RO 486

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June 6, 2005

Jerry Wickham
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Re: Subsurface Investigation Report
Former Shell Service Station
4255 MacArthur Blvd.
Oakland, California
SAP Code 135701
Incident No. 98995758
ACHCSA # 3769

Dear Mr. Wickham:

Attached for your review and comment is a copy of the *Subsurface Investigation Report* for the above referenced site. Upon information and belief, I declare, under penalty of perjury, that the information contained in the attached document is true and correct.

If you have any questions or concerns, please call me at (707) 865-0251.

Sincerely,

Denis L. Brown
Sr. Environmental Engineer

CAMBRIA

June 6, 2005

Mr. Jerry Wickham
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Re: **Subsurface Investigation Report**
Former Shell Service Station
4255 MacArthur Boulevard
Oakland, California
Incident # 98995758
Cambria Project #247-0524-007
ACEH Case #3769

Dear Mr. Wickham:

Cambria Environmental Technology, Inc. (Cambria) prepared this report on behalf of Equilon Enterprises LLC dba Shell Oil Products US (Shell) to document the recent site investigation activities at the referenced site. The purpose of the investigation was to determine the source and extent of the separate phase hydrocarbon (SPH) plume beneath the site using cone penetration testing (CPT) and ultraviolet induced fluorescence (UVIF). Cambria followed the scope of work presented in our *Subsurface Investigation Work Plan Addendum* submitted to the Alameda County Health Care Service Agency (ACHCSA) on May 17, 2004. Because no response was received within 60 days of the work plan submittal, Cambria initiated the investigation without ACHCSA approval in accordance with State of California Underground Storage Tank (UST) regulations (CCR Title 23, Division 3, Chapter 16, Section 2722(e)) . Cambria performed the work in accordance with ACHCSA and San Francisco Regional Water Quality Control Board guidelines. Presented below are a description of the site, a summary of previous work, current investigation procedures, investigation results, and conclusions.

SITE LOCATION AND DESCRIPTION

Site Location: The site is a former Shell service station located at the MacArthur Boulevard and High Street intersection in a mixed commercial and residential area of Oakland, California (Figures 1 and 2). An active Unocal service station and a former Chevron service station are located east of the site. A trailer park and adjacent California Department of Transportation (Caltrans) access to Interstate 580 are located immediately southwest of the site. Topography

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slopes toward the west, with a 5-foot (ft) elevation difference between grade at the site and the trailer park property, and an additional 5-ft elevation difference between grade at the trailer park property and the Caltrans property.

Soil Lithology: The lithology beneath the site and vicinity typically consists of 12 to 15 ft of silts and clays, underlain by sandy clay, clayey and silty sands, and sand to the total explored depth of 25 feet below grade (fbg).

Groundwater Depth and Flow Direction: Quarterly groundwater monitoring has been conducted at the site since November 1993. The historical depth to groundwater on site has ranged from approximately 4 to 17 fbg, and currently (first quarter 2005) ranges from 5.83 to 10.59 fbg. Groundwater typically flows in a west-southwesterly direction.

PREVIOUS INVESTIGATIONS

June 1985 Subsurface Investigation: In June 1985, Emcon Associates of San Jose, California drilled three soil borings and installed one groundwater monitoring well adjacent to the USTs. Up to 15,800 parts per million (ppm) total petroleum hydrocarbons as gasoline (TPHg) were detected in the shallow soil samples from inside the UST area. In July 1992, GeoStrategies, Inc. of Hayward, California performed a site reconnaissance and verified that the original monitoring well had been destroyed during the 1985 UST replacement activities.

December 1985 UST Replacement: In December 1985, the USTs were replaced, and approximately 810 cubic yards of hydrocarbon-bearing soil were transported to a disposal facility. Up to 22,000 ppm total volatile hydrocarbons and 500 ppm benzene were detected in the soil samples from the excavation.

November 1993 Subsurface Investigation: In November 1993, Weiss Associates (WA) of Emeryville, California drilled soil borings BH-A, BH-B and BH-C, which were converted into monitoring wells MW-1, MW-2 and MW-3, respectively. Up to 1,700 ppm TPHg and 3.3 ppm benzene were detected in soil boring BH-C (MW-3) between the 11-ft and 16-ft depth. Up to 66 ppm TPHg and 0.07 ppm benzene were detected in soil boring BH-B (MW-2) between the 9-ft and 14-ft depth.

November 1994 Subsurface Investigation: In November 1994, WA drilled on-site soil borings BH-D and BH-E, located on the northeastern end of the lot, and off-site boring BH-F (MW-4), located near the Highway 580 on-ramp. Up to 5,900 ppm TPHg and 23 ppm benzene were detected at 5 fbg in soil boring BH-E, located adjacent to the central eastern pump island. Trace hydrocarbon concentrations were detected in the capillary fringe soil samples collected from each of the borings.

November 1995 Dispenser and Piping Removal and Sampling: In November 1995, WA collected 15 soil samples during dispenser and piping replacement activities. Up to 7,800 ppm TPHg were detected in samples collected from beneath the former middle dispenser, and 2,800 ppm TPHg were detected in the sample collected from beneath the adjacent product piping. Up to 7,300 ppm TPHg were detected in the sample collected from beneath the northeast dispenser island. No benzene above 1 ppm was detected in any of the 15 samples collected. During the dispenser replacements, horizontal wells HW-1 through HW-4 were installed in the vadose zone about 5 ft below ground surface and adjacent to the former piping and dispensers to facilitate future removal of petroleum hydrocarbons from the impacted soil.

August 1997 Soil Vapor Extraction (SVE) Test: In August 1997, Cambria performed short-term SVE tests using a VR Systems Model V3 internal combustion engine on horizontal vapor extraction wells HW-1 through HW-4 and on monitoring wells MW-2 and MW-3. Cambria measured vapor extraction flow rates, the vacuum applied to the wellheads, and the vacuum influence in nearby wells. Cambria calculated an effective radius of influence of 35 to 50 ft during testing of wells MW-3 and MW-2. The relatively high TPHg removal rates measured in horizontal wells HW-1 through HW-4 were likely temporary, and are not believed to be representative of site conditions due to extensive well screen in permeable fill material. The results of the short-term testing indicated that SVE achieved only low hydrocarbon removal rates in wells MW-2 and MW-3, which are more representative of native soil conditions.

February 1998 Subsurface Investigation: In February 1998, Cambria drilled two off-site borings (SB-1 and SB-2) in the trailer park adjacent to the Shell site. No TPHg or benzene was detected in the soil samples collected from the two borings. The highest methyl-tert-butyl ether (MTBE) concentration detected in soil was 1.4 ppm detected in soil boring SB-2 at a depth of 7 fbg. Up to 7,700 parts per billion (ppb) TPHg, 210 ppb benzene, and 46,000 ppb MTBE were detected in the grab groundwater sample collected from soil boring SB-2. In sample analysis of soil physical parameters, total organic carbon was detected at 2,140 ppm and 7,210 ppm at a depth of 5.5 fbg in borings SB-1 and SB-2, respectively, and total porosity was measured as 35.2% and 37.4%, respectively. Specific permeability values were 181 millidarcies (md) for SB-1-5.5 and 71 md for SB-2-5.5, but the lab noted that due to fine fractures developed in the samples upon drying, the measured values were an order or more of magnitude too high. Permeability measurements confirmed the low permeability of the shallow soils beneath the site.

2001 Sensitive Receptor Survey (SRS), Conduit Study and Site Conceptual Model (SCM): Cambria included an SRS, conduit study results, and an SCM in the *First Quarter 2001 Monitoring Report.* The SRS identified 25 monitoring wells, 4 cathodic protection wells, and 1 domestic well within ½ mile of the site. Given the conduit study results, Cambria concluded that nearby upgradient and crossgradient sewer, storm drain, and water lines located between 8 to 13 fbg could serve as preferential pathways for the migration of petroleum hydrocarbons and MTBE. However, Cambria did not identify any conduits in the nearby downgradient direction.

November 2001 Off-Site Monitoring Well Installation: Shell voluntarily instructed Cambria to delineate the off-site plume, and on November 12, 2001, Cambria supervised the installation of one downgradient monitoring well (MW-5) approximately 200 ft southwest of the site, on the Caltrans right-of-way adjacent to the I-580 on-ramp. No TPHg, benzene, toluene, ethyl benzene and xylenes (BTEX), or MTBE were detected in the soil sample collected during the investigation. MW-5 has been included in the quarterly groundwater monitoring schedule since the first quarter of 2002. MTBE concentrations in groundwater have ranged from 32 to 110 ppb. No hydrocarbons have been detected in groundwater from this well.

January 2003 Tank Removal and Soil Excavation: Between January 27 and February 7, 2003, all surface features, USTs, fuel dispensers, and associated product piping were removed from the site as part of station closure and demolition. Cambria conducted soil and groundwater sampling, and supervised over-excavation to remove hydrocarbon-impacted soils to the practical extents. Approximately 875 cubic yards of soil were removed from the site during the tank-pull and over-excavation activities. Approximately 4,600 gallons of groundwater were pumped to dewater the UST excavation prior to removing the tanks. The highest chemical concentrations in soil in the former UST area were 380 ppm TPHg, 1.7 ppm benzene and 1.2 ppm MTBE, detected in the southeast corner of the tank pit in sample TP-5. The grab groundwater sample from the former tank pit area (TP-1-Water) contained 11,000 ppb TPHg, 410 ppb benzene and 5,200 ppb MTBE. The highest hydrocarbon concentrations remaining in soil in any of the former dispenser areas were 980 ppm TPHg and 1.2 ppm benzene, detected in sample P-2-8 at 8 fbg. The highest detected MTBE concentration remaining in soil in any of the former dispenser areas was 0.9 ppm, detected in sample D-5-S10. Following over excavation, approximately 720 pounds of oxygen-releasing compound were mixed in the excavation base before backfilling with 1.5-inch drain rock to 4 fbg. The remainder of the tank pit and the over-excavation was backfilled and compacted with Class II road base material. In the April 28, 2003 *Tank Closure and Soil Excavation Report,* Cambria recommended installing one additional groundwater monitoring well in the southern corner of the former tank pit. Cambria submitted a September 22, 2003, *Subsurface Investigation Work Plan* detailing the proposed monitoring well installation activities. Cambria modified the proposed scope of work in its May 17, 2004 *Subsurface Investigation Work Plan Addendum* to include the SPH investigation detailed in this report prior to the determination of new monitoring well locations.

Remediation and Groundwater Monitoring

Groundwater Extraction (GWE): Monthly groundwater extraction (GWE) using a vacuum truck was conducted intermittently at the site from April 1999 until September 2003. Mobile GWE vacuum operations consist of lowering dedicated stingers into selected monitoring wells and extracting fluids using a vacuum truck. The volume of extracted fluid is recorded and used to calculate the quantity of aqueous-phase hydrocarbon removed from the subsurface. To date, an

estimated 15.1 pounds of liquid-phase hydrocarbons and 26.8 pounds of liquid-phase MTBE have been removed from the site. GWE was discontinued at the site after September 2003 due to low pumping volumes.

Dual Phase Vapor Extraction (DVE): DVE is the process of applying high vacuum through an airtight well seal to simultaneously extract soil vapors from the vadose zone and enhance GWE from the saturated zone. For mobile DVE, a vacuum truck is used to create the vacuum and to contain extracted fluids. Mobile DVE augmented hydrocarbon removal efforts from November 2000 to June 2001, from April 2002 through September 2003, and from July 2003 through September 2003. DVE was discontinued after September 2003 due to decreased mass removal. To date, DVE has removed an estimated 26.4 pounds of vapor-phase hydrocarbons.

SPH: SPH was observed periodically in wells MW-2 and MW-3 between 1994 and 1997. During that time, an estimated total of 21.8 pounds of SPH was removed from monitoring wells by manual bailing. SPH was again observed in well MW-3 in the third quarter of 2002. During the fourth quarter of 2003 and the first and third quarters of 2004, SPH was observed in wells MW-2 and MW-3.

The table below summarizes the aqueous-, separate-, and vapor-phase hydrocarbon removal data for the site.

Mass Removal	Cumulative MTBE (lbs)	Cumulative Hydrocarbons (lbs)
Aqueous-Phase	26.8	15.1
Vapor-Phase	0.3	26.4
Separate-Phase	0.0	21.8
Total	27.1	63.3

Groundwater Monitoring: Quarterly groundwater monitoring has been conducted at the site since November 1993. Currently, five monitoring wells at the site are gauged and sampled quarterly. At Shell's request, wells sampled during the first quarter 2005 monitoring event were also analyzed for tertiary butyl alcohol (TBA). During this monitoring event, TBA was detected in samples collected from all wells, with the maximum concentration (21,000 ppb) detected in the sample from well MW-2. Since third quarter 2002, Cambria has coordinated joint sampling with the adjacent Conoco-Phillips (COP) service station #1156, located at the corner of High and MacArthur.

Potential Off-Site Source: MTBE concentrations in upgradient COP wells MW-2 and MW-7 and in Shell's well MW-2 are depicted graphically in Figure 3 of Cambria's *First Quarter 2005 Monitoring Report* dated April 11, 2005.

An elevated MTBE concentration was observed in Shell well MW-2 in the second quarter of 2000; however, the MTBE concentration declined steadily until the second quarter of 2002. The rebound in MTBE concentrations in Shell well MW-2 during the first three quarters of 2003 might be attributed to the observed upgradient COP MTBE plume. Increasing MTBE concentrations were detected in COP well MW-2 in the third quarter of 2000. Elevated concentrations were subsequently detected downgradient in COP well MW-7 in the fourth quarter of 2001. It is clear to Cambria from the concentrations observed in COP wells MW-2 and MW-7 that the COP plume has migrated in the direction of the former Shell station and began to influence Shell well MW-2 beginning in the third quarter of 2002. Upon inquiry, COP has informed Shell that they intend to conduct periodic GWE from some of their monitoring wells. Concentrations in all three wells have been either relatively stable or exhibited a general decrease since first quarter 2003.

INVESTIGATION SUMMARY

Cambria oversaw the advancement of 11 CPT soil borings (CPT-1 through CPT-11) and two direct-push Geoprobe® soil borings (SB-3 and SB-4) at the locations shown on Figure 2. At each CPT location, a UVIF module was used to identify hydrocarbons in the subsurface. One CPT boring (CPT-12) proposed in the *Subsurface Investigation Work Plan Addendum* was not completed due to subsurface debris or fill; field staff was unable to hand clear the top 5 feet of the boring location. Figure 2 includes the locations of the attempted borings. In order to provide sufficient information using fewer borings, the location of CPT-6 was moved approximately 10 ft to the east of the proposed location. A description of the UVIF module, which is presented in Gregg In Situ, Inc.'s Ultraviolet Induced Fluorescence Information Sheet, and Cambria's standard field procedures for Geoprobe® and CPT with UVIF are included in Attachment A.

Cambria Personnel Present: Working under California Professional Engineer Matt Derby's supervision, Cambria senior staff scientist, Stewart A. Dalie, IV, directed the field activities.

Permit: Cambria obtained permit # W05-0363 from the Alameda County Public Works Agency (Attachment B).

Drilling Company: Gregg Drilling, Inc. (Gregg) of Martinez, California (C57 License # 656-407).

Drilling Dates: April 5 and 6, 2005.

Drilling Methods: CPT and Geoprobe®

Number of Borings: Eleven CPT soil borings (CPT-1 through CPT-11), and two soil borings (SB-3 and SB-4). Soil boring logs are included in Attachment C, and Gregg's presentation of CPT data is included in Attachment D.

Boring Depths: CPT borings (CPT-1 through CPT-11) and soil borings (SB-3 and SB-4) were advanced to a depth of 25 fbg.

Soil Sampling Methods: Cambria logged soil types in borings CPT-1 through CPT-11 continuously using CPT equipment. Encountered soils are described on the CPT plots presented in Attachment D. Additionally, Cambria logged lithology continuously in soil boring locations SB-3 and SB-4. Cambria did not collect soil samples for laboratory analysis from the borings. Cambria screened the soil samples from SB-3 and SB-4 in the field for the presence of organic vapors using a photo-ionization detector (PID) and recorded the PID measurements on the boring logs included in Attachment C.

Soil Classification: At borings SP-3 and SP-4, Cambria observed silty and clayey gravel to up to approximately 5 fbg, underlain by inter-bedded silt (ML) and clay (CL) to depths of approximately 16 fbg, underlain by sand (SP), sandy clay (CL) and clayey sand (SC) to the total explored depth of 25 fbg (Attachment C). Soil classifications logged using CPT equipment generally agreed with those logged manually.

Backfill Method: All CPT and soil borings were backfilled using a tremie pipe with neat cement grout to match the existing grade.

Soil Chemical Analyses: No soil samples were collected for analysis during this investigation.

UVIF Results: The CPT/UVIF plots indicate non-SPH hydrocarbon impacts in two zones may be present beneath the site. Refer to CPT/UVIF plots presented in Attachment D.

Groundwater Depths: A pore pressure dissipation test was performed during the advancement of CPT-3. The test indicated a groundwater depth of 9.4 fbg. Depth to groundwater was manually gauged at each location following completion of the borings; depths to groundwater ranged from 6 to 9 fbg.

Groundwater Sampling: No groundwater samples were collected during this investigation.

Soil Disposal: Less than 1 cubic yard of soil was generated during field activities and temporarily stored on site. Cambria sampled the soil and profiled it for disposal. The certified analytical laboratory report is included in Attachment E. On April 26, 2005, Manley and Sons Trucking Inc., of Sacramento, California transported the soil to Allied Waste Industries Inc.'s Forward Landfill facility in Manteca, California for disposal as non-hazardous waste. A disposal confirmation report is included in Attachment F.

INVESTIGATION RESULTS

Soil lithology observed during this investigation was consistent with previous investigations. Upon completion of the borings and the removal of down hole equipment, the depths to groundwater were measured in the open boreholes. Static groundwater depths were determined to be between approximately 6 and 9 fbg. This is consistent with the result of the dissipation test performed during CPT advancement as well as with depth to water measurements collected during the most recent quarterly groundwater monitoring event.

PID measurements indicated the presence of organic vapors at concentrations up to 444 ppm in soil collected from boring SB-3 and at 801 ppm in that of boring SB-4, with the highest readings at both locations occurring in samples collected at approximately 20 fbg.

UVIF works on the principle that hydrocarbons will fluoresce in the presence of ultra violet light, absorbing the ultra violet energy and releasing it at a longer wavelength. The magnitude of this difference can be used to verify the presence of hydrocarbons in the soil and groundwater as well as to identify specific compounds. UVIF responds at greater magnitude when heavier hydrocarbons, such as diesel or motor oil, are present. Lighter hydrocarbons, such as gasoline, will have a smaller response and, thus, the magnitude of the voltages reported will also be smaller.

Based on the data collected during this investigation, it appears that lighter-phase hydrocarbon contamination exists at most locations at two distinct depths: a shallow zone above 17 fbg and a deeper zone from approximately 19 to 20 fbg to the bottom of the borings at 25 fbg. The magnitude of response is essentially the same in the shallow and deeper zones. Because voltage response is a function of concentration as well as type of hydrocarbon present, greater voltage

response would be expected where SPH is encountered and, thus, no SPH is indicated at these locations. Cambria's interpretation of UFIV investigation results at each location are presented below:

Location	UVIF Response
CPT-1	No response
CPT-2	Response between approximately 18 and 21.5 fbg
CPT-3	Response between approximately 10 and 17 fbg and between approximately 18.5 and 25 fbg
CPT-4	Response between approximately 15.5 and 17 fbg and between approximately 21 and 25 fbg
CPT-5	Slight response at approximately 9 and 11 fbg; Response between approximately 15 and 16.5 fbg and between approximately 20.5 and 25 fbg
CPT-6	Response between approximately 13 and 14.5 fbg and between approximately 18 and 25 fbg
CPT-7	Slight response at approximately 19 fbg
CPT-8	Response between approximately 12 and 16.5 fbg and between approximately 18.5 and 25 fbg
CPT-9	No response
CPT-10	Response between approximately 13 and 15.5 fbg and between approximately 20.5 and 25 fbg
CPT-11	Response between approximately 7.5 and 9 fbg and between approximately 20 and 25 fbg

CONCLUSIONS AND RECOMMENDATIONS

No evidence of an SPH plume was found during this investigation. However, two zones of hydrocarbon contamination were identified in most CPT borings completed during the investigation. This may indicate residual contamination within the clay and a smear zone that extends to as shallow as 9 fbg. Because the borings advanced during this investigation were terminated at 25 fbg and contamination was still indicated at this depth, Cambria recommends advancing additional borings with depth-discrete soil and groundwater sampling at the locations shown on Figure 2 prior to installing additional monitoring wells to determine screened intervals that will provide the most accurate monitoring of hydrocarbon concentrations for each location. Based on the existence of contaminants at locations downgradient of both the former dispenser island as well as the former USTs, it appears that both locations may be sources of contamination at the site. Cambria will propose a work plan for the depth-discrete soil and groundwater sampling under separate cover.

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Following the depth-discrete soil and groundwater sampling, Cambria recommends installing four additional groundwater monitoring wells at the site, including two on-site wells downgradient of the former dispenser islands, one within the former UST complex, and one upgradient of the former dispenser islands. The wells proposed downgradient of the former dispenser islands are necessary to determine the current contamination level of groundwater beneath the site and for potential use in remediation. The well proposed upgradient of the former dispenser islands is intended to investigate a possible off-site contribution to the contaminant plume. An additional well is also recommended off site between current wells MW-2 and MW-5. This well would aid in determining the lateral extent of groundwater contamination in the downgradient direction. Proposed soil and groundwater sampling and monitoring well installation locations are included on Figure 2. Cambria will propose the details of well installations, including final locations and screened intervals, upon completion of depth-discrete soil and groundwater sampling at the proposed well locations.

CAMBRIA

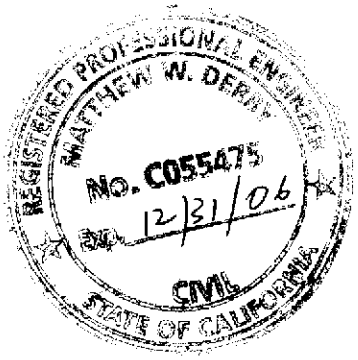
CLOSING

If you have any questions regarding the contents of this document, please call David Gibbs at (510) 420-3363.

Sincerely,
Cambria Environmental Technology, Inc.

