand
2 organic material	5 clayey silt to silty clay	8 sand to silty sand	11 very stiff fine grained (*)
3 clay	6 sandy silt to clayey silt	9 sand	12 sand to clayey sand (*)

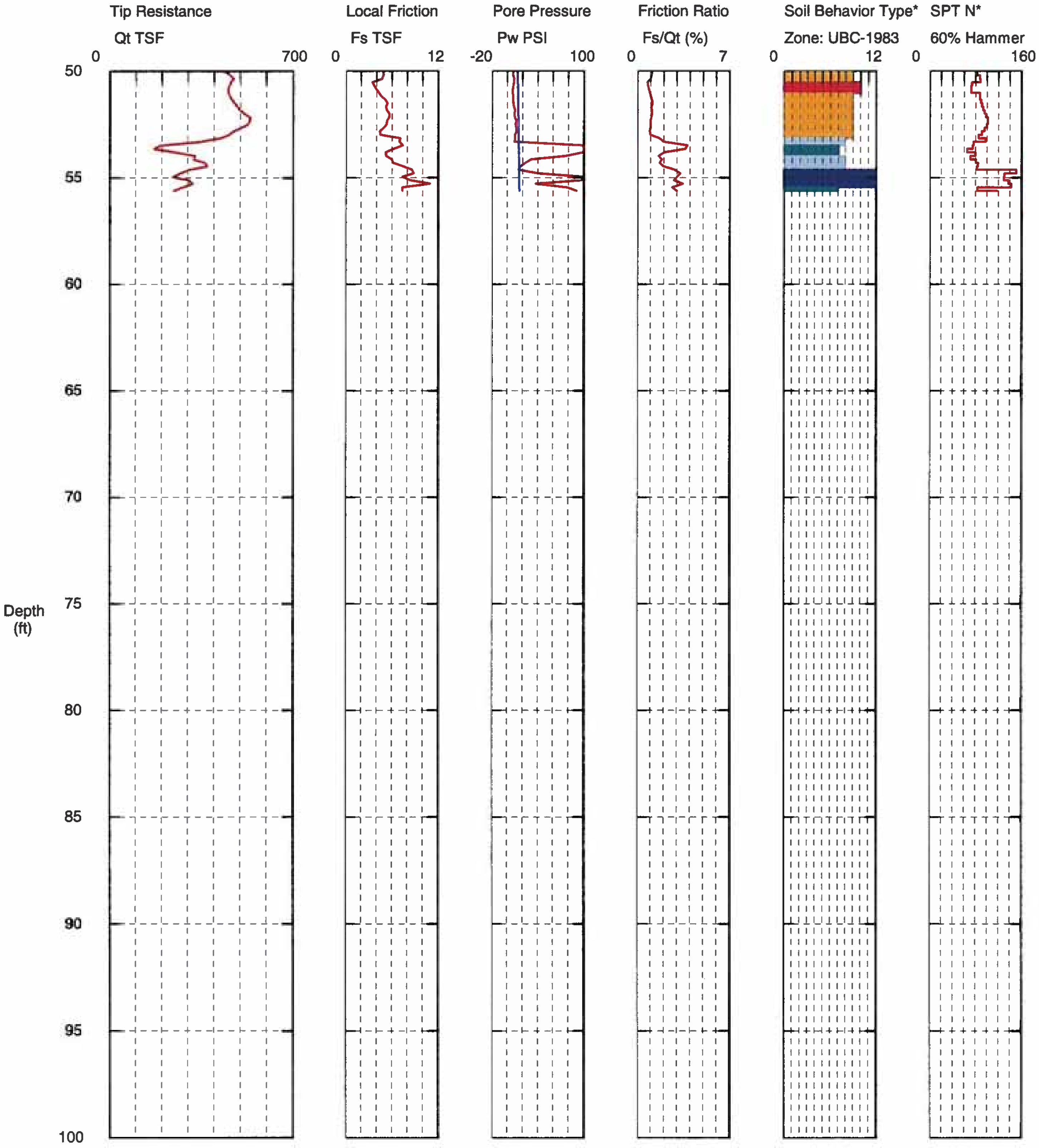
N32 23 50.7 W86 17 34.4

Sounding terminated due to excessive skin friction. Sounding collapsed at 18.7'

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright	CPT Date/Time: 7/29/2008 3:47:53 PM
Sounding: SG-1a	Location: Sand and Gravel Pits
Cone Used: DSG0780	Job Number: C06-401



Maximum Depth = 55.61 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay

■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt

■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand

■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

N32 23 50.7 W86 17 34.4

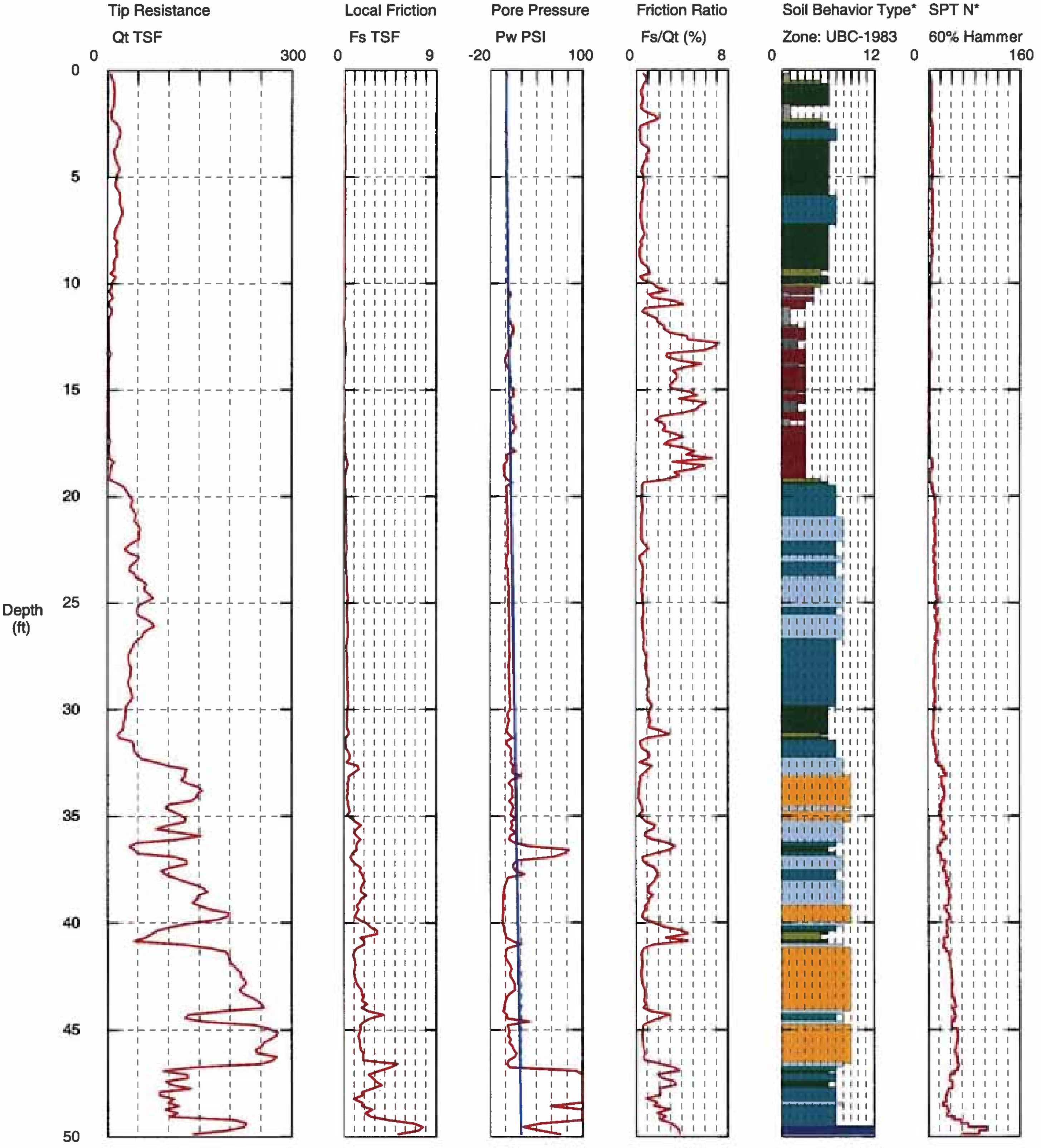
Sounding terminated due to excessive skin friction. Sounding collapsed at 18.7'

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-2
Cone Used: DSG0780

CPT Date/Time: 7/29/2008 4:54:24 PM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 57.25 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt
■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

N32 24 11.3 W86 17 54.6

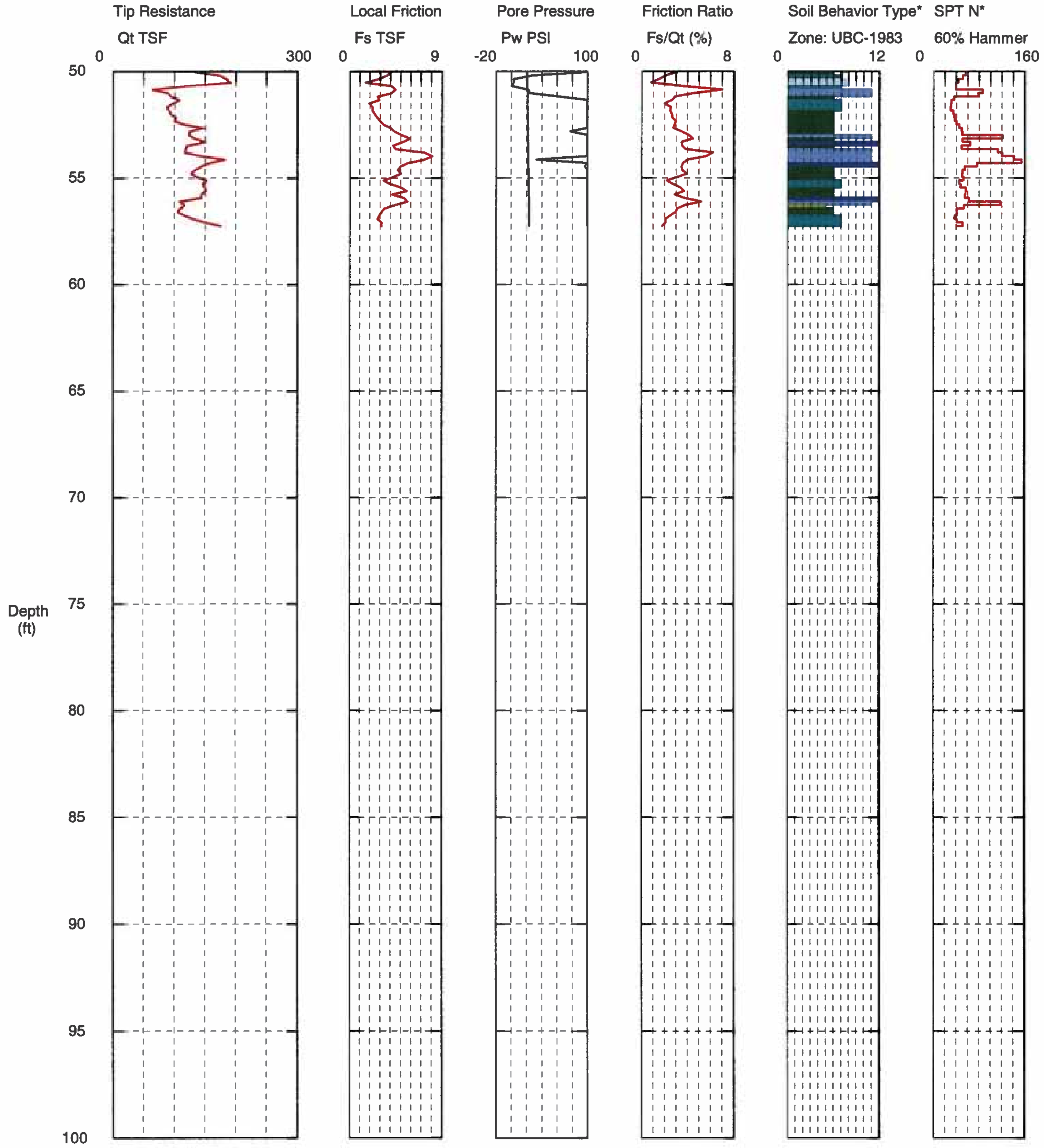
Soundijng terminated due to excessive pore pressure. Groundwater measured at 3.2'

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-2
Cone Used: DSG0780

CPT Date/Time: 7/29/2008 4:54:24 PM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 57.25 feet

Depth Increment = 0.164 feet

- ■ 1 sensitive fine grained
- ■ 2 organic material
- ■ 3 clay
- ■ 4 silty clay to clay
- ■ 5 clayey silt to silty clay
- ■ 6 sandy silt to clayey silt
- ■ 7 silty sand to sandy silt
- ■ 8 sand to silty sand
- ■ 9 sand
- ■ 10 gravelly sand to sand
- ■ 11 very stiff fine grained (*)
- ■ 12 sand to clayey sand (*)

N32 24 11.3 W86 17 54.6

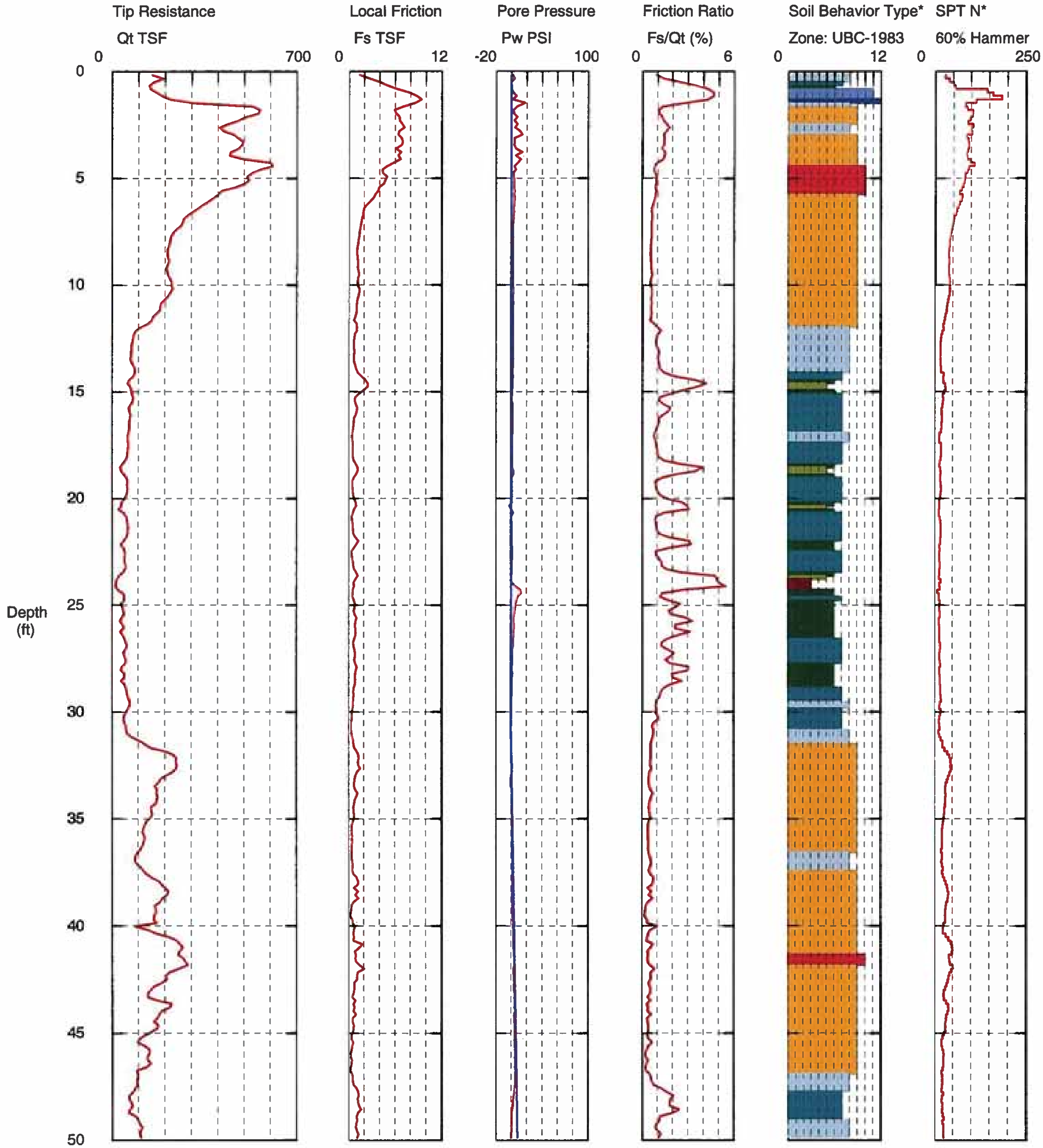
Soundijng terminated due to excessive pore pressure. Groundwater measured at 3.2'

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-3
Cone Used: DSG0780

CPT Date/Time: 7/30/2008 12:47:03 PM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 76.61 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt
■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

N32 24 5.8 W86 17 43.8

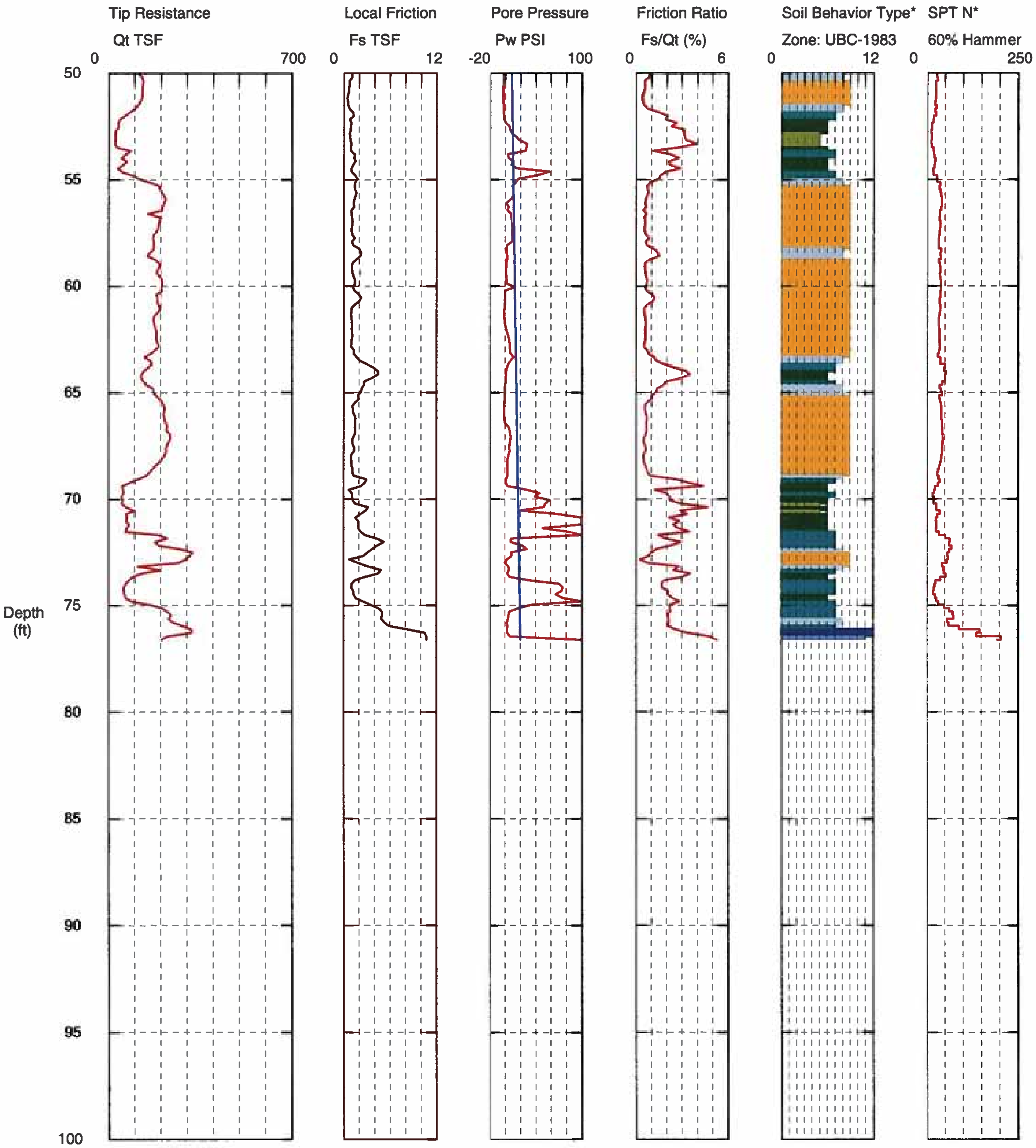
Sounding collapsed at 30.6'; terminated due to excessive skin friction.

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-3
Cone Used: DSG0780

CPT Date/Time: 7/30/2008 12:47:03 PM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 76.61 feet

Depth Increment = 0.164 feet

- ■ 1 sensitive fine grained
- ■ 2 organic material
- ■ 3 clay
- ■ 4 silty clay to clay
- ■ 5 clayey silt to silty clay
- ■ 6 sandy silt to clayey silt
- ■ 7 silty sand to sandy silt
- ■ 8 sand to silty sand
- ■ 9 sand
- ■ 10 gravelly sand to sand
- ■ 11 very stiff fine grained (*)
- ■ 12 sand to clayey sand (*)

N32 24 5.8 W86 17 43.8

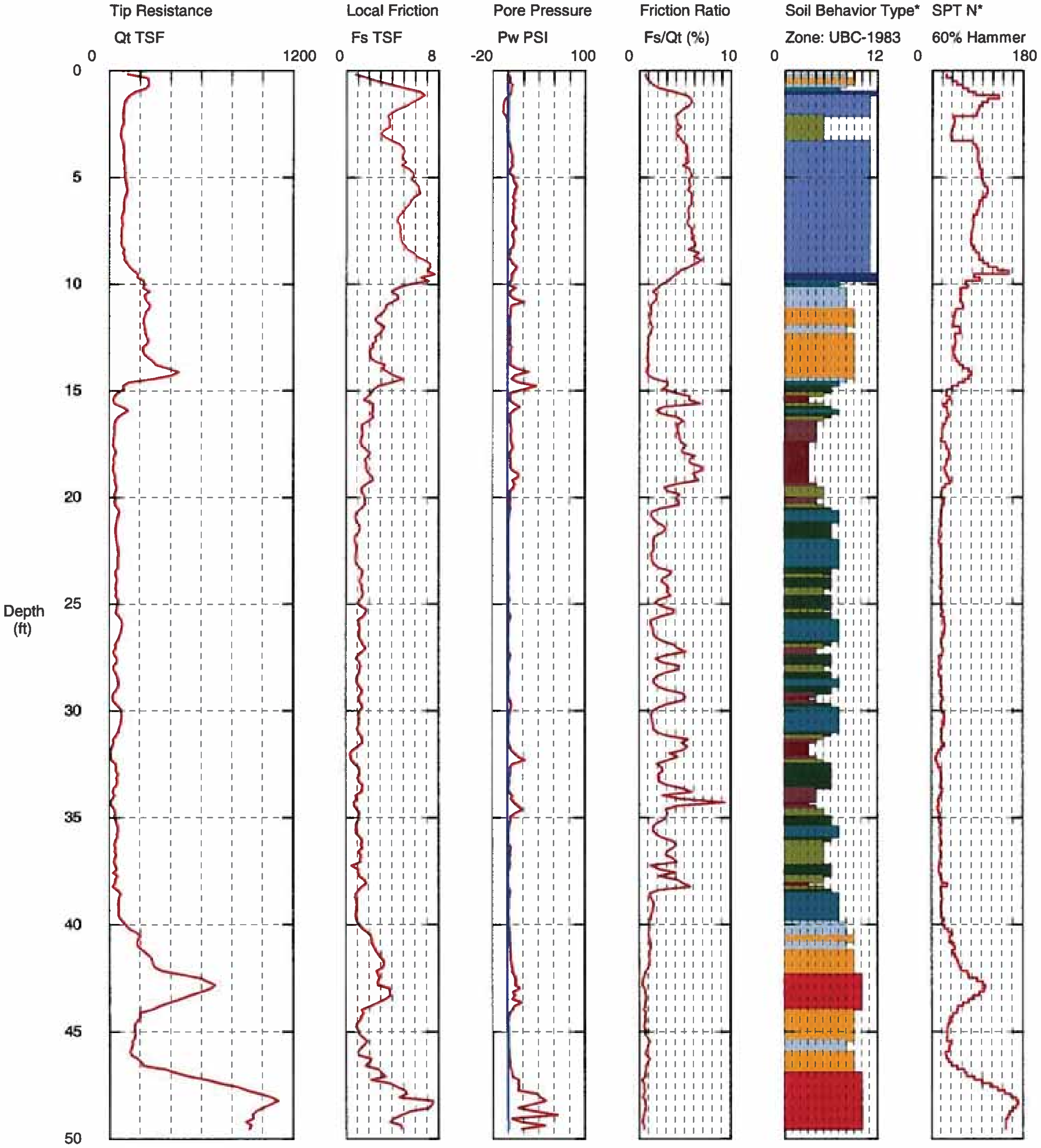
Sounding collapsed at 30.6'; terminated due to excessive skin friction.

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-4
Cone Used: DSG0780

CPT Date/Time: 7/30/2008 2:03:39 PM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 49.54 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay

■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt

■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand

■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

N32 24 6.3 W86 17 56.2

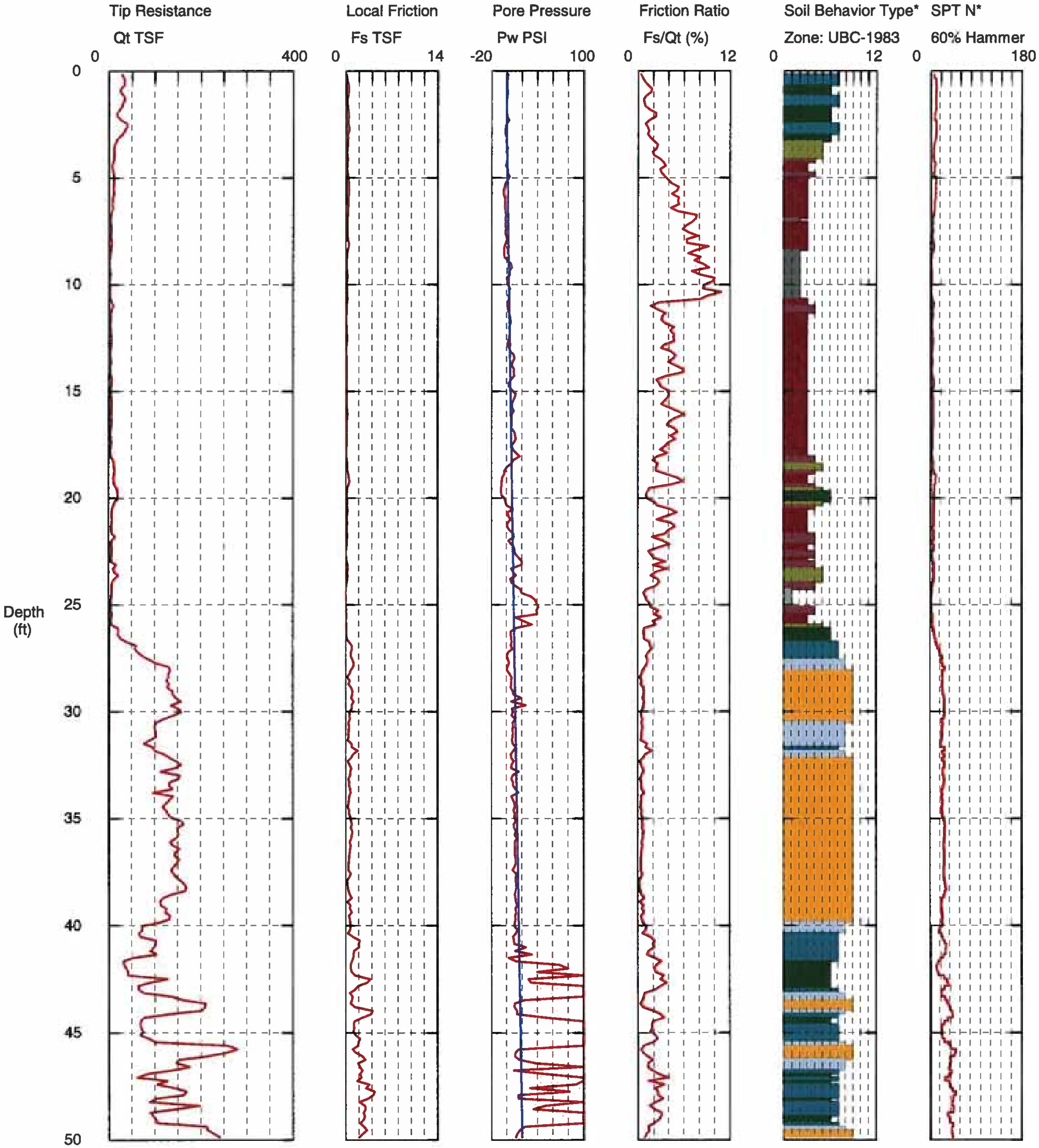
Sounding collapsed at 48.2'; terminated due to refusal.

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-5
Cone Used: DSG0780

CPT Date/Time: 7/30/2008 3:00:50 PM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 59.71 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt
■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

N32 24 13.9 W86 17 54.2

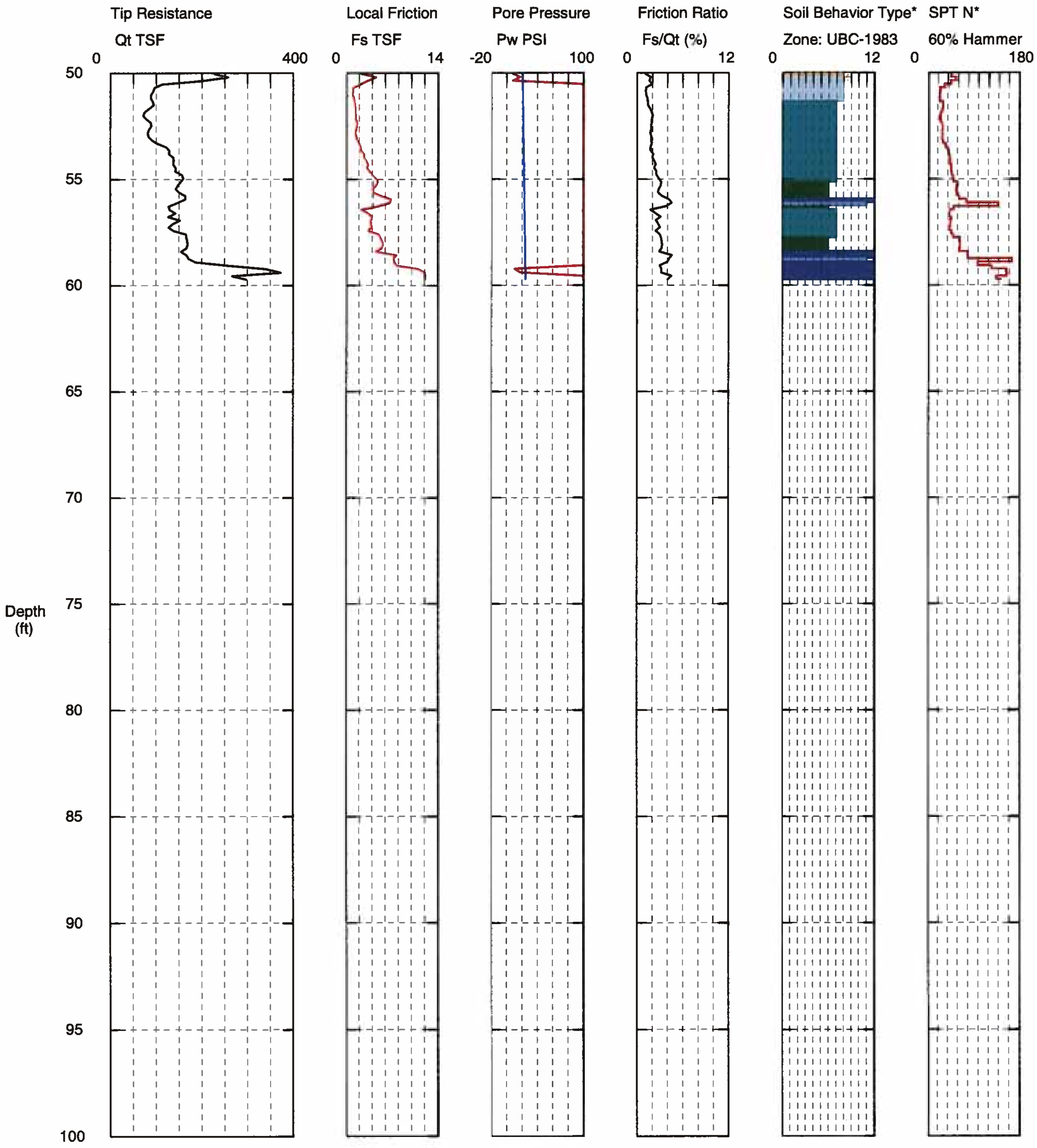
Sounding terminated due to excessive skin friction. Groundwater measured at 2.9'

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-5
Cone Used: DSG0780

CPT Date/Time: 7/30/2008 3:00:50 PM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 59.71 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt
■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

N32 24 13.9 W86 17 54.2

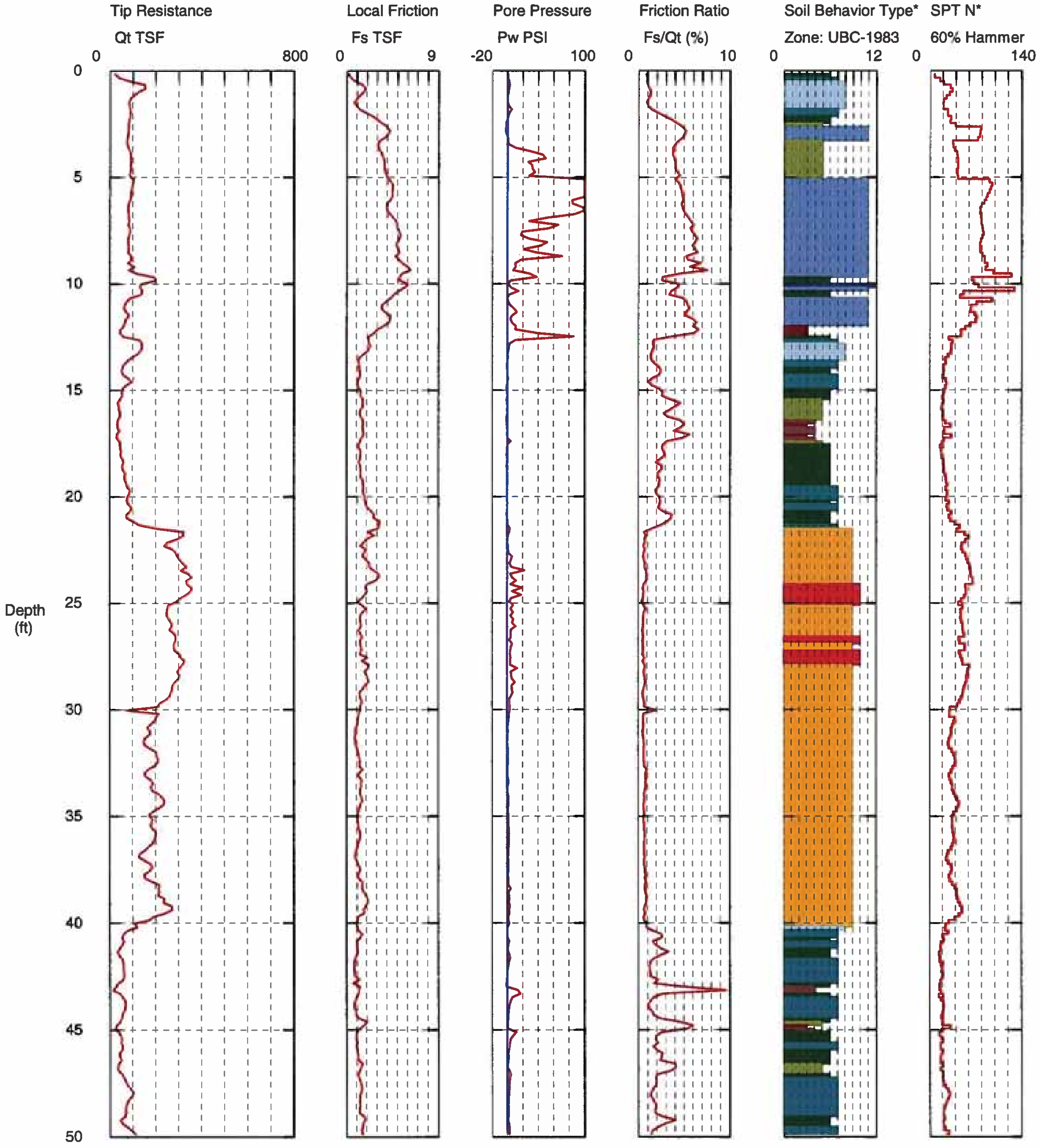
Sounding terminated due to excessive skin friction. Groundwater measured at 2.9'

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-6
Cone Used: DSG0780

CPT Date/Time: 7/30/2008 4:04:10 PM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 102.36 feet

Depth Increment = 0.164 feet

⬜ 1 sensitive fine grained
⬛ 2 organic material
🟥 3 clay
🟫 4 silty clay to clay
🟩 5 clayey silt to silty clay
⬛ 6 sandy silt to clayey silt
🟦 7 silty sand to sandy silt
🟦 8 sand to silty sand
🟧 9 sand
🟥 10 gravelly sand to sand
🟦 11 very stiff fine grained (*)
🟦 12 sand to clayey sand (*)

N32 24 16.4 W86 17 40.2

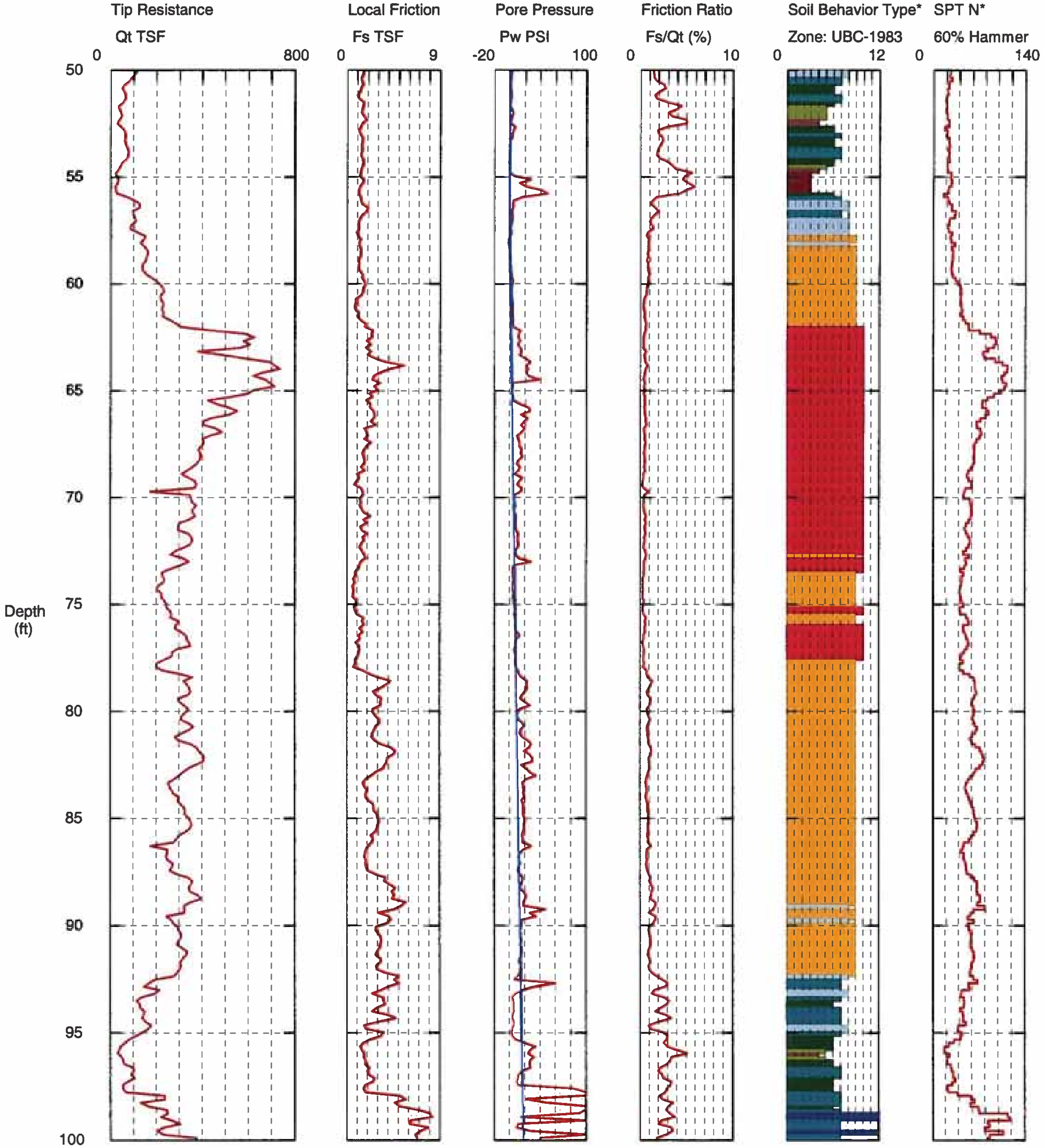
Sounding collapsed at 58.6'; terminated due to excessive rod inclination.

