APPENDIX B

SITE ASSESSMENT REPORT AND CLOSURE SUMMARIES

ENVIRONMENTAL DEPARTMENT

Site Assessment and Remediation Division

REPORT OF SITE ASSESSMENT ACTIVITIES AT 19 UNDERGROUND STORAGE TANK SITES NAVAL AIR FACILITY EL CENTRO, CALIFORNIA

Prepared for:

Commander, Navy Region Southwest
Naval Air Facility El Centro
Code N45ECW

Prepared by:

David M. Bloom
Navy Public Works Center
Environmental Department
Code 980

Date Prepared:
October 21, 2004
Revision 0

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REPORT OF
SITE ASSESSMENT ACTIVITIES
AT
19 UNDERGROUND STORAGE TANK SITES
NAVAL AIR FACILITY
EL CENTRO, CALIFORNIA

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Navy Public Works Center San Diego
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Approved by:

Rod Soule
Division Director

NAVFAC
Naval Facilities Engineering Command
PUBLIC WORKS CENTER SAN DIEGO

TABLE OF CONTENTS

Section	Section Tab
OVERVIEW	A
UST SITE 110	110
UST SITE 114	114
UST SITE 145	145
UST SITE 315	315
UST SITE 328	328
UST SITE 333	333
UST SITE 364	364
UST SITE 400	400
UST SITE 400(A)(1) AND 400(B)(2)	400AB
UST SITE 410	410
UST SITE 446	446
UST SITE 459	459
UST SITE 490	490
UST SITE 528	528
UST SITE 537	537
UST SITE 547	547
UST SITE 550	550
UST SITE 551	551
UST SITE 551(I)(N)	551IN

Tables

Abbreviations and Notations iii
Table 1 – Chemical Constituents of Potential Concern A-1
Table 2 – Site Summary Matrix A-2

Figure

Figure 1 – UST Sites Overview Map

ABBREVIATIONS AND NOTATIONS

AC	Asphaltic concrete
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene and total xylenes
DOHS	California Department of Health Services
CCR	California Code of Regulations
CEG	Certified Engineering Geologist
COC	Chain-of–Custody
cy	cubic yard
DQO	Data quality objectives
DTSC	Department of Toxic Substances Control
EM	Electromagnetic
EPA	Environmental Protection Agency
ft	Feet
ft^3	Cubic feet
gal	Gallon
GC/MS	Gas chromatograph/mass spectrometer
GPR	Ground penetrating radar
GPS	Global positioning system
HSA	Hollow-stem auger
ID	Identification
IDW	Investigation-derived wastes
kg	Kilogram
LCS/LCSD	Laboratory control sample /laboratory control sample duplicate
LIF	Laser-induced fluorescence
LNAPL	Light non-aqueous phase liquid
LUFT	Leaking underground fuel tank
MCL	Maximum contaminant level
mg/kg	Milligram per kilogram
mL	Milliliter
MS/MSD	Matrix spike/matrix spike duplicate
msl	Mean sea level
MTBE	Methyl-tertiary-butyl ether
N/A	Not applicable
NA	Not analyzed
NAF	Naval Air Facility
NAPL	Non-aqueous phase liquid
ND	Not detected
OVA	Organic vapor analyzer
PAHs	Polynuclear aromatic hydrocarbons
PID	Photoionization detector
PPE	Personal protective equipment
ppm	Part per million
PRGs	Preliminary Remediation Goals
PWCSD	Navy Public Works Center San Diego
QA	Quality assurance
QC	Quality control
RG	Registered Geologist
RWQCB	Regional Water Quality Control Board
SCAPS	Site Characterization and Analysis Penetrometer System
SWDIV	Naval Facilities Engineering Command Southwest Division
SWRCB	State Water Resources Control Board
TPH	Total petroleum hydrocarbons
TPHd	Total petroleum hydrocarbons-diesel range
TPHg	Total petroleum hydrocarbons-gasoline range
µg/L	Micrograms per liter
µg/kg	Micrograms per kilogram
USA	Underground Service Alert
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground storage tank
VOA	Volatile organic analysis
VOCs	Volatile organic compounds
yd^3	Cubic yards

A. OVERVIEW

The Navy Public Works Center, San Diego, Environmental Department (PWCSD) prepared this report documenting the assessment of 19 underground storage tank (UST) sites at Naval Air Facility (NAF) El Centro (Figure 1). The work was performed in April and May 2004 in accordance with a generic work plan, prepared by PWCSD, dated November 24, 2003, and work plan addenda prepared for each of the 19 sites. The work plans were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. RWQCB correspondence is attached for reference to specific data requests for some sites. This report is divided into 19 sections corresponding to each of the 19 sites assessed. Each section stands as a complete document unto itself. This format was adopted so that information, documentation, conclusions, and recommendations for each site are self-contained. Following the text of each report a "Closure Summary" section is provided so that the RWQCB can concur with the closure of each individual site. It is provided with a signature block for the agency and the Navy to concur with the conclusion.

The sites assessed are a subset of the UST sites in the assessment program. The 19 sites selected for this phase of assessment were ones that met the criteria for assessment using PWCSD's Site Characterization and Analysis Penetrometer System (SCAPS). As discussed in detail in the generic work plan, SCAPS uses laser induced fluorescence (LIF). The intensity and peak wavelength of the LIF is an indication of petroleum, oils, and lubricants (POL). All the sites have previously been subject to some level of assessment. Some have undergone remediation activities. All had data gaps because of insufficient assessment or incomplete remediation. The purpose of the assessment work was to fill data gaps to support closure, guide additional assessment, or show areas for remediation. The specific work plan addenda provided a problem statement. Action criteria are listed below on Table 1.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.

a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

SCAPS LIF was supplemented by soil and groundwater sampling. A brief summary of the 19 sites, studies conducted, and conclusions, are provided in the following matrix.

Table 2 – Site Summary Matrix
UST Assessment Sites
Naval Air Facility, El Centro

Site	Problem Statement	PWC work performed 2004	Conclusion
110	*Soil exceeded cleanup levels for TPH-diesel.*	Four SCAPS pushes. No POL. One soil sample (ND/ND for TPH-g/d). One groundwater sample: 30 mg/L TPH-diesel.	Assessment adequate. Request closure.
114	*Soil exceeded cleanup levels for TPH-diesel.*	10 SCAPS pushes. POL present to NE of former tank location. One groundwater sample (ND).	Delineated extent of hydrocarbons remaining. Recommend leave in place or excavate.
145	*Soil exceeded cleanup levels for TPH-diesel. Groundwater exceeded action level for benzene.*	Four SCAPS pushes, and one groundwater sample. Three soils (ND/ND for TPH-g/d); one groundwater (ND for BTEX/MTBE).	Assessment adequate. Request closure.
315	*Soil exceeded cleanup levels for TPH-diesel.*	Five SCAPS pushes to west. No POL.	Assessment adequate. South inaccessible due to presence of building. Request closure.
328	*Soil exceeded cleanup levels for TPH-diesel.*	Five SCAPS pushes. No POL in three. POL strong at 7-10 ft. Three soil samples (ND/69/2,600 TPH-d).	Assessment adequate. Contamination zone delineated. Recommend excavation.
333	*Soil exceeded cleanup levels for TPH-gasoline. Groundwater exceeded action level for benzene.*	Two SCAPS pushes. No POL.	TPH soil delineated to north. Collect groundwater sample(s) to north/northwest.
364	*Groundwater unconfirmed whether or not action levels for benzene and MTBE are met.*	One SCAPS push. One groundwater sample (ND for BTEX/MTBE).	Assessment adequate. Request closure.
400	*Soil TPH-gasoline and TPH-diesel concentrations unconfirmed.*	One SCAPS push, 15 feet east of former UST. No POL. Facilities preclude SCAPS rig access to other locations.	Use hand auger or limited access to collect soil sample(s).
400(A)(1) &(B)(2)	*Groundwater exceeded action levels for benzene. Confirm extent and severity of MTBE and toluene in groundwater.*	Four groundwater samples; MTBE only detected: 12, 110, 66, 40 ug/L, from source to 150 feet north.	Collect groundwater grab samples from additional microwells(s) to delineate MTBE plume.
410	*Soil exceeded cleanup levels for TPH-diesel.*	Five SCAPS pushes to north and east. Two: no POL. Push-02 POL response. Pushes-04/-06 weak single point POL. Three soil samples TPH-d 200, 100, 400 mg/kg)	Assessment adequate. Request closure.
446	*Groundwater unconfirmed whether or not action levels for BTEX are met.*	One SCAPS push. One groundwater sample (ND for MTBE, 0.9J ug/L for benzene, 1.1 ug/L for toluene).	Assessment adequate. Request closure.
459	*Groundwater exceeded action levels for benzene and toluene*	One SCAPS push. One groundwater sample (ND for BTEX/MTBE).	Assessment adequate. Request closure.

Table A – Site Summary Matrix (continued)

Site	Problem Statement	PWC work performed 2004	Conclusion
490	*Soil exceeded cleanup levels for TPH-diesel. Groundwater exceeded action level for benzene.*	Four SCAPS pushes. One soil (ND/1,300 for TPH-g/d); one groundwater (ND for MTBE, 1.1 for benzene).	Delineation of soil incomplete to south. Request closure of groundwater issue.
528	*Soil exceeded cleanup levels for TPH-diesel. Groundwater exceeded action level for benzene. The presence and magnitude of MTBE in groundwater has not been confirmed.*	Five SCAPS pushes. No POL in one to north. Low POL to east. Strong POL to west. One soil sample (ND/2,700 mg/kg TPH-g/d), one groundwater sample (MTBE 1.3J ug/L, benzene 13 ug/L).	Delineation of soil incomplete. Assess soil using SCAPS to south and west.
537	*Soil exceeded cleanup levels for TPH-diesel. Groundwater exceeded action level for benzene.*	15 SCAPS pushes. Six show strong POL. Delineated except to west (Building 537). One soil (ND/640 TPH-g/d); one groundwater (ND for MTBE/BTEX).	Soil partially delineated. Groundwater assessment complete. Recommend excavation.
547	*Soil exceeded cleanup levels for TPH-diesel.*	Nine SCAPS pushes. Strong POL in three at depths of 10.5 to 17.4 feet (east). Five soil samples (ND for TPH-g; ND, 8,300, 640, 1,500, and 190 for TPH-d). One groundwater sample (ND for BTEX/MTBE).	Soil delineated. Groundwater assessment adequate. Recommend excavation of contaminated soil.
550	*Soil exceeded cleanup levels for TPH-diesel.*	Eight SCAPS pushes. No POL to weak POL. Three soil samples (ND for TPH-g; ND, ND, 840 for TPH-d). One groundwater sample (ND for BTEX/MTBE).	Soil delineated and characterized. Groundwater assessment adequate. Meets cleanup levels. Recommend closure.
551	*Soil exceeded cleanup levels for TPH-diesel.*	Five SCAPS pushes. No POL to weak POL. Three soil samples (ND for TPH-g; 59, 66, and 260 for TPH-d). One groundwater sample (ND for BTEX/MTBE).	Soil delineated and characterized. Groundwater assessment adequate. Meets cleanup levels. Recommend closure.
551(I)(N)	*Soil exceeded cleanup levels for TPH-diesel. Groundwater exceeded action level for benzene and unconfirmed for MTBE.*	Five SCAPS pushes. No POL in four; weak in one. One groundwater sample (ND for BTEX/MTBE).	Assessment adequate. Request closure.

Notes:

Green tint = Assessment adequate. Recommend no further action (closure).

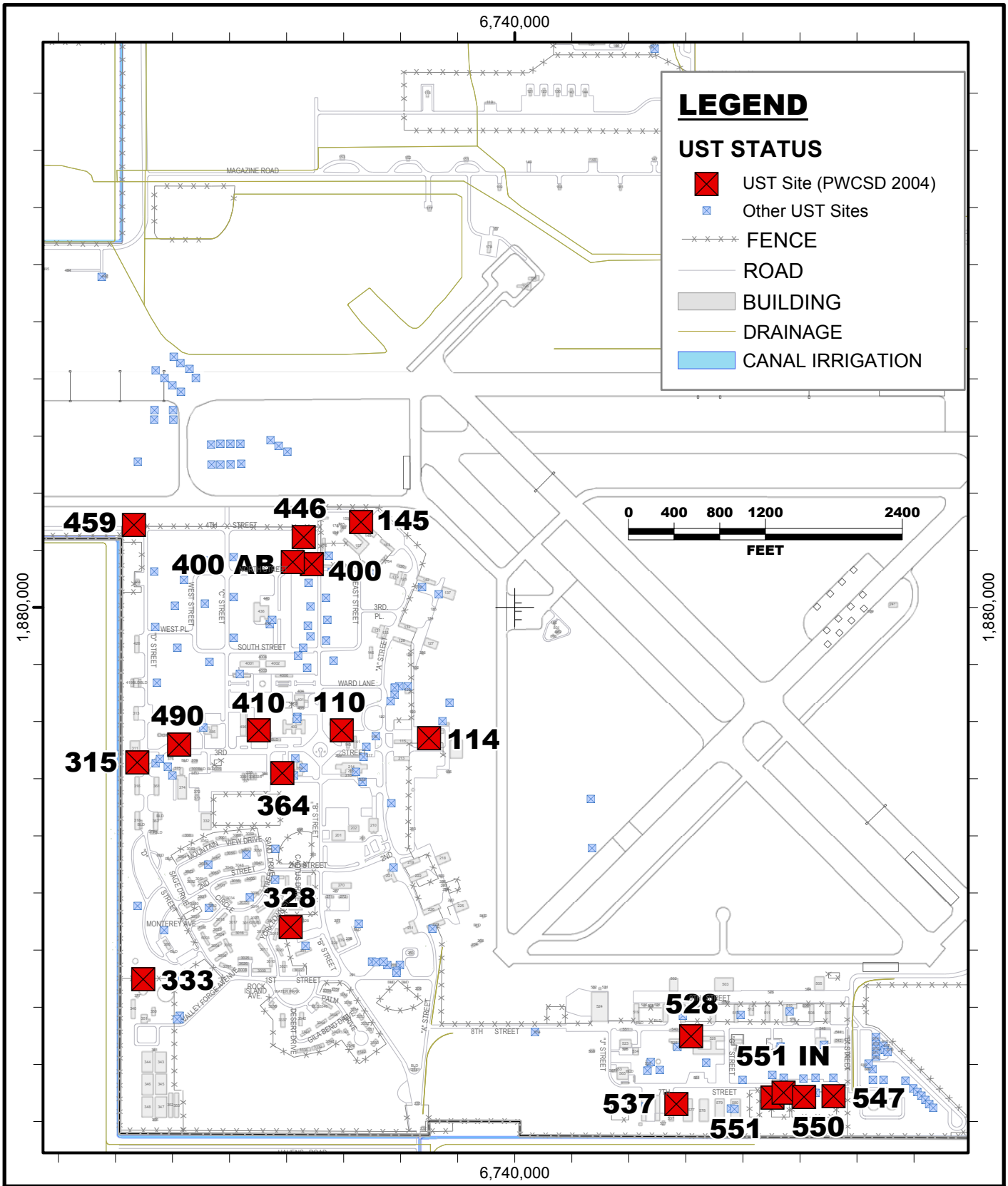
Blue tint = Recommend additional soil or groundwater assessment.

Red tint = Recommend remediation of soil by excavation.

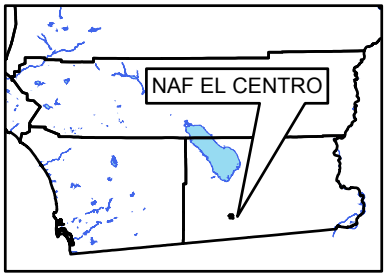
Yellow tint = Other or multiple recommendation options.

Soil analytical results reported in milligrams per kilogram (mg/kg)

Groundwater analytical results reported in micrograms per liter (ug/L).



LOCATION MAP



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MAP PROJECTION: NAD 83 CALIFORNIA STATE PLANE ZONE 6, SURVEY FEET

UST SITES OVERVIEW MAP

NAVAL AIR FACILITY EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
SITE ASSESSMENT
AND REMEDIATION DIVISION

DATE: OCT 21, 2004
FILE: UST04-RPT -Fig1.mxd

FIGURE: 1

California Regional Water Quality Control Board
Colorado River Basin Region

Terry Tamminen
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Arnold Schwarzenegger
Governor

May 6, 2004

Mr. David Bloom
Navy Public Works Center
Environmental Department Code 980
2730 McKean St., Suite 1
San Diego, CA 92136-5294

RE: **WORK PLAN ADDENDUM FOR SITE ASSESSMENTS AT VARIOUS UNDERGROUND STORAGE TANK (UST) SITES, NAVAL AIR FACILITY, EL CENTRO, CALIFORNIA.**

The Regional Water Quality Control Board, Colorado River Basin region, received the above referenced documents for 22 UST sites in at various times during late March and early April. The purpose of these documents is to provide site-specific details regarding assessment and potential remediation strategies for the UST sites. The addendum are intended to supplement a Generic Work Plan for UST Assessment and Remediation which has previously been reviewed and approved by this agency. After reviewing the individual addendum, board staff has the following comments:

1. **Tank 364**: Proposed work plan says that 2-4 groundwater samples will be taken, yet the site map shows (5) proposed sample points. Please clarify. The tank was last reported as left in place, is there any plan to excavate and perform soil confirmation samples if it is confirmed as present?
2. **Tank 459**: The text indicates that at least two groundwater samples will be collected from the SCAPS microwells, yet Figure 2 only shows one proposed SCAPS location. Will the two samples be taken from the same point or at different locations? Staff requests that the samples be taken from the upper portion of the aquifer for most accurate results.
3. **Tank 547**: The text indicates that a groundwater sample MAY be collected from a SCAPS microwell. Staff is requesting that at least one groundwater sample be collected. Previous groundwater investigation samples were not taken from the upper portion of the aquifer [groundwater table at 11.3 feet (Borehole Log 547-S1), sample taken at 14.5-18 feet).
4. **Tank 490**: The text indicates that previous groundwater samples were collected from a depth range of 6 to 16 feet bgs. Board staff requests that proposed SCAPS groundwater samples be taken from the upper portion of the aquifer, utilizing a smaller screen interval for more accurate results

5. Tank 550: The text indicates that previous groundwater samples taken during previous site investigations were taken at a depth of 16.5-20 feet bgs. Soil boring log 550-H1 indicates that the water table begins at 10 feet. Board staff are concerned that groundwater samples may not reflect actual conditions since many diesel constituents and additives are less dense than water and are more likely to be present at the upper portion of the aquifer. At least four SCAPS pushes are proposed for this site, board staff requests that at least one groundwater sample be taken down gradient of the tank location to verify that groundwater constituents are below regulatory action levels.

6. Tank 551: Board staff requests that one groundwater sample be taken, down gradient form the tank location, from at least one SCAPS microwell, in order to verify that groundwater constituents are below regulatory action levels. Previous samples were taken in the lower portion of the aquifer, and as noted on table 4-38, results for MTBE are "unconfirmed and may have been caused by chromatographic interference."

7. Tank 114: Board staff requests that at least one groundwater sample be collected from a SCAPS microwell. Previous groundwater samples were taken northeast from the tank location, yet the text indicates that groundwater flow is towards the northwest. Please collect the sample from the upper portion of the aquifer for more accurate results.

Board staff concur with the recommendations proposed for tanks 110, 145, 198, 315, 328, 331, 333, 400, 400 (A)(1), 400 (B)(2), 410, 446, 485, 528, 537, and 551 (I)(N) in the work plan addendum. Should you have any questions regarding these comments, please contact me at (760) 776-8973.

DAVID VIRGINIA
Environmental Scientist (B)

cc: Mr. Robert Fischer, NAF El Centro
Mr. James Hoyle, SW DIV

DV/hs

File: DoD, Naval Air Facility El Centro

California Regional Water Quality Control Board
Colorado River Basin Region

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Governor

FEB 10 2004

Mr. David M. Bloom
Naval Facilities Engineering Command
Public Works Center, Environmental Dept.
2730 McKean St., Suite 1
San Diego, CA 92136-6000

RE: **WORK PLAN ADDENDA FOR SITE ASSESSMENTS AT UNDERGROUND STORAGE TANK SITES 328, 331, 485, AND 550, NAVAL AIR FACILITY, EL CENTRO, CA.**

The Regional Water Quality Control Board, Colorado River Basin region, received the above referenced documents on January 29, 2004, and has completed its' review. The purpose of these documents is to supplement the Generic Work Plan for Site Assessment and Remedial Action at Underground Storage Tanks (UST's) at Naval Air Facility, El Centro. The addenda are site specific and present the current tank status, background monitoring results, any identified data gaps, and proposed remedial actions needed to support closure of the sites.

Regional Board staff concurs with the proposed work plans as presented for UST sites 485 and 550. Previous groundwater samples taken during past investigations at UST sites 328 and 331 indicate that groundwater may be potentially contaminated with hydrocarbons, BTEX compounds, and/or MTBE. Should further sampling confirm contamination, Task III of the Generic Work Plan, installation of downgradient monitoring wells, may be implemented as necessary.

Should you have any questions regarding this correspondence, please contact me at (760) 776-8973.

David Virginia

DAVID VIRGINIA
Environmental Scientist (B)

DV/hs

cc: Mr. Robert Fischer, NAF El Centro
Mr. James Hoyle, SWDIV
Commander, Navy Region Southwest

File ref: DoD, Naval Air Facility, El Centro

Site Assessment Report and
Closure Summary
UST Site 110
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 110 at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 110 work plan addendum, dated March 8, 2004, prepared by the Public Works Center San Diego (PWCSD). Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 110. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 110
Site Address:	Northwest of 3rd and "B" Streets, southeast corner of Building 110 Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,738,485 Northing: 1,878,921 feet (State Plane 6)
Facility Name:	Chaplain's Office/Base Library/Navy Relief Office
Property Owner: Tank Owner/Operator: Responsible Party:	United States Navy United States Navy United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430006

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	Not available
Construction Materials:	Reinforced concrete
Capacity:	2,400 gallons
Contents:	Diesel
Year Removed:	1993 by Environmental Chemical Corp. (ECC)

Figure 1 shows a map of the site location and previous and current assessment locations.

According to the *Final Technical Memorandum Underground Storage Tank Site Investigation*, dated March 2000, prepared by Bechtel National, Inc. (BNI, 2000), ECC removed a 2,400-gallon UST in 1993 at the location shown on Figure 1. Four soil samples were collected directly from the excavation as part of tank removal. Analytical testing results indicate total petroleum hydrocarbons quantitated as diesel (TPH-diesel) concentrations in two of the excavation soil samples exceeded the cleanup standard of 1,000 milligrams per kilogram (mg/kg).

In 1999, BNI advanced one HydroPunch boring approximately 30 feet north (downgradient) of the former tank location. The groundwater sample was collected from a depth range of 6 to 16 feet bgs. The groundwater sample indicated that constituents of concern were not detected or were detected below action levels.

In May/June 2000, Geofon, Inc., excavated approximately 201 cubic yards (cy) of fuel-impacted soil from the former tank location, according to *Final Technical Memorandum, Removal of Underground Storage Tanks and Remediation of Fuel-Impacted Soil at Various UST Sites, Naval Air Facility, El Centro, California*, dated November 13, 2000, prepared by Geofon, Inc. At the excavation limits, a soil and groundwater sample were collected from the bottom of the excavation, and five soil samples were collected from the sidewalls, as shown on Figure 4-1, attached. Soil samples collected from the north, east, and south sidewalls contained TPH-diesel concentrations of 27,100; 58,600 J; and 7,910 mg/kg, respectively, which exceeded the cleanup goals for the site. The groundwater concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX) did not exceed cleanup levels, and methyl-*tertiary*-butyl ether (MTBE) was not detected. The historical analytical results are summarized in Table 4-1, attached.

PWCSD Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Soil exceeds cleanup levels for TPH-diesel*. Specifically, we focused our assessment on the north, east, and south sides of the former tank overexcavation. The groundwater gradient is estimated to be to the north. Field activities were performed April 4-5, 2004.

In accordance with the work plan, Laser Induced Fluorescence (LIF) was measured *in situ* using the Site Characterization and Analysis Penetrometer System (SCAPS) at four locations as shown on Figure 1. Mature landscaping and subsurface utilities precluded additional sample points further west or northwest of sample location EC-110-04, located northeast and downgradient to cross-gradient of the former UST location. The LIF data are summarized and interpreted in Table 2. No fluorescence characteristic of petroleum, oil, or lubricants (POL) was encountered.

At location EC-110-04, a soil sample was collected at a depth of 10.0 feet below ground surface (bgs), and a groundwater sample was collected from a depth of 6 to 16 feet bgs. The samples were immediately delivered to an on-site mobile laboratory for analytical testing. TPH-gasoline was not detected and TPH-diesel was detected at a concentration of 30 mg/kg in the soil sample, which is consistent with the expected LIF detection threshold. BTEX and MTBE were not detected in the groundwater sample. Groundwater was measured at approximately 13.0 feet bgs. The temporary well was screened with ¾-inch diameter 0.010-inch slotted PVC from 6 to 16 feet bgs. The groundwater grab sample was collected unpurged using a single-use disposable bailer. Sample locations and analytical results are illustrated on Figure 1. The temporary well was abandoned by grouting in place.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, the vertical and horizontal extent of fuel-impacted soils has been delineated to the extent practicable. Groundwater does not appear to be adversely affected by fuel contamination. The data obtained during the previous and current investigations indicate that the majority of TPH-diesel impacted soil has been removed and that the elevated TPH-diesel concentrations reported on soil in the north, east, and south sidewalls in 2000 appear to extend an insignificant distance from the tested locations (less than 5 to 10 feet laterally), or may have naturally decreased in concentration through time and/or the exposure of the atmosphere during excavation.

Due to the limited amount of impacted soil that is anticipated to remain, and no documented groundwater impact from a fuel release from this site, and a site that is covered by asphalt or landscaping, the contaminants that may remain do not pose an unacceptable risk to human health or the environment. It is the opinion of PWCSD that further assessment or remediation at this site is unnecessary. We recommend that no further action be considered for this site.

Site Characterization and Closure Information

Description of the former UST:	See Background Information, page 1.
Contaminants Identified:	See attached analytical results table.
Amount of Contaminants Leaked:	Not estimated. See attached analytical results table.
MTBE:	None detected.
Description of the soil/geology:	Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? Yes. Based on a review of the analytical data, the lateral and vertical extent of soil impacted with fuels has been delineated.

Estimated volume of contaminated soil left on site and concentration: An upper-range (conservative) estimate of soil containing greater than 1,000 mg/kg TPH-diesel would be 15 cubic yards (cy). This volume assumes the presence of contamination along the south and east sides (40 feet), width of 5 feet from the sides and a thickness of 2 feet. A lower range estimate is <1 cy. Actual volume is likely within this range.

Is groundwater contamination completely delineated? Yes. Current analytical results for groundwater show that constituents of concern are not detected.

Monitoring wells installed, properly permitted? No monitoring wells were installed.

Depth to groundwater: Approximately 13 feet bgs.

Is groundwater or surface water impacted? No. All analytical results for groundwater meet cleanup goals for the site (below tap water PRGs and drinking water MCLs).

Closure

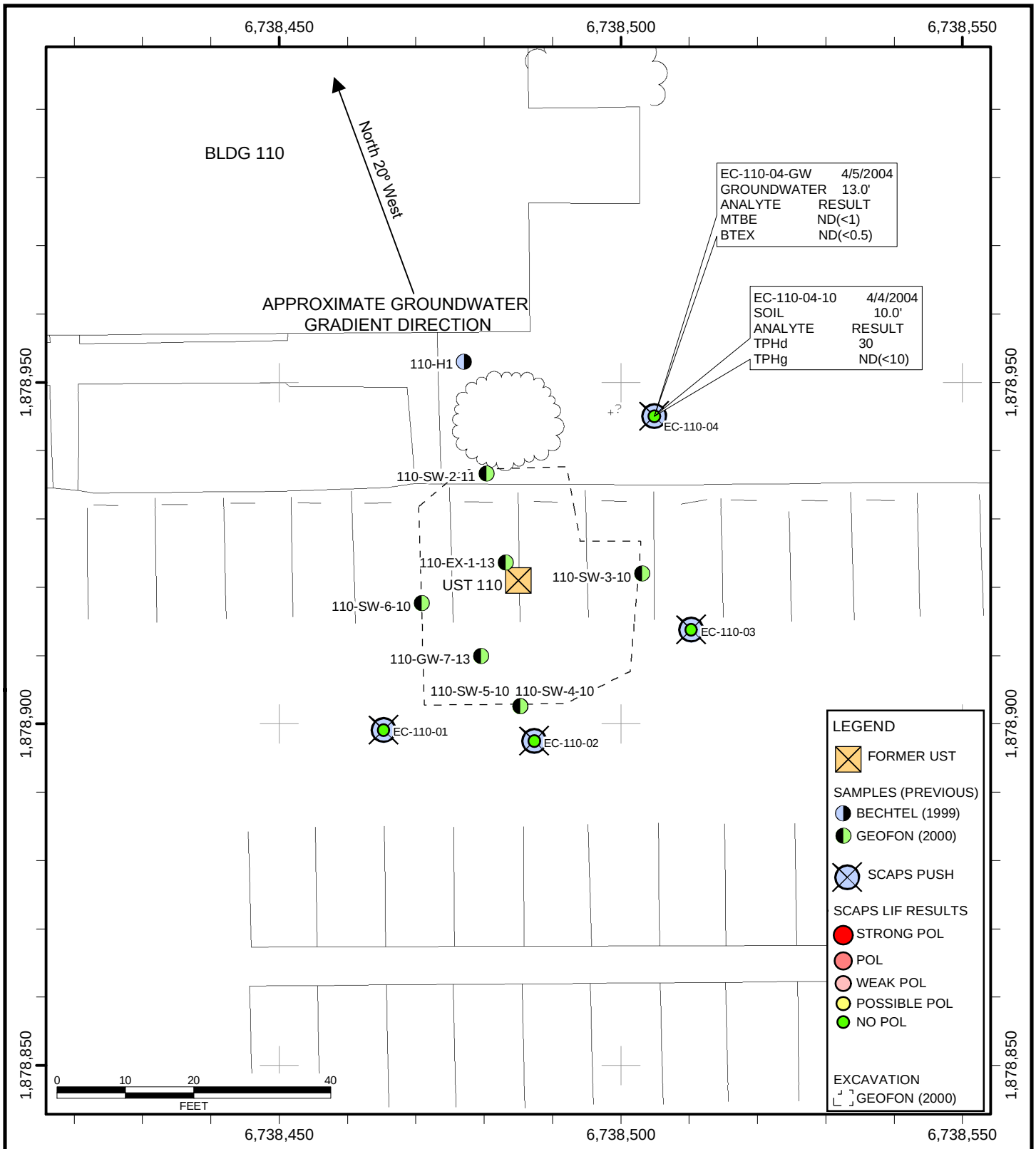
Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Yes.

Remedial action taken? UST removed 1993. Approximately 201 cy fuel-containing soil removed 2000.

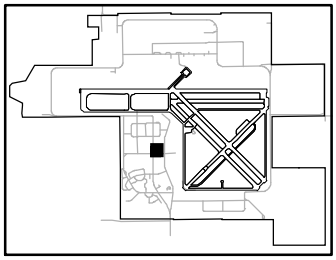
Site Closure: Due to the limited amount of impacted soil that is anticipated to remain, and no documented groundwater impact from a fuel release from this site, and a site that is covered by asphalt or landscaping, the contaminants that may remain do not pose an unacceptable risk to human health or the environment. The recommendation for site closure is accepted and no further action is required at this site.