David M. Gibbs, P.G.
Project Geologist

Matthew W. Derby, P.E.
Senior Project Engineer



Figures:
1 - Vicinity/Area Well Survey Map
2 - CPT and Soil Boring Location Map

Attachments:
A - Cambria's Standard Field Procedures for Geoprobe® and CPT with UVIF Module, and Gregg's UVIF Information Sheet
B - Soil boring Permit
C - Soil Boring Logs
D - Gregg's Presentation of CPT Test Data
E - Certified Laboratory Analytical Report
F - Soil Disposal Confirmation Report

cc: Denis Brown, Shell Oil Products US, 20945 S. Wilmington Ave., Carson, CA 90810
Roland C. Malone, Jr., PO Box 2744, Castro Valley, CA 94546
Kenneth Williams, Mac Arthur/High Trailer Park, c/o Bookkeeping, 332 Peyton Dr., Hayward, CA 94544
Thomas H. Kosel, Conoco-Phillips Company, 76 Broadway, Sacramento, CA 95818

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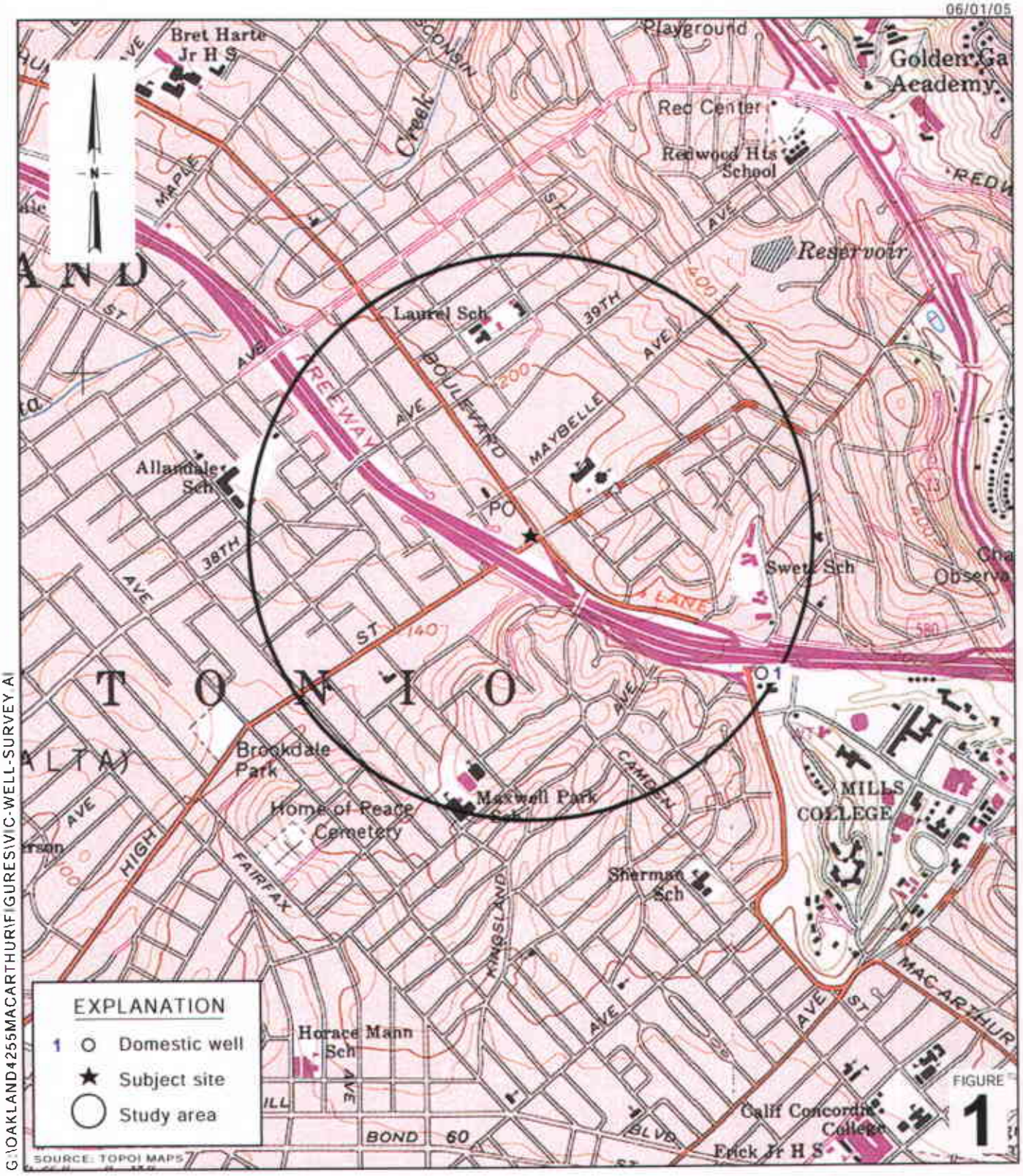

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FIGURE 1

Former Shell Service Station
4255 MacArthur Boulevard
Oakland, California
Incident No.98995758

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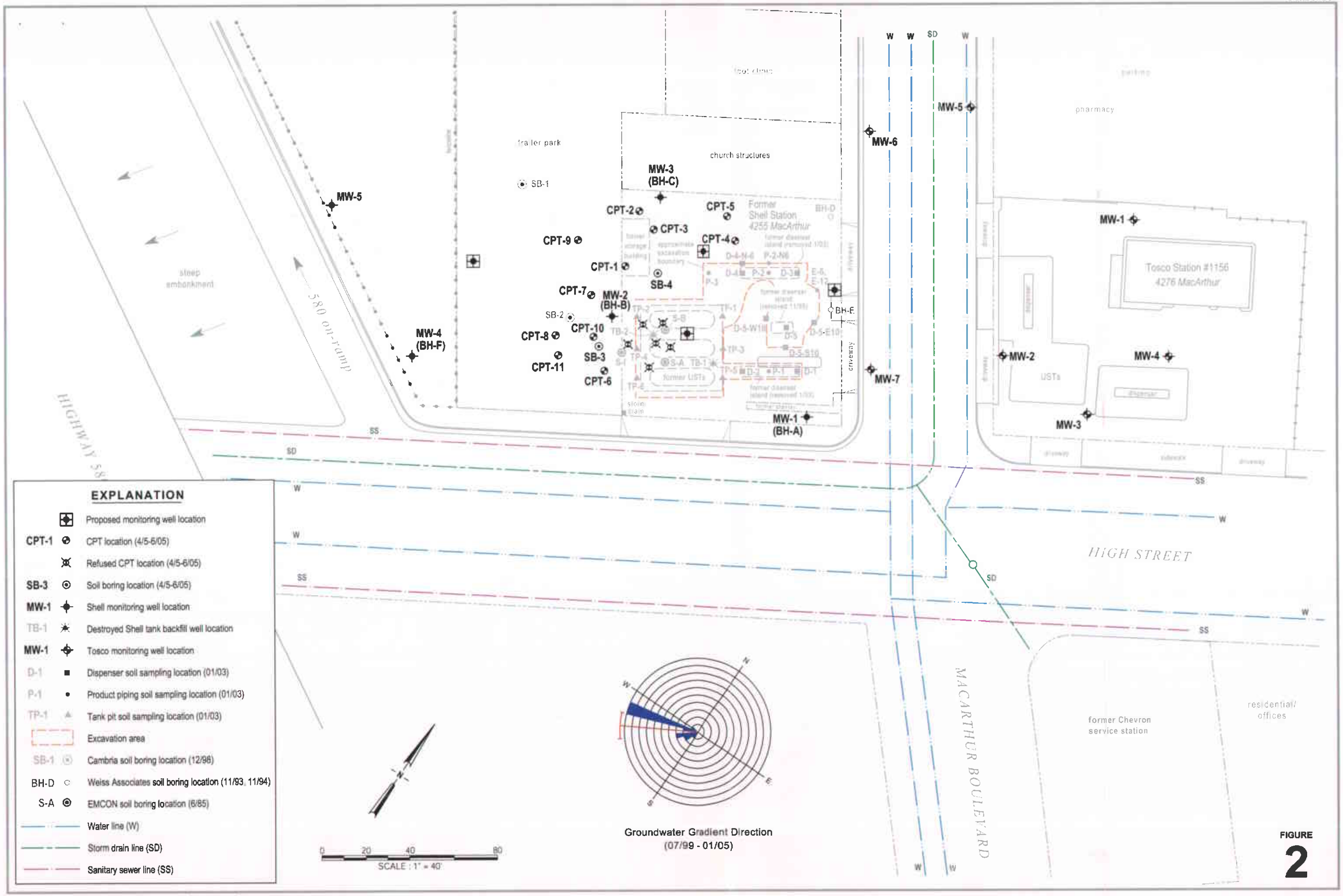
Vicinity/Area Well Survey Map
(1/2 Mile Radius)

06/03/05

CPT and Soil Boring Location Map



EXPLANATION

- Proposed monitoring well location
- CPT-1 — CPT location (4/5-6/05)
- Refused CPT location (4/5-6/05)
- SB-3 — Soil boring location (4/5-6/05)
- MW-1 — Shell monitoring well location
- TB-1 — Destroyed Shell tank backfill well location
- MW-1 — Tosco monitoring well location
- D-1 — Dispenser soil sampling location (01/03)
- P-1 — Product piping soil sampling location (01/03)
- TP-1 — Tank pit soil sampling location (01/03)
- Excavation area
- SB-1 — Cambria soil boring location (12/98)
- BH-D — Weiss Associates soil boring location (11/93, 11/94)
- S-A — EMCON soil boring location (6/85)
- Water line (W)
- Storm drain line (SD)
- Sanitary sewer line (SS)

Groundwater Gradient Direction
(07/99 - 01/05)

FIGURE
2

Former Shell Service Station
4255 MacArthur Boulevard
Oakland, California
Incident No.98995758

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ATTACHMENT A

Cambria's Standard Field Procedures for Geoprobe® and CPT with UVIF Module, and Gregg's UVIF Information Sheet

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STANDARD FIELD PROCEDURES FOR GEOPROBE® SOIL AND GROUNDWATER SAMPLING

This document describes Cambria Environmental Technology's standard field methods for GeoProbe® soil and ground water sampling. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

Objectives

Soil samples are collected to characterize subsurface lithology, assess whether the soils exhibit obvious hydrocarbon or other compound vapor odor or staining, estimate ground water depth and quality and to submit samples for chemical analysis.

Soil Classification/Logging

All soil samples are classified according to the Unified Soil Classification System by a trained geologist or engineer working under the supervision of a California Professional Geologist (PG) or a Certified Engineering Geologist (CEG). The following soil properties are noted for each soil sample:

- Principal and secondary grain size category (i.e., sand, silt, clay or gravel)
- Approximate percentage of each grain size category,
- Color,
- Approximate water or separate-phase hydrocarbon saturation percentage,
- Observed odor and/or discoloration,
- Other significant observations (i.e., cementation, presence of marker horizons, mineralogy), and
- Estimated permeability.

Soil Sampling

GeoProbe® soil samples are collected from borings driven using hydraulic push technologies. A minimum of one and one half ft of the soil column is collected for every five ft of drilled depth. Additional soil samples can be collected near the water table and at lithologic changes. Samples are collected using samplers lined with polyethylene or brass tubes driven into undisturbed sediments at the bottom of the borehole. The ground surface immediately adjacent to the boring is used as a datum to measure sample depth. The horizontal location of each boring is measured in the field relative to a permanent on-site reference using a measuring wheel or tape measure.

Drilling and sampling equipment is steam-cleaned or washed prior to drilling and between borings to prevent cross-contamination. Sampling equipment is washed between samples with trisodium phosphate or an equivalent EPA-approved detergent.

Sample Storage, Handling and Transport

Sampling tubes chosen for analysis are trimmed of excess soil and capped with Teflon® tape and plastic end caps. Soil samples are labeled and stored at or below 4°C on either crushed or dry ice, depending upon local regulations. Samples are transported under chain-of-custody to a State-certified analytic laboratory.

Field Screening

After a soil sample has been collected, soil from the remaining tubing is placed inside a sealed plastic bag and set aside to allow hydrocarbons to volatilize from the soil. After ten to fifteen minutes, a portable GasTech® or photoionization detector measures volatile hydrocarbon vapor concentrations in the bag's headspace, extracting the vapor through a slit in the plastic bag. The measurements are used along with the field observations, odors, stratigraphy and ground water depth to select soil samples for analysis.

Grab Ground Water Sampling

Ground water samples are collected from the open borehole using bailers, advancing disposable Tygon® tubing into the borehole and extracting ground water using a diaphragm pump, or using a hydro-punch style sampler with a bailer or tubing. The ground water samples are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4° C, and transported under chain-of-custody to the laboratory.

Duplicates and Blanks

Blind duplicate water samples are usually collected only for monitoring well sampling programs, at a rate of one blind sample for every 10 wells sampled. Laboratory-supplied trip blanks accompany samples collected for all sampling programs to check for cross-contamination caused by sample handling and transport. These trip blanks are analyzed if the internal laboratory quality assurance/quality control (QA/QC) blanks contain the suspected field contaminants. An equipment blank may also be analyzed if non-dedicated sampling equipment is used.

Grouting

If the borings are not completed as wells, the borings are filled to the ground surface with cement grout poured or pumped through a tremie pipe.

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STANDARD FIELD PROCEDURES FOR CONE PENETROMETER TESTING WITH ULTRAVIOLET INDUCED FLUORESCENCE MODULE

This document describes Cambria Environmental Technology ' s standard field methods for Cone Penetrometer Testing (CPT) and direct-push soil and groundwater sampling. These procedures are designed to comply with Federal, State and local regulatory guidelines.

Use of CPT for logging and soil and groundwater sampling requires separate borings. Typically an initial boring is advanced to estimate soil and groundwater characteristics as described below. To collect soil samples a separate boring must be advanced using a soil sampling device. If groundwater samples are collected, another separate boring must be advanced using a groundwater sampling device. Specific field procedures are summarized below.

Cone Penetrometer Testing (CPT) with Ultraviolet Induced Fluorescence (UVIF) Module

Cone Penetrometer Testing is performed by a trained geologist or engineer working under the supervision of a California Registered Geologist (RG) or a Certified Engineering Geologist (CEG). According to Gregg In Situ, Inc., Cone Penetrometer Tests (CPT) are carried out by pushing an integrated electronic piezocone into the subsurface. The piezocone is pushed using a specially designed CPT rig with a force capacity of 20 to 25 tons. The piezocones are capable of recording the following parameters:

Tip Resistance (Qc)
Sleeve Friction (Fs)
Pore Water Pressure (U)
Bulk Soil Resistivity (rho) - with an added module

A compression cone is used for each CPT sounding. Piezocones with rated load capacities of 5, 10 or 20 tons are used depending on soil conditions. The 5 and 10 ton cones have a tip area of 10 sq. cm. and a friction sleeve area of 150 sq. cm. The 20 ton cones have a tip area of 15 sq. cm. and a friction sleeve area of 250 sq. cm. A pore water pressure filter is located directly behind the cone tip. Each of the filters is saturated in glycerin under vacuum pressure prior to penetration. Pore Pressure Dissipation Tests (PPDT) are recorded at 5 second intervals during pauses in penetration. The equilibrium pore water pressure from the dissipation test can be used to identify the depth to groundwater.

The measured parameters are printed simultaneously on a printer and stored on a computer disk for future analysis. All CPTs are carried out in accordance with ASTM D-3441. A complete set of baseline readings is taken prior to each sounding to determine any zero load offsets.

The inferred stratigraphic profile at each CPT location is included on the plotted CPT logs. The stratigraphic interpretations are based on relationships between cone bearing (Qc) and friction ratio (Rf). The friction ratio is a calculated parameter (Fs/Qc) used in conjunction with the cone bearing to identify the soil type. Generally, soft cohesive soils have low cone bearing pressures and high friction ratios. Cohesionless soils (sands) have high cone bearing pressures and low friction ratios. The classification of soils is based on correlations developed by Robertson et al (1986). It is not always possible to clearly identify a soil type based on Qc and Rf alone. Correlation with existing soils information and analysis of pore water pressure measurements should also be used in determining soil type.

The UVIF module is located behind the standard piezocone. The UVIF cone works on the principle that hydrocarbons and their polyaromatic hydrocarbon(PAH's) constituents, mixed with soil and groundwater, fluoresce when irradiated by ultra violet light. Therefore, by measuring the UVIF intensity of the soil and groundwater the lateral and vertical extent of hydrocarbon contamination in the ground can be determined.

The UVIF module uses principles of fluorescence spectrometry by irradiating the soil with ultraviolet (UV) light. The hydrocarbon molecules absorb the UV light energy during radiation and immediately re-emit the light at a longer wavelength. This re-emission is termed fluorescence. The difference between the excitation (250 nanometers (nm)) and emission (275-550 nm) wavelengths is called the Stokes shift. Specific hydrocarbon compounds can be identified by the magnitude of their Stokes shift. In general, as the number of aromatic rings increase the fluorescent response shifts toward longer wavelengths. Therefore, lighter compounds tend to fluoresce at shorter wavelengths and heavier compounds fluoresce at longer wavelengths.

The UVIF module contains a fiber optic cable that captures the emitted radiation and sends it to an amplifier at the surface so the intensity can be recorded. Therefore, the soil parameters are recorded along with the UVIF intensity in real time.

CPT and sampling equipment are steam-cleaned or washed prior to work and between borings to prevent cross-contamination. Sampling equipment is washed between samples with trisodium phosphate or an equivalent EPA-approved detergent. Groundwater samples are decanted into appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4° C, and transported under chain-of-custody to the laboratory.

After the CPT probes are removed, the borings are filled to the ground surface with cement grout poured or pumped through a tremie pipe.

Objectives

Soil samples are collected to characterize subsurface lithology, assess whether the soils exhibit obvious hydrocarbon or other compound by vapor odor or staining, estimate groundwater depth and quality and to submit samples for chemical analysis.

Soil Classification/Logging

All soil samples are classified according to the Unified Soil Classification System by a trained geologist or engineer working under the supervision of a California Registered Geologist (RG) or a Certified Engineering Geologist (CEG). The following soil properties are noted for each soil sample:

- Principal and secondary grain size category (i.e., sand, silt, clay or gravel)
- Approximate percentage of each grain size category,
- Color,
- Approximate water or separate-phase hydrocarbon saturation percentage,
- Observed odor and/or discoloration,
- Other significant observations (i.e., cementation, presence of marker horizons, mineralogy), and
- Estimated permeability.

Soil Sampling

Soil samples are collected from borings driven using hydraulic push technologies. A minimum of one and one half ft of the soil column is collected for every five ft of drilled depth. Additional soil samples can be collected near the water table and at lithologic changes. Samples are collected using samplers lined with polyethylene or brass tubes driven into undisturbed sediments at the bottom of the borehole. The ground surface immediately adjacent to the boring is used as a datum to measure sample depth. The horizontal location of each boring is measured in the field relative to a permanent on-site reference using a measuring wheel or tape measure.

Drilling and sampling equipment is steam-cleaned or washed prior to drilling and between borings to prevent cross-contamination. Sampling equipment is washed between samples with trisodium phosphate or an equivalent EPA-approved detergent.

Sample Storage, Handling and Transport

Sampling tubes chosen for analysis are trimmed of excess soil and capped with Teflon[7] tape and plastic end caps. Soil samples are labeled and stored at or below 4°C on either crushed or dry ice, depending upon local regulations. Samples are transported under chain-of-custody to a State-certified analytic laboratory.

Field Screening

After a soil sample has been collected, soil from the remaining tubing is placed inside a sealed plastic bag and set aside to allow hydrocarbons to volatilize from the soil. After ten to fifteen minutes, a portable photoionization detector measures volatile hydrocarbon vapor concentrations in the bag=s headspace, extracting the vapor through a slit in the plastic bag. The measurements are used along with the field observations, odors, stratigraphy and groundwater depth to select soil samples for analysis.

Grab Groundwater Sampling

Groundwater samples are collected from the open borehole using bailers, advancing disposable Tygon[7] tubing into the borehole and extracting groundwater using a diaphragm pump, or using a hydro-punch style sampler with a bailer or tubing. The groundwater samples are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4° C, and transported under chain-of-custody to the laboratory.

Duplicates and Blanks

Blind duplicate water samples are usually collected only for monitoring well sampling programs, at a rate of one blind sample for every 10 wells sampled. Laboratory-supplied trip blanks accompany samples collected for all sampling programs to check for cross-contamination caused by sample handling and transport. These trip blanks are analyzed if the internal laboratory quality assurance/quality control (QA/QC) blanks contain the suspected field contaminants. An equipment blank may also be analyzed if non-dedicated sampling equipment is used.

Grouting

If the borings are not completed as wells, the borings are filled to the ground surface with cement grout poured or pumped through a tremie pipe.

Ultra Violet Induced Flourescence (UVIFCPTu)

Gregg In Situ, Inc. conducts Ultra Violet Induced Fluorescence (UVIF) Cone Penetration Tests using a UVIF module that is located behind the standard piezocone, *Figure UVIF*. The ultra violet induced fluorescence cone works on the principle that polyaromatic hydrocarbons (PAH's), mixed with soil and groundwater, fluoresce when irradiated by ultra violet light. Therefore, by measuring the UVIF intensity of the soil and groundwater the lateral and vertical extent of polyaromatic hydrocarbon contamination in the ground can be determined.

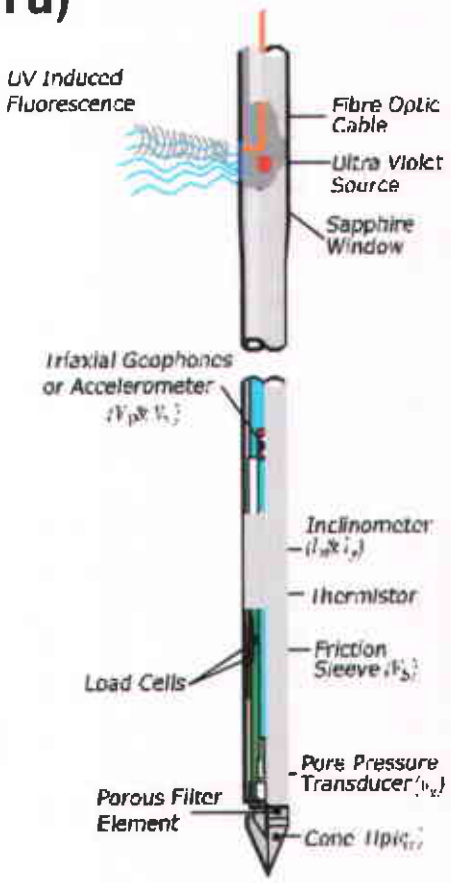

Figure UVIF

The UVIF module uses principles of fluorescence spectrometry by irradiating the soil with ultra violet light. The hydrocarbon molecules absorb the UV light energy during radiation and immediately re-emit the light at a longer wavelength. This re-emission is termed fluorescence. The difference between the excitation (250 nm) and emission (275-550 nm) wavelengths is called the Stokes shift. Specific hydrocarbon compounds can be identified by the magnitude of their Stokes shift, refer to *Figure EWL*.

In general, as the number of aromatic rings increase the fluorescent response shifts toward longer wavelengths. Therefore, lighter compounds tend to fluoresce at shorter wavelengths and heavier compounds fluoresce at longer wavelengths.

The UVIF module contains a fiber optic cable that captures the emitted radiation and sends it to an amplifier at the surface so the intensity can be recorded.

The UVIF data is displayed in graphical form along with soil behavior type and other calculated parameters with the corresponding CPT plot.

For a detailed reference on UVIF cone testing, refer to Woeller et. al., 2000.

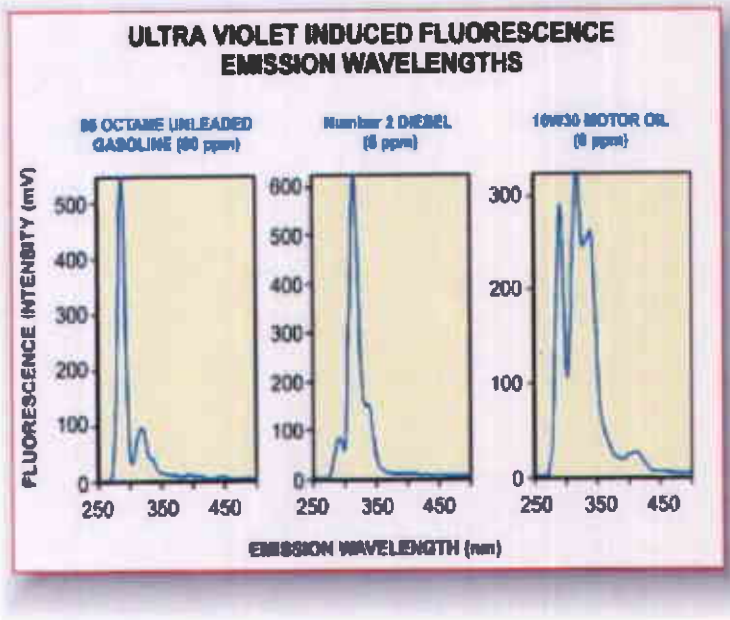

Figure EWL (After Fontana, 1994)

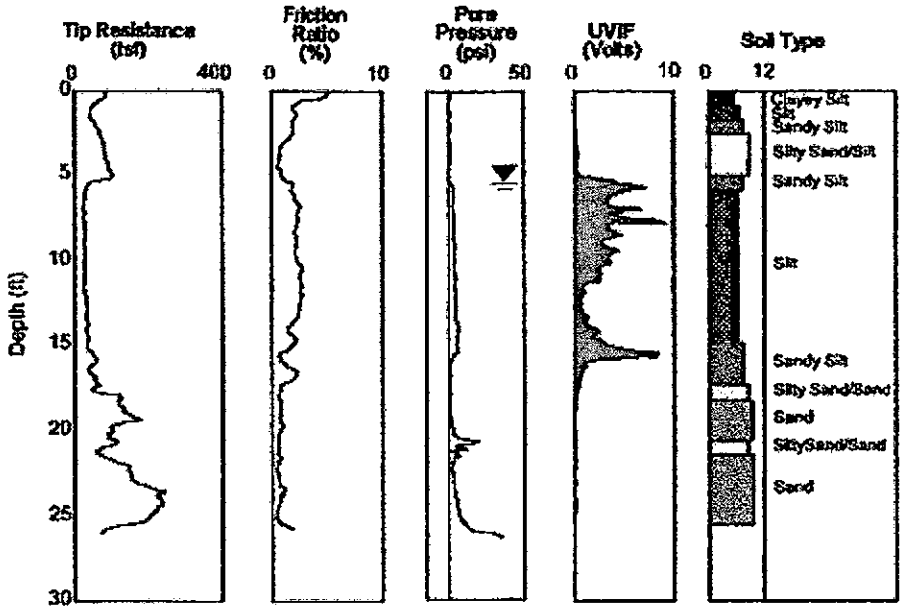

Figure Output

For a detailed reference on UVIF cone testing, refer to Woeller et. al., 2000.