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-6
Cone Used: DSG0780

CPT Date/Time: 7/30/2008 4:04:10 PM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 102.36 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt
■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

N32 24 16.4 W86 17 40.2

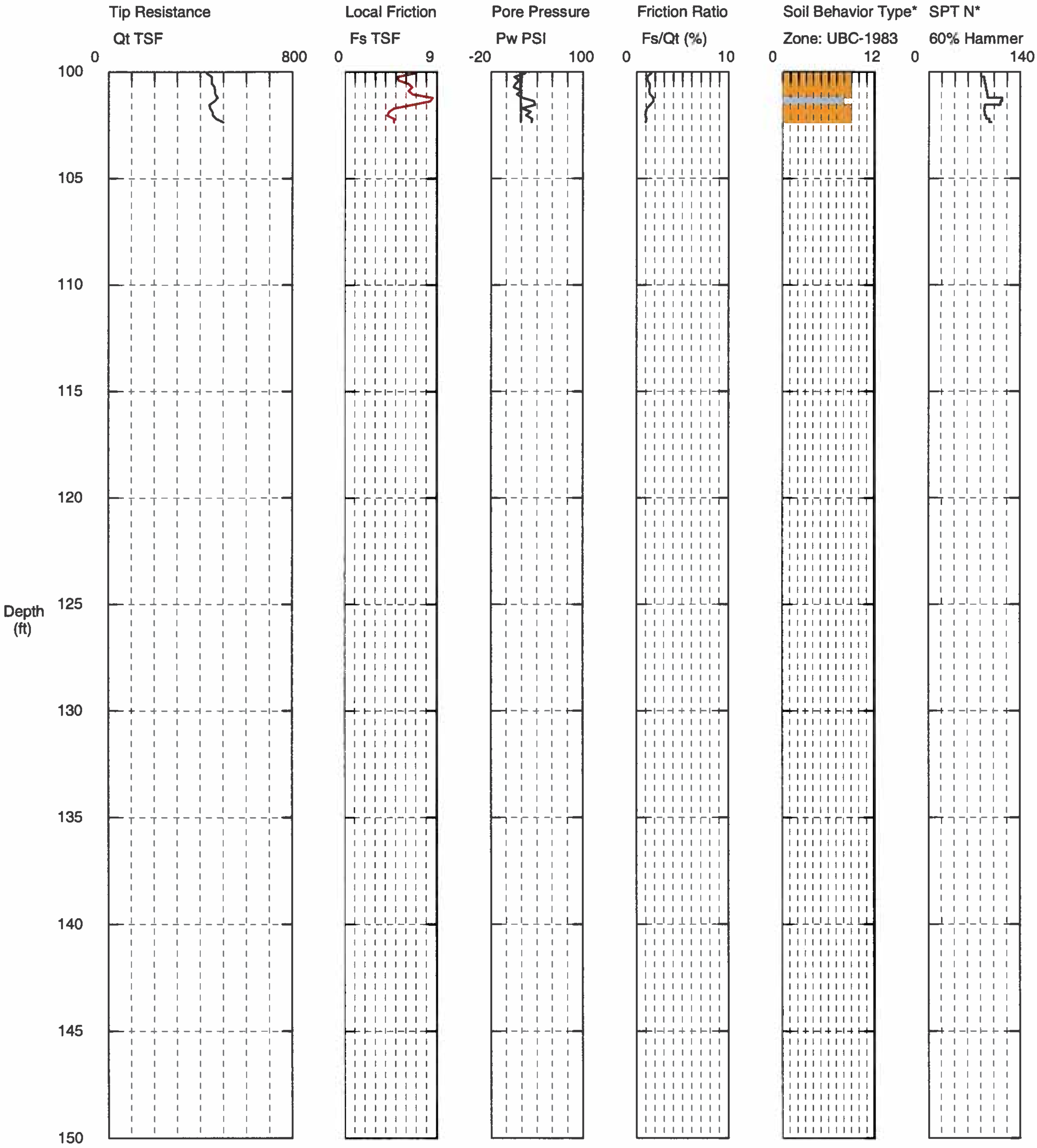
Sounding collapsed at 58.6'; terminated due to excessive rod inclination.

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-6
Cone Used: DSG0780

CPT Date/Time: 7/30/2008 4:04:10 PM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 102.36 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt
■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

N32 24 16.4 W86 17 40.2

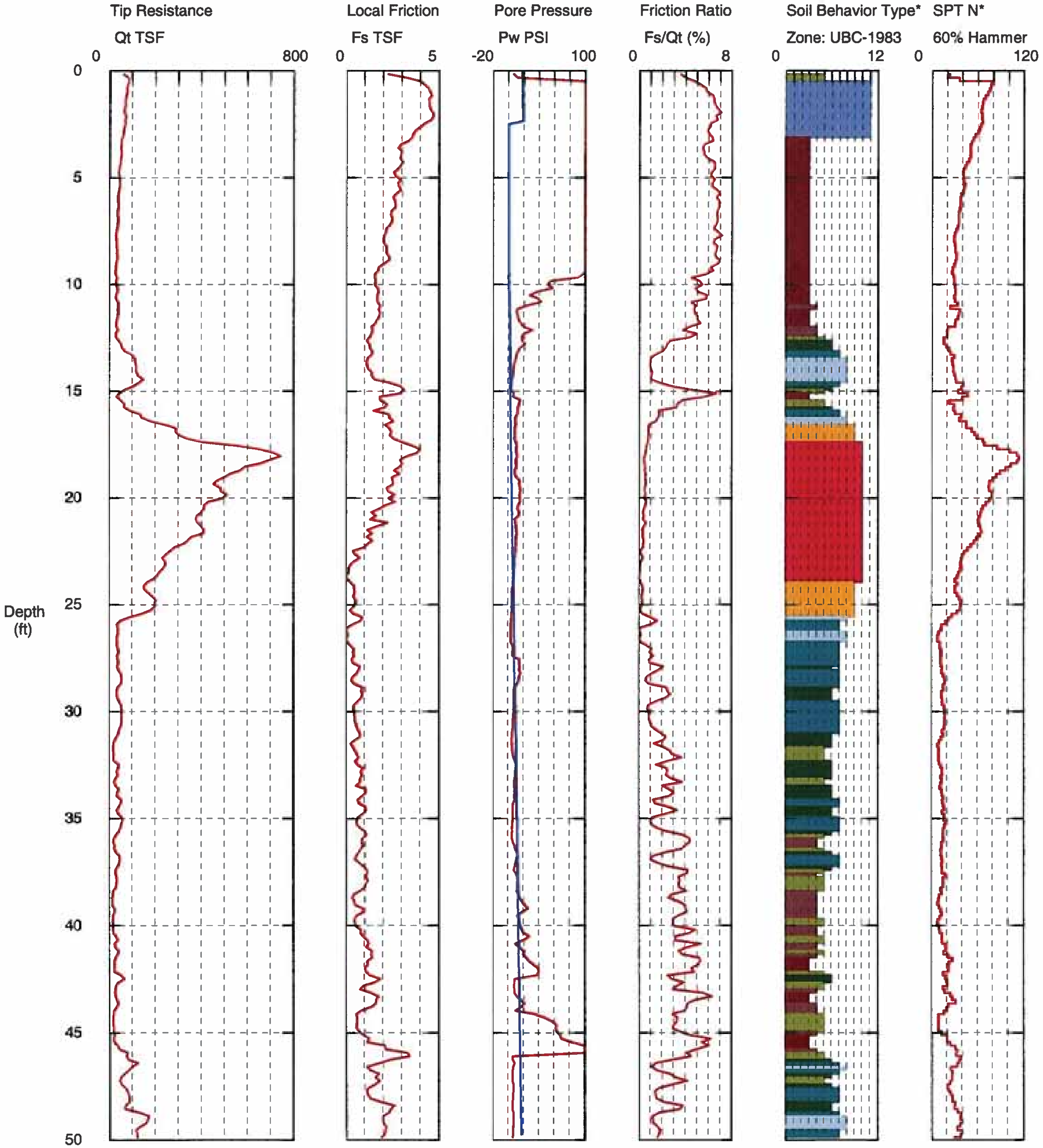
Sounding collapsed at 58.6'; terminated due to excessive rod inclination.

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-7
Cone Used: DSG0780

CPT Date/Time: 7/31/2008 7:37:02 AM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 58.73 feet

Depth Increment = 0.164 feet

- 1 sensitive fine grained
- 2 organic material
- 3 clay
- 4 silty clay to clay
- 5 clayey silt to silty clay
- 6 sandy silt to clayey silt
- 7 silty sand to sandy silt
- 8 sand to silty sand
- 9 sand
- 10 gravelly sand to sand
- 11 very stiff fine grained (*)
- 12 sand to clayey sand (*)

N32 24 26.5 W86 17 41.3

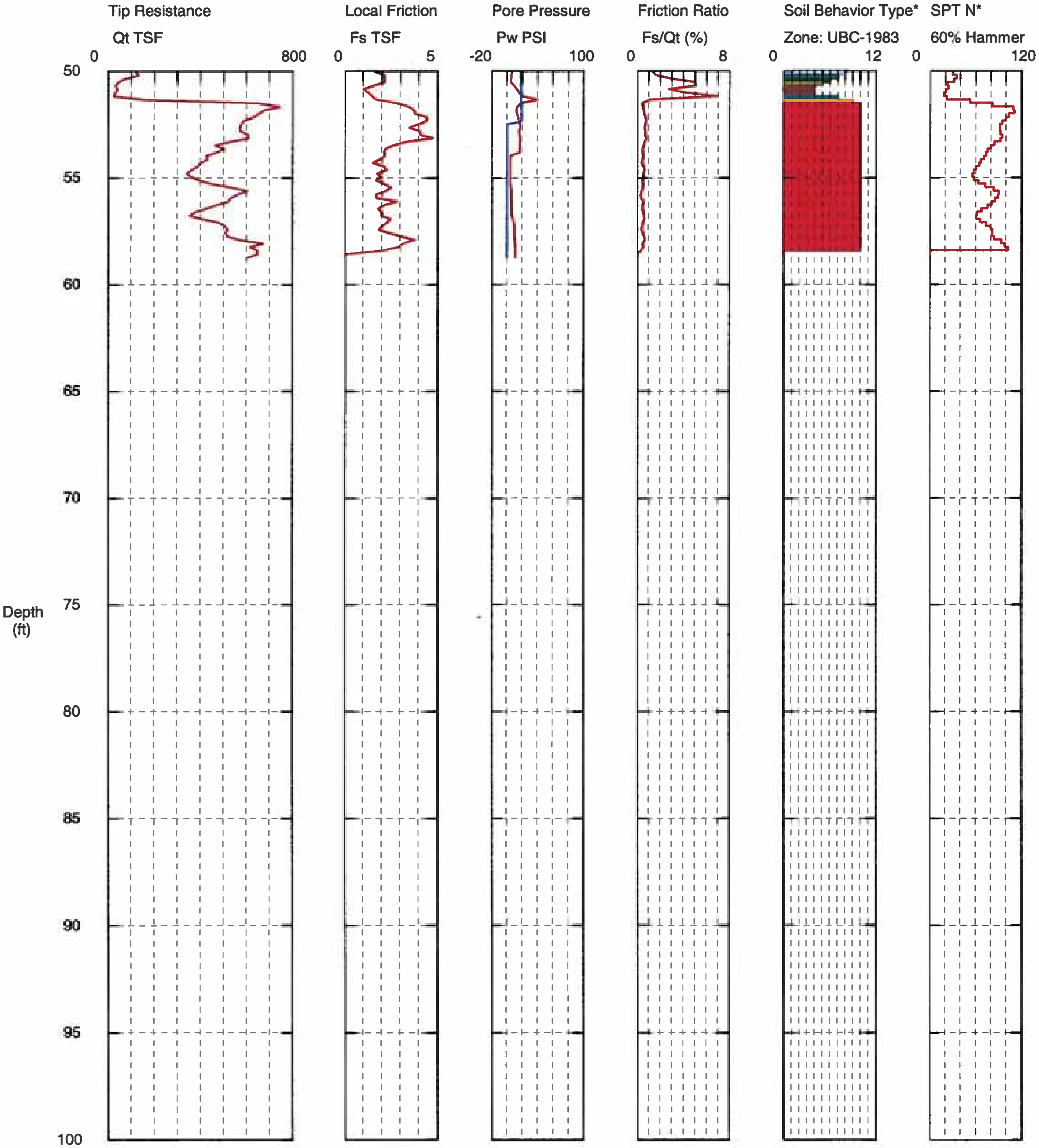
Groundwater measured at

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-7
Cone Used: DSG0780

CPT Date/Time: 7/31/2008 7:37:02 AM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 58.73 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt
■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

N32 24 26.5 W86 17 41.3

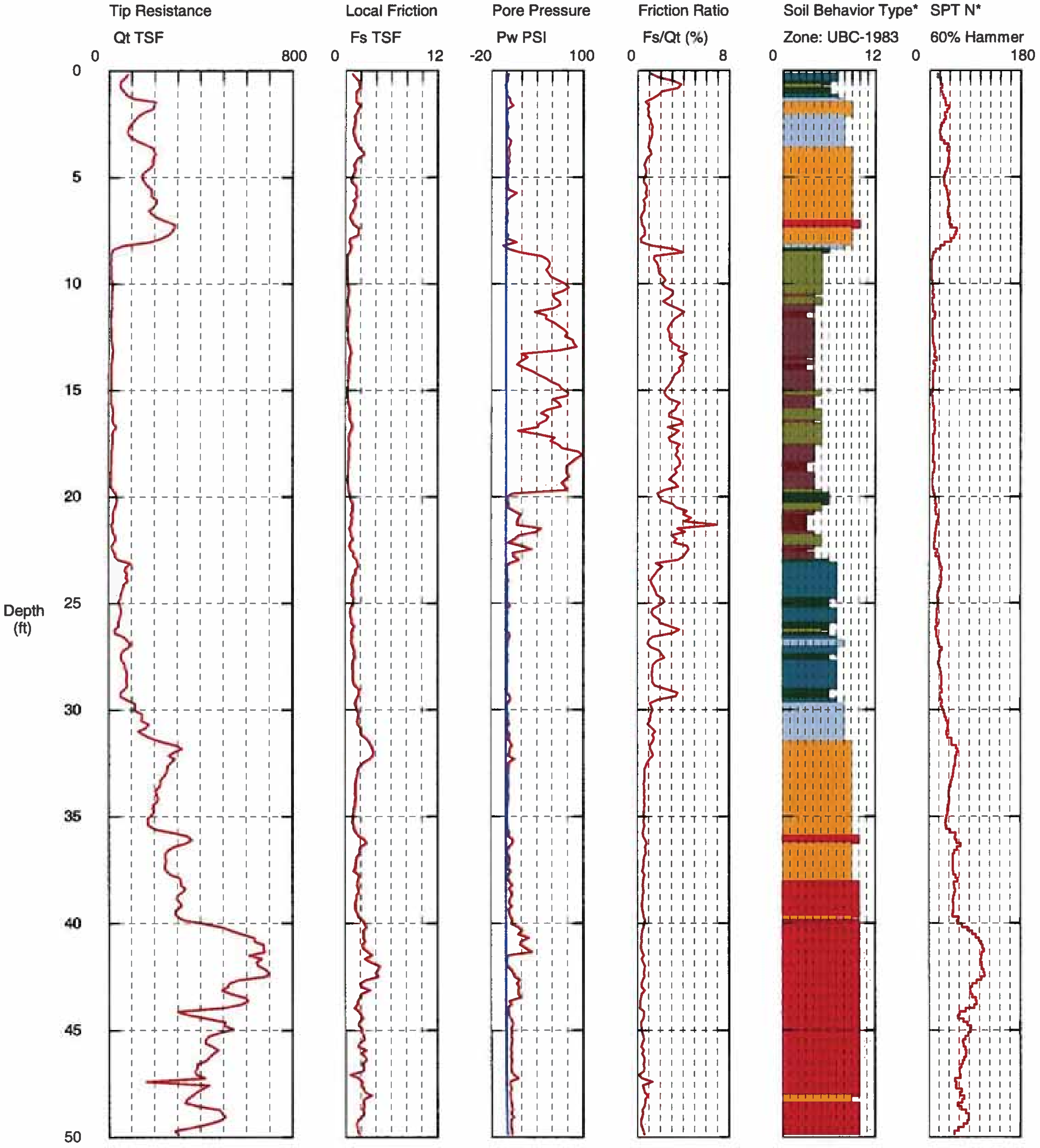
Groundwater measured at

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-8
Cone Used: DSG0780

CPT Date/Time: 7/31/2008 8:47:05 AM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 63.32 feet

Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay

4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt

7 silty sand to sandy silt
8 sand to silty sand
9 sand

10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

N32 24 41.8 W86 17 49.5

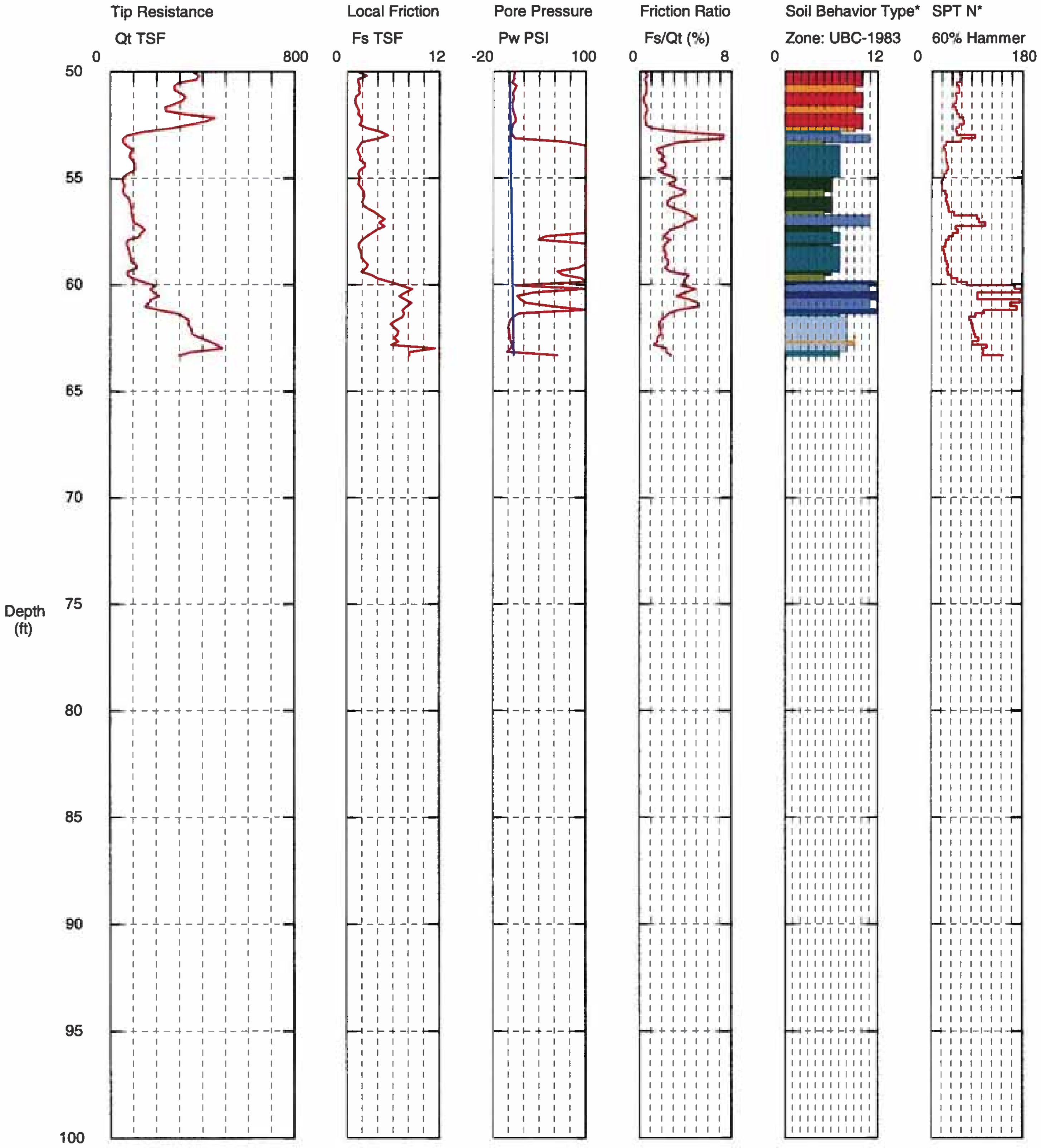
Sounding collapsed and wet 5.4 feet.

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-8
Cone Used: DSG0780

CPT Date/Time: 7/31/2008 8:47:05 AM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 63.32 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained	■ 4 silty clay to clay	■ 7 silty sand to sandy silt	■ 10 gravelly sand to sand
■ 2 organic material	■ 5 clayey silt to silty clay	■ 8 sand to silty sand	■ 11 very stiff fine grained (*)
■ 3 clay	■ 6 sandy silt to clayey silt	■ 9 sand	■ 12 sand to clayey sand (*)

N32 24 41.8 W86 17 49.5

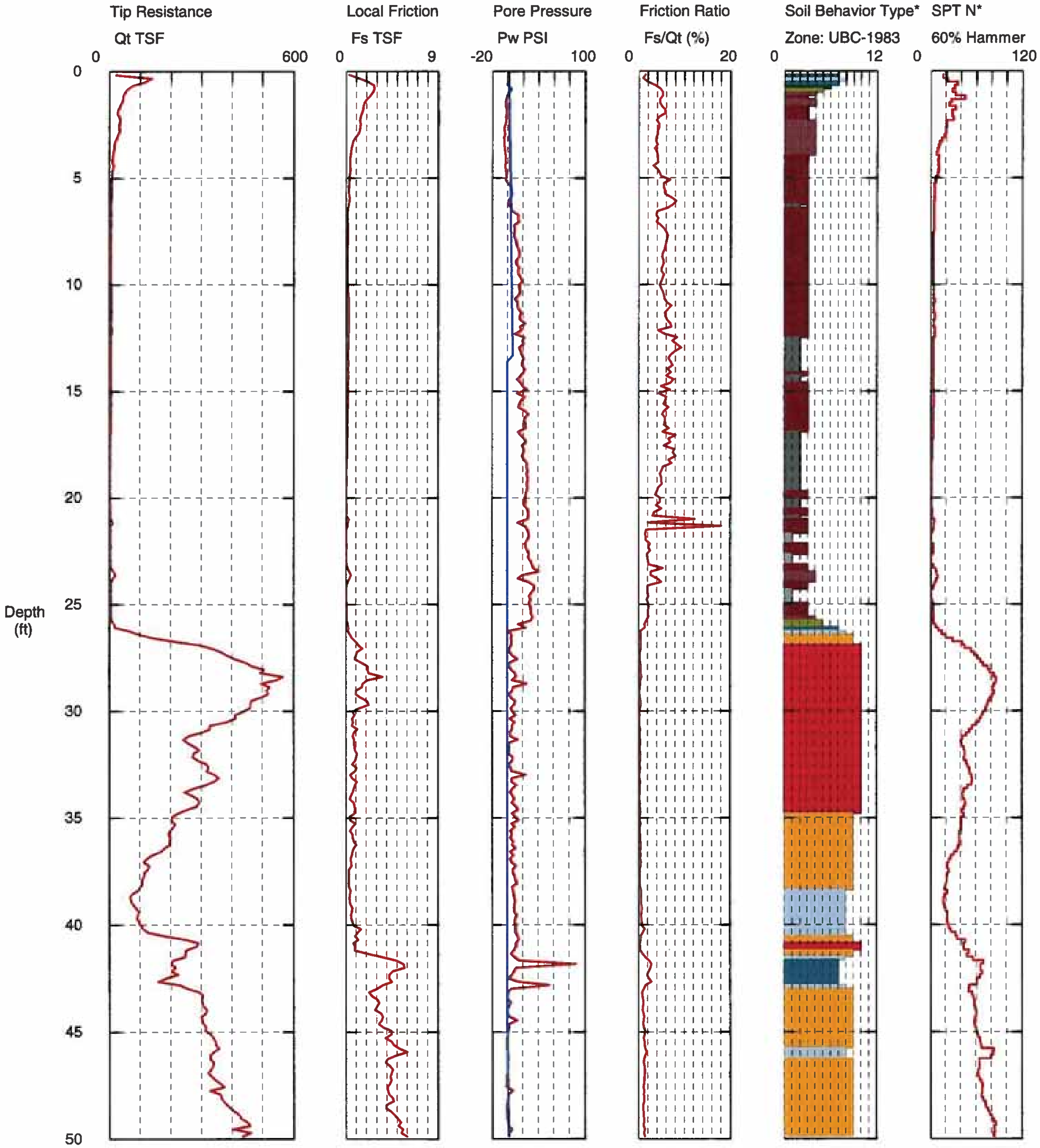
Sounding collapsed and wet 5.4 feet.

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-9
Cone Used: DSG0780

CPT Date/Time: 7/31/2008 10:44:49 AM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 81.53 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay

■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt

■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand

■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

N32 23 578 W86 17 34.9

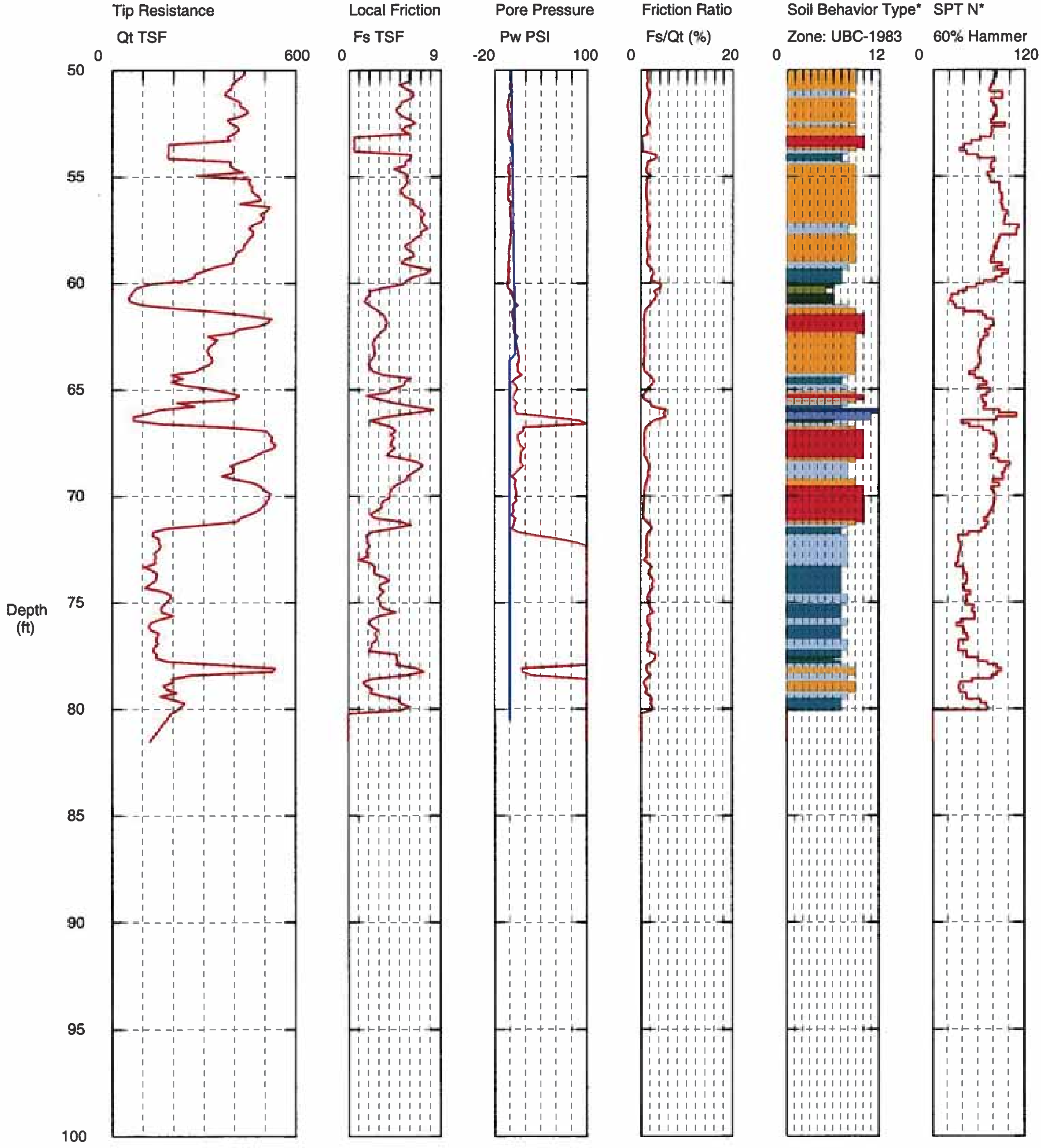
Groundwater measured at

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-9
Cone Used: DSG0780

CPT Date/Time: 7/31/2008 10:44:49 AM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 81.53 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt
■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

N32 23 578 W86 17 34.9

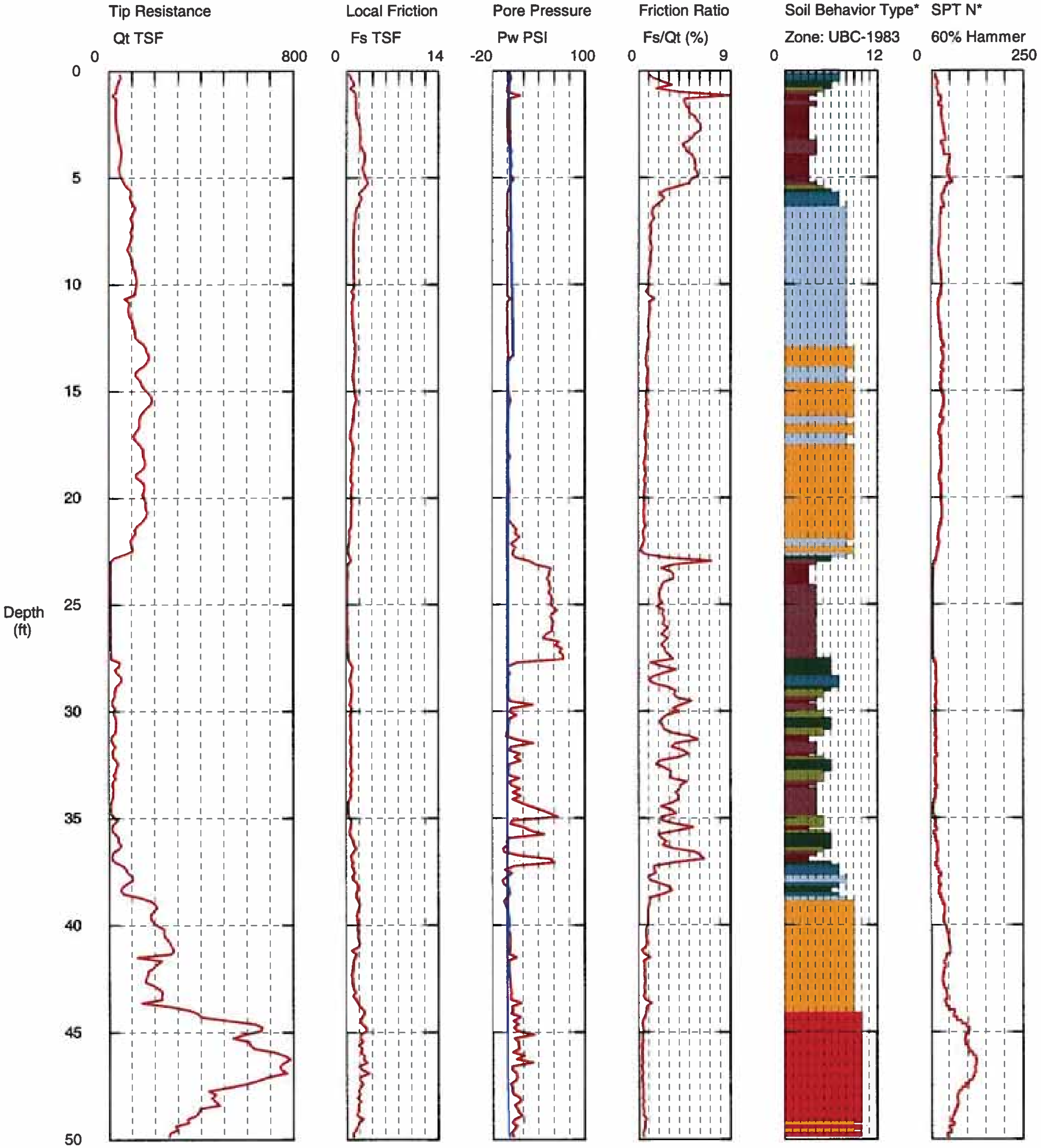
Groundwater measured at

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-10
Cone Used: DSG0780

CPT Date/Time: 7/31/2008 2:48:02 PM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 90.06 feet