Signature: ***Date:***	***Signature:*** ***Date:***
N.R. Wells **Lieutenant Commander, CEC, US Navy** **By direction of** **The Commanding Officer**	**Liann P. Chavez, R.G.** **Senior Engineering Geologist** **California Environmental Protection Agency** **California Regional Water Quality Control Board** **Colorado River Basin Region**

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS, Soil, and Groundwater Results
Site 110 from Geofon (2000), including Table 4-1, and Figure 4-1
SCAPS Logs
Laboratory Analytical Report and Chain-of-Custody Documentation



OVERVIEW MAP - NAF EL CENTRO



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MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 110

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC1

FIGURE: 1

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence, Soil, and Groundwater Analytical Data Summary

UST Site 110
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-110-01	4/2/2004	19.6	21.9	2,004 @ 13.9	No POL		
EC-110-02	4/2/2004	19.3	21.8	1,805 @ 7.2	No POL		
EC-110-03	4/2/2004	19.3	21.6	2,653 @ 12.6	No POL		
EC-110-04	4/2/2004	19.4	21.6	2,229 @ 12.4	No POL		
EC-110-04-10	4/4/2004					10.0': TPHd: 30 mg/kg TPHg: <10 mg/kg	
EC-110-04-GW	4/5/2004					13.0': BTEX: <1.0 ug/L MTBE: <10.0 ug/L	6'-16'

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

4.0 SITE ANALYTICAL RESULTS

This section describes the current use of each site and available information on specific USTs, and summarizes current and previous UST related activities conducted at the UST sites. See Section 3.0 for a discussion of the field activities associated with the current UST site investigation/cleanup.

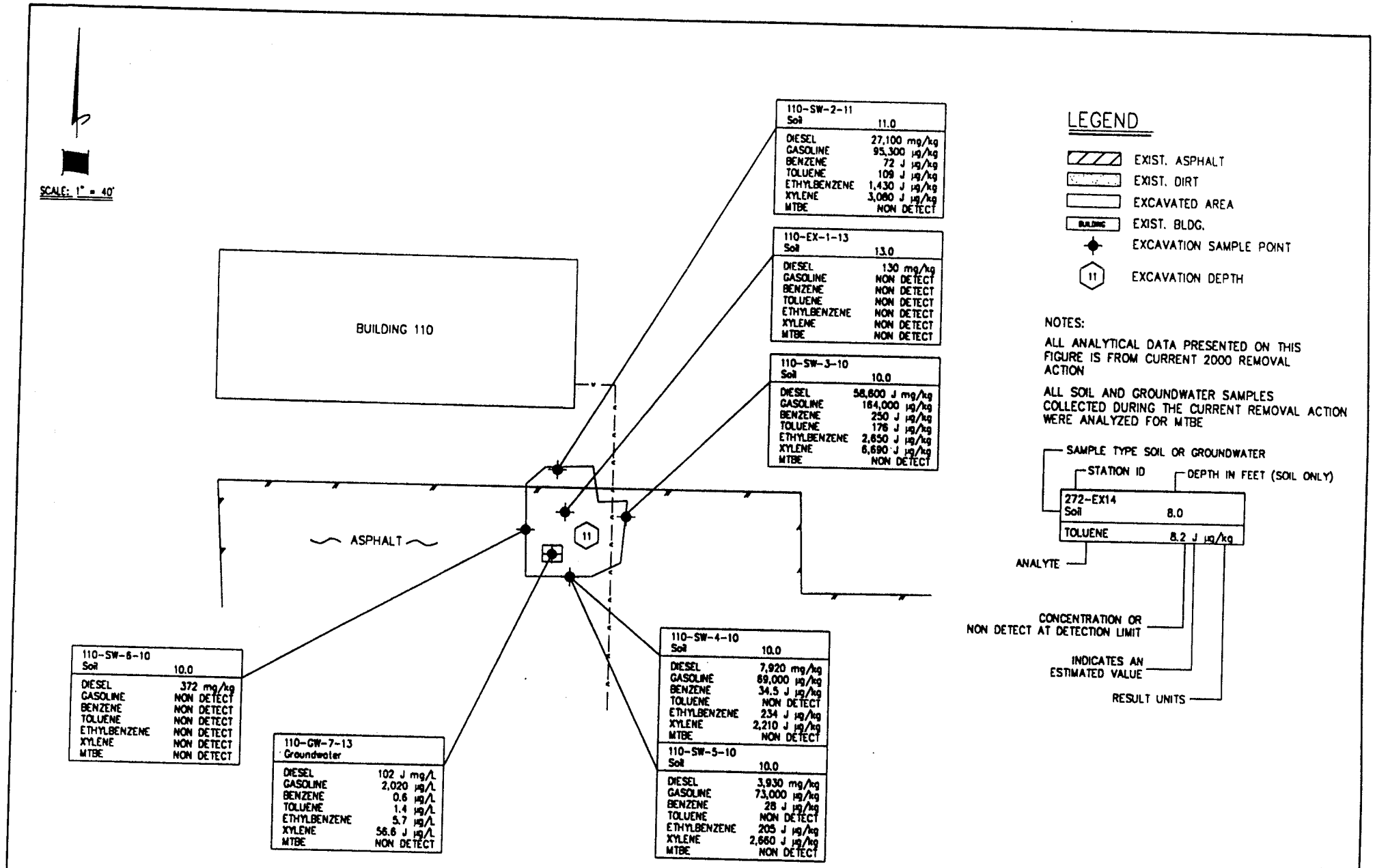
4.1 Site 110: Site Description and Analytical Results

UST 110 was a 2,400-gallon concrete diesel fuel UST, that was removed by Environmental Chemical Corp. (ECC) (1993). This tank was located near the southeast corner of Building 110. Information on the installation date was not available.

Several previous soil and groundwater investigations have been conducted at UST Site 110 (Table 4-1). In 1993, ECC collected four soil samples as part of the tank removal. The four samples were collected directly from the tank excavation. Historical records indicate that contaminated soil from the excavation was disposed off-site. In 1999, BNI advanced a single Hydropunch soil boring approximately 30 feet downgradient of the original tank site The HydroPunch -boring was advanced to 16 feet bgs and utilized a 10-foot PVC 0.010-slotted screen, set from 6 to 16 feet bgs (Table 4-1).

As part of this current UST site investigation/cleanup, an excavation measuring approximately 31 x 27 x 11 feet was accomplished and approximately 201 cubic yards (cyd) of fuel-impacted soil was removed and disposed of off-site (Appendix D). Upon reaching the limits of excavation, one soil sample (110-EX-1-13) and one groundwater sample (110-GW-7-13) was collected from the bottom of the excavation and five soil samples (110-SW-2-11, 110-SW-3-10, 110-SW-4-10, 110-SW-5-10 and 110-SW-6-10), including a field duplicate, were collected from the sidewalls of the excavation (Figure 4-1, Table 4-1).

Soil samples collected from the north (110-SW-2-11) and east (110-SW-3-10) sidewalls contained concentrations of diesel (27,100 mg/kg and 58, 600 J mg/kg, respectively) above the soil cleanup level of 1,000 mg/kg. Additionally, sample 110-SW-3-10 had a concentration of gasoline (164,000 μg/kg) above the soil cleanup goal of 100,000 μg/kg. At the direction of the RPM SWDIV, no further excavation was performed at this site.



Technical Memeorandum
Figure 4-1
Site 110 - Site Map

NAF El Centro
Imperial County, California

GEOFON INCORPORATED

Date: November 2000
Contract No.: N68711-97-D-8702
DO No.: 003

Table 4-1
Analytical Results for Site 110

Sample Number	Boring Number	Depth (feet bgs)	TPH-Gas[a]	TPH-Diesel[b]	TRPH	Benzene[c]	Toluene[c]	Ethlybeneze	Xylene[c]	MTBE[c]	Organolead[d]
Soil Results - GEOFON, Soil Removal/Field Investigation, May/June 2000 (μg/kg)											
110-EX-1-13	Excavation	13	2,000 U	130[e]		10 U	10 U	10 U	20 UJ	20 U	
110-SW-2-11	Excavation	10	95,300	27,100[e]		72 J	109 J	1430 J	3080 J	100 U	
110-SW-3-10	Excavation	10	164,000	58,600 J[e]		250 J	176 J	2650 J	6690 J	50 U	
110-SW-4-10	Excavation	10	69,000	7,920[e]		34.5 J	25 U	234 J	2210 J	50 U	
110-SW-5-10	Excavation	10	73,000	3,930[e]		28 J	25 U	205 J	2660 J	50 U	
110-SW-6-10	Excavation	10	2,000 U	372[e]		10 U	10 U	10 U	20 UJ	20 U	
Groundwater Results - GEOFON, Soil Removal/Field Investigation, May/June 2000 (μg/L)											
110-GW-7-13	Excavation	13	2,020	102 J[f]		0.6	1.4	5.7	56.6 J	1.0 U	
Historical Data, Groundwater Results - BNI, Field Investigation, January/February 1999 (μg/L)											
175HP38	110-H1	6-16[g]		12[f]		0.5 U	1.0 U	41	59	10 U	
Historical Data, Soil Results - Environmental Chemical Corp., UST Removal Phase I, 1993 (mg/kg)[h]											
Tank 110-1		11		393							
Tank 110-2		11		763							
Tank 110-3		Unknown		12,910							
Tank 110-4		Unknown		46,440							

Notes:
- [a] analyzed using United States Environmental Protection Agency (U.S. EPA) Method 8015-M; this analysis was calibrated for TPH-gasoline
- [b] analyzed using U.S. EPA Method 8015-M; this analysis was calibrated for TPH-diesel
- [c] analyzed using U.S. EPA Method 8021B
- [d] analyzed by California Leaking Underground Fuel Tank Method
- [e] diesel results for soil reported in milligrams per kilogram
- [f] diesel results for groundwater reported in milligrams per liter
- [g] Hydropunch screened interval
- [h] collected during UST removal

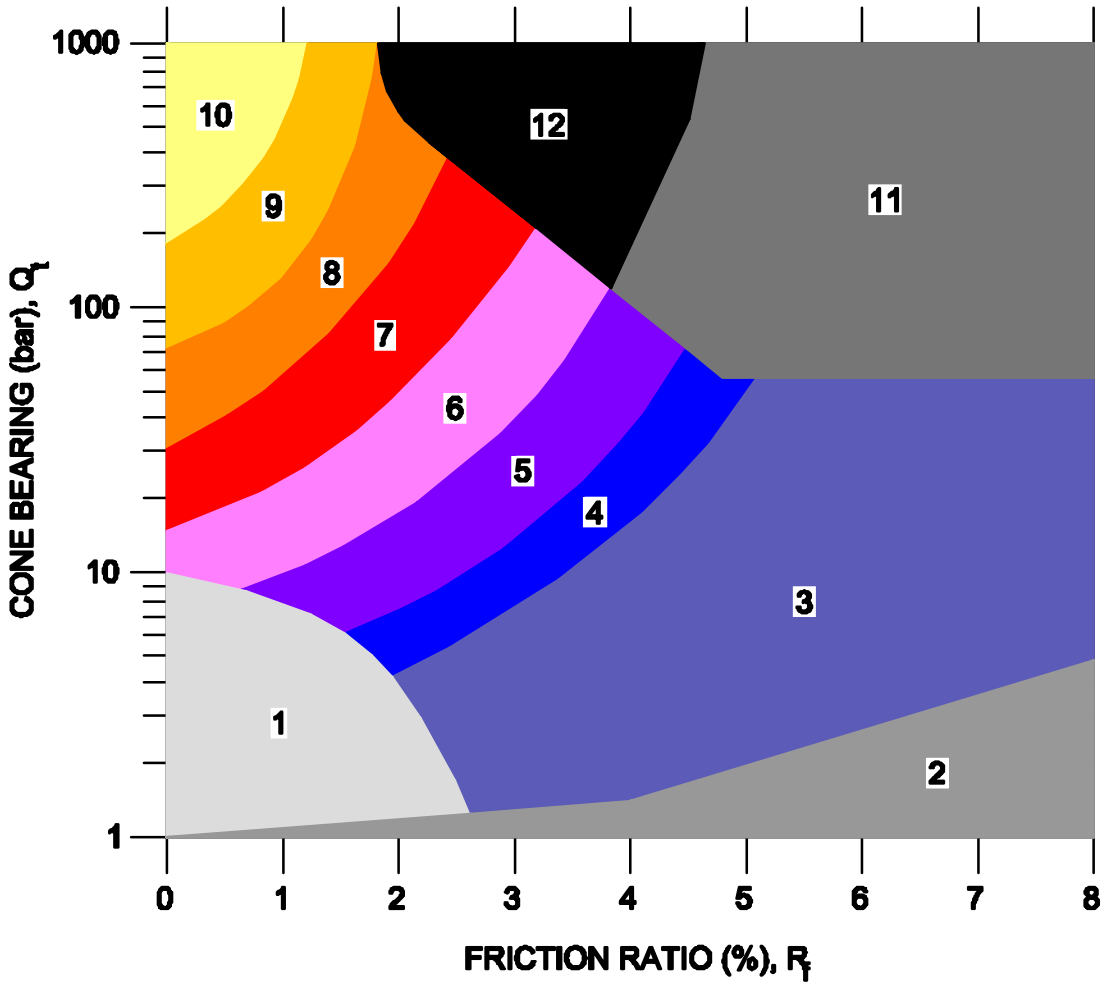
Acronyms/Abbreviations:
- μg/L - micrograms per liter
- μg/kg - micrograms per kilogram
- bgs - below ground surface
- BNI - Bechtel National, Inc.

Table 4-1 (Continued)
Analytical Results for Site 110

Acronyms/Abbreviations:

mg/kg - milligrams per kilogram (parts per million)
MTBE - methyl-tertiary-butyl ether
TRPH - total recoverable petroleum hydrocarbons
U - not detected above the referenced detection limit
J - an estimated value
UJ - detection limit is an estimated value

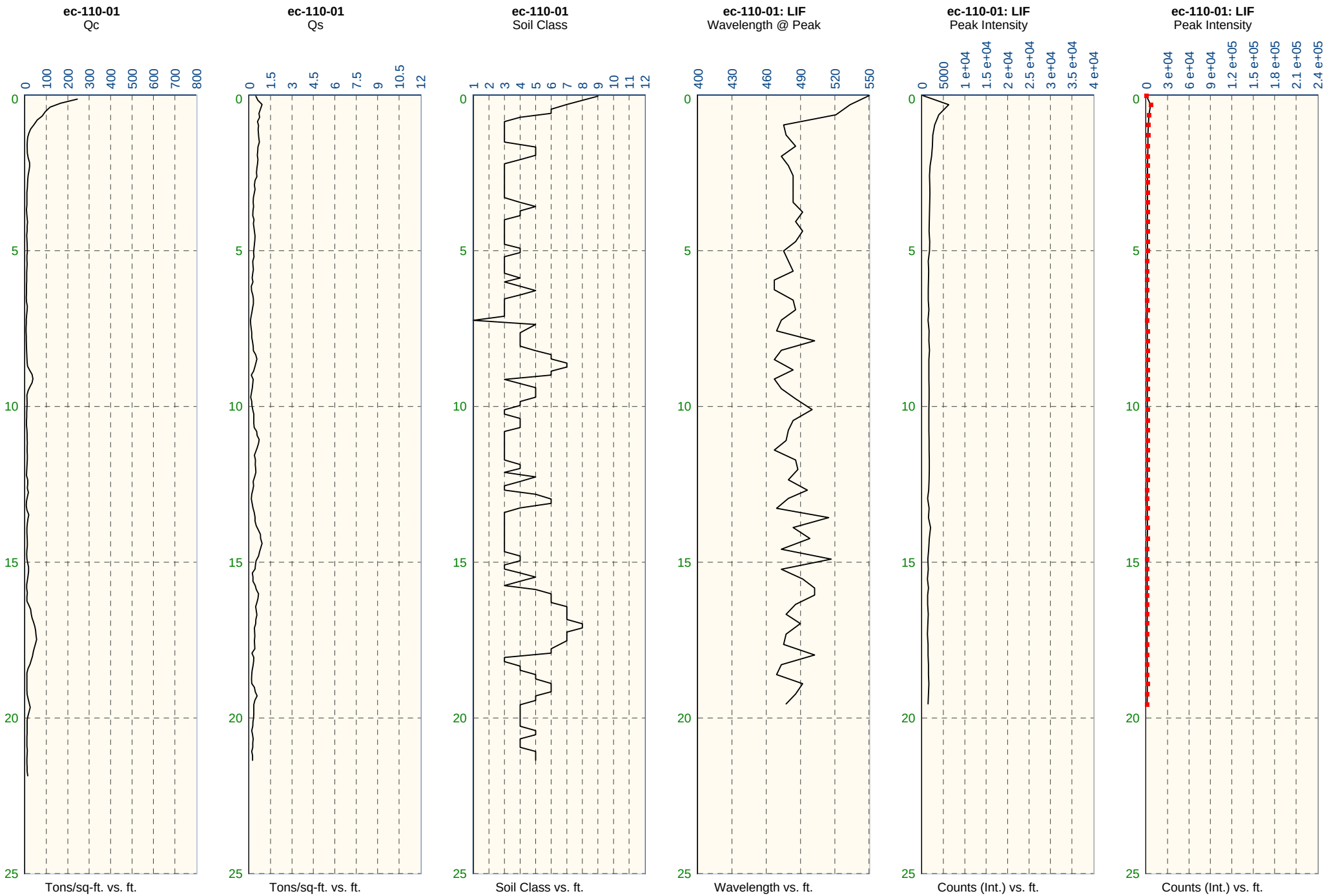
CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)

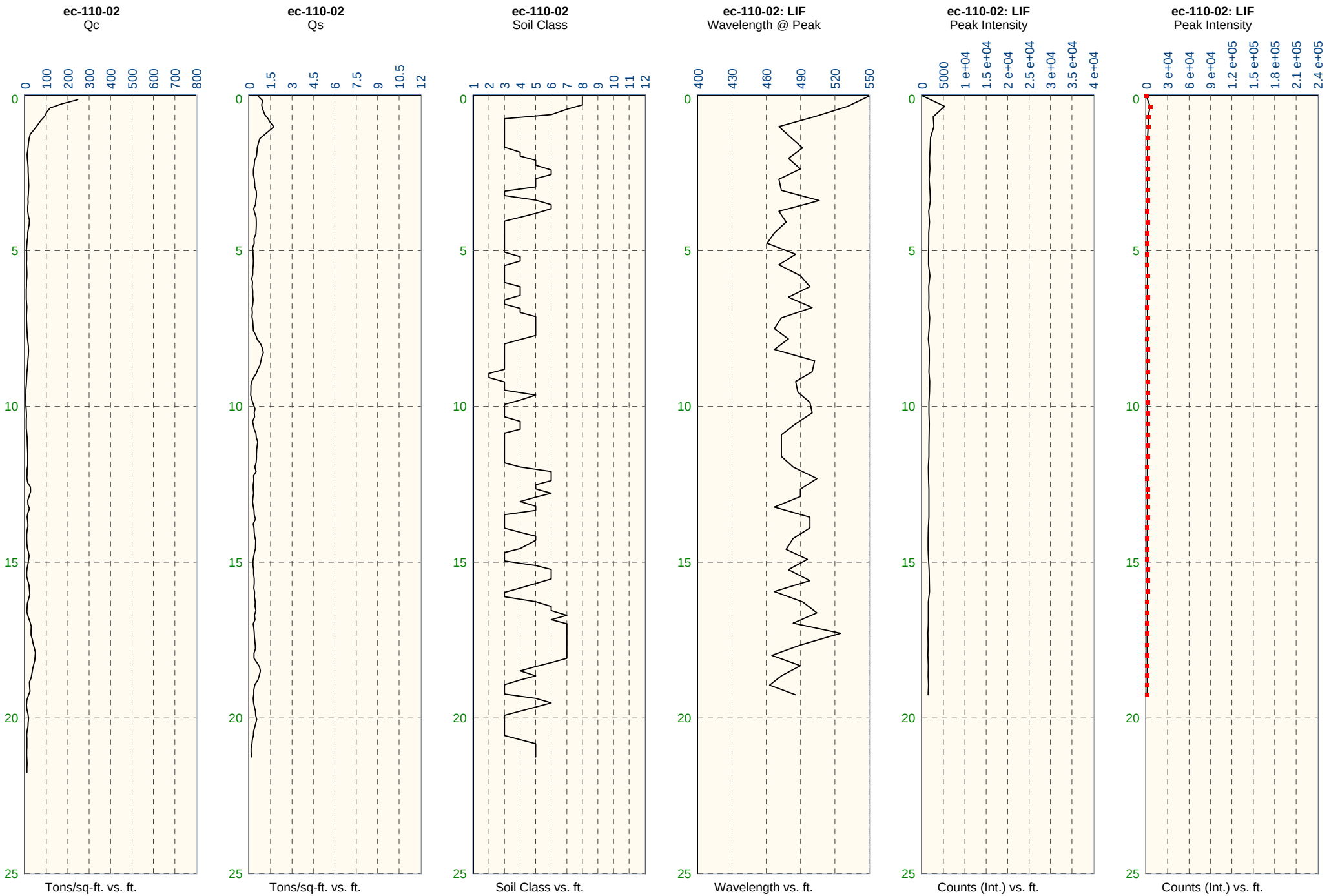


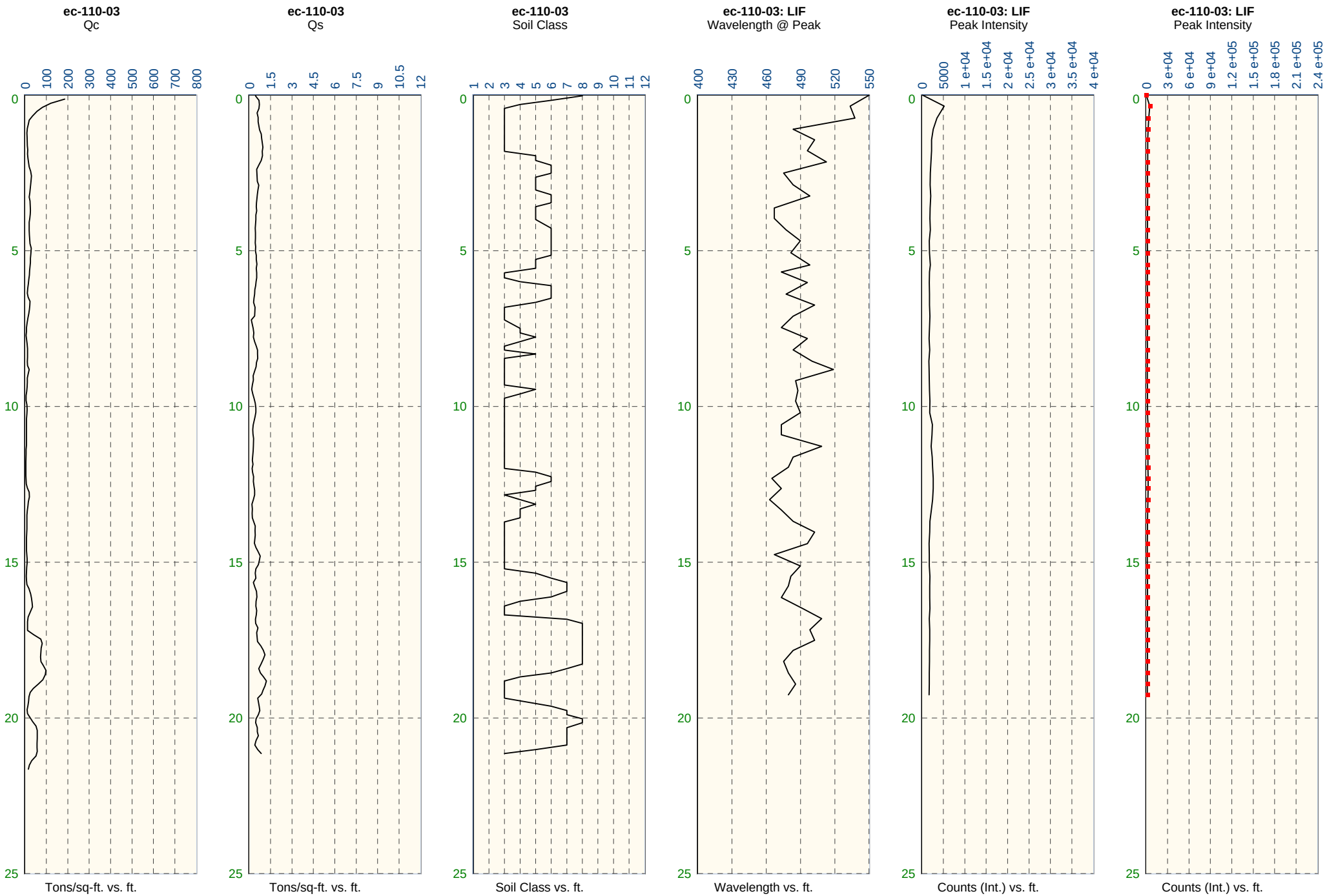
Friction Ratio (R_f) = Sleeve Friction (F_s)/Cone Pressure (Q_t) x 100%
1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

Zone		Q_t/ 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


ec-110-01
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-110-01
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-110-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-110-01: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-110-01: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-110-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-110-02
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-110-02
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-110-02
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-110-02: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-110-02: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-110-02: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-110-03
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-110-03
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-110-03
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-110-03: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-110-03: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-110-03: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.

MOBILE GEO CHEMISTRY

H&P

April 13, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – SITE 110 – NAVAL AIR FACILITY - EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP040504W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1746).

Project Summary

The following analyses were conducted:

- 1 soil for total petroleum hydrocarbons (TPH) by DHS LUFT/8015M Method
- 1 water for volatile aromatic hydrocarbons (BTEX) & MTBE by EPA Method 8021

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
2373 208th Street, Suite F-1, Torrance, California 90501 | 310 782.2929 — Fax 310 782.2798
www.HandPmg.com | 1-800-834-9888

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NAVY PUBLIC WORKS PROJECT #1113621902008
SITE 110
NAVAL AIR FACILITY
EL CENTRO, CA

H&P Project #NP040504-W1

TPH (DHS LUFT/ 8015M Method) ANALYSES OF SOILS

SAMPLE NUMBER	DATE ANALYZED	TPH-GAS C5-C11 (mg/kg)	TPH-DIESEL C12-C24 (mg/kg)
METHOD BLANK	4/5/2004	ND	ND
EC-110-04-10	4/5/2004	ND	30
DETECTION LIMITS		10	10

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
4-15-2004

MOBILE GEOCHEMISTRY

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NAVY PUBLIC WORKS PROJECT #1113621902008
SITE 110
NAVAL AIR FACILITY
EL CENTRO, CA

H&P Project #NP040504-W1

BTEX, MTBE (EPA Method 8021) ANALYSES OF WATERS

SAMPLE NUMBER	DATE ANALYZED	MTBE (ug/l)	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYLBENZ (ug/l)	XYLENES (ug/l)	SURROGATE (%REC)
METHOD BLANK	4/5/2004	ND	ND	ND	ND	ND	106
EC-110-04	4/5/2004	ND	ND	ND	ND	ND	101
REPORTING LIMITS		10.0	1.0	1.0	1.0	1.0	53%-145%
DETECTION LIMITS		1.0	0.5	0.5	0.5	0.5	

J INDICATES VALUE DETERMINED IS BETWEEN DETECTION LIMIT AND REPORTING LIMIT

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
4-15-2004

MOBILE GEOCHEMISTRY

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QA/QC REPORT - CALIBRATION DATA

H&P Project #NP040504-W1
DAILY CALIBRATION DATE : 04/05/04

COMPOUND	CALIBRATION RANGE SOIL (ppm)	CALIBRATION RANGE WATER (ppb)	INITIAL CALIB DATE	INITIAL RF	%RSD	OPENING AREA	OPENING RF	OPENING %DIFF	CLOSING / LCS AREA	CLOSING / LCS RF	CLOSING / LCS %DIFF
TPH GASOLINE - FID1	10-20000	330-660000	7/14/2003	0.878	6.1%	241	0.830	5.5%	241	0.830	5.5%
TPH GASOLINE - FID2	10-20000	330-660000	7/14/2003	0.580	11.9%	372	0.538	7.3%	368	0.538	7.3%
TPH GASOLINE - FID3	10-20000	330-660000	7/14/2003	0.696	10.4%	304	0.658	5.5%	293	0.658	5.5%
TPH DIESEL - FID1	10 - 50000	330 - 1650000	7/11/2003	1.014	9.5%	489	1.022	0.8%	489	1.022	0.8%
TPH DIESEL - FID2	10 - 50000	330 - 1650000	7/11/2003	0.690	13.3%	718	0.696	1.0%	731	0.696	1.0%
TPH DIESEL - FID3	10 - 50000	330 - 1650000	7/11/2003	0.723	7.9%	663	0.754	4.3%	667	0.754	4.3%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP040504-W1
DAILY CALIBRATION DATE : 04/05/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ug/kg)	WATER (ug/L)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
MTBE	500 - 25	2500 - 125	4/2/2004	1.22	13.2%	112	1.12	7.8%	130	1.30	7.0%
BENZENE	500 - 25	2500 - 125	4/2/2004	3.24	10.1%	371	3.71	14.4%	285	2.85	12.1%
TOLUENE	500 - 25	2500 - 125	4/2/2004	15.47	11.2%	413	4.13	*73.3%	715	7.15	*53.8%
TFT	500 - 25	2500 - 125	4/2/2004	1.02	8.5%	117	1.17	14.4%	96	0.96	6.6%
ETHYLBENZENE	500 - 25	2500 - 125	4/2/2004	14.84	6.6%	1,677	16.77	13.0%	1,481	14.81	0.2%
m&p-XYLENES	500 - 25	2500 - 125	4/2/2004	19.14	9.8%	2,063	20.63	7.8%	1,778	17.78	7.1%
o-XYLENES	500 - 25	2500 - 125	4/2/2004	15.74	9.3%	1,708	17.08	8.5%	1,495	14.95	5.0%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

* DUE TO A CONTAMINATION THE % DIFF VALUE WAS OUTSIDE OF CRITERIA. TOLUENE WAS RECALIBRATED ON 04/06/2004 AND DATA WAS REPROCESSED. ALL DATA WAS REPROCESSED AND % DIFF WAS WITHIN CRITERIA.

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

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QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR SOILS

ANALYSIS DATE : 04/05/04

H&P Project #NP040504-W1

COMPOUND	SPK CONC (mg/kg)	MS CONC (mg/kg)	%REC MS	MSD CONC (mg/kg)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	210	105.0%	214	107.0%	1.9%	15%	75% - 125%
TPH DIESEL	500	514	102.8%	506	101.2%	1.6%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR WATERS

ANALYSIS DATE : 04/05/04

H&P Project #NP040504-W1

COMPOUND	SPK CONC (ug/L)	MS CONC (ug/L)	%REC MS	MSD CONC (ug/L)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	10.0	10.0	99.9%	10.2	102.3%	2.4%	15%	75% - 125%
BENZENE	10.0	10.0	100.3%	10.0	99.8%	0.5%	15%	75% - 125%
TOLUENE	10.0	11.3	113.0%	11.0	110.0%	2.7%	15%	75% - 125%
ETHYLBENZENE	10.0	11.1	111.4%	11.8	118.3%	6.0%	15%	75% - 125%
TOTAL XYLENES	20.0	21.7	108.3%	21.7	108.7%	0.4%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR SOILS

ANALYSIS DATE : 04/05/04

H&P Project #NP040504-W1

COMPOUND	SPK CONC (mg/kg)	LCS CONC (mg/kg)	%REC LCS	LCSD CONC (mg/kg)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	212	106.0%	218	109.0%	2.8%	15%	75% - 125%
TPH DIESEL	500	506	101.2%	490	98.0%	3.2%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY
H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR WATERS

ANALYSIS DATE : 04/05/04
H&P Project #NP040504-W1

COMPOUND	SPK CONC (ug/L)	LCS CONC (ug/L)	%REC LCS	LCSD CONC (ug/L)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	10.0	10.1	101.0%	9.6	95.7%	5.4%	15%	75% - 125%
BENZENE	10.0	10.0	99.5%	10.3	102.6%	3.1%	15%	75% - 125%
TOLUENE	10.0	11.1	111.0%	10.4	104.0%	6.5%	15%	75% - 125%
ETHYLBENZENE	10.0	11.0	110.0%	11.3	112.7%	2.4%	15%	75% - 125%
TOTAL XYLENES	20.0	21.5	107.3%	22.0	109.8%	2.3%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

Chain of Custody Record

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469
☒ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404
☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 4/4/04
H&P Project # AP 040504 W
Outside Lab:

Client: NAVY PUBLIC WORKS, ENVIRONMENTAL
Address: 2730 McKEAN ST, STE 1, CODE 980
SAN DIEGO, CA 92136
Phone: 619-524 6967 Fax: 619 524-6000

Collector: TWS
Page: 1 Of 5
Client Project # 113621902008
Project Manager DAVID M. BLOM
Location: NAF EL CENTRO SITE 110
Turn around time:

Global ID: TO 60255945 EDF: Yes / No

Sample Receipt
Intact: ☐ Yes ☐ No
Seal Intact: ☐ Yes ☐ No ☐ N/A
Cold: ☐ Yes ☐ No
N/A (Received on Site)

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B: BTEX / Oxygenates	8260B: Oxygenates	8260B: VOC's	8260B: VOC's and Oxygenates	Methane	Fixed Gases						Total # of containers
EC-110-04-10	110-04-10	10'	16:10	4/4/04	Soil	SS Tube	X																
EC-110-04	110-04		1150	4/5/04	W	VOA			X														

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Tim Shu	Navy PWC	James Villarreal	H&P	4-5-04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constit[illegible] uthorization to proceed with analysis and acceptance of condition on back.