GREGG

2726 Walnut Avenue · Signal Hill · California · 90755 · Phone: (562) 427-6899 · Fax: (562) 427-3314
Web Site: www.greggdrilling.com Email: info@greggdrilling.com
Additional locations in: Charleston · Houston · Palo Alto · Salt Lake City · San Francisco · Vancouver

ATTACHMENT B

Soil Boring Permit

ALAMEDA COUNTY PUBLIC WORKS AGENCY

WATER RESOURCES SECTION
399 ELMHURST ST. HAYWARD CA. 94544-1395
PHONE (510) 670-6633 James You
FAX (510) 782-1939
www.acfcwcd.org

APPLICANTS: PLEASE ATTACH A SITE MAP FOR ALL DRILLING PERMIT APPLICATIONS
DESTRUCTION OF WELLS OVER 45 FEET REQUIRES A SEPARATE PERMIT APPLICATION

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT 4255 McArthur Blvd Oakland, CA

CLIENT
Name Shell Oil Products Co. (US)
Address 20945 Wilmington Blvd Phone 559 645 9306
City Carson, CA Zip 90810

APPLICANT
Name Cambria Environmental Fax 510 420 9170
Address 5900 Hollis St, Ste A Phone 510 420 3339
City Emeryville, CA Zip 94608

TYPE OF PROJECT

Well Construction		Geotechnical Investigation	
Cathodic Protection		General	X
Water Supply		Contamination	
Monitoring		Well Destruction	

PROPOSED WATER SUPPLY WELL USE

New Domestic		Replacement Domestic	
Municipal		Irrigation	
Industrial		Other	

DRILLING METHOD:

Mud Rotary		Air Rotary		Auger	
Cable		Other	X	CPT boring	

DRILLER'S NAME Gregg Drilling
DRILLER'S LICENSE NO C57-485-765

WELL PROJECTS
Drill Hole Diameter 3 in. Maximum
Casing Diameter in. Depth ft.
Surface Seal Depth ft. Owner's Well Number

GEOTECHNICAL/CONTAMINATION PROJECTS
Number of Borings 12 Maximum
Hole Diameter 3 in. Depth 85 ft.

STARTING DATE 4/5/5
COMPLETION DATE 4/6/5

FOR OFFICE USE
PERMIT NUMBER W05-0363
WELL NUMBER
APN

PERMIT CONDITIONS
Circled Permit Requirements Apply

A. GENERAL
1. A permit application should be submitted so as to arrive at the ACPWA office five days prior to proposed starting date.
2. Submit to ACPWA within 60 days after completion of permitted original Department of Water Resources Well Completion Report.
3. Permit is void if project not begun within 90 days of approval date

B. WATER SUPPLY WELLS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved.

C. GROUNDWATER MONITORING WELLS INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

D. GEOTECHNICAL/CONTAMINATION
Backfill bore hole by tremie with cement grout or cement grout/sand mixture. Upper two-three feet replaced in kind or with compacted cuttings.

E. CATHODIC
Fill hole anode zone with concrete placed by tremie.

F. WELL DESTRUCTION
Send a map of work site. A separate permit is required for wells deeper than 45 feet.

G. SPECIAL CONDITIONS B #1

NOTE: One application must be submitted for each well or well destruction. Multiple borings on one application are acceptable for geotechnical and contamination investigations.

APPROVED [signature] DATE 3-21-05

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE [signature] DATE 3/10/5

PLEASE PRINT NAME Stewart Davis IV

Rev.5-11-04

ALAMEDA COUNTY PUBLIC WORKS AGENCY

WATER RESOURCES SECTION
399 ELMHURST ST. HAYWARD, CA. 94544-1395
PHONE (510) 670-6633 James Yoo FAX (510) 782-1939

PERMIT NO. W05-0363

WATER RESOURCES SECTION
GROUNDWATER PROTECTION ORDINANCE
B#1-GENERAL CONDITIONS: GEOTECHNICAL & CONTAMINATION BOREHOLES

1. Prior to any drilling activities, it shall be the applicants responsibilities to contact and coordinate a Underground Service Alert (USA), obtain encroachment permit(s), excavation permit(s) or any other permits required for that Federal, State, County or to the City and follow all City or County Ordinances. No work shall begin until all the permits and requirements have been approved or obtained.

2. Boreholes shall not be left open for a period of more than **24 hours.** All boreholes left open more than 24 hours will need approval from Alameda County Public Works Agency, Water Resources Section. All boreholes shall be backfilled according to permit destruction requirements and all concrete material and asphalt material shall be to Caltrans Spec or County/City Codes. No borehole(s) shall be left in a manner to act as a conduit at any time.

3. Permitte, permittee's, contractors, consultants or agents shall be responsible to assure that all material or waters generated during drilling, boring destruction, and/or other activities associated with this Permit will be safely handled, properly managed, and disposed of according to all applicable federal, state, and local statues regulating such. In no case shall these materials and/or waters be allowed to enter, or potentially enter, on-or off site storm sewers, dry wells, or waterways or be allowed to move off the property where work is being completed.

4. Permit is valid only for the purpose specified herein **April 5 to April 6, 2005.** No changes in construction procedures, as described on this permit application. Boreholes shall not be converted to monitoring wells, without a permit application process.

5. Drilling Permit(s) can be voided/ canceled only in writing. It is the applicants responsibilities to notify Alameda County Public Works Agency, Water Resources Section in writing for an extension or to cancel the drilling permit application. No drilling permit application(s) shall be extended beyond ninety (90) days from the original start date. Applicants may not cancel a drilling permit application after the completion date of the permit issued has passed.

6. Permittee shall assume entire responsibility for all activities and uses under this permit and shall indemnify, defend and save the Alameda County Public Works Agency, its officers, agents, and employees free and harmless from any and all expense, cost, liability in connection with or resulting from the exercise of this Permit including, but not limited to, properly damage, personal injury and wrongful death.

7. **Applicant shall contact George Bolton for a inspection time at 510-670-5594 at least five (5) working days prior to starting, once the permit has been approved. Confirm the scheduled date(s) at least 24 hours prior to drilling.**

COUNTY OF ALAMEDA
PUBLIC WORKS AGENCY
399 Elmhurst Street • Hayward, CA 94544-1395
(510) 670-5480

January 3, 2005

NOTICE OF A PROPOSAL TO ESTABLISH SERVICE FEES FOR THE WELL STANDARDS PROGRAM

Notice is hereby given that Alameda County Public Works Agency proposes to establish service fees for its Well Standards Program. The proposed fees are intended to recover the cost of providing program services as authorized by Alameda County General Ordinance Code Section 6.88.050-B.

Services provided by the Well Standards Program include the permitting and inspection of groundwater wells and exploratory bore holes. Currently, these services are provided at no direct cost to the permittee. However, faced with continually increasing budget constraints the program can no longer afford to provide these services free of charge. Therefore, the following fees are proposed:

A permit to construct, rehabilitate, or destroy wells, including cathodic protection wells, shall cost $300.00 per well.

A permit to bore exploratory holes, including temporary 24-hour test wells, shall cost $200.00 per site.

The amount of these fees were derived by estimating the reasonable costs associated with administering permits and performing inspections. This cost data is available at the Public Works Agency Maps and Files Room located at 399 Elmhurst Street in Hayward.

The proposed fees are like those charged by other local jurisdictions. A comparison of the proposed fees with those charged by Alameda County Water District, the City of Berkeley, and other Bay Area counties shows them to be consistent with the fees of these other jurisdictions.

Pursuant to Government Code Section 66016, the matter of adopting the proposed fee schedule shall be considered during the regularly scheduled meeting of the County Board of Supervisors on Tuesday, January 11, 2005 at 10:30 am. The Board meets on the fifth floor of the County Administration Building, Room 512, located at 1221 Oak Street in Oakland. Public comments, adhering to board policy, are always welcome.

If approved by the Board, the proposed fees shall become effective March 14, 2005.

Questions and comments concerning this proposal should be directed to Larry Johmann at 510-670-6694 or larry@acpwa.org. Additional information regarding the Well Standards Program can be found on-line at:

www.acgov.org/pwa/wells

"To Serve and Preserve Our Community"

ATTACHMENT C

Soil Boring Logs

Cambria Environmental Technology, Inc.
5900 Hollis Street, Suite A
Emeryville, CA 94608
Telephone: (510) 420-0700
Fax: (510) 420-9170

BORING/WELL LOG

CLIENT NAME	Shell Oil Products US	**BORING/WELL NAME**	SB-3
JOB/SITE NAME	Former Shell-branded service station	**DRILLING STARTED**	06-Apr-05
LOCATION	4255 MacArthur Boulevard, Oakland, California	**DRILLING COMPLETED**	06-Apr-05
PROJECT NUMBER	247-0524-007	**WELL DEVELOPMENT DATE (YIELD)**	NA
DRILLER	Gregg Drilling	**GROUND SURFACE ELEVATION**	
DRILLING METHOD	Hydraulic push	**TOP OF CASING ELEVATION**	NA
BORING DIAMETER	3"	**SCREENED INTERVAL**	NA
LOGGED BY	S. Dalie	**DEPTH TO WATER (First Encountered)**	16.0 ft (06-Apr-05)
REVIEWED BY	M. Derby, PE# 55475	**DEPTH TO WATER (Static)**	9.5 ft (06-Apr-05)
REMARKS	Hand augered to 5 fbg.		

PID (ppm)	TPHg (ppm)	BLOW COUNTS	SAMPLE ID	EXTENT	DEPTH (ft bgs)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH (ft bgs)	WELL DIAGRAM
						GM		**Asphalt** **Silty GRAVEL with Clay** (GM); Gray; loose; dry; 15% clay, 25% silt; 60% gravel.	0.4 2.0	
					5	CL		**Silty CLAY** (CL); Brown to olive brown; medium to very stiff; dry; 75% clay, 25% silt.		
18								Little to no fines, 90% clay, 10% silt.	8.0	
						ML		**Clayey SILT** (ML); Olive brown; dense; dry; 45% clay, 55% silt.	9.0	
					10	CL		**Silty CLAY** (CL); Olive brown; hard; dry; 65% clay, 35% silt.	12.4	
1.1						ML		**Clayey SILT** (ML); Dark brown; very stiff to hard; dry; 30% clay, 70% silt.	14.8	Portland Type I/II Cement
195					15	CL		**Sandy CLAY** (CL); Dark brown; hard; damp; 75% clay, 25% fine sand.	16.8	
444					20	SM		**Silty SAND** (SM); Olive gray; medium dense; wet; 55% silt, 65% coarse sand.	21.0	
						CL		**Sandy CLAY** (CL); Gray; medium stiff; wet; 85% clay, 15% fine sand.	22.9	
						SC		**Clayey SAND** (SC); Gray; medium dense; wet; 25% clay, 75% coarse sand.	24.5	
285					25	SW		**Well Graded SAND** (SW); Gray; loose; wet; 100% coarse sand.	25.0	Bottom of Boring @ 25 ft

WELL LOG (PID/TPHG) G:\OAKLAND 4255 MACARTHUR\4255.GPJ DEFAULT.GDT 5/25/05

Cambria Environmental Technology, Inc.
5900 Hollis Street, Suite A
Emeryville, CA 94608
Telephone: (510) 420-0700
Fax: (510) 420-9170

BORING/WELL LOG

CLIENT NAME	Shell Oil Products US	**BORING/WELL NAME**	SB-4
JOB/SITE NAME	Former Shell-branded service station	**DRILLING STARTED**	06-Apr-05
LOCATION	4255 MacArthur Boulevard, Oakland, California	**DRILLING COMPLETED**	06-Apr-05
PROJECT NUMBER	247-0524-007	**WELL DEVELOPMENT DATE (YIELD)**	NA
DRILLER	Gregg Drilling	**GROUND SURFACE ELEVATION**	
DRILLING METHOD	Hydraulic push	**TOP OF CASING ELEVATION**	NA
BORING DIAMETER	3"	**SCREENED INTERVAL**	NA
LOGGED BY	S. Dalie	**DEPTH TO WATER (First Encountered)**	15.3 ft (06-Apr-05) ▽
REVIEWED BY	M. Derby, PE# 55475	**DEPTH TO WATER (Static)**	10.5 ft (06-Apr-05) ▼
REMARKS	Hand augered to 5 fbg.		

PID (ppm)	TPHg (ppm)	BLOW COUNTS	SAMPLE ID	EXTENT	DEPTH (ft bgs)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH (ft bgs)	WELL DIAGRAM
						GW		**Well Graded GRAVEL**; (GW); Gray; loose; dry; 100% gravel.	1.8	
						GC		**Clayey GRAVEL**; (GC); Brownish gray; medium dense; dry; 25% clay, 10% silt, 5% sand, 60% gravel.	5.2	
					5	ML		**Clayey SILT with Gravel** (ML); Olive gray; dense; dry; 25% clay, 60% silt, 15% gravel.	7.0	
6						CL		**Silty CLAY** (CL); Olive gray; very stiff; dry; 90% clay, 10% silt.	9.5	
					10	ML		**Clayey SILT** (ML); Olive gray; dense; moist; 35% clay, 65% silt. ▼		
199									13.0	◄ Portland Type I/II Cement
						CL		**Silty CLAY** (CL); Olive gray; medium stiff; wet; 55% clay, 45% silt. ▽	17.0	
749					15					
						SC		**Clayey SAND** (SC); Olive gray; dense; wet; 25% clay, 75% coarse sand; low plasticity.		
801					20			Clayey SAND with Gravel; gray; loose; wet; 25% clay, 60% coarse sand; 15% small angular gravel.	22.0	
						GC		**Clayey GRAVEL**; (GC); Olive gray; very dense; wet; 45% clay, 55% gravel.	23.8	
304						CL		**CLAY**; (CL); Olive gray; very stiff to hard; wet; 90% clay, 10% fine sand.	25.0	
210					25					Bottom of Boring @ 25 ft

WELL LOG (PID/TPHG) G:\OAKLAND\4255 MACARTHUR\4255.GPJ DEFAULT.GDT 5/25/05

ATTACHMENT D

Gregg Drilling Inc.

Presentation of Cone Penetration Test and UVIF Data

GREGG DRILLING AND TESTING, INC.
GREGG IN SITU, INC.
ENVIRONMENTAL AND GEOTECHNICAL INVESTIGATION SERVICES

April 7, 2005

Cambria
Attn: Stuart Dalie
5900 Hollis St, Suite A
Emeryville, California 94608

Subject: CPT Site Investigation
Shell 4255 Mcarthur Blvd
Oakland, California
GREGG Project Number: 05-122MA

Dear Mr. Dalie:

The following report presents the results of GREGG IN SITU's Cone Penetration Test investigation for the above referenced site. The following testing services were performed:

1	Cone Penetration Tests	(CPTU)	☒
2	Pore Pressure Dissipation Tests	(PPD)	☐
3	Seismic Cone Penetration Tests	(SCPTU)	☐
4	Resistivity Cone Penetration Tests	(RCPTU)	☐
5	UVIF Cone Penetration Tests	(UVIFCPTU)	☒
6	Groundwater Sampling	(GWS)	☐
7	Soil Sampling	(SS)	☐
8	Vapor Sampling	(VS)	☐
9	Vane Shear Testing	(VST)	☐
10	SPT Energy Calibration	(SPTE)	☐

A list of reference papers providing additional background on the specific tests conducted is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact our office at (562) 427-6899.

Sincerely,
GREGG IN SITU, Inc.

Mary Walden
Operations Manager

Bibliography

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Copies of ASTM Standards are available through www.astm.org

Cone Penetration Test Sounding Summary

-Table 1-

CPT Sounding Identification	Date	Termination Depth (Feet)	Depth of Groundwater Samples (ft)	Depth of Soil Samples (ft)	Depth of Pore Pressure Dissipation Tests (ft)
CPT-01	4/05/05	25	-	-	-
CPT-02	4/05/05	25	-	-	-
CPT-03	4/05/05	28	-	-	-
CPT-04	4/05/05	28	-	-	-
CPT-05	4/05/05	27	-	-	-
CPT-06	4/05/05	28	-	-	-
CPT-07	4/05/05	28	-	-	-
CPT-08	4/06/05	28	-	-	-
CPT-09	4/06/05	28	-	-	-
CPT-10	4/06/05	28	-	-	-
CPT-11	4/06/05	28	-	-	-

Gregg In Situ Interpretations as of June 30, 2004 (Release 1.22A)

Gregg In Situ's interpretation routine provides a tabular output of geotechnical parameters based on current published CPT correlations and is subject to change to reflect the current state of practice. The interpreted values are not considered valid for all soil types. The interpretations are presented only as a guide for geotechnical use and should be carefully scrutinized for consideration in any geotechnical design. Reference to current literature is strongly recommended. Gregg In Situ does not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the program and does not assume liability for any use of the results in any design or review. Representative hand calculations should be made for any parameter that is critical for design purposes. The end user of the interpreted output should also be fully aware of the techniques and the limitations of any method used in this program. The purpose of this document is to inform the user as to which methods were used and what the appropriate papers and/or publications are for further reference.

The CPT interpretations are based on values of tip, sleeve friction and pore pressure averaged over a user specified interval (e.g. 0.20m). Note that q_t is the tip resistance corrected for pore pressure effects and q_c is the recorded tip resistance. Since all Gregg In Situ cones have equal end area friction sleeves, pore pressure corrections to sleeve friction, f_s, are not required.

The tip correction is: $q_t = q_c + (1-a) \bullet u_2$

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure behind the tip (u_2 position)
a is the Net Area Ratio for the cone (typically 0.85 for Gregg In Situ cones)

The total stress calculations are based on soil unit weights that have been assigned to the Soil Behavior Type zones, from a user defined unit weight profile or by using a single value throughout the profile. Effective vertical overburden stresses are calculated based on a hydrostatic distribution of equilibrium pore pressures below the water table or from a user defined equilibrium pore pressure profile (this can be obtained from CPT dissipation tests). For over water projects the effects of the column of water have been taken into account as has the appropriate unit weight of water. How this is done depends on where the instruments were zeroed (i.e. on deck or at mud line).

Details regarding the interpretation methods for all of the interpreted parameters are provided in Table 1. The appropriate references cited in Table 1 are listed in Table 2. Where methods are based on charts or techniques that are too complex to describe in this summary the user should refer to the cited material.

The estimated Soil Behavior Types (normalized and non-normalized) are based on the charts developed by Robertson and Campanella shown in Figures 1 and 2. The Bq classification charts are not reproduced in this document but can be reviewed in Lunne, Robertson and Powell (1997) or Robertson (1990).

Where the results of a calculation/interpretation are declared *'invalid'* the value will be represented by the text strings "-9999" or "-9999.0". In some cases the value 0 will be used. Invalid results will occur because of (and not limited to) one or a combination of:

1. Invalid or undefined CPT data (e.g. drilled out section or data gap).

2. Where the interpretation method is inappropriate, for example, drained parameters in an undrained material (and vice versa). The user must evaluate the site specific soil conditions and characteristics to properly apply the appropriate interpretation method.

3. Where interpretation input values are beyond the range of the referenced charts or specified limitations of the interpretation method.

4. Where pre-requisite or intermediate interpretation calculations are invalid.

The parameters selected for output from the program are often specific to a particular project. As such, not all of the interpreted parameters listed in Table 1 may be included in the output files delivered with this report.

The output files are in one format:

File Type	Typical Extensions	Description
Spreadsheet	XLS	IFI, NLI files exported directly to Excel format. Column and cell formatting has been done. Header information is exported to start in Column C allowing the depth columns A and/or B to be duplicated on each printed page without repetition of part of the header information.