Depth Increment = 0.164 feet

- ■ 1 sensitive fine grained
- ■ 2 organic material
- ■ 3 clay
- ■ 4 silty clay to clay
- ■ 5 clayey silt to silty clay
- ■ 6 sandy silt to clayey silt
- ■ 7 silty sand to sandy silt
- ■ 8 sand to silty sand
- ■ 9 sand
- ■ 10 gravelly sand to sand
- ■ 11 very stiff fine grained (*)
- ■ 12 sand to clayey sand (*)

N32 23 23.4 W86 17 28.3

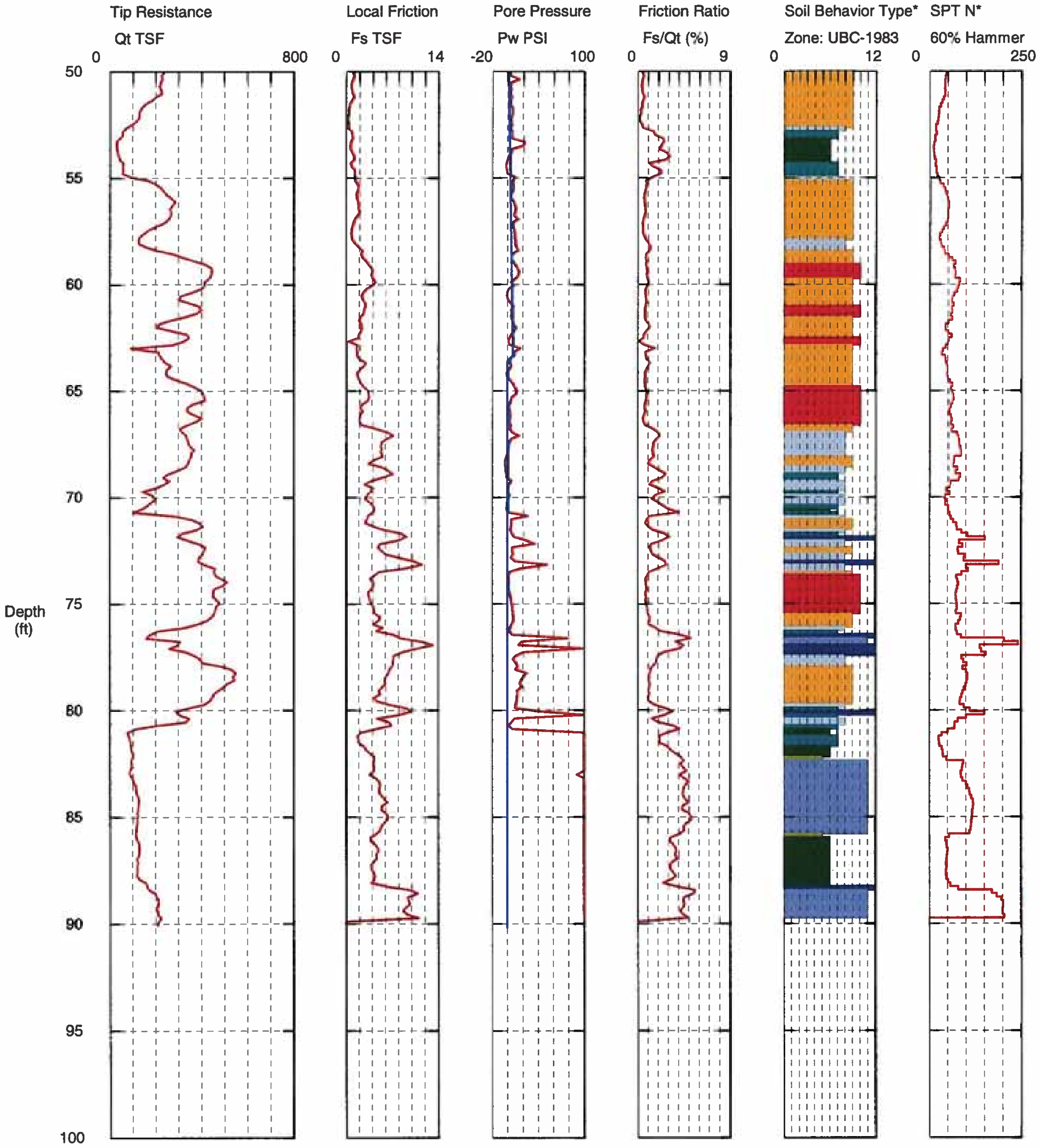
Groundwater measured at

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-10
Cone Used: DSG0780

CPT Date/Time: 7/31/2008 2:48:02 PM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 90.06 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt
■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

N32 23 23.4 W86 17 28.3

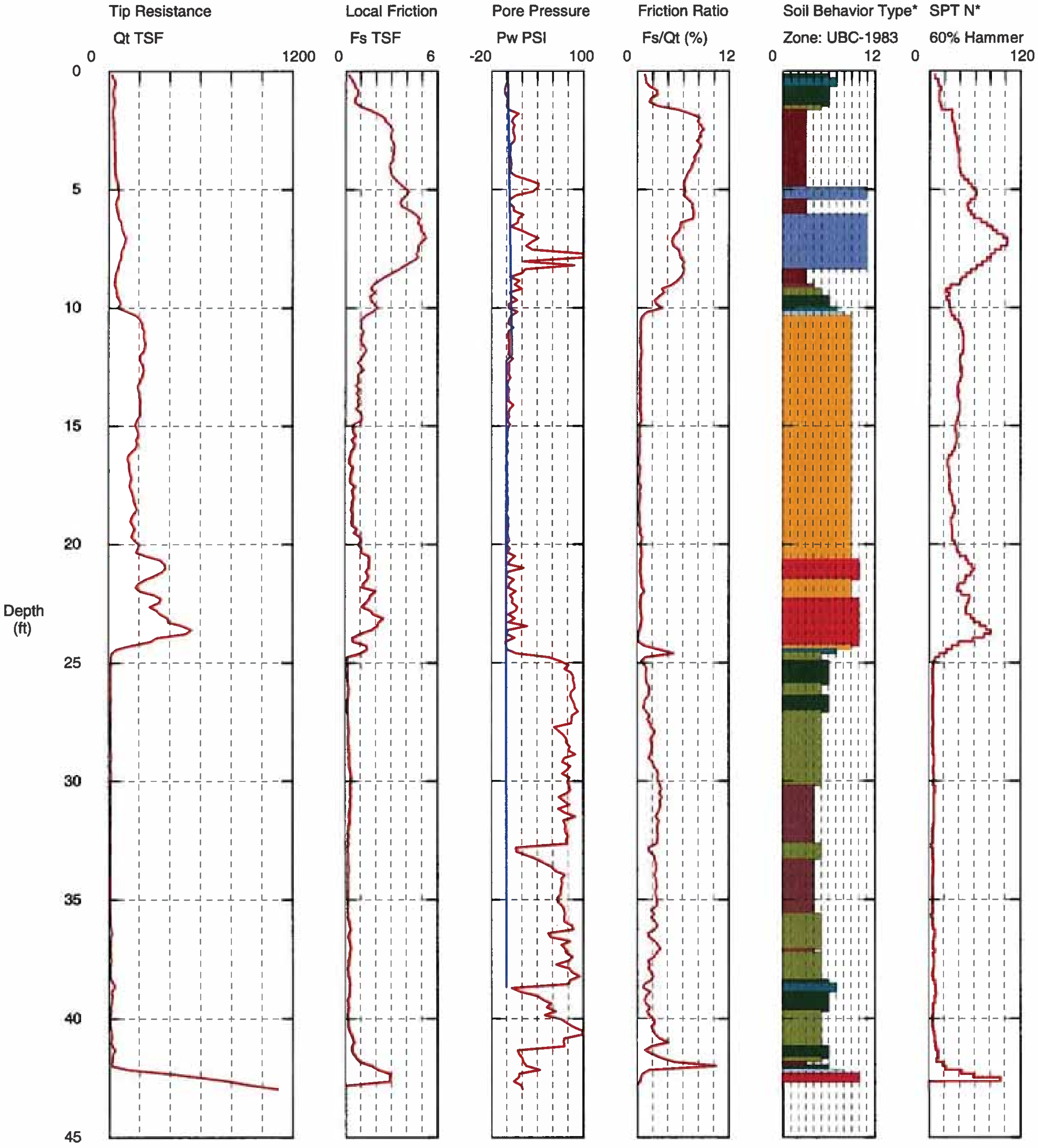
Groundwater measured at

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-11a
Cone Used: DSG0780

CPT Date/Time: 7/31/2008 4:39:23 PM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 42.98 feet

Depth Increment = 0.164 feet

🟩 1 sensitive fine grained
⬛ 2 organic material
🟥 3 clay
🟫 4 silty clay to clay
🟩 5 clayey silt to silty clay
⬛ 6 sandy silt to clayey silt
🟦 7 silty sand to sandy silt
🟦 8 sand to silty sand
🟧 9 sand
🟥 10 gravelly sand to sand
🟦 11 very stiff fine grained (*)
🟦 12 sand to clayey sand (*)

N32 24 35.2 W86 17 29.7

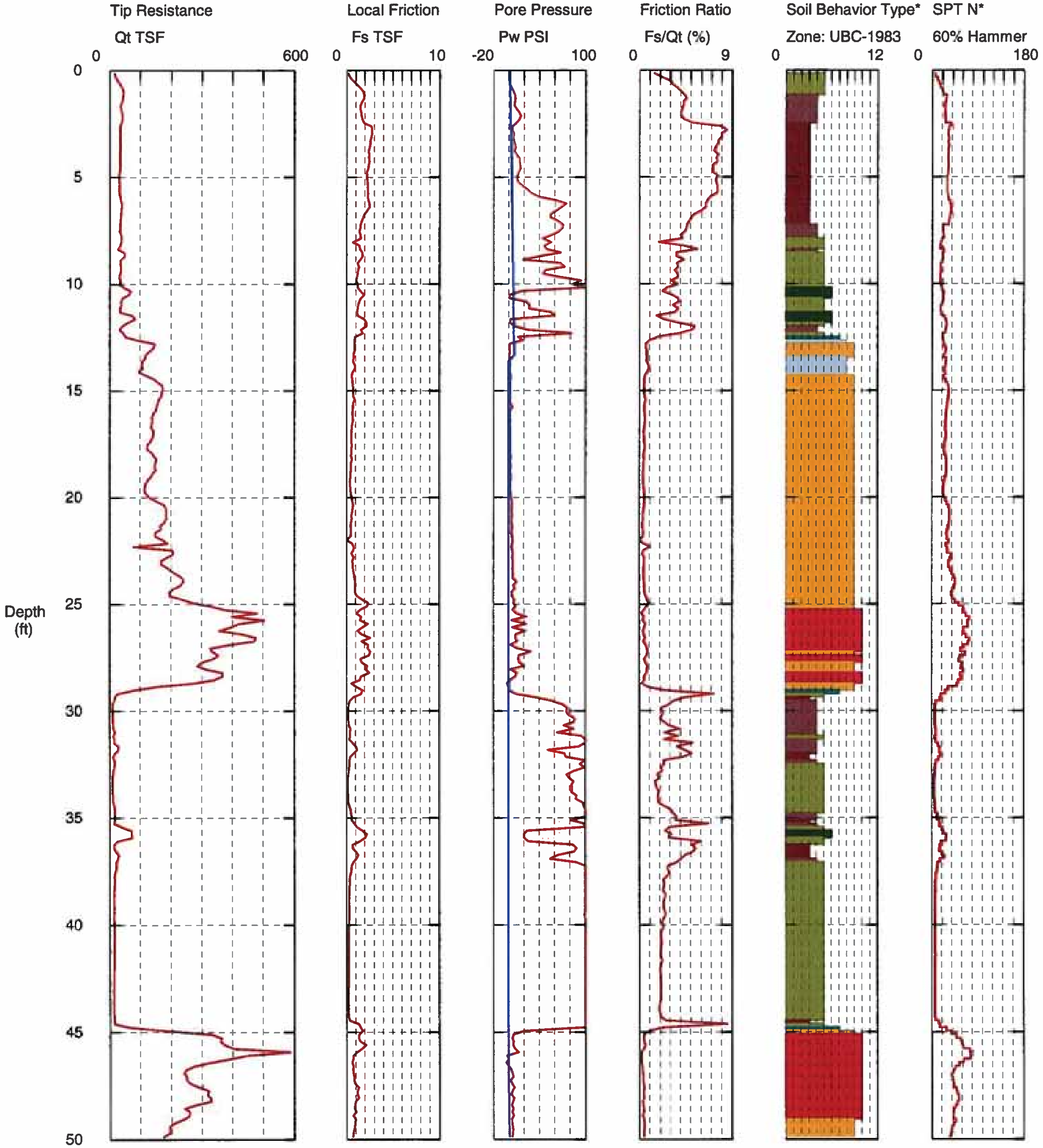
Groundwater measured at

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-12
Cone Used: DSG0780

CPT Date/Time: 8/1/2008 7:51:02 AM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 73.16 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt
■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

N32 24 40.2 W86 17 36.0

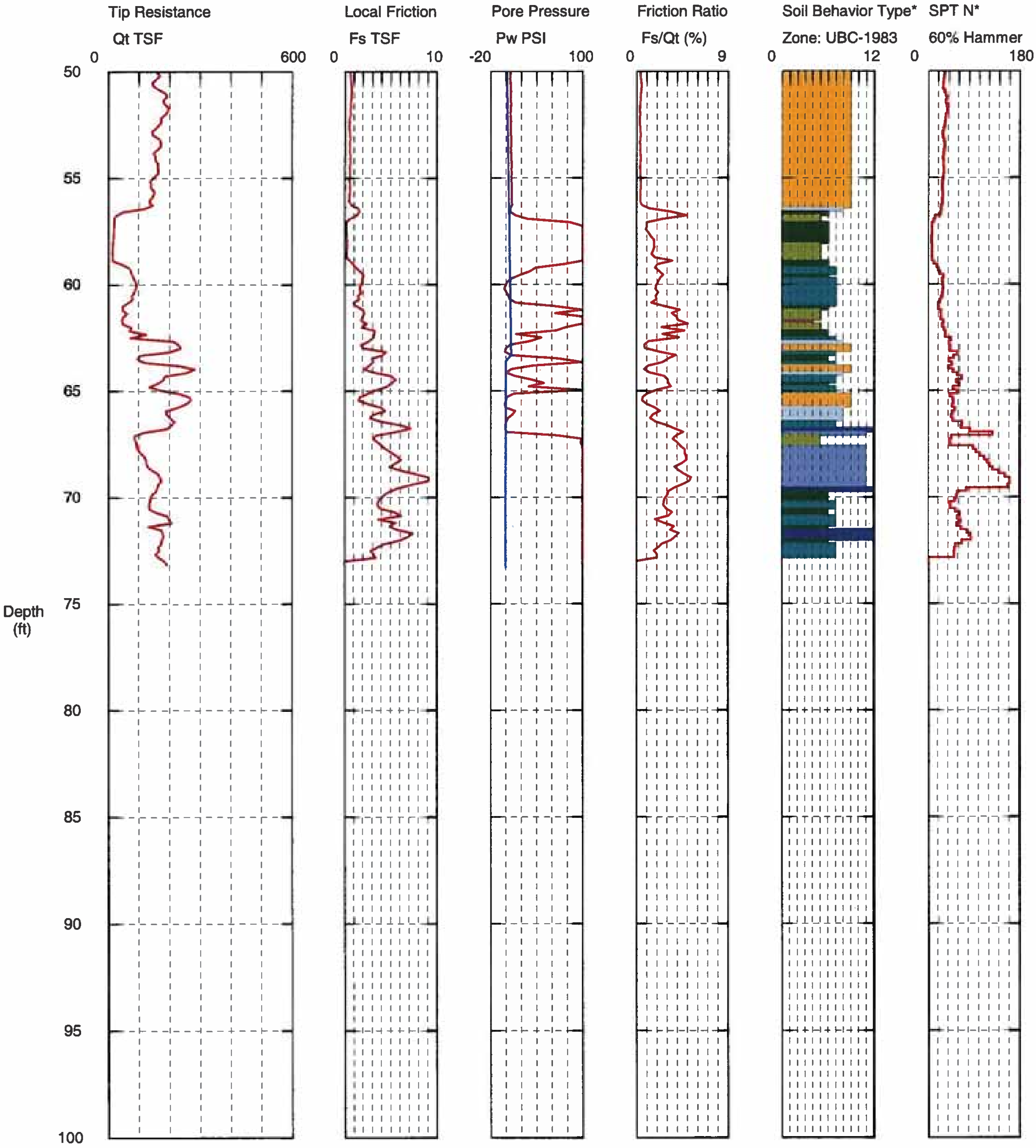
Groundwater measured at

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-12
Cone Used: DSG0780

CPT Date/Time: 8/1/2008 7:51:02 AM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 73.16 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt
■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

N32 24 40.2 W86 17 36.0

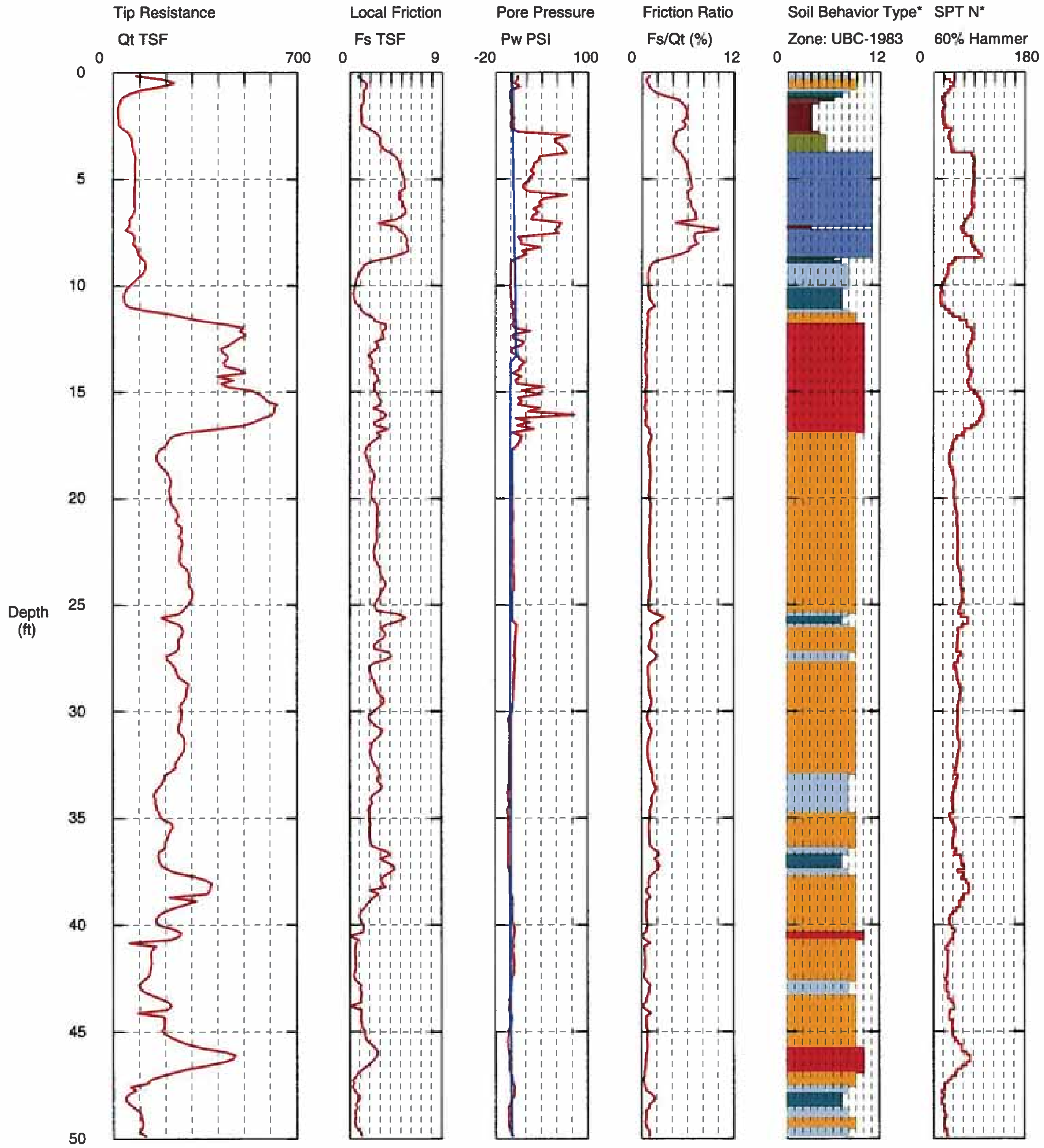
Groundwater measured at

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-13
Cone Used: DSG0780

CPT Date/Time: 8/1/2008 9:09:45 AM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 68.24 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt
■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

N32 24 59.9 W86 17 29.6

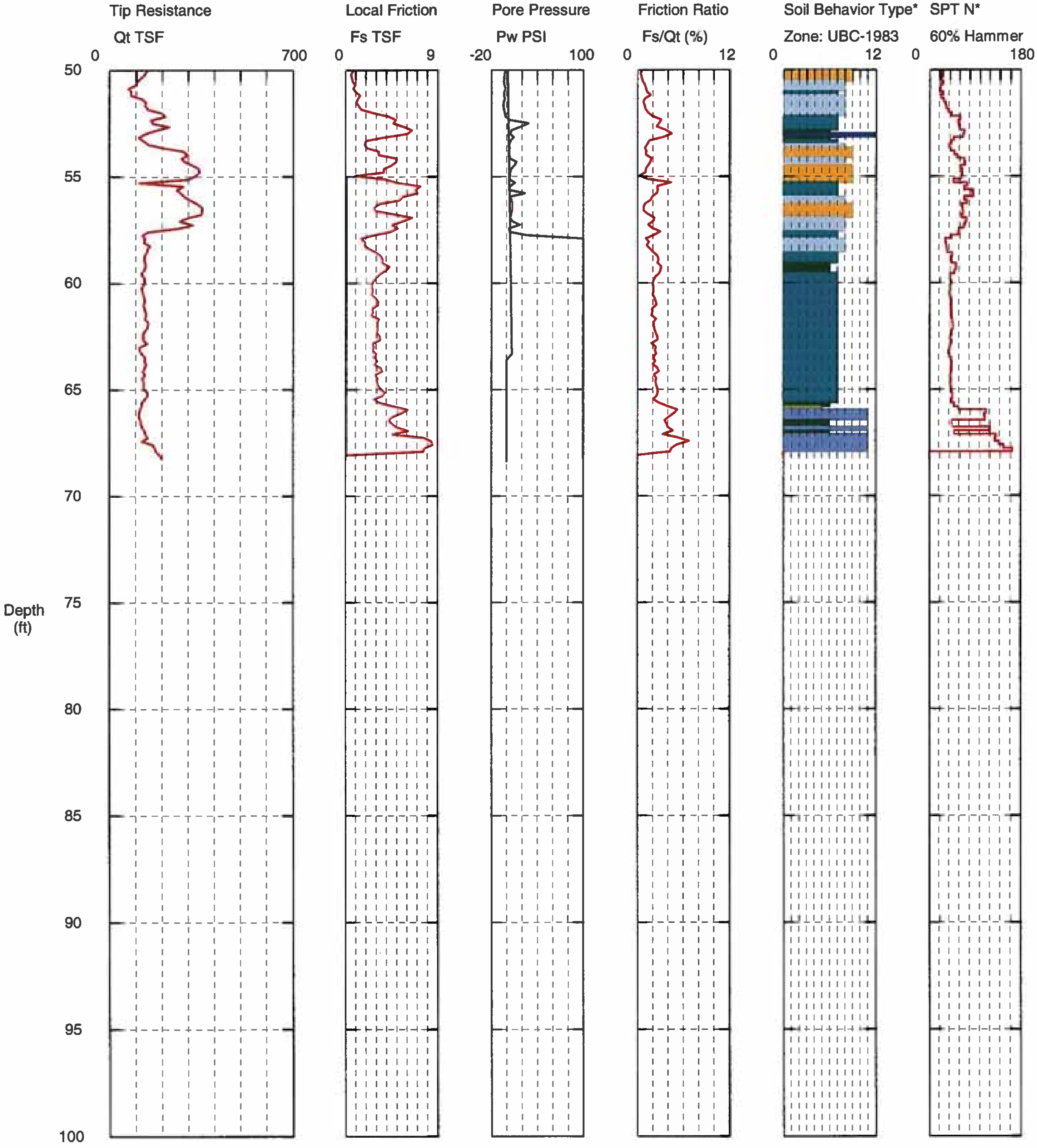
Groundwater measured at

*Soil behavior type and SPT based on data from UBC-1983

Southern Earth Sciences, Inc

Operator: Mike Wright
Sounding: SG-13
Cone Used: DSG0780

CPT Date/Time: 8/1/2008 9:09:45 AM
Location: Sand and Gravel Pits
Job Number: C06-401



Maximum Depth = 68.24 feet

Depth Increment = 0.164 feet

■ 1 sensitive fine grained
■ 2 organic material
■ 3 clay
■ 4 silty clay to clay
■ 5 clayey silt to silty clay
■ 6 sandy silt to clayey silt
■ 7 silty sand to sandy silt
■ 8 sand to silty sand
■ 9 sand
■ 10 gravelly sand to sand
■ 11 very stiff fine grained (*)
■ 12 sand to clayey sand (*)

N32 24 59.9 W86 17 29.6

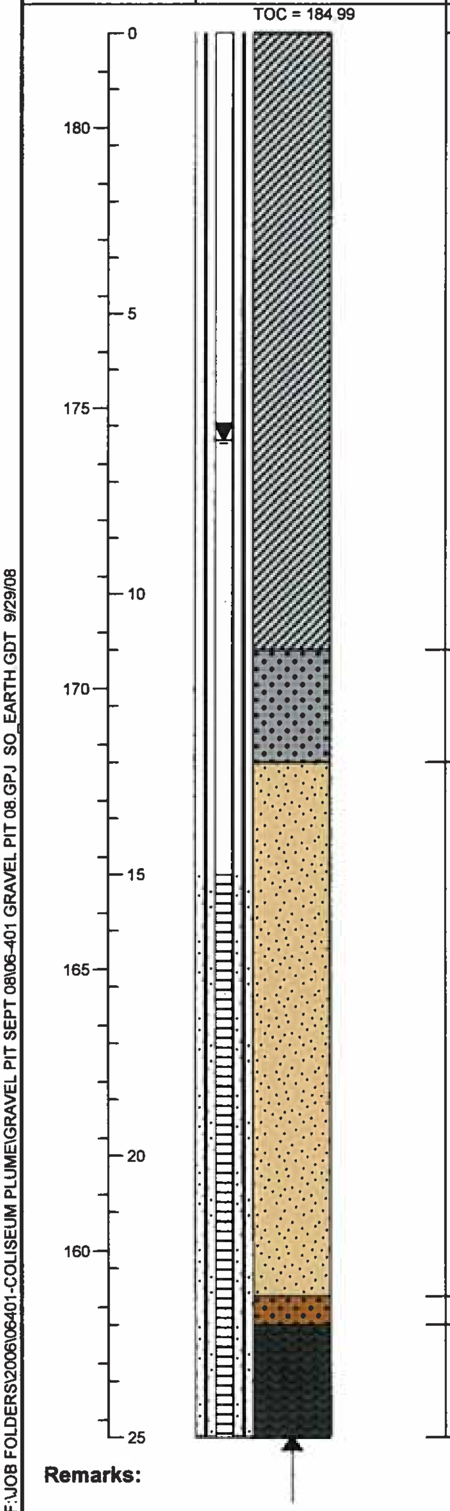
Groundwater measured at

*Soil behavior type and SPT based on data from UBC-1983

Page 1 of 1

LOG OF BOREHOLE NO.G-1

PROJECT: COLISEUM PLUME
SESI PROJECT: 06-401
PROJECT LOCATION: MONTGOMERY, AL
METHOD: GEOPROBE
BORING LOCATION: SEE SITE MAP
BORING ELEVATION: 181.69 ft
DATE DRILLED: 09/12/08
DATE COMPLETED: 09/12/08
WATER LEVEL: 7.32 ft
WATER LEVEL DATE: 09/12/08
GEOL / ENGR: E. GUARINO
TOC: 184.99 ft
DRILLER: D. BAILEY



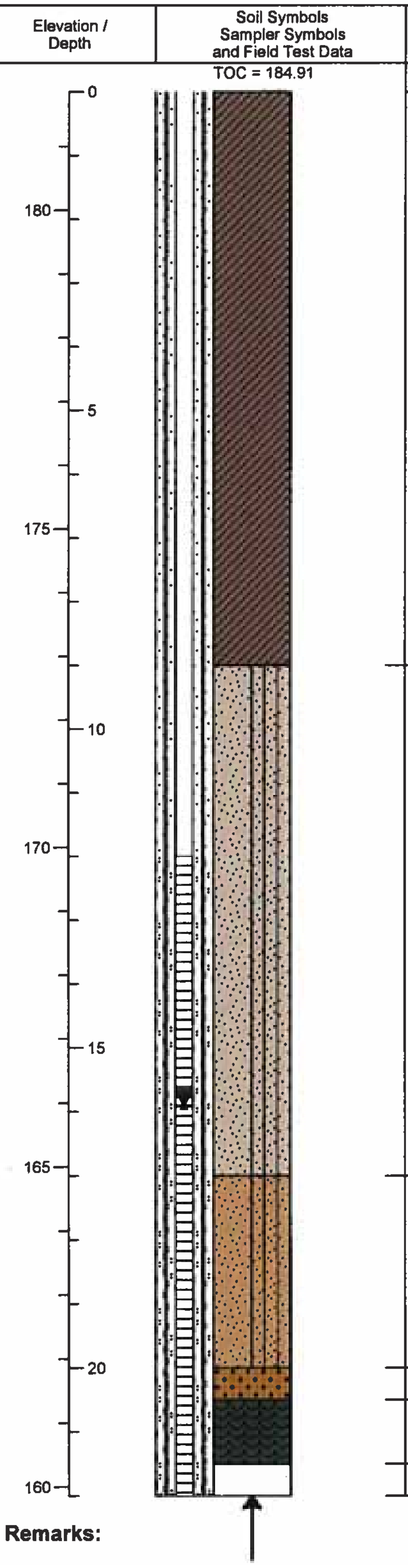
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	NM %	LL %	200 %
		CL	Dark greenish gray to light greenish gray CLAY; SILT content begins at 5.5'. GLEY 1 4/10Y to GLEY 1 7/10Y	20.8	26	93
		SW	Very fine grained greenish gray saturated SAND. 12-12.5'. Insufficient groundwater to sample. GLEY 1 6/10Y			
		SP	Fine grained to coarse grained light greenish gray to yellow SAND/GRAVEL. GLEY 1 8/10Y to 2.5Y 8/6	14.7		3
		SW	Fine grained strong brown SAND. 7.5YR 5/8			
		OH	Black CLAY. 7.5YR 2.5/1	208.0	288	90

Remarks:

Page 1 of 1

LOG OF BOREHOLE NO.G-2

PROJECT: COLISEUM PLUME
SESI PROJECT: 06-401
PROJECT LOCATION: MONTGOMERY, AL
METHOD: GEOPROBE
BORING LOCATION: SEE SITE MAP
BORING ELEVATION: 181.86 ft
DATE DRILLED: 09/12/08
DATE COMPLETED: 09/12/08
WATER LEVEL: 15.96 ft
WATER LEVEL DATE: 09/12/08
GEOL / ENGR: E. GUARINO
TOC: 184.91 ft
DRILLER: D. BAILEY



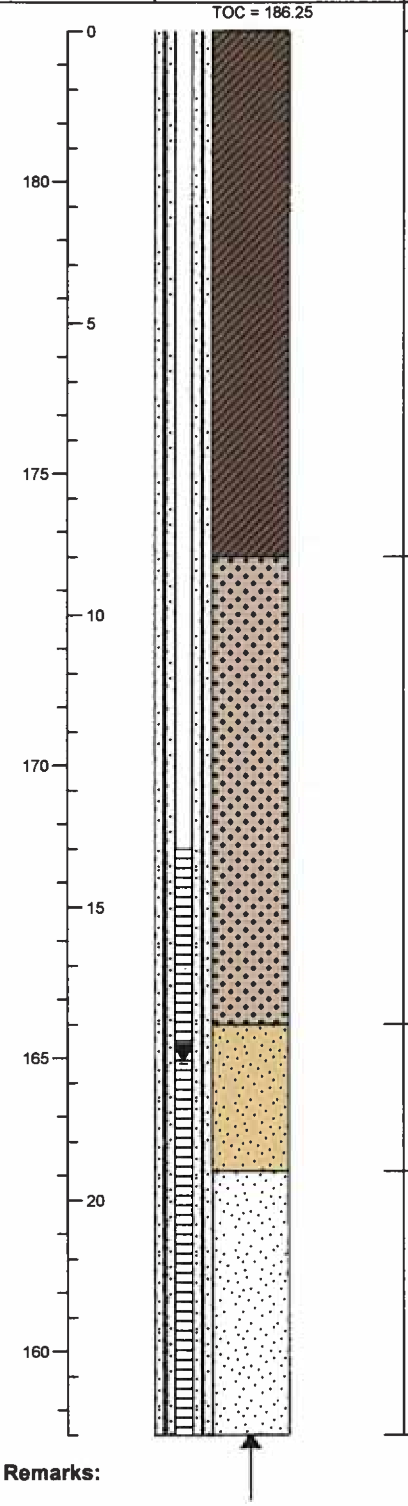
USCS	Description	NM %	LL %	200 %
CL	Weak red to reddish brown CLAY with silt at 7'. 2.5YR 5/2 to 5YR 4/4			
SP-SM	Fine grained white to very pale brown SAND Dry. GLEY 1 8N to 10YR 7/3	10.0		11
SP-SM	Coarse grained reddish yellow to white SAND/GRAVEL saturated at 18'. 7.5YR 6/6 to 7.5YR 8/1	16.2		5
SW	Fine grained to medium grained strong brown SAND. 7.5YR 5/8			
OH	Saturated black CLAY with wood fragments. 7.5YR 2.5/1	68.7	90	72
	Piezometer Set at 22'			

Remarks:

GEOLOG4 F:\JOB FOLDERS\2006\06401-COLISEUM PLUME\GRAVEL PIT SEPT 08\06-401 GRAVEL PIT 08.GPJ SO_EARTH.GDT 9/29/08

LOG OF BOREHOLE NO.G-3

PROJECT: COLISEUM PLUME
SESI PROJECT: 06-401
PROJECT LOCATION: MONTGOMERY, AL
METHOD: GEOPROBE
BORING LOCATION: SEE SITE MAP
BORING ELEVATION: 182.57 ft
DATE DRILLED: 09/12/08
DATE COMPLETED: 09/12/08
WATER LEVEL: 17.67 ft
WATER LEVEL DATE: 09/12/08
GEOL / ENGR: E. GUARINO
TOC: 186.25 ft
DRILLER: D. BAILEY



Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	NM %	200 %
		CL	Well indurated reddish brown CLAY Dry very hard. Silty Clay at 8.5'. 5YR 4/4		
		SW	Fine grained white to very pale brown SAND. GLEY 1 8N to 10YR 7/3		
		SP	Fine grained to coarse grained white to yellow SAND/GRAVEL very saturated at 19.5'. GLEY 8N to 2.5Y 8/6	7.4	4
		SP	No Sample Recovered (tube stuck in Macro Core sampler) Presumably due to a coarse SAND and GRAVEL		

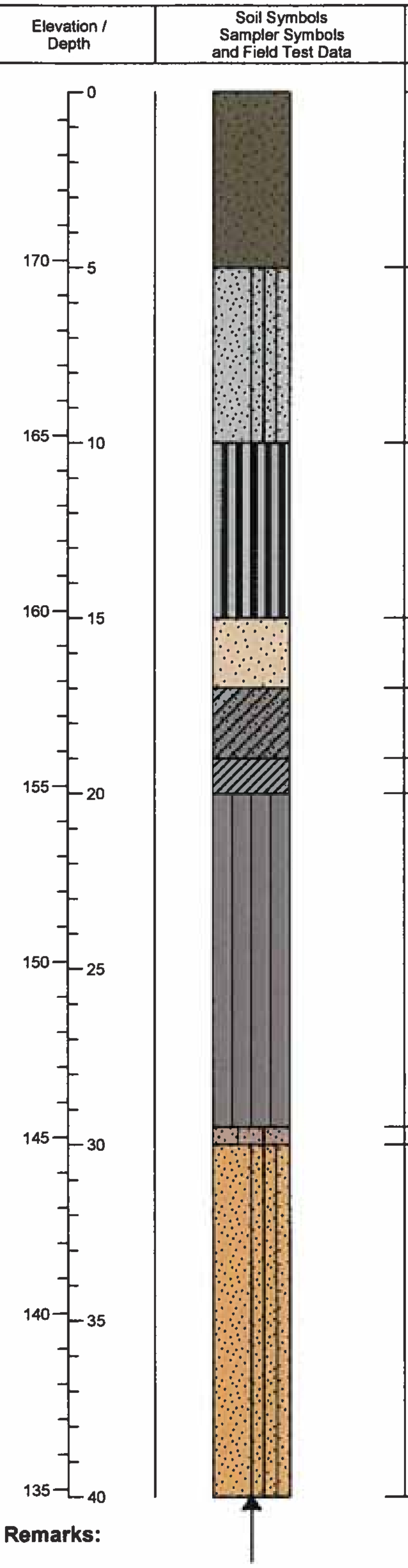
Remarks:

GEOLOG4 F:\JOB FOLDERS\2006\06401-COLISEUM PLUME\GRAVEL PIT SEPT 08\06-401 GRAVEL PIT 08.GPJ SO_EARTH.GDT 9/29/08

LOG OF BOREHOLE NO.G-4

PROJECT: COLISEUM PLUME
PROJECT LOCATION: MONTGOMERY, AL
BORING LOCATION: SEE SITE MAP
DATE DRILLED: 09/08/08
WATER LEVEL:
GEOL / ENGR: E. GUARINO

SESI PROJECT: 06-401
METHOD: GEOPROBE
BORING ELEVATION: 174.79 ft
DATE COMPLETED: 09/08/08
WATER LEVEL DATE: 09/08/08
DRILLER: D. BAILEY



USCS	Description	NM %	LL %	200 %
SP	Brown coarse well sorted, well rounded SAND with some silt. Moist. 10YR 4/3			
SP-SM	Light gray and tan moderate to poorly sorted subangular SAND with some silt. 10YR 7/1	12.4		11
MH	Saturated light gray clayey silt. 10YR 7/1	47.8	50	99
SP	Tan wet gravely SAND, poorly graded. 10YR 8/4			
SC	Mottled gray and tan transition CLAY and SAND with some sub-rounded grains. 10YR 5/1			
CL	Gray CLAY, stiff with limited plasticity. 10YR 5/1			
ML	Mottled tan and gray clayey silt. Very silty and dry. 10YR 5/1	34.7	44	98
SM	Transition back to red and orange silty loose SAND with some mica. 2.5YR 6/3			
SP-SM	Orange loose coarsening downward SAND/GRAVEL with some silt	10.5		8

Remarks:

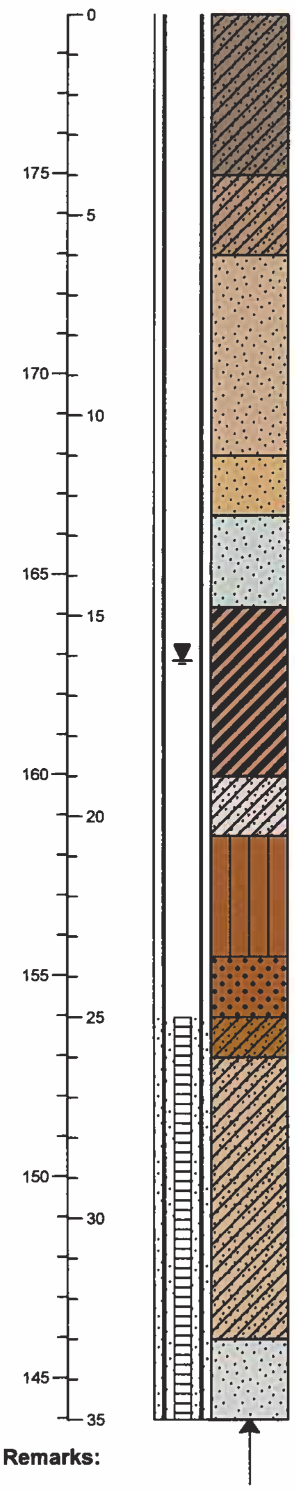
Page 1 of 1

LOG OF BOREHOLE NO.G-5

PROJECT: COLISEUM PLUME
PROJECT LOCATION: MONTGOMERY, AL
BORING LOCATION: SEE SITE MAP
DATE DRILLED: 09/09/08
WATER LEVEL: 16.2 ft
GEOL / ENGR: E. GUARINO

SESI PROJECT: 06-401
METHOD: GEOPROBE
BORING ELEVATION: 178.95 ft
DATE COMPLETED: 09/09/08
WATER LEVEL DATE: 09/09/08
DRILLER: D. BAILEY

Elevation / Depth | Soil Symbols Sampler Symbols and Field Test Data



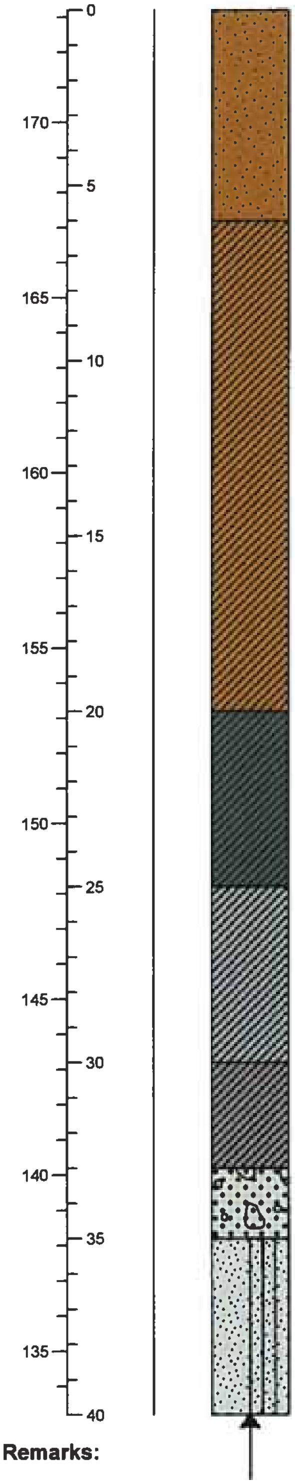
USCS	Description	NM %	LL %	200 %
SC	Clayey SAND. 10YR 5/3			
SC	Light brown sandy CLAY. 7.5YR 6/4			
SP	Fine to coarse grained very pale brown SAND. 10YR 7/4	5.0		5
SP	Saturated coarse grained to gravely yellow SAND. 10YR 7/6			
SP	Saturated light greenish gray SAND coarse grained to 14.8' and fine grained after14.8'. GLEY 1 8/10Y			
CH	Light red CLAY Moderate Induration. 2.5YR 6/6	27.4	50	57
SC	Fine grained pinkish white clayey SAND. 5YR 8/2			
ML	Fine grained yellowish red clayey silt. Saturated. 5YR 5/8			
SW	Fine grained yellowish red SAND with silty clay towards bottom. 5YR 5/8			
SC	Brown sandy CLAY to very fine grained SAND moist. 7.5YR 5/8			
SC	Very fine grained very pale brown clayey SAND. 10YR 7/4	30.0	33	49
SP	Fine to coarse grained white SAND. 10YR 8/1			

Remarks:

LOG OF BOREHOLE NO.G-6

PROJECT: COLISEUM PLUME
PROJECT LOCATION: MONTGOMERY, AL
BORING LOCATION: SEE SITE MAP
DATE DRILLED: 09/11/08
WATER LEVEL:
GEOL / ENGR: E. GUARINO

SESI PROJECT: 06-401
METHOD: GEOPROBE
BORING ELEVATION: 173.20 ft
DATE COMPLETED: 09/11/08
WATER LEVEL DATE: 09/11/08
DRILLER: D. BAILEY



Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	NM %	LL %	200 %
		SP	Fine to coarse grained strong brown SAND saturated at 0-6'. 7.5YR 5/8			
		CL	Brown silty CLAY moderate to well indurated saturated at 16'. 7.5YR 5/8	36.3	34	84
		CL	Dark greenish gray silty CLAY with increased Mica content with depth. GLEY 1 4/10Y			
		CL	Greenish gray silty CLAY with increased Mica content with depth GLEY 1 6/10Y	21.5	28	52
		CL	Gray silty CLAY with increased Mica content with depth. 7.5YR 5/1			
		SP	Fine to coarse grained light greenish gray SAND with gravel. 7.5YR to GLEY 1 8/10Y			
		SP-SM	Fine to coarse grained light greenish gray SAND with gravel. 7.5YR to GLEY 1 8/10Y	3.2		7

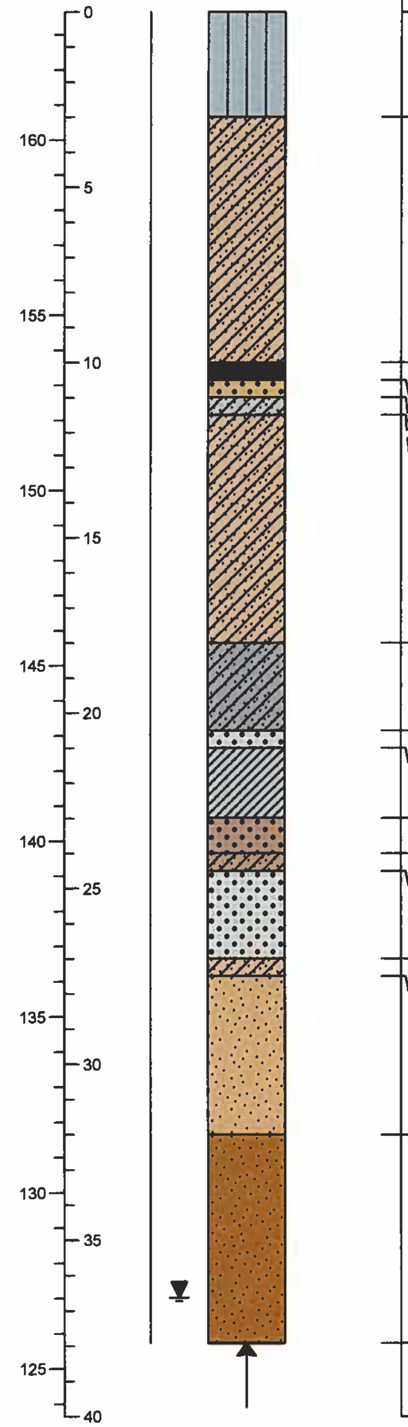
Remarks:

GEOLOG4 F:\JOB FOLDERS\2006\06401-COLISEUM PLUME\GRAVEL PIT SEPT 08\06-401 GRAVEL PIT 08.GPJ SO_EARTH.GDT 9/29/08

LOG OF BOREHOLE NO.G-7

PROJECT: COLISEUM PLUME
PROJECT LOCATION: MONTGOMERY, AL
BORING LOCATION: SEE SITE MAP
DATE DRILLED: 09/11/08
WATER LEVEL: 36.72 ft
GEOL / ENGR: E. GUARINO

SESI PROJECT: 06-401
METHOD: GEOPROBE
BORING ELEVATION: 163.65 ft
DATE COMPLETED: 09/11/08
WATER LEVEL DATE: 09/11/08
DRILLER: D. BAILEY

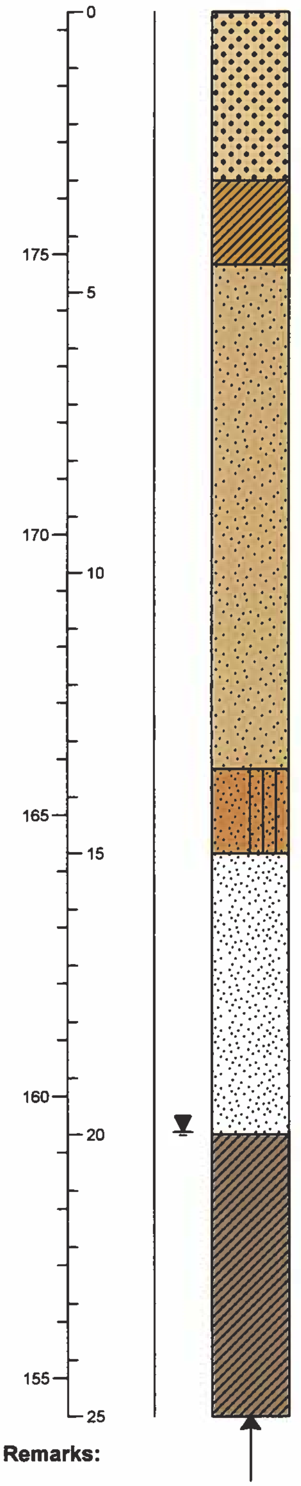
Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	NM %	200 %
		ML	Light greenish gray silty CLAY moderately indurated. GLEY 1 7/5GY		
		SC	Very pale brown clayey SAND slightly saturated. 10YR 7/4		
		SP	Dark brown coarse SAND saturated. 7.5YR 3/2		
		SW	Fine grained yellow SAND. 2.5Y 7/5		
		SC	Light greenish gray sandy CLAY. GLEY 1 7/10Y		
		SC	Fine grained very pale brown clayey SAND. 10YR 7/4		
		SC	Slightly sandy greenish gray CLAY. GLEY 1 6/10Y		
		SW	Fine grained light greenish gray dry SAND. GLEY 1 8/10Y		
		CL	Saturated light greenish gray CLAY. GLEY 1 7/10Y		
		SW	Fine grained light brown SAND. 7.5YR 6/4		
		SC	Light yellowish brown sandy CLAY. 10YR 6/4		
		SW	Fine grained light greenish gray SAND. GLEY 1 8/10Y		
		SC	Saturated very pale brown clayey SAND. 10YR 7/4		
		SP	Fine to medium grained yellow SAND. 10YR 7/6		
		SP	Coarse grained strong brown SAND w/ GRAVEL saturated at 36'. 7.5YR 5/8	5.1	4

Remarks:

GEOLOG4 F:\JOB FOLDERS\2006\06401-COLISEUM PLUME\GRAVEL PIT SEPT 08\06-401 GRAVEL PIT 08.GPJ SO_EARTH GDT 9/29/08

LOG OF BOREHOLE NO.G-8

PROJECT: COLISEUM PLUME
SESI PROJECT: 06-401
PROJECT LOCATION: MONTGOMERY, AL
METHOD: GEOPROBE
BORING LOCATION: SEE SITE MAP
BORING ELEVATION: 179.32 ft
DATE DRILLED: 09/13/08
DATE COMPLETED: 09/13/08
WATER LEVEL: 20.01 ft
WATER LEVEL DATE: 09/13/08
GEOL / ENGR: E. GUARINO
DRILLER: D. BAILEY



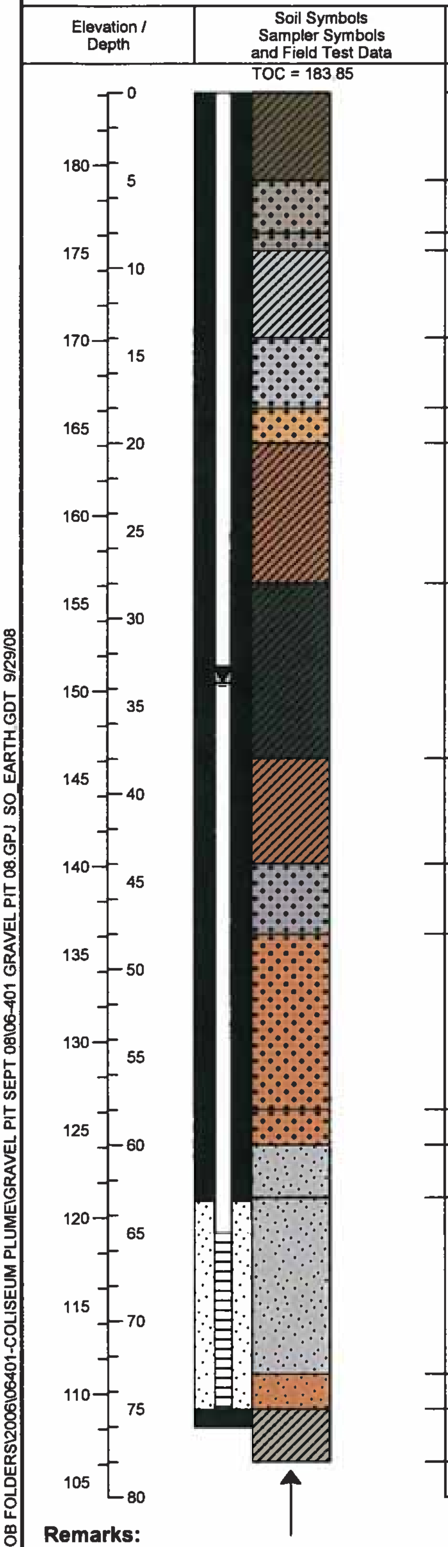
USCS	Description	NM %	200 %
SW	Fine grained yellow SAND. 2.5Y 8/6		
CL	Brownish yellow CLAY. 10YR 6/8		
SP	Coarse grained to Gravely yellow SAND saturated at 13'. 2.5Y7/6		
SP-SM	Fine to medium grained reddish yellow SAND. 7.5YR 6/8	13.5	9
SP	No Sample Recovered (tube stuck in Macro Core sampler) Presumably due to a coarse SAND and GRAVEL		
CL	Yellowish brown silty CLAY to CLAY saturated. 10YR 5/4		

Remarks:

GEOLOG4 F:\JOB FOLDERS\2006\06401-COLISEUM PLUME\GRAVEL PIT SEPT 08\06-401 GRAVEL PIT 08.GPJ SO EARTH.GDT 9/29/08

LOG OF BOREHOLE NO.MW-221C

PROJECT: COLISEUM PLUME
SESI PROJECT: 06-401
PROJECT LOCATION: MONTGOMERY, AL
METHOD: ROTO SONIC
BORING LOCATION: SEE SITE MAP
BORING ELEVATION: 184.15 ft
DATE DRILLED: 09/10/08
DATE COMPLETED: 09/10/08
WATER LEVEL: 33.87 ft
WATER LEVEL DATE: 09/23/08
GEOL / ENGR: S. BAXTER
TOC: 183.85 ft
DRILLER: MILLER



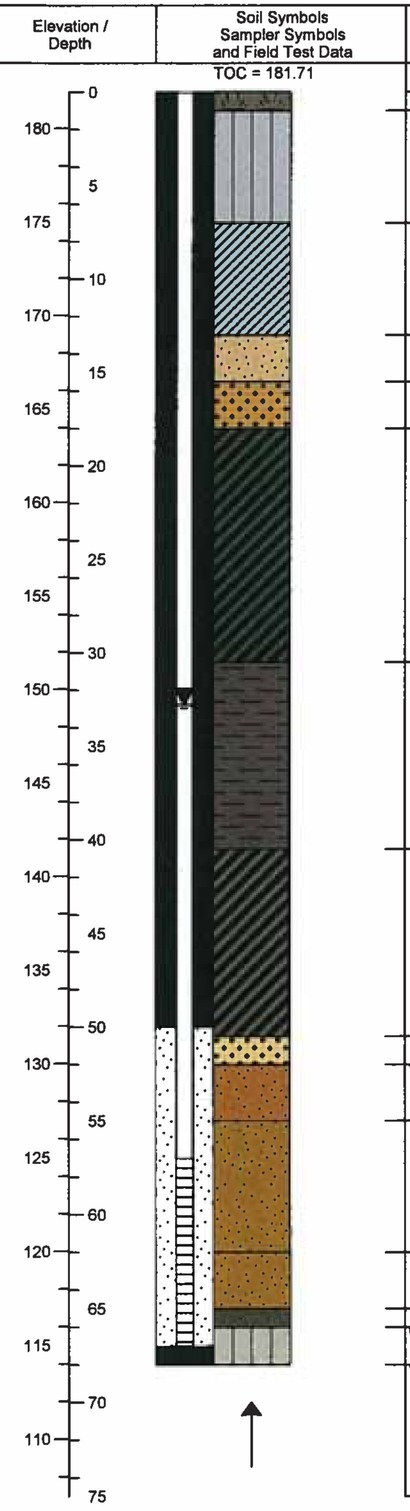
USCS	Description
CL	Stiff gray CLAY. 10YR 4/4
SW	Gray coarse slightly saturated SAND. 10YR 6/2
SW	Coarse gray SAND, saturated. 10YR 6/2
CL	Stiff light gray CLAY. 5YR 7/1
SW	Loose light gray rounded river SAND, poorly sorted. 5YR 7/1
SW	Coarse orange oxidized SAND with high gravel content. 7.5YR 7/8
CL	Red stiff non-plastic CLAY, saturated. 2.5YR 5/6
CL	Dark black plastic CLAY with a high wood content, saturated. 2.5YR/8
CL	Light gray non-plastic saturated CLAY. 2.5YR 5/6
SW	Coarse gray and white SAND and GRAVEL, poorly sorted with large rounded river stones and subangular grains; saturated. 5YR 6/1
SW	Orange loose SAND with medium to large sized river pebbles. SAND coarsening downward. 2.5YR 8/8
SW	Orange loose SAND with medium to large river pebbles. Subangular to subrounded grains. 2.5YR 8/8
SP	Clean gray well sorted subangular SAND. 7.5YR 7/1
SP	Clean light gray SAND with some oxidation, moderately to well sorted. 7.5YR 7/1
SP	Orange well sorted loose SAND. 2.5YR 6/8
CL	Stiff gray CLAY. 10YR 6/2

Remarks:

Page 1 of 1

LOG OF BOREHOLE NO. MW-259

PROJECT: COLISEUM PLUME
SESI PROJECT: 06-401
PROJECT LOCATION: MONTGOMERY, AL
METHOD: ROTO SONIC
BORING LOCATION: SEE SITE MAP
BORING ELEVATION: 181.94 ft
DATE DRILLED: 09/09/08
DATE COMPLETED: 09/09/08
WATER LEVEL: 32.96 ft
WATER LEVEL DATE: 09/15/08
GEOL / ENGR: E. GUARINO
TOC: 181.71 ft
DRILLER: MILLER



USCS	Description	NM %	LL %	200 %
	Topsoil-Clayey dark grayish brown SAND. 10YR 4/3			
ML	Light gray silty CLAY. 2.5Y 7/1			
CL	Well indurated light greenish gray CLAY. GLEY 1 8/10Y to GLEY 1 7/5 GY			
SP	Fine grained yellow SAND. 2.5Y 7/6			
SW	Fine grained SAND Grading to goarse to gravely grained yellow to brownish yellow SAND. 10YR 7/8 to 10YR 6/8 Very Moist to Slightly Saturated; may provide small amount of water			
CH	Saturated micaceous gray to dark gray CLAY. GLEY1 5N to 4N	35.8	51	99
OL	Dark brown to black CLAY. Wood highly pervasive throughout. 7.5YR 2.5/1 to 7.5YR 3/2			
CH	Dark to very dark grayish brown CLAY wet with minor wood fragments. <5% Wood. 2.5Y 4/2 to 3/2	57.6	50	99
SW	White to yellow gravely SAND slightly saturated. 2.5Y 8/8			
SP	Fine to coarse grained strong brown SAND. Slightly saturated. 7.5YR 5/8			
SP	Fine grained to coarse grained yellowish brown SAND. Slightly saturated. 10YR 5/8	11.6		1
SP	Fine to coarse grained yellowish brown SAND gravel pervasive. 10YR 5/8			
SP	Fine to medium grained dark olive brown SAND. 2.5Y 3/3			
ML	strong brown to light gray clayey SILT to silty CLAY. 7.5YR 5/6 to 5Y 7/2			

Remarks:

GEOLOG4 F:\JOB FOLDERS\2006\06401-COLISEUM PLUME\GRAVEL PIT SEPT 08\06-401 GRAVEL PIT 08.GPJ SO_EARTH.GDT 9/29/08

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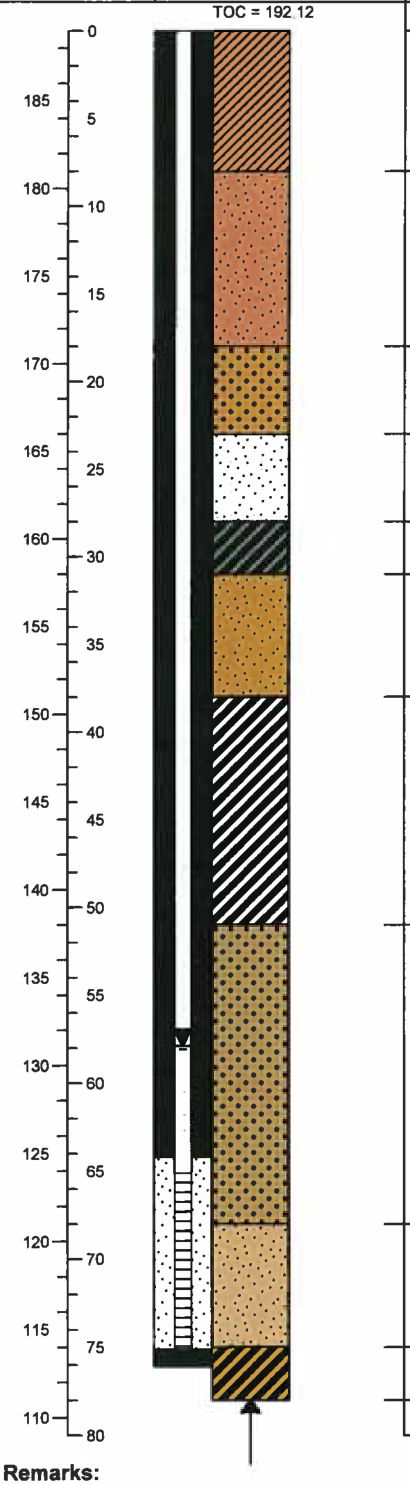
LOG OF BOREHOLE NO.MW-260

PROJECT: COLISEUM PLUME
SESI PROJECT: 06-401
PROJECT LOCATION: MONTGOMERY, AL
METHOD: ROTO SONIC
BORING LOCATION: SEE SITE MAP
BORING ELEVATION: 188.99 ft
DATE DRILLED: 09/11/08
DATE COMPLETED: 09/11/08
WATER LEVEL: 58.06 ft
WATER LEVEL DATE: 09/23/08
GEOL / ENGR: S. BAXTER
TOC: 192.12 ft
DRILLER: MILLER

Elevation / Depth | Soil Symbols Sampler Symbols and Field Test Data



USCS	Description
CL	Light red stiff clay. 2.5YR 6/8
SP	Light red fine sub-rounded sand. 2.5YR 6/8
SW	Brownish-yellow coarse sand with gravel. 10YR 6/8
SP	Pale green well sorted sand. GLEY1 8/2
CH	Gray clay. GLEY1 6/N
SP	Brownish-yellow well sorted sand. 10YR 6/8
CH	Yellow clay. 2.5Y 8/8
SW	Olive yellow coarse sand with gravel. 2.5Y 6/6
SP	Yellow well sorted sand. 10YR 7/6
CH	Brownish-yellow stiff clay with some silt. 10YR 6/8

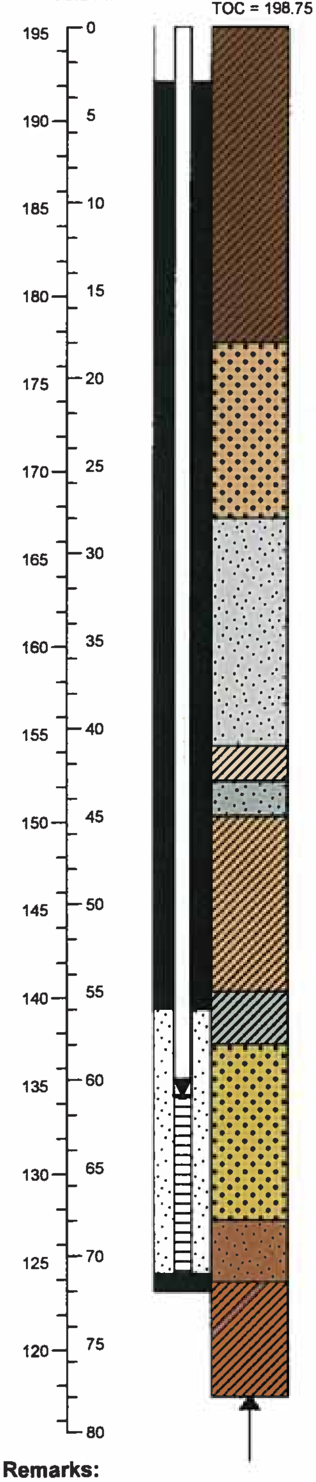
Remarks:

GEOLOG4 F:\JOB FOLDERS\2006\06401-COLISEUM PLUME\GRAVEL PIT SEPT 08\06-401 GRAVEL PIT 08.GPJ SO_EARTH.GDT 9/29/08

LOG OF BOREHOLE NO. MW-261

PROJECT: COLISEUM PLUME
SESI PROJECT: 06-401
PROJECT LOCATION: MONTGOMERY, AL
METHOD: ROTO SONIC
BORING LOCATION: SEE SITE MAP
BORING ELEVATION: 195.35 ft
DATE DRILLED: 09/12/08
DATE COMPLETED: 09/12/08
WATER LEVEL: 61.08 ft
WATER LEVEL DATE: 09/23/08
GEOL / ENGR: S. BAXTER
TOC: 198.75 ft
DRILLER: MILLER

Elevation / Depth | Soil Symbols Sampler Symbols and Field Test Data



USCS	Description
CL	Yellowish-red stiff clay. 5YR 4/6
SW	Yellow gavelly sands. 10YR 7/6
SP	Very pale brown well sorted sand. 10YR 8/1
CL	Very pale brown stiff clay. 10YR 8/4
SP	White fine sand. GLEY1 8/10Y
CL	Reddish yellow stiff clay. 7.5YR 7/8
CL	Light greenish-gray clayey sand. GLEY1 8/10Y
SW	Yellow coarse sand with gravel. 5Y 7/8
SP	Yellowish red coarse sand with gravel. 5YR 5/6
CL	Red stiff clay. 2.5YR 5/8

Remarks:

GEOLOG4 F:\JOB FOLDERS\2006\06401-COLISEUM PLUME\GRAVEL PIT SEPT 08\06-401 GRAVEL PIT 08.GPJ SO EARTH.GDT 9/29/08

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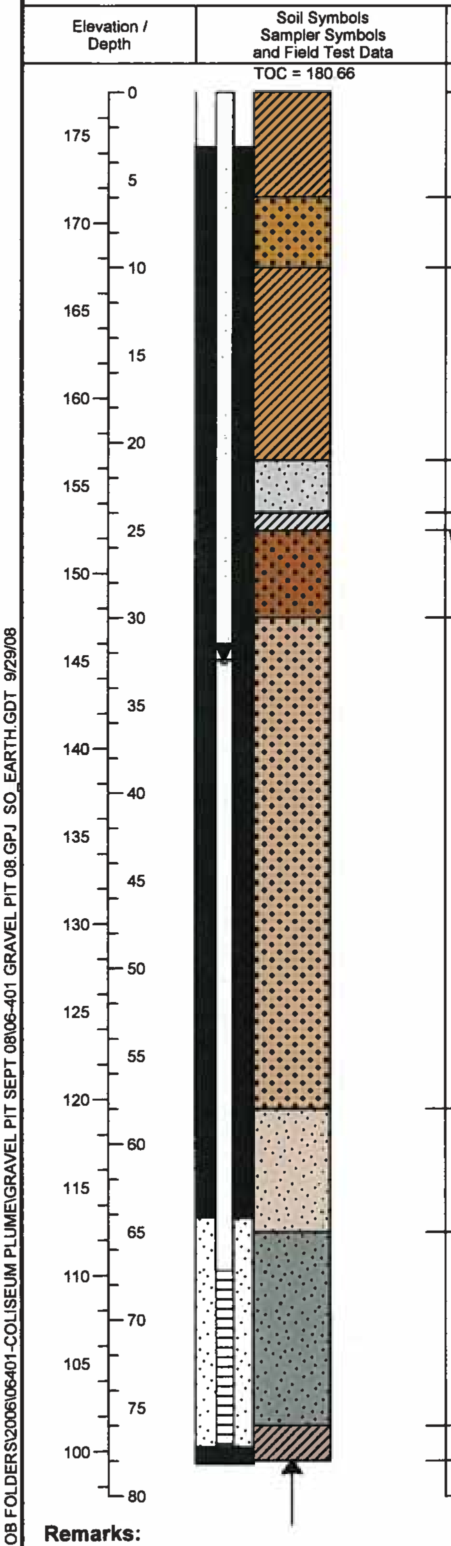
LOG OF BOREHOLE NO.MW-262

PROJECT: COLISEUM PLUME
SESI PROJECT: 06-401
PROJECT LOCATION: MONTGOMERY, AL
METHOD: ROTO SONIC
BORING LOCATION: SEE SITE MAP
BORING ELEVATION: 177.47 ft
DATE DRILLED: 09/12/08
DATE COMPLETED: 09/12/08
WATER LEVEL: 32.60 ft
WATER LEVEL DATE: 09/24/08
GEOL / ENGR: S. BAXTER
TOC: 180.66 ft
DRILLER: MILLER



USCS	Description
CL	Yellow stiff clay. 10YR 7/8
SW	Brownish yellow coarse sand with gravel. 10YR 6/8
CL	Reddish yellow stiff clay. 5YR 6/8
SP	White well sorted sand. 5YR 8/1
CL	White stiff clay. 5YR 8/1
SW	Yellowish red coarse sand with gravel. 5YR 5/8
SW	Very pale brown to yellowish brown coarse sand with gravel. 10YR 7/4 - 10YR 5/8
SP	Very pale brown well sorted sand. 10YR 8/3
SP	Light greenish gray to light red well sorted sand. GLEY2 7/5BG to 2.5YR 6/8
CL	Light reddish brown stiff clay. 2.5YR 6/3

Remarks:

GEOLOG4 F:\JOB FOLDERS\2006\06401-COLISEUM PLUME\GRAVEL PIT\GRAVEL PIT SEPT 08\06-401 GRAVEL PIT 08.GPJ SO_EARTH.GDT 9/29/08

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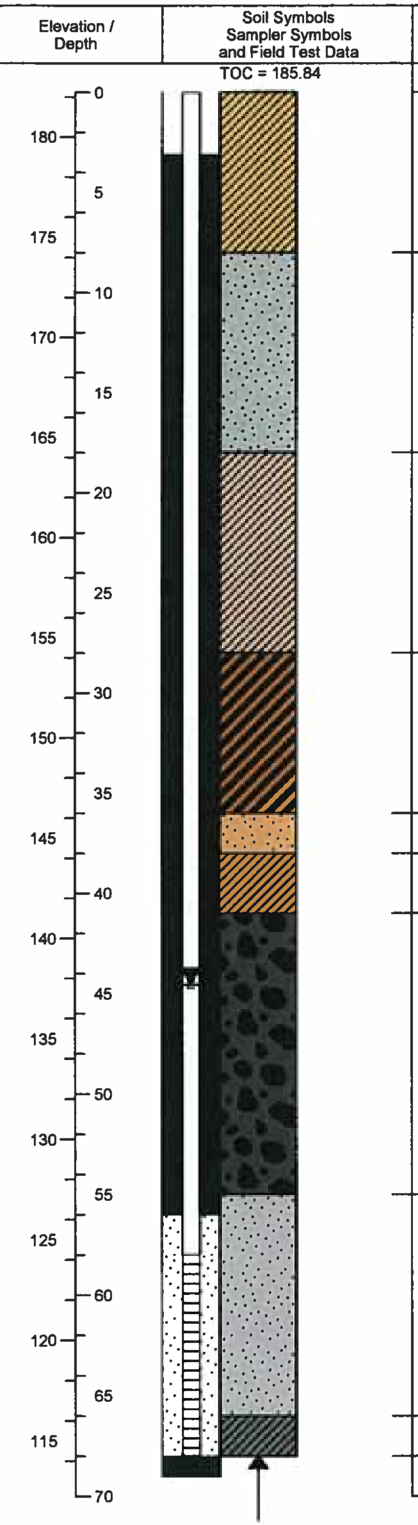
LOG OF BOREHOLE NO.MW-263

PROJECT: COLISEUM PLUME
SESI PROJECT: 06-401
PROJECT LOCATION: MONTGOMERY, AL
METHOD: ROTO SONIC
BORING LOCATION: SEE SITE MAP
BORING ELEVATION: 182.24 ft
DATE DRILLED: 09/13/08
DATE COMPLETED: 09/13/08
WATER LEVEL: 44.71 ft
WATER LEVEL DATE: 09/23/08
GEOL / ENGR: S. BAXTER
TOC: 185.84 ft
DRILLER: MILLER