Sample disposal [illegible]ction: ☐ *Disposal @ $2.00 each* ☐ *Return to client* ☐ *Pickup*

Site Assessment Report and
Closure Summary
UST Site 114
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 114 at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 114 work plan addendum, dated March 12, 2004, prepared by the Public Works Center San Diego (PWCSD). Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 114. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 114
Site Address:	North of the 3rd Street, at its west end, southwest of Building 240 Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,739,249 Northing: 1,878,853 feet (State Plane 6)
Facility Name:	Former storehouse
Property Owner: Tank Owner/Operator: Responsible Party:	United States Navy United States Navy United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430007

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	Unknown
Construction Materials:	Reinforced concrete
Capacity:	1,400 gallons
Contents:	Diesel
Year Removed:	1993 by Kroeker

Figure 1 shows a map of the site location and previous and current assessment locations.

During UST removal in 1993, Kroeker collected three soil samples from the excavation as discussed in the *Final Technical Memorandum Underground Storage Tank Site Investigation*, dated March 2000, prepared by Bechtel National, Inc. (BNI, 2000). These samples were collected from depths of 9, 10, and 12 feet below ground surface (bgs), and tested for total recoverable petroleum hydrocarbons (TRPH). Although not directly comparable to total petroleum hydrocarbons quantitated as diesel (TPH-diesel), a constituent of concern, one of the soil samples contained a TRPH concentration of 98,000 milligrams per kilogram (mg/kg), suggesting that TPH-diesel would need to be tested to show whether or not it exceeded its action level of 1,000 mg/kg.

In 1999, BNI advanced two direct-push soil borings and one HydroPunch boring in the vicinity of Site 114 as shown on Figure 1. The soil borings were located near the former tank excavation. The HydroPunch boring was located approximately 50 feet north (downgradient) of the former tank location. Analytical testing results indicated TPH-diesel soil concentrations exceeded the cleanup level in the sample collected at 11.8 feet bgs from soil boring 114-S2. Constituents of concern were not detected or were detected below action levels in the groundwater sample.

In May/June 2000, Geofon, Inc., removed approximately 88 cubic yards (cy) of fuel-impacted soil from an initial excavation measuring 20 by 20 by 12 feet at the former UST location, according to *Final Technical Memorandum, Removal of Underground Storage Tanks and Remediation of Fuel-Impacted Soil at Various UST Sites, Naval Air Facility, El Centro, California*, dated November 13, 2000, prepared by Geofon, Inc. Concentrations of TPH-diesel in sidewall samples exceeded the cleanup level, so the excavation was extended 20 feet to the north and exploratory trenches were advanced to the east and west. Approximately 189 cy of additional fuel-impacted soil was removed and disposed of off site. Soil samples collected from the north and east sidewalls revealed concentrations of TPH-diesel above the cleanup level. In the north sample, the concentration of TPH-gasoline (112 mg/kg) also exceeded the cleanup level (see Figure 4-2, and Table 4-2, attached).

PWCSD Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Soil exceeds cleanup levels for TPH-diesel*. In addition, the RWQCB, in their approval letter, requested a groundwater sample downgradient of the tank. Specifically, we focused our assessment to the north and east of Geofon's 2000 excavation footprint. Field activities were performed April 4-5 and May 12-13, 2004.

In accordance with the work plan, Cone Penetrometer Test (CPT) and Laser Induced Fluorescence (LIF) data were collected *in situ* using the Site Characterization and Analysis Penetrometer System (SCAPS) at 10 locations as shown on Figure 1. Additional sample points further east and north were

not obtained because underground utilities were located to approximately 50 feet from the former UST location. The LIF data are summarized and interpreted in Table 2. At three of the locations no fluorescence characteristic of petroleum, oil, or lubricants (POL) was encountered. At four of the remaining locations, fluorescence suggesting POL was encountered. This fluorescence consisted of a rise in intensity above background levels coupled with a drop in wavelength. At the three remaining locations, very thin fluorescence intervals with intensities slightly above background coupled with a drop in wavelength suggest possible POL. The LIF results show a POL fluorescence interval centered on push location EC-114-05 between 12.5 and 14.0 feet bgs. This interval thickens slightly to the northwest (EC-114-03) to an interval between 11.5 and 14.0 feet. The interval shows a weaker peak intensity and thins to the southeast (EC-114-04) to 11.8 to 12.5 feet and to the northwest (EC-114-07) to 15.1 to 15.7 feet. Push locations EC-114-06 and EC-114-09 both show insignificant or no fluorescence, constraining the extent of contamination to the northwest and southeast, respectively. To the southwest, the petroleum hydrocarbon impact area is bounded by the excavation boundary of Geofon (2000). EC-114-07 is located to the northeast. The POL interval between 15.1 and 15.7 feet is unconstrained, but the trend is decreasing, and two other pushes EC-114-08 and EC-114-10 also to the northeast both show insignificant or no fluorescence . The evidence suggests that the impacted zone extends no farther than 10 feet northeasterly from EC-114-07. Using these constraints, an estimated volume of impacted soil remaining at this site is 12 cy, and occurs in a layer up to 2.5 feet thick, tapering to zero thickness 35 feet in a northwest-southeast direction, and 30 feet in a northeast-southwest direction.

At location EC-114-02, a groundwater sample was collected, and immediately delivered to an on-site mobile laboratory for analytical testing. BTEX and MTBE were not detected in the groundwater sample. Groundwater was measured at approximately 9.48 feet bgs. The temporary well was screened with 0.010-slotted ¾-inch diameter PVC from 7 to 17 feet bgs. The groundwater grab sample was collected unpurged using a single-use disposable bailer. The temporary well was abandoned by grouting in place. Soil samples were not collected during this investigation.

Additional assessment to the northeast was not performed due to the presence of Building 240, and limited area evaluated for live utilities prior to advancing the push borings. Sample locations and analytical results with cross sections are illustrated on Figure 1.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, the vertical and horizontal extent of fuel-impacted soils has been delineated to the extent practicable. Groundwater does not appear to be adversely affected by fuel contamination. The data obtained during the current investigation indicate that the elevated TPH-diesel concentrations reported on soil in the north and east sidewalls and exploratory trenches in 2000 appear to extend an additional 30 to 35 feet northeasterly at a depth interval tapering to zero from 2.5 feet (11.5 to 14.0 feet bgs). Approximately 12 cy of petroleum contaminated soil with concentrations greater than 1,000 mg/kg TPH-diesel may be expected within this interval.

It is the opinion of PWCSD that further assessment may be conducted to further support these conclusions. Such a study could include the collection of soil samples in the impacted interval to measure the concentration of TPH-gasoline and TPH-diesel. Collection of additional soil data to the northeast adjacent to, or beneath Building 240 may better constrain the extent of contamination in this direction. Such a recommendation, however, must be balanced by the needs of the stakeholders and

the risk posed by the site. If the site is to remain in its current condition, it is noted that the source of contamination has been removed along with 277 cy of contaminated soil. An effort to remove a relatively thin interval of petroleum hydrocarbon contaminated soil would require a relatively large effort to remove the clean overburden. Unless site use changes, such as with new construction, it is our opinion that remediation at this site is unnecessary. Therefore, we recommend that no further action be considered for this site.

Site Characterization and Closure Information

Description of the former UST:	See Background Information (page 2).
Contaminants Identified:	See attached analytical results tables.
Amount of Contaminants Leaked:	Not estimated. See attached analytical results tables.
MTBE:	None detected.
Description of the soil/geology:	Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? Yes. Based on a review of the analytical data, the lateral and vertical extent of soil impacted with fuels has been delineated, to an impact thickness of less than 2.5 feet.

Estimated volume of contaminated soil left on site and concentration: 12 cy (inferred to be greater than 1,000 mg/kg TPH-diesel).

Is groundwater contamination completely delineated? Yes. Current analytical results for groundwater show that constituents of concern are not detected.

Monitoring wells installed, properly permitted? No monitoring wells were installed.

Depth to groundwater: Approximately 9.5 feet bgs.

Is groundwater or surface water impacted? No. All analytical results for groundwater meet cleanup goals for the site (below tap water PRGs and drinking water MCLs).

Remedial action taken? UST removed 1993. Approximately 277 cy fuel-containing soil removed 2000.

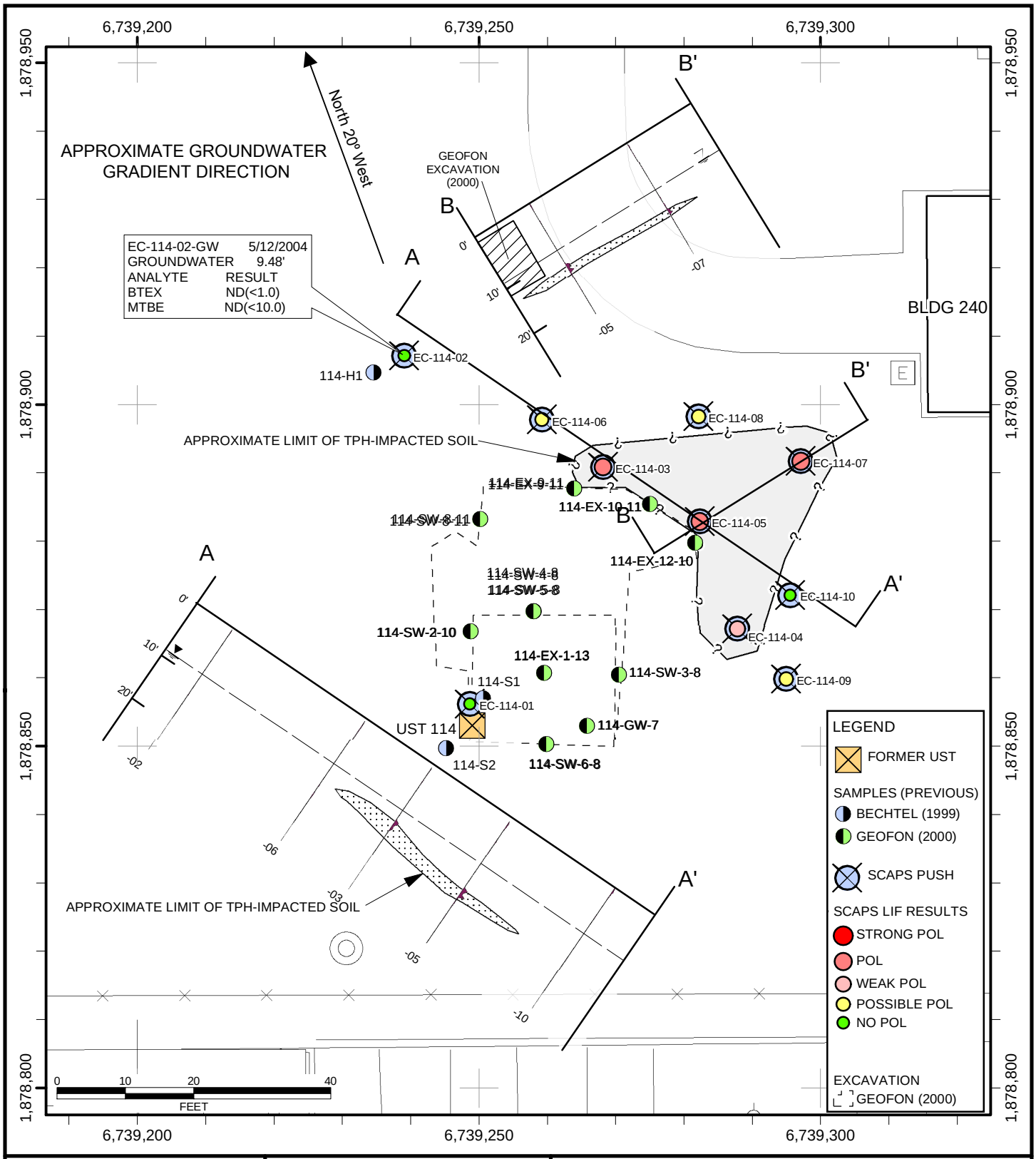
Closure

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Yes.

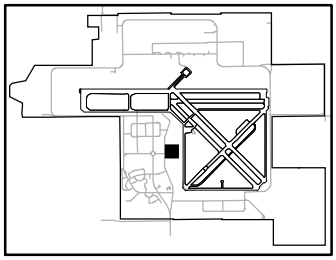
Site Closure: Due to the small volume (estimated 12 cy) of impacted soil that is anticipated to remain in place, and no documented groundwater impact from a fuel release from this site, the contaminants that may remain do not pose an unacceptable risk to human health or the environment. The recommendation for site closure is accepted and no further action is required at this site.

Signature: ***Date:***	***Signature:*** ***Date:***
N.R. Wells **Lieutenant Commander, CEC, US Navy** **By direction of** **The Commanding Officer**	**Liann P. Chavez, R.G.** **Senior Engineering Geologist** **California Environmental Protection Agency** **California Regional Water Quality Control Board** **Colorado River Basin Region**

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS, Soil, and Groundwater Results
Site 114 from Geofon (2000), including Table 4-2, and Figure 4-2
SCAPS Logs
Laboratory Analytical Report and Chain-of-Custody Documentation



OVERVIEW MAP - NAF EL CENTRO



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MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 114

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC1

FIGURE: 1

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence, and Groundwater Analytical Data Summary

UST Site 114
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-114-01	4/1/2004	19.2	21.4	2,935 @ 5.3	No POL		
EC-114-02	4/2/2004	19.3	21.6	2,915 @ 14.5	No POL		
EC-114-02-GW	5/12/2004					9.48': BTEX: <1.0 ug/L MTBE: <10.0 ug/L	7'-17'
EC-114-03	4/2/2004	19.3	21.7	26,484 @ 12.1	POL		
EC-114-04	4/2/2004	19.3	21.7	12,532 @ 12.2	Weak POL		
EC-114-05	5/12/2004	23.0	25.2	40,994 @ 13.9	POL		
EC-114-06	5/12/2004	22.9	25.0	4,099 @ 17.8	Possible POL		
EC-114-07	5/12/2004	22.5	24.7	30,008 @ 15.7	POL		
EC-114-08	5/12/2004	19.1	21.3	5,364 @ 14.8	Possible POL		
EC-114-09	5/13/2004	19.1	21.5	9,341 @ 11.0	Possible POL		
EC-114-10	5/13/2000	19.4	21.6	2,632 @ 13.1	No POL		

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
ug/L = micrograms per liter

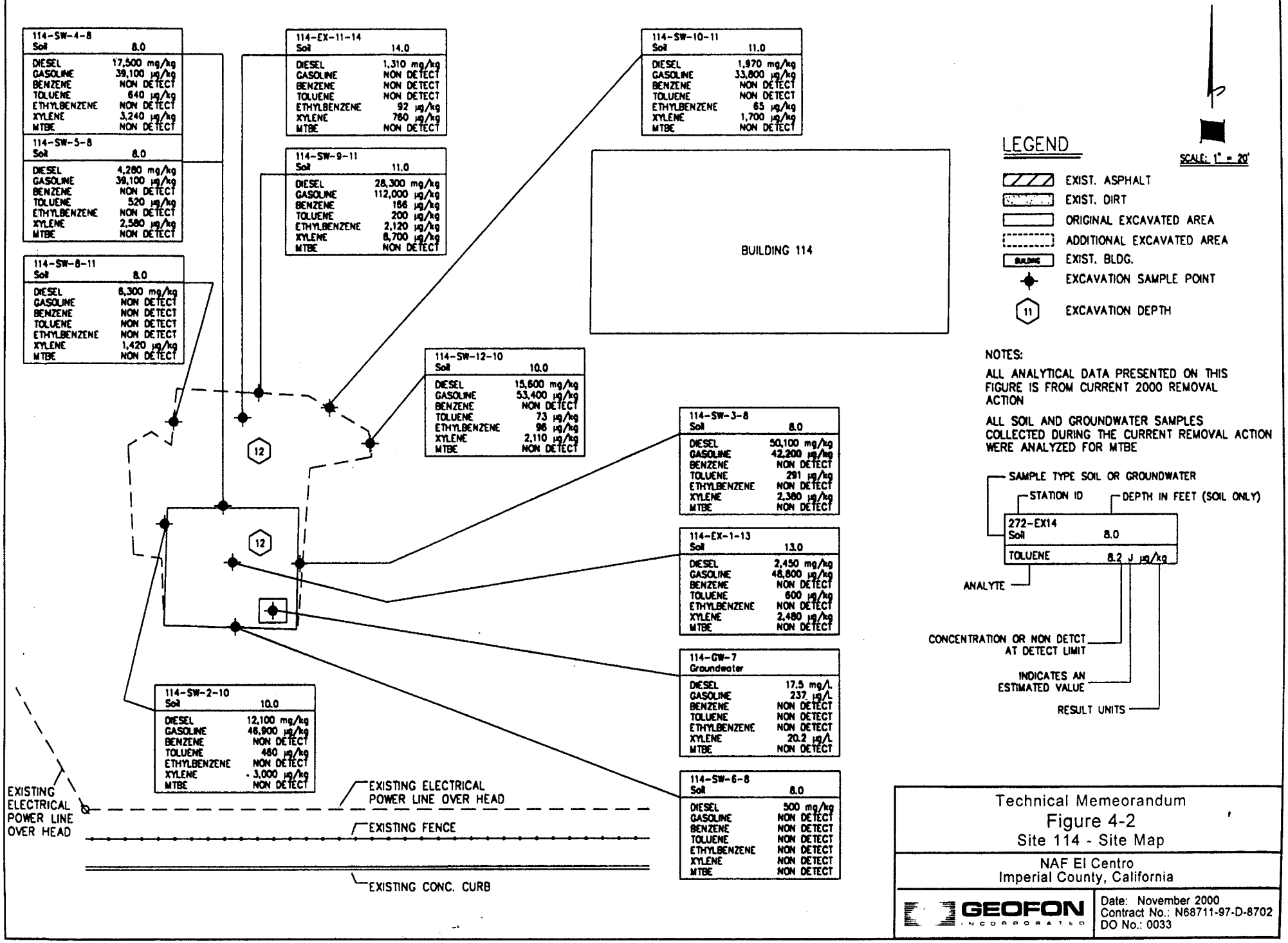
4.2 Site 114: Site Description and Analytical Results

UST 114 was a 1,400-gallon concrete diesel fuel UST removed in 1993 by Kroeker (Kroeker 1994). The date of installation for UST 114 was not available. This tank was located between Buildings 115 and 240.

Several previous soil and groundwater investigations have been conducted at UST Site 114 (Table 4-2). In 1993, Kroeker collected three soil samples as part of the tank removal. The three samples were collected directly from the tank excavation. Historical records indicate that contaminated soil from the excavation was disposed off-site. In 1999, BNI advanced two direct-push soil borings and one HydroPunch boring at UST Site 114. The soil borings (114-S1 and 114-S2) were advanced to 13 feet bgs along the perimeter of the former tank pit. The HydroPunch soil boring was advanced approximately 50 feet downgradient (north) of the original tank site. This HydroPunch boring was advanced to 17 feet bgs and utilized a 4-foot stainless steel HydroPunch screen, set from 13 to 17 feet bgs. Four soil samples and one water sample were collected.

As part of this current UST site investigation/cleanup, an initial excavation measuring approximately 20 x 20 x 12 feet was accomplished and approximately 88 cubic yards (cyd) of fuel-impacted soil was removed and disposed of off-site (Appendix D). Upon reaching the limits of excavation, one soil sample (114-EX-1-13) and one groundwater sample (114-GW-7) were collected from the bottom of the excavation, and five soil samples (114-SW-2-10, 114-SW-3-8, 114-SW-4-8, 114-SW-5-8, 114-SW-6-8), including one field duplicate, were collected from the sidewalls of the excavation (Figure 4-2, Table 4-2). Soil samples collected from the north (114-SW-4-8), east (114-SW-2-10) and west (114-SW-3-8) sidewalls contained concentrations of diesel (17,500 mg/kg, 12,100 mg/kg and 50, 100 mg/kg, respectively) above the soil cleanup level of 1,000 mg/kg.

Based on the analytical results, and at the direction of the RPM in coordination with the CO, the excavation was further extended to the north approximately 20 feet, and exploratory trenches were accomplished to the east and west, to determine the limits of contamination. Approximately 189 cubic yards of additional fuel-impacted soil was removed and disposed of off-site (Appendix D). Subsequent to excavation, one soil sample (114-EX-11-14) was collected from the bottom of the excavation and four samples (114-SW-8-11, 114-SW-9-11, 114-SW-10-11 and 114-SW-12-10) were collected from the sidewalls (Figure 4-2, Table 4-2). Samples collected from the north (114-SW-9-11) and far east (114-SW-12-10) sidewalls contained concentrations of diesel above the soil cleanup level. Additionally, sample 114-SW-9-11 had a concentration of gasoline (112,000 μg/kg) above the soil cleanup level of 100,000 μg/kg.



Technical Memeorandum

Figure 4-2

Site 114 - Site Map

NAF El Centro
Imperial County, California

GEOFON INCORPORATED

Date: November 2000
Contract No.: N68711-97-D-8702
DO No.: 0033

Table 4-2
Analytical Results for Site 114

Sample Number	Boring Number	Depth (feet bgs)	TPH-Gas[a]	TPH-Diesel[b]	TRPH	Benzene[c]	Toluene[c]	Ethlybeneze	Xylene[c]	MTBE[c]	Organolead[d]
Soil Results - GEOFON, Soil Removal/Field Investigation, May/June 2000 (µg/kg)											
114-EX-1-13	Excavation	13	48,800	2,450[e]		100 U	100 U	600	2,480	200 U	
114-SW-2-10	Excavation	10	46,900	12,100[e]		100 U	100 U	460	3,000	200 U	
114-SW-3-8	Excavation	8	42,200	50,100[e]		100 U	100 U	291	2,380	100 U	
114-SW-4-8	Excavation	8	39,100	17,500[e]		100 U	100 U	640	3,240	200 U	
114-SW-5-8	Excavation	8	39,100	4,280[e]		100 U	100 U	520	2,580	200 U	
114-SW-6-8	Excavation	8	1,000 U	500[e]		5 U	5 U	5 U	10 U	10 U	
114-SW-8-11	Excavation	11	10,000 U	6,300[e]		50 U	50 U	50 U	1,420	100 U	
114-SW-9-11	Excavation	11	112,000	28,300[e]		166	200	2,120	8,700	200 U	
114-SW-10-11	Excavation	11	33,800	1,970[e]		50 U	50 U	65	1,700	100 U	
114-EX-11-14	Excavation	14	10,000 U	1,310[e]		50 U	50 U	92	760	50 U	
114-SW-12-10	Excavation	10	53,400	15,600[e]		50 U	73	96	2,110	100 U	
Groundwater Results - GEOFON, Soil Removal/Field Investigation, May/June 2000 (µg/L)											
114-GW-7	Excavation		237	17.5[f]		0.5 U	0.5 U	0.5 U	20.2	0.5 U	
Historical Data, Soil Results - BNI, Field Investigation, January/February 1999 (mg/kg)											
175S039	114-S1	6		13 U		0.06 U	0.13 U	0.13 U	0.13 U	1.3 U	
175S040	114-S1	11.8		560		0.06 U	0.42	0.83	2.9	1.3 U	
175S041	114-S2	9.6		13 U		0.06 U	0.13 U	0.13 U	0.13 U	1.3 U	
175S042	114-S2	11.8		1,900		0.07 U	0.14 U	0.14U	0.73	1.4 U	
Historical Data, Groundwater Results - BNI, Field Investigation, January/February 1999 (µg/L)											
175HP16	114-H1	13-17[g]		6.4[f]		0.5 U	1.0 U	1.0 U	1.6	10 U	
Historical Data, Soil Results - Kroeker, Inc., UST Removal Phase 2, 20 January 1994 (mg/kg)[h]											
114-S1		12		1,000							
114-S2		10		20 U							
114-S3		9		98,000							

Table 4-2 (Continued)
Analytical Results for Site 114

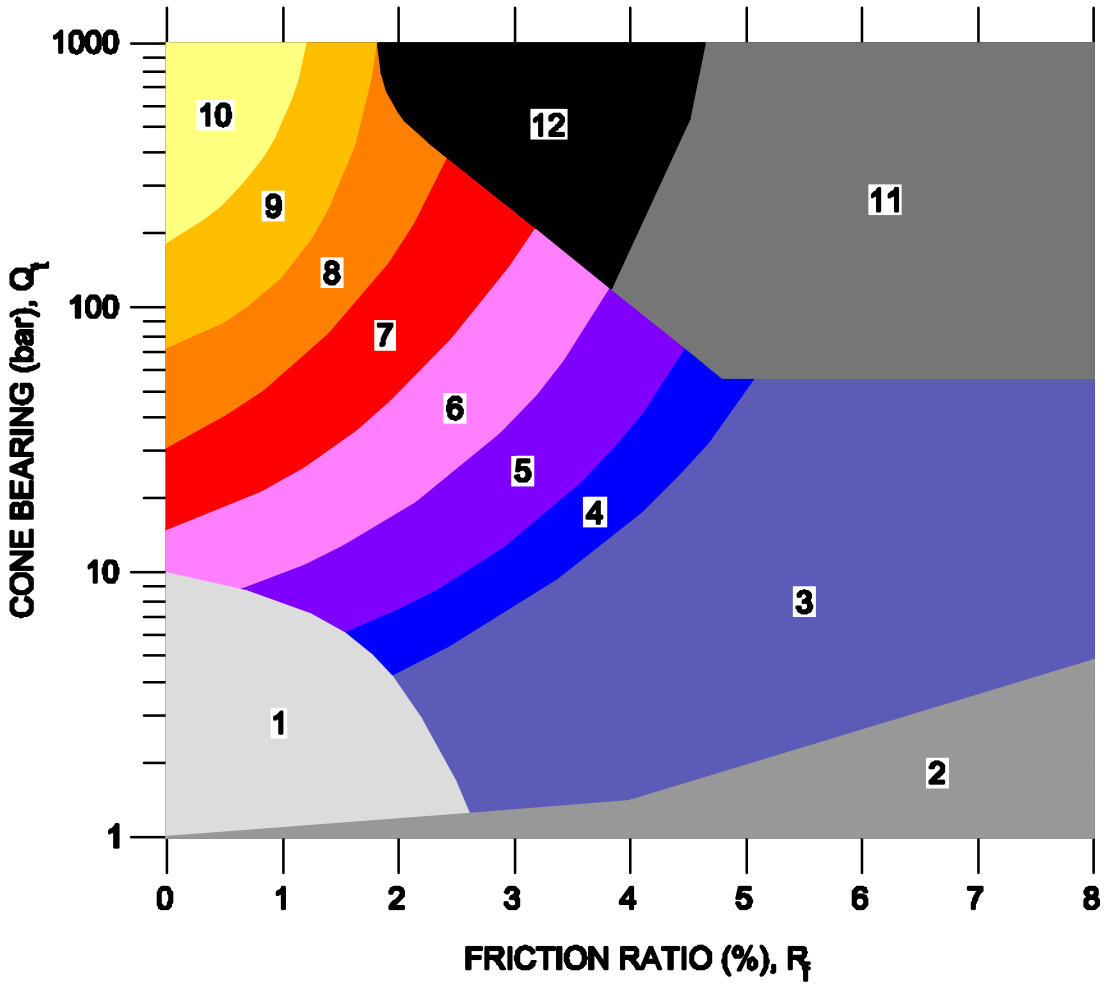
Notes:

[a] analyzed using United States Environmental Protection Agency (U.S. EPA) Method 8015-M; this analysis was calibrated for TPH-gasoline
[b] analyzed using U.S. EPA Method 8015-M; this analysis was calibrated for TPH-diesel
[c] analyzed using U.S. EPA Method 8021B
[d] analyzed by California Leaking Underground Fuel Tank Method
[e] diesel results for soil reported in milligrams per kilogram
[f] diesel results for groundwater reported in milligrams per liter
[g] Hydropunch screened interval
[h] collected during UST removal

Acronyms/Abbreviations:

µg/L - micrograms per liter
µg/kg - micrograms per kilogram
bgs - below ground surface
BNI - Bechtel National, Inc.
mg/kg - milligrams per kilogram (parts per million)
MTBE - methyl-tertiary-butyl ether
TRPH - total recoverable petroleum hydrocarbons
U - not detected above the referenced detection limit

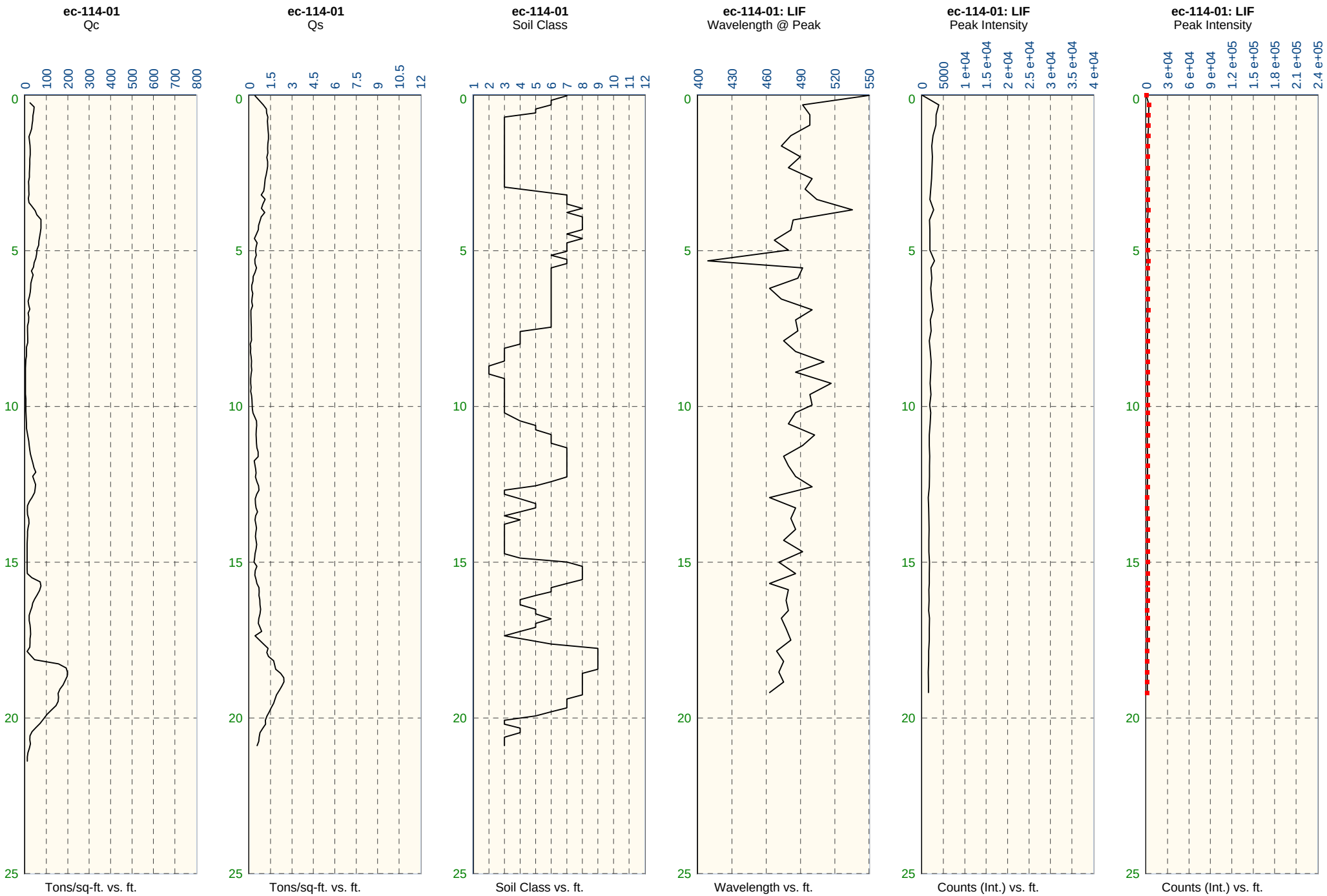
CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)