Table 1
CPT Interpretation Methods

Interpreted Parameter	Description	Equation	Ref
Depth	Mid Layer Depth *(where interpretations are done at each point then Mid Layer Depth = Recorded Depth)*	*Depth (Layer Top) + Depth (Layer Bottom) / 2.0*	
Elevation	Elevation of Mid Layer based on sounding collar elevation supplied by client	Elevation = Collar Elevation – Depth	
Avgqc	Averaged recorded tip value (q_c)	$Avgqc = \frac{1}{n}\sum_{i=1}^{n} q_c$ *n=1 when interpretations are done at each point*	
Avgqt	Averaged corrected tip (q_t) where: $q_t = q_c + (1-a) \bullet u$	$Avgqt = \frac{1}{n}\sum_{i=1}^{n} q_t$ *n=1 when interpretations are done at each point*	
Avgfs	Averaged sleeve friction (f_s)	$Avgfs = \frac{1}{n}\sum_{i=1}^{n} fs$ *n=1 when interpretations are done at each point*	
AvgRf	Averaged friction ratio (Rf) where friction ratio is defined as: $Rf = 100\% \bullet \frac{fs}{qt}$	$AvgRf = 100\% \bullet \frac{Avgfs}{Avgqt}$ *n=1 when interpretations are done at each point*	
Avgu	Averaged dynamic pore pressure *(u)*	$Avgu = \frac{1}{n}\sum_{i=1}^{n} u_i$ *n=1 when interpretations are done at each point*	
AvgRes	Averaged Resistivity (this data is not always available since it is a specialized test requiring an additional module)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} RESISTIVITY_i$ *n=1 when interpretations are done at each point*	
AvgUVIF	Averaged UVIF ultra-violet induced fluorescence (this data is not always available since it is a specialized test requiring an additional module)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} UVIF_i$ *n=1 when interpretations are done at each point*	
AvgTemp	Averaged Temperature (this data is not always available since it is a specialized test)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} TEMPERATURE_i$ *n=1 when interpretations are done at each point*	

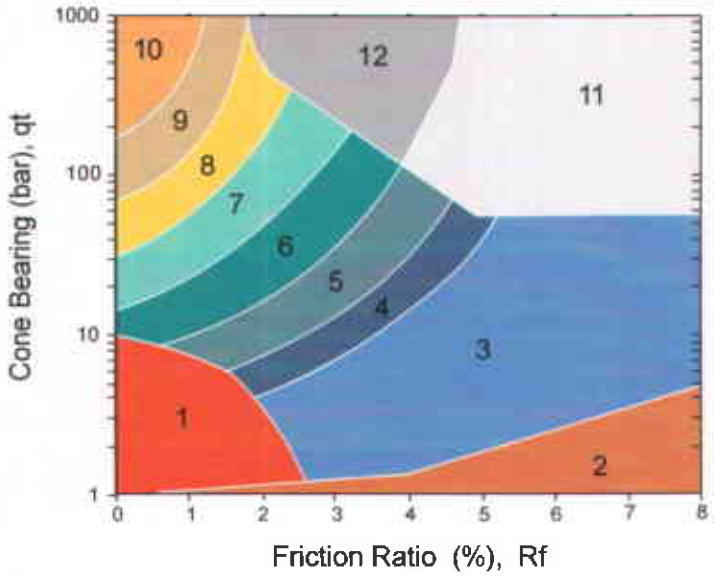
Interpreted Parameter	Description	Equation	Ref
AvgGamma	Averaged Gamma Counts (this data is not always available since it is a specialized test requiring an additional module)	$Avgu = \frac{1}{n}\sum_{i=1}^{n} GAMMA$ *n=1 when interpretations are done at each point*	
SBT	Soil Behavior Type as defined by Robertson and Campanella	See Figure 1	2, 5
SBTn	Normalized Soil Behavior Type as defined by Robertson and Campanella	See Figure 2	2, 5
SBT-BQ	Non-normalized soil behavior type based on the Bq parameter	See Figure 5.7 (reference 5)	2, 5
SBT-BQn	Normalized Soil Behavior base on the Bq parameter	See Figure 5.8 (reference 5) or Figure 3 (reference 2)	2, 5
k	Coefficient of permeability (assigned to each SBT zone)		5
U.Wt.	Unit Weight of soil determined from one of the following user selectable options: 1) uniform value 2) value assigned to each SBT zone 3) user supplied unit weight profile	See references	5
T. Stress σ_v	Total vertical overburden stress at Mid Layer Depth. *A layer is defined as the averaging interval specified by the user. For data interpreted at each point the Mid Layer Depth is the same as the recorded depth.*	$TStress = \sum_{i=1}^{n} \gamma_i h_i$ where γ_i is layer unit weight h_i is layer thickness	
Ueq	Equilibrium pore pressure determined from one of the following user selectable options: 1) hydrostatic from water table depth 2) user supplied profile	For hydrostatic option: $u_{eq} = \gamma_w \bullet (D - D_{wt})$ where u_{eq} is equilibrium pore pressure γ_w is unit weight of water D is the current depth D_{wt} is the depth to the water table	
E. Stress σ_v'	Effective vertical overburden stress at Mid Layer Depth	*Estress = Tstress - u_{eq}*	
Cn	SPT N_{60} overburden correction factor	$Cn=(\sigma_v')^{-0.5}$ where σ_v' *is in tsf* $0.5 < C_n < 2.0$	
N_{60}	SPT N value at 60% energy calculated from qt/N ratios assigned to each SBT zone. This method has abrupt N value changes at zone boundaries.	*See Figure 1*	4, 5
$(N_1)_{60}$	SPT N_{60} value corrected for overburden pressure	$(N_1)_{60} = Cn \bullet N_{60}$	4
$N_{60}Ic$	SPT N_{60} values based on the Ic parameter	(qt/pa)/ N_{60} = 8.5 (1 – Ic/4.6)	5
$(N_1)_{60}Ic$	SPT N_{60} value corrected for overburden pressure (using N_{60} I_c). User has 2 options.	1) $(N_1)_{60}Ic = Cn \bullet (N_{60}Ic)$ 2) $q_{c1n}/(N_1)_{60}Ic$ = 8.5 (1 – Ic/4.6)	4 5
$(N_1)_{60cs}Ic$	Clean sand equivalent SPT $(N_1)_{60}Ic$. User has 3 options.	1) $(N_1)_{60cs}Ic = a + ß((N_1)_{60}Ic)$ 2) $(N_1)_{60cs}Ic = K_{SPT} * ((N_1)_{60}Ic)$ 3) $q_{c1ncs}/(N_1)_{60cs}Ic$ = 8.5 (1 – Ic/4.6) FC = 5%: a = 0, ß=1.0 FC = 35% a = 5.0, ß=1.2 5% < FC < 35% a = exp[1.76 – (190/FC^2)] ß = [0.99 + ($FC^{1.5}$/1000)]	10 10 5

Interpreted Parameter	Description	Equation	Ref
Q_t	Normalized q_t for Soil Behavior Type classification as defined by Robertson, 1990	$Qt = \frac{qt - \sigma_v}{\sigma'_v}$	2, 5
F_r	Normalized Friction Ratio for Soil Behavior Type classification as defined by Robertson, 1990	$Fr = 100\% \bullet \frac{fs}{qt - \sigma_v}$	2, 5
Bq	Pore pressure parameter	$Bq = \frac{\Delta u}{qt - \sigma_v}$ *where:* $\Delta u = u - u_{eq}$ *and* u *= dynamic pore pressure* u_{eq} *= equilibrium pore pressure*	1, 5
I_c	Soil index for estimating grain characteristics	$Ic = [(3.47 - \log_{10}Q)^2 + (\log_{10} Fr + 1.22)^2]^{0.5}$ *Where:* $Q = \left(\frac{qt - \sigma_v}{P_{a2}}\right)\left(\frac{P_a}{\sigma'_v}\right)^n$ *And* *Fr is in percent* P_a *= atmospheric pressure* P_{a2} *= atmospheric pressure* *n varies from 0.5 to 1.0 and is selected in an iterative manner based on the resulting* I_c	3, 8
FC	Apparent fines content (%)	*FC=1.75(Ic$^{3.25}$) - 3.7* *FC=100 for Ic > 3.5* *FC=0 for Ic < 1.26* *FC = 5% if 1.64 < Ic < 2.36 AND F_r<0.5*	3
Ic Zone	This parameter is the Soil Behavior Type zone based on the Ic parameter (valid for zones 2 through 7 on SBTn chart)	Ic < 1.31 Zone = 7 1.31 < Ic < 2.05 Zone = 6 2.05 < Ic < 2.60 Zone = 5 2.60 < Ic < 2.95 Zone = 4 2.95 < Ic < 3.60 Zone = 3 Ic > 3.60 Zone = 2	3
Dr	Relative Density determined from one of the following user selectable options: a) Ticino Sand b) Hokksund Sand c) Schmertmann 1976 d) Jamiolkowski - All Sands	See reference	5
PHI ϕ	Friction Angle determined from one of the following user selectable options: a) Campanella and Robertson b) Durgunoglu and Mitchel c) Janbu	See reference	5
State Parameter	The state parameter is used to describe whether a soil is contractive (SP is positive) or dilative (SP is negative) at large strains based on the work by Been and Jefferies	See reference	8, 6, 5
Es/qt	Intermediate parameter for calculating Youngs Modulus, E, in sands. It is the Y axis of the reference chart.	Based on Figure 5.59 in the reference	5

Interpreted Parameter	Description	Equation	Ref
Youngs Modulus E	Youngs Modulus based on the work by Baldi. There are three types of sands considered in this technique. The user selects the appropriate type for the site from: a) OC Sands b) Aged NC Sands c) Recent NC Sands Each sand type has a family of curves that depend on mean normal stress. The program calculates mean normal stress and linearly interpolates between the two extremes provided in Baldi's chart.	Mean normal stress is evaluated from: $\sigma'_m = \frac{1}{3} \bullet (\sigma'_v + \sigma'_h + \sigma'_h)$ where σ_v'= vertical effective stress σ_h'= horizontal effective stress and $\sigma_h = K_o * \sigma_v'$ with Ko assumed to be 0.5	5
Su	Undrained shear strength - N_{kt} is user selectable	$Su = \frac{qt - \sigma_v}{N_{kt}}$	1, 5
OCR	Over Consolidation Ratio	a) Based on Schmertmann's method involving a plot of $S_u/\sigma_v' / (S_u/\sigma_v')_{NC}$ and OCR where the Su/p' ratio for NC clay is user selectable	9

The following parameters are not presented but may be interpreted for use in liquefaction analysis. Further detailed interpretation may be completed by using the Liquefaction Spreadsheet following the committee recommendations of the NCEER. This Spreadsheet is available for purchase. A promotional document is presented in the Interpretations directory on the Data Disk with this report.

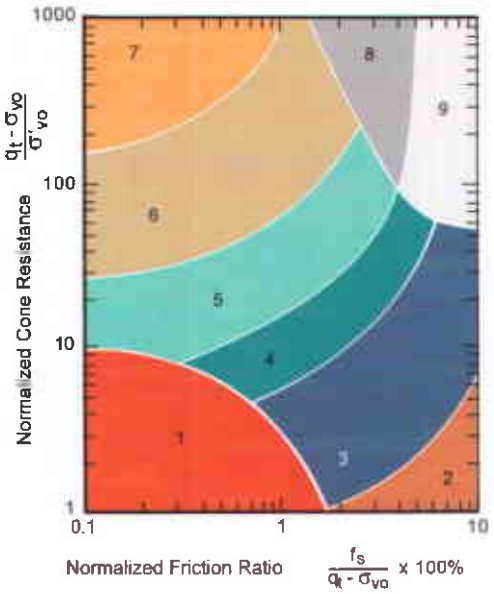
Interpreted Parameter	Description	Equation	Ref
q_{c1}	q_t normalized for overburden stress used for seismic analysis	$q_{c1} = q_t \bullet (Pa/\sigma_v')^{0.5}$ where: Pa = atm. Pressure q_t is in Mpa	3
q_{c1n}	q_{c1} in dimensionless form used for seismic analysis	$q_{c1n} = (q_{c1} / Pa)(Pa/\sigma_v')$ where: Pa = atm. Pressure and n ranges from 0.5 to 0.75 based on Ic.	3
K_{SPT}	Equivalent clean sand factor for $(N_1)60$	$K_{SPT} = 1 + ((0.75/30) * (FC - 5))$	10
K_{CPT}	Equivalent clean sand correction for q_{c1N}	$K_{cpt} = 1.0$ for $I_c \leq 1.64$ $K_{cpt} = f(I_c)$ for $I_c > 1.64$ *(see reference)*	10
q_{c1ncs}	Clean sand equivalent q_{c1n}	$q_{c1ncs} = q_{c1n} \bullet K_{cpt}$	3
CRR	Cyclic Resistance Ratio (for Magnitude 7.5)	$q_{c1ncs} < 50$: $CRR_{7.5} = 0.833 [(q_{c1ncs}/1000)] + 0.05$ $50 \leq q_{c1ncs} < 160$: $CRR_{7.5} = 93 [(q_{c1ncs}/1000)^3] + 0.08$	10
CSR	Cyclic Stress Ratio	$CSR = (\tau_{av}/\sigma_v') = 0.65 (a_{max} / g) (\sigma_v / \sigma_v') r_d$ $r_d = 1.0 - 0.00765\ z$ $z \leq 9.15m$ $r_d = 1.174 - 0.0267\ z$ $9.15 < z \leq 23m$ $r_d = 0.744 - 0.008\ z$ $23 < z \leq 30m$ $r_d = 0.50$ $z > 30m$	10
MSF	Magnitude Scaling Factor	See Reference	10
FofS	Factor of Safety against Liquefaction	$FS = (CRR_{7.5} / CSR)\ MSF$	10
Liquefaction Status	Statement indicating possible liquefaction	Takes into account FofS and limitations based I_c and q_{c1ncs}.	10



Zone	qt / N	Soil Behavior Type
1	2	sensitive fine grained
2	1	organic material
3	1	clay
4	1.5	silty clay to clay
5	2	clayey silt to silty clay
6	2.5	sandy silt to clayey silt
7	3	silty sand to sandy silt
8	4	sand to silty sand
9	5	sand
10	6	gravelly sand to sand
11	1	very stiff fine grained *
12	2	sand to clayey sand *

* overconsolidated or cemented

Figure 1 Non-Normalized Behavior Type Classification Chart



Zone	Normalized Soil Behavior Type
1	sensitive fine grained
2	organic material
3	clay to silty clay
4	clayey silt to silty clay
5	silty sand to sandy silt
6	clean sands to silty sands
7	gravelly sand to sand
8	very stiff sand to clayey sand
9	very stiff fine grained

Figure 2 Normalized Behavior Type Classification Chart

Table 2 References

No.	References
1	Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, "Use of Piezometer Cone Data", Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.
2	Robertson, P.K., 1990, "Soil Classification Using the Cone Penetration Test", Canadian Geotechnical Journal, Volume 27.
3	Robertson, P.K. and Fear, C.E., 1998, "Evaluating cyclic liquefaction potential using the cone penetration test", Canadian Geotechnical Journal, 35: 442-459.
4	Robertson, P.K. and Wride, C.E., 1998, "Cyclic Liquefaction and its Evaluation Based on SPT and CPT", NCEER Workshop Paper, January 22, 1997
5	Lunne, T., Robertson, P.K. and Powell, J. J. M., 1997, " Cone Penetration Testing in Geotechnical Practice," Blackie Academic and Professional.
6	Plewes, H.D., Davies, M.P. and Jefferies, M.G., 1992, "CPT Based Screening Procedure for Evaluating Liquefaction Susceptibility", 45th Canadian Geotechnical Conference, Toronto, Ontario, October 1992.
7	Jefferies, M.G. and Davies, M.P., 1993. "Use of CPTu to Estimate equivalent N_{60}", Geotechnical Testing Journal, 16(4): 458-467.
8	Been, K. and Jefferies, M.P., 1985, "A state parameter for sands", Geotechnique, 35(2), 99-112.
9	Schmertmann, 1977, "Guidelines for Cone Penetration Test Performance and Design", Federal Highway Administration Report FHWA-TS-78-209, U.S. Department of Transportation
10	Proceedings of theNCEER Workshop on Evaluation of Liquefaction Resistance of Soils, Salt LakeCity, 1996. Chaired by Leslie Youd.

Cone Penetration Test Data & Interpretation

Soil behavior type and stratigraphic interpretation is based on relationships between cone bearing (q_c), sleeve friction (f_s), and pore water pressure (u_2). The friction ratio (R_f) is a calculated parameter defined by $100 f_s/q_c$ and is used to infer soil behavior type. Generally:

Cohesive soils (clays)

- High friction ratio (R_f) due to small cone bearing (q_c)
- Generate large excess pore water pressures (u_2)

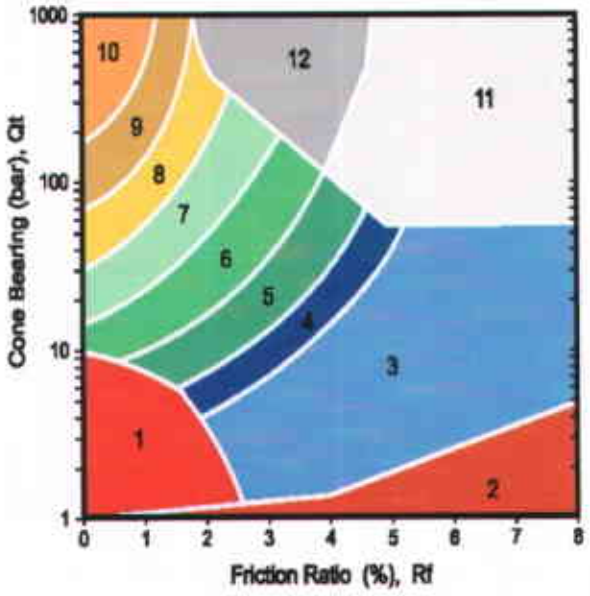
Cohesionless soils (sands)

- Low friction ratio (R_f) due to large cone bearing (q_c)
- Generate very little excess pore water pressures (u_2)

A complete set of baseline readings are taken prior to and at the completion of each sounding to determine temperature shifts and any zero load offsets. Corrections for temperature shifts and zero load offsets can be extremely important, especially when the recorded loads are relatively small. In sandy soils, however, these corrections are generally negligible.

The cone penetration test data collected from your site is presented in graphical form in Appendix CPT. The data includes CPT logs of measured soil parameters, computer calculations of interpreted soil behavior types (SBT), and additional geotechnical parameters. A summary of locations and depths is available in Table 1. Note that all penetration depths referenced in the data are with respect to the existing ground surface.

Soil interpretation for this project was conducted using recent correlations developed by Robertson et al, 1990, *Figure SBT*. Note that it is not always possible to clearly identify a soil type based solely on q_c, f_s, and u_2. In these situations, experience, judgment, and an assessment of the pore pressure dissipation data should be used to infer the soil behavior type.



ZONE	Qt/N	SBT
1	2	Sensitive, fine grained
2	1	Organic materials
3	1	Clay
4	1.5	Silty clay to clay
5	2	Clayey silt to silty clay
6	2.5	Sandy silt to clayey silt
7	3	Silty sand to sandy silt
8	4	Sand to silty sand
9	5	Sand
10	6	Gravely sand to sand
11	1	Very stiff fine grained*
12	2	Sand to clayey sand*

*over consolidated or cemented

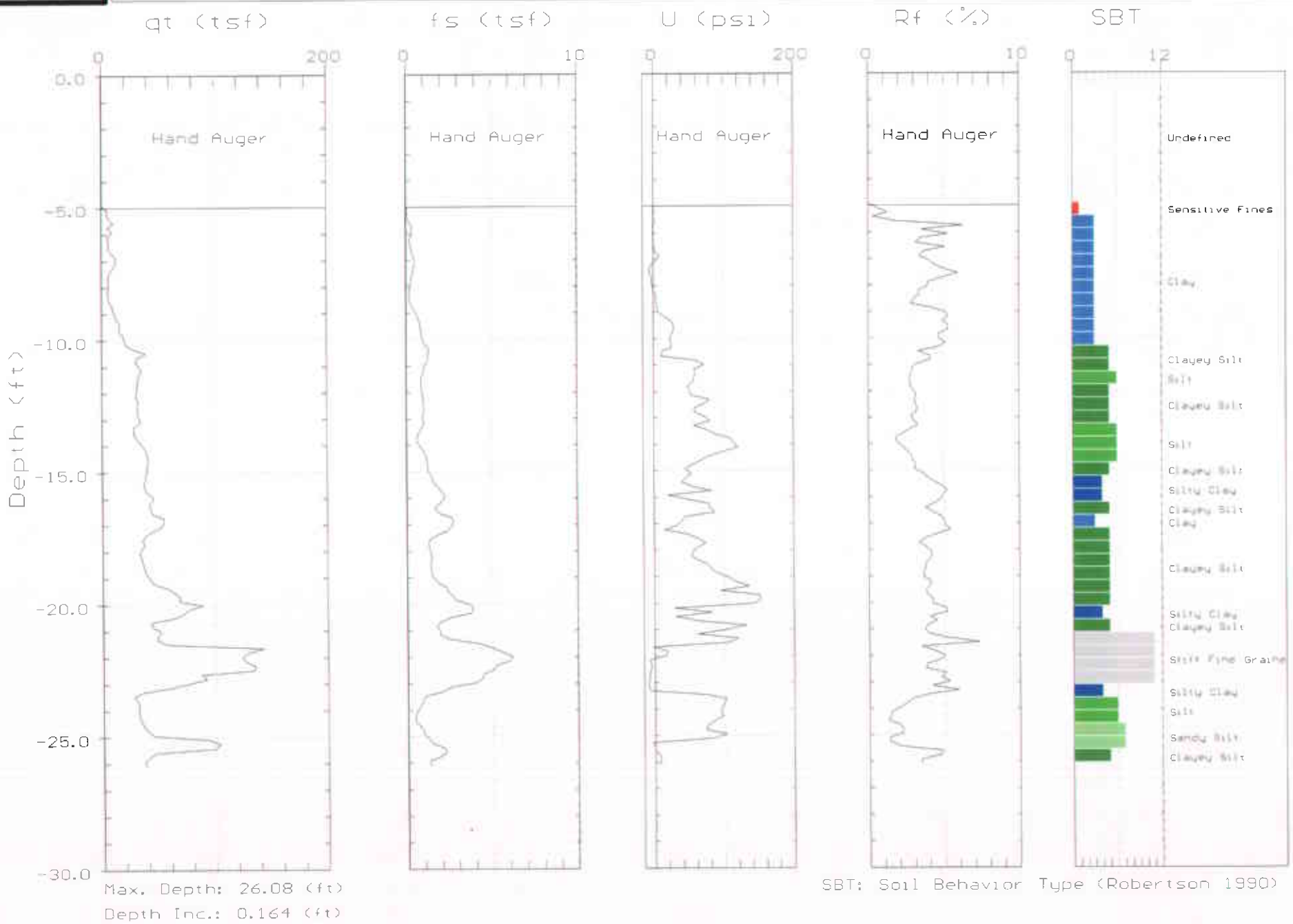
Figure SBT

GREGG

CAMBRIA

Site: SHELL
Location: CPT-01

Engineer: S.DALIE
Date: 04:05:05 08:39



Max. Depth: 26.08 (ft)
Depth Inc.: 0.164 (ft)

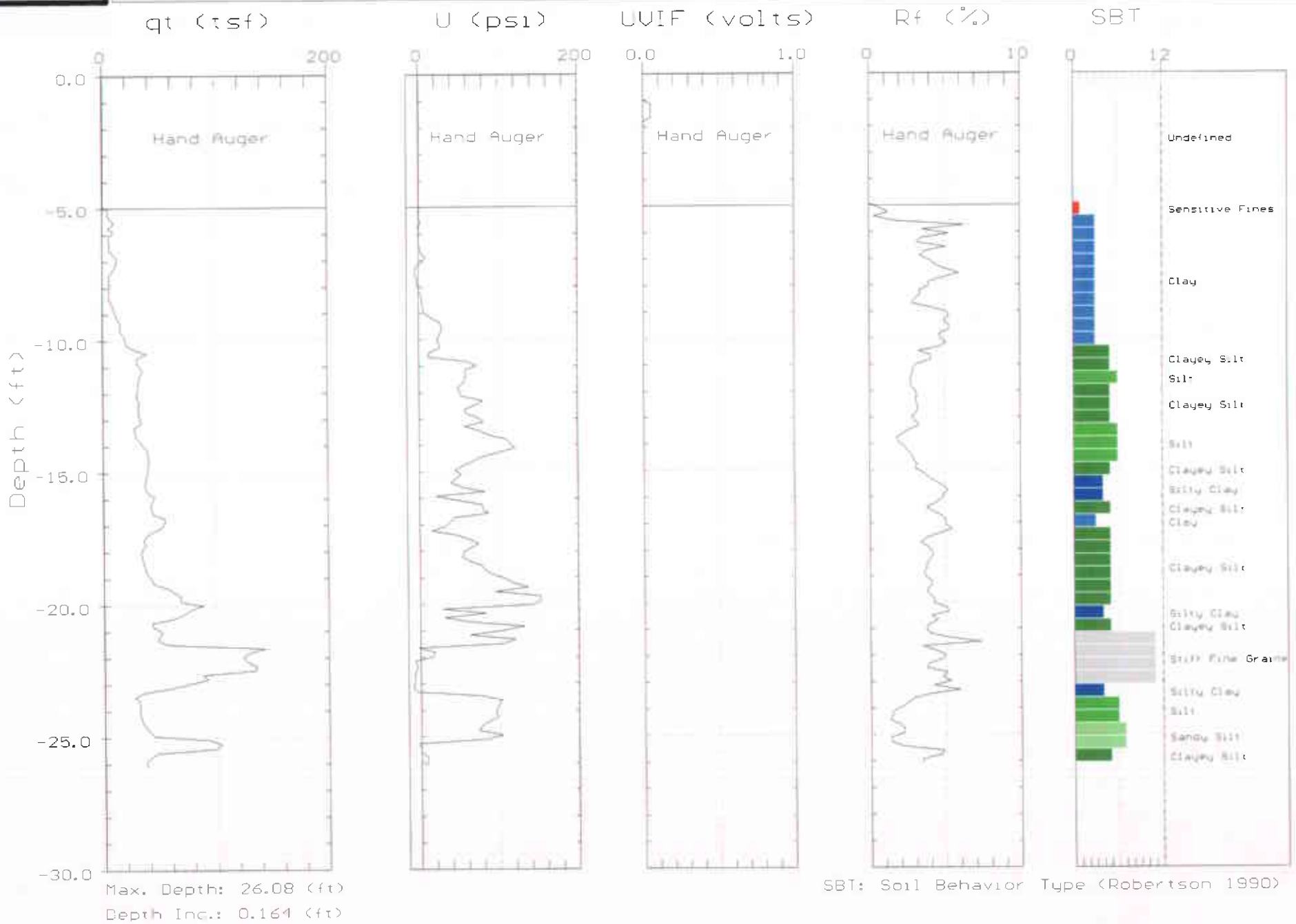
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