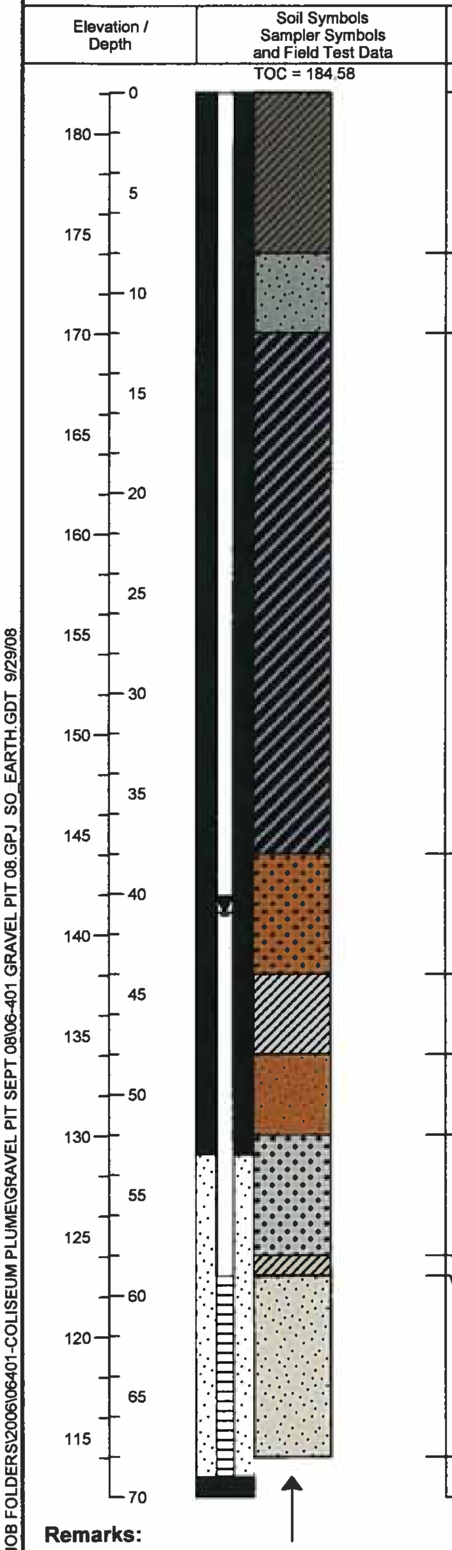
USCS	Description
CL	Yellow stiff clay. 10YR 7/8
SP	Light greenish gray well sorted sand. GLEY1 8/10Y
CL	Pink stiff clay. 7.5YR 7/4
CH	Yellowish red clay. 5YR 5/8
SP	Reddish yellow coarse sand. 7.5YR 7/8
CL	Reddish yellow clay with sand. 7.5YR 6/8
GW	Brown gravel with sand. 7.5YR 3/1
SP	Light gray fine sand. 10YR 7/1
CL	Greenish gray stiff clay. GLEY1 6/10Y

Remarks:

GEOLOG4 F:\JOB FOLDERS\2006\06401-COLISEUM PLUME\GRAVEL PIT SEPT 08\06-401 GRAVEL PIT 08.GPJ SO_EARTH.GDT 9/29/08

LOG OF BOREHOLE NO.MW-264

PROJECT: COLISEUM PLUME
SESI PROJECT: 06-401
PROJECT LOCATION: MONTGOMERY, AL
METHOD: ROTO SONIC
BORING LOCATION: SEE SITE MAP
BORING ELEVATION: 182.07 ft
DATE DRILLED: 09/14/08
DATE COMPLETED: 09/14/08
WATER LEVEL: 41.09 ft
WATER LEVEL DATE: 09/25/08
GEOL / ENGR: S. BAXTER
TOC: 184.58 ft
DRILLER: MILLER



USCS	Description
CL	Pinkish gray to brown Clay. 7.5YR 6/2 to 7.5YR 4/2
SP	Light greenish gray well-sorted Sand. GLEY1 7/10Y
CH	Greenish gray Clay. GLEY2 5/5BG
SW	Light gray to yellowish red Sandy Gravel. 2.5Y 7/1 to 5YR 5/8
CL	Light gray Silty Clay. 10YR 7/1
SP	White to yellowish red fine Sand. 10YR 8/1 to 5YR 5/8
SW	Light gray coarse Sandy Gravel. 2.5Y 7/1
CL	Light gray Clay. 2.5Y 7/2
SP	Pale yellow fine Sand. 2.5Y 8/2

Remarks:

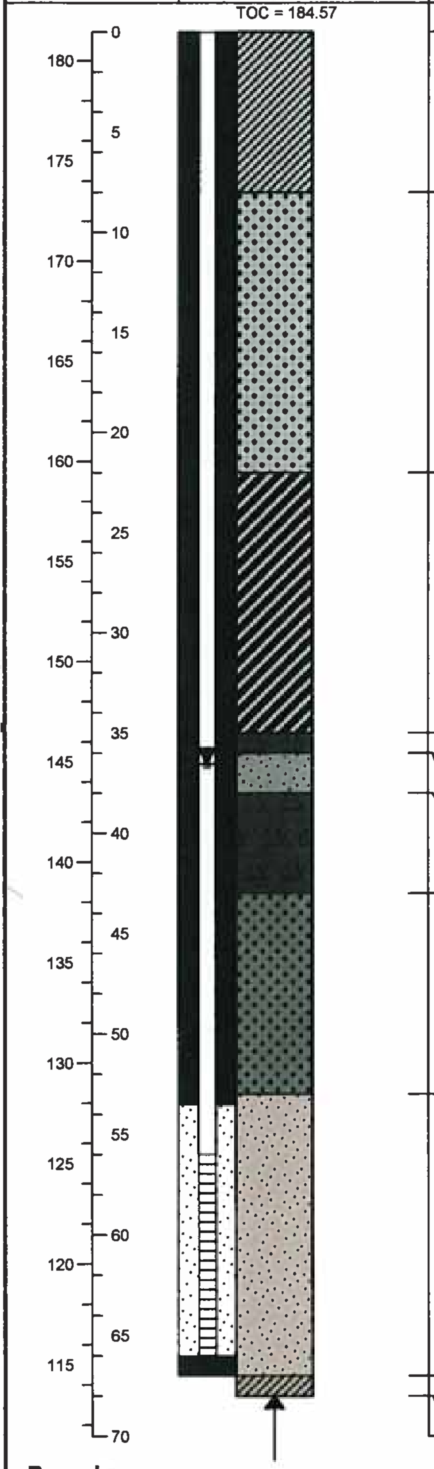
Page 1 of 1

LOG OF BOREHOLE NO. MW-265

PROJECT: COLISEUM PLUME
SESI PROJECT: 06-401
PROJECT LOCATION: MONTGOMERY, AL
METHOD: ROTO SONIC
BORING LOCATION: SEE SITE MAP
BORING ELEVATION: 181.44 ft
DATE DRILLED: 09/15/08
DATE COMPLETED: 09/15/08
WATER LEVEL: 36.72 ft
WATER LEVEL DATE: 09/25/08
GEOL / ENGR: S. BAXTER
TOC: 184.57 ft
DRILLER: MILLER

Elevation / Depth

Soil Symbols Sampler Symbols and Field Test Data



USCS	Description
CL	Light greenish gray stiff clay. GLEY1 8/5GY
SW	Light greenish gray to light gray sand with gravel. GLEY1 8/10Y to 10YR 7/2
CH	Greenish gray clay. GLEY1 6/5GY
PT	Black organic matter. 10YR 2/1
SP	Light greenish gray fine sand. GLEY1 7/10Y
PT	Black organic matter. 10YR 2/1
SW	Greenish gray to light brown sand with gravel. GLEY1 6/5GY to 7.5YR 6/4
SP	Light gray to pale yellow fine sand. 10YR 7/2 to 2.5Y 7/3
CL	Light brownish-gray clay with sand. 2.5Y 6/2

Remarks:

GEOLOG4 F:\JOB FOLDERS\2006\06401-COLISEUM PLUME\GRAVEL PIT SEPT 08\06-401 GRAVEL PIT 08.GPJ SO EARTH.GDT 9/29/08

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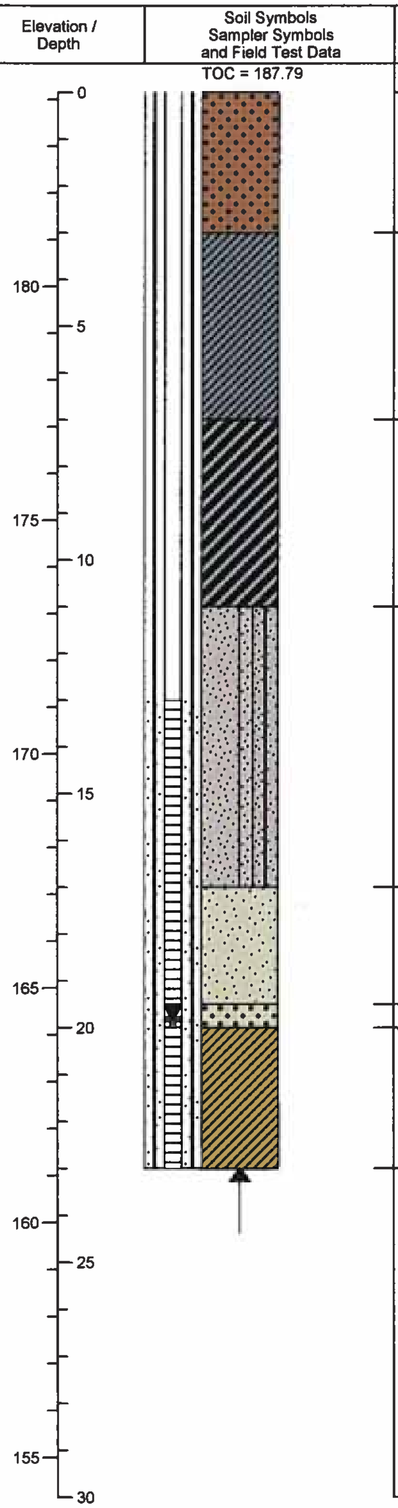
LOG OF BOREHOLE NO.PZ-20 Shallow

PROJECT: COLISEUM PLUME
SESI PROJECT: 06-401
PROJECT LOCATION: MONTGOMERY, AL
METHOD: GEOPROBE
BORING LOCATION: SEE SITE MAP
BORING ELEVATION: 184.15 ft
DATE DRILLED: 09/13/08
DATE COMPLETED: 09/13/08
WATER LEVEL: 19.92 ft
WATER LEVEL DATE: 09/13/08
GEOL / ENGR: E. GUARINO
TOC: 187.79 ft
DRILLER: D. BAILEY



USCS	Description	NM %	LL %	200 %
SW	Fine grained red SAND. 2.5YR 5/6			
CL	Medium gray silty CLAY. GLEY 1 5/10Y	16.5	39	87
CH	Reddish gray CLAY. 2.5YR 6/1 to 2.5YR 6/4	23.0	78	98
SP-SM	Fine grained pale red SAND. 2.5Y 7/2 to 2.5Y 7/8	4.3		7
SP	Coarse grained pale yellow SAND and GRAVEL saturated. 5Y 8/3			
SW	Fine grained pale yellow SAND saturated. 5Y 8/3			
CL	Olive yellow CLAY. 2.5Y 6/6 to GLEY 1 6/10Y	39.0	49	99

Remarks:

APPENDIX B

DESIGN INFORMATION FOR IMPLEMENTED CORRECTIVE MEASURES

Southwest Treatment Area
Corrective Measures Implementation Plan

COLISEUM BOULEVARD PLUME SITE
MONTGOMERY, ALABAMA

ALABAMA
DEPARTMENT OF TRANSPORTATION

APPENDIX B-1

DESIGN INFORMATION FOR NEW DISCHARGE POND

Southwest Treatment Area
Corrective Measures Implementation Plan

COLISEUM BOULEVARD PLUME SITE
MONTGOMERY, ALABAMA

ALABAMA
DEPARTMENT OF TRANSPORTATION

MEMORANDUM

To: Andy Eversull

From: Hydro Engineering Solutions, LLC.

Copy: Britt McMillan

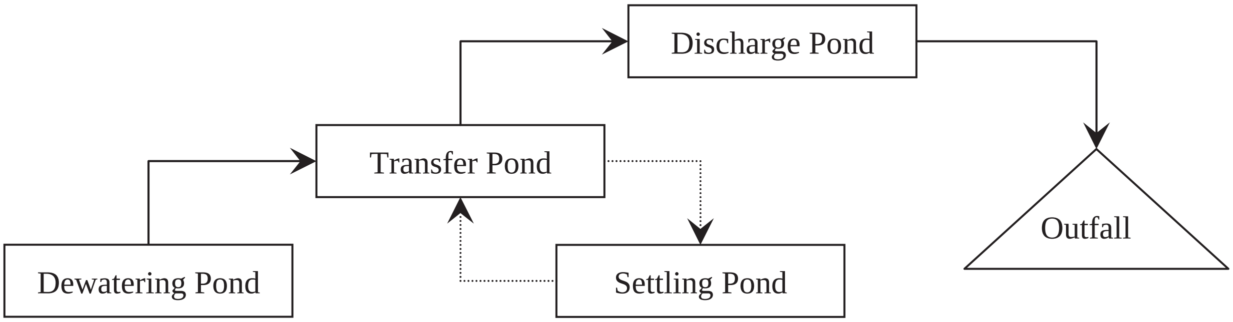
Date: 14 February 2011

RE: Southwest Area
Discharge Pond and Dewatering System

The Southwest Area Treatment System consists of the following components:

- Dewatering Pond:
- Transfer Pond
- Settling Pond for additional treatment if necessary (contingency use)
- Discharge Pond (South Pond)
- Outfall

The dewatering pond is used to lower the groundwater level and capture the southwest portion of the CBP. The transfer pond is an intermediate pond used for flow equalization, primary sediment settling, and TCE removal through volatilization. The settling pond will include a wetland treatment area and will only be used when either additional solids or TCE need to be removed to meet discharge limits. The Discharge Pond, currently the South Pond, will provide for sediment settling for the water from the transfer pond and TCE removal through volatilization and wetland treatment. The Discharge Pond will include a sediment forebay, three vegetated treatment cells, and a final cell for flow equalization and polishing if necessary. The outfall will discharge to a wetland area on the southern portion of the Southwest Area property.



Based on previous information provided by Malcolm Pirnie, design of the dewatering system shall be based on an average daily volume of 500,000 gallons to 600,000 gallons and a pumping rate of 1,100 gallons per minute (gpm).

Existing Conditions

The dewatering system that is currently being utilized at this facility consists of the following.

1. *Dewatering Pond:*
    - Current pool elevation is generally maintained between 116 and 122 feet mean sea level (msl);
    - One (1) Dobbs 20 hp floating centrifugal pump #12DM-4 with manual controls;
    - The Dobbs pump is on a flotation device;
    - Elevation of the Dobbs pump is dependant upon the pool elevation of the dewatering pond;
    - Topography indicates approximately 4:1 (H:V) side slopes above elevation 122 feet;
    - Topography data is not available of the area below the existing pool elevation; and,
    - Existing force main consists of a combination of steel and HDPE pipes and discharges into the Transfer Pond.

2. *Transfer Pond:*
    - Current pool elevation is 135 feet msl;
    - Two (2) ABS Jumbo 200 High Volume (HV) Pumps with manual controls;
    - Both ABS pumps are on single flotation device;
    - Elevation of the ABS pumps are dependant upon pool elevation of the transfer pond;
    - Topography indicates varying side slopes above elevation 135 feet msl;
    - Stabilization of side slopes is on-going;
    - Topography data is not available of the area below the existing pool elevation; and,
    - Existing force main consists of a combination of steel and HDPE pipes and discharges into the existing South Pond.

Planned Improvements

Based on concepts previously developed by Malcolm Pirnie, improvements to the dewatering system are required for it to function as desired. A summary of the proposed improvements are presented below.

1. *Dewatering Pond:*
    - Excavate the bottom of the dewatering pond to elevation 107 feet msl;
    - At the location of the pumps, excavate the pond bottom to elevation 104 feet msl;
    - Maintain a pool elevation at approximately 110 feet msl;
    - Replace the existing Dobbs pump system with two (2) ABS Jumbo 200 HV pumps;
    - Determine the most cost effective method of operating the pumps (manual or automated controls); and,
    - Replace existing force main to Transfer Pond with a new 12” diameter HDPE force main.

2. *Transfer Pond:*
    - Maintain a pool elevation at approximately 135 feet msl;
    - Use the existing two (2) ABS Jumbo 200 HV pumps;

- Determine the most cost effective method of operating the pumps (manual or automated controls);
- Replace existing force main to the Discharge Pond with a new 12” diameter HDPE force main;
- Construct a 12” diameter HDPE diversion pipe from the force main to a planned wetland area, allowing pumped water to recirculate through the wetland area and Transfer Pond; and,
- Provide a control valve to direct water to either the Discharge Pond or the wetland area.

3. *Discharge Pond:*
    - Construct a rectangular settling pond with a sediment forebay, three vegetated benches and secondary polishing pool;
    - Pond volume shall provide a minimum of one (1) day storage capacity under average flow conditions (approximately 600,000 gallons);
    - Pond outlet shall consist of two 18” diameter concrete pipes; and,
    - Drainage swale shall convey water discharged from the Discharge Pond to the NPDES permitted outfall.

Design

Design of the planned improvements has been developed using recently collected topographic data and is based on the following criteria.

Table 1

	Dewatering Pond	**Transfer Pond**	**Discharge Pond**
Pond Data			
Bottom El	107 ft msl	Unknown	Varies by Cell
High Pool Elev.	112 ft msl	135 ft msl	190 ft msl
Low Pool Elev.	108 ft msl	133 ft msl	
Surface Area	1 acre	2.68 acres	0.95 acres
Volume	1,303,400 gal	1,749,500 gal	600,000 gal
No. Pumps	**2**	**2**	
Force Main			
Average Flow	1,100 gpm	1,100 gpm	
Peak Flow	2,700 gpm	2,700 gpm	
Min. Velocity	3 ft/s	3 ft/s	
Max Velocity	9 ft/s	9 ft/s	
Length	620 ft	800 ft	
Discharge Elev.	139 ft	189 ft	

1. *Dewatering Pond and Transfer Pond Grading:*
    - Grading along the perimeter of the Dewatering Pond and Transfer Pond is being performed by others and is not included as part of this design; and,

- It is assumed that grading of the ponds will provide the surface areas and volumes as described above.

2. *Force Mains:*
   - Force mains sizing based on single pump flows of 1,100 gallons per minute (gpm) and dual pump flows of 2,700 gpm;
   - Three different types of material were evaluated for constructing the force mains. Based on conditions of the site and operational needs of the dewatering system, it is recommended that force mains be constructed using High Density Polyethylene (HDPE) pipe;
   - A comparison of the advantages and disadvantages of each material type, as well as, information provided by the pipe distributor and/or vendor is summarized below;

Table 2

Pipe Type	Advantages	Disadvantages
High Density Polyethylene (HDPE)	a. Flexible; Allows for vertical movement with Floating Pumps b. "Smooth" Pipe c. Pipe is butt-fused togerther; joints not normally required d. No leakage at pipe joints e. Installation is relatively quick f. Longer pipe sections than DI and PVC g. No corrosion potential	a. Ability to crack horizontally under repeated pressure surges b. Material costs are higher than PVC c. Requires experienced installer for butt-fusing procedure
Ductile Iron (DI)	a. Resistant to extreme high pressure surges b. Installation can be performed by General Contractors	a. Potential for corrosion; Pipe must be internally and externally coated b. Required joints allow for leakage at pipe ends c. Higher material costs than HDPE and PVC d. Shorter pipe sections than HDPE e. Not Flexible; Requires special joint at pumps to allow for movement f. Pipe roughness higher than HDPE g. Higher weight per foot than HDPE and PVC
Polyvinyl Chloride (PVC)	a. "Smooth" Pipe b. Lowest material costs c. No corrosion potential d. Installation can be performed by General Contractors	a. Ability to crack horizontally under repeated pressure surges b. Required joints allow for leakage at pipe ends c. Shorter pipe sections than HDPE d. Not Flexible; Requires special joint at pumps to allow for movement

   - A hydraulic model was developed using KY Pipe and the design criteria summarized above to size the force mains; and,
   - Based on the hydraulic analysis, the force mains shall be 12-inch inside diameter HDPE, Class 200, DR 9 pipe.

3. *Pumps*
   - Two (2) ABS Jumbo 200 HV pumps are currently being used in the Transfer Pond;
   - Based on data provided by the pump vendor and the hydraulic model, ABS Jumbo 200 HV pumps are suitable for meeting the design requirements;
   - Pump and System Curves for a single pump scenario and a duplex pump scenario are attached as Figure 1; and,

- A hydraulic model was developed using KY Pipe to simulate the operation of the dewatering system. Figure 2 and Table 3 provides the results of the hydraulic model for various operational scenarios considered in the design process.

4. *Pump Controls*

There are three alternatives of controlling the pump operation:

- Manual pump controls
    - Requires someone to visit the site daily to turn pumps on and off as needed.
- Automated level controls
    - Pumps will be controlled by a MultiSmart Control system;
    - Pond levels are controlled by level floats or transducer;
    - This system can estimate flow based on volume pumped and pump run times;
    - Measures the 3-phase supply and the 3 phase currents for each pump to provide over-current protection, under current protection, phase fail, ground/earth fault and phase rotation;
    - Data can be downloaded at the control panel for use back in the office;
    - This system also supports high speed Ethernet and serial communication with open protocols. This allows the system to be accessed remotely via hardwire or telemetry system; and,
    - Requires someone to visit the site routinely for inspection and maintenance.
- Remote automated level controls
    - Remote controls will utilize a satellite monitoring system such as the HTT2100 and HTT3100 by High Tide Technologies (Product Sheets attached);
    - The satellite systems have a built in satellite modem and are self contained communications devices that receive data from analog or digital sensors and transmit that data through the ORBCOMM low-Earth orbit satellite (LEO) network directly to the High Tide Technologies server (No towers, repeaters licenses or RF surveys required);
    - This system will allow the operator to control the pump operation and the actuated valve that diverts flow back into the transfer pond via a computer offsite;
    - It has the capability to provide alerts based on predetermined operational conditions;
    - Using a stage storage curve, it can estimate flows using pump run times; and,
    - Requires someone to visit the site routinely for inspection and maintenance.

5. *Discharge Pond:*

Conceptual grading of the Discharge Pond has been developed for two locations.

- Pond velocities and water surface elevations were evaluated using a 2D model. Based on the results of the 2D Model, the design has incorporated protection to minimize the scour potential at the inlet. ALDOT Class II Riprap underlain by a geotextile at outlet of force main into pond;
- The pond has been graded such that surface water will drain away from the pond;

- ALDOT Class I Riprap underlain by a geotextile has been specified at the inlet of two 18” diameter outlet pipes leaving pond;
- The top elevation of the berm surrounding the pond shall be 3 feet above the pool elevation to account for head and backwater created by the two 18” diameter outlet pipes. This will also allow for room to put a spillway 1.5 foot below the top of the berm that can tie into the drainage swale leaving the pond;
- The pool will fluctuate between 189 and 190 during normal pumping cycles. The change in this elevation may require stability to be checked within this zone;
- Invert elevation of force main at Discharge Pond is assumed to be 189 feet;
- Invert elevation of the two 18” diameter outlet pipes is designed to be 189 feet;
- Top of surrounding berm is recommended to be 192 feet;
- Top of the baffles should be 190 feet;
- The actual elevations may change based on the final location of the pond, but they should remain relative to one another; and,
- Recommend 8’ wide bottom with 4:1 (H:V) side slope spillway with ALDOT Class I Riprap underlain by a geotextile at 190.5 feet.

6. *Drainage Swale from South Pond to Settling Pond:*

A drainage swale was designed to carry flow from pond and incidental surface drainage to the outfall. The drainage swale shall be constructed as follows.

- 3 foot bottom with 4:1 (H:V) side slopes;
- Minimum 2 feet deep;
- 2-foot thick Class II Riprap underlain by a geotextile;, and
- Minimum 1% grade

Cost Estimate

An estimate of probable construction costs for three options for controlling pump operation. The three options are:

Option 1 – Duplex Pumps with Manual Controls
Option 2 – Duplex Pumps with Level Controls (MultiSmart Control System)
Option 3 – Duplex Pumps with Remote Controls (High Tide Control System)

An estimate of probable construction cost is attached.

Figure 1
Pump and System Curves

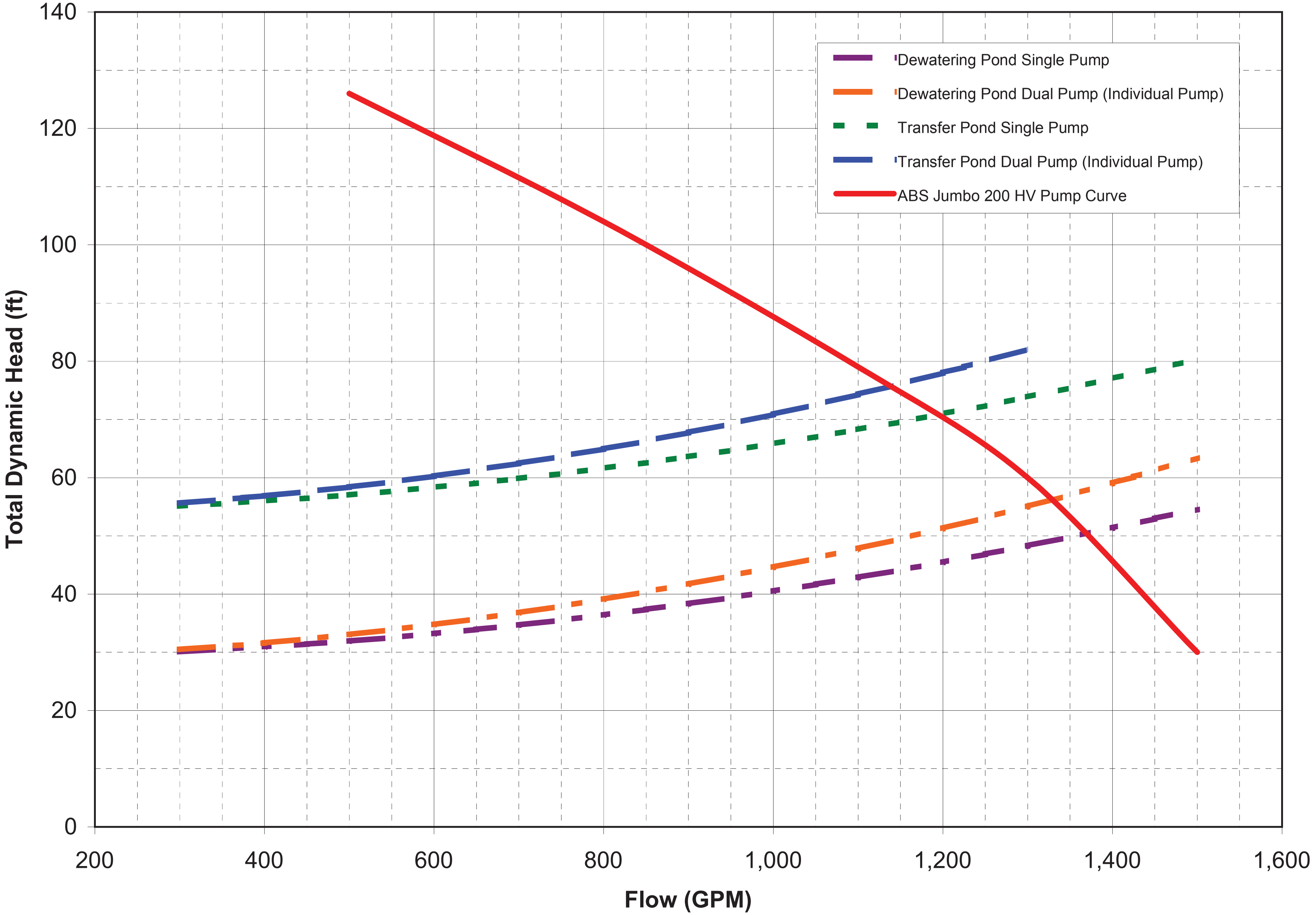


Figure 2
Pond Inflow versus Pump Time

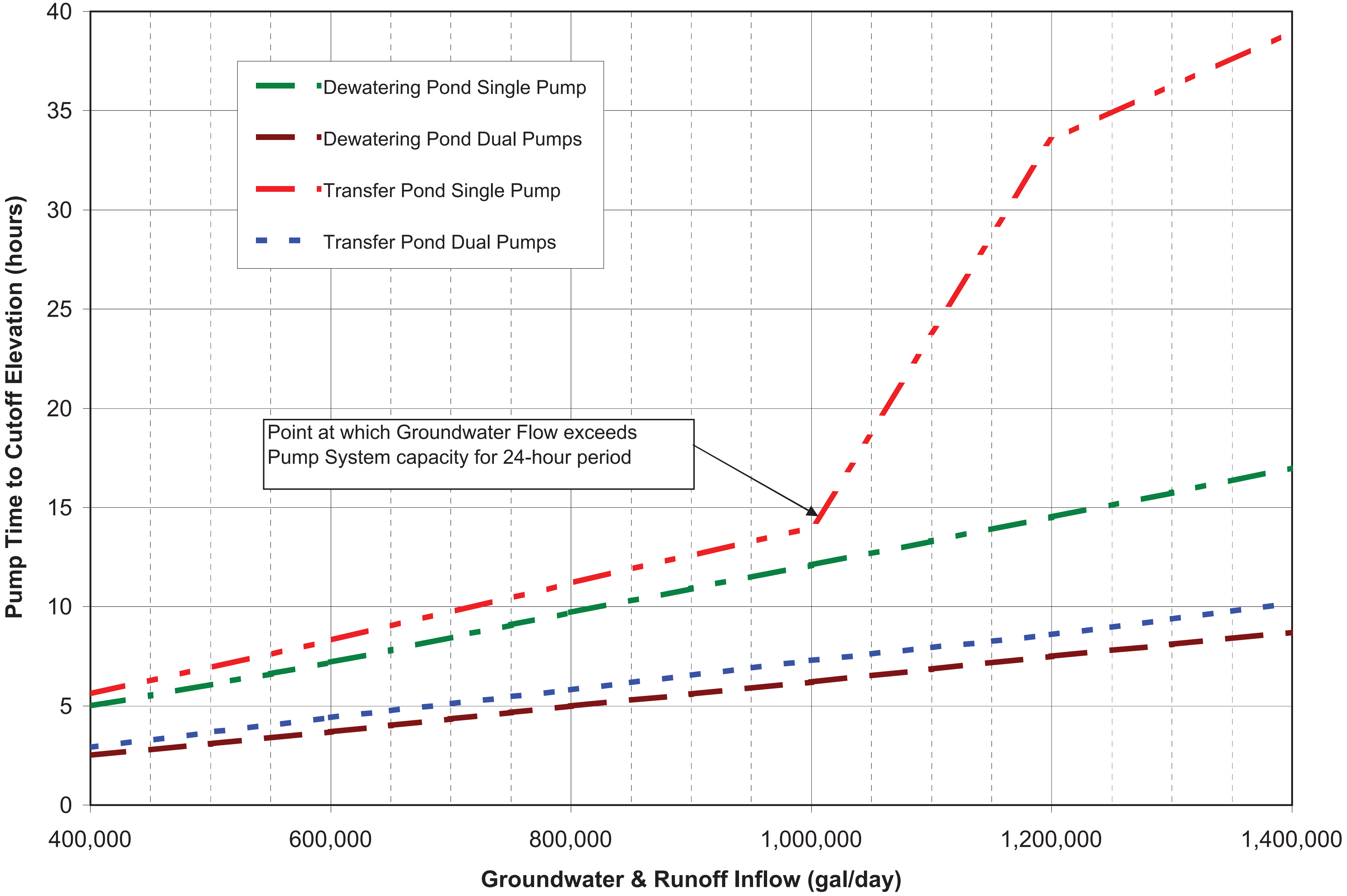


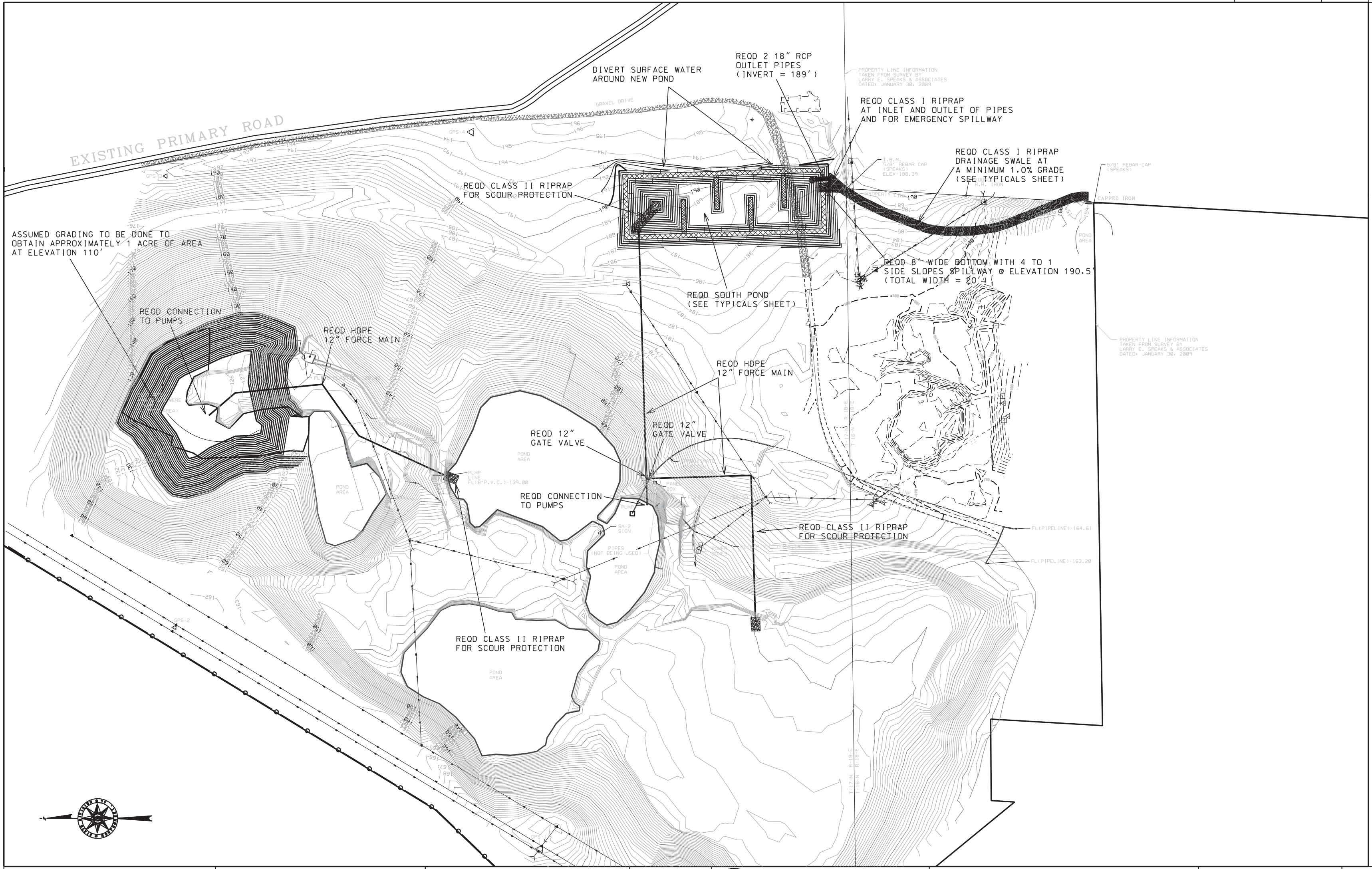
Table 3

Preliminary Pump Operational Data

System	Groundwater & Runoff Inflow (gallons/day)	Dewatering Pond			Transfer Pond		
		Pump Time (hours)[2]	Avg Force Main Flow (GPM)	High Water Elevation (feet)[3]	Pump Time (hours)[2]	Avg Force Main Flow (GPM)	High Water Elevation (feet)[4]
Single ABS Pump	400,000	5.0	1378	110.57	5.6	1190	135.39
	600,000	7.2	1377	110.75	8.3	1191	135.59
	800,000	9.7	1376	110.85	11.2	1192	135.78
	1,000,000	12.1	1376	110.88	14.0	1193	135.98
	1,200,000	14.5	1375	110.84	33.5	1193	136.14
	1,400,000	17.0	1375	110.73	39.0	1194	136.32
Dual ABS Pumps	400,000	2.5	2672	110.64	2.9	2280	135.39
	600,000	3.7	2672	110.90	4.4	2281	135.59
	800,000	5.0	2672	111.12	5.8	2283	135.78
	1,000,000	6.2	2672	111.30	7.3	2284	135.98
	1,200,000	7.5	2672	111.44	8.6	2285	136.14
	1,400,000	8.7	2672	111.55	10.2	2287	136.32

1.) Time between off-peak pumping cycles for Inflow only.
2.) Time required to pump to Pump System cutoff elevation (Dewatering Pond - 110 feet, Transfer Pond - 135 feet) while Inflow continues
3.) High Pond Elevation during Pump/Inflow cycle for a 24-hour period
4.) Determined by outflow of Dewatering Pond Dual Pump System

REFERENCE PROJECT NO	FISCAL YEAR	SHEET NO



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ALABAMA DEPARTMENT OF TRANSPORTATION

HORIZ

100 0 100

SCALE (FEET)