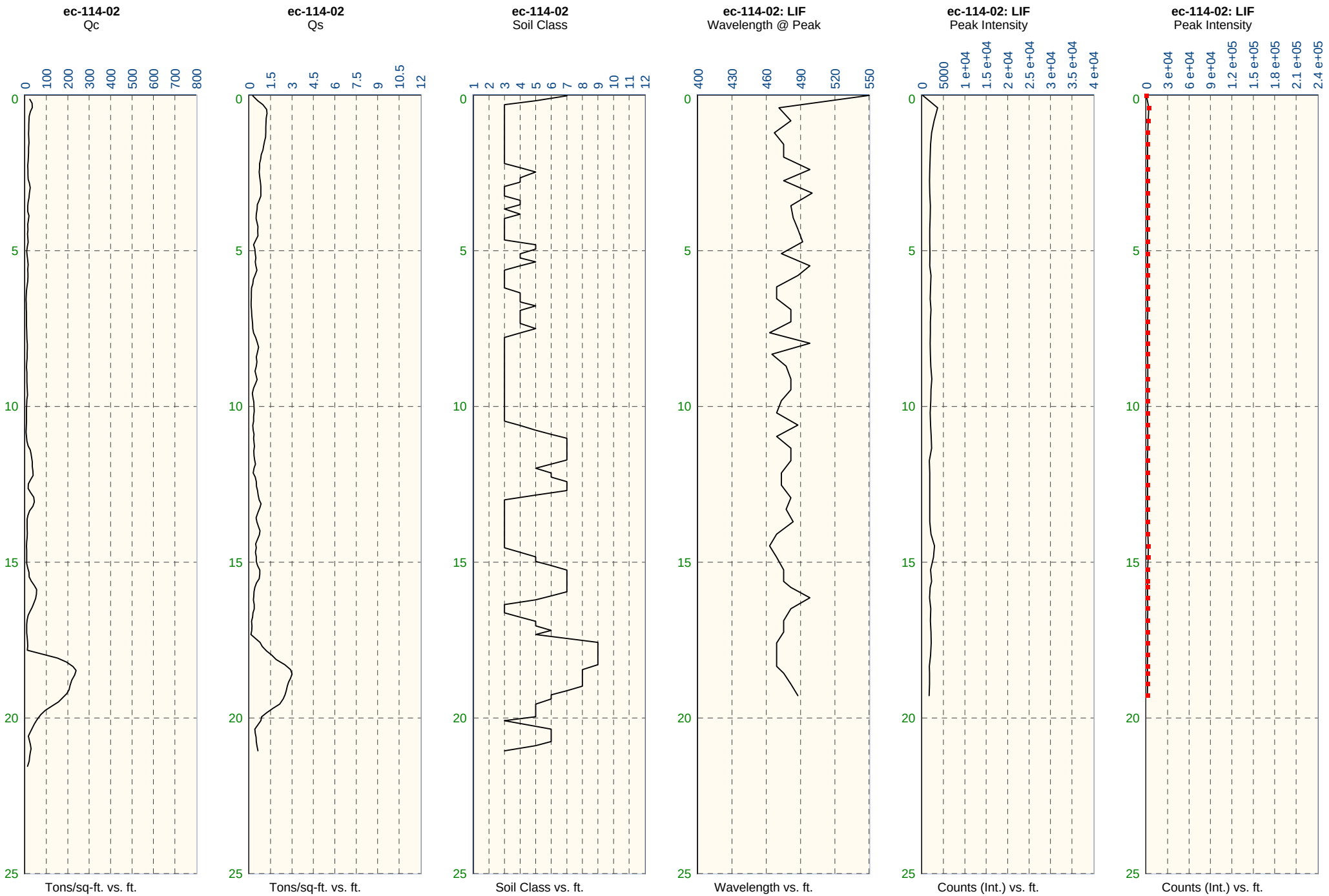


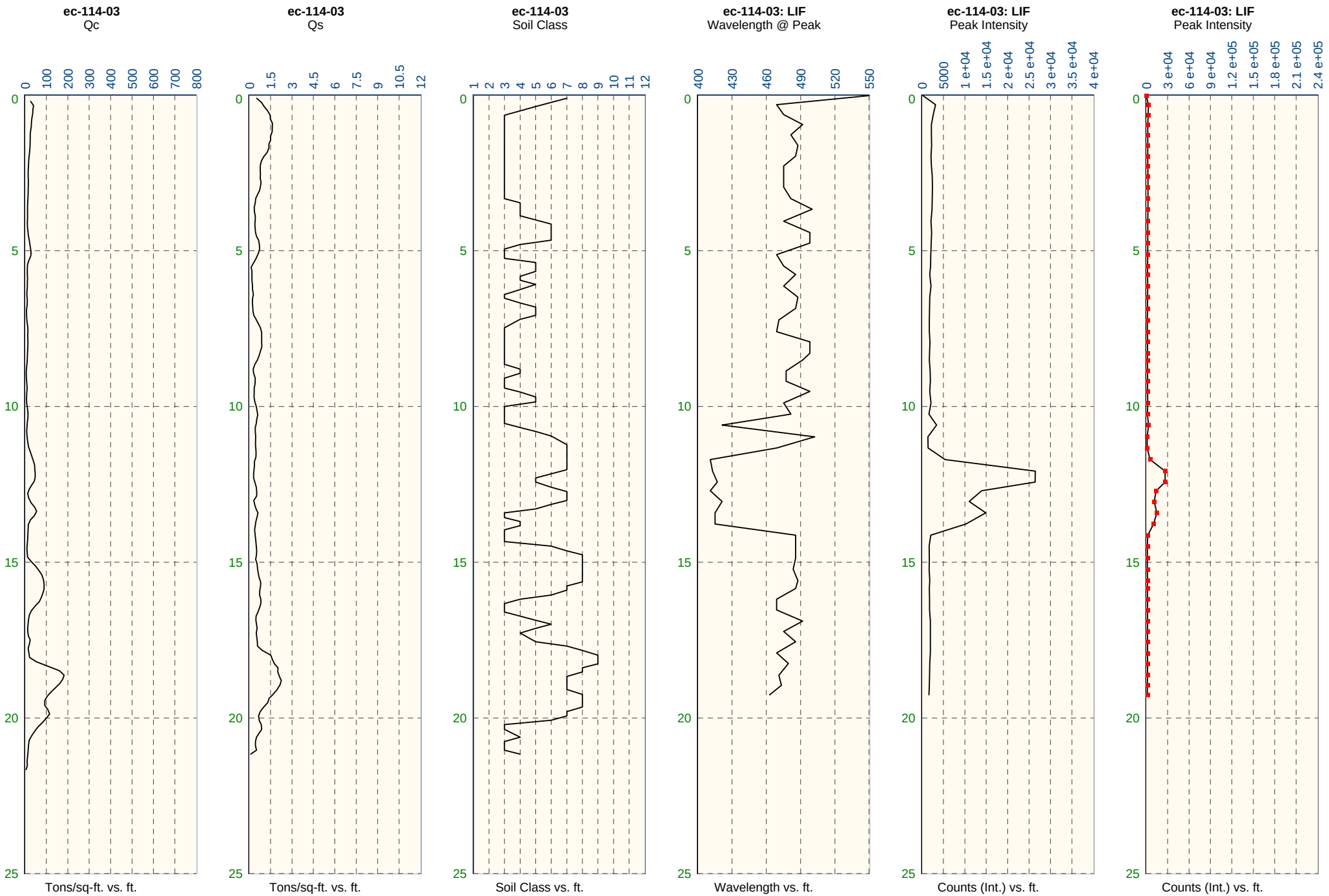
Friction Ratio (R_f) = Sleeve Friction (F_s)/Cone Pressure (Q_t) x 100%
1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

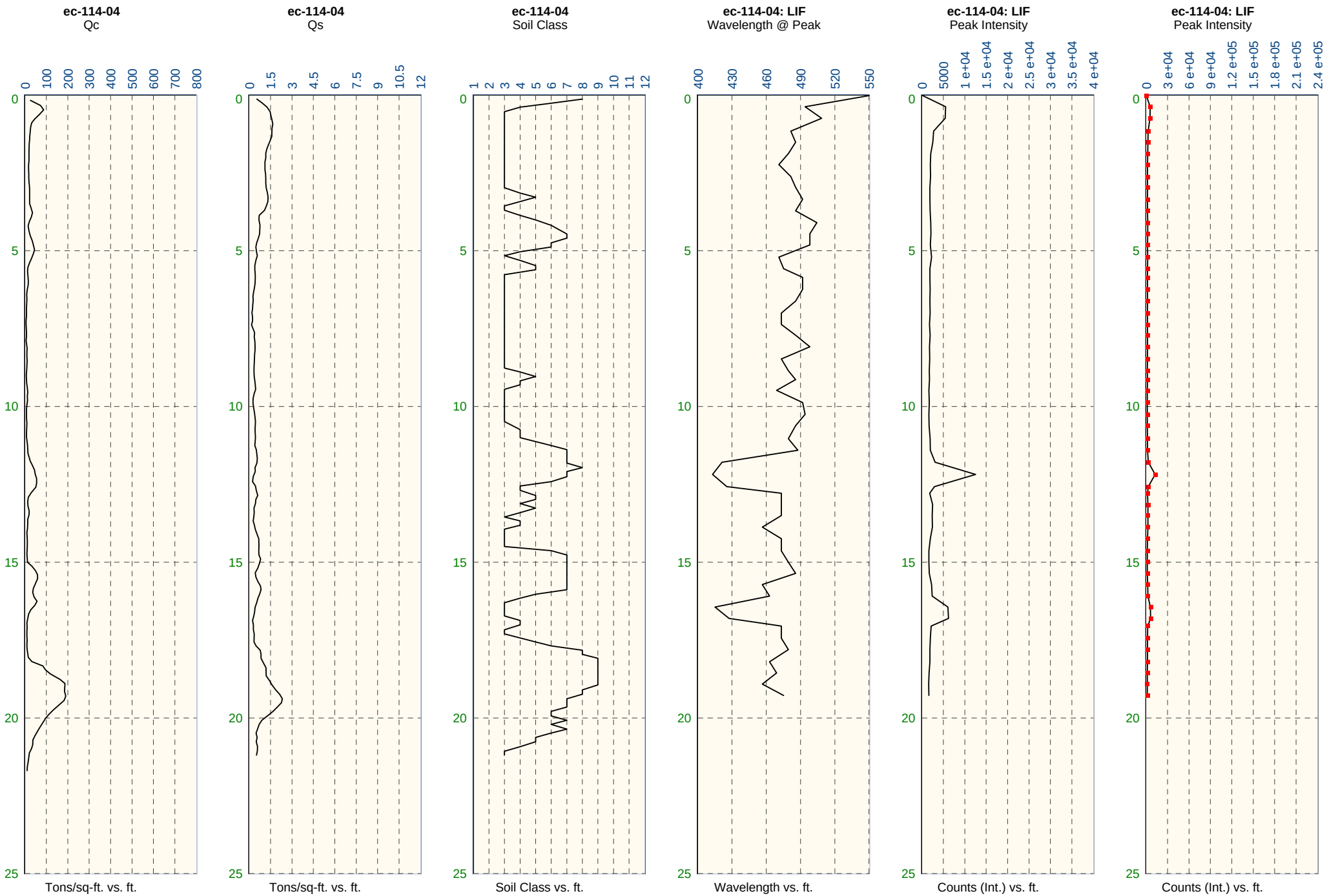
Zone		Q_t/ N	Soil Behavior Type
1		2	sensitive fine grained
2		1	organic material
3		1	clay
4		1.5	silty clay to clay
5		2	clayey silt to silty clay
6		2.5	sandy silt to clayey silt
7		3	silty sand to sandy silt
8		4	sand to silty sand
9		5	sand
10		6	gravelly sand to sand
11		1	very stiff fine grained*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

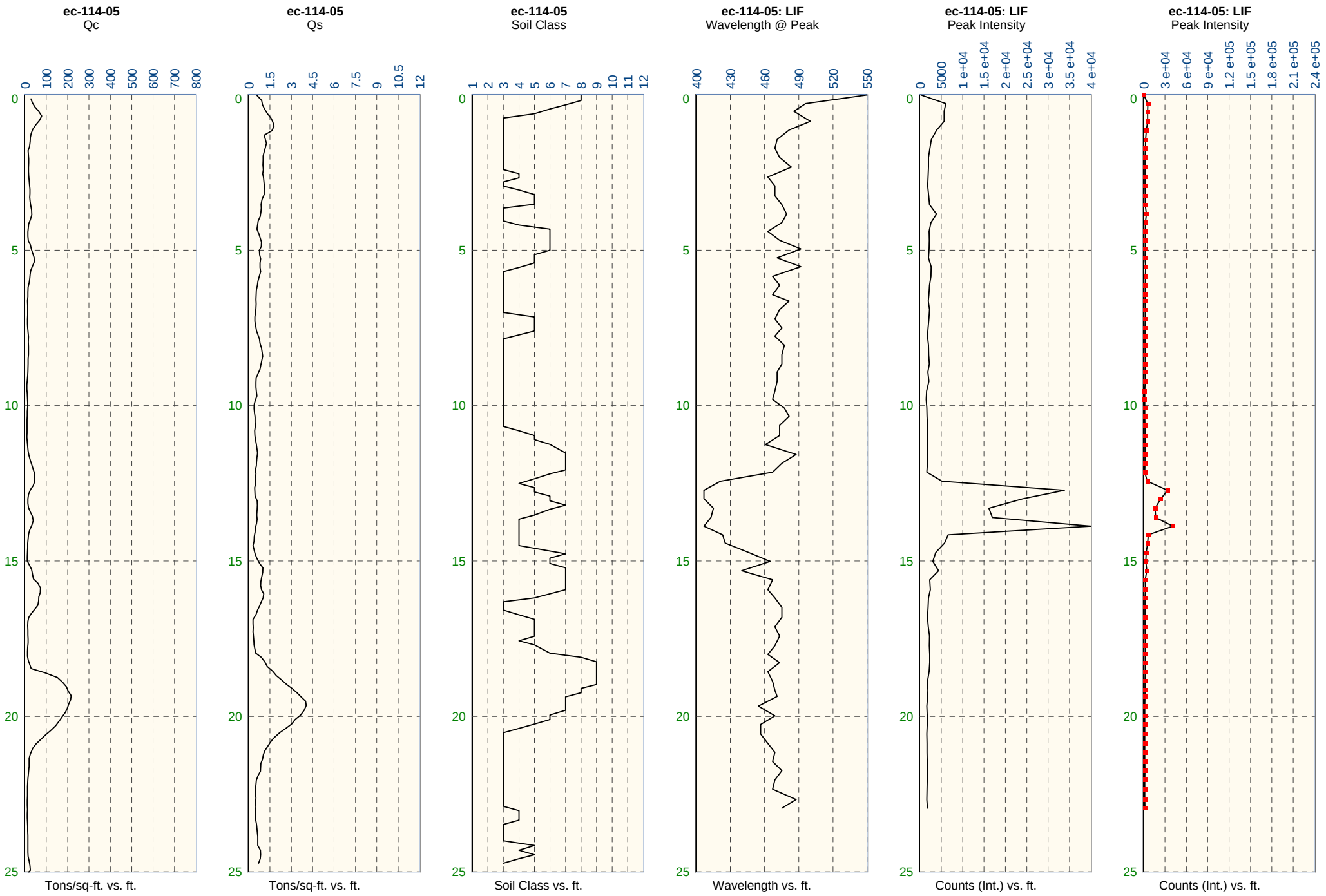
* overconsolidated or cemented

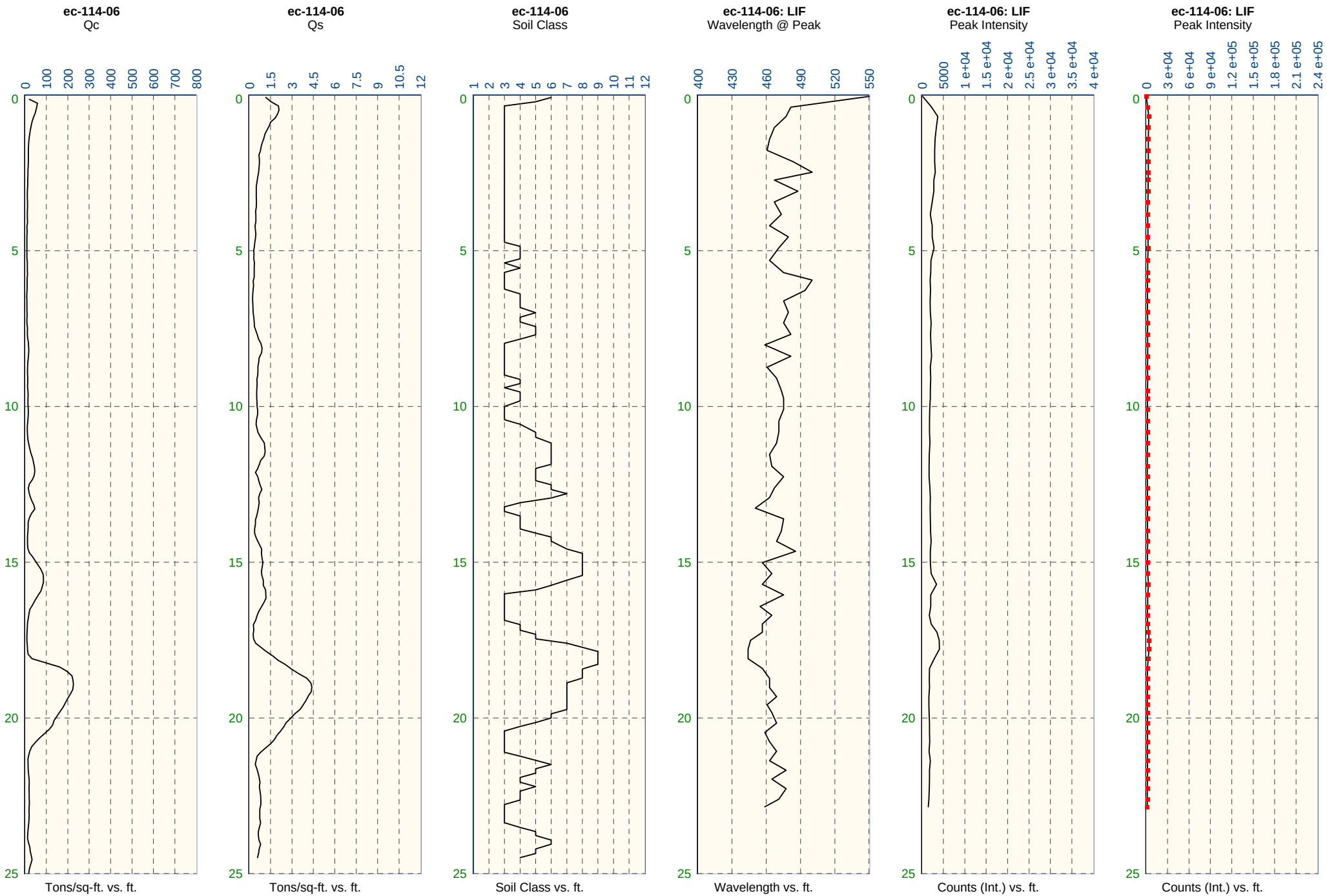

ec-114-01
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-114-01
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-114-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-114-01: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-114-01: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-114-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.

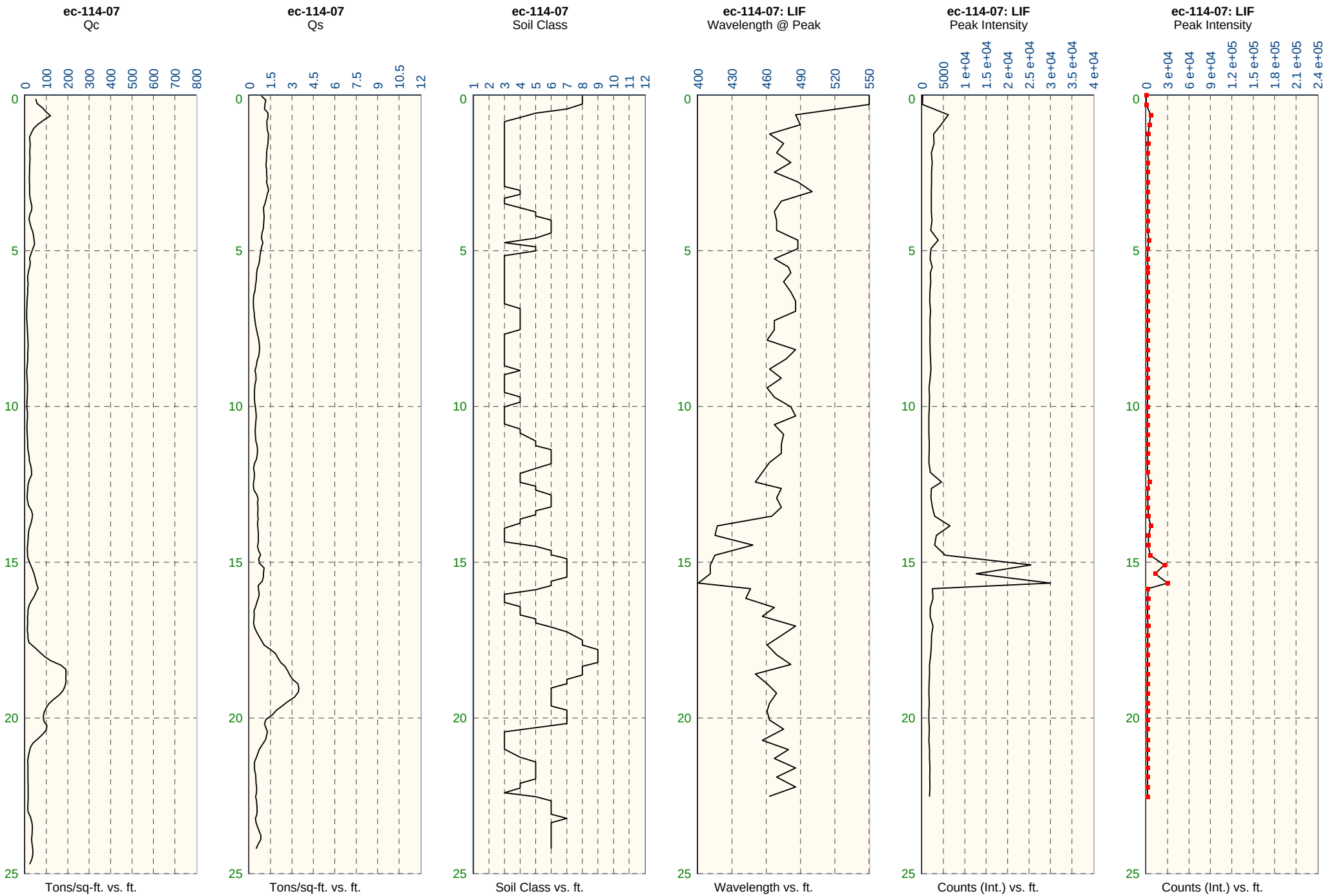

ec-114-02
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-114-02
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-114-02
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-114-02: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-114-02: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-114-02: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.

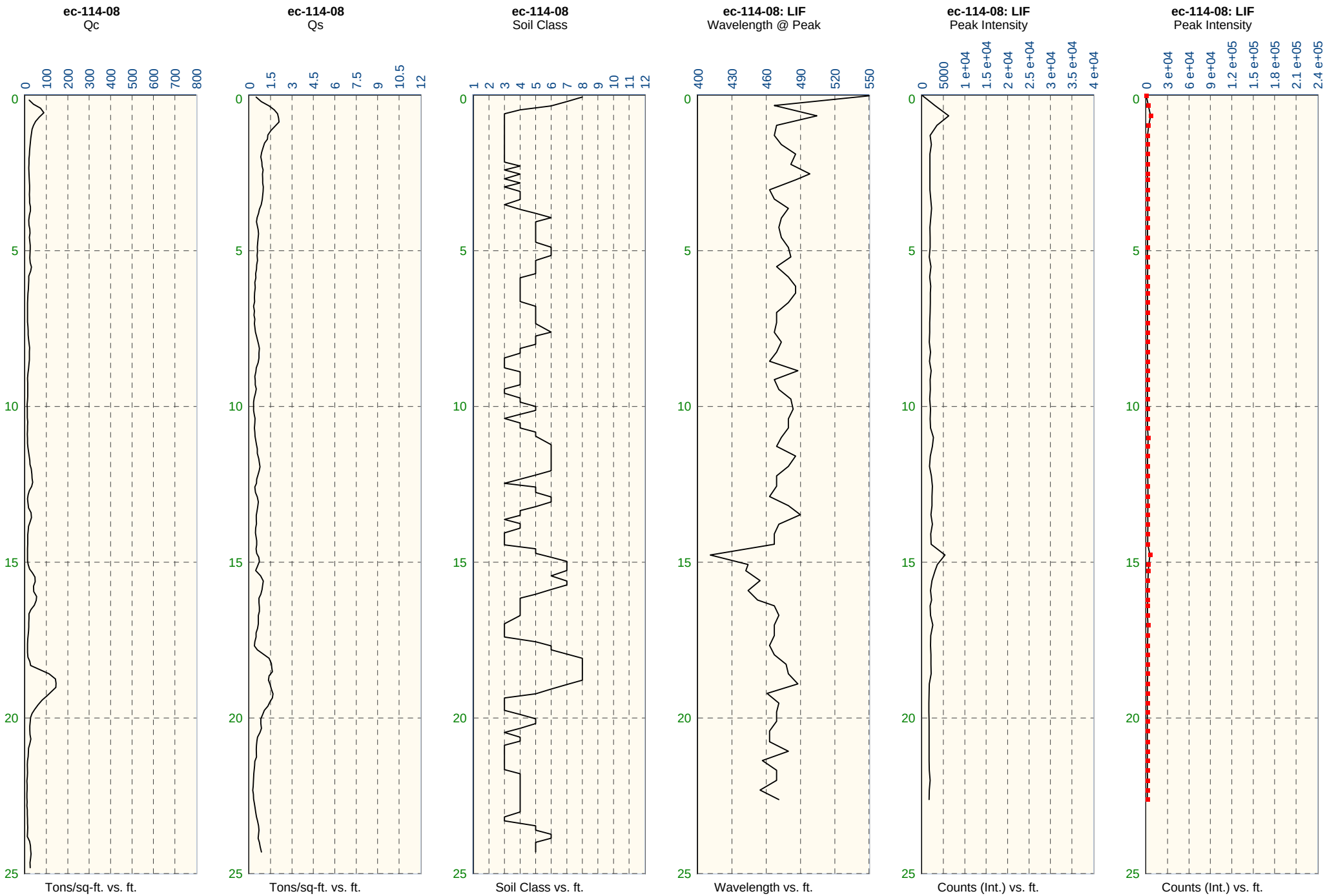

ec-114-03
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-114-03
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-114-03
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-114-03: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-114-03: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-114-03: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25

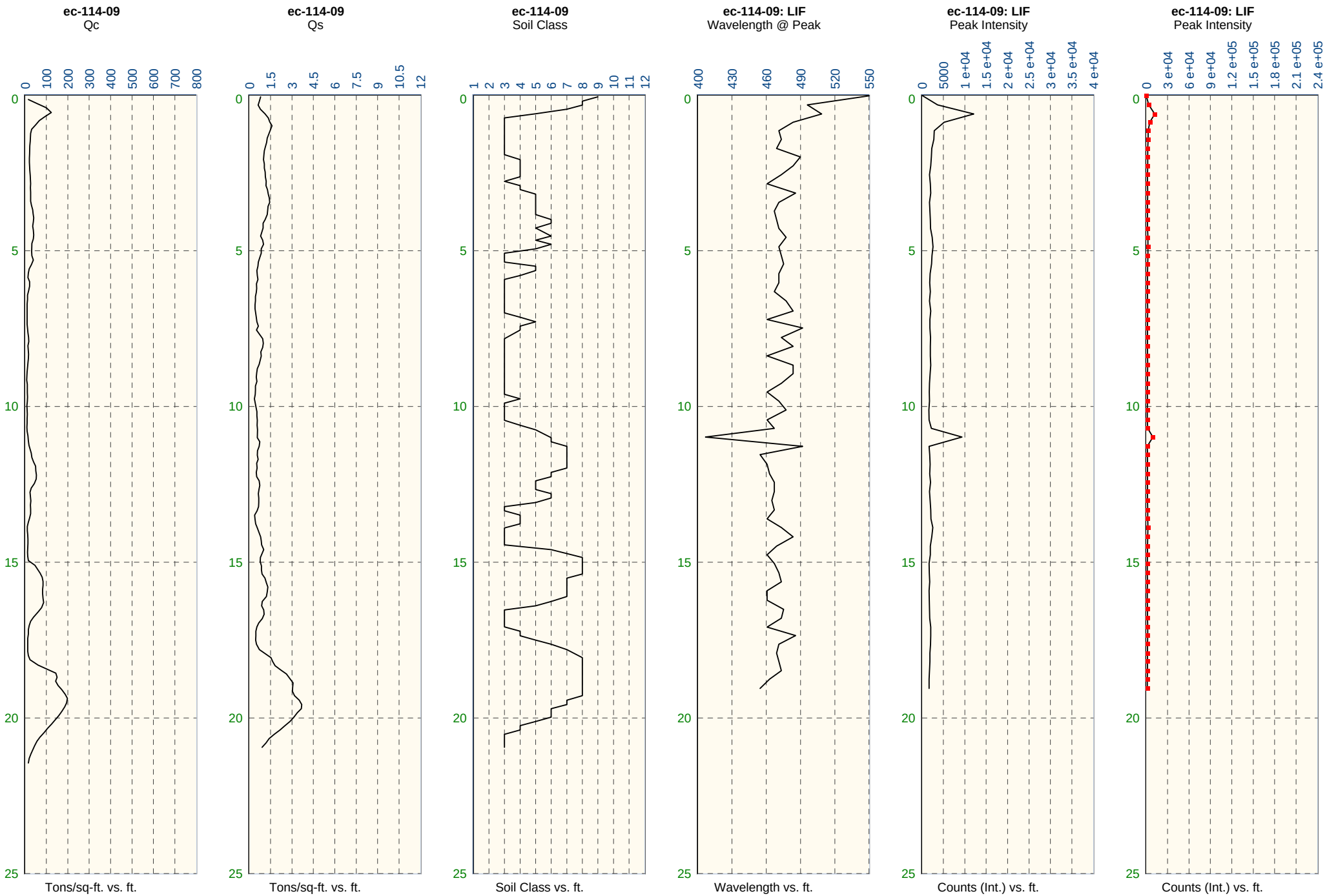

ec-114-04
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-114-04
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-114-04
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-114-04: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-114-04: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-114-04: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.