Site: SHELL
Location: CPT-01

Engineer: S.DALIE
Date: 04:05:05 08:35



Max. Depth: 26.08 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

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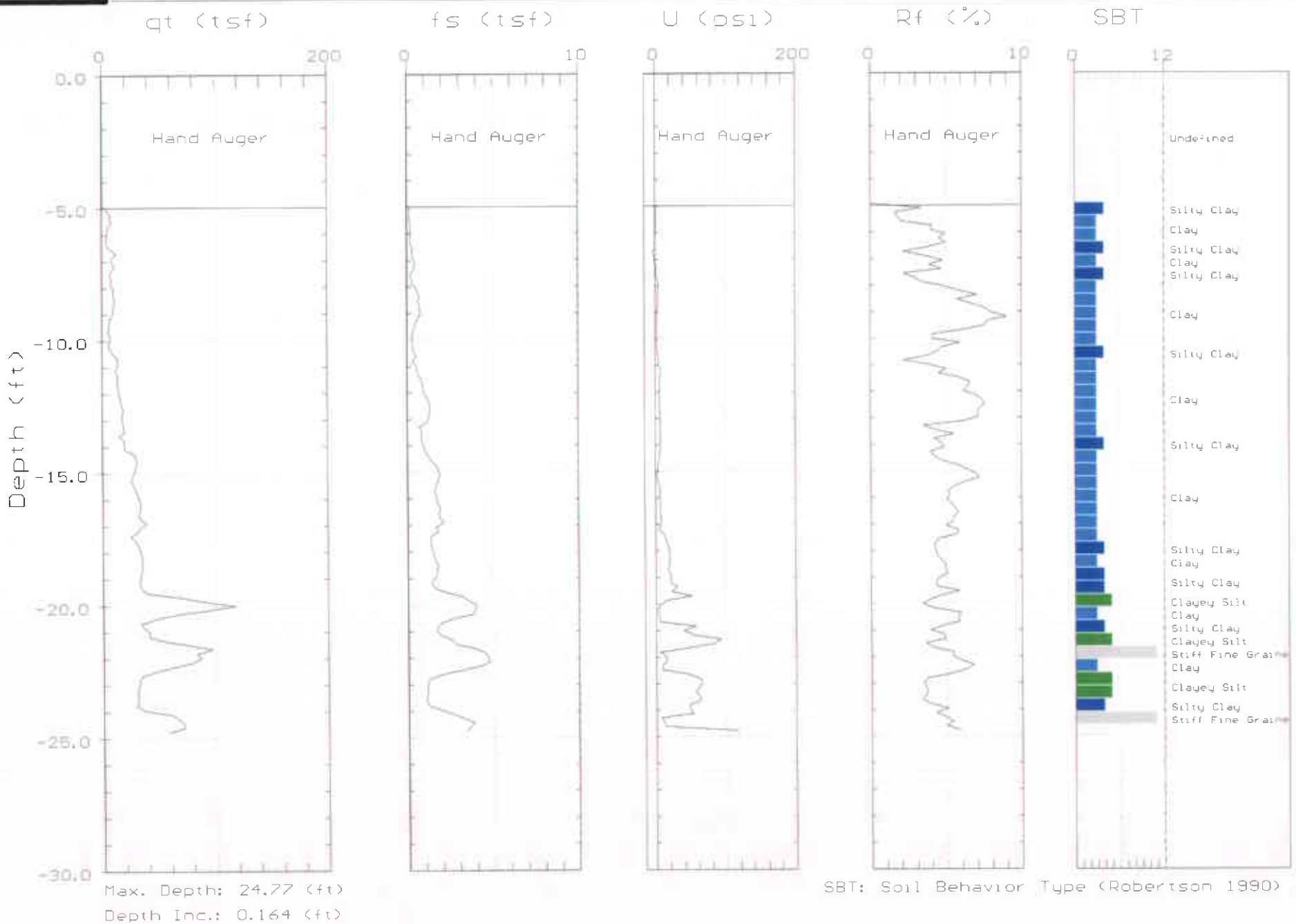
Location: CPT-02

Engineer: S.DALIE
Date: 04:05:05 10:18



GREGG

CAMBRIA

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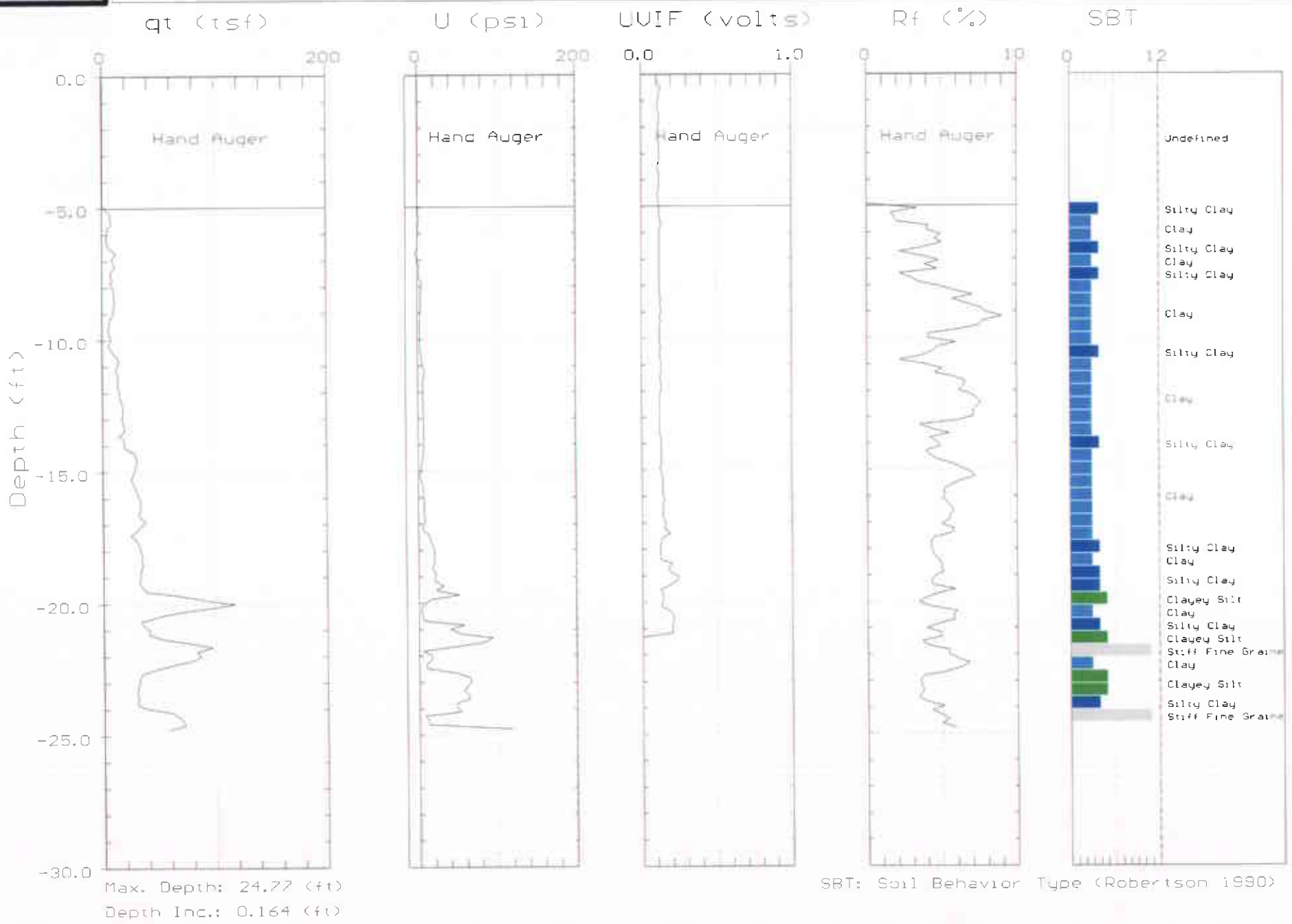
Location: CPT-02

Engineer: S.DALIE
Date: 04:05:05 10:18



GREGG

CAMBRIA

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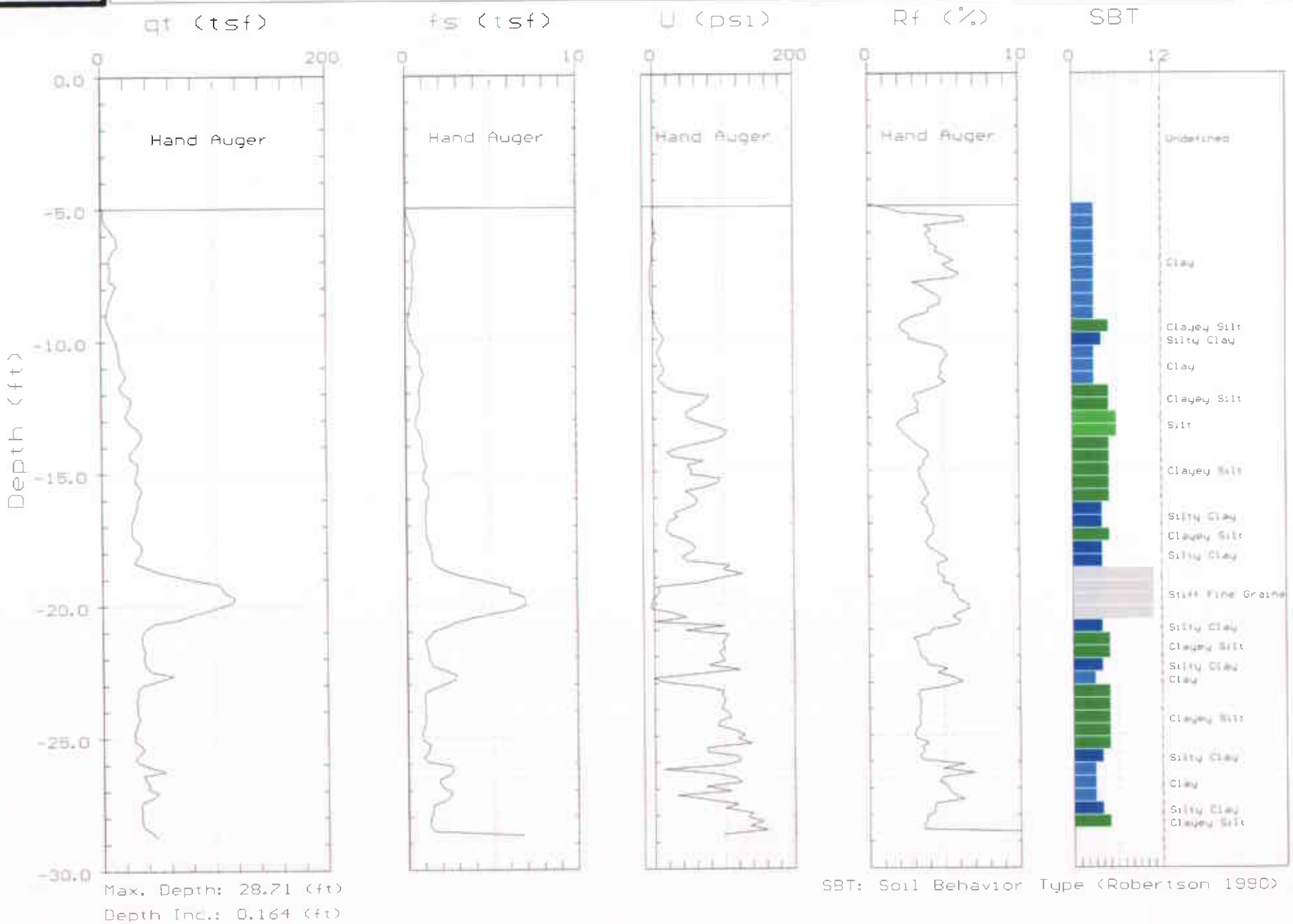
Location: CPT-03

Engineer: S.DALIE
Date: 04:05:05 11:45



Max. Depth: 28.71 (ft)
Depth Inc.: 0.164 (ft)

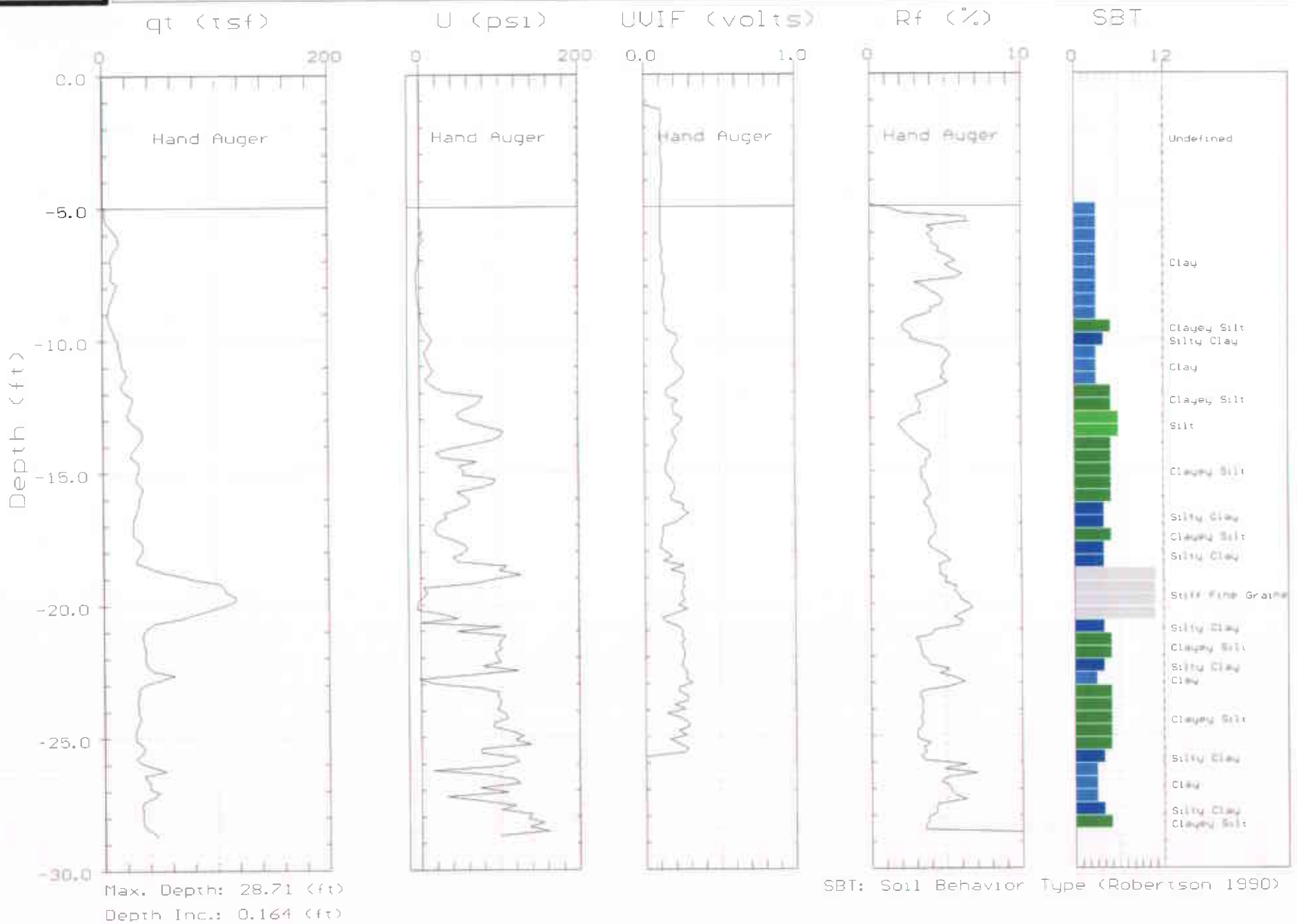
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

Site: SHELL
Location: CPT-03

Engineer: S.DALIE
Date: 04:05:05 11:45



Max. Depth: 28.71 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

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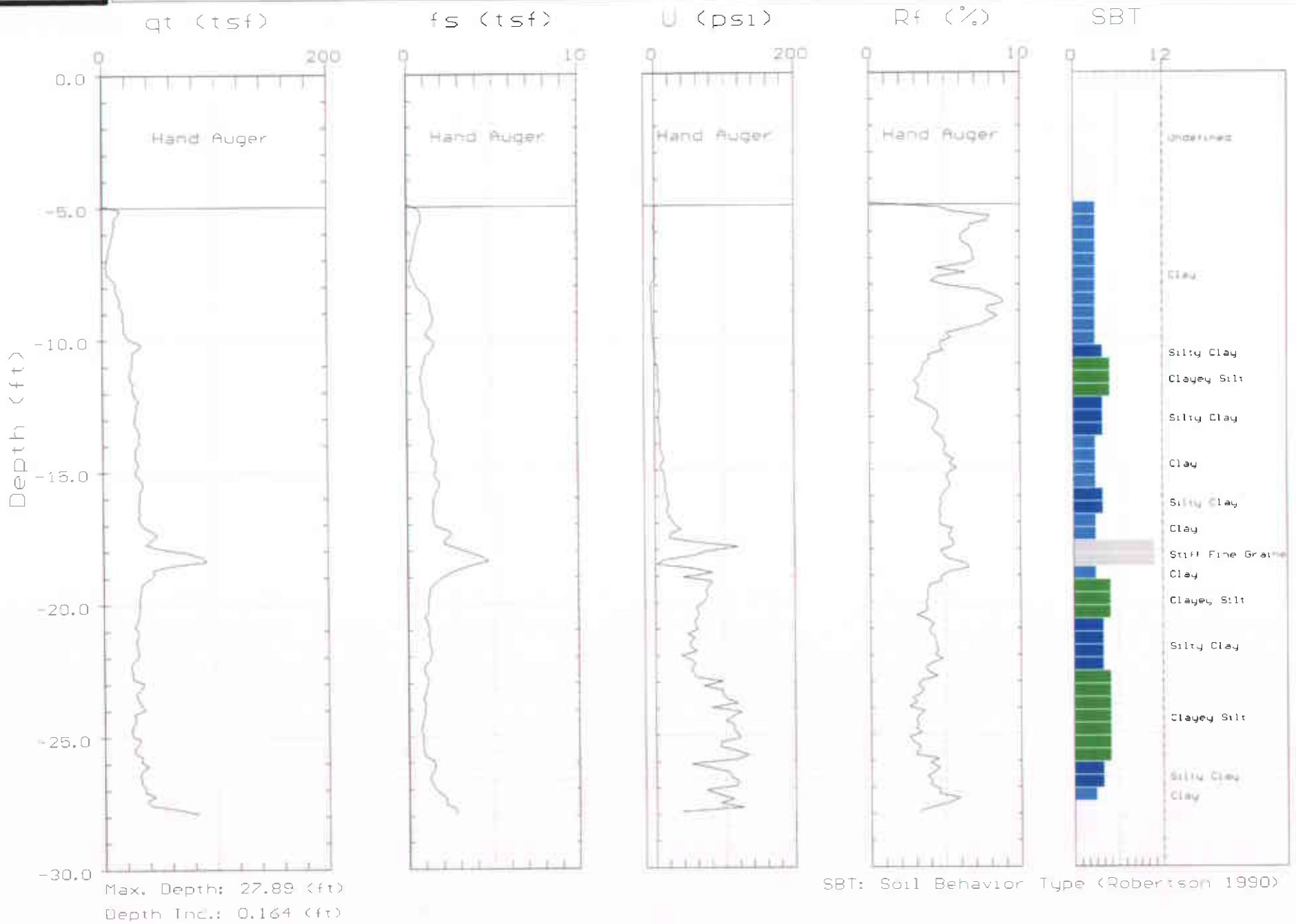
Location: CPT-04

Engineer: S.DALIE
Date: 04:03:05 13:36



Max. Depth: 27.89 (ft)
Depth Inc.: 0.164 (ft)

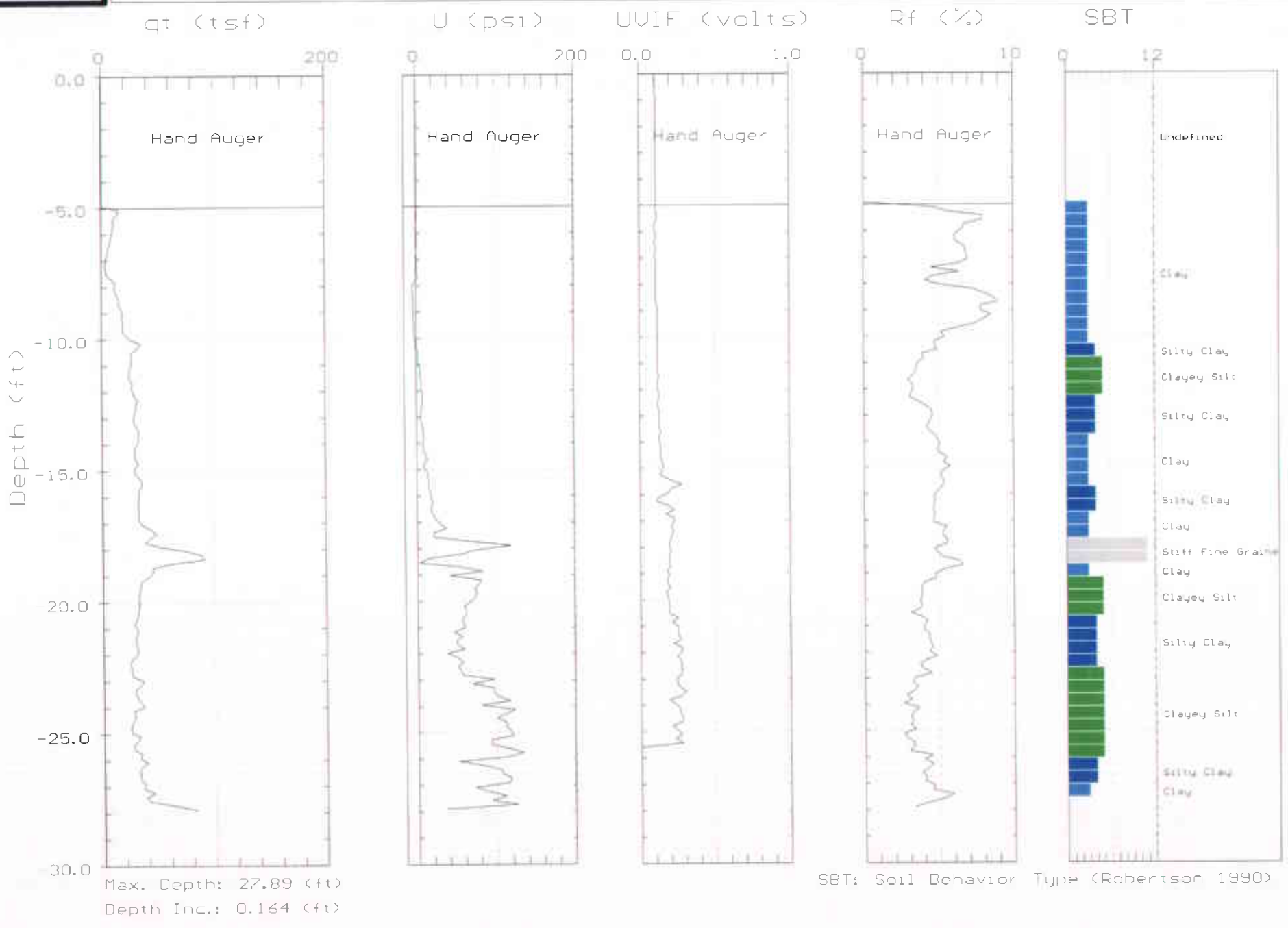
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

Site: SHELL
Location: CPT-04

Engineer: S.DALIE
Date: 04:05:05 13:36



Max. Depth: 27.89 (ft)
Depth Inc.: 0.164 (ft)