SHEET TITLE

ROUTE

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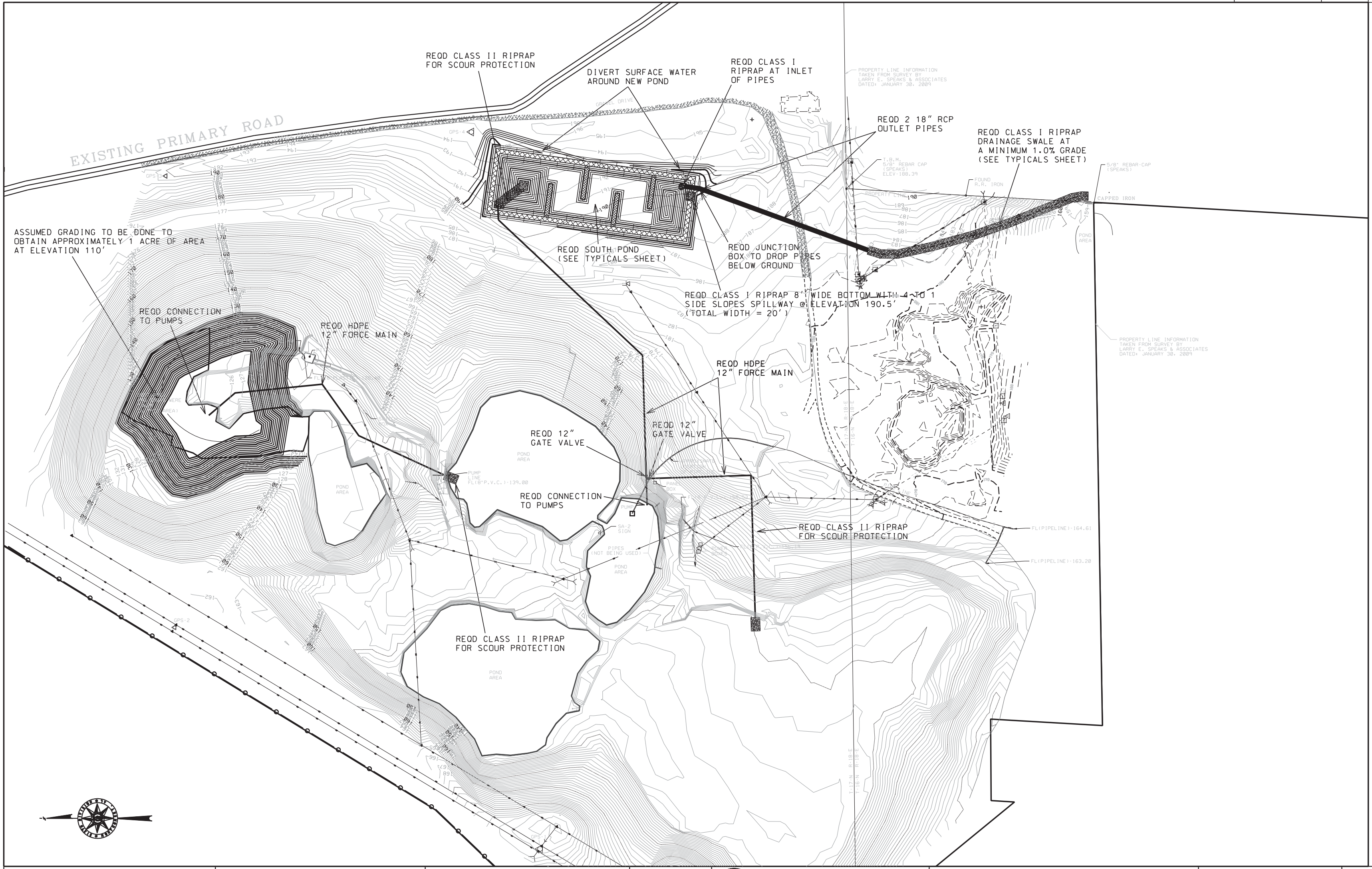

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DATE:	DATE:	DATE:					

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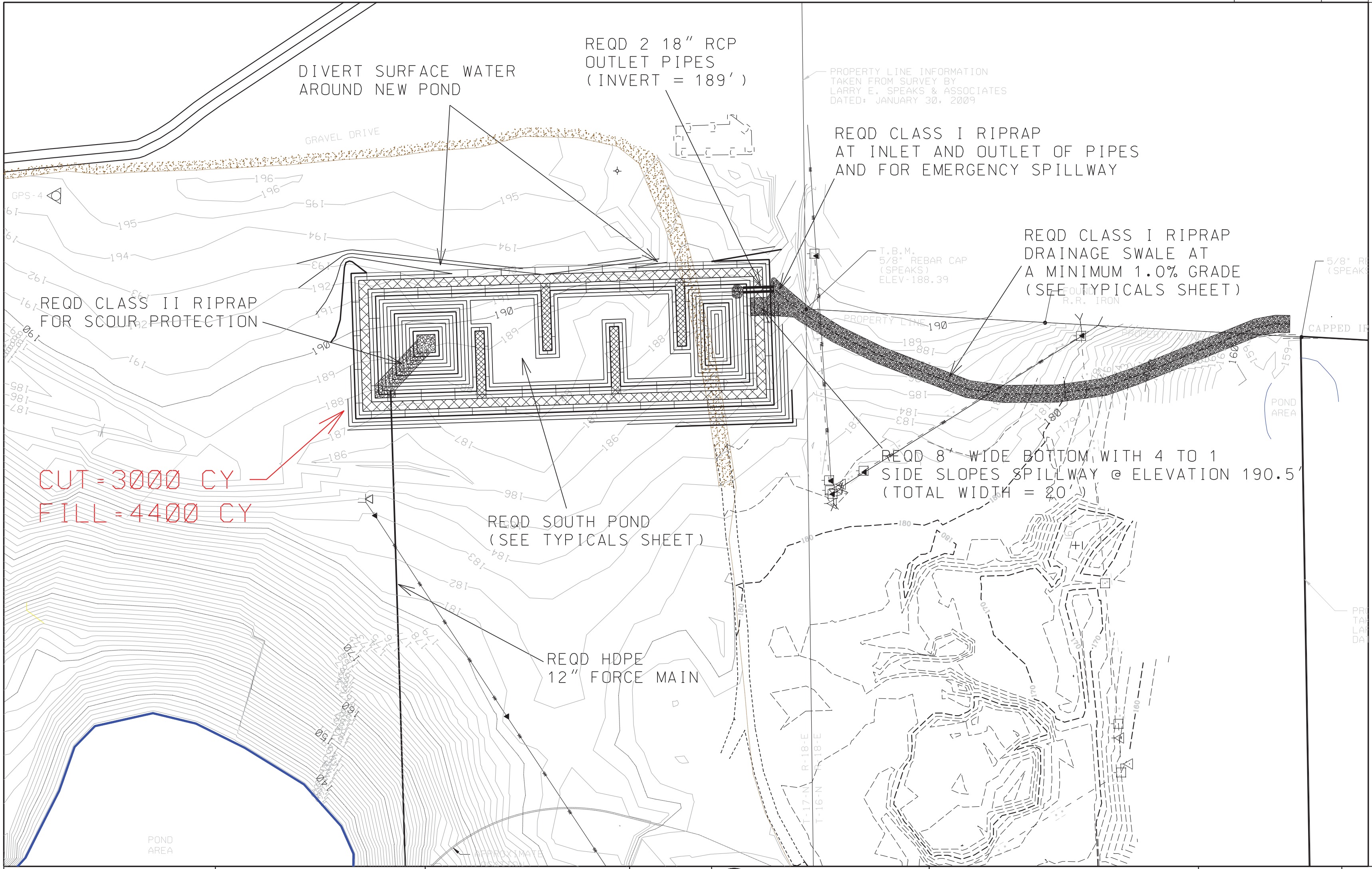

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DATE:	DATE:	DATE:					

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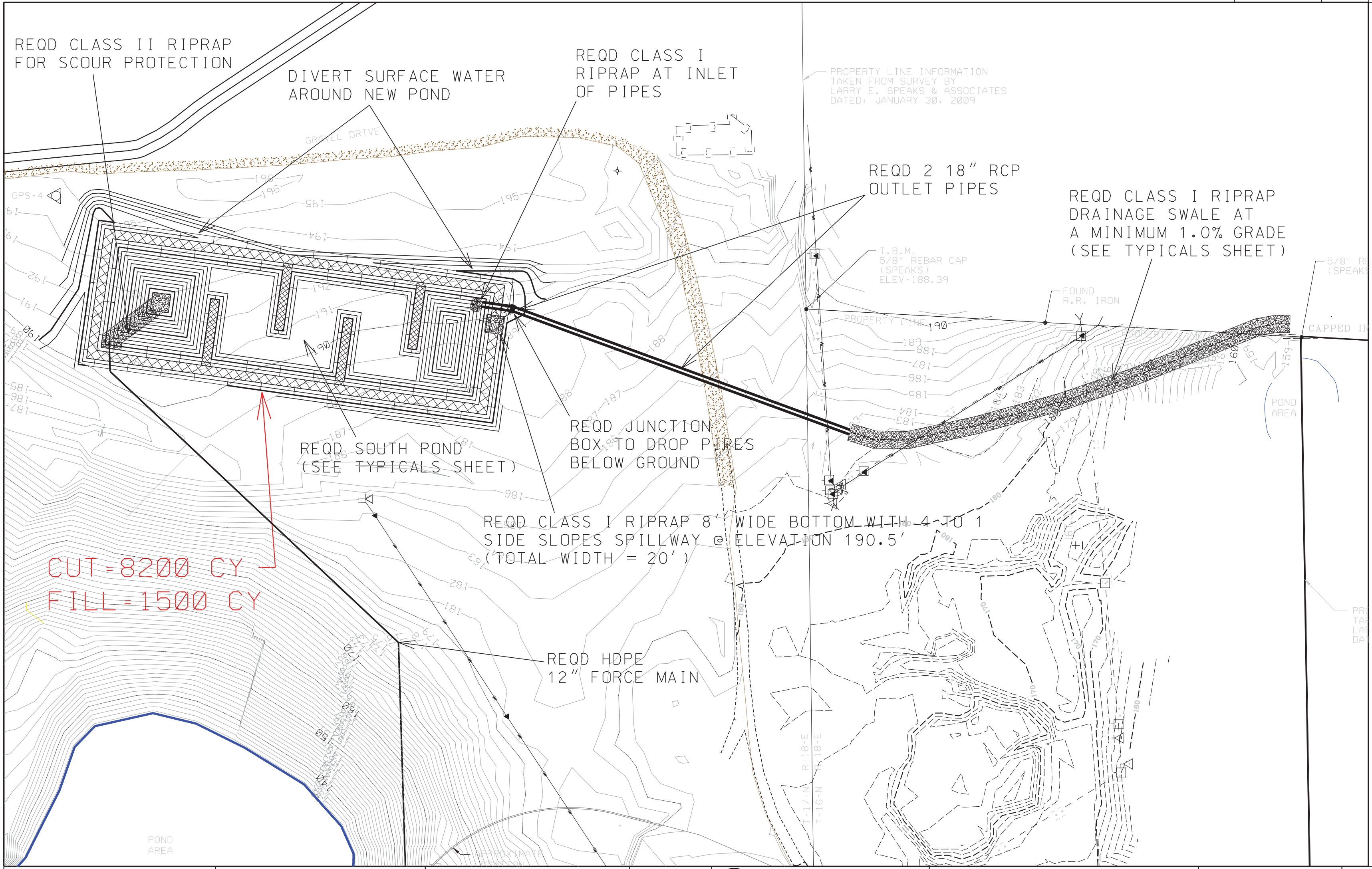

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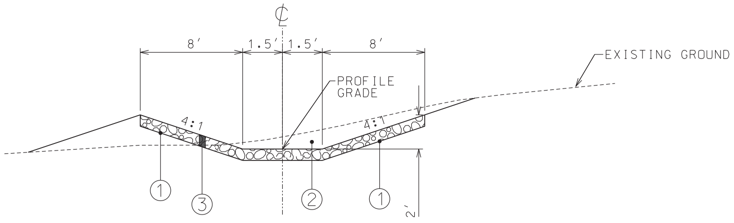
ALABAMA DEPARTMENT OF TRANSPORTATION

HORIZ SCALE (FEET) 50 0 50

SHEET TITLE

ROUTE

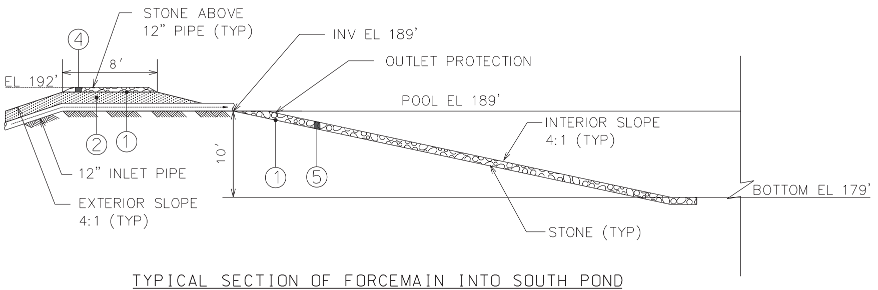
REFERENCE PROJECT NO	FISCAL YEAR	SHEET NO



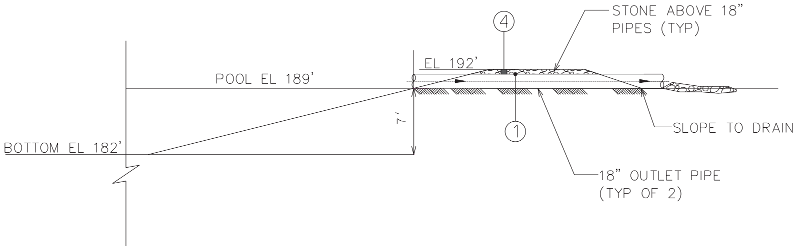
TYPICAL SECTION FOR DRAINAGE SWALE LEAVING SOUTH POND

NOTES:

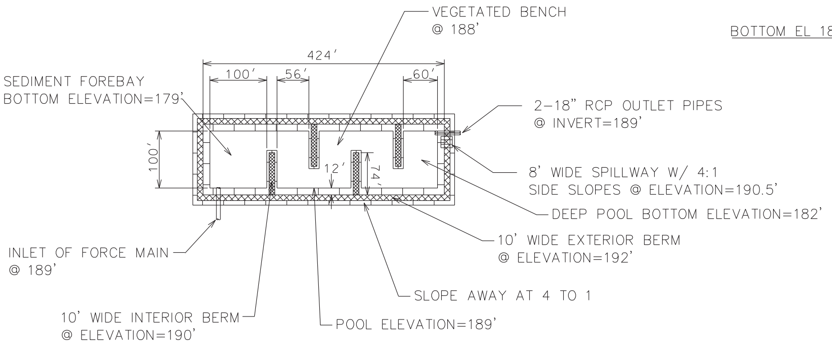
1. TRANSITION BOTTOM TO MATCH PIPE WIDTH AT OUTLET FROM THE POND.



TYPICAL SECTION OF FORCEMAIN INTO SOUTH POND



TYPICAL SECTION OF DRAINAGE LEAVING SOUTH POND



REQUIRED MATERIALS LEGEND

LEGEND	ITEM No	DESCRIPTION
①	610D-003	FILTER BLANKET, GEOTEXTILE
②	210A-000	UNCLASSIFIED EXCAVATION
③	610C-000	LOOSE RIPRAP, CLASS 1, APP. 2-FT THICK
④	430B-005	AGGREGATE SURFACING (ALDOT #410), APP. 3-IN THICK
⑤	610C-001	LOOSE RIPRAP, CLASS 2, APP. 2-FT THICK

RESPONSIBLE PE:	SUPERVISOR:	DESIGNER:	PLAN SUBMITTAL	ALABAMA DEPARTMENT OF TRANSPORTATION	NOT TO SCALE	SHEET TITLE	ROUTE
DATE:	DATE:	DATE:					

HTT 2100

HighTideTechnologies
SATELLITE TELEMETRY SOLUTIONS

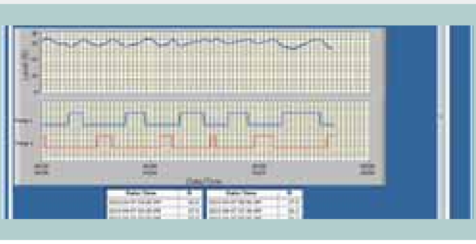
High Tide Technologies, LLC | P.O. Box 100189 - Nashville, TN 37224 | 615.256.6678 | www.HighTideTechnologies.com

The Model 2100 is a self-contained communications device that receives input data from analog or digital sensors and transmits that data through the ORBCOMM low-Earth orbit satellite (LEO) network directly to the High Tide Technologies server. The transmitted information is checked for alarms and stored in a historical database. Attached valve and pump assets can be controlled based on incoming data or directly by the customer. Historical data can be viewed by the subscribing client through the Internet using any standard Internet browser. Typical applications include water pump stations and water tanks.

Typical **Applications**:
- Tank Monitors with or without pump station controls
- Pump or Valve station controls

Hardware **Features**:
- Built in satellite modem
- Compatible with TelemetryVIEW Web-based SCADA services
- No towers, repeaters licenses or RF surveys required
- Simple installation and service
- No antenna aiming
- A/C or Solar powered.
- 8 Digital inputs (4 counters)
- 4 Analog level inputs (4-20ma or 0-5V)
- 24V loop power for 2-wire sensors
- 4 Relay outputs for pump control
- Optional rain gauge
- Battery backed up with power fail alarms

System **Features**:
- Secure access from any Internet connected computer
- 24 hour customer support
- Text and/or Voice Alarms
- History graphs for tank and pump statistics
- Daily starts and runtime reporting for pump stations
- Up to 4 user configurable alarms levels for each analog input
- Various automatically generated reports in Excel format stored on servers



Input Power	110/220 VAC or 12v Solar
Backup Power	12v DC lead acid
Modem	ORBCOMM Compatible
Antenna	1/2 Wave WHIP
Enclosure	NEMA 4 FIBERGLASS
Satellite Vendor	ORBCOMM, LLC
Communications	User configurable
Storage Temp	-40 ~ 60 ºC
Operating Temp	-25 ~ 60 ºC
Humidity	0~100% non-condensing
Product Life	Est. 3-yr for Battery
Alarm Conditions	External power loss
	Low battery
	Pump failure

HTT 3100

HighTideTechnologies
SATELLITE TELEMETRY SOLUTIONS

High Tide Technologies, LLC | P.O. Box 100189 - Nashville, TN 37224 | 615.256.6678 | www.HighTideTechnologies.com

The Model 3100 is a self-contained communications and control device that receives input data from analog or digital sensors and transmits that data through the ORBCOMM low-Earth orbit satellite (LEO) network directly to the High Tide Technologies server. The transmitted information is checked for alarms and stored in a historical database. Historical data can be viewed by the subscribing client through the Internet using any standard Internet browser. Typical applications include unmanned treatment plan monitoring, large lift-station monitoring, and various local control applications.

Typical **Applications**:

- Unmanned treatment plan monitors
- Primary lift station monitoring

Hardware **Features**:

- Built in satellite modem
- Compatible with TelemetryVIEW Web-based SCADA services
- No towers, repeaters licenses or RF surveys required
- Simple installation and service
- No antenna aiming
- 28 Digital inputs
- 8 Relay outputs
- 4 Analog inputs (4-20ma, 0-5)
- 2 Additional Analog inputs (4-20ma)
- 2 Analog outputs (4-20)
- 24v loop power for 2-wire sensors
- Battery back up with power fail alarms

System **Features**:

- Secure access from any Internet connected computer
- 24 hour customer support
- Text and/or Voice Alarms
- History graphs for tank and pump statistics
- Daily starts and runtime reporting for pump stations
- User configurable alarms
- Various automatically generated reports in Excel format stored on servers

Input Power	110/220 VAC
Backup Power	12v DC lead acid
Modem	ORBCOMM Compatible
Antenna	1/2 Wave WHIP
Enclosure	NEMA 4 FIBERGLASS
Satellite Vendor	ORBCOMM, LLC
Communications	User configurable
Storage Temp	-40 ~ 60 °C
Operating Temp	-20 ~ 60 °C
Humidity	0~100% non-condensing
Product Life	Est. 3-yr for Battery
Alarm Conditions	External power loss
	Low battery
	Pump failure

SOUTHWEST AREA
Pump Options

Option 1 - Duplex Pumps with Manual Controls		Dewatering Pond				Transfer Pond			Total
	Qty	Units	Unit Price	Total	Qty	Units	Unit Price	Total	
ABS J200HV 30HP/230V Pumps	2	ea	$ 13,357	$ 26,714		ea	$ 13,357	$ -	$ 26,714
Manual Duplex Control Panel	1	ea	$ 6,430	$ 6,430		ea	$ 6,430	$ -	$ 6,430
Float for pumps w/ Chain Fall Hoist	2	ea	$ 2,850	$ 5,700		ea	$ 2,850	$ -	$ 5,700
Float for Manifold	1	ea	$ 2,850	$ 2,850		ea	$ 2,850	$ -	$ 2,850
Manifold	1	ea	$ 5,000	$ 5,000		ea	$ 5,000	$ -	$ 5,000
Floats for discharge piping	3	ea	$ 143	$ 429		ea	$ 143	$ -	$ 429
12" Gate Valve w/ Box		ea	$ 1,400	$ -	2	ea	$ 1,400	$ 2,800	$ 2,800
12" X 12" Ductile Iron Tee		ea	$ 2,460	$ -	1	ea	$ 2,460	$ 2,460	$ 2,460
12" Dia. HDPE Pipe	620	lf	$ 80	$ 49,600	800	lf	$ 80	$ 64,000	$ 113,600
Contingency	10	%		$ 9,672	10	%		$ 6,926	$ 16,598
Total				$ 106,395				$ 76,186	**$ 182,581**

Option 2 - Duplex Pumps with Level Controls		Dewatering Pond				Transfer Pond			Total
	Qty	Units	Unit Price	Total	Qty	Units	Unit Price	Total	
ABS J200HV 30HP/230V Pumps	2	ea	$ 13,357	$ 26,714		ea	$ 13,357	$ -	$ 26,714
Duplex Control Panel (MultiSmart Control System)	1	ea	$ 9,750	$ 9,750	1	ea	$ 9,750	$ 9,750	$ 19,500
Float for pumps w/ Chain Fall Hoist	2	ea	$ 2,850	$ 5,700		ea	$ 2,850	$ -	$ 5,700
Float for Manifold	1	ea	$ 2,850	$ 2,850		ea	$ 2,850	$ -	$ 2,850
Manifold	1	ea	$ 5,000	$ 5,000		ea	$ 5,000	$ -	$ 5,000
Floats for discharge piping	3	ea	$ 143	$ 429		ea	$ 143	$ -	$ 429
12" Gate Valve w/ Box		ea	$ 1,400	$ -	2	ea	$ 1,400	$ 2,800	$ 2,800
12" X 12" Ductile Iron Tee		ea	$ 2,460	$ -	1	ea	$ 2,460	$ 2,460	$ 2,460
12" Dia. HDPE Pipe	620	lf	$ 80	$ 49,600	800	lf	$ 80	$ 64,000	$ 113,600
Contingency	10	%		$ 10,004	10	%		$ 7,901	$ 17,905
Total				$ 110,047				$ 86,911	**$ 196,958**

Option 3 - Duplex Pumps with Automatic Controls		Dewatering Pond				Transfer Pond			Total
	Qty	Units	Unit Price	Total	Qty	Units	Unit Price	Total	
ABS J200HV 30HP/230V Pumps	2		$ 13,357	$ 26,714			$ 13,357	$ -	$ 26,714
Automatic Duplex Control Panel (High Tide System)	1		$ 10,715	$ 10,715	1		$ 10,715	$ 10,715	$ 21,430
Float for pumps w/ Chain Fall Hoist	2		$ 2,850	$ 5,700			$ 2,850	$ -	$ 5,700
Float for Manifold	1		$ 2,850	$ 2,850			$ 2,850	$ -	$ 2,850
Manifold	1		$ 5,000	$ 5,000			$ 5,000	$ -	$ 5,000
Floats for discharge piping	3		$ 143	$ 429			$ 143	$ -	$ 429
12" Gate Valve w/ Box		ea	$ 1,400	$ -	2	ea	$ 1,400	$ 2,800	$ 2,800
12" X 12" Ductile Iron Tee		ea	$ 2,460	$ -	1	ea	$ 2,460	$ 2,460	$ 2,460
12" Dia. HDPE Pipe	620	lf	$ 80	$ 49,600	800	lf	$ 80	$ 64,000	$ 113,600
Solenoid Control Valve 12"			$ 11,429	$ -	1		$ 11,429	$ 11,429	$ 11,429
Contingency	10	%		$ 10,101	10	%		$ 9,140	$ 19,241
Total				$ 111,109				$ 100,544	**$ 211,653**

Notes:

1. Pumps and floats located in the Transfer Pond will remain the same.
2. Option 1 will require someone to manually turn pumps on and off.
3. Option 2 Pumps will be controled using a MultiSmart Control system.
4. Option 3 uses a Hightied Controler that provide telemetry via web acess. Yearly monitoring fees are $1,200/year.
5. Option 3 includes an automatic control valve to either direct water from the Transfer Pond to the New South Pond or recirculate back to Transfer Pond.

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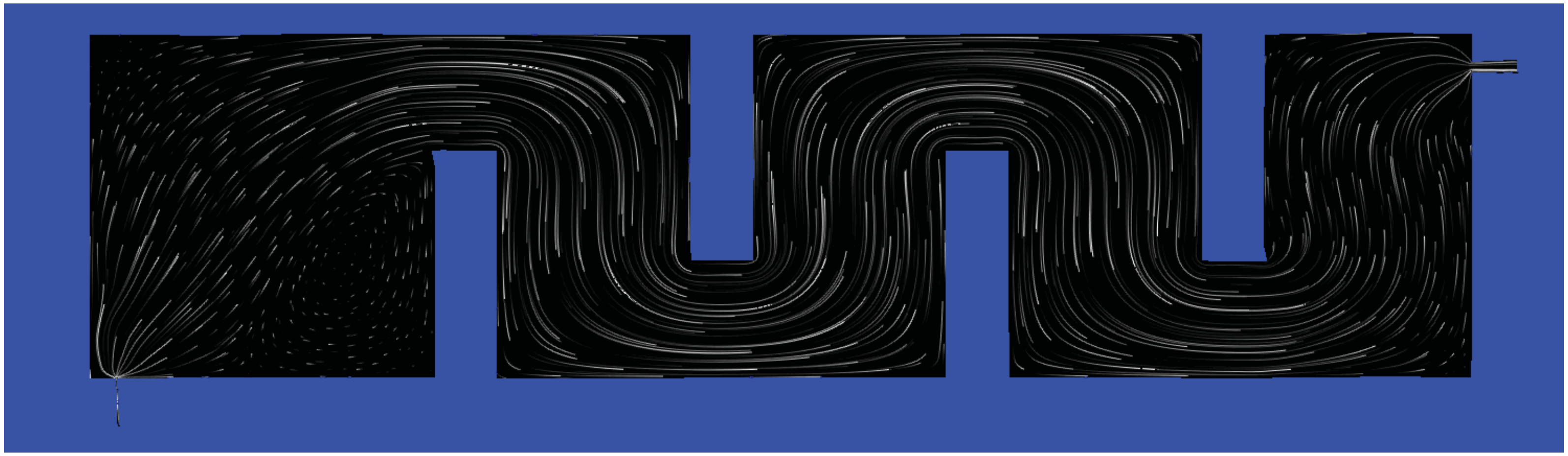
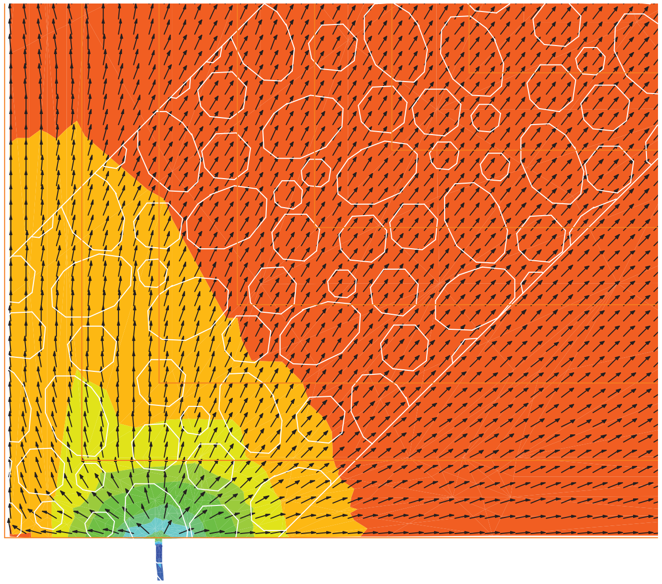
SOUTH POND 2-D MODEL FLOW TRACE



SOUTH POND 2-D MODEL FLOW FIELD AT INLET



SOUTHWEST AREA
Pump Options

Option 1 - Duplex Pumps with Manual Controls		Dewatering Pond				Transfer Pond			Total
	Qty	Units	Unit Price	Total	Qty	Units	Unit Price	Total	
ABS J200HV 30HP/230V Pumps	2	ea	$ 13,357	$ 26,714		ea	$ 13,357	$ -	$ 26,714
Manual Duplex Control Panel	1	ea	$ 6,430	$ 6,430		ea	$ 6,430	$ -	$ 6,430
Float for pumps w/ Chain Fall Hoist	2	ea	$ 2,850	$ 5,700		ea	$ 2,850	$ -	$ 5,700
Float for Manifold	1	ea	$ 2,850	$ 2,850		ea	$ 2,850	$ -	$ 2,850
Manifold	1	ea	$ 5,000	$ 5,000		ea	$ 5,000	$ -	$ 5,000
Floats for discharge piping	3	ea	$ 143	$ 429		ea	$ 143	$ -	$ 429
12" Gate Valve w/ Box		ea	$ 1,400	$ -	2	ea	$ 1,400	$ 2,800	$ 2,800
12" X 12" Ductile Iron Tee		ea	$ 2,460	$ -	1	ea	$ 2,460	$ 2,460	$ 2,460
12" Dia. HDPE Pipe	620	lf	$ 80	$ 49,600	800	lf	$ 80	$ 64,000	$ 113,600
Contingency	10	%		$ 9,672	10	%		$ 6,926	$ 16,598
Total				$ 106,395				$ 76,186	**$ 182,581**

Option 2 - Duplex Pumps with Level Controls		Dewatering Pond				Transfer Pond			Total
	Qty	Units	Unit Price	Total	Qty	Units	Unit Price	Total	
ABS J200HV 30HP/230V Pumps	2	ea	$ 13,357	$ 26,714		ea	$ 13,357	$ -	$ 26,714
Duplex Control Panel (MultiSmart Control System)	1	ea	$ 9,750	$ 9,750	1	ea	$ 9,750	$ 9,750	$ 19,500
Float for pumps w/ Chain Fall Hoist	2	ea	$ 2,850	$ 5,700		ea	$ 2,850	$ -	$ 5,700
Float for Manifold	1	ea	$ 2,850	$ 2,850		ea	$ 2,850	$ -	$ 2,850
Manifold	1	ea	$ 5,000	$ 5,000		ea	$ 5,000	$ -	$ 5,000
Floats for discharge piping	3	ea	$ 143	$ 429		ea	$ 143	$ -	$ 429
12" Gate Valve w/ Box		ea	$ 1,400	$ -	2	ea	$ 1,400	$ 2,800	$ 2,800
12" X 12" Ductile Iron Tee		ea	$ 2,460	$ -	1	ea	$ 2,460	$ 2,460	$ 2,460
12" Dia. HDPE Pipe	620	lf	$ 80	$ 49,600	800	lf	$ 80	$ 64,000	$ 113,600
Contingency	10	%		$ 10,004	10	%		$ 7,901	$ 17,905
Total				$ 110,047				$ 86,911	**$ 196,958**

Option 3 - Duplex Pumps with Automatic Controls		Dewatering Pond				Transfer Pond			Total
	Qty	Units	Unit Price	Total	Qty	Units	Unit Price	Total	
ABS J200HV 30HP/230V Pumps	2		$ 13,357	$ 26,714			$ 13,357	$ -	$ 26,714
Automatic Duplex Control Panel (High Tide System)	1		$ 10,715	$ 10,715	1		$ 10,715	$ 10,715	$ 21,430
Float for pumps w/ Chain Fall Hoist	2		$ 2,850	$ 5,700			$ 2,850	$ -	$ 5,700
Float for Manifold	1		$ 2,850	$ 2,850			$ 2,850	$ -	$ 2,850
Manifold	1		$ 5,000	$ 5,000			$ 5,000	$ -	$ 5,000
Floats for discharge piping	3		$ 143	$ 429			$ 143	$ -	$ 429
12" Gate Valve w/ Box		ea	$ 1,400	$ -	2	ea	$ 1,400	$ 2,800	$ 2,800
12" X 12" Ductile Iron Tee		ea	$ 2,460	$ -	1	ea	$ 2,460	$ 2,460	$ 2,460
12" Dia. HDPE Pipe	620	lf	$ 80	$ 49,600	800	lf	$ 80	$ 64,000	$ 113,600
Solenoid Control Valve 12"			$ 11,429	$ -	1		$ 11,429	$ 11,429	$ 11,429
Contingency	10	%		$ 10,101	10	%		$ 9,140	$ 19,241
Total				$ 111,109				$ 100,544	**$ 211,653**

Notes:

1. Pumps and floats located in the Transfer Pond will remain the same.
2. Option 1 will require someone to manually turn pumps on and off.
3. Option 2 Pumps will be controled using a MultiSmart Control system.
4. Option 3 uses a Hightied Controler that provide telemetry via web acess. Yearly monitoring fees are $1,200/year.
5. Option 3 includes an automatic control valve to either direct water from the Transfer Pond to the New South Pond or recirculate back to Transfer Pond.

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APPENDIX B-2

DESIGN INFORMATION FOR AUTOMATED PUMP CONTROL SYSTEM

Southwest Treatment Area Corrective Measures Implementation Plan

COLISEUM BOULEVARD PLUME SITE
MONTGOMERY, ALABAMA

DEPARTMENT OF TRANSPORTATION

ALDOT Southwest Area
Montgomery, Alabama

Dewatering Pump Control System

INTRODUCTION

The Alabama Department of Transportation (ALDOT) is making improvements to the dewatering system at the Southwest Area located in Montgomery, Alabama. The Southwest Area is a former sand and gravel mining facility that is currently being reclaimed. ALDOT is requesting proposals to provide all materials, equipment, labor and incidentals to construct the following improvements:

Dewatering Pond

- Remove existing Dobbs pump, cables and control panel and store on-site at a location to be determined by ALDOT.
- Provide and install a new pump with level controls, control panel, and telemetry system; and,
- Provide and install a flow meter on the existing 8” force main.

Transfer Pond

- Provide and install level controls, control panel, and telemetry system for existing pumps; and,
- Provide and install a flow meter on the existing 10” force main.

A scaled drawing showing the location of the Dewatering Pond and Transfer Pond is provided in Attachment A.

Existing dewatering pumps located in the Transfer Pond are two (2) ABS Jumbo 200HV MEX Pumps. The manufacturer’s technical data is provided in Attachment B.

Costs shall include all equipment, labor and materials for the installation, setup, and initial operation of a complete pump control system. A general description of each component is provided below.

LEVEL CONTROLS

Provide and install level controls in the Dewatering Pond and Transfer Pond for new and existing pumps.

- Level controls shall be either float, transducer type or approved equal installed adjacent to the existing pumps;

- Level controls shall be installed on a pole or as required for existing site conditions to provide a permanent installation;

- Dewatering Pond level controls shall be capable of turning the new pump on and off at elevations to be determined by ALDOT;

- Transfer Pond level controls shall be capable of operating both pumps. It is anticipated that during normal operations only one pump will operate at a time. During high flow conditions, operation of both pumps may be required. On, off and high level elevations shall be determined by ALDOT; and,

- Provide wiring and connections as required to connect level controls to control panel. Wiring shall be enclosed in PVC conduit in accordance with applicable standards and codes.

CONTROL PANEL

Provide and install a control panel for the Dewatering Pond and Transfer Pond to operate the new and existing pumps as either a simplex or duplex pump station, as applicable. Control panels shall include all components, controls, wiring and connections as required to provide a complete system. Control panels shall include but not limited to the following.

- Nema 4X enclosure with aluminum inner door, three point latch, intrusion switch, enclosure lights and drip shields;

- Programmable controller with the capabilities of motor protection and flow estimation;

- Soft pump starters and isolation contactors;

- Outside alarm light;

- Manual pump on/off controls;

- Circuit breakers, controllers, control transformers, heater, thermostats, chargers, power supply, meters, ground fault interrupter, receptacles, selectors, illuminated push button, relays and sockets as required; and,

- Control panels shall be installed on a pole or as required for existing site conditions to provide a permanent installation.

- Provide wiring and connections as required to connect the control panel and power to the pumps. Wiring shall be enclosed in PVC conduit in accordance with applicable standards and codes. For this item, assume the maximum distance between the existing pump(s) and the control panel will not exceed 200 feet.

TELEMETRY SYSTEM

Provide and install a telemetry system for the Dewatering Pond and Transfer Pond that will provide the following:

- Secure access via internet;
- Monitor real time status and operation of the pump station;
- Allow remote access to modify pump station operation;
- Communicate via cellular, satellite or hard connection;
- Provide automated user configurable alarms via e-mail and/or text message;
- History graphs of pump statistics; and,
- Daily starts and runtime reporting for pump stations.

DEWATERING POND PUMP

Provide and install one (1) ABS J 200HV MEX pump with six (6) inch discharge pipe or approved equal. A system curve for the Dewatering Pond pump is provided in Attachment C. The pump shall be capable to provide a minimum flow of 1,100 gallons per minute (GPM) to the Transfer Pond. Manufacturer’s technical specifications are provided in Attachment B. Provide and install the following accessories with the pump:

- One (1) – Submersible pump floatation system;
- One (1) – Header piping floatation system;
- One (1) – Six (6) inch discharge 90 degree elbow;
- One (1) – Six (6) inch to eight (8) inch increaser;
- One (1) – Eight (8) inch check valve;
- One (1) – Eight (8) inch butterfly valve; and,
- One (1) – Eight (8) inch flanged adapters with back up rings and bolts as required for connecting to existing HDPE force main.