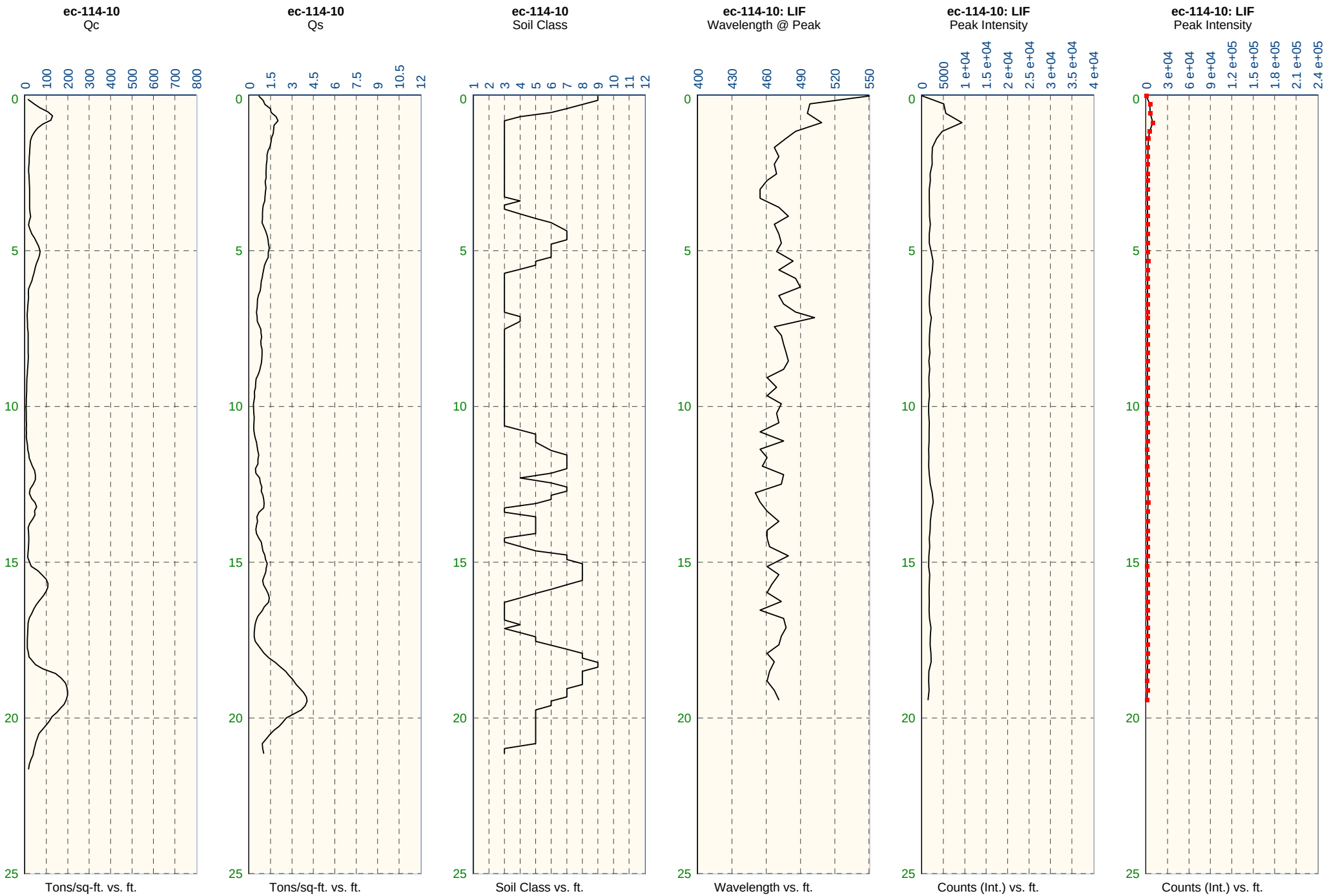

ec-114-05
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-114-05
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-114-05
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-114-05: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-114-05: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-114-05: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-114-06
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-114-06
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-114-06
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-114-06: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-114-06: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-114-06: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-114-07
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-114-07
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-114-07
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-114-07: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-114-07: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-114-07: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-114-08
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-114-08
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-114-08
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-114-08: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-114-08: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-114-08: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-114-09
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-114-09
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-114-09
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-114-09: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-114-09: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-114-09: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-114-10
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-114-10
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-114-10
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-114-10: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-114-10: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-114-10: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.

MOBILE GEOCHEMISTRY
H&P

May 20, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – NAS – SITE 114 – EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP051104W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1317).

Project Summary

The following analyses were conducted:

- 1 water for volatile aromatic hydrocarbons (BTEX) & MTBE by EPA Method 8021B

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
2373 208th Street, Suite F-1, Torrance, California 90501 | 310 782.2929 — Fax 310 782.2798
www.HandPmg.com | 1-800-834-9888

MOBILE GEOCHEMISTRY

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NAVY PUBLIC WORKS PROJECT #1113621902008
NAS
SITE 114
EL CENTRO, CA

H&P Project #NP051104-W1

BTEX, MTBE (EPA Method 8020 Modified) ANALYSES OF WATERS

SAMPLE NUMBER	DATE ANALYZED	MTBE (ug/l)	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYLBENZ (ug/l)	XYLENES (ug/l)	SURROGATE (%REC)
METHOD BLANK	5/12/2004	ND	ND	ND	ND	ND	108
EC-114-02-GW	5/12/2004	ND	ND	ND	ND	ND	97
REPORTING LIMITS		10.0	1.0	1.0	1.0	1.0	53%-145%
DETECTION LIMITS		1.0	0.5	0.5	0.5	0.5	

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
5-26-2004

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP051104-W1
DAILY CALIBRATION DATE : 05/12/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ug/kg)	WATER (ug/L)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
MTBE	500 - 25	2500 - 125	4/2/2004	3.07	7.2%	291	2.91	5.1%	322	3.22	5.0%
BENZENE	500 - 25	2500 - 125	5/6/2004	9.44	11.6%	1,035	10.35	9.6%	881	8.81	6.7%
TOLUENE	500 - 25	2500 - 125	5/6/2004	17.80	12.5%	1,710	17.10	4.0%	1,558	15.58	12.5%
TFT	500 - 25	2500 - 125	5/6/2004	5.49	9.8%	582	5.82	6.1%	604	6.04	10.1%
ETHYLBENZENE	500 - 25	2500 - 125	5/6/2004	15.77	5.6%	1,584	15.84	0.5%	1,391	13.91	11.8%
m&p-XYLENES	500 - 25	2500 - 125	5/6/2004	20.54	8.8%	1,925	19.25	6.3%	1,747	17.47	15.0%
o-XYLENES	500 - 25	2500 - 125	5/6/2004	16.61	7.7%	1,592	15.92	4.1%	1,530	15.30	7.9%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR WATERS

ANALYSIS DATE : 05/12/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	MS CONC (ug/L)	%REC MS	MSD CONC (ug/L)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	17.8	89.0%	19.8	99.0%	10.6%	15%	75% - 125%
BENZENE	20.0	17.9	89.5%	19.8	99.0%	10.1%	15%	75% - 125%
TOLUENE	20.0	16.1	80.5%	16.3	81.5%	1.2%	15%	75% - 125%
ETHYLBENZENE	20.0	17.8	89.0%	18.5	92.5%	3.9%	15%	75% - 125%
TOTAL XYLENES	40.0	34.2	85.5%	34.8	87.0%	1.7%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR WATERS

ANALYSIS DATE : 05/12/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	LCS CONC (ug/L)	%REC LCS	LCSD CONC (ug/L)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	19.7	98.5%	20.2	101.0%	2.5%	15%	75% - 125%
BENZENE	20.0	17.4	87.0%	17.2	86.0%	1.2%	15%	75% - 125%
TOLUENE	20.0	16.4	82.0%	16.3	81.5%	0.6%	15%	75% - 125%
ETHYLBENZENE	20.0	17.8	89.0%	17.4	87.0%	2.3%	15%	75% - 125%
TOTAL XYLENES	40.0	33.6	84.0%	33.4	83.5%	0.6%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

Chain of Custody Record

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469
☒ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404
☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 5-12-04
H&P Project # NP0511C4W1
Outside Lab:

Client: NAVY Public Work Code 980
Address: 2730 McKean St. Suite 1
SD CA
Phone: 619-524-6967 Fax: 619-524-6000

Collector: D. Bloom
Client Project # 113621902008
Location: NAS El Centro Site 14
Turn around time:

Page: 6 Of 6
Project Manager D Bloom

Global ID: T0602566740 EDF: Yes / No

Sample Receipt
Intact: ☐ Yes ☐ No
Seal Intact: ☐ Yes ☐ No ☐ N/A
Cold: ☐ Yes ☐ No
N/A (Received on Site)

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B: BTEX / Oxygenates	8260B: Oxygenates	8260B: VOC's	8260B: VOC's and Oxygenates	Methane	Fixed Gases							Total # of containers
EC-14-62-GW			1220	5/12	W	VOA			X															

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
David M Bloom	CODE 980	Jaime Villarreal	H&P	5/12/04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constitutes authorization to proceed with analysis and acceptance of condition on back.

Sample disposal instruction: ☐ *Disposal @ $2.00 each* ☐ *Return to client* ☐ *Pickup*

Site Assessment Report and
Closure Summary
UST Site 145
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 145 at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 145 work plan addendum, dated March 15, 2004, prepared by the Public Works Center San Diego (PWCSD). Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 145. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 145
Site Address:	South of east end of "A" Street, near north corner Building 145 Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,738,653 Northing: 1,880,748 feet (State Plane 6)
Facility Name:	KBR Corp. offices (former PWC shops building)
Property Owner:	United States Navy
Tank Owner/Operator:	United States Navy
Responsible Party:	United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430010

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	Unknown
Construction Materials:	Uncertain, either reinforced concrete or steel
Capacity:	275 gallons
Contents:	Diesel
Year Removed:	1993 by Environmental Chemical Corp. (ECC)

Figure 1 shows a map of the site location and previous and current assessment locations.

In 1993, ECC removed a 275-gallon diesel UST at the location shown on Figure 2. During tank removal activities, ECC collected two soil samples from the tank excavation. The tank cavity samples contained TPH-diesel concentrations at 6,640 and 22,110 milligrams per kilogram (mg/kg) as reported on Table 4-7 (attached) in Final Technical Memorandum Underground Storage Tank Site Investigation, dated March 2000, prepared by Bechtel National, Inc. (BNI, 2000).

In 1999, BNI advanced one HydroPunch boring approximately 45 feet northwest (downgradient) of the former tank location. Analytical testing results indicate a benzene groundwater concentration of 1.4 micrograms per liter (ug/L), which exceeds the site cleanup goal of 1.0 ug/L. Additional background information is provided in the work plan.

PWC Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Soil exceeds cleanup levels for TPH-diesel. Groundwater exceeds action level for benzene.* Field activities were performed April 2-4, 2004.

In accordance with the work plan, Cone Penetrometer Test (CPT) and Laser Induced Fluorescence (LIF) data were collected *in situ* using the Site Characterization and Analysis Penetrometer System (SCAPS) at four locations as shown on Figure 1. Additional sample points to the southeast were inaccessible because of the presence of Building 145. A direct push temporary well was installed at a fifth location north of the former UST, near the previous Bechtel sample location, as shown on Figure 1. The LIF data are summarized and interpreted in Table 2.

The CPT results for the locations outside the tank excavation show clayey silt to sandy silt in the upper 6 to 9 feet overlying predominantly clay to approximately 12 feet bgs. Push EC-145-04, inside the tank excavation, showed clay with some silt layers to approximately 12 feet bgs. All pushes show a layer of silty sand from approximately 12 to 16.5 feet bgs overlying interbedded clay and silt to the bottom of the soundings at approximately 21 feet bgs.

At three of the locations, no fluorescence characteristic of petroleum, oil, or lubricants (POL) was encountered. At the remaining location (EC-145-04), fluorescence characterized by a drop in wavelength coupled with elevated intensity was encountered between 7.8 and 9.6 feet bgs, suggesting POL.

Two soil samples and a groundwater sample were collected at this site. The soil samples were collected within three feet of the associated LIF push. All samples were immediately delivered to an on-site mobile laboratory for analytical testing. The sample results are shown in Table 2.

At location EC-145-04, a soil sample was collected from a depth of approximately 9.0 bgs (within the fluorescence interval). The sample consisted of silty clay with a fuel odor and black veins of apparently natural organic material. The sample had a non-detectable TPH diesel concentration (<10 mg/kg), which is unexpectedly low compared to the LIF measurements. Based on the analytical result, the remaining soil in the drive sample was inspected, and a sample of the black vein organic material from approximately 8.7 feet bgs was submitted to the laboratory for analysis. This sample also had a non-detectable TPH diesel concentration. The LIF and analytical results suggest that a non-fuel fluorescing material may be the source of fluorescence that appears to be related to POL – *i.e.* an LIF false positive.

At location EC-145-03 (a location with no POL fluorescence characteristics), a sample was collected from a depth of approximately 9.0 feet bgs. The sample had a non-detectable TPH diesel concentration (<10 mg/kg) which is consistent with the expected LIF detection threshold.

A groundwater sample only was collected at location EC-145-05. The temporary wells were screened with 0.010-inch slotted ¾-inch diameter PVC with an ultrafine sand filter prepack from 10 to 20 feet bgs. Groundwater was measured at approximately 19.8 feet and 13.8 feet bgs at locations EC-145-04 and EC-145-05, respectively. However, the sampling team reported inconsistent readings from the depth sounder. Groundwater grab samples were collected unpurged using single-use disposable bailers. BTEX and MTBE were not detected in the groundwater sample. The temporary well was abandoned by grouting in place. Sample locations and results with cross section A-A' are illustrated on Figure 1.

Despite LIF results showing a weakly fluorescent interval at push location EC-145-04 between 7.8 and 9.6 feet bgs, the two soil samples indicated that neither TPH-gasoline nor TPH-diesel were present at depths of 8.7 feet and 9.0 feet bgs. The evidence suggests that soil impact is minimal and, if present, limited in horizontal extent.

Additional assessment to the east was not performed due to the presence of Building 145.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, the vertical and horizontal extent of fuel-impacted soils has been delineated to the extent practicable. Building 145 has limited assessment to the east. However, based on the assumed groundwater gradient to the northwest and analytical result of samples collected nearby, it is unlikely significant contaminant concentrations extend under the building. Groundwater appears to be unaffected by fuel contamination. The data obtained during the current investigation does not support the 1993 finding of elevated TPH-diesel concentrations reported for soil in the former UST cavity, suggesting that the previously detected elevated concentrations were anomalous, or natural degradation has occurred.

Based on the absence of fuel-impacted soil or groundwater discovered during this investigation, the presence of asphalt or buildings over the site, and no proposed land-use changes, it is the opinion of PWCSD that further assessment or remediation at this site is unnecessary. Therefore, we recommend that no further action be considered for this site.

Site Characterization and Closure Information

Description of the former UST:	See Background Information (page 2).
Contaminants Identified:	None. See attached analytical results tables.
Amount of Contaminants Leaked:	Not estimated. See attached analytical results tables.
MTBE:	None detected.
Description of the soil/geology:	Subsurface geology consists of predominately fine grained lithology with interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? Yes. Based on a review of the analytical data, the lateral and vertical extent of soil impacted with fuels has been delineated.

Estimated volume of contaminated soil left on site and concentration: Not Estimated. TPH-gasoline and TPH-diesel not detected.

Is groundwater contamination completely delineated? Yes. Current analytical results for groundwater show that constituents of concern are not detected.

Monitoring wells installed, properly permitted? No monitoring wells were installed.

Depth to groundwater: Approximately 13 feet bgs.

Is groundwater or surface water impacted? No. All analytical results for groundwater meet cleanup goals for the site (below tap water PRGs and drinking water MCLs).

Remedial action taken? UST removed 1993.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Yes.

Site Closure: Due to the limited amount of impacted soil that is anticipated to remain in place, and no documented groundwater impact from a fuel release from this site, and a site that is covered by asphalt, the contaminants that may remain, do not pose an unacceptable risk to human health or the environment. The recommendation for site closure is accepted and no further action is required at this site.

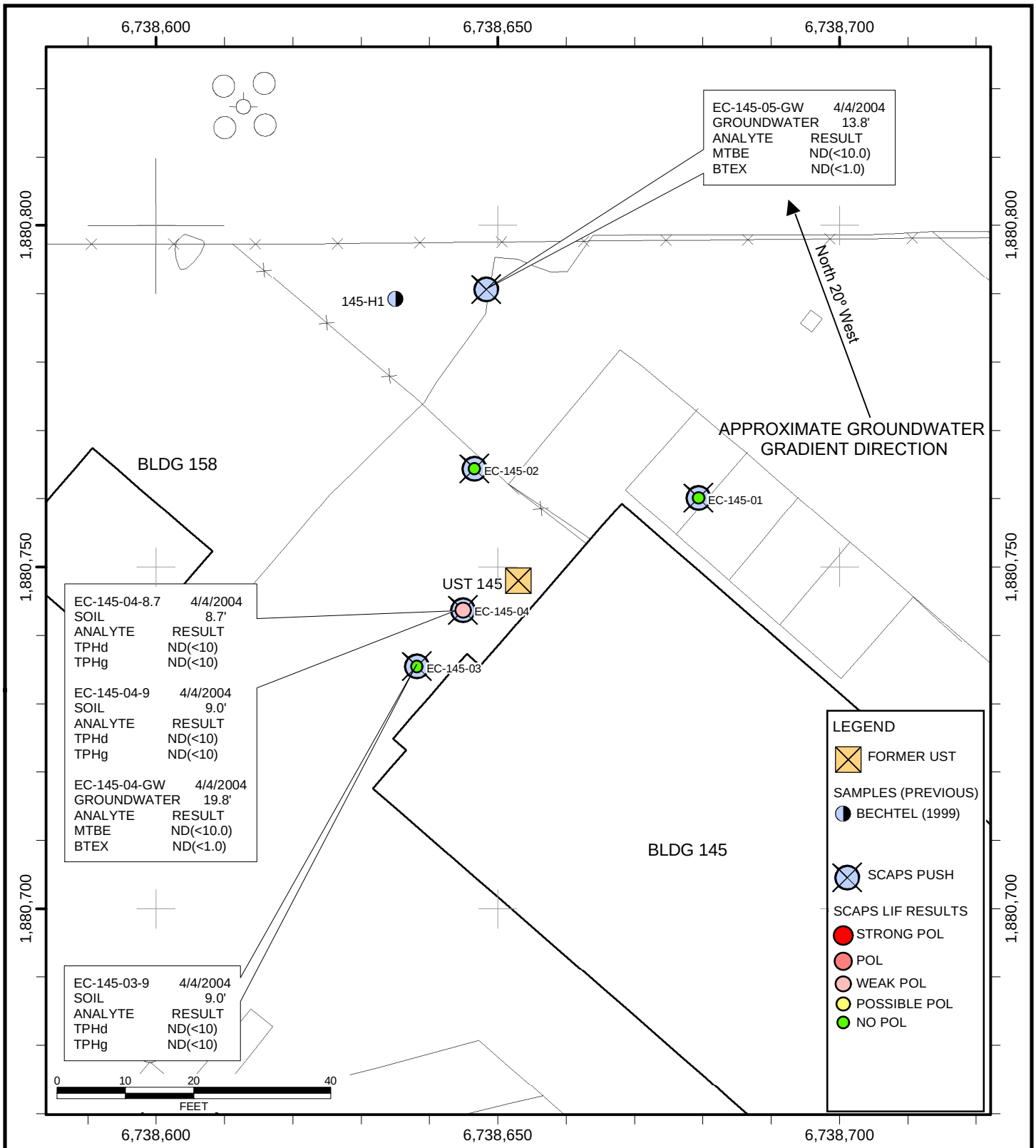
Signature: ***Date:***

N.R. Wells
Lieutenant Commander, CEC, US Navy
By direction of
The Commanding Officer

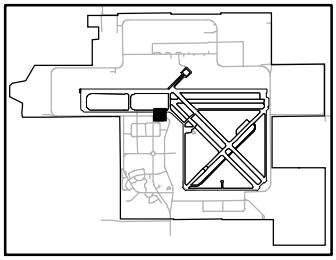
Signature: ***Date:***

Liann P. Chavez, R.G.
Senior Engineering Geologist
California Environmental Protection Agency
California Regional Water Quality Control Board
Colorado River Basin Region

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS, Soil, and Groundwater Results
SCAPS Logs
Laboratory Analytical Report and Chain-of-Custody Documentation



OVERVIEW MAP - NAF EL CENTRO



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MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 145

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC1

FIGURE: 1

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence, Soil, and Groundwater Analytical Data Summary

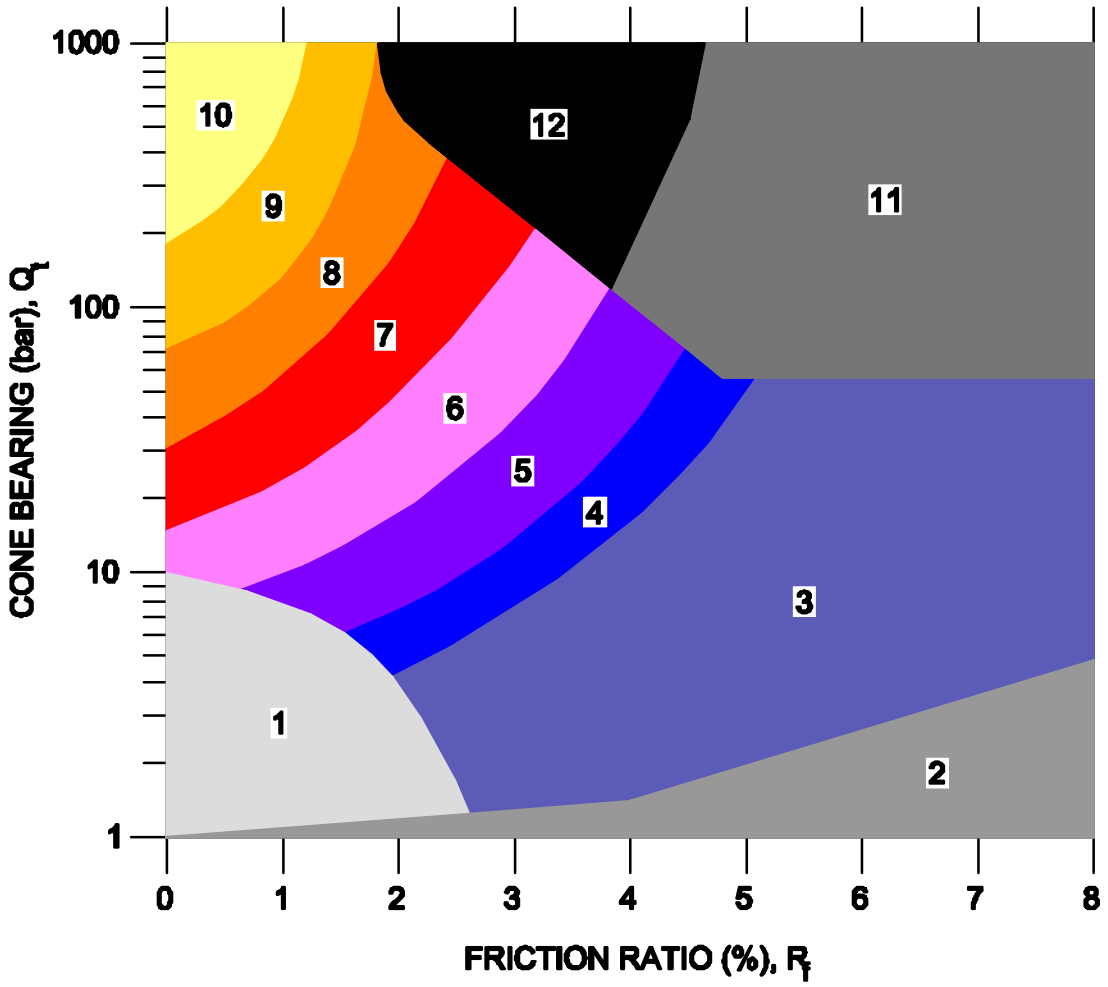
UST Site 145
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-145-01	4/2/2004	19.3	21.5	3,445 @ 2.3	No POL		
EC-145-02	4/2/2004	19.4	21.7	2,289 @ 6.6	No POL		
EC-145-03	4/2/2004	19.4	21.8	2,546 @ 6.1	No POL		
EC-145-03-9	4/4/2004					9.0': TPHd: <10 mg/kg TPHg: <10 mg/kg	
EC-145-04	4/2/2004	19.4	21.7	11,434 @ 8.5	Possible POL		
EC-145-04-8.7	4/4/2004					8.7': TPHd: <10 mg/kg TPHg: <10 mg/kg	
EC-145-04-9	4/4/2004					9.0': TPHd: <10 mg/kg TPHg: <10 mg/kg	
EC-145-04-GW	4/4/2004					19.8': BTEX: <1.0 ug/L MTBE: <10.0 ug/L	
EC-145-05-GW	4/4/2004					13.8': BTEX: <1.0 ug/L MTBE: <10.0 ug/L	

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

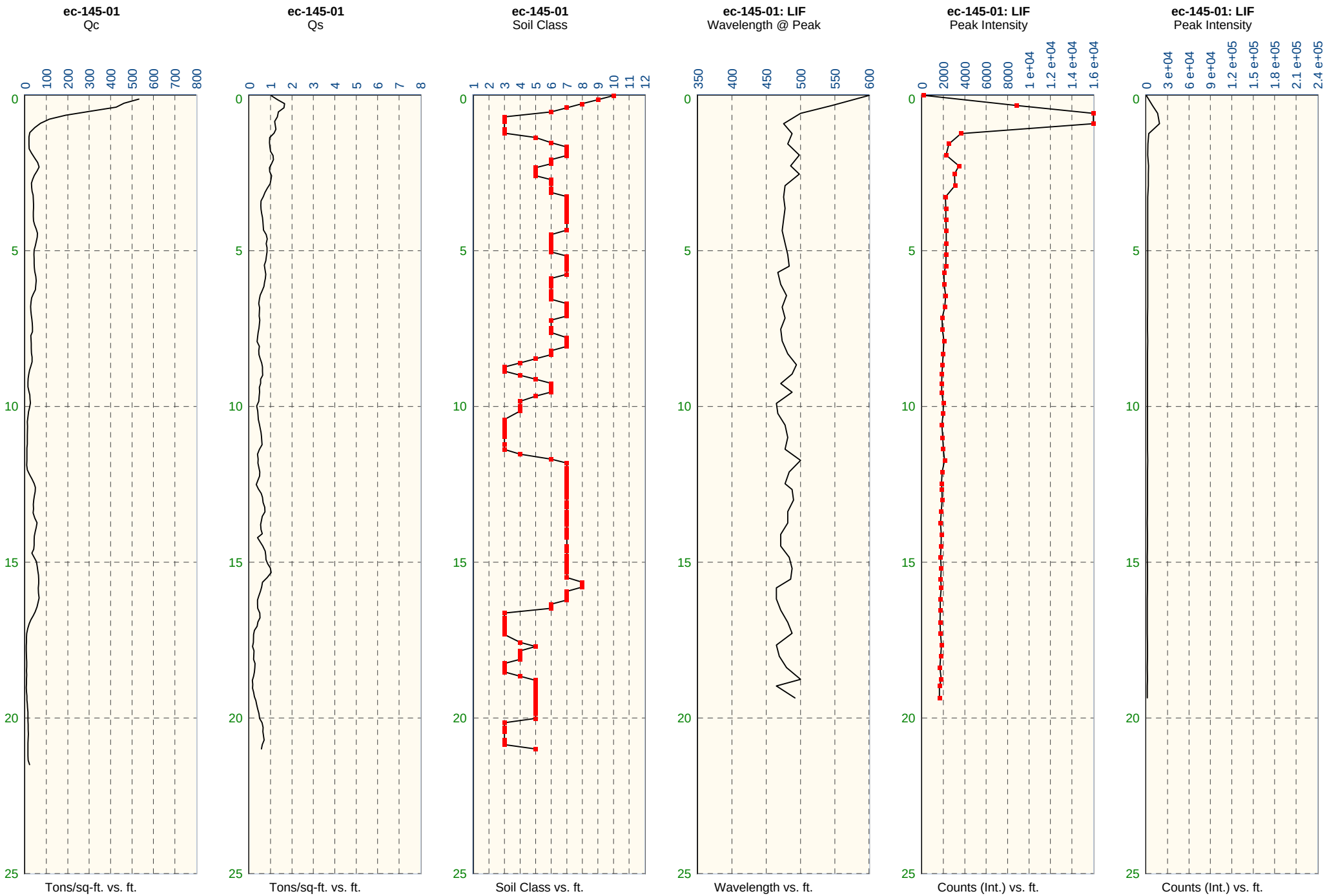
CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)