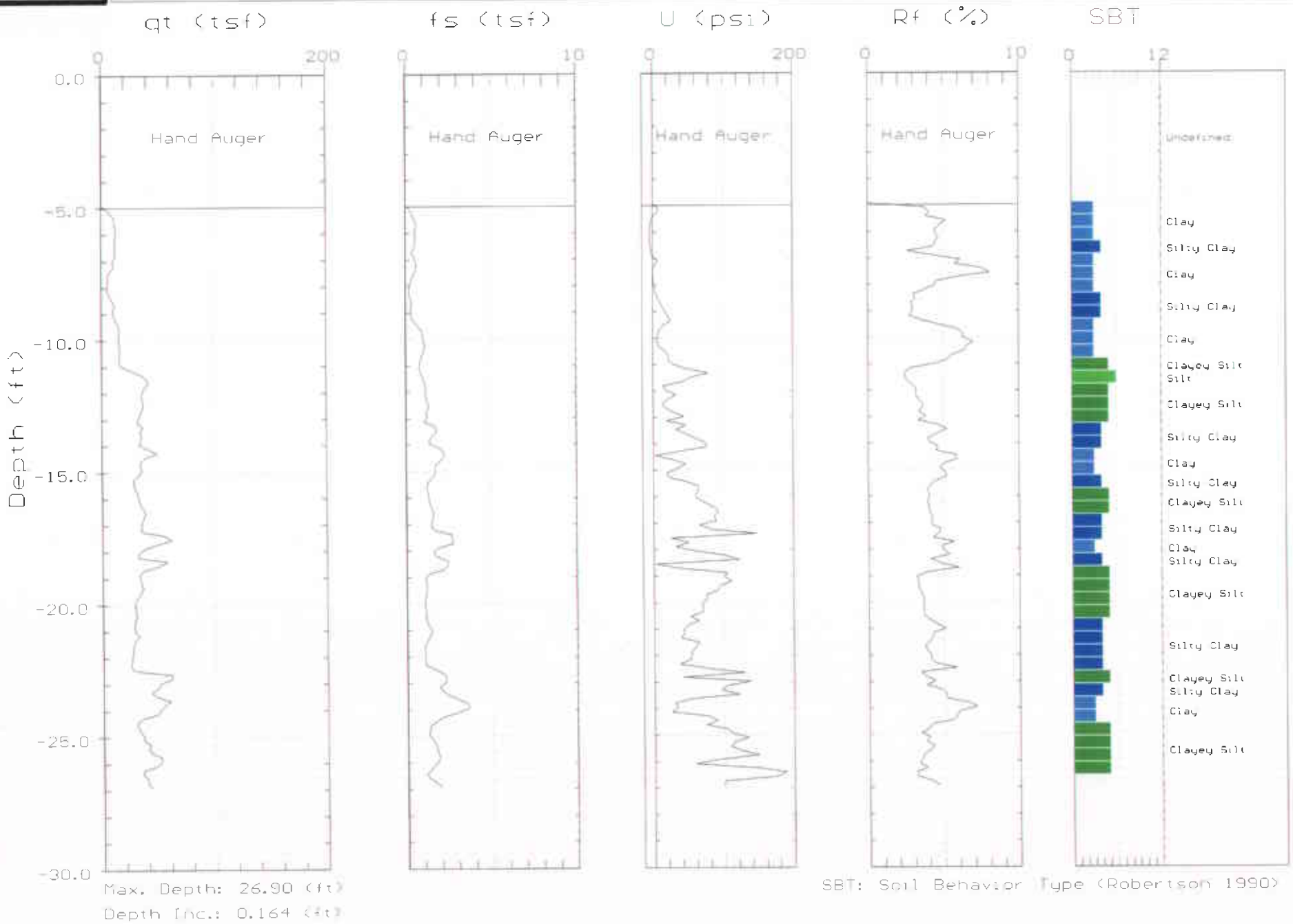
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

Site: SHELL
Location: CPT-05

Engineer: S.DALIE
Date: 04:05:05 15:01



Max. Depth: 26.90 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

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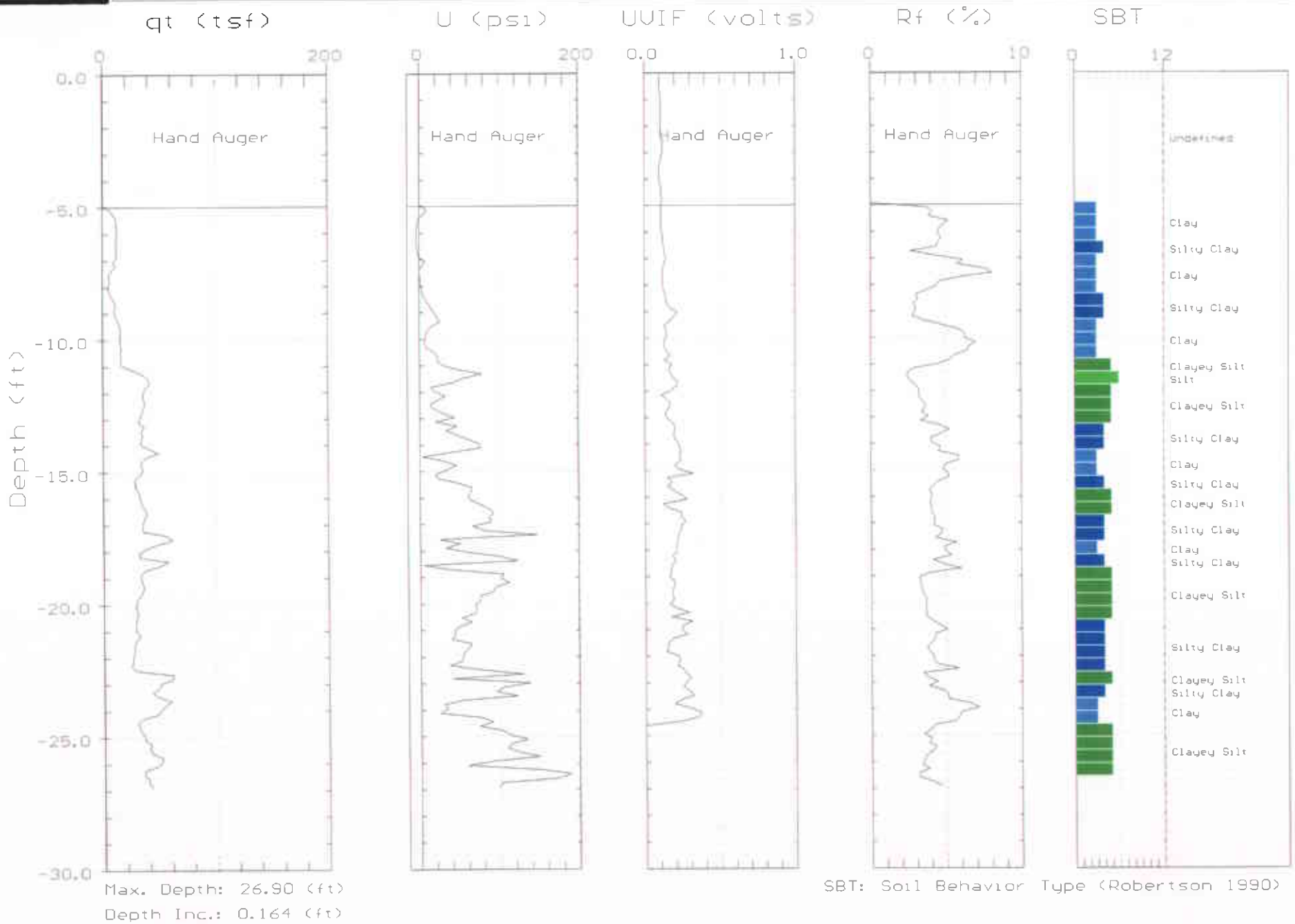
Location: CPT-05

Engineer: S.DALIE
Date: 04:05:05 15:01



Max. Depth: 26.90 (ft)
Depth Inc.: 0.164 (ft)

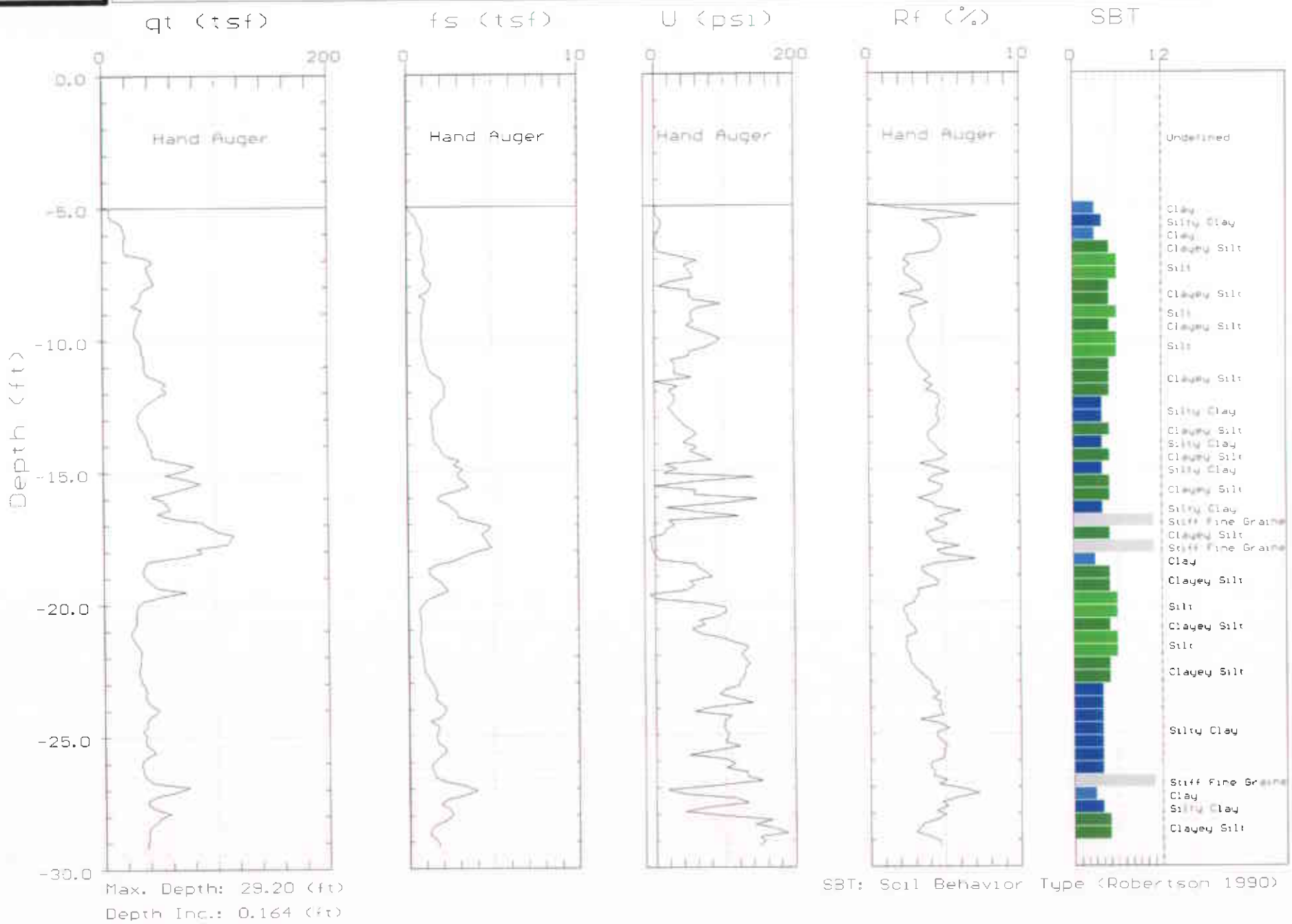
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

Site: SHELL
Location: CPT-06

Engineer: S.DALIE
Date: 04:05:05 16:36

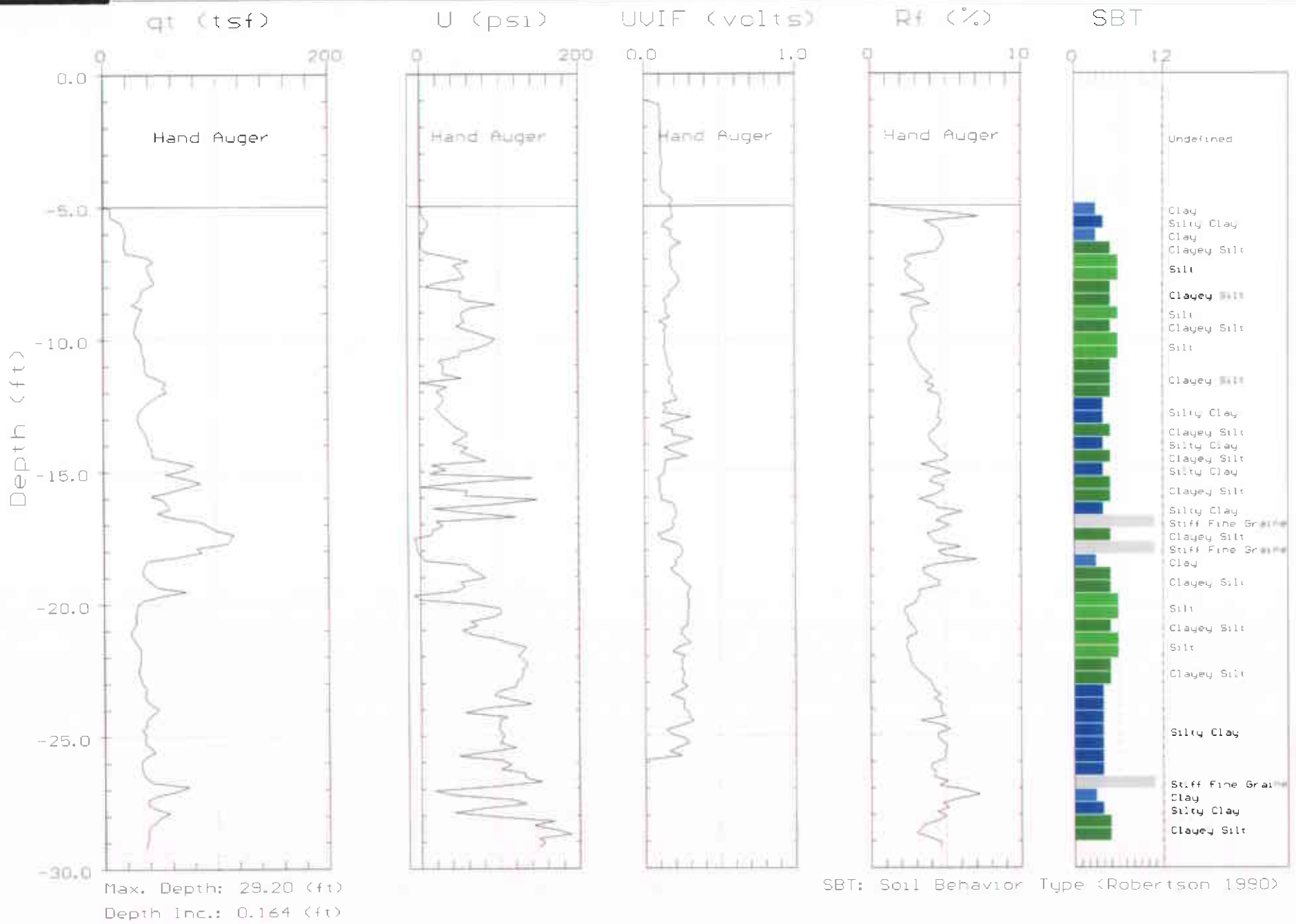


GREGG

CAMBRIA

Site: SHELL
Location: CPT-06

Engineer: S.DALIE
Date: 04:05:05 16:36



Max. Depth: 29.20 (ft)
Depth Inc.: 0.164 (ft)

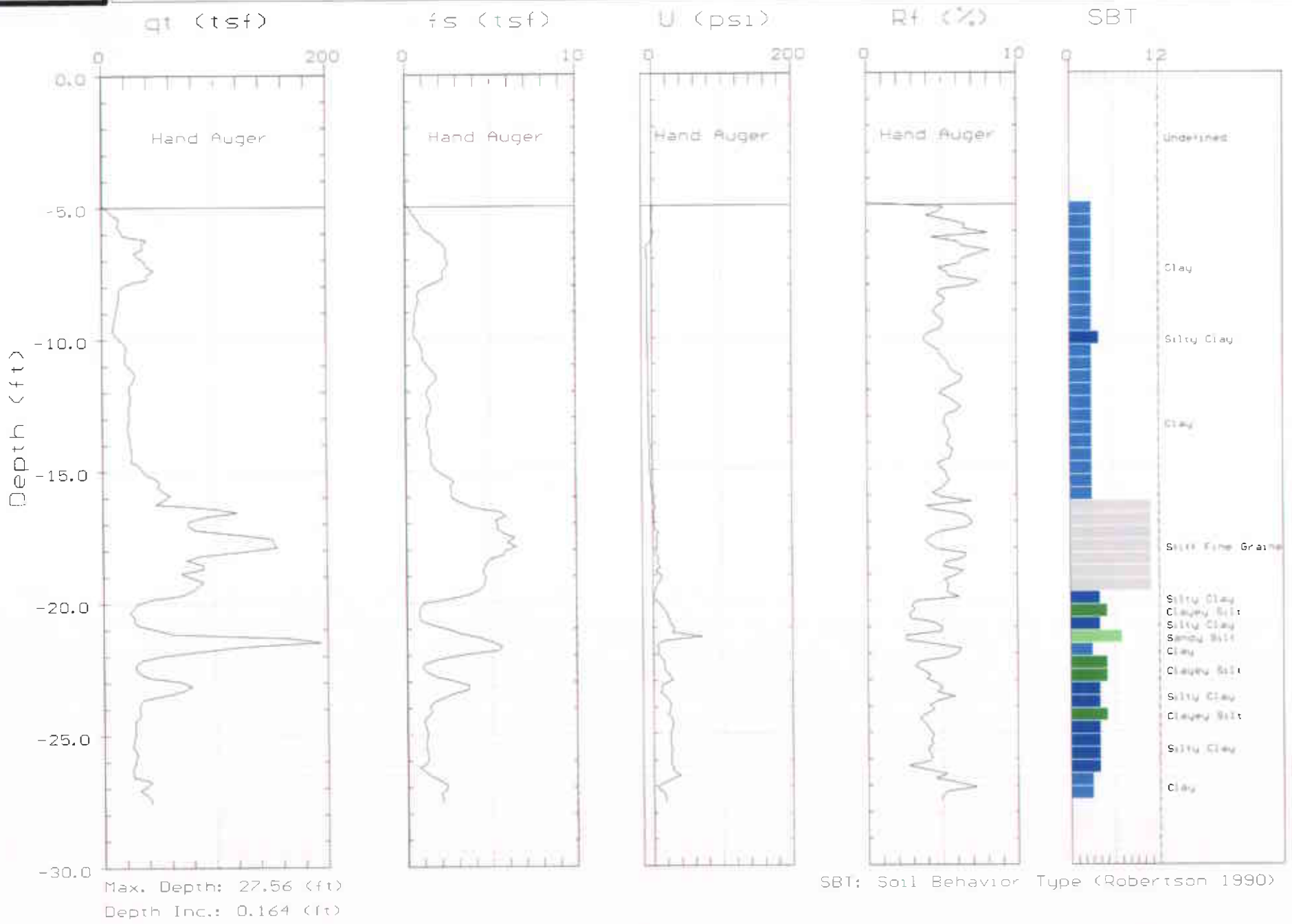
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

Site: SHELL
Location: CPT-07

Engineer: S.DALIE
Date: 04:05:05 17:31



Max. Depth: 27.56 (ft)
Depth Inc.: 0.164 (ft)

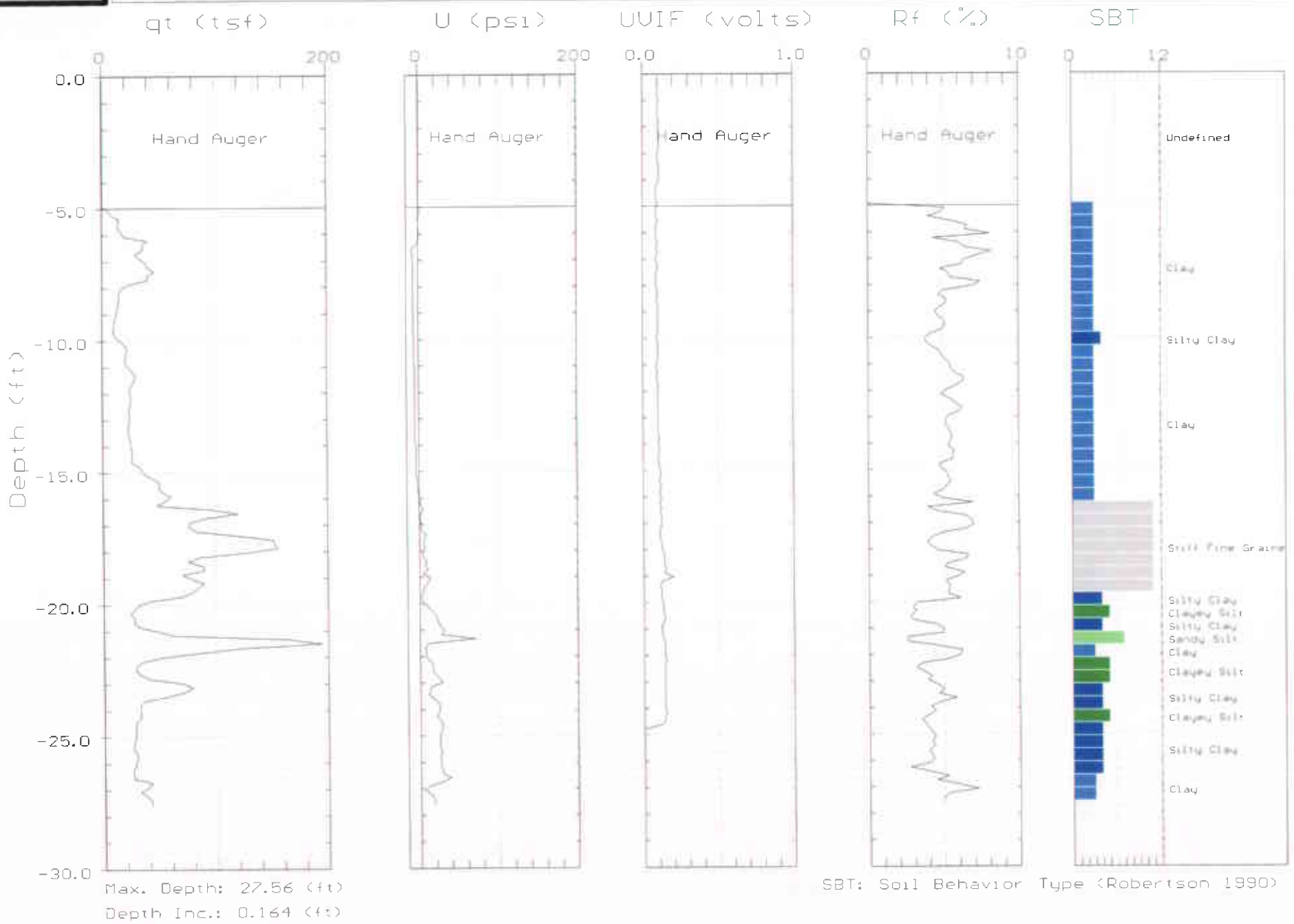
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

Site: SHELL
Location: CPT-07

Engineer: S.DALIE
Date: 04:05:05 17:31



Max. Depth: 27.56 (ft)
Depth Inc.: 0.164 (ft)