Fittings and valves shall be ductile iron with mechanical joints or approved equal.

FLOW METERS

Provide and install propeller type flow meters on the force main from the Dewatering Pond and Transfer Pond and force main from the Transfer Pond to the Discharge Pond. Flow meters shall be McCrometer Model MW500 with a standard instantaneous flow rate indicator and straight-reading totalizer or approved equal. Each flow meter shall include an overbearing pin for flows exceeding the manufacturer's recommended maximum. The requirements for each force main are provided below.

Dewatering Pond has a nominal 8 inch diameter pipe with sections of HDPE, PVC, and ductile iron. Provide and install:

- One (1) – Eight (8) inch McCrometer MW500 propeller flow meter flanged;
- Two (2) – Eight (8) inch flanged adaptors (assume HDPE section);
- Two (2) – Eight (8) inch back up rings; and,
- Two (2) – Eight (8) inch bolt packs.

Transfer Pond has a 12.5 inch outside diameter (10 inch inside diameter) HDPE SDR 11 pipe. Provide and install:

- One (1) – Ten (10) inch McCrometer MW500 propeller flow meter flanged;
- Two (2) – Ten (10) inch flanged adaptors (HDPE SDR 11);
- Two (2) – Ten (10) inch back up rings; and,
- Two (2) – Ten (10) inch bolt packs.

Manufacturer data is provided in Attachment D.

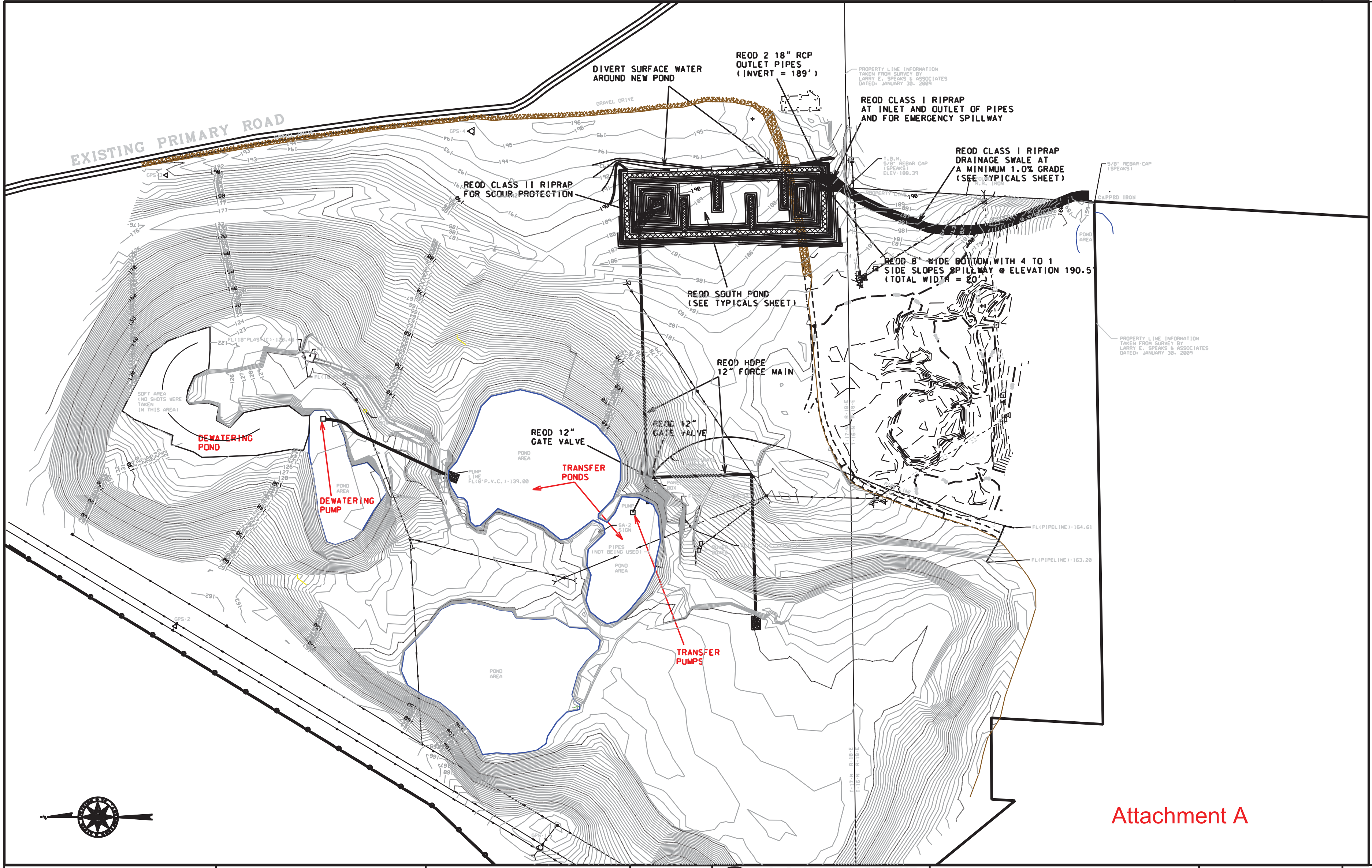
TRAINING

Provide an eight (8) hour training session for up to ten (10) people in the operation and maintenance of the system.

INSTALLATION

ALDOT will require the vendor to provide, install and setup the pump, level controls, control panels and telemetry system. Cost associated with this effort shall include all labor, equipment, materials, expenses and incidentals required for complete installation, setup and operation.

REFERENCE PROJECT NO	FISCAL YEAR	SHEET NO



Attachment A

RESPONSIBLE PE:	SUPERVISOR:	DESIGNER:	PLAN SUBMITTAL	ALABAMA DEPARTMENT OF TRANSPORTATION	HORIZ 100 0 100 SCALE (FEET)	SHEET TITLE	ROUTE
DATE:	DATE:	DATE:					

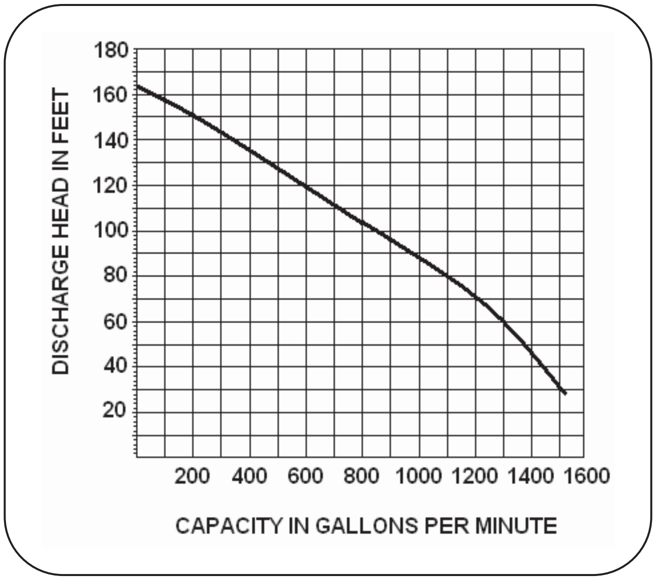
Attachment B

MSHA Approved Mine Permissible Pumps

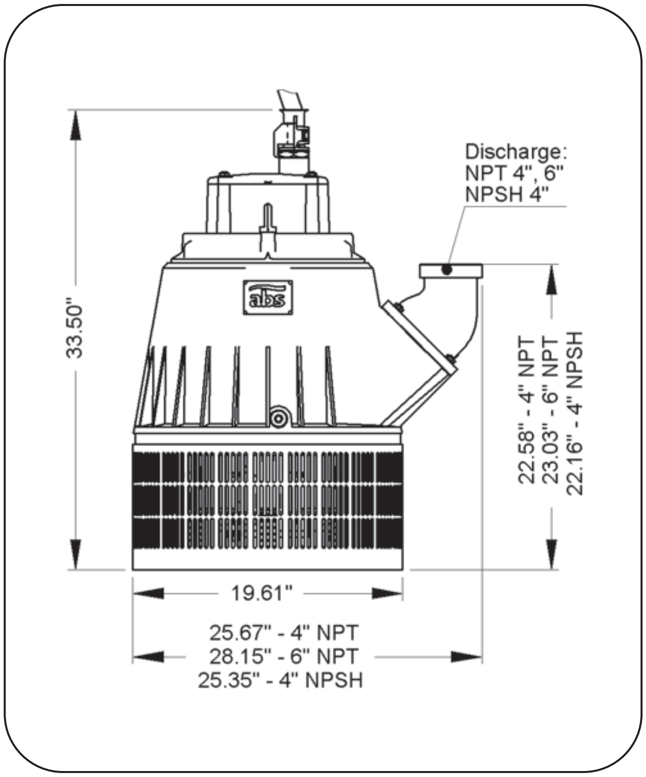
J••••••M••••

SPECIFICATION
MSHA (Mining Safety and Health Administration) and D.O.E.R. (Pennsylvania Department of Environmental Resources) approved.

APPLICATIONS
Include gassy coal mines, tunnels, strip mines and quarries where MSHA permissible pumps are required. Guaranteed to run dry.



TECHNICAL DATA	
Model	J200HV MEX
Power output	31.3 hp (23.2 kW)
Phase	3
Frequency	60 Hz
Speed	3450 RPM
Voltage	460/575
Full load amps	38.2 / 30.5
PHYSICAL DATA	
Power cable	AWG 8/4 + 10/4 GGC, Hypalon, MSHA
Control cable	Together with power cable
Cable length	Standard – 50 ft. (15m)
Motor housing	Cast aluminum alloy
Oil chamber	Cast aluminum alloy rubber coated
Impeller	ASTM A 743 CA-40 hardened stainless steel
Cooling jacket	Cast aluminum alloy
Wear ring	Cast aluminum alloy rubber coated polycloroprene
Diffuser	Cast aluminum alloy rubber coated
Motor shaft	AISI 420 Stainless steel
O-rings	Buna N
Ext. hardware	AISI 304 Stainless steel
Mechanical seal	**Upper** –Chrome Steel/Carbon **Lower** – SiC/SiC
Upper bearing	Single row ball bearing
Lower bearing	Double row angular contact ball bearing
Weight with cables	425 lbs. (193kg)
Discharge size	NPT 4", 6"; NPSH 4"
Solid size	1"
ELECTRICAL DATA	
Motor type	Enclosed submersible – IP 68
Motor design	NEMA type N
Insulation	Class F
Max. stator temp.	155° C
Max. ambient temp.	40° C
Service factor	1.0
Voltage tolerance	± 10
Motor protection	Bimetalic switch in each phase of the winding
	Dielectrode seal probe in the motor housing



The manufacturer reserves the right to alter performance specifications or design without notice

We know how water works

Corporate Office:
ABS USA
140 Pond View Drive
Meriden, CT 06450
Tel: (203) 238-2700
Fax: (203) 238-0738

Offices:
ABS USA
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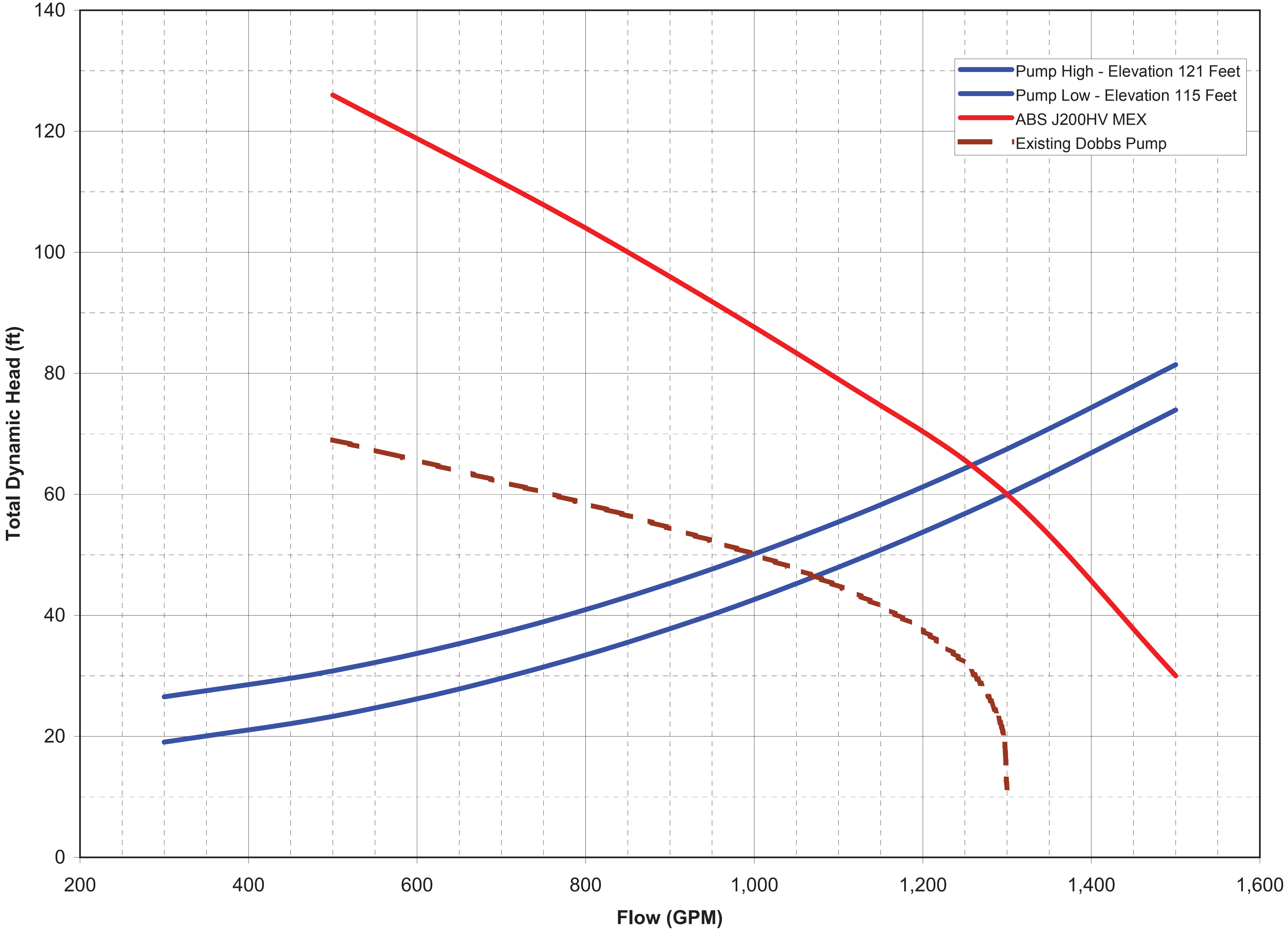
ABS Canada
1401 Meyerside Drive, Unit#2
Mississauga, Ontario L5T 1G8
Tel: (905) 670-4677
Fax: (905) 670-3709

Attachment C
Dewatering Pond Pump System Curve



Attachment D

MC Propeller

CONFIGURATION SHEET
MAIN LINE FLOWMETER

MODEL MW500 / MZ500

DESCRIPTION

Model MW500 and MZ500 Main Line Propeller Flowmeters are manufactured to comply with the applicable provisions of the American Water Works Association Standard No. C704-02 for propeller type flowmeters. The model MW500 is designed for a maximum continuous working pressure of up to 150 psi and is fitted with AWWA Class D flanges. The model MZ500 is designed for a continuous working pressure of up to 300 psi and is fitted with ANSI B16.5 Class 300 flanges. The impeller and drive assembly are easily removed through the top flange connection. The meter flow tubes are coated with fusion-bonded epoxy for maximum corrosion protection, and integral flow straightening vanes reduce upstream flow turbulence. As with all McCrometer propeller flowmeters, standard features include a magnetically coupled drive, instantaneous flowrate indicator and straight reading, six-digit totalizer.

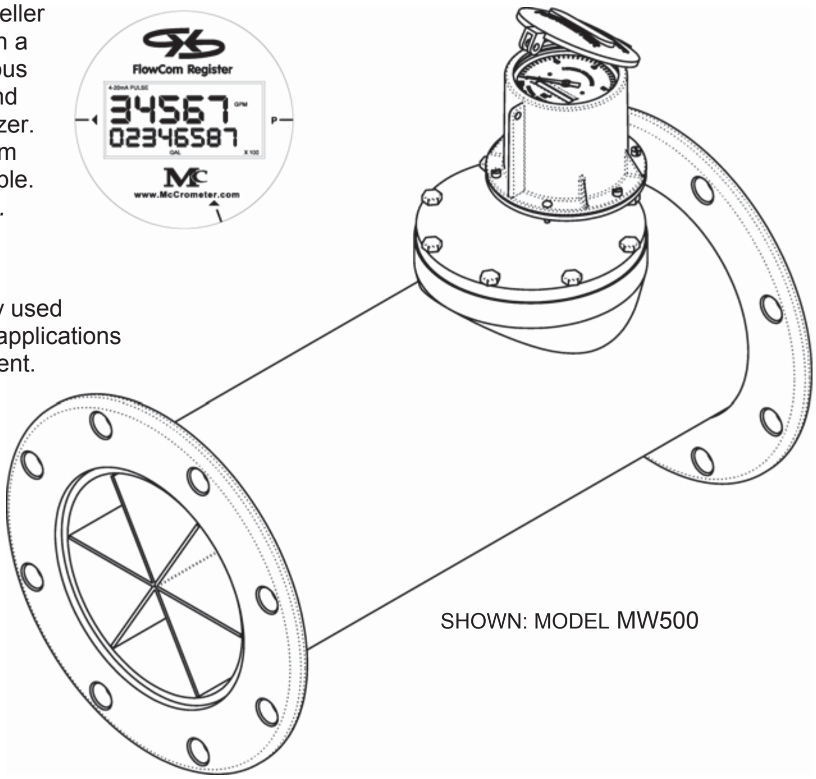
Impellers are manufactured of high-impact plastic, capable of retaining their shape and accuracy over the life of the meter. Each impeller is individually calibrated at the factory to accommodate the use of any standard McCrometer register. The MW500 and MZ500 can be field-serviced without the need for factory recalibration. Factory lubricated, stainless steel bearings are used to support the impeller shaft. The shielded bearing design limits the entry of materials and fluids into the bearing chamber providing maximum bearing protection.

The instantaneous flowrate indicator is standard and available in gallons per minute, cubic feet per second, liters per second and other units. The register is driven by a flexible steel cable encased within a protective vinyl liner. The register housing protects both the register and cable drive system from moisture while allowing clear reading of the flowrate indicator and totalizer.

INSTALLATION

Standard installation is horizontal mount. If the meter is to be mounted in the vertical position, please advise the factory. A straight run of full pipe the length of five diameters ahead and one diameter behind the meter is the minimum normally recommended.

The McCrometer Propeller flowmeter comes with a standard instantaneous flowrate indicator and straight-reading totalizer. An optional FlowCom register is also available. *Typical face plates.*



APPLICATIONS

The McCrometer propeller meter is the most widely used flowmeter for municipal and wastewater treatment applications as well as agricultural and turf irrigation measurement. Typical applications include:

- Water and wastewater management
- Center pivot systems
- Sprinkler irrigation systems
- Drip irrigation systems
- Golf course and park water management
- Gravity turnouts from underground pipelines
- Commercial nurseries

SHOWN: MODEL MW500

Lit#24517-20 Rev 1.9/07-07

McCROMETER
3255 West Stetson Avenue
Hemet CA 92545 USA
951-652-6811 / FAX 951-652-3078
www.mccrometer.com

MAIN LINE FLOWMETER MODEL MW500 / MZ500

Attachment D

SPECIFICATIONS

PERFORMANCE

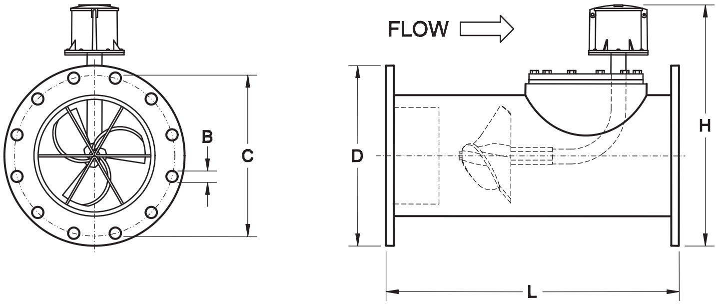
ACCURACY: ±2% of reading guaranteed throughout range.
RANGE: See dimensions chart below
HEAD LOSS: See dimensions chart below
MAXIMUM TEMPERATURE: (Standard Construction) 160°F constant
PRESSURE RATING: Model MW500: 150 psi
Model MZ500: 300 psi

MATERIALS

BEARING ASSEMBLY: Impeller shaft is 316 stainless steel. Ball bearings are 440C stainless steel.
MAGNETS: (Permanent type) Cast or sintered Alnico
BEARING HOUSING: Brass; Stainless Steel optional
REGISTER: An instantaneous flowrate indicator and six-digit straight-reading totalizer are standard. The register is hermetically sealed within a die cast aluminum case. This protective housing includes a domed acrylic lens and hinged cover with locking hasp.
IMPELLER: Impellers are manufactured of high-impact plastic, retaining their shape and accuracy over the life of the meter. High temperature impeller is optional.

OPTIONS

- International flange standards available
- Other than standard laying lengths available
- Register extensions available
- Forward/reverse flow measurement
- All stainless steel construction
- High temperature construction
- “Over Run” bearing assembly for higher-than-normal flowrates
- Electronic propeller meter available in all sizes of this model
- A complete line of flow recording/control instrumentation
- Certified calibration test results



McCROMETER reserves the right to change design or specifications without notice.

MW500/MZ500	DIMENSIONS														
Meter and Nominal Pipe Size	**2**	**2 1/2**	**3**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**24**	**30**	**36**
Maximum Flow U.S. GPM	250	250	250	600	1200	1500	1800	2500	3000	4000	5000	6000	8500	12,500	17,000
Minimum Flow. U.S. GPM	40	40	40	50	90	100	125	150	250	275	400	475	700	1200	1500
Approx. Head Loss in Inches at Max. Flow	29.50	29.50	29.50	23.00	17.00	6.75	3.75	2.75	2.00	1.75	1.50	1.25	1.00	1.00	1.00
MW500															
Approx. Shipping Weight-lbs.	36	36	43	54	115	135	197	325	465	530	744	890	1,293	1450	1650
B (inches)	3/4	3/4	3/4	3/4	7/8	7/8	1	1	1 1/8	1 1/8	1 1/4	1 1/4	1 3/8	1 3/8	1 5/8
C (inches)	4 3/4	5 1/2	6	7 1/2	9 1/2	11 3/4	14 1/4	17	18 3/4	21 1/4	22 3/4	25	29 1/2	36	42 3/4
D (inches)	6	7	7 1/2	9	11	13 1/2	16	19	21	23 1/2	25	27 1/2	32	38 3/4	46
H (inches)	11 3/4	12 1/4	12 1/2	15 1/4	16 1/4	18 1/2	21 3/4	24 1/4	25 1/4	28 1/2	29 1/4	32 1/2	36 3/4	42 3/4	49 1/4
L (inches)	14	16	16	20	22	24	26	28	42	48	54	60	60	60	60
No. of Bolts per Flange	4	4	4	8	8	8	12	12	12	16	16	20	20	28	32
No. of Topplate Bolts	6	6	6	6	8	8	12	12	12	12	16	16	16	16	16
MZ500															
Approx. Shipping Weight-lbs.	50	55	62	90	145	220	340	430	650	820	1,315	1,508	2,165		
B (inches)	3/4	7/8	7/8	7/8	7/8	1	1 1/8	1 1/4	1 1/4	1 3/8	1 3/8	1 3/8	1 5/8		
C (inches)	5	5 7/8	6 5/8	7 7/8	10 5/8	13	15 1/4	17 3/4	20 1/4	22 1/2	24 3/4	27	32		
D (inches)	6 1/2	7 1/2	8 1/4	10	12 1/2	15	17 1/2	20 1/2	23	25 1/2	28	30 1/2	36		
H (inches)	12	12 1/2	12 7/8	15 3/4	17	19 1/4	22 1/2	25	26 1/4	29 1/2	32 3/4	34	38 3/4		
L (inches)	20	20	20	24	26	28	30	32	42	48	54	60	60		
No. of Bolts per Flange	8	8	8	8	12	12	16	16	20	20	24	24	24		

Note: *Flanges meet ASTM-A-181 specs.* *Larger flowmeters on special order.*

REPRESENTED BY:

Lit#24517-20 Rev 1.9/07-07

McCROMETER
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APPENDIX C

SWTA BORING AND PIEZOMETER INSTALLATION REPORT

Southwest Treatment Area
Corrective Measures Implementation Plan

COLISEUM BOULEVARD PLUME SITE
MONTGOMERY, ALABAMA

Department Of Transportation

Appendix C
SWTA Boring and Piezometer Installation Report
Coliseum Boulevard Plume Investigation

SWTA Boring and Piezometer Installation

Southern Earth Sciences, Inc. (SESI) supervised the advancement of borings (Sonic Borings 1-7) and the conversion of three borings to piezometers (PZ-27, PZ-28, and PZ-29) on November 12-15, 2013. These borings were completed for ALDOT to determine the potential for future sand and/or gravel mining within the area that encompassed the borings.

The borings were advanced by Layne Companies, Inc. by RotoSonic drilling. Cross-contamination between borings was minimized by thorough steam cleaning and pressure washing of all downhole equipment prior to drilling each borehole or converting a boring to a piezometer. A core barrel was advanced in 10-foot intervals to collect undisturbed sediment samples at each location. When the sample barrel reached the end of its sample depth, an override casing was advanced to the bottom of the sample barrel and the sample barrel removed. Sediment samples were collected from the core barrel in plastic sleeves. Boring and piezometer locations are illustrated on Figure C-1.

Boring depths ranged from approximately 60 to 90 feet below land surface. Sediment lithologies were described by an on-site geologist. (See Boring Logs in Appendix C-1). Sediment samples were field screened by utilizing a MiniRAE Lite photo ionization detector (PID) with a 10.6eV gas-discharge lamp. The PID results are listed on the boring logs in Appendix C-1. Borings that were not converted to piezometers were plugged by using neat (Portland) cement via the tremie method.

The piezometers comprised threaded, 2-inch diameter, Schedule 40 PVC pipe with fifteen (15) feet of 0.010-inch slotted screen. The annulus of each piezometer was filled with a sand pack of uniformly graded well-rounded quartz sand to approximately two feet above the top of the screen. Two feet of bentonite pellets were placed above the sand pack. The annulus above the bentonite seal was filled to ground surface with a neat cement grout. The piezometers were completed with locking caps and stickup completions protected with steel shrouds. Four (4) bollards were installed around each of the piezometers. Construction diagrams for the piezometers are shown on the Well Construction and Lithologic Description logs in Appendix C-1. The total depth, screened interval, and top-of-casing elevation of each piezometer are listed in Table C-1.

The piezometers were developed by using a submersible pump except for PZ-27, which was developed with an inertial pump. Development continued until the field readings (conductivity, temperature, pH, dissolved oxygen, turbidity, and redox potential) were stable. Development water was containerized and placed into the dewatering pond of the Southwest Treatment Area for discharge through the on-site treatment system and subsequent discharge via the NPDES permitted outfall.

During the PZ-27 well development procedure, the submersible pump could not be lowered beyond 20 feet below the top of casing. It was determined that the well casing at this depth was either bent or the pipe casing had constricted during the well installation. The integrity of the well is believed to be sound; however, sampling equipment with a diameter greater than one-inch cannot be advanced beyond this depth. This necessitated the development and sampling using the inertial pump. The sample was collected from the sample tubing at the check valve following removal from the well.

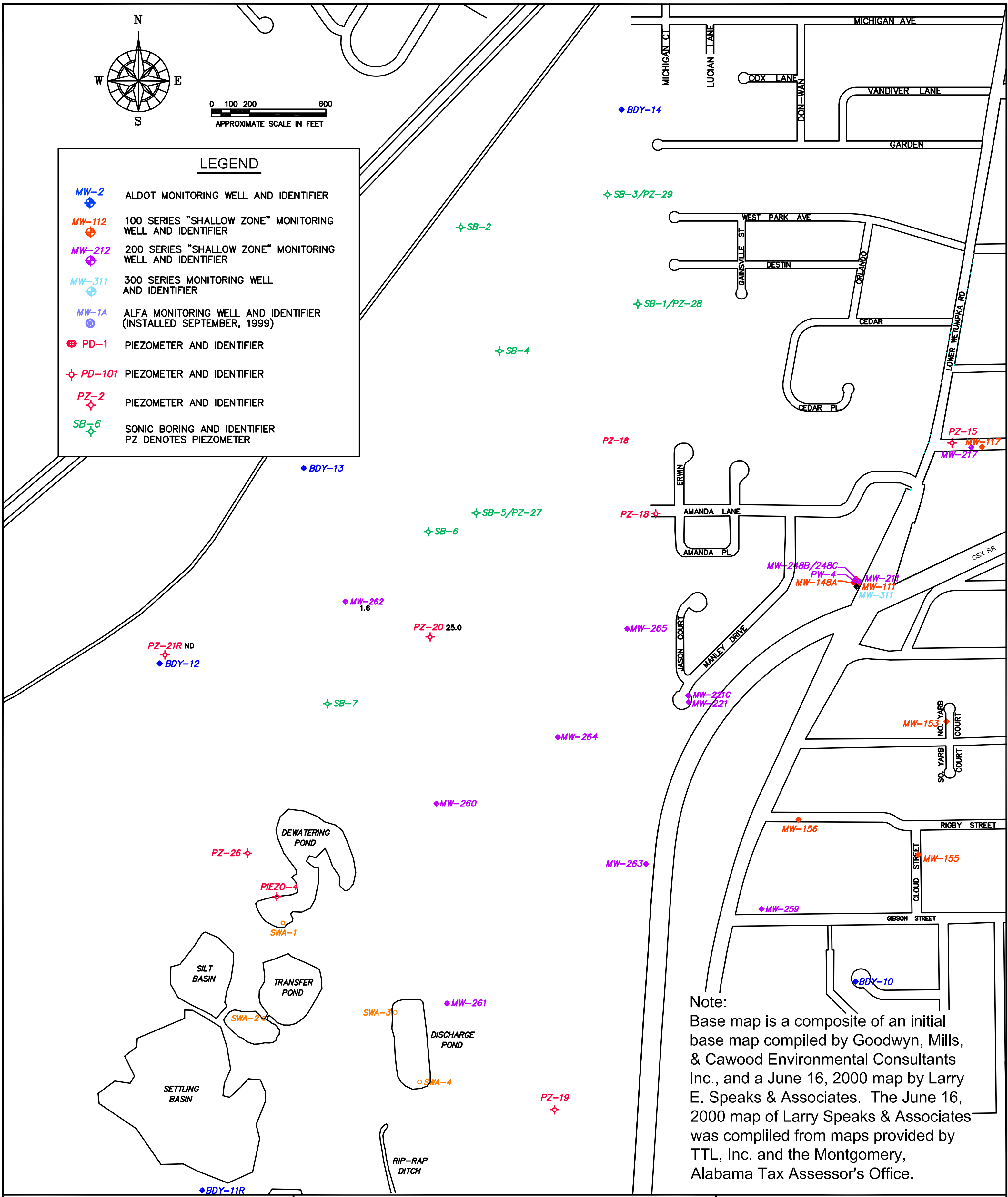
The piezometers were sampled for volatile organic compounds (VOCs) via EPA Method 8260. Samples were collected by using bladder pumps (PZ-28 and PZ-29) and inertial pump (PZ-27). Sampling data are presented in Table C-2. Trichloroethylene (TCE) was not detected in any of the groundwater samples from the piezometers. Laboratory analytical reports are presented in Appendix C-2.

DEPARTMENT OF TRANSPORTATION

Appendix C
SWTA Boring and Piezometer Installation Report

Coliseum Boulevard Plume Investigation

FIGURE



Note:
Base map is a composite of an initial base map compiled by Goodwyn, Mills, & Cawood Environmental Consultants Inc., and a June 16, 2000 map by Larry E. Speaks & Associates. The June 16, 2000 map of Larry Speaks & Associates was compliled from maps provided by TTL, Inc. and the Montgomery, Alabama Tax Assessor's Office.

ALABAMA DEPARTMENT OF TRANSPORTATION SWTA BORING AND PIEZOMETER INSTALLATION MONTGOMERY, ALABAMA	SOUTHERN EARTH SCIENCES, INC. Geotechnical, Environmental & Construction Materials Testing www.soearth.com	FIGURE C-1 BORING AND PIEZOMETER LOCATION PLAN SESI JOB #: C06-401

TABLES

TABLE C-1: GROUNDWATER ELEVATION & PIEZOMETER CHARACTERISTICS AT SWTA GRAVEL INVESTIGATION

Facility Name: Coliseum Boulevard Plume
SESI Project No.: C06-401

PIEZOMETER NO.	PZ-27		PZ-28		PZ-29	
DIAMETER (IN)	2		2		2	
TOTAL DEPTH (FT)	73.00		59.00		54.00	
SCREENED INTERVAL (FT)	57-73		44-59		39-54	
TOC ELEVATION (FT AMSL)	184.11		201.33		203.40	
GROUND SURFACE ELEVATION (FT AMSL)	181.30		198.25		200.68	
DATE	**GW ELEV**	**DTW**	**GW ELEV**	**DTW**	**GW ELEV**	**DTW**
12/3/2013	159.49	24.62	161.83	39.5	177.96	25.44

Notes:
1. "TOC" = top-of-casing
2. "DTW" = depth to groundwater from top-of-casing
3. "GW ELEV" = groundwater elevation expressed in feet above mean sea level.
4. "AMSL" = above mean sea level
5. Elevations are based on survey by Speaks & Associates, Inc.

Table: C-2.

Results of analyses of detected volatile organic compounds (VOCs)[1] in groundwater samples from SWTA piezometers; December 2013
Coliseum Boulevard Plume
Montgomery, Alabama

		Trichloroethylene	cis-1,2-Dichloroethylene	Vinyl Chloride	Carbon Tetrachloride	Chloroethane	Chloroform	1,1-Dichloroethane	1,1-Dichloroethylene	Methylene Chloride	Tetrachloroethylene	Benzene
Location ID	**Sample Date**	**1.0 µg/l [2]**	**1.0 µg/l [2]**	**1.0 µg/l [2]**	**1.0 µg/l [2]**	**1.0 µg/l [2]**	**1.0 µg/l [2]**	**1.0 µg/l [2]**	**1.0 µg/l [2]**	**1.0 µg/l [2]**	**1.0 µg/l [2]**	**1.0 µg/l [2]**
PZ-27	12/03/13	<1	<1	<1	<1	<1	**2.1**	<1	<1	<1	<1	<1
PZ-28	12/03/13	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	**69.1**
PZ-29	12/03/13	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Notes:

1 Samples were analyzed in accordance with Method 8260 outlined in Test Methods for Evaluating Solid W aste Physical/Chemical Methods, EPA, SW-846.

2 MDL - Method Detection Limit of 1.0 microgram per liter (□g/L) for the laboratory analyses.

APPENDIX C-1

CONSTRUCTION DIAGRAMS AND BORING LOGS

WELL CONSTRUCTION AND LITHOLOGIC DESCRIPTION

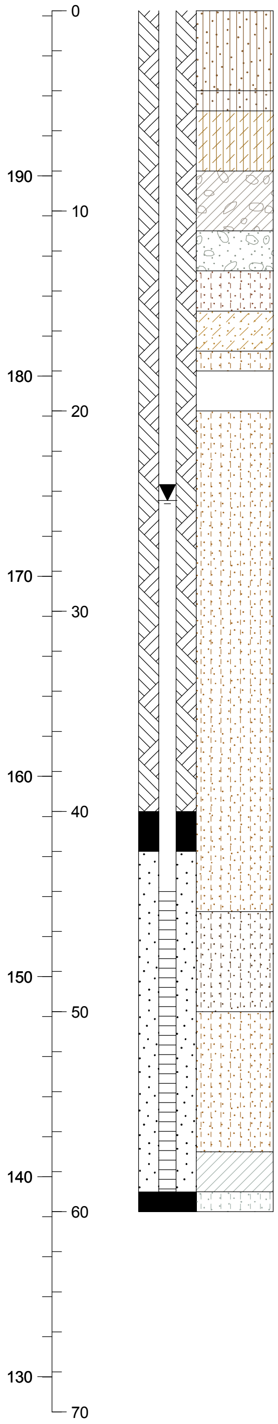
Page 1 of 1

BORING NO.: SB-1/PZ-28
PROJECT NO.: C06-401
PROJECT: COLISEUM BOULEVARD PLUME
PROJECT LOCATION: SOUTHWEST AREA
COORDINATES: N32°24'52.16" W86°17'29.23"
DATE DRILLED: 11/15/13
DATE COMPLETED: 11/15/13
GEOL / ENGR: S. TRAYLOR

DRILLER: LAYNE
METHOD: ROTOSONIC
WELL DIAMETER: 2 INCHES
SCREEN SLOT SIZE: 0.010"
TOC ELEVATION: 201.33
GROUND ELEVATION: 198.25
WATER LEVEL: 24.62 ft
WATER LEVEL DATE: 12/03/13

Elevation / Depth

Soil Symbols Sampler Symbols and Field Test Data



USCS	Description	PID ppm
	SANDY SILT; DRY; STRONG BROWN 7.5YR 4/6	
	SANDY SILT; SATURATED; BROWN 7.5YR 4/4	
	CLAYEY SILT; DRY; YELLOWISH BROWN 10 YR 5/8	
	GRAVELLY CLAY; GRAVEL IS 5-10%; GRAY 10YR 6/1	
GP-GM	GRAVELLY SAND; MEDIUM GRAINED TO GRAVEL; GRAVEL IS APPROX. 50%; GRAY 10 YR 6/1	
	SILTY SAND; FINE GRAINED; RED 2.5YR 4/6	
	CLAYEY SAND; DRY; BROWNISH YELLOW 10YR 6/8	
SM	SILTY SAND; FINE GRAINED; DRY; STRONG BROWN 7.5YR 5/8	
	NO RETURNS	
SP-SM	SILTY SAND; FINE GRAINED; STRONG BROWN 7.5YR 5/8	ND
	SILTY SAND; FINE GRAINED; IRON CONCENTRATIONS PREVALENT (25%); DARK BROWN 7.5YR 3/4	
	SILTY SAND; FINE GRAINED; STRONG BROWN 7.5YR 5/8	
	CLAY; STIFF; MOTTLING LIGHT GREENISH GRAY GLEY 1 7/10Y	
	SILTY SAND; FINE GRAINED; GLAUCONITIC; LIGHT GREENISH GRAY GLEY 1 7/N	

Remarks: USCS CLASSIFICATION BASED ON GRAIN SIZE ANALYSIS

■ **- Bentonite** ⁚ **- Filter Sand** ▧ **- Neat Cement**

SOUTHERN EARTH SCIENCES, inc.