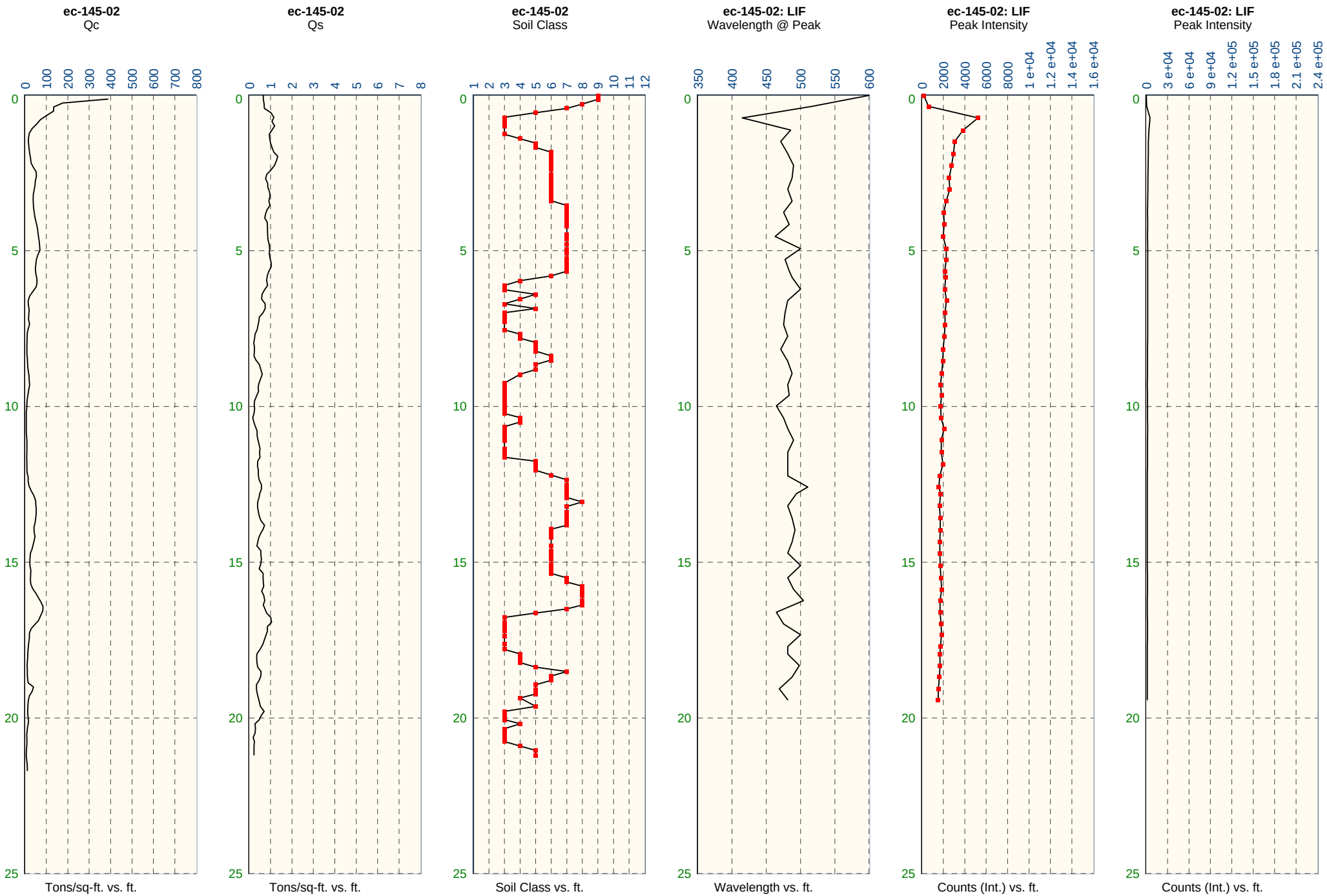


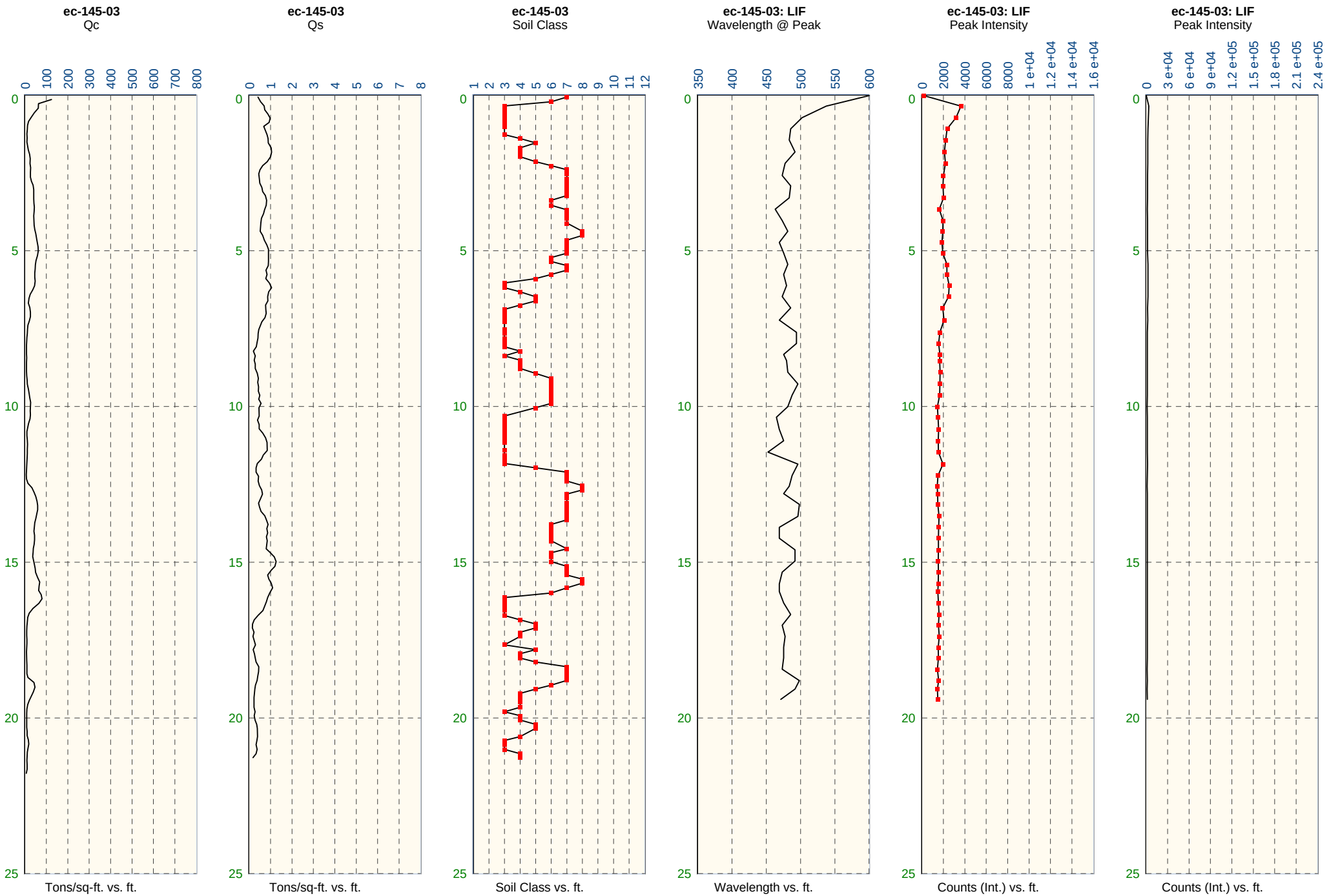
Friction Ratio (R_f) = Sleeve Friction (F_s)/Cone Pressure (Q_t) x 100%
1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

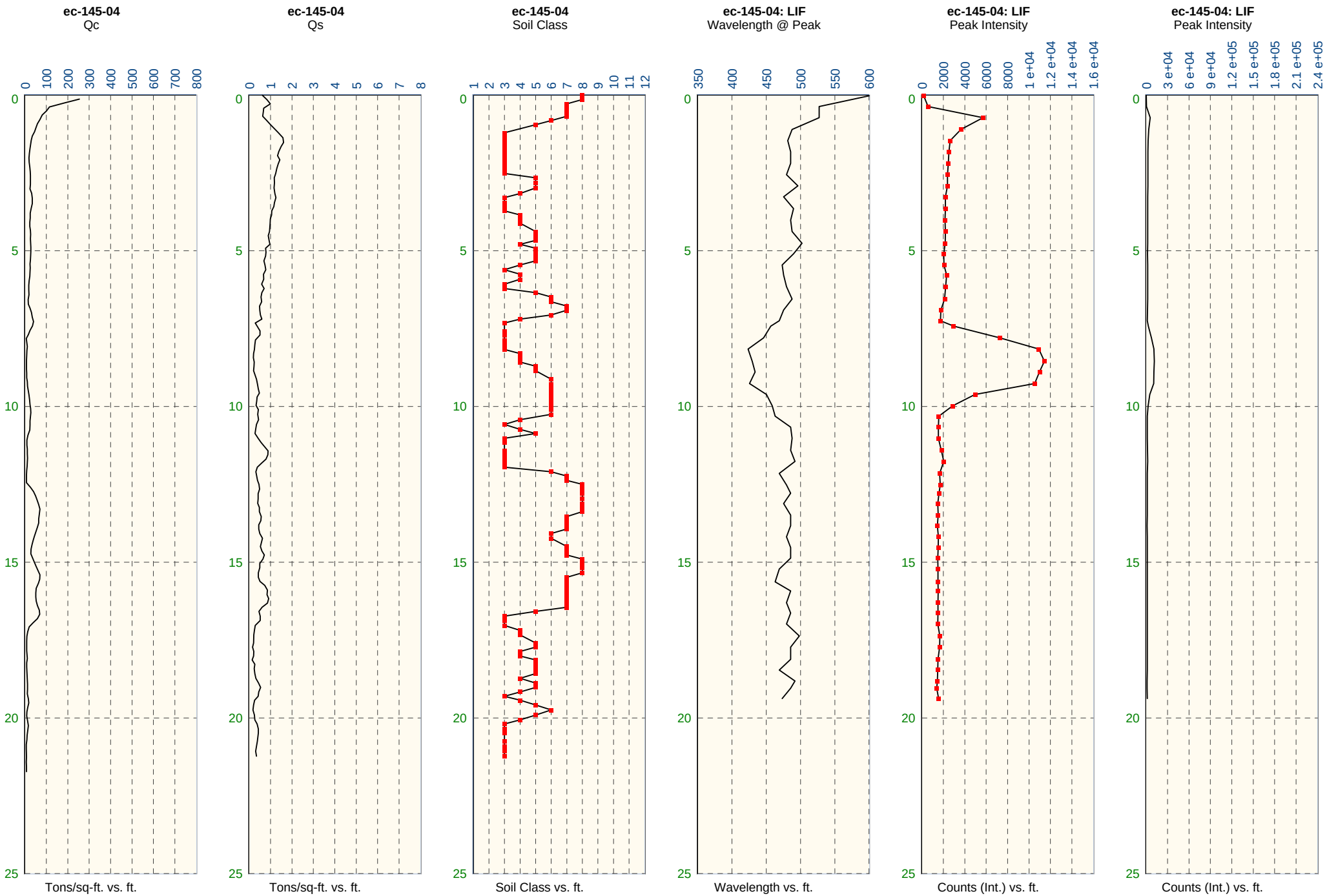
Zone		Q_t/ N	Soil Behavior Type
1		2	sensitive fine grained
2		1	organic material
3		1	clay
4		1.5	silty clay to clay
5		2	clayey silt to silty clay
6		2.5	sandy silt to clayey silt
7		3	silty sand to sandy silt
8		4	sand to silty sand
9		5	sand
10		6	gravelly sand to sand
11		1	very stiff fine grained*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

* overconsolidated or cemented


ec-145-01
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-145-01
Qs
0 1 2 3 4 5 6 7 8
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-145-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-145-01: LIF
Wavelength @ Peak
350 400 450 500 550 600
0 5 10 15 20 25
Wavelength vs. ft.
ec-145-01: LIF
Peak Intensity
0 2000 4000 6000 8000 1 e+04 1.2 e+04 1.4 e+04 1.6 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-145-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-145-02
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-145-02
Qs
0 1 2 3 4 5 6 7 8
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-145-02
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-145-02: LIF
Wavelength @ Peak
350 400 450 500 550 600
0 5 10 15 20 25
Wavelength vs. ft.
ec-145-02: LIF
Peak Intensity
0 2000 4000 6000 8000 1 e+04 1.2 e+04 1.4 e+04 1.6 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-145-02: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-145-03
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-145-03
Qs
0 1 2 3 4 5 6 7 8
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-145-03
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-145-03: LIF
Wavelength @ Peak
350 400 450 500 550 600
0 5 10 15 20 25
Wavelength vs. ft.
ec-145-03: LIF
Peak Intensity
0 2000 4000 6000 8000 1 e+04 1.2 e+04 1.4 e+04 1.6 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-145-03: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-145-04
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-145-04
Qs
0 1 2 3 4 5 6 7 8
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-145-04
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-145-04: LIF
Wavelength @ Peak
350 400 450 500 550 600
0 5 10 15 20 25
Wavelength vs. ft.
ec-145-04: LIF
Peak Intensity
0 2000 4000 6000 8000 1 e+04 1.2 e+04 1.4 e+04 1.6 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-145-04: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.

MOBILE GEO CHEMISTRY
H&P

April 13, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – SITE 145 – NAVAL AIR FACILITY - EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP040504W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1746).

Project Summary

The following analyses were conducted:

- 3 soils for total petroleum hydrocarbons (TPH) by DHS LUFT/8015M Method
- 2 waters for volatile aromatic hydrocarbons (BTEX) & MTBE by EPA Method 8021

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Blayne Hartman

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
2373 208th Street, Suite F-1, Torrance, California 90501 | 310 782.2929 — Fax 310 782.2798
www.HandPmg.com | 1-800-834-9888

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NAVY PUBLIC WORKS PROJECT #1113621902008
SITE 145
NAVAL AIR FACILITY
EL CENTRO, CA

H&P Project #NP040504-W1

TPH (DHS LUFT/ 8015M Method) ANALYSES OF SOILS

SAMPLE NUMBER	DATE ANALYZED	TPH-GAS C5-C11 (mg/kg)	TPH-DIESEL C12-C24 (mg/kg)
METHOD BLANK	4/5/2004	ND	ND
EC-145-03-9	4/5/2004	ND	ND
EC-145-04-9	4/5/2004	ND	ND
EC-145-04-8.7	4/5/2004	ND	ND
DETECTION LIMITS		10	10

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne

MOBILE GEOCHEMISTRY
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NAVY PUBLIC WORKS PROJECT #1113621902008
SITE 145
NAVAL AIR FACILITY
EL CENTRO, CA

H&P Project #NP040504-W1

BTEX, MTBE (EPA Method 8021) ANALYSES OF WATERS

SAMPLE NUMBER	DATE ANALYZED	MTBE (ug/l)	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYLBENZ (ug/l)	XYLENES (ug/l)	SURROGATE (%REC)
METHOD BLANK	4/5/2004	ND	ND	ND	ND	ND	106
EC-145-04	4/5/2004	ND	ND	ND	ND	ND	108
EC-145-05	4/5/2004	ND	ND	ND	ND	ND	105
REPORTING LIMITS		10.0	1.0	1.0	1.0	1.0	53%-145%
DETECTION LIMITS		1.0	0.5	0.5	0.5	0.5	

J INDICATES VALUE DETERMINED IS BETWEEN DETECTION LIMIT AND REPORTING LIMIT

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
4-15-2004

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP040504-W1
DAILY CALIBRATION DATE : 04/05/04

COMPOUND	CALIBRATION RANGE SOIL (ppm)	CALIBRATION RANGE WATER (ppb)	INITIAL CALIB DATE	INITIAL RF	INITIAL %RSD	OPENING AREA	OPENING RF	OPENING %DIFF	CLOSING / LCS AREA	CLOSING / LCS RF	CLOSING / LCS %DIFF
TPH GASOLINE - FID1	10-20000	330-660000	7/14/2003	0.878	6.1%	241	0.830	5.5%	241	0.830	5.5%
TPH GASOLINE - FID2	10-20000	330-660000	7/14/2003	0.580	11.9%	372	0.538	7.3%	368	0.538	7.3%
TPH GASOLINE - FID3	10-20000	330-660000	7/14/2003	0.696	10.4%	304	0.658	5.5%	293	0.658	5.5%
TPH DIESEL - FID1	10 - 50000	330 - 1650000	7/11/2003	1.014	9.5%	489	1.022	0.8%	489	1.022	0.8%
TPH DIESEL - FID2	10 - 50000	330 - 1650000	7/11/2003	0.690	13.3%	718	0.696	1.0%	731	0.696	1.0%
TPH DIESEL - FID3	10 - 50000	330 - 1650000	7/11/2003	0.723	7.9%	663	0.754	4.3%	667	0.754	4.3%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP040504-W1
DAILY CALIBRATION DATE : 04/05/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ug/kg)	WATER (ug/L)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
MTBE	500 - 25	2500 - 125	4/2/2004	1.22	13.2%	112	1.12	7.8%	130	1.30	7.0%
BENZENE	500 - 25	2500 - 125	4/2/2004	3.24	10.1%	371	3.71	14.4%	285	2.85	12.1%
TOLUENE	500 - 25	2500 - 125	4/2/2004	15.47	11.2%	413	4.13	*73.3%	715	7.15	*53.8%
TFT	500 - 25	2500 - 125	4/2/2004	1.02	8.5%	117	1.17	14.4%	96	0.96	6.6%
ETHYLBENZENE	500 - 25	2500 - 125	4/2/2004	14.84	6.6%	1,677	16.77	13.0%	1,481	14.81	0.2%
m&p-XYLENES	500 - 25	2500 - 125	4/2/2004	19.14	9.8%	2,063	20.63	7.8%	1,778	17.78	7.1%
o-XYLENES	500 - 25	2500 - 125	4/2/2004	15.74	9.3%	1,708	17.08	8.5%	1,495	14.95	5.0%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

* DUE TO A CONTAMINATION THE % DIFF VALUE WAS OUTSIDE OF CRITERIA. TOLUENE WAS RECALIBRATED ON 04/06/2004 AND DATA WAS REPROCESSED. ALL DATA WAS REPROCESSED AND % DIFF WAS WITHIN CRITERIA.

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR SOILS

ANALYSIS DATE : 04/05/04

H&P Project #NP040504-W1

COMPOUND	SPK CONC (mg/kg)	MS CONC (mg/kg)	%REC MS	MSD CONC (mg/kg)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	210	105.0%	214	107.0%	1.9%	15%	75% - 125%
TPH DIESEL	500	514	102.8%	506	101.2%	1.6%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY
H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR WATERS

ANALYSIS DATE : 04/05/04
H&P Project #NP040504-W1

COMPOUND	SPK CONC (ug/L)	MS CONC (ug/L)	%REC MS	MSD CONC (ug/L)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	10.0	10.0	99.9%	10.2	102.3%	2.4%	15%	75% - 125%
BENZENE	10.0	10.0	100.3%	10.0	99.8%	0.5%	15%	75% - 125%
TOLUENE	10.0	11.3	113.0%	11.0	110.0%	2.7%	15%	75% - 125%
ETHYLBENZENE	10.0	11.1	111.4%	11.8	118.3%	6.0%	15%	75% - 125%
TOTAL XYLENES	20.0	21.7	108.3%	21.7	108.7%	0.4%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR SOILS

ANALYSIS DATE : 04/05/04
H&P Project #NP040504-W1

COMPOUND	SPK CONC (mg/kg)	LCS CONC (mg/kg)	%REC LCS	LCSD CONC (mg/kg)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	212	106.0%	218	109.0%	2.8%	15%	75% - 125%
TPH DIESEL	500	506	101.2%	490	98.0%	3.2%	15%	75% - 125%

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR WATERS

ANALYSIS DATE : 04/05/04
H&P Project #NP040504-W1

COMPOUND	SPK CONC (ug/L)	LCS CONC (ug/L)	%REC LCS	LCSD CONC (ug/L)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	10.0	10.1	101.0%	9.6	95.7%	5.4%	15%	75% - 125%
BENZENE	10.0	10.0	99.5%	10.3	102.6%	3.1%	15%	75% - 125%
TOLUENE	10.0	11.1	111.0%	10.4	104.0%	6.5%	15%	75% - 125%
ETHYLBENZENE	10.0	11.0	110.0%	11.3	112.7%	2.4%	15%	75% - 125%
TOTAL XYLENES	20.0	21.5	107.3%	22.0	109.8%	2.3%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

Chain of Custody Record

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469
☐ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404
☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 4/4/04

H&P Project # NP040504W1

Outside Lab:

Client: NAVY PWC - SAN DIEGO ENVIRONMENTAL

Address: 2730 McKEAN ST, STE 1, CODE 980
SAN DIEGO CA 92136

Phone: 619-524 6967 Fax: 619-524 6000

Collector: TWS

Page: 2 Of 5

Client Project # 11 3621902008

Project Manager DAVID M. BLOOM

Location: NAF EL CENTRO SITE 145

Turn around time:

Global ID: T0602578 23

EDF: Yes / No

Sample Receipt

Intact: ☐ Yes ☐ No

Seal Intact: ☐ Yes ☐ No ☐ N/A

Cold: ☐ Yes ☐ No

N/A (Received on Site)

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B: BTEX / Oxygenates	8260B: Oxygenates	8260B: VOC's	8260B: VOC's and Oxygenates	Methane	Fixed Gases						Total # of containers
EC-145-03-9	145-03-9	9'	1200	4/4/04	soil	ss Tube	X																
EC-145-04-9	145-04-9	9'	1225	4/4/04	soil	ss Tube	X																
EC-145-04	145-04		1410	4/4/04	water	40ml VOA			X														
EC-145-05	145-05		1430	4/4/04	water	40ml VOA			X														
EC-145-04-8.7	145-04-8.7	8.7'	1225	4/4/04	soil	ss tube	X																

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
[signature]	Navy PWC	James Villarreal	H&P	4/5/04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constitutes authorization to proceed with analysis and acceptance of condition on back.

Sample disposal instruction: ☐ *Disposal @ $2.00 each* ☐ *Return to client* ☐ *Pickup*

Site Assessment Report and
Closure Summary
UST Site 315
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 315 at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 114 work plan addendum, dated March 18, 2004. Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 315. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 315
Site Address:	Southwest corner of 3rd and "D" Streets, north of Building 315 Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,736,691 Northing: 1,878,644 feet (State Plane 6)
Facility Name:	Standby Generator
Property Owner:	United States Navy
Tank Owner/Operator:	United States Navy
Responsible Party:	United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430016

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	Unknown
Construction Materials:	Steel
Capacity:	Not provided.
Contents:	Diesel
Year Removed:	1993 by Environmental Chemical Corp. (ECC)

Figure 1 shows a map of the site location and current and previous assessment locations.

During UST removal in 1993, ECC collected three soil samples from the excavation as discussed in the Final Technical Memorandum Underground Storage Tank Site Investigation, dated March 2000, prepared by Bechtel National, Inc. (BNI, 2000). The samples revealed TPH-diesel concentrations ranging from 3,680 to 21,020 milligrams per kilogram (mg/kg), which exceeded the TPH-diesel cleanup level of 1,000 mg/kg.

In 1999, BNI advanced two direct-push soil borings at the former UST location. A sample collected from a depth of 3.5 feet below ground surface (bgs) revealed a TPH-diesel concentration of 54,000 mg/kg. A TPH-diesel soil concentration of 1,000 mg/kg was reported for the 8-foot sample collected from this boring. The two soil samples collected from the other soil boring met the cleanup level.

BNI advanced a HydroPunch groundwater boring immediately north (downgradient) of the former UST location and collected a groundwater sample from between 4 and 8 feet bgs. The groundwater results from the HydroPunch boring indicated that constituents of concern were not detected or were below action levels. Sample locations are presented on Figure 1.

In May/June 2000, Geofon, Inc., removed approximately 186 cubic yards (cy) of fuel-impacted soil from an initial excavation measuring approximately 20 × 20 × 12 feet at the former tank location, according to *Final Technical Memorandum, Removal of Underground Storage Tanks and Remediation of Fuel-Impacted Soil at Various UST Sites, Naval Air Facility, El Centro, California*, dated November 13, 2000, prepared by Geofon, Inc. Concentrations of TPH-diesel in sidewall samples exceeded the cleanup level, so the excavation was extended approximately 1 to 2 feet to the north and south. A soil sample collected from the south sidewall revealed concentrations of TPH-gasoline and TPH-diesel that exceeded cleanup levels. However, the presence of Building 315 precluded further excavation to the south. A soil sample collected from the west sidewall revealed concentrations of TPH-diesel at 1,600 mg/kg, and TPH-gasoline at 134 mg/kg, which are above their respective cleanup levels. A groundwater sample collected toward the west side of the excavation revealed no MTBE or BTEX except for xylenes at 2.2 micrograms per liter, and a concentration of TPH-diesel of 24 milligrams per liter (see Figure 4-9, and Table 4-7, attached).

PWC Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Soil exceeds cleanup levels for TPH-diesel*. Specifically, we focused our assessment to the west of Geofon's 2000 excavation footprint. Field activities were performed April 2 and May 13, 2004.

In accordance with the work plan, Cone Penetrometer Test (CPT) and Laser Induced Fluorescence (LIF) data were collected *in situ* using the Site Characterization and Analysis Penetrometer System

(SCAPS) at five locations as shown on Figure 1. The LIF data are summarized and interpreted in Table 2. No fluorescence characteristic of petroleum, oil, or lubricants (POL) was encountered at any of the five locations. The locations were concentrated toward the west of the former UST excavation based on elevated soil concentrations reported by Geofon (2000). Sidewall sample results collected from the north and east indicated remediation activities met cleanup goals. Additional sample points further south were not obtained because the presence of Building 315 prevented access to this area. Soil samples were not collected from the site during this investigation.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, the vertical and horizontal extent of fuel-impacted soils has been delineated to the extent practicable. Groundwater does not appear to be adversely affected by fuel contamination. The data obtained during the current investigation indicate that the elevated TPH-gasoline and TPH-diesel concentrations reported on soil in the west and south sidewalls in 2000 appear to be limited toward the west, and that contamination may extend an insignificant distance to the south where data was unobtainable due to the presence of a building. Although data do not constrain the extent of soil impact, if present, in a southerly direction, based on the SCAPS data collected at this site, previous data reported by others, the general groundwater flow direction to the north, and observations of impacted soil at other UST sites at NAFEC, it is likely that the extent of soil impact to the south is limited in both vertical and horizontal extent. A negligible amount of contaminated soil may exist. However, to make a conservative estimate of remaining contaminated soil, we may assume that contaminated soil extends south 10 feet along 15 feet of Geofon's 2000 excavation sidewall, and an impacted zone exists between 8 and 10 feet bgs. If these conservative assumptions are used, approximately 11 cubic yards of soil containing TPH-diesel and TPH-gasoline concentrations greater than 1,000 mg/kg and 100 mg/kg, respectively, may be expected.

Based on the limited volume of petroleum-impacted soil anticipated to remain in place, the absence of impact to groundwater, and the continued land use of the site, it is our opinion that further assessment and remediation at this site is unnecessary. Therefore, we recommend that no further action be considered for this site.

Site Characterization and Closure Information

Description of the former UST:	See Background Information (page 2).
Contaminants Identified:	See attached analytical results tables.
Amount of Contaminants Leaked:	Not estimated. See attached analytical results tables.
MTBE:	None detected.
Description of the soil/geology:	Subsurface geology consists of predominately fine grained lithology with interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? Based on a review of the analytical data, the lateral and vertical extent of soil impacted with fuels has been delineated, except in the southerly direction, which is inaccessible because of the presence of Building 315. In 2000, a south sidewall sample revealed a TPH-diesel concentration of 8,410 mg/kg, and TPH-gasoline of 466 mg/kg.

Estimated volume of contaminated soil left on site and concentration: 11 cubic yards (inferred to be greater than 1,000 mg/kg TPH-diesel and greater than 100 mg/kg TPH-gasoline).

Is groundwater contamination completely delineated? Yes. Current analytical results for groundwater show that constituents of concern are below cleanup standards or not detected.

Monitoring wells installed, properly permitted? No monitoring wells were installed.

Depth to groundwater: Approximately 13 feet bgs (May/June 2000).

Is groundwater or surface water impacted? No. All analytical results for groundwater meet cleanup goals for the site (below tap water PRGs and drinking water MCLs).

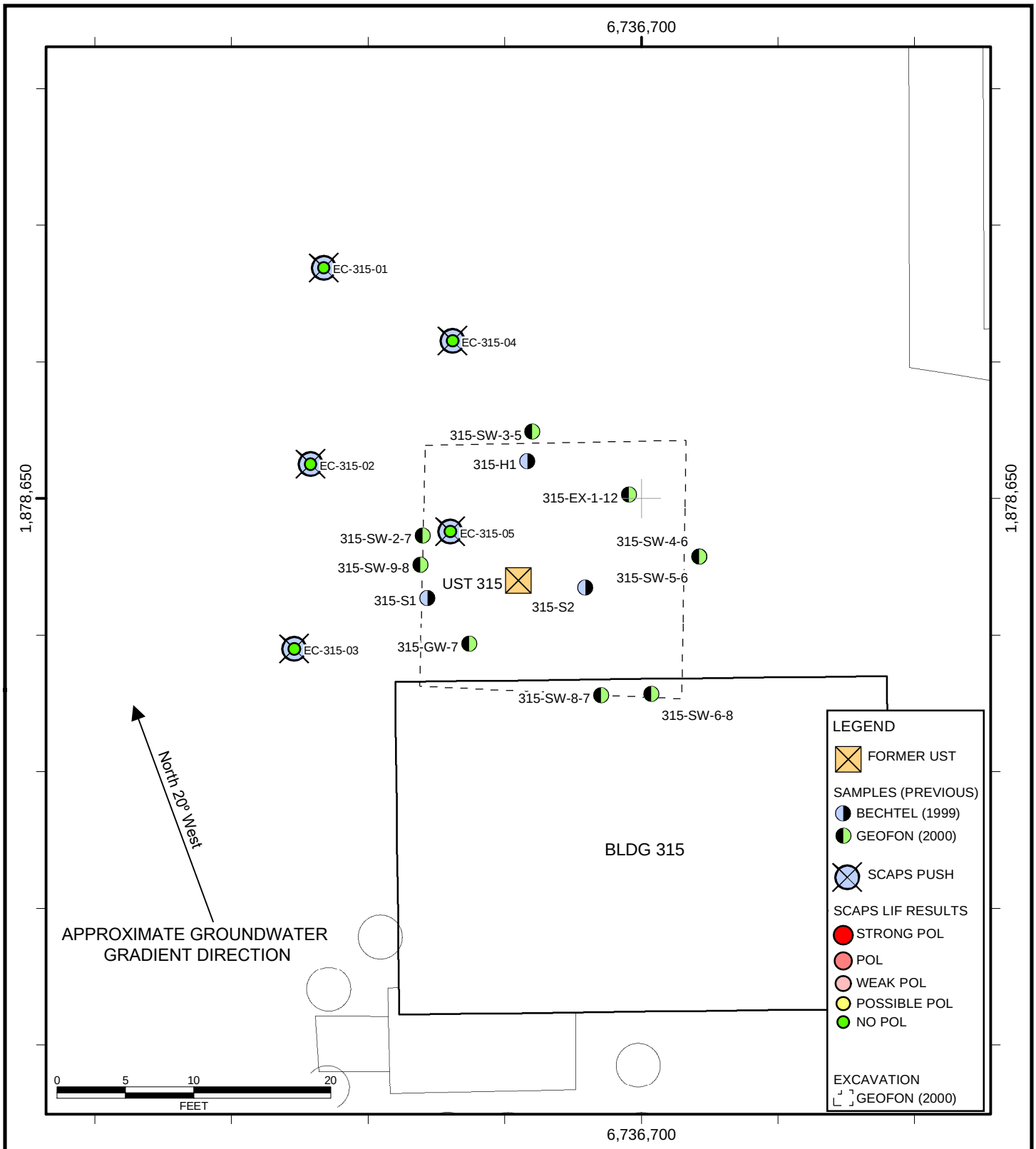
Remedial action taken? UST removed 1993. Approximately 186 cy (or more) fuel-containing soil removed 2000.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Yes.

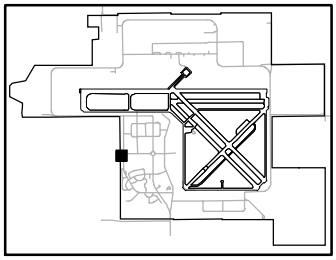
Site Closure: Due to the small volume (estimated 11 cy or less) of impacted soil that is anticipated to remain, and no documented groundwater impact from a fuel release from this site, the contaminants that may remain do not pose an unacceptable risk to human health or the environment. The recommendation for site closure is accepted and no further action is required at this site.

Signature: ***Date:***	***Signature:*** ***Date:***
N.R. Wells **Lieutenant Commander, CEC, US Navy** **By direction of** **The Commanding Officer**	**Liann P. Chavez, R.G.** **Senior Engineering Geologist** **California Environmental Protection Agency** **California Regional Water Quality Control Board** **Colorado River Basin Region**

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS Results
Site 315 from Geofon (2000), including Table 4-7, and Figure 4-9
SCAPS Logs
Laboratory Analytical Report and Chain-of-Custody Documentation



OVERVIEW MAP - NAF EL CENTRO



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MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 315

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC1

FIGURE: 1

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence Data Summary

UST Site 315
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-315-01	4/2/2004	19.8	22.0	2,100 @ 12.9	No POL		
EC-315-02	4/2/2004	19.3	21.6	1,909 @ 8.0	No POL		
EC-315-03	4/2/2004	19.4	21.6	2,091 @ 11.2	No POL		
EC-315-04	5/13/2004	19.1	21.5	4,127 @ 3.1	No POL		
EC-315-05	5/13/2004	19.0	21.4	5,068 @ 4.9	No POL		

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

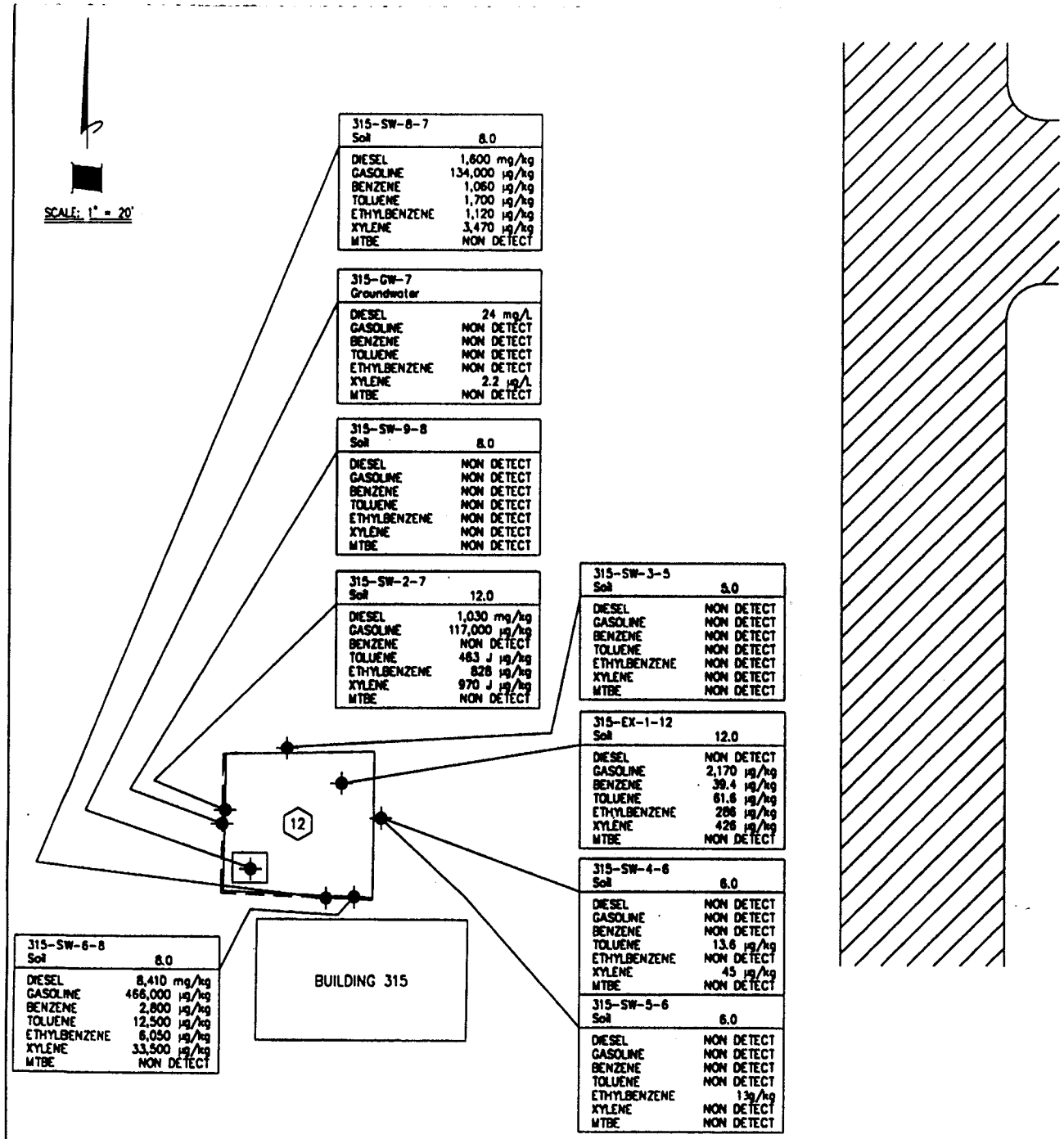
4.9 Site 315: Site Description and Analytical Results

UST 315 was a steel, diesel fuel UST removed by ECC (1993). This tank was located near the southeast corner of Building 315. Information on the date of installation and capacity of this UST was not available.