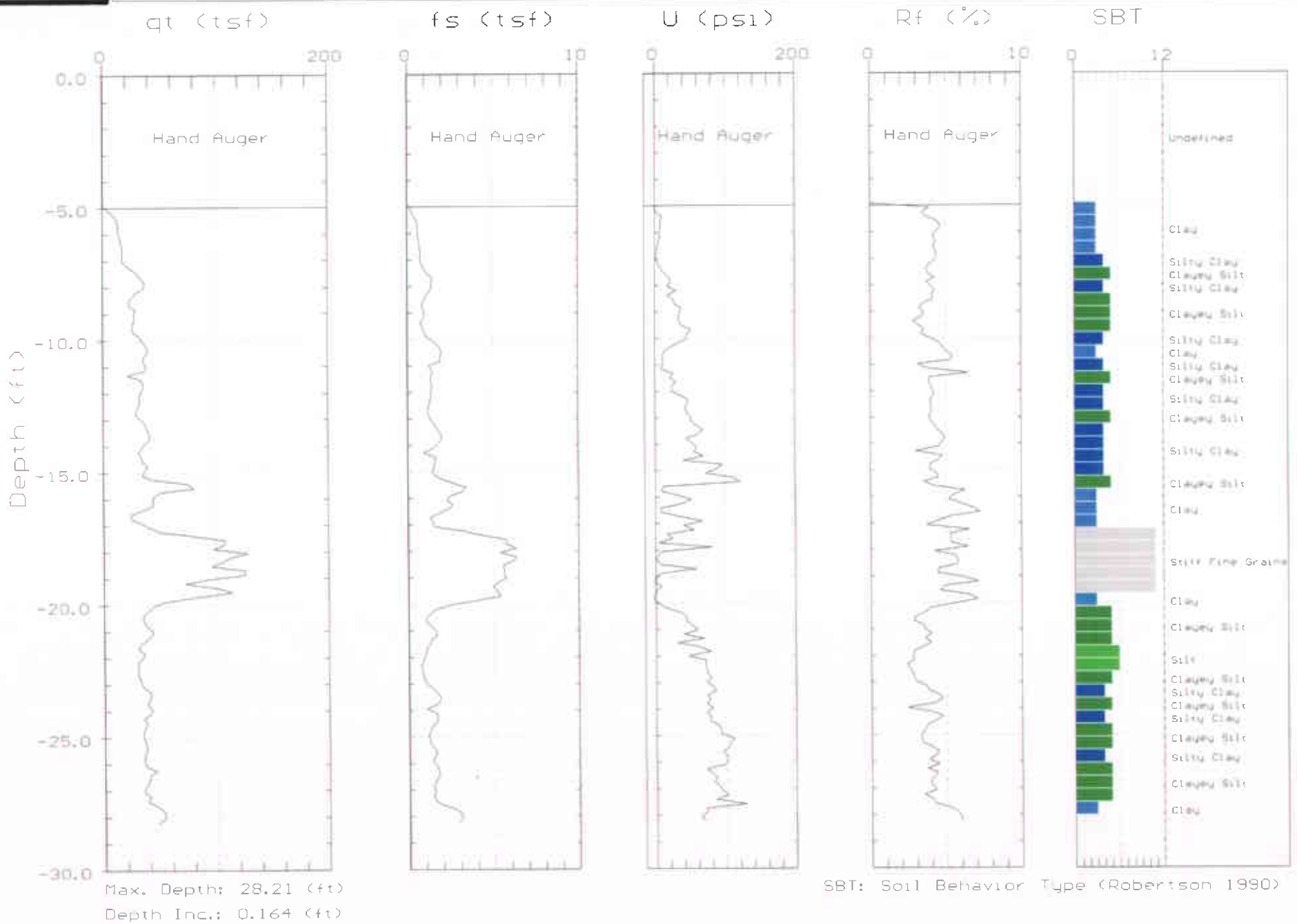
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

Site: SHELL
Location: CPT-08

Engineer: S.DALIE
Date: 04:06:05 09:12



Max. Depth: 28.21 (ft)
Depth Inc.: 0.164 (ft)

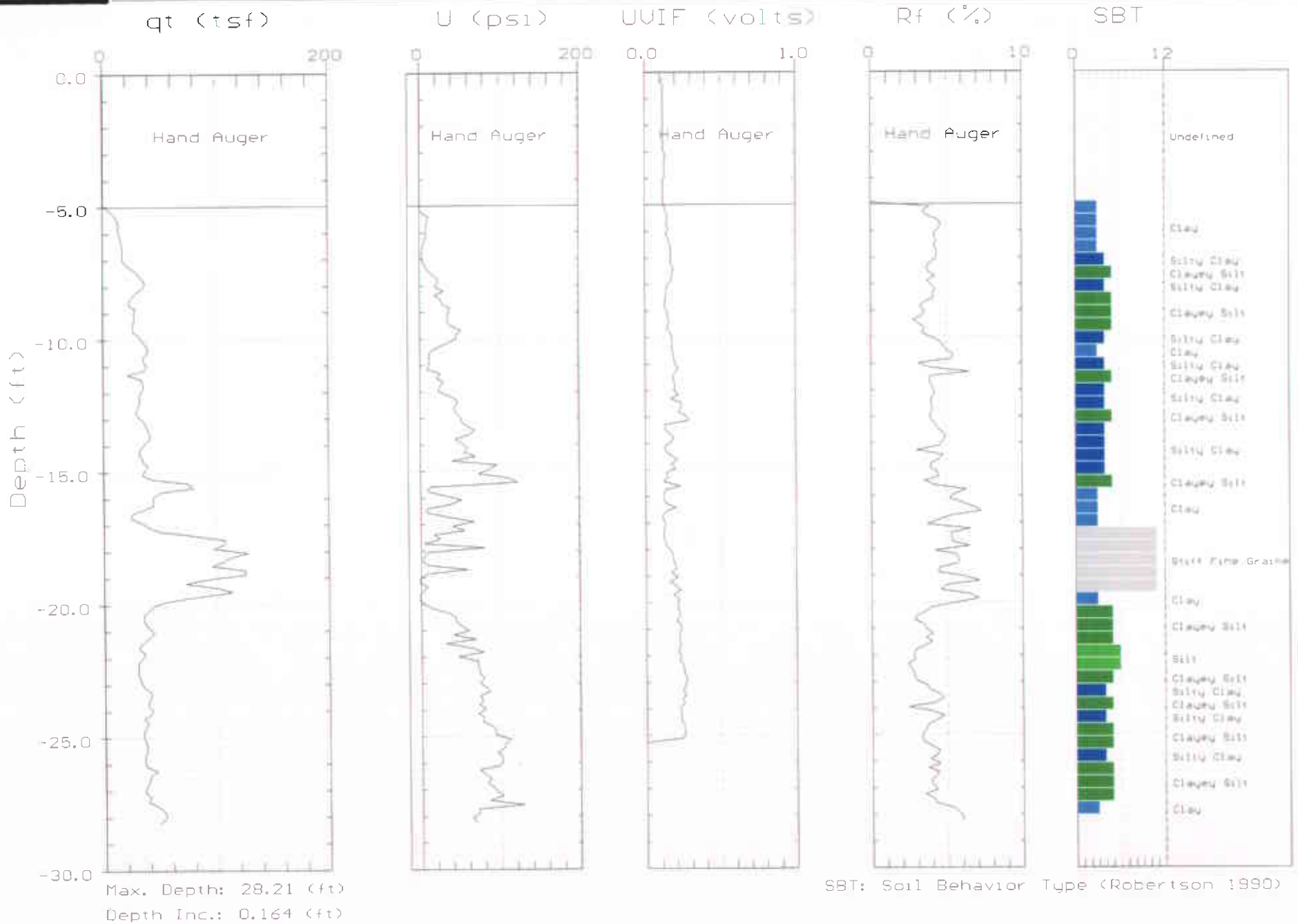
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

Site: SHELL
Location: CPT-08

Engineer: S.DALIE
Date: 04:06:05 09:12



Max. Depth: 28.21 (ft)
Depth Inc.: 0.164 (ft)

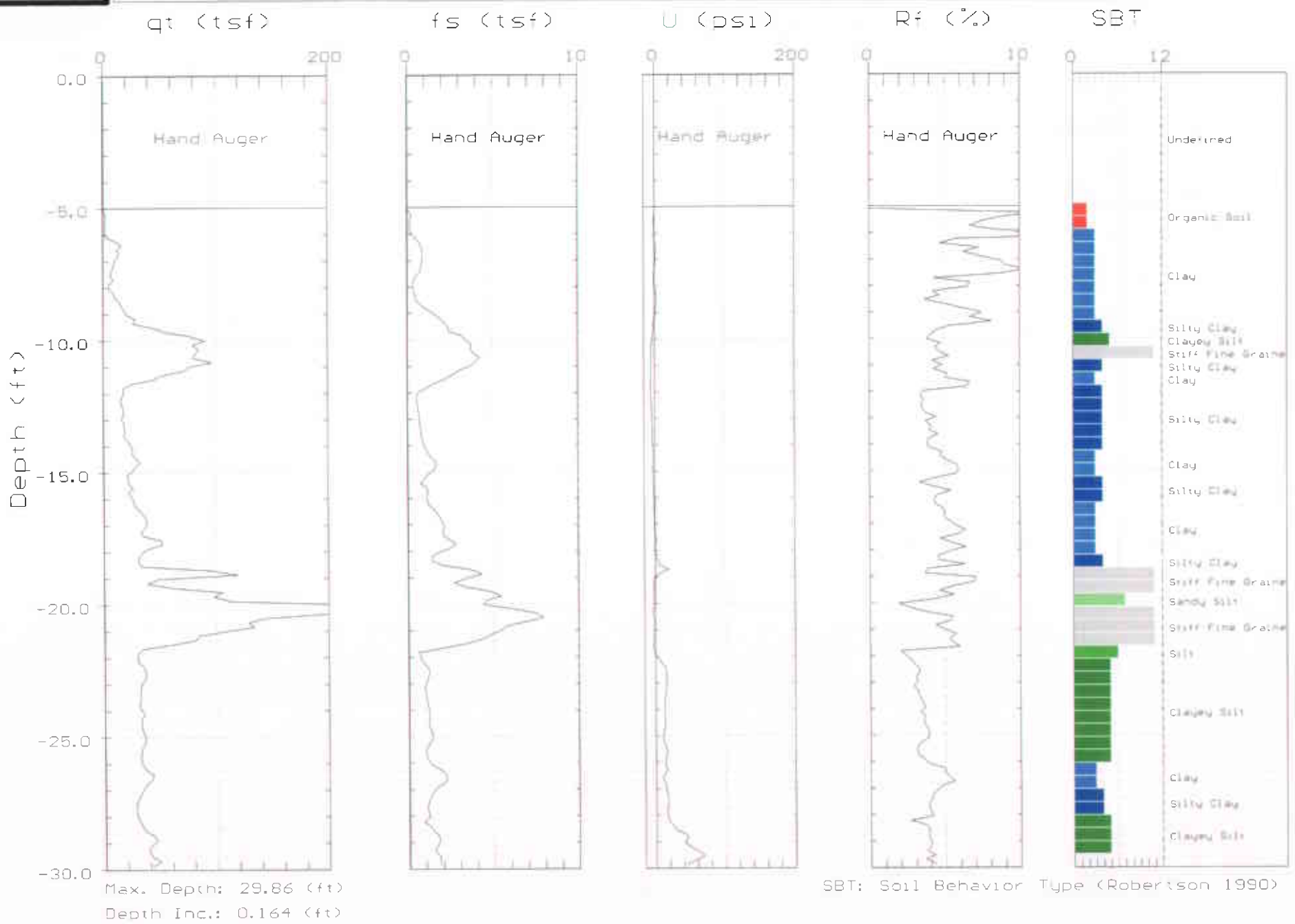
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

Site: SHELL
Location: CPT-09

Engineer: S.DALIE
Date: 04:06:05 11:49



Max. Depth: 29.86 (ft)
Depth Inc.: 0.164 (ft)

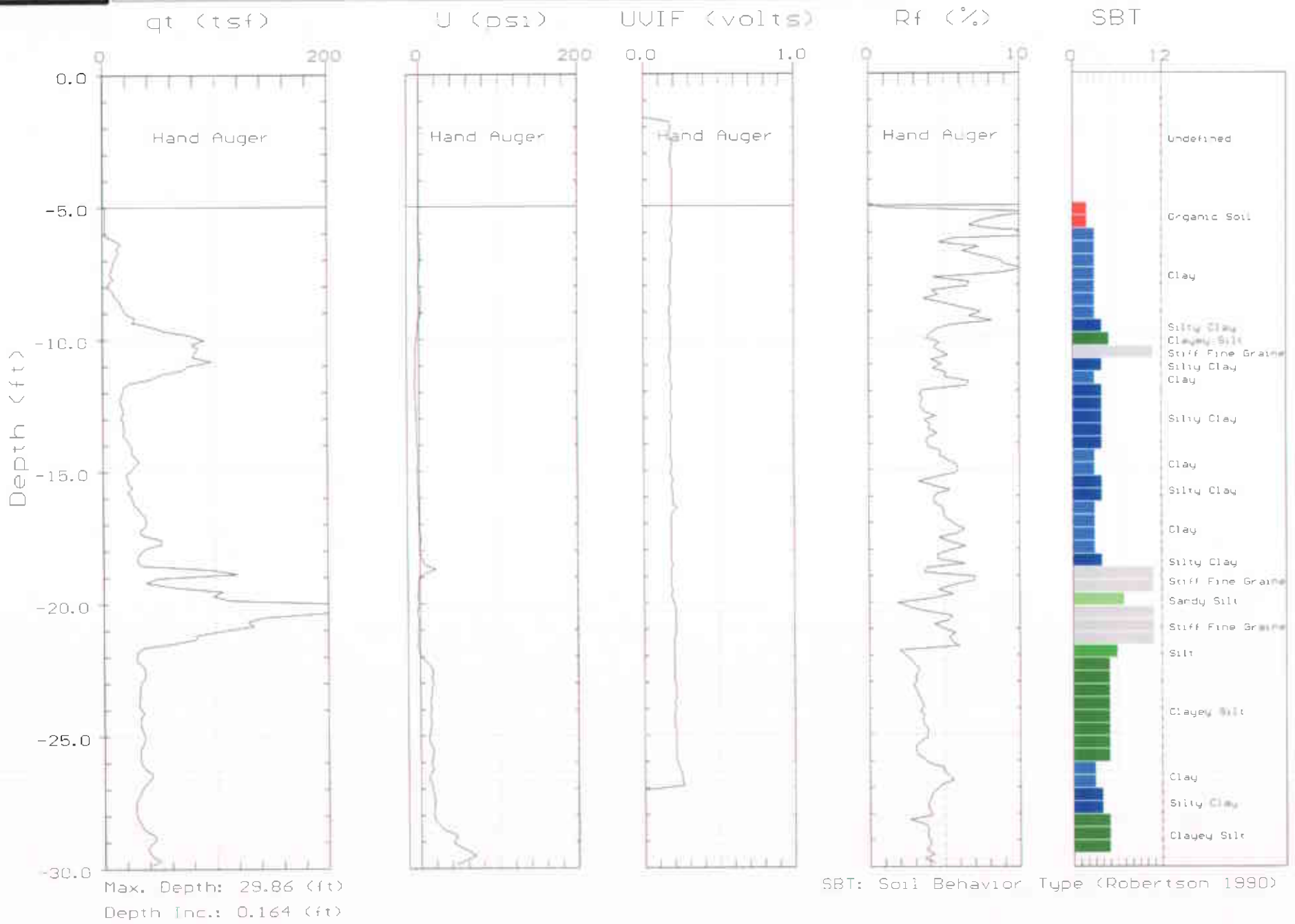
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

Site: SHELL
Location: CPT-09

Engineer: S.DALIE
Date: 04:06:05 11:49



Max. Depth: 29.86 (ft)
Depth Inc.: 0.164 (ft)

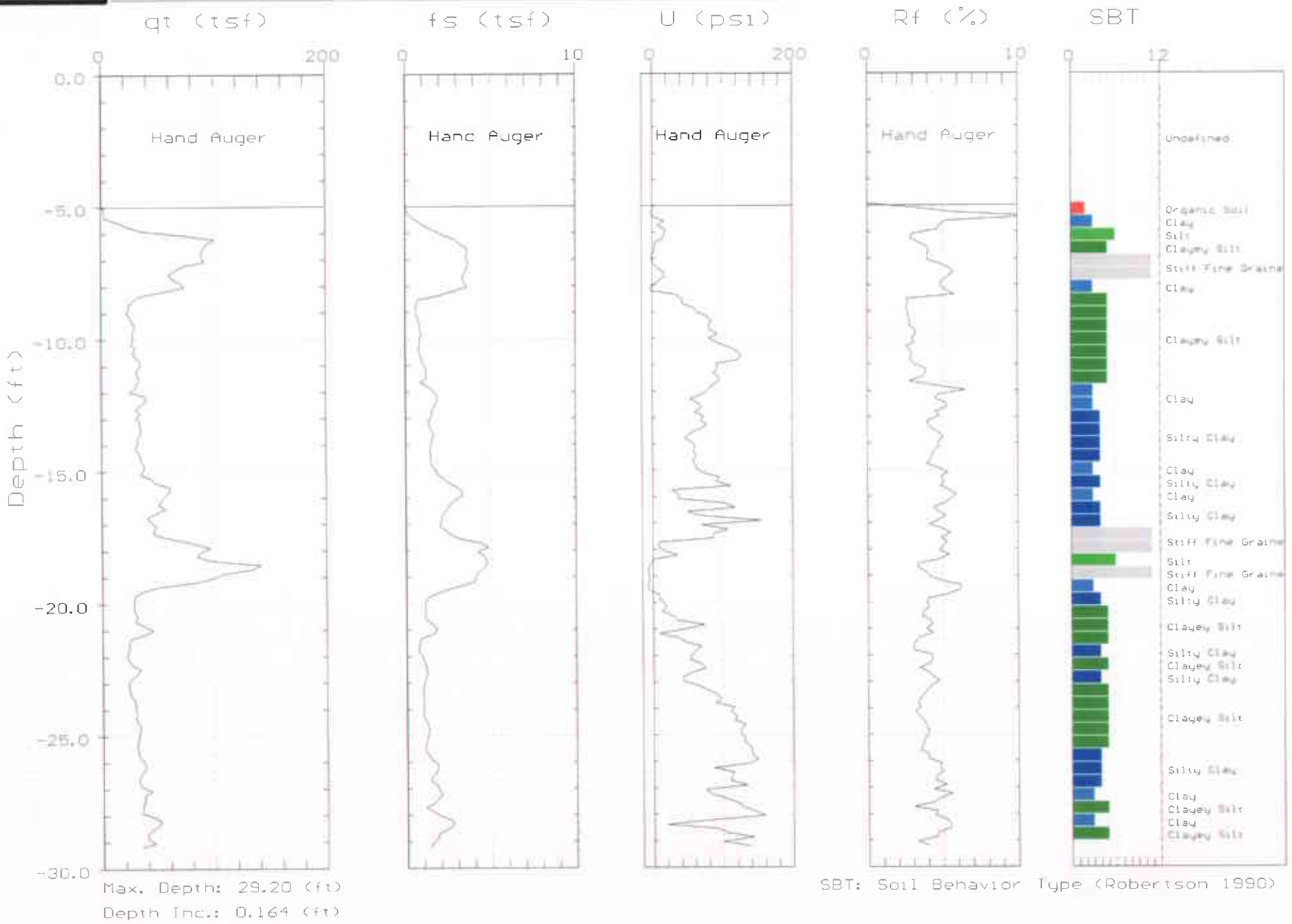
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

Site: SHELL
Location: CPT-10

Engineer: S.DALIE
Date: 04:06:05 12:44



Max. Depth: 29.20 (ft)
Depth Inc.: 0.164 (ft)

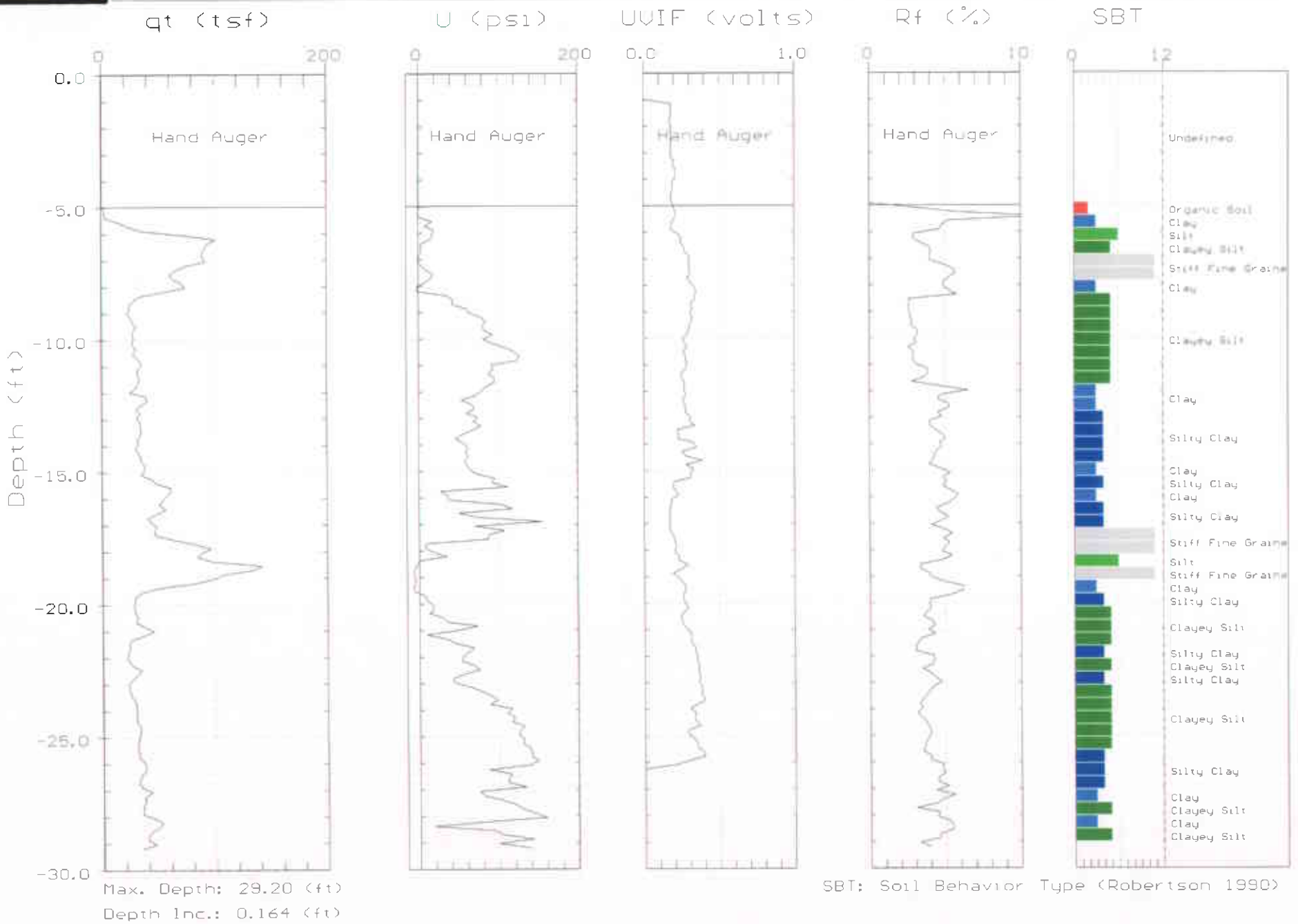
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

Site: SHELL
Location: CPT-10

Engineer: S.DALIE
Date: 04:06:05 12:44



Max. Depth: 29.20 (ft)
Depth Inc.: 0.164 (ft)