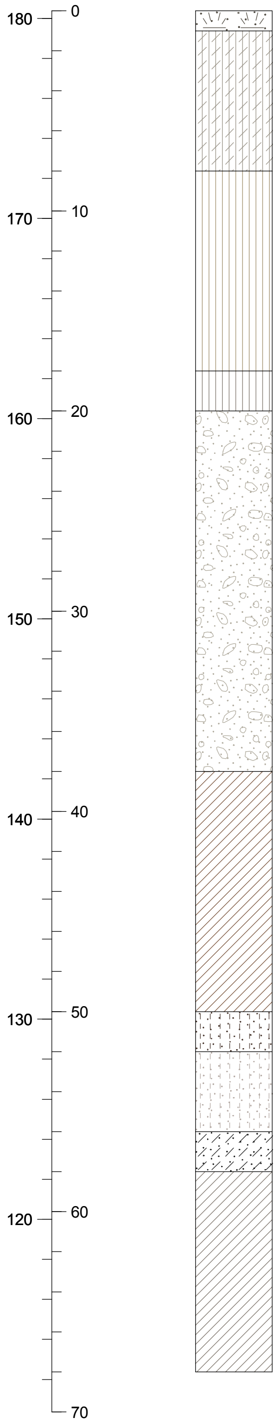
ERIC Z:\PROJECTS\JOB FOLDERS\2000-09\2006\06401-COLISEUM PLUME\BORING LOGS\CBP LOGS COLOR 2012.GPJ SO_EARTH_COLOR.GDT 3/17/14

SAMPLE AND LITHOLOGY LOG

BORING NO.: SB-2
PROJECT NO.: C06-401
PROJECT: COLISEUM BOULEVARD PLUME
PROJECT LOCATION: SOUTHWEST AREA
COORDINATES: N32°24'56.10" W86°17'40.09"
DATE DRILLED: 11/15/13

DRILLER: LAYNE
METHOD: ROTOSONIC
GROUND ELEVATION: 180.38
WATER LEVEL: NOT MEASURED
GEOL / ENGR: S. TRAYLOR
DATE COMPLETED: 01/15/13

Elevation / Depth — Soil Symbols Sampler Symbols and Field Test Data



USCS	Description	PID ppm
	TOPSOIL; VERY DARK GRAY 2.5Y 3/1	
	CLAYEY SILT; LIGHTLY MOTTLED; GRAY 2.5Y 6/1	
SM	SILTY SAND; SATURATED; LIGHT YELLOWISH BROWN 2.5Y 6/3	
SM	SILTY SAND; MOIST; GRAY GLEY 1 6/N	
SM	GRAVELLY SAND; POORLY SORTED; IRON CONCENTRATIONS PRESENT (20%); LIGHT GRAY 5Y 7/1	
	CLAY; STIFF; MOTTLED; REDDISH BROWN 5YR 4/4	
	SILTY SAND; MOTTLED; DARK REDDISH BROWN 5YR 2.5/2	
	SILTY SAND WITH OCCASIONAL CLAY LENSES; LIGHT GRAY 5YR 7/1	
	CLAYEY TO SILTY SAND; POSSIBLE GLAUCONITIC; LIGHT GRAY GLEY 1 7/N	
	CLAY; MOTTLED; STIFF; GRAY 10YR 5/1	

Remarks: USCS CLASSIFICATION BASED ON GRAIN SIZE ANALYSIS

SOUTHERN EARTH SCIENCES, inc.

WELL CONSTRUCTION AND LITHOLOGIC DESCRIPTION

Page 1 of 1

BORING NO.: ***SB-3/PZ-29***

PROJECT NO.: C06-401

PROJECT: COLISEUM BOULEVARD PLUME

PROJECT LOCATION: SOUTHWEST AREA

COORDINATES: N32°24'57.83" W86°17'31.12"

DATE DRILLED: 11/14/13

DATE COMPLETED: 11/14/13

GEOL / ENGR: S. TRAYLOR

DRILLER: LAYNE

METHOD: ROTOSONIC

WELL DIAMETER: 2 INCHES

SCREEN SLOT SIZE: 0.010"

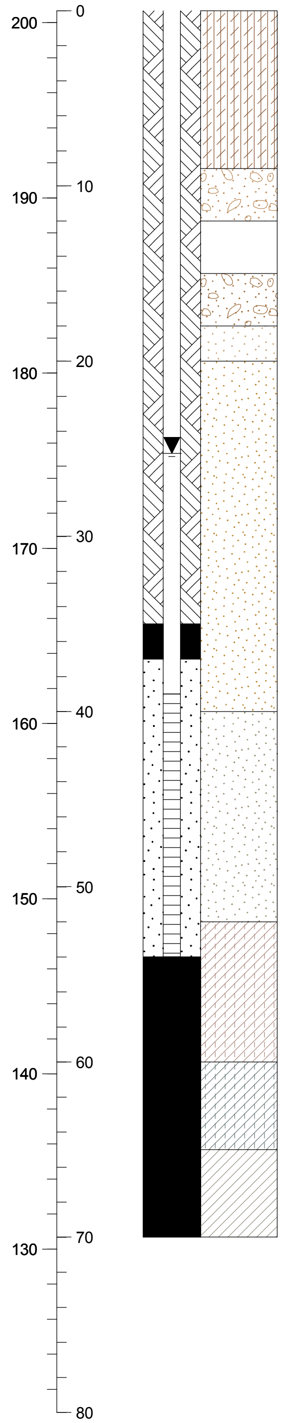
TOC ELEVATION: 203.4

GROUND ELEVATION: 200.68

WATER LEVEL: 25.44 ft

WATER LEVEL DATE: 12/02/13

Elevation / Depth | Soil Symbols Sampler Symbols and Field Test Data



USCS	Description	PID ppm
	CLAYEY SILT; DRY; YELLOWISH RED 5YR 4/6	
SP-SM	GRAVELLY SAND; POORLY SORTED; REDDISH YELLOW 7.5YR 6/6 TO STRONG BROWN 7.5YR 5/6	
	NO RETURNS	
SP-SM	GRAVELLY SAND; POORLY SORTED; RED 7.5R 5/6	
	SAND; FINE GRAINED; WELL SORTED; VERY PALE BROWN 10YR 7/4	
SP-SM	SAND; MEDIUM GRAINED; WELL SORTED; SATURATED; BROWNISH YELLOW 10YR 6/8	ND
	SAND; FINE GRAINED; IRON CONCENTRATIONS PREVALENT (25%); LIGHT BROWNISH GRAY 2.5Y 6/2 TO DARK YELLOWISH BROWN 10YR 4/4	
	SILTY CLAY; STIFF; MOTTLING; PALE BROWN 10YR 6/3	
	SILTY CLAY; STIFF; GREENISH GRAY GLEY 1 5/5GY	
	CLAY; GLAUCONITIC SAND IN BOTTOM 2" OF SAMPLE; STIFF CLAY; GRAY 5Y 6/1	

Remarks: USCS CLASSIFICATION BASED ON GRAIN SIZE ANALYSIS

■ **- Bentonite** ⁚ **- Filter Sand** ▨ **- Neat Cement**

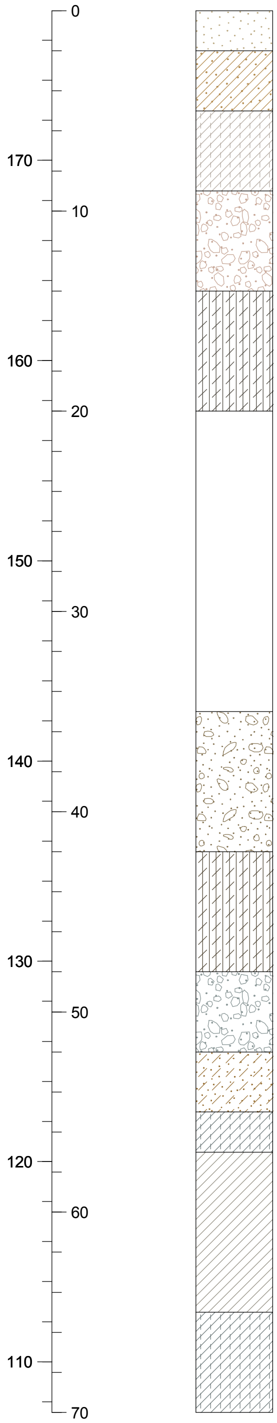
SOUTHERN EARTH SCIENCES, inc.

SAMPLE AND LITHOLOGY LOG

Page 1 of 1

BORING NO.: SB-4
PROJECT NO.: C06-401
PROJECT: COLISEUM BOULEVARD PLUME
PROJECT LOCATION: SOUTHWEST AREA
COORDINATES: N32°24'56.10" W86°17'40.09"
DATE DRILLED: 11/14/13

DRILLER: LAYNE
METHOD: ROTOSONIC
GROUND ELEVATION: 177.47
WATER LEVEL: NOT MEASURED
GEOL / ENGR: S. TRAYLOR
DATE COMPLETED: 11/14/13

Elevation / Depth	Soil Symbols Sampler Symbols and Field Test Data	USCS	Description	PID ppm
			SAND, FINE GRAINED, PALE BROWN 2.5Y 7/3	
			SANDY CLAY, STIFF, BROWNISH YELLOW 10YR 6/6	
			SILTY CLAY, STIFF, MOTTLING, LIGHT GRAY 7.5YR 7/1	
		SW-SM	SANDY GRAVEL, POORLY SORTED, LIGHT REDDISH BROWN 2.5YR 7/3	
			CLAYEY SILT, ORGANIC, WOOD FRAGEMENTS, SATURATED, VERY DARK GRAY 2.5Y 3/1	
			NO RETURNS	
		SP-SM	GRAVELLY SAND, SATURATED, POORLY SORTED, LIGHT OLIVE BROWN 2.5Y 5/3	
			CLAYEY SILT, 5% GRAVEL, ORGANICS PRESENT, VERY DARK GRAYISH BROWN 2.5Y 3/2	
		SP	SANDY GRAVEL, POORLY SORTED, GRAY GLEY 1 6/N	
			CLAYEY SAND, FINE GRAINED, YELLOWISH BROWN 10Y 5/6	
			SILTY CLAY, GLAUCONITIC, GREENISH GRAY GLEY 1 5/5GY	
			CLAY, STIFF, HEAVY MOTTLING, GRAY 5Y 6/1	
			SILTY CLAY, STIFF, MOTTLED, GLAUCONITIC, GREENISH GRAY GLEY 1 5/5GY	

Remarks: USCS CLASSIFICATION BASED ON GRAIN SIZE ANALYSIS

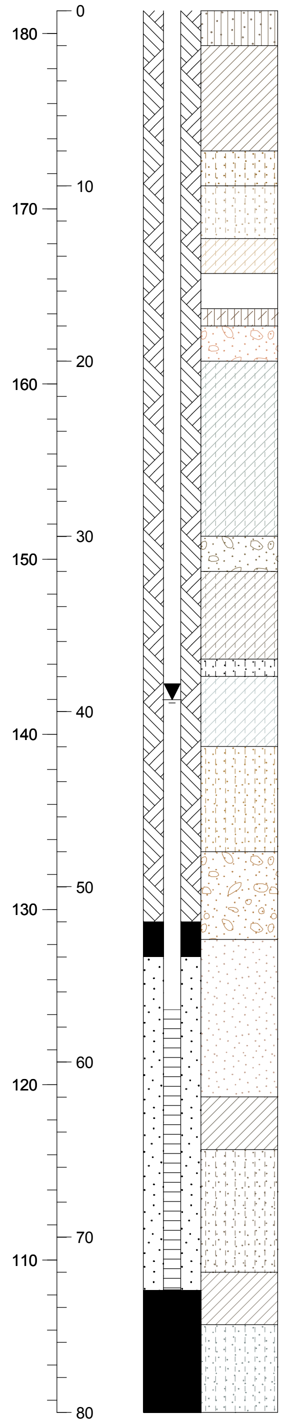
SOUTHERN EARTH SCIENCES, inc.

WELL CONSTRUCTION AND LITHOLOGIC DESCRIPTION

Page 1 of 1

BORING NO.:	***SB-5/PZ-27***	***DRILLER:***	LAYNE
PROJECT NO.:	C06-401	***METHOD:***	ROTOSONIC
PROJECT:	COLISEUM BOULEVARD PLUME	***WELL DIAMETER:***	2 INCHES
PROJECT LOCATION:	SOUTHWEST AREA	***SCREEN SLOT SIZE:***	0.010"
COORDINATES:	N32°24'41.27" W86°17'39.08"	***TOC ELEVATION:***	184.11
DATE DRILLED:	11/13/13	***GROUND ELEVATION:***	181.30
DATE COMPLETED:	11/13/13	***WATER LEVEL:***	39.50 ft
GEOL / ENGR:	S. TRAYLOR	***WATER LEVEL DATE:***	12/05/13

Elevation / Depth | Soil Symbols Sampler Symbols and Field Test Data



USCS	Description	PID ppm
	SANDY SILT; GRAYISH BROWN 10YR 5/2	
	CLAY; MOTTLING PRESENT; GRAYISH BROWN 10YR 5/2 TO GREENISH GRAY GLEY 1 6/5GY	
SM	SILTY SAND; FINE GRAINED; YELLOWISH BROWN 10YR 5/6	
SP-SM	SILTY SAND; COARSE GRAINED; APPROX. 25% GRAVEL PRESENT; SATURATED; VERY PAL BROWN 10YR 7/3	
	SILTY CLAY; SOFT; VERY PALE BROWN 10YR 8/3	
	NO RETURNS	
	CLAYEY SILT; BROWN 7.5YR 4/3	
SP-SM	SILTY SAND; MEDIUM GRAINED TO GRAVEL (5-10%); POORLY SORTED; LIGHT GRAY 10YR 7/2 TO LIGHT RED 2.5YR 7/6	
	SILTY CLAY; MOTTLED; SOFT; LIGHT GREENISH GRAY GLEY 1 7/10Y	
SW-SC	SILTY SAND; (10% GRAVEL); POORLY SORTED; SATURATED; LIGHT OLIVE BROWN 2.5Y 5/3	ND
	SILTY CLAY; SOFT; GRAY 2.5Y 6/1 TO YELLOWISH BROWN 10YR 5/8	
	SILTY SAND WITH CLAY LENSES; LIGHT GRAY GLEY 1 7/N	
	SILTY CLAY; SOFT; LIGHT GREENISH GRAY GLEY 1 8/10Y	
	SILTY SAND; FINE GRAINED; BROWNISH YELLOW 10YR 6/6	
SP-SM	GRAVEL; WITH COARSE SAND; POORLY SORTED; SATURATED; REDDISH YELLOW 7.5R 6/6	
	SAND; MEDIUM GRAINED; SATURATED; PALE BROWN 2.5Y 7/3	
	CLAY; STIFF; GRAY 2.5Y 5/1	
	SILTY SAND; MEDIUM GRAINED; YELLOWISH BROWN 10YR 5/6 TO DARK GRAYISH BROWN 10YR 4/2	
	CLAY; STIFF; MOTTLED; GRAY 10YR 6/1	
	SILTY SAND; MEDIUM GRAINED; GRAY GLEY 1 6/N	

Remarks: USCS CLASSIFICATION BASED ON GRAIN SIZE ANALYSIS

■ **- Bentonite** ⁙ **- Filter Sand** ▨ **- Neat Cement**

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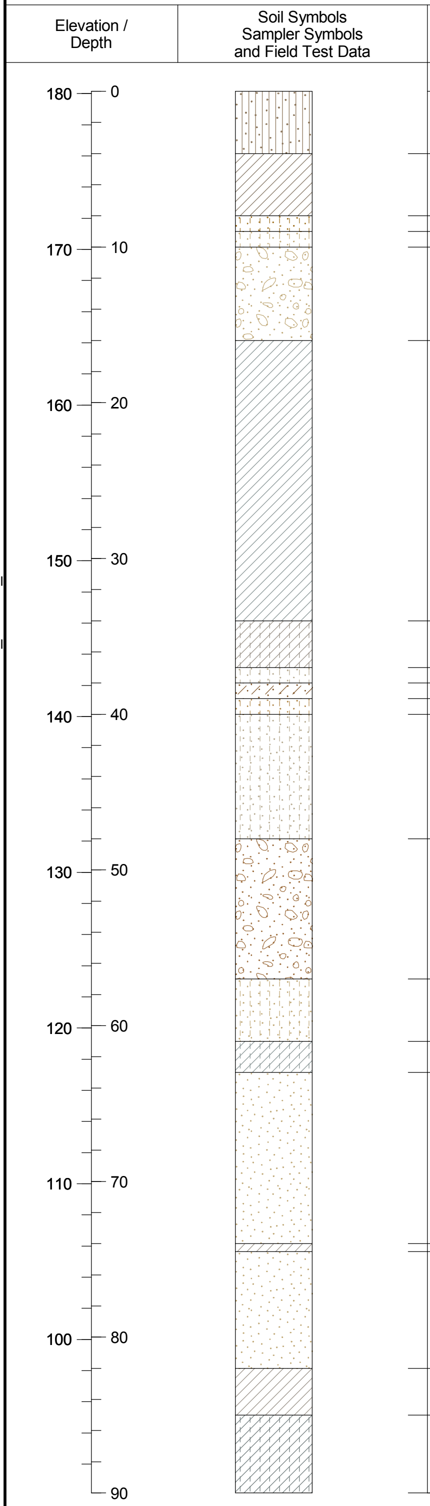
SAMPLE AND LITHOLOGY LOG

Page 1 of 1

BORING NO.: SB-6
PROJECT NO.: C06-401
PROJECT: COLISEUM BOULEVARD PLUME
PROJECT LOCATION: SOUTHWEST AREA
COORDINATES: N32°24'40.29" W86°17'42.00"
DATE DRILLED: 11/12/13

DRILLER: LAYNE
METHOD: ROTOSONIC
GROUND ELEVATION: 180.15
WATER LEVEL: NOT MEASURED
GEOL / ENGR: S. TRAYLOR
DATE COMPLETED: 11/13/13



USCS	Description	PID ppm
	SANDY SILT, DRY, BROWN 10YR 5/3	
	CLAY, STIFF, MOTTLING, GRAYISH BROWN 10YR 5/2	
SP	SILTY SAND, FINE GRAINED, DRY, YELLOWISH BROWN 10YR 5/8	
SP-SM	SILTY SAND, FINE GRAINED, DRY, PALE BROWN 2.5Y 7/4	
	GRAVELLY SAND, 20% GRAVEL, PALE BROWN 2.5Y 7/4	
	CLAY, STIFF, MOTTLING, GREENISH GRAY GLEY 1 6/10Y TO GREENISH GRAY GLEY 1 5/5GY	
	SILTY CLAY, MOTTLED, GRAY 10YR 6/1	
	SILTY SAND, FINE GRAINED, LIGHT GRAY 2.5Y 7/2	
SP	CLAYEY SAND, IRON CONCENTRATIONS PRESENT (20%), STRONG BROWN 7.5YR 4/6	
	SILTY SAND, FINE GRAINED, BROWNISH YELLOW 10YR 6/6	
	SILTY SAND, FINE TO MEDIUM GRAINED, SATURATED, LIGHT GRAY 2.5Y 7/2	
SP	GRAVELLY SAND, POORLY SORTED, GRAVEL IS 30%, SATURATED, STRONG BROWN 7.5YR 5/6 TO PALE BROWN 2.5Y 7/4	
	SILTY SAND, COARSE GRAINED, SATURATED, PALE BROWN 2.5Y 7/4	
	SILTY CLAY, MOTTLING, GREENISH GRAY GLEY 1 6/10Y	
SP	SAND, FINE GRAINED, SATURATED, PALE BROWN 2.5Y 7/4	
	CLAY, STIFF, MOTTLED, GRAY 10YR 6/1	
	SAND, FINE GRAINED, SATURATED, PALE BROWN 2.5Y 7/4	
	CLAY, STIFF, MOTTLED, GRAY 10YR 6/1	
	SILTY CLAY, MOTTLED, GREENISH GRAY GLEY 1 5/5GY	

Remarks: USCS CLASSIFICATION BASED ON GRAIN SIZE ANALYSIS

SOUTHERN EARTH SCIENCES, inc.

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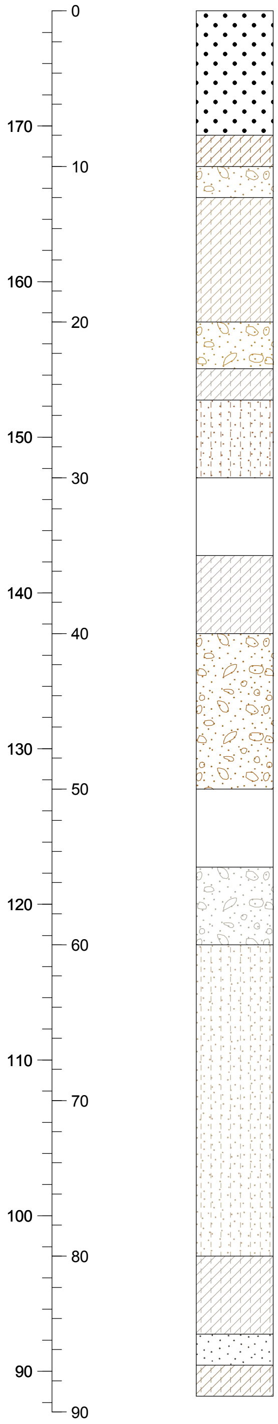
SAMPLE AND LITHOLOGY LOG

Page 1 of 1

BORING NO.: SB-7
PROJECT NO.: C06-401
PROJECT: COLISEUM BOULEVARD PLUME
PROJECT LOCATION: SOUTHWEST AREA
COORDINATES: N32°24'31.34" W86°17'48.13"
DATE DRILLED: 11/12/13

DRILLER: LAYNE
METHOD: ROTOSONIC
GROUND ELEVATION: 177.4
WATER LEVEL: NOT MEASURED
GEOL / ENGR: S. TRAYLOR
DATE COMPLETED: 11/12/13

Elevation / Depth — Soil Symbols Sampler Symbols and Field Test Data



USCS	Description	PID ppm
	COMPACTED, UNCLASSIFIED FILL	
	SILTY CLAY, SOFT, STRONG BROWN 7.5YR 5/6	
SM	GRAVELLY SAND, POORLY SORTED, BROWNISH YELLOW 10YR 6/6	
	SILTY CLAY, VERY PALE BROWN 10YR 7/3	
SM	GRAVELLY SAND, POORLY SORTED, WET, BROWNISH YELLOW 10YR 6/8	
	SILTY CLAY, SOFT, MOTTLING, LIGHT GRAY 10YR 7/1 TO YELLOWISH BROWN 7.5YR 5/6	
SM	SILTY SAND, MICACEOUS, YELLOWISH RED 5YR 5/6 TO PALE RED 10R 7/2	
	NO RETURNS	
	SILTY CLAY, STIFF, MICACEOUS, LIGHT GRAY 10YR 7/1	
SP-SM	GRAVELLY SAND, POORLY SORTED, STRONG BROWN 7.5YR 5/8 TO VERY PALE BROWN 10YR 7/4	
	NO RETURNS	
SP	GRAVELLY SAND, SAND IS COARSE GRAINED, LIGHT GRA 5Y 7/1	
	SILTY SAND, FINE GRAINED, SATURATED, MOTTLING, VERY PALE BROWN 10YR 7/3 TO PALE YELLOW 5Y 7/4	
	SILTY CLAY, MOTTLED, LIGHT GRAY 10YR 7/1	
	SAND, HIGH ORGANIC CONTENT, VERY DARK GRAY 10YR 3/1	
	SILTY CLAY, PALE BROWN 10YR 6/3	

Remarks: USCS CLASSIFICATION BASED ON GRAIN SIZE ANALYSIS

SOUTHERN EARTH SCIENCES, inc.

ERICNOWELL Z:\PROJECTS\JOB FOLDERS\2000-09\2006\06401-COLISEUM PLUME\BORING LOGS\CBP LOGS COLOR 2012.GPJ SO_EARTH_COLOR.GDT 3/18/14

APPENDIX C-2

LABORATORY ANALYTICAL REPORTS, FIELD MEASUREMENTS, AND CHAINS-OF-CUSTODY

EnviroChem
Environmental Laboratories

4320 Midmost Drive Mobile, Alabama 36609
Phone (251) 344-9106 Fax (251) 341-9492

Report Date: 12/31/13 09:30

Report To: Southern Earth Sciences-Montgomery
Post Office Box 231238
Montgomery AL, 38123
Attention: Hal Wood

Project: ALDOT CBP-Monitoring Wells

Project Number: 06-401

ANALYTICAL REPORT

This report includes the results of analyses for the samples listed below that were received by the laboratory on 12/05/13 13:15 . The associated quality control data is not included in this report but is available upon request. If you have any questions concerning this report, please feel free to call Susan Maynord at (251) 344-9106.

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
PZ-28	13L0095-15	Ground Water	12/03/13 14:37	12/05/13 13:15
PZ-27	13L0177-13	Ground Water	12/05/13 12:00	12/10/13 13:00
PZ-29	13L0196-01	Ground Water	12/02/13 15:37	12/03/13 13:00

Susan Maynord

Susan Maynord, Lab Director

ACCREDITED IN ACCORDANCE WITH nelac

The test results in this report meet NELAP requirements for accredited parameters, unless otherwise noted, and relate only to the sample(s) received by this laboratory. This report must be reproduced in its entirety unless approved by the laboratory.

Results are reported on a "wet weight basis", unless otherwise noted.

Southern Earth Sciences-Montgomery
Sample Name: PZ-28 Sample Type: Grab
Sample Date: 12/03/13 14:37 Date Received: 12/05/13 13:15 Sampled by: Shane Traylor Matrix: Ground Water

Volatile Organic Compounds by EPA Method 8260

Analyte	*Result*	*Units*	*Reporting Limit*	*Analyst*	*Prepared*	*Analyzed*	*Method*	*Batch*	*Lab Number*
1,1,1,2-Tetrachloroethane	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
1,1,1-Trichloroethane	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
1,1,2,2-Tetrachloroethane	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
1,1,2-Trichloroethane	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
1,1-Dichloroethane	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
1,1-Dichloroethene	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
1,2-Dichlorobenzene	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
1,2-Dichloroethane	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
1,2-Dichloropropane	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
1,3-Dichlorobenzene	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
1,4-Dichlorobenzene	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
Benzene	**69.1**	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
Bromodichloromethane	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
Bromoform	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
Carbon Tetrachloride	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
Chlorobenzene	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
Chloroethane	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
Chloroform	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
Chloromethane	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
cis-1,2-Dichloroethene	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
cis-1,3-Dichloropropene	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
Dibromochloromethane	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
Ethylbenzene	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
m,p-Xylene	< 2.0	ug/L	2.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
Methylene Chloride	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
o-Xylene	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
Tetrachloroethylene	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
Toluene	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
trans-1,2-Dichloroethene	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
trans-1,3-Dichloropropene	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
Trichloroethylene	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
Trichlorofluoromethane	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15
Vinyl chloride	< 1.0	ug/L	1.0	SAB	12/05/13 14:00	12/05/13 21:21	EPA 8260	3L06004	13L0095-15

Southern Earth Sciences-Montgomery

Sample Name: PZ-27   Sample Type: Grab

Sample Date: 12/05/13 12:00   Date Received: 12/10/13 13:00   Sampled by: Hal Wood/EG   Matrix: Ground Water

Volatile Organic Compounds by EPA Method 8260

Analyte	*Result*	*Units*	*Reporting Limit*	*Analyst*	*Prepared*	*Analyzed*	*Method*	*Batch*	*Lab Number*
1,1,1,2-Tetrachloroethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
1,1,1-Trichloroethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
1,1,2,2-Tetrachloroethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
1,1,2-Trichloroethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
1,1-Dichloroethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
1,1-Dichloroethene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
1,2-Dichlorobenzene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
1,2-Dichloroethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
1,2-Dichloropropane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
1,3-Dichlorobenzene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
1,4-Dichlorobenzene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
Benzene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
Bromodichloromethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
Bromoform	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
Carbon Tetrachloride	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
Chlorobenzene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
Chloroethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
Chloroform	**2.1**	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
Chloromethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
cis-1,2-Dichloroethene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
cis-1,3-Dichloropropene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
Dibromochloromethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
Ethylbenzene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
m,p-Xylene	< 2.0	ug/L	2.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
Methylene Chloride	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
o-Xylene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
Tetrachloroethylene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
Toluene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
trans-1,2-Dichloroethene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
trans-1,3-Dichloropropene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
Trichloroethylene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
Trichlorofluoromethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13
Vinyl chloride	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 11:32	EPA 8260	3L16002	13L0177-13

Southern Earth Sciences-Montgomery

Sample Name: PZ-29 Sample Type: Grab

Sample Date: 12/02/13 15:37 Date Received: 12/03/13 13:00 Sampled by: Shane Traylor Matrix: Ground Water

Volatile Organic Compounds by EPA Method 8260

Analyte	*Result*	*Units*	*Reporting Limit*	*Analyst*	*Prepared*	*Analyzed*	*Method*	*Batch*	*Lab Number*
1,1,1,2-Tetrachloroethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
1,1,1-Trichloroethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
1,1,2,2-Tetrachloroethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
1,1,2-Trichloroethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
1,1-Dichloroethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
1,1-Dichloroethene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
1,2-Dichlorobenzene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
1,2-Dichloroethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
1,2-Dichloropropane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
1,3-Dichlorobenzene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
1,4-Dichlorobenzene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
Benzene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
Bromodichloromethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
Bromoform	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
Carbon Tetrachloride	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
Chlorobenzene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
Chloroethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
Chloroform	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
Chloromethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
cis-1,2-Dichloroethene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
cis-1,3-Dichloropropene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
Dibromochloromethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
Ethylbenzene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
m,p-Xylene	< 2.0	ug/L	2.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
Methylene Chloride	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
o-Xylene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
Tetrachloroethylene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
Toluene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
trans-1,2-Dichloroethene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
trans-1,3-Dichloropropene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
Trichloroethylene	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
Trichlorofluoromethane	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01
Vinyl chloride	< 1.0	ug/L	1.0	SAB	12/13/13 14:00	12/14/13 12:01	EPA 8260	3L16002	13L0196-01

MONITORING WELL

Project: ALDOT/Coliseum Blvd Plume
Well No: SWTA Boring Piezo #1
Job No: 06-401
Personnel: ST
Date: 12/3/13
Sampling Method: ☑ Bladder Pump ☐ Peristaltic Pump ☐ Submersible Pump
Pump No.: SESI

Depth to Water, ft: 24.62	Total Well Depth, ft: 62.33	Calculated Well Vol: ~~18.9~~ 6.3
Controller Settings: 11/19		Volume Purged, gal:

3 vols = 18.9

Time	Temperature C°	Conductivity umhos/cm	pH	Turbidity ntu	DO mg/L	~~Redox~~ ORP mV	Remarks
1049	18.90	62	4.07	120	2.65	~~222.3~~	
1051	18.97	62	4.70	1083	3.81	201	
1056	18.97	62	4.73	83	2.32	199	
							~2:00
1421	19.26	60	5.14	3.75	4.52	192.4	ST → HW
1426	19.24	60	4.83	-1	4.51	206.0	SESI
1431	19.27	60	4.84	-1	3.21	204.7	Safety Policy
1437	19.26	60	4.86	-.13	2.28	203.7	Sample
							@ 1437

REQUESTED ANALYSIS:
EPA 8260 (CBP)

CONTAINER 40 ML VOA HCL
QUANTITY: 3

RELINQUISHED BY: Kyle C. Hodge	DATE: 12.03.13	SHIPPED VIA: UPS
COMPANY: SESI	TIME: 1700	DATE SHIPPED: 12.04.13
RECEIVED BY:	DATE: 12-05-13	LAB NO: 13L0095
COMPANY: ENVIROCHEM 4320 MIDMOST MOBILE AL 36609	TIME: 1315	

SOUTHERN EARTH SCIENCES, Inc.

SEMI-ANNUAL GROUND WATER MONITORING WELL

ENVIROCHEM Environmental Laboratories

Project: ALDOT/Coliseum Blvd Plume

Job No: 06-401

Personnel: ST

Sampling Method: ☑ Bladder Pump ☐ Peristaltic Pump ☐ Submersible Pump

Well No: SWTA Boring Piezo #3

Date: 12/2/2013

Pump No.: SES 5L

Depth to Water, ft: 25.44	Total Well Depth, ft: 57.21	Calculated Well Vol: 5.3 gal.
Controller Settings: 15/15		Volume Purged, gal: 16 gal.

3 vol. = 15.9 gal.

Time	Temperature C°	Conductivity umhos/cm	pH	Turbidity ntu	DO mg/L	Redox mV	Remarks
1455	18.90	111	6.07	152	8.60	171.2	INITIAL
1522	18.69	101	5.82	-6.51	67.6	61.0	
1527	18.68	93	5.77	-16.17	67.5	62.4	
1532	18.64	96	5.76	-8.96	67.5	62.8	
1537	18.66	98	5.74	-10.03	66.0	62.3	

REQUESTED ANALYSIS: EPA 8260 (CBP)

CONTAINER: 40 ML VOA HCL

QUANTITY: 3

107

RELINQUISHED BY:

COMPANY: SESI

DATE: 12-2-13

TIME: 12-03-13

SHIPPED VIA: UPS

DATE SHIPPED: 12/2/13

RECEIVED BY: Crystal J Mandel

COMPANY: ENVIROCHEM 4320 MIDMOST MOBILE AL 36609

DATE: ~~12-10-13~~

TIME: ~~1315~~ 1300

LAB NO: 13L0196-P2-29 -01

SOUTHERN EARTH SCIENCES, Inc.

SEMI-ANNUAL GROUND WATER MONITORING WELL

ENVIROCHEM
Environmental Laboratories

Project: ALDOT/Coliseum Blvd Plume
Well No: SWTA Boring Piezo#5
Job No: 06-401
Personnel: HW/EG
Date: 12/5/2013
Sampling Method: ☐ Bladder Pump ☐ Peristaltic Pump ☐ Submersible Pump
Pump No.:
Inertial Pump

Depth to Water, ft: 39.5	Total Well Depth, ft: 75.57	Calculated Well Vol: 5.8
Controller Settings:		Volume Purged, gal: 25

Time	Temperature C°	Conductivity umhos/cm	pH	Turbidity ntu	DO mg/L	Redox mV	Remarks
	19.69	384	9.67	369	3.84	-62	Purged for 3 hours with inertial pumping Sampled @ ≈ 1200
	20.20	430	10.53	85.3	3.38	-54	
	19.72	318	7.78	2175	2.54	-68.6	
	20.37	379	9.24	425	2.86	-56.7	
	16.68	231	7.17	1668	2.44	-22.7	
	19.82	197	6.31	823	2.65	-6.2	
	19.97	255	6.67	1746	1.97	-25.8	
	20.44	224	6.54	1448	2.74	-22.7	
	20.21	271	6.77	1244	2.95	-21.6	
	20.68	235	6.70	1317	2.86	-22.4	
	20.66	125	6.09	750	3.53	52.6	
	21.09	140	5.99	328	3.98	65	
	21.36	157	6.23	1022	4.02	67.3	← 25 gallons

REQUESTED ANALYSIS:
EPA 8260 (CBP)
CONTAINER: 40 ML VOA HCL
QUANTITY: 3

RELINQUISHED BY:	DATE: 12/10/13	SHIPPED VIA: Hand Deliver
COMPANY: SESI	TIME: 1200	DATE SHIPPED:
RECEIVED BY: Crystal J Gaudet	DATE: 12-10-13	LAB NO: 13L0177
COMPANY: ENVIROCHEM 4320 MIDMOST MOBILE AL 36609	TIME: 1300	

- Hold samples received at earlier date