Several previous soil and groundwater investigations have been conducted at UST Site 315 (Table 4-7). In 1993, ECC collected three soil samples as part of the tank removal. The three samples were collected directly from the tank excavation. Historical records indicate that contaminated soil from the excavation was disposed off-site. In 1999, BNI advanced two direct-push soil borings and one HydroPunch boring at UST Site 315. The soil borings (315-S1 and 315-S2) were advanced to 8.5 and 11 feet bgs, respectively. The HydroPunch soil boring was advanced approximately 10 feet north of the original tank site. This HydroPunch boring was advanced to a total depth of 12 feet bgs and utilized a 4-foot stainless steel HydroPunch screen, set from 8 to 12 feet bgs. The original screened interval was from 4 to 8 feet bgs, however, insufficient amounts of sample for testing could be recovered at this depth. Four soil samples and one water sample were collected from this site.

As part of this current UST site investigation/cleanup, an initial excavation measuring approximately 20 x 20 x 12 feet was accomplished and approximately 186 cubic yards (cyd) of fuel-impacted soil was removed and disposed of off-site (Appendix D). Upon reaching the limits of excavation, one soil sample (315-EX-1-13) and one groundwater sample (315-GW-7) was collected from the bottom of the excavation, and five soil samples (315-SW-2-10, 315-SW-3-8, 315-SW-4-8, 315-SW-5-8, 315-SW-6-8), including one field duplicate, were collected from the sidewalls of the excavation (Figure 4-9, Table 4-7). Soil samples collected from the south (315-SW-6-8) and east (315-SW-2-7) sidewalls contained concentrations of diesel (8,410 mg/kg and 1.030 mg/kg, respectively) and gasoline (466,000 µg/kg and 117,000 µg/kg, respectively) above the soil cleanup levels.

Based on the analytical results, and at the direction of the RPM, the excavation was further extended to the north and south approximately 1 to 2 feet. The excavation could not be further excavated to the south, due to the presence of Building 315. Subsequent to excavation, two soil samples (315-SW-8-7 and 315-SW-9-8) were collected from the south and east sidewalls, respectively (Figure 4-9, Table 4-7). The sample collected from the south (315-SW-8-7) sidewall had a concentration of gasoline (134,000 µg/kg) above the soil cleanup level of 100,000 µg/kg. The sample collected from the east (315-SW-9-8) did not contain any concentrations above the soil cleanup levels. At the direction of the RPM, no further excavation was performed at this site.



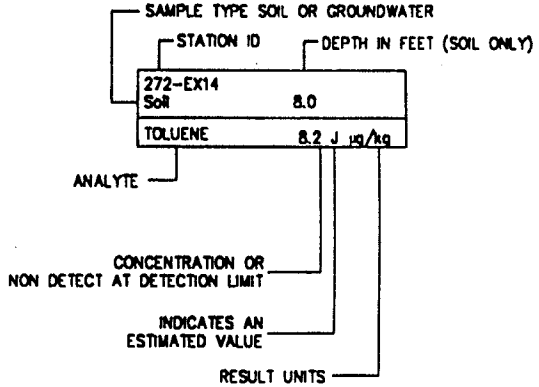
LEGEND

- EXIST. ASPHALT
- EXIST. DIRT
- ORIGINAL EXCAVATED AREA
- ADDITIONAL EXCAVATED AREA
- EXIST. BLDG.
- EXCAVATION SAMPLE POINT
- (12) EXCAVATION DEPTH

NOTES:

ALL ANALYTICAL DATA PRESENTED ON THIS FIGURE IS FROM CURRENT 2000 REMOVAL ACTION

ALL SOIL AND GROUNDWATER SAMPLES COLLECTED DURING THE CURRENT REMOVAL ACTION WERE ANALYZED FOR MTBE



Technical Memeorandum

Figure 4-9

Site 315 - Site Map

NAF El Centro
Imperial County, California

GEOFON INCORPORATED

Date: November 2000
Contract No.: N68711-97-D-8702
DO No.: 0033

Table 4-7
Analytical Results for Site 315

Sample Number	Boring Number	Depth (feet bgs)	TPH-Gas[a]	TPH-Diesel[b]	TRPH	Benzene[c]	Toluene[c]	Ethlybeneze	Xylene[c]	MTBE[c]	Organolead[d]
Soil Results - GEOFON, Soil Removal/Field Investigation, May/June 2000 (µg/kg)											
315-EX-1-13	Excavation	12	1,900	533[e]		5 U	49.5	49	141	10 U	
315-SW-2-10	Excavation	7	117,000	1,030[e]		500 U	828	463 J	970 J	1000 U	
315-SW-3-8	Excavation	5	1,000 U	10 U[e]		5 U	5 U	5 U	10 U	10 U	
315-SW-4-8	Excavation	6	1,000 U	10 U[e]		5 U	5 U	13.6	45	10 U	
315-SW-5-8	Excavation	6	1,000 U	10 U[e]		5 U	5 U	5 U	13	10 U	
315-SW-6-8	Excavation	8	466,000	8,410[e]		2,800	6,050	12,500	33,500	500 U	
315-SW-8-7	Excavation	8	134,000	1,600[e]		1,060	1,700	1,120	3,470	200 U	
315-SW-9-8	Excavation	8	1,000 U	10 U[e]		5 U	5 U	5 U	10 U	10 U	
Groundwater Results - GEOFON, Soil Removal/Field Investigation, May/June 2000 (µg/L)											
315-GW-7	Excavation		10 U	24[f]		0.5 U	0.5 U	0.5 U	2.2	1 U	
Historical Data, Soil Results - BNI, Field Investigation, January/February 1999 (mg/kg)											
175S021	315-S1	5		29		0.067 U	0.13 U	0.13 U	0.13 U	1.3 U	
175S022	315-S1	7.6		710		0.06 U	0.12 U	0.12 U	0.13	1.2 U	
175S023	315-S2	3.5		54,000		0.06 U	0.12 U	0.12 U	0.12 U	1.2 U	
175S024	315-S2	8		1,000		0.062	0.12 U	0.12 U	0.22	1.2 U	
Historical Data, Groundwater Results - BNI, Field Investigation, January/February 1999 (µg/L)											
175HP11	315-H1	4-8[g]		1.3[f]		0.5 U	1	6.2	31	10 U	
Historical Data, Soil Results - Environmental Chemical Corp., UST Removal Phase 1, 1993 (mg/kg)[h]											
315-1		4		21,020							
315-2		Unknown		3,680							
315-3		Unknown		9,170							

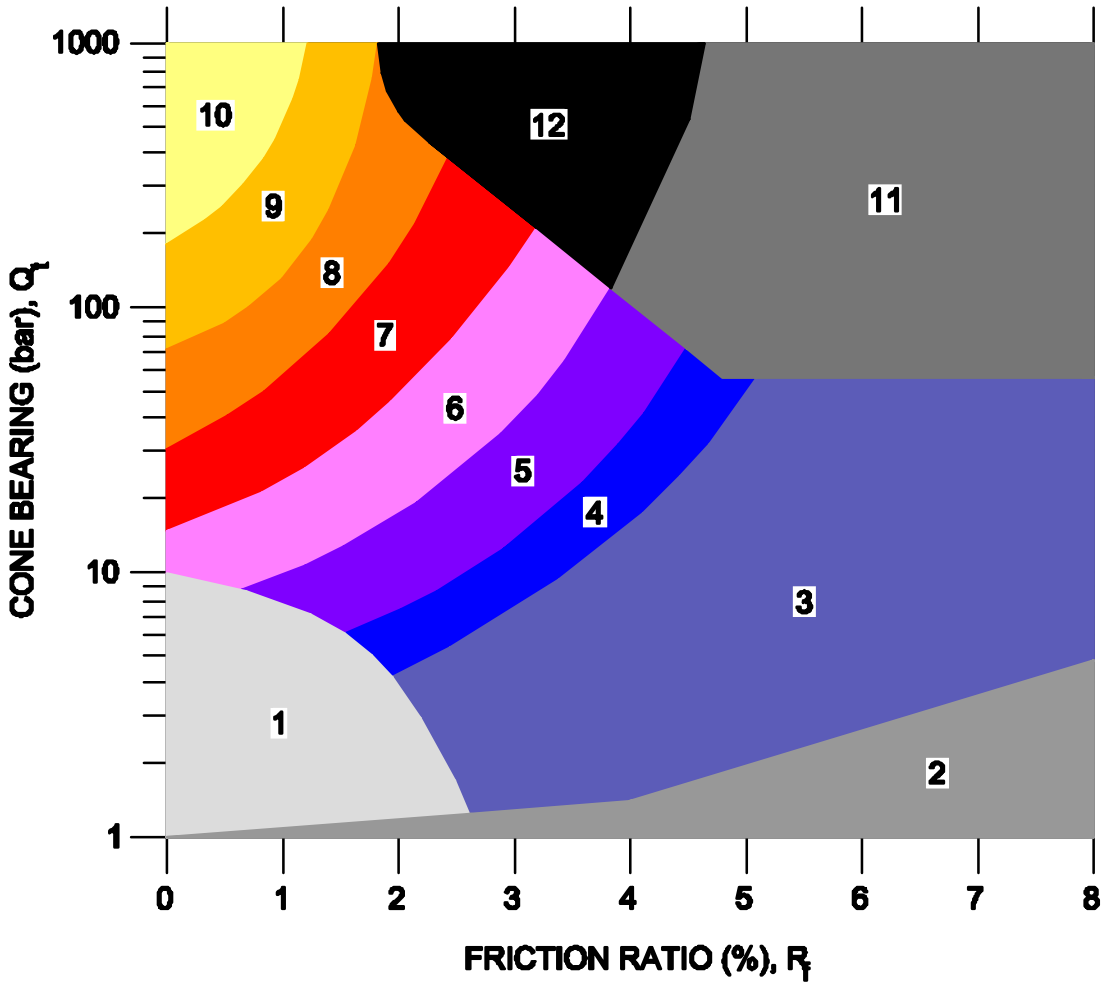
Notes:
[a] analyzed using United States Environmental Protection Agency (U.S. EPA) Method 8015-M; this analysis was calibrated for TPH-gasoline
[b] analyzed using U.S. EPA Method 8015-M; this analysis was calibrated for TPH-diesel
[c] analyzed using U.S. EPA Method 8021B
[d] analyzed by California Leaking Underground Fuel Tank Method
[e] diesel results for soil reported in milligrams per kilogram
[f] diesel results for groundwater reported in milligrams per liter

Table 4-7 (Continued)
Analytical Results for Site 315

Notes:
[g] Hydropunch screened interval
[h] collected during UST removal

Acronyms/Abbreviations:
µg/L - micrograms per liter
µg/kg - micrograms per kilogram
bgs - below ground surface
BNI - Bechtel National, Inc.
mg/kg - milligrams per kilogram (parts per million)
MTBE - methyl-tertiary-butyl ether
TRPH - total recoverable petroleum hydrocarbons
U - not detected above the referenced detection limit

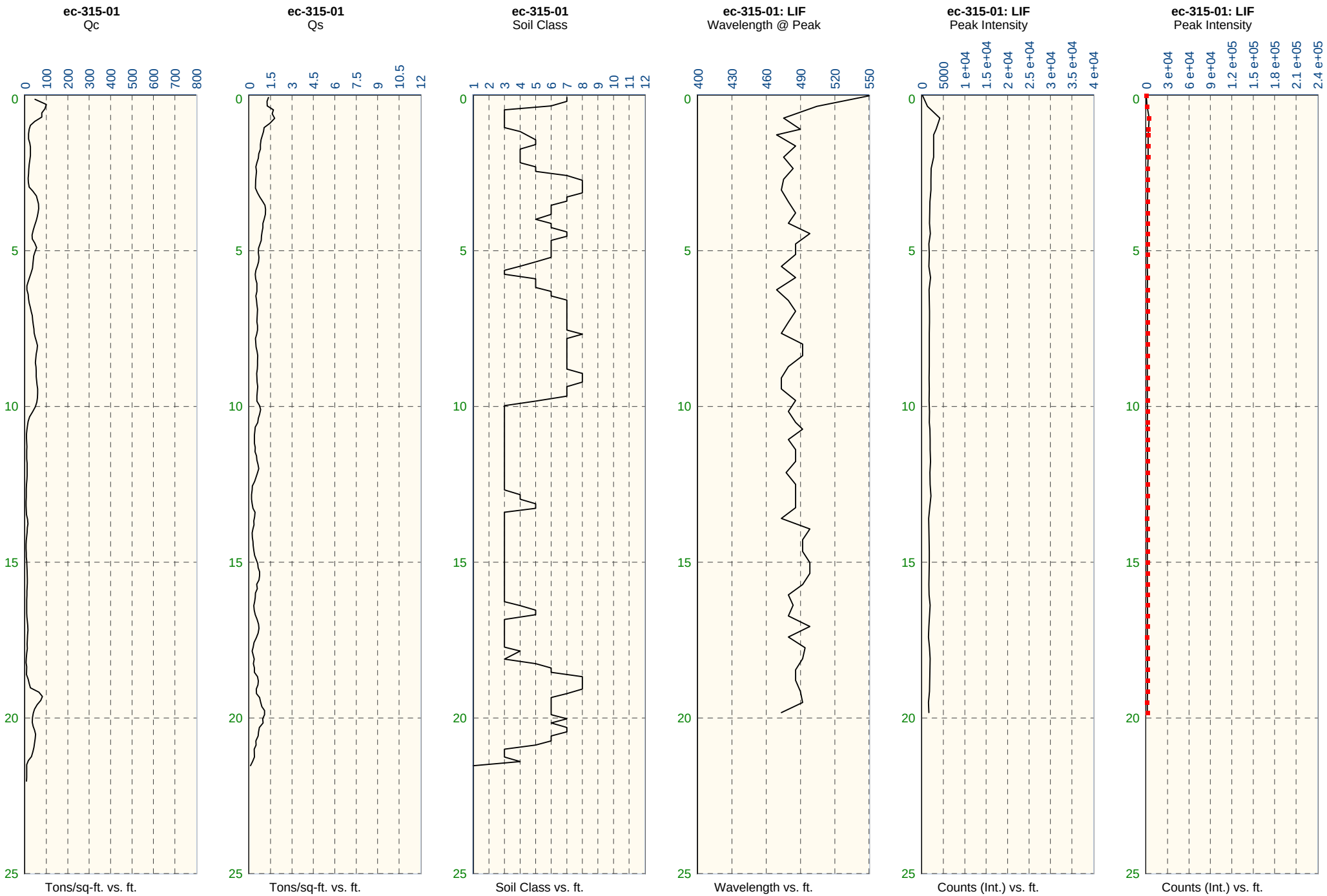
CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)

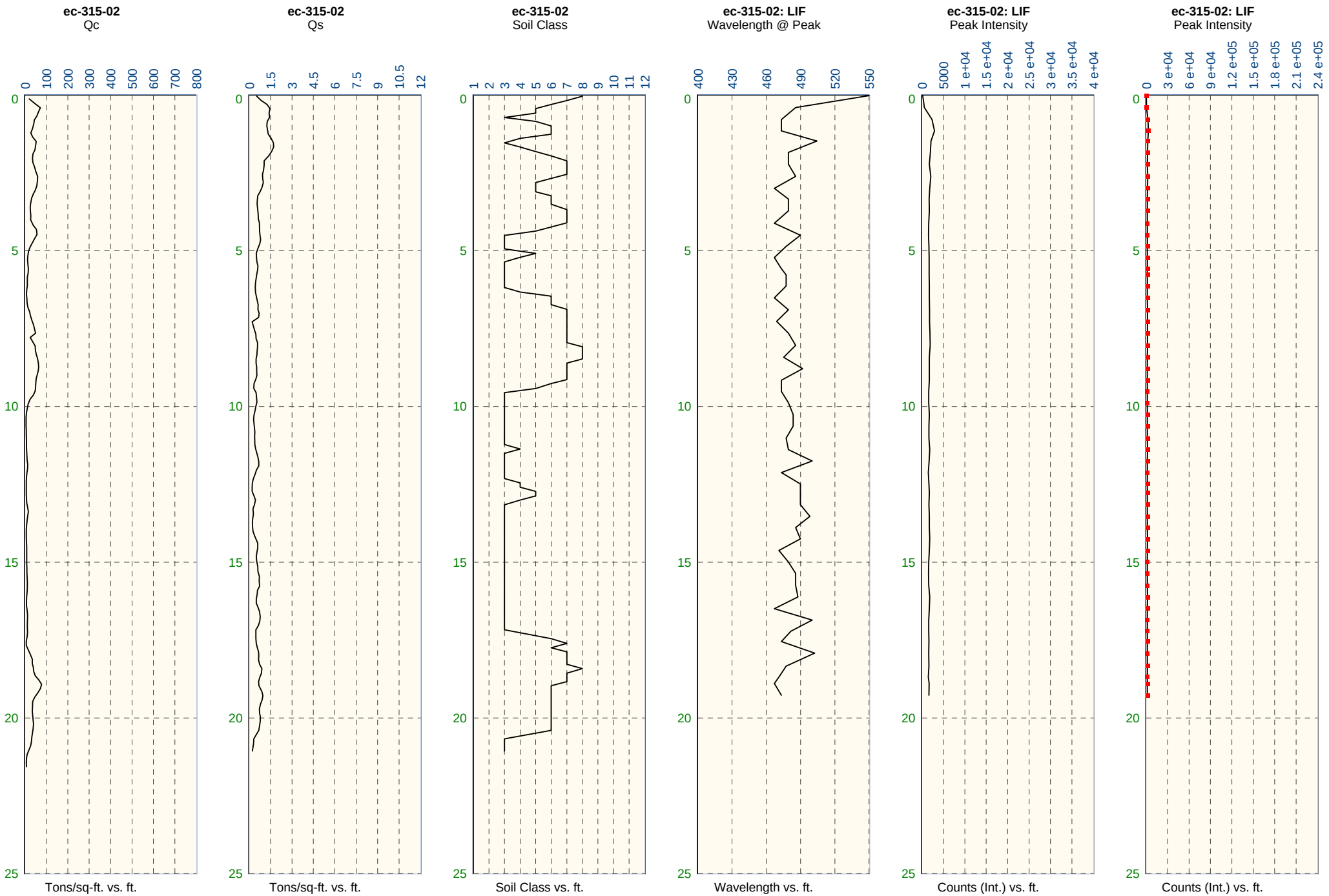


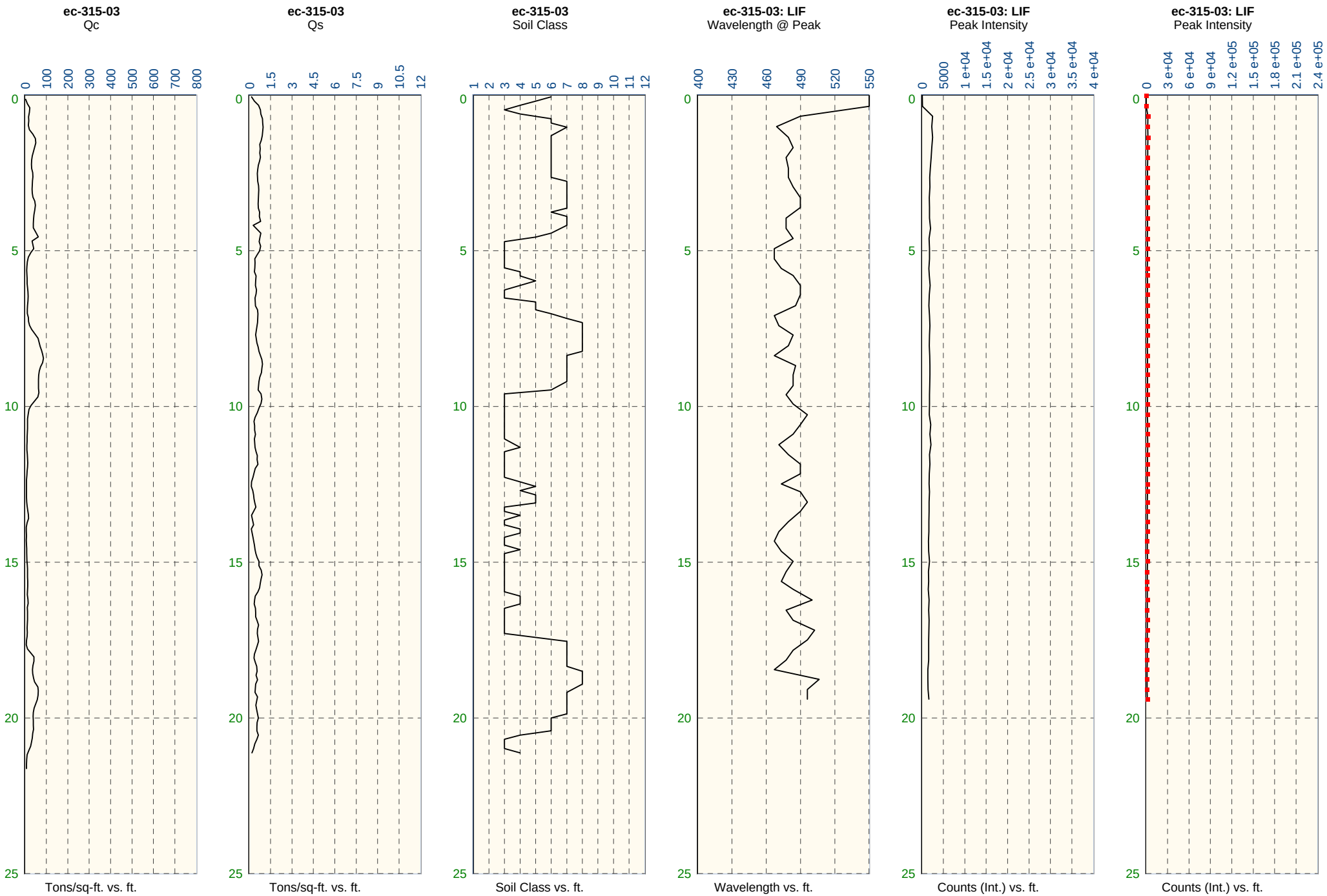
Friction Ratio (R_f) = Sleeve Friction (F_s)/Cone Pressure (Q_t) x 100%
1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

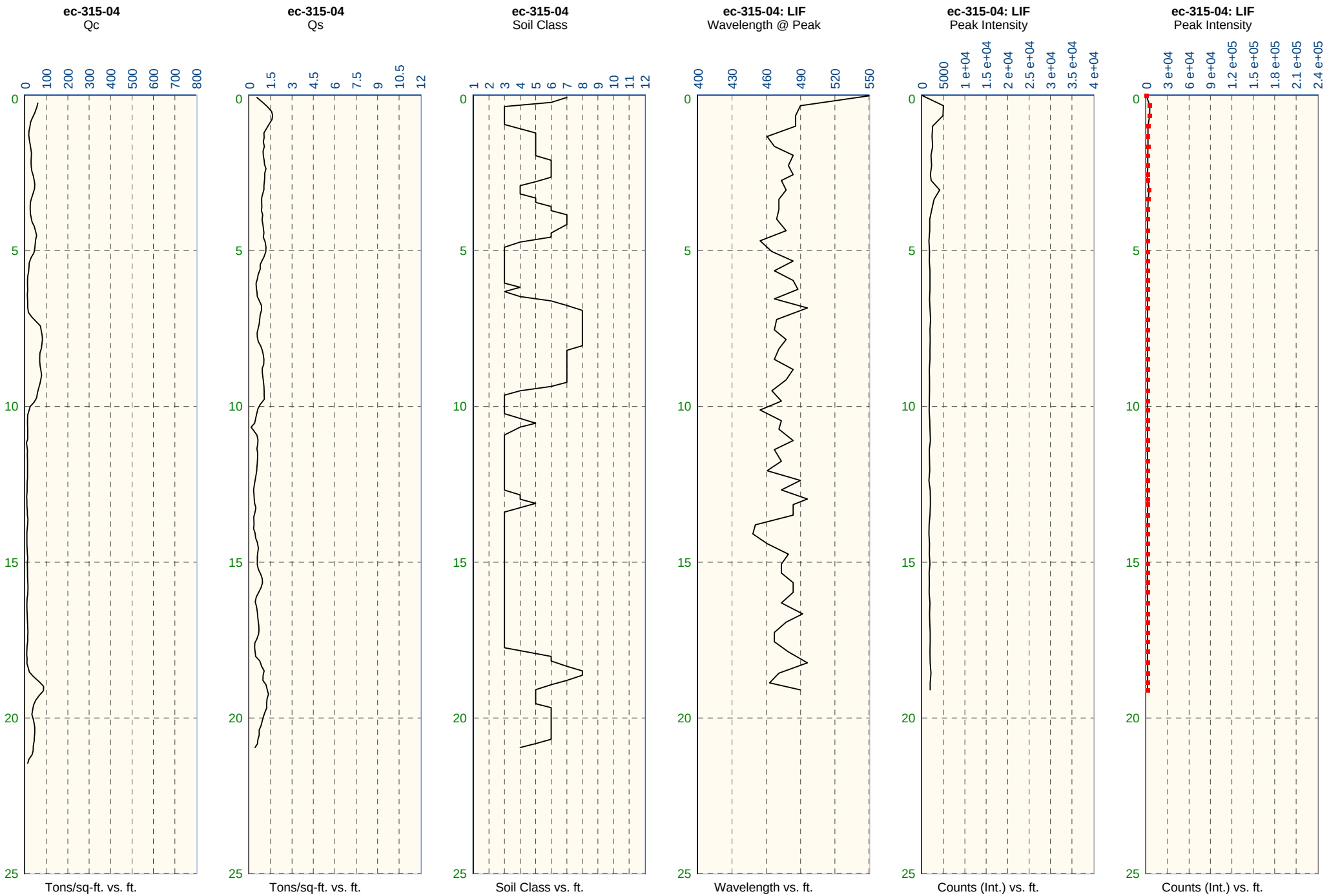
Zone		Q_t/ N	Soil Behavior Type
1		2	sensitive fine grained
2		1	organic material
3		1	clay
4		1.5	silty clay to clay
5		2	clayey silt to silty clay
6		2.5	sandy silt to clayey silt
7		3	silty sand to sandy silt
8		4	sand to silty sand
9		5	sand
10		6	gravelly sand to sand
11		1	very stiff fine grained*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

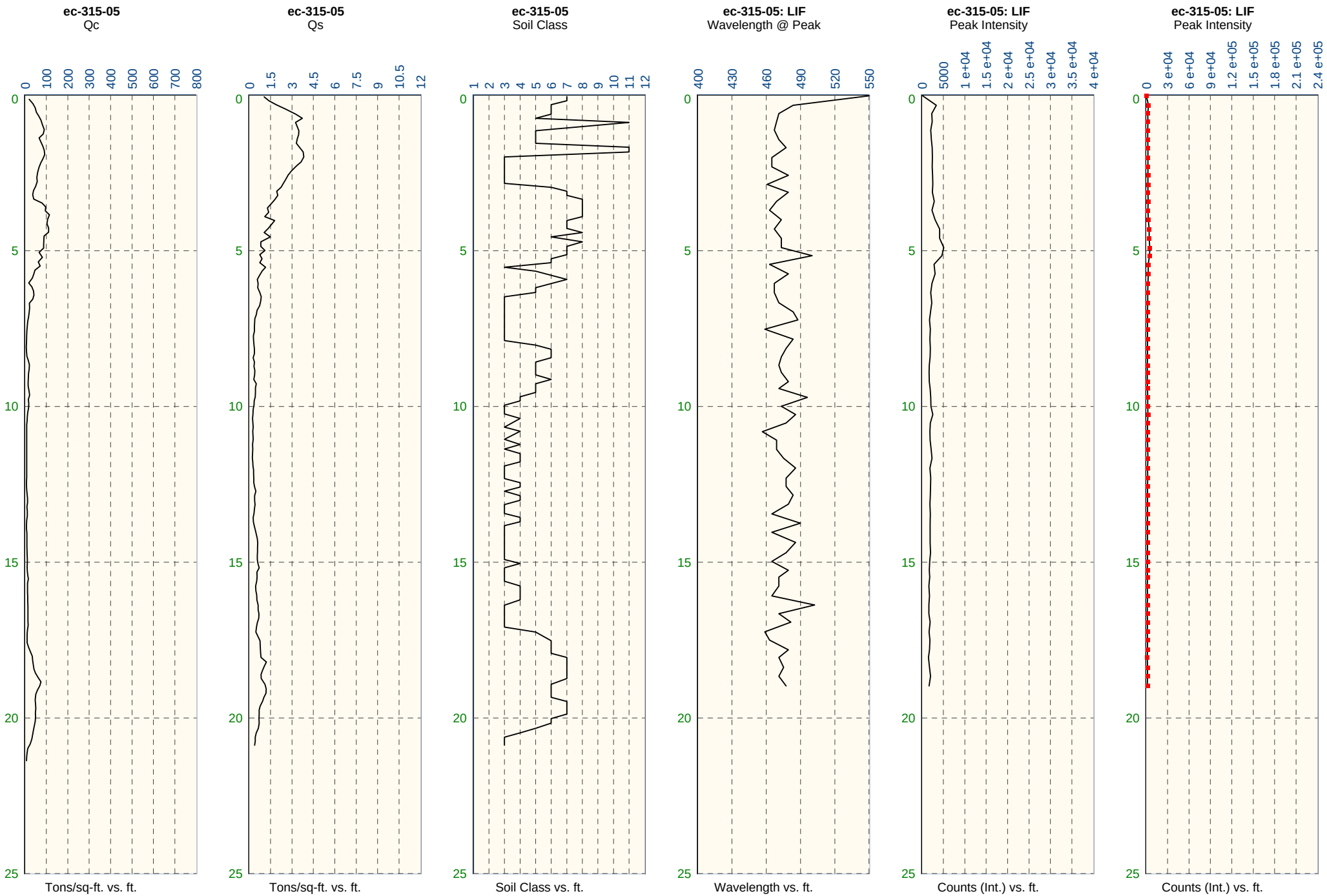
* overconsolidated or cemented


ec-315-01
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-315-01
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-315-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-315-01: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-315-01: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-315-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-315-02
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-315-02
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-315-02
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-315-02: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-315-02: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-315-02: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-315-03
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-315-03
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-315-03
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-315-03: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-315-03: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-315-03: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-315-04
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-315-04
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-315-04
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-315-04: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-315-04: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-315-04: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-315-05
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-315-05
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-315-05
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-315-05: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-315-05: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-315-05: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.