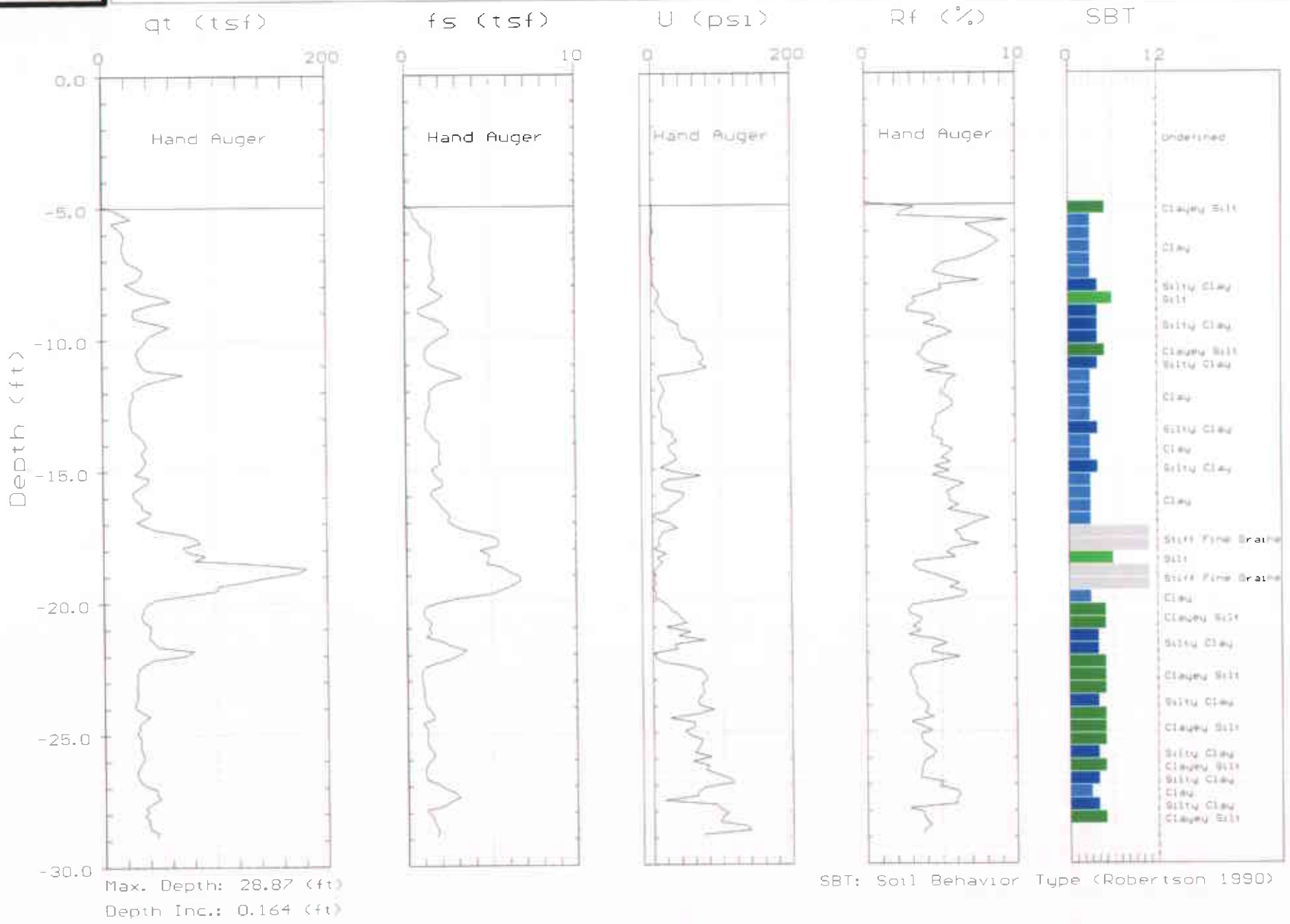
SBT: Soil Behavior Type (Robertson 1990)

GREGG

CAMBRIA

Site: SHELL
Location: CPT-11

Engineer: S.DALIE
Date: 04:06:05 13:56

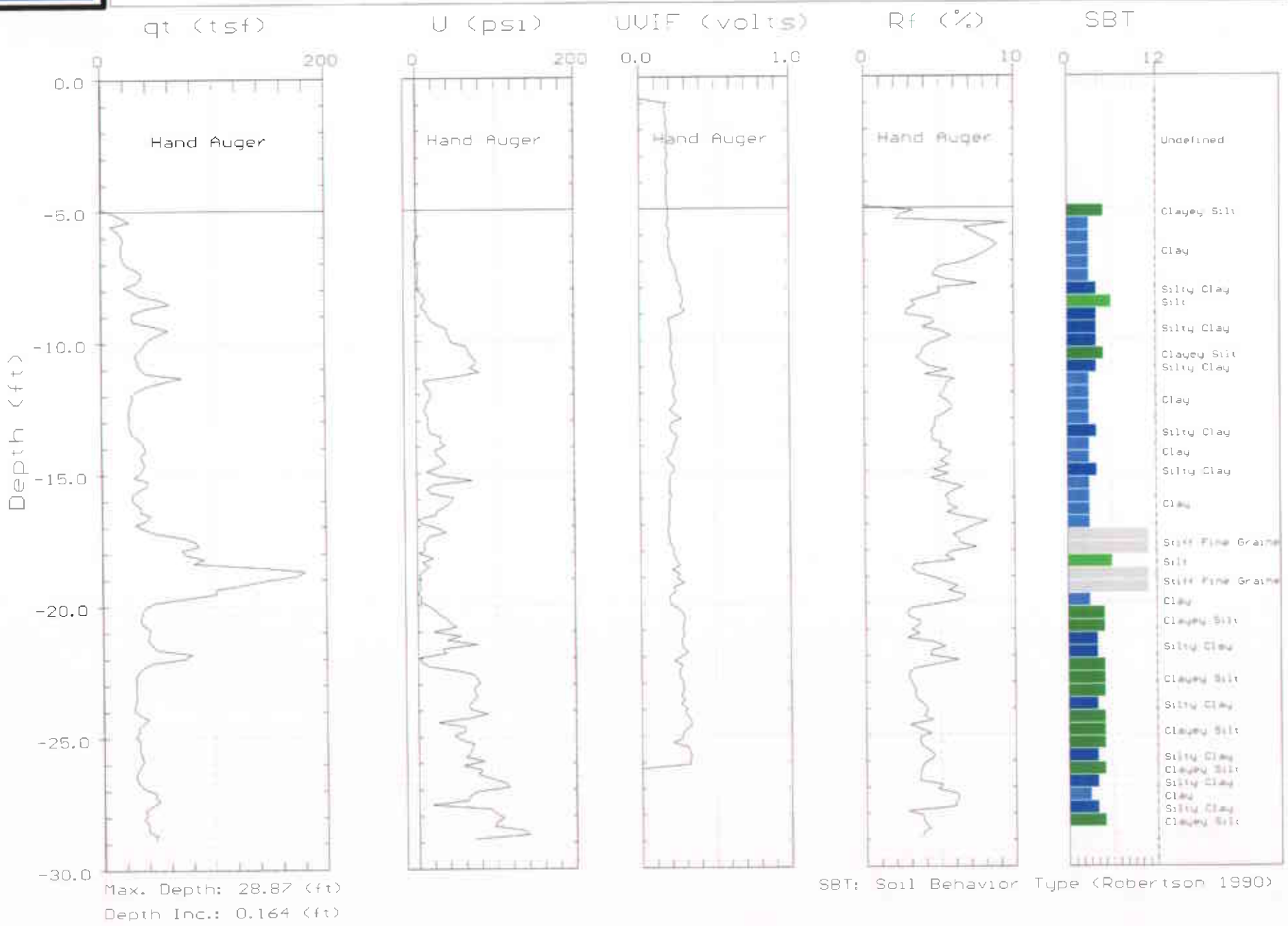


GREGG

CAMBRIA

Site: SHELL
Location: CPT-11

Engineer: S.DALIE
Date: 04:06:05 13:56



Max. Depth: 28.87 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

ATTACHMENT E

Certified Laboratory Analytical Report

SEVERN TRENT STL

Submission#: 2005-04-0196

Cambria Environmental Emeryville

April 14, 2005

5900 Hollis Street, Ste. A
Emeryville, CA 94608

Attn.: David Gibbs

Project#: 247-0524-007
Project: 98995758
Site: 4255 MacArthur Blvd, Oakland, CA

Attached is our report for your samples received on 04/07/2005 11:25
This report has been reviewed and approved for release. Reproduction of this report is permitted only in its entirety.

Please note that any unused portion of the samples will be discarded after 05/22/2005 unless you have requested otherwise.
We appreciate the opportunity to be of service to you. If you have any questions,

You can also contact me via email. My email address is: mbrewer@stl-inc.com

Sincerely,

Melissa Brewer

Melissa Brewer
Project Manager

SEVERN TRENT STL

Submission: 2005-04-0196

Gas/BTEX Fuel Oxygenates by 8260B (C6-C12)

Cambria Environmental Emeryville
Attn.: David Gibbs

5900 Hollis Street, Ste. A
Emeryville, CA 94608
Phone: (510) 420-3363 Fax: (510) 420-9170

Project: 247-0524-007
98995758

Received: 04/07/2005 11:25

Site: 4255 MacArthur Blvd, Oakland, CA

Samples Reported

Sample Name	Date Sampled	Matrix	Lab #
SP-1	04/06/2005 15:00	Soil	1

Gas/BTEX Fuel Oxygenates by 8260B (C6-C12)

Cambria Environmental Emeryville

Attn.: David Gibbs

5900 Hollis Street, Ste. A
Emeryville, CA 94608
Phone: (510) 420-3363 Fax: (510) 420-9170

Project: 247-0524-007
98995758

Received: 04/07/2005 11:25

Site: 4255 MacArthur Blvd, Oakland, CA

Prep(s):	5030B	Test(s):	8260B
Sample ID:	**SP-1**	Lab ID:	2005-04-0196 - 1
Sampled:	04/06/2005 15:00	Extracted:	4/9/2005 12:00
Matrix:	Soil	QC Batch#:	2005/04/09-1A.69

Compound	Conc.	RL	Unit	Dilution	Analyzed	Flag
Gasoline [Shell]	ND	1.0	mg/Kg	1.00	04/09/2005 12:00	
Benzene	ND	0.0050	mg/Kg	1.00	04/09/2005 12:00	
Toluene	ND	0.0050	mg/Kg	1.00	04/09/2005 12:00	
Ethyl benzene	ND	0.0050	mg/Kg	1.00	04/09/2005 12:00	
Total xylenes	ND	0.0050	mg/Kg	1.00	04/09/2005 12:00	
Surrogate(s)						
1,2-Dichloroethane-d4	90.7	76-124	%	1.00	04/09/2005 12:00	
Toluene-d8	89.5	75-116	%	1.00	04/09/2005 12:00	

Gas/BTEX Fuel Oxygenates by 8260B (C6-C12)

Cambria Environmental Emeryville

Attn.: David Gibbs

5900 Hollis Street, Ste. A
Emeryville, CA 94608
Phone: (510) 420-3363 Fax: (510) 420-9170

Project: 247-0524-007
98995758

Received: 04/07/2005 11:25

Site: 4255 MacArthur Blvd, Oakland, CA

Batch QC Report

Prep(s): 5030B

Test(s): 8260B

Method Blank

Soil

QC Batch # 2005/04/09-1A.69

MB: 2005/04/09-1A.69-056

Date Extracted: 04/09/2005 07:56

Compound	Conc.	RL	Unit	Analyzed	Flag
Gasoline [Shell]	ND	1.0	mg/Kg	04/09/2005 07:56	
Benzene	ND	0.0050	mg/Kg	04/09/2005 07:56	
Toluene	ND	0.0050	mg/Kg	04/09/2005 07:56	
Ethyl benzene	ND	0.0050	mg/Kg	04/09/2005 07:56	
Total xylenes	ND	0.0050	mg/Kg	04/09/2005 07:56	
Surrogates(s)					
1,2-Dichloroethane-d4	92.8	76-124	%	04/09/2005 07:56	
Toluene-d8	91.4	75-116	%	04/09/2005 07:56	

Gas/BTEX Fuel Oxygenates by 8260B (C6-C12)

Cambria Environmental Emeryville

Attn.: David Gibbs

5900 Hollis Street, Ste. A
Emeryville, CA 94608
Phone: (510) 420-3363 Fax: (510) 420-9170

Project: 247-0524-007
98995758

Received: 04/07/2005 11:25

Site: 4255 MacArthur Blvd, Oakland, CA

Batch QC Report

Prep(s): 5030B

Test(s): 8260B

Laboratory Control Spike **Soil** **QC Batch # 2005/04/09-1A.69**

LCS 2005/04/09-1A.69-036 Extracted: 04/09/2005 Analyzed: 04/09/2005 07:36

LCSD

Compound	Conc. mg/Kg		Exp.Conc.	Recovery %		RPD	Ctrl.Limits %		Flags	
	LCS	LCSD		LCS	LCSD	%	Rec.	RPD	LCS	LCSD
Benzene	0.0476		0.05	95.2			69-129	20		
Toluene	0.0476		0.05	95.2			70-130	20		
Surrogates(s)										
1,2-Dichloroethane-d4	472		500	94.4			76-124			
Toluene-d8	460		500	92.0			75-116			

Gas/BTEX Fuel Oxygenates by 8260B (C6-C12)

Cambria Environmental Emeryville
Attn.: David Gibbs

5900 Hollis Street, Ste. A
Emeryville, CA 94608
Phone: (510) 420-3363 Fax: (510) 420-9170

Project: 247-0524-007
98995758

Received: 04/07/2005 11:25

Site: 4255 MacArthur Blvd, Oakland, CA

Batch QC Report

Prep(s): 5030B

Test(s): 8260B

Matrix Spike (MS / MSD) **Soil** **QC Batch # 2005/04/09-1A.69**

SP-1 >> MS

Lab ID: 2005-04-0196 - 001

MS: 2005/04/09-1A.69-019 Extracted: 04/09/2005

Analyzed: 04/09/2005 12:19

Dilution: 1.00

MSD: 2005/04/09-1A.69-039 Extracted: 04/09/2005

Analyzed: 04/09/2005 12:39

Dilution: 1.00

Compound	Conc. mg/Kg			Spk.Level	Recovery %			Limits %		Flags	
	MS	MSD	Sample	mg/Kg	MS	MSD	RPD	Rec.	RPD	MS	MSD
Benzene	0.0437	0.0426	ND	0.049701	87.9	90.5	2.9	69-129	20		
Toluene	0.0441	0.0424	ND	0.049701	88.7	90.1	1.6	70-130	20		
Surrogate(s)											
1,2-Dichloroethane-d4	417	432		500	83.4	86.4		76-124			
Toluene-d8	445	450		500	89.0	90.0		75-116			

SEVERN TRENT STL

Submission: 2005-04-0196

Total Lead

Cambria Environmental Emeryville
Attn.: David Gibbs

5900 Hollis Street, Ste. A
Emeryville, CA 94608
Phone: (510) 420-3363 Fax: (510) 420-9170

Project: 247-0524-007
98995758

Received: 04/07/2005 11:25

Site: 4255 MacArthur Blvd, Oakland, CA

Samples Reported

Sample Name	Date Sampled	Matrix	Lab #
SP-1	04/06/2005 15:00	Soil	1

Total Lead

Cambria Environmental Emeryville
Attn.: David Gibbs

5900 Hollis Street, Ste. A
Emeryville, CA 94608
Phone: (510) 420-3363 Fax: (510) 420-9170

Project: 247-0524-007
98995758

Received: 04/07/2005 11:25

Site: 4255 MacArthur Blvd, Oakland, CA

Prep(s): 3050B
Sample ID: **SP-1**
Sampled: 04/06/2005 15:00
Matrix: Soil

Test(s): 6010B
Lab ID: 2005-04-0196 - 1
Extracted: 4/13/2005 14:44
QC Batch#: 2005/04/13-03.15

Compound	Conc.	RL	Unit	Dilution	Analyzed	Flag
Lead	6.3	1.0	mg/Kg	1.00	04/13/2005 22:04	

Total Lead

Cambria Environmental Emeryville
Attn.: David Gibbs

5900 Hollis Street, Ste. A
Emeryville, CA 94608
Phone: (510) 420-3363 Fax: (510) 420-9170

Project: 247-0524-007
98995758

Received: 04/07/2005 11:25

Site: 4255 MacArthur Blvd, Oakland, CA

Batch QC Report

Prep(s): 3050B
Test(s): 6010B

Method Blank **Soil** **QC Batch # 2005/04/13-03.15**

MB: 2005/04/13-03.15-033
Date Extracted: 04/13/2005 14:44

Compound	Conc.	RL	Unit	Analyzed	Flag
Lead	ND	1.0	mg/Kg	04/13/2005 21:22	

Total Lead

Cambria Environmental Emeryville
Attn.: David Gibbs

5900 Hollis Street, Ste. A
Emeryville, CA 94608
Phone: (510) 420-3363 Fax: (510) 420-9170

Project: 247-0524-007
98995758

Received: 04/07/2005 11:25

Site: 4255 MacArthur Blvd, Oakland, CA

Batch QC Report

Prep(s): 3050B

Test(s): 6010B

Laboratory Control Spike **Soil** **QC Batch # 2005/04/13-03.15**

LCS 2005/04/13-03.15-034 Extracted: 04/13/2005 Analyzed: 04/13/2005 21:25
LCSD 2005/04/13-03.15-035 Extracted: 04/13/2005 Analyzed: 04/13/2005 21:28

Compound	Conc. mg/Kg		Exp.Conc.	Recovery %		RPD	Ctrl.Limits %		Flags	
	LCS	LCSD		LCS	LCSD	%	Rec.	RPD	LCS	LCSD
Lead	104	103	100.0	104.0	103.0	1.0	80-120	20		

LAB STL San francisc

SHELL Chain Of Custody Record

113963

Shell Project Manager to be Invoiced: Denis Brown

☑ SCIENCE & ENGINEERING ☐ TECHNICAL SERVICES ☐ CRMT HOUSTON

2005-04-0196

INCIDENT NUMBER (S&E ONLY): 9 8 9 9 5 7 5 8

SAP or CRMT NUMBER (TS/CRMT): 1 3 5 7 0 1

DATE: 4/6/05

PS 1 of 2

COMPANY NAME: Cambria Environmental	LOCA CODE: CET0
ADDRESS: 5900 Hollis Street, Suite A Emeryville, CA 94608	
PROJECT CONTACT (Hardcopy or PDF Report to): David Gibbs	
TELEPHONE: 510-420-3383	FAX: 510-420-9170
E-MAIL: dgibbs@cambria-env.com	
SITE ADDRESS (Street and City): 4255 MacArthur Blvd, Oakland CA	SITE GLOBAL ID: T0600101261
EDF DELIVERABLE TO (Consultant Entity or Developer): shelloaklanderlf@cambria-env.com	PHONE NO.: 510-420-0700
FAX:	CONSULTANT PROJECT NO.: 247-0524-007
SAMPLER NAME(S) (Print): Stu Dalle	LAB USE ONLY

TURNAROUND TIME (BUSINESS DAYS): ☑ 10 DAYS ☐ 5 DAYS ☐ 72 HOURS ☐ 48 HOURS ☐ 24 HOURS ☐ LESS THAN 24 HOURS

☐ LA - RWQCB REPORT FORMAT ☐ UST AGENCY: _____

GC/MS MTBE CONFIRMATION: HIGHEST _____ HIGHEST per BORING _____ ALL _____

SPECIAL INSTRUCTIONS OR NOTES: CHECK BOX IF EDD IS NOT NEEDED ☐

please cc lab reults to dgibbs@cambria-env.com and sdalle@cambria-env.com

REQUESTED ANALYSIS

LAB USE ONLY	Field Sample Identification	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPHg (EPA Method 8260)	BTEX (EPA Method 8260)	TBA (EPA Method 8260)	MTBE (8260B - 0.5ppb RL)	5 oxygenates	Ethanol (8260B)	Methanol	EDB & 1,2-DCA (8260B)	EPA 5035 Extraction for Volatiles	VOCs Halogenated/Aromatic (8021B)	TRPH (418.1)	Vapor VOCs BTEX / MTBE (TO-15)	Vapor VOCs Full List (TO-15)	Vapor TPH (ASTM 3416m)	Vapor Fixed Gases (ASTM D1946)	Test for Disposal (48-)	Test for Disposal, see attached	TPH - Diesel, Extractable (8015m)		MTBE (8260B) Confirmation, See Note
	SP-1A	4/6/5	3:00	Soil	1	X	X															X			
	SP-1B	↓	↓	↓	↓	↓	↓															↓			
	SP-1C																								
	SP-1D																								

FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes

4°C

Grab GSE Finish point ID

TEMPERATURE ON RECEIPT

SP-1

Relinquished by: (Signature)	Received by: (Signature)	Date: 4/6/5	Time: 1200
Relinquished by: (Signature) S. Thompson	Received by: (Signature)	Date: 4/7/05	Time: 11:25am
Relinquished by: (Signature)	Received by: (Signature)	Date: 04/07/05	Time: 1758

DISTRIBUTION: White with shipment, Green to Lab, Yellow and Pink to Originator

OAS Graphic (714) 639-9792

RESIDUAL MANAGEMENT PROCEDURE

ISSUED DATE: [illegible]
CANCELS ISSUE:
ISSUED BY: LRR

RESIDUAL STREAM: SOIL WITH UNLEADED GASOLINE + [illegible]

VENDOR: ALLIED [illegible]

LOCATION: ALLIED WASTE [illegible]
[illegible] SOUTH AUSTIN ROAD
[illegible], CA [illegible]

CALIFORNIA TRANSPORTATION [illegible]

[illegible] BENZENE [illegible] IS > [illegible] THEN [illegible] IS REQUIRED)

CAM METALS = TTLC METALS – lead only
STLC ON ALL TTLC METALS 10 TIMES STLC [illegible]
TTLC LEAD [illegible] REQUIRES ORGANIC LEAD ANALYSIS
IF ANY TTLC TOTAL METAL IS > OR = 10 TIMES THE REGULATORY LEVEL, TCLP IS REQUIRED

[illegible] PETROLEUM HYDROCARBONS, METHOD [illegible] (8015) – GASOLINE AND [illegible]

~~[illegible]~~

AQUATIC BIOASSAY (FISH TOXICITY) [illegible] TO 500 PPM (THE AQUATIC [illegible] PART 800 OF STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER (15TH EDITION)

LABORATORY INSTRUCTIONS (MINIMUM GUIDELINES ONLY)
ALTERNATE APPROVED TEST METHODS PER SW846 ARE ALSO ACCEPTABLE
ALL REQUIRED TESTS ON COMPOSITE (max [illegible])
LABORATORY IS TO SUPPLY QA/QC INFORMATION WITH ALL ANALYTICAL REPORTS
~~[illegible]~~

PROCEDURE ORIGINAL DATE: [illegible]
PROCEDURE REVISED DATE: [illegible]

09-0032

2692

ATTACHMENT F

Soil Disposal Confirmation Report

MANLEY & SONS TRUCKING, INC.
ROCK
SAND
DEMO
FILL DIRT
TOP SOIL
CA0950
(916) 381-6864

Hazardous Waste Hauler (Registration #2843)

8896 Elder Creek Rd. • Sacramento, CA 95828 • FAX (916) 381-1573

FAXED

Disposal Confirmation

Request for Transportation Received: 04/19/05

Consultant Information

Company:	Cambria
Contact:	Stu
Phone:	510-420-3339
Fax:	510-420-9170

Site Information

Station #:	
Street Address:	4255 MacArthur Blvd.
City, State, ZIP:	Oakland, Ca
Customer:	Shell Oil Company RESA-0023-LDC
RIPR #:	43705
SAP # / Location:	135701
Incident #:	98995758
Location / WIC #:	204-5510-0600
Environmental Engineer:	Denis Brown
Material Description:	Soil Stockpile
Estimated Quantity:	1 cy
Service Requested Date:	ASAP
Disposal Facility:	Forward Landfill
Contact:	Scott
Phone:	800 204-4242
Approval #:	5427
Date of Disposal:	04/26/05
Actual Tonnage	.07 tons
Transporter:	Manley & Sons Trucking, Inc.
Contact:	Alayna A Rowe
Phone:	916 381-6864
Fax:	916 381-1573
Invoice:	200504-27
Date of Invoice:	04/30/05