Site Assessment Report
UST Site 328
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 328 at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 328 work plan addendum, dated December 30, 2003. Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 328. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST 328
Site Address:	Northwest corner 1st & "B" Streets (former Building 328) Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,738,037 Northing: 1,877,200 feet (State Plane 6)
Facility Name:	Park and Recreation Area
Property Owner: Tank Owner/Operator: Responsible Party:	United States Navy United States Navy United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430017

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	Unknown
Construction Materials:	Concrete
Capacity:	500 gallons
Contents:	Diesel
Year Removed:	1993 by Environmental Chemical Corp. (ECC)

Figure 1 shows a map of the site location and current assessment locations.

During UST removal in 1993, ECC collected six soil samples from the excavation. Concentrations of total petroleum hydrocarbons quantitated as diesel (TPH-diesel) reportedly ranged from 11 to 11,730 milligrams per kilogram (mg/kg). Bechtel National, Inc. (BNI), performed a field investigation consisting of one HydroPunch groundwater grab sample in February 1999 as reported in their Final Underground Storage Tank Technical Memorandum (BNI, 2000, p. 4-62). The HydroPunch screened interval was 3 to 13 feet below ground surface (bgs). Low concentrations of xylenes and TPH-diesel were detected in the groundwater. Additional background information was provided in our work plan.

In 2003, NAFEC demolished Building 328, and installed landscaping in the vicinity for park uses.

PWC Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Soil exceeds cleanup levels for TPH-diesel*. Field activities were performed on May 10, 2004.

In accordance with the work plan, Cone Penetrometer Test (CPT) and Laser Induced Fluorescence (LIF) data were collected *in situ* using the Site Characterization and Analysis Penetrometer System (SCAPS) at five locations as shown on Figure 1. The LIF data are summarized and interpreted in Table 2. At three of the locations, no fluorescence characteristic of petroleum, oil, or lubricants (POL) was encountered. At the two other locations, fluorescence characterized by a drop in wavelength coupled with elevated intensity was encountered, suggesting POL. The fluorescence interval at location EC-328-02 was from 7.2 to 9.8 feet bgs, while at EC-328-05 the interval was from from 7.9 to 10.5 feet bgs.

Three soil samples from two locations were collected,, placed in an ice chest for storage overnight, and delivered to an on-site mobile laboratory the next morning for analytical testing. The sample results are shown in Table 2. The samples were collected within three lateral feet of the associated LIF push location. TPH-gasoline was not detected in the three samples.

At location EC-328-02, soil samples were collected from depths of approximately 4.5 bgs (above the fluorescence interval) and 8.5 feet bgs (within the fluorescence interval). The sample from 4.5 feet bgs consisted of silt to clay with a moderate fuel odor and abundant black stain and plant roots. The CPT classification for this depth is clay to silty clay. The sample had a TPH-diesel concentration of 2,600 mg/kg, which is unexpectedly high compared to the LIF measurements. The sample from 8.5 feet bgs consisted of thin layer of sand overlying silt to clay with moderate odor and a trace of dark stain. The CPT classification for this depth is clayey silt to silty clay. The sample had a non-detectable TPH-diesel concentration (<10 mg/kg), which is unexpected compared to the LIF measurements and odor of the sample. Although the LIF is known to be more sensitive in matrices with relatively low surface

area, such as sand, and less sensitive in matrices with high surface area, such as clay, in our experience this discrepancy between the analytical and SCAPS LIF data set at this one push location is anomalous. Other SCAPS investigations at sites with fine-grained soils have shown that relatively small-scale lateral and vertical heterogeneity in contaminant distributions can occur and be a significant factor when comparing LIF to analytical results. It is our opinion that such heterogeneity may be a factor at this location. However, if it is assumed that heterogeneity is not a significant factor, the soil sample result from 4.5 feet bgs suggests that the LIF detection threshold in soils with a CPT classification of clay to silty clay at this site may be above 2,600 mg/kg. Considering the LIF results and the moderate fuel odor in the sample from 8.5 feet bgs, it is our opinion that the laboratory result of non-detect reflects heterogeneous contaminant distribution. However, another contributing factor may be the contribution of naturally-occurring non-fuel fluorescing compounds, yielding a false LIF positive effect at this location.

At location EC-328-01 (a location with no POL fluorescence characteristics), a sample was collected from a depth of 8.5 feet bgs. The sample consisted of silt to clay with a fuel odor and black streaks. The CPT classification for this depth is clayey silt to silty clay. The sample had a TPH-diesel concentration of 69 mg/kg, which is consistent with the expected LIF detection threshold.

The LIF and analytical results suggest the main mass of contamination is centered near push location EC-328-02, and has spread relatively little from this location. We expect the impacted zone to extend a radius of approximately 10 feet around location EC-328-02. Assuming a 2-foot thick contaminated soil thickness, we estimate a volume of 23 cubic yards (cy) of impacted soil remains at this site.

Conclusions and Recommendation

Based on the findings of our assessment, the vertical and horizontal extent of fuel-impacted soils has been delineated to the extent practicable. The data obtained during the current investigation indicate that TPH-diesel concentrations that exceed the cleanup level occur in a zone that varies in thickness, averaging about 2 feet thick, centered approximately 8 to 9 feet bgs. Approximately 23 cy of petroleum contaminated soil at concentrations exceeding 1,000 mg/kg may be expected at this site.

It is the opinion of PWCSD that further assessment may be conducted to further support these conclusions. Such a study could include the collection of soil samples in the impacted interval to more precisely estimate the volume of contaminated soil. However, it has been our experience that the data obtained to date is sufficient to guide remediation by excavating contaminated soil that exceeds cleanup values. We recommend that while the site is open and planted with limited landscaping, remediation by excavation of contaminated soil be performed. Groundwater downgradient of the former tank site should be tested for constituents of concern to verify they meet cleanup standards.

Site Characterization Information

Description of the former UST:	See Background Information (page 2).
Contaminants Identified:	See attached analytical results tables.
Amount of Contaminants Leaked:	Not estimated. See attached analytical results tables.
MTBE:	None detected.

Description of the soil/geology: Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? Yes. Based on a review of the analytical data, the lateral and vertical extent of soil impacted with fuels has been delineated. Highest concentration detected in recent (2004) soil assessment is 2,600 mg/kg.

Estimated volume of contaminated soil left on site and concentration: 23 cy (of soil containing greater than 1,000 mg/kg TPH-diesel).

Is groundwater contamination completely delineated? Bechtel (2000) groundwater data from the former tank location revealed TPH-diesel at 16 milligrams per liter, and xylenes at 34 micrograms per liter (ug/L). Benzene and MTBE were not detected at <5 ug/L and <100 ug/L, respectively.

Monitoring wells installed, properly permitted? No monitoring wells were installed.

Depth to groundwater: Not reported (February 9, 1999, log reports saturated conditions at 8.5 feet bgs [Bechtel, 2000]).

Is groundwater or surface water impacted? Unknown. Detection limits for undetected analytes benzene and MTBE exceed cleanup goals for the site.

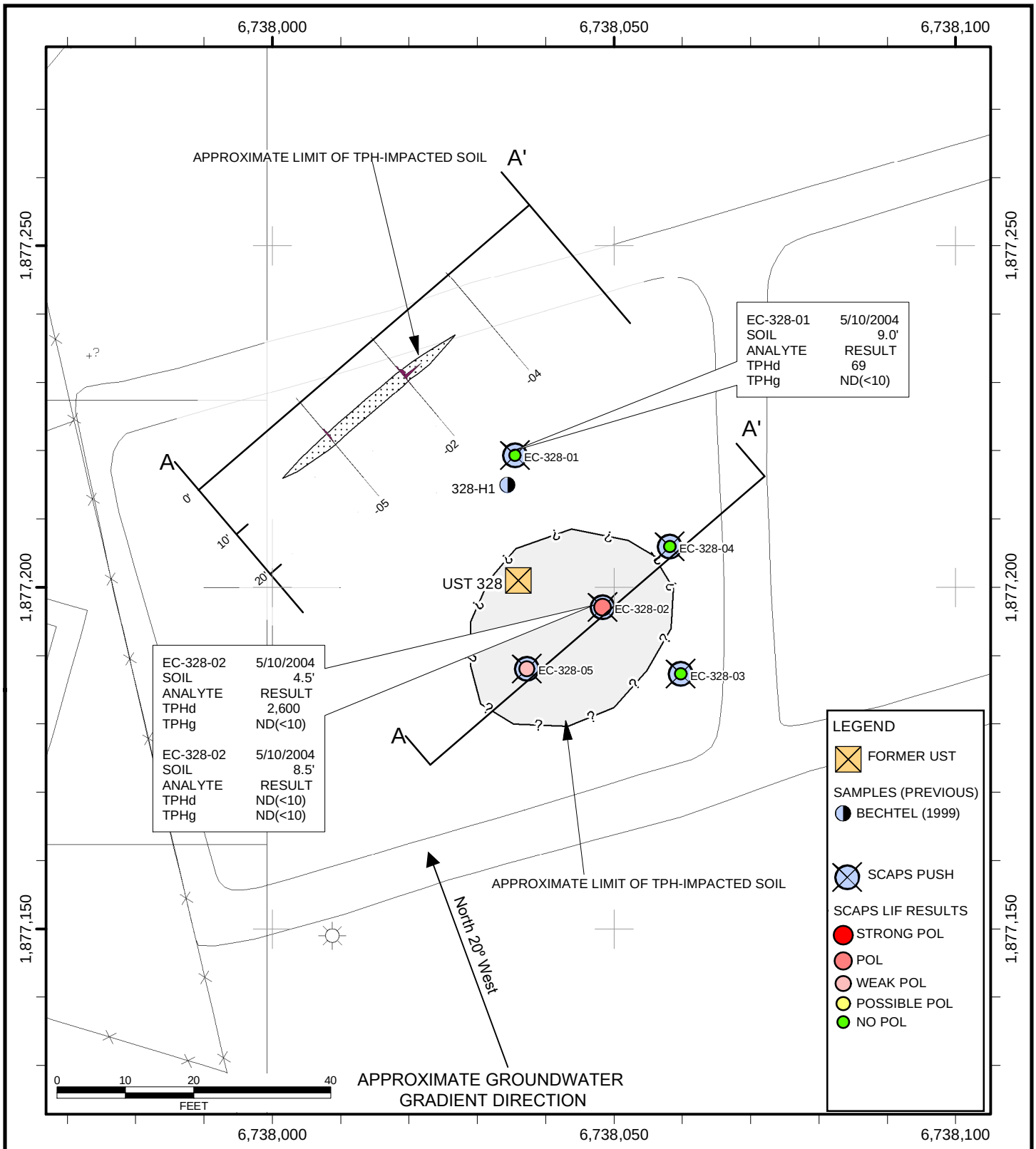
Remedial action taken? UST removed 1993.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Yes.

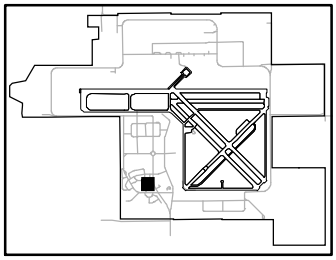
Site Closure: An estimated 23 cy of petroleum-hydrocarbon impacted soil may remain at the site. Groundwater results indicate cleanup standards are met for toluene, ethylbenzene, and xylene and are uncertain for benzene and MTBE. Therefore, the recommendation for removal of impacted soil by excavation is accepted at this site, with a groundwater sample to confirm levels of benzene and MTBE met cleanup standards.

Signature: ***Date:***	***Signature:*** ***Date:***
N.R. Wells **Lieutenant Commander, CEC, US Navy** **By direction of** **The Commanding Officer**	**Liann P. Chavez, R.G.** **Senior Engineering Geologist** **California Environmental Protection Agency** **California Regional Water Quality Control Board** **Colorado River Basin Region**

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS, Soil, and Groundwater Results
SCAPS Logs
Laboratory Analytical Report and Chain-of-Custody Documentation



OVERVIEW MAP - NAF EL CENTRO



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MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 328

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC1

FIGURE: 1

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence, and Soil Analytical Data Summary

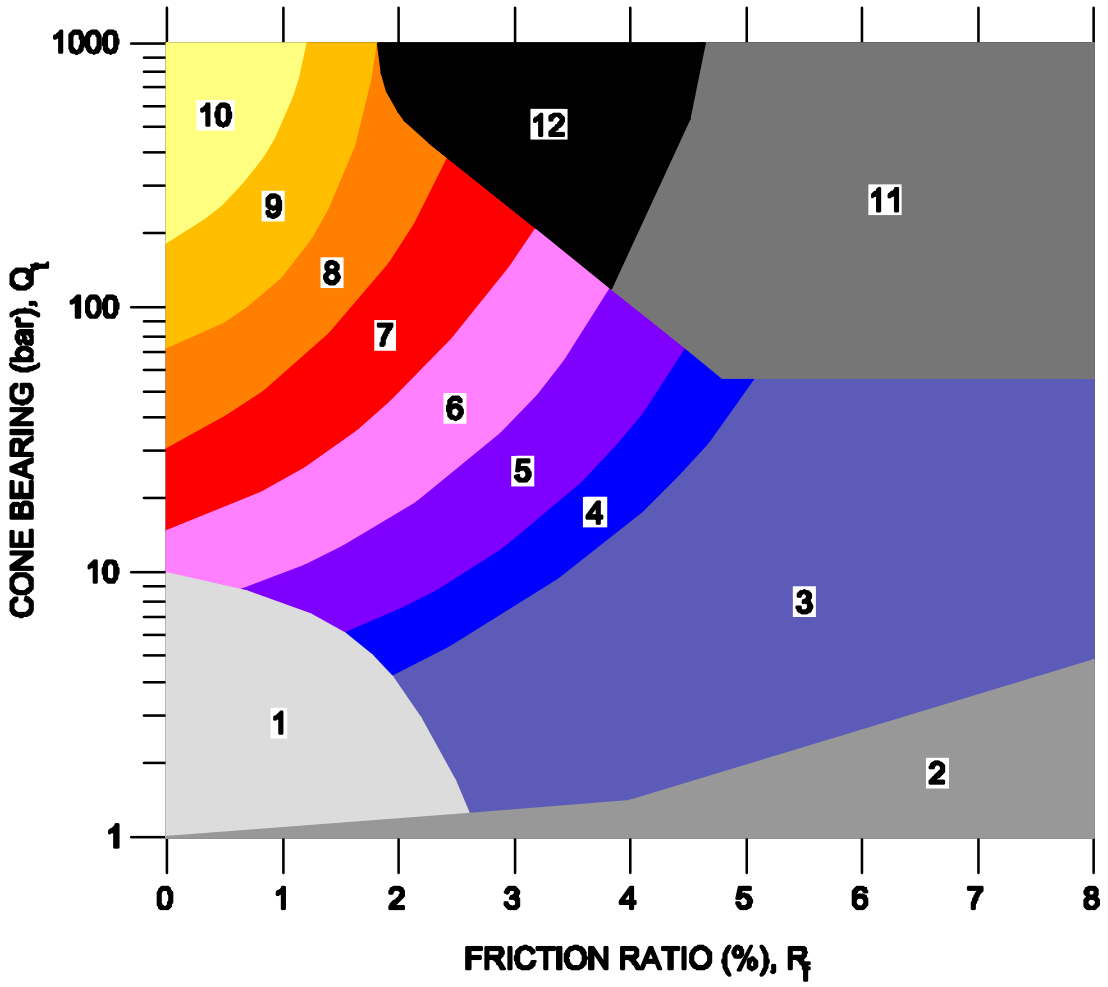
UST Site 328
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-328-01	5/10/2004	19.1	21.4	2,115 @ 10.8	No POL	9.0': TPHd: 69 mg/kg TPHg: <10 mg/kg	
EC-328-02	5/10/2004	19.1	21.2	159,616 @ 9.5	POL: 7.2'-9.8'	4.5': TPHd: <2,600 mg/kg TPHg: <10 mg/kg 8.5': TPHd: <10 mg/kg TPHg: <10 mg/kg	
EC-328-03	5/10/2004	19.2	21.3	2,076 @ 10.0	No POL		
EC-328-04	5/10/2004	19.1	21.2	2,761 @ 6.2	No POL		
EC-328-05	5/10/2004	19.3	21.5	12,653 @ 8.5	POL: 7.9'-10.5'		

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

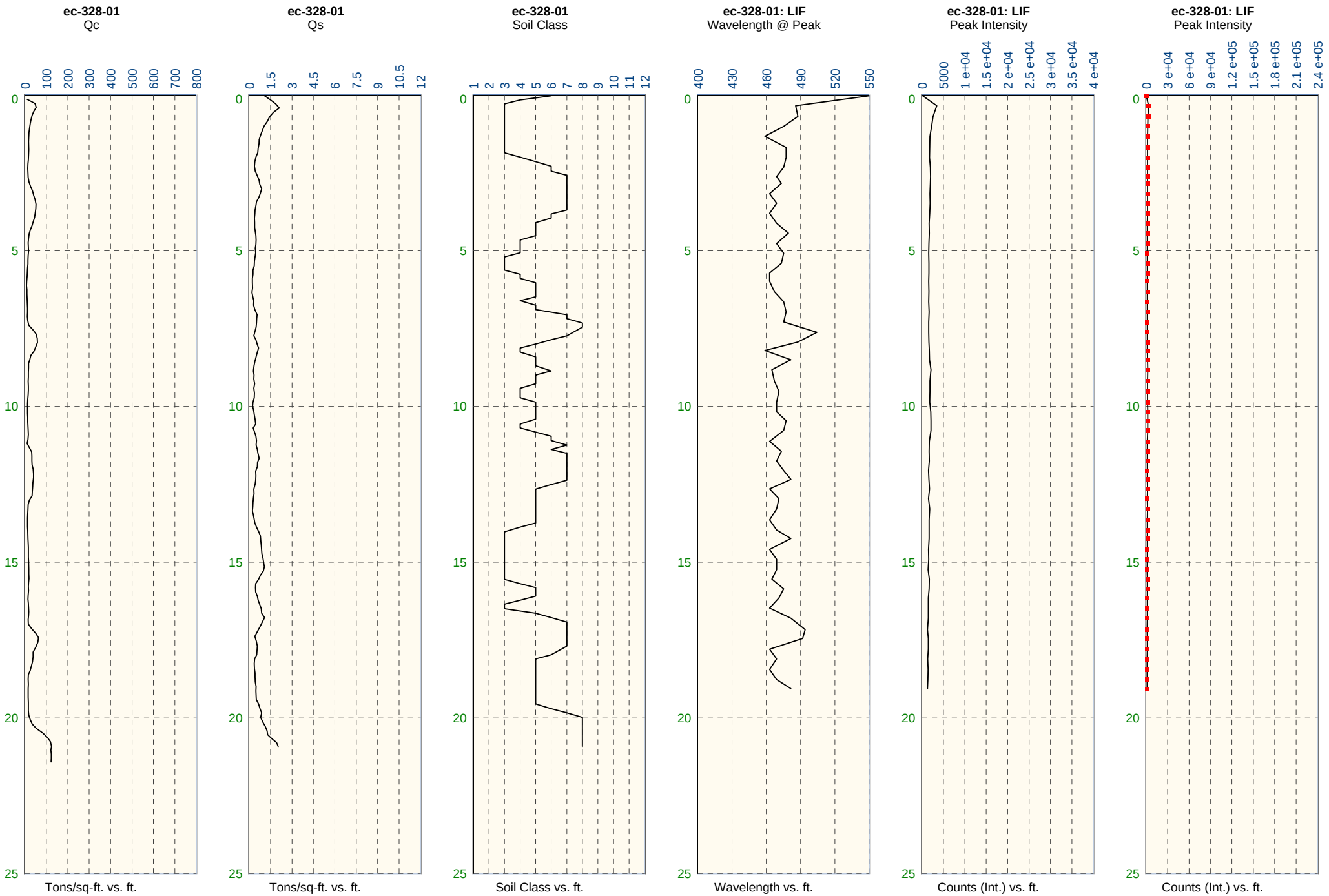
CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)

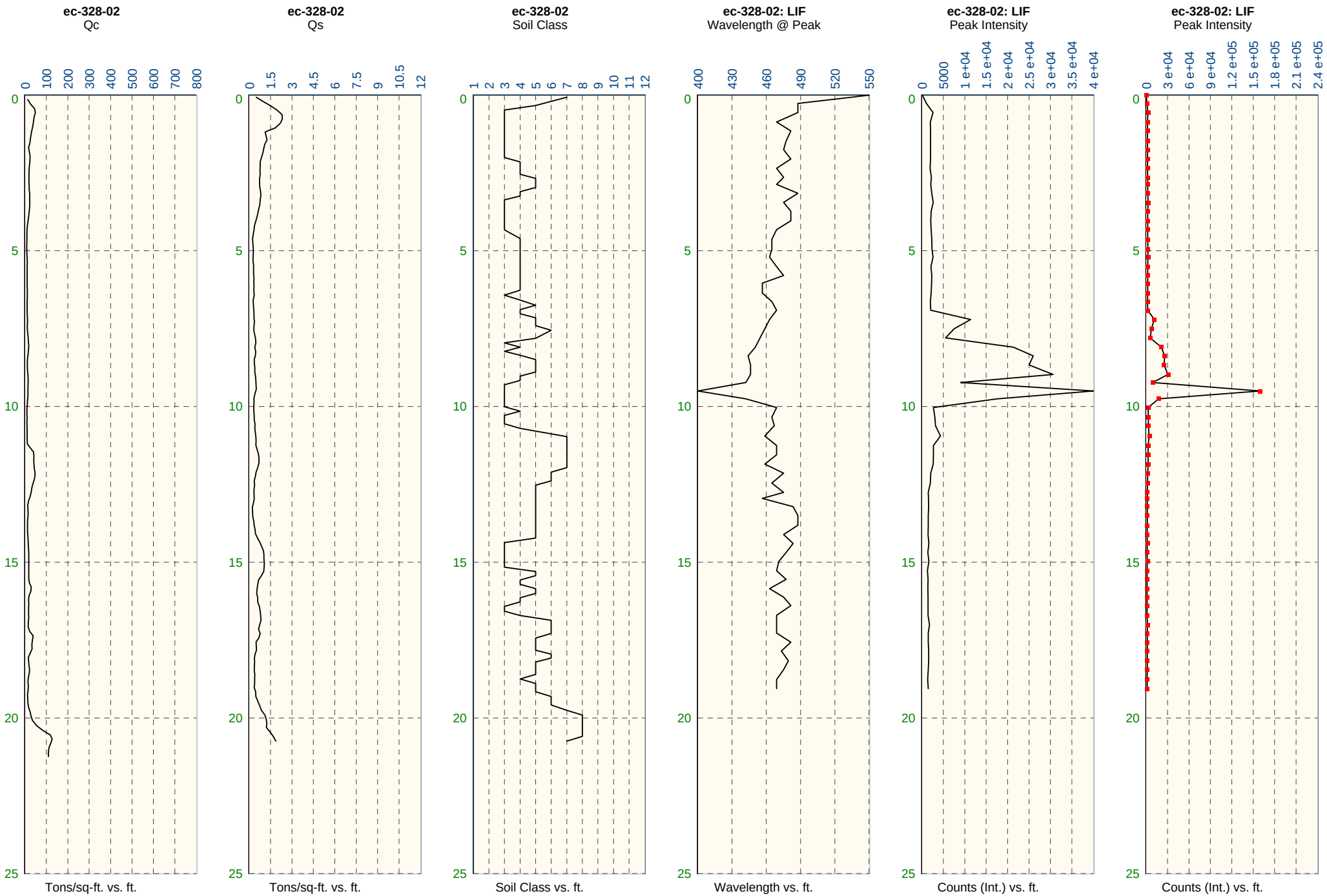


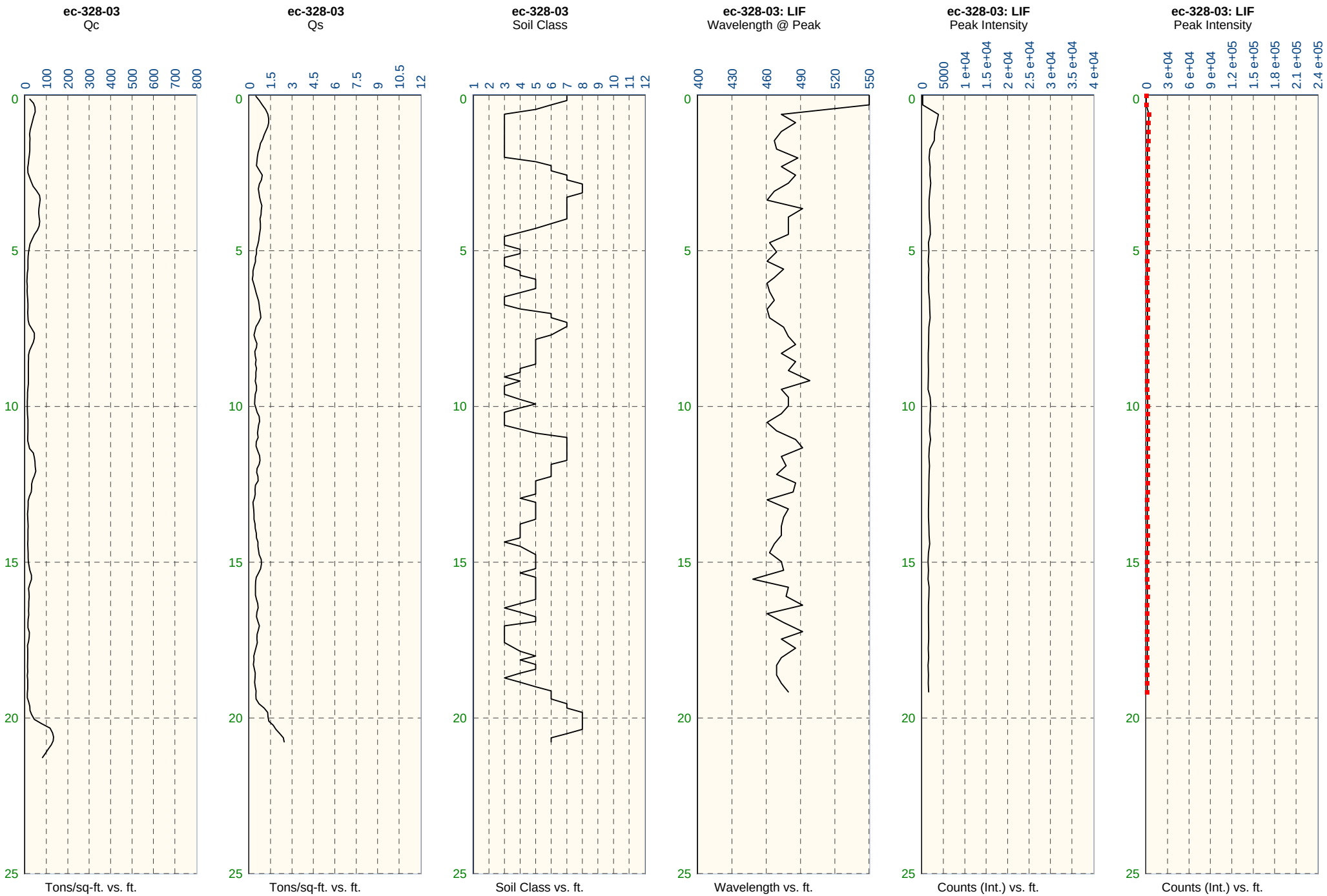
Friction Ratio (R_f) = Sleeve Friction (F_s)/Cone Pressure (Q_t) x 100%
1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

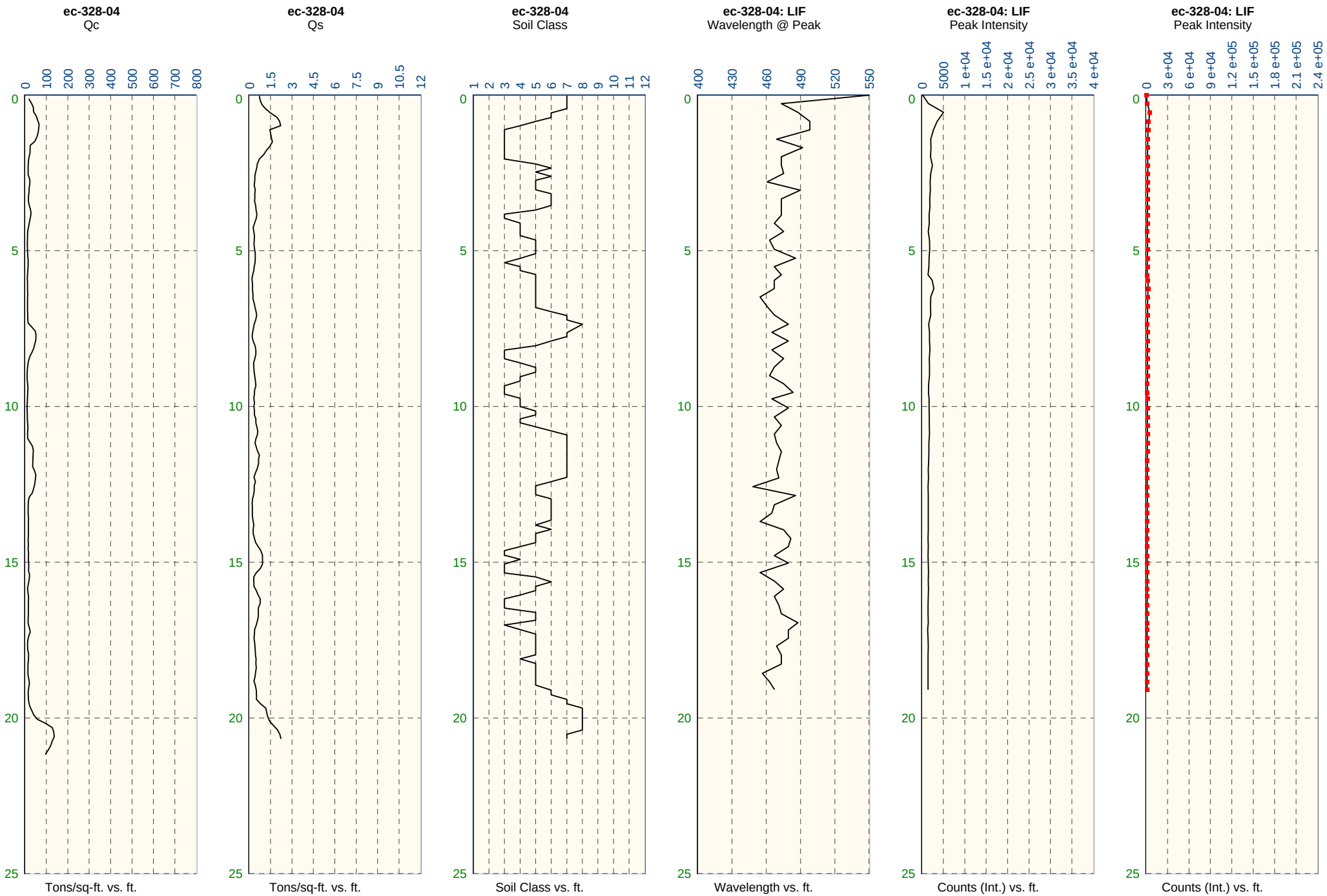
Zone		Q_t/ N	Soil Behavior Type
1		2	sensitive fine grained
2		1	organic material
3		1	clay
4		1.5	silty clay to clay
5		2	clayey silt to silty clay
6		2.5	sandy silt to clayey silt
7		3	silty sand to sandy silt
8		4	sand to silty sand
9		5	sand
10		6	gravelly sand to sand
11		1	very stiff fine grained*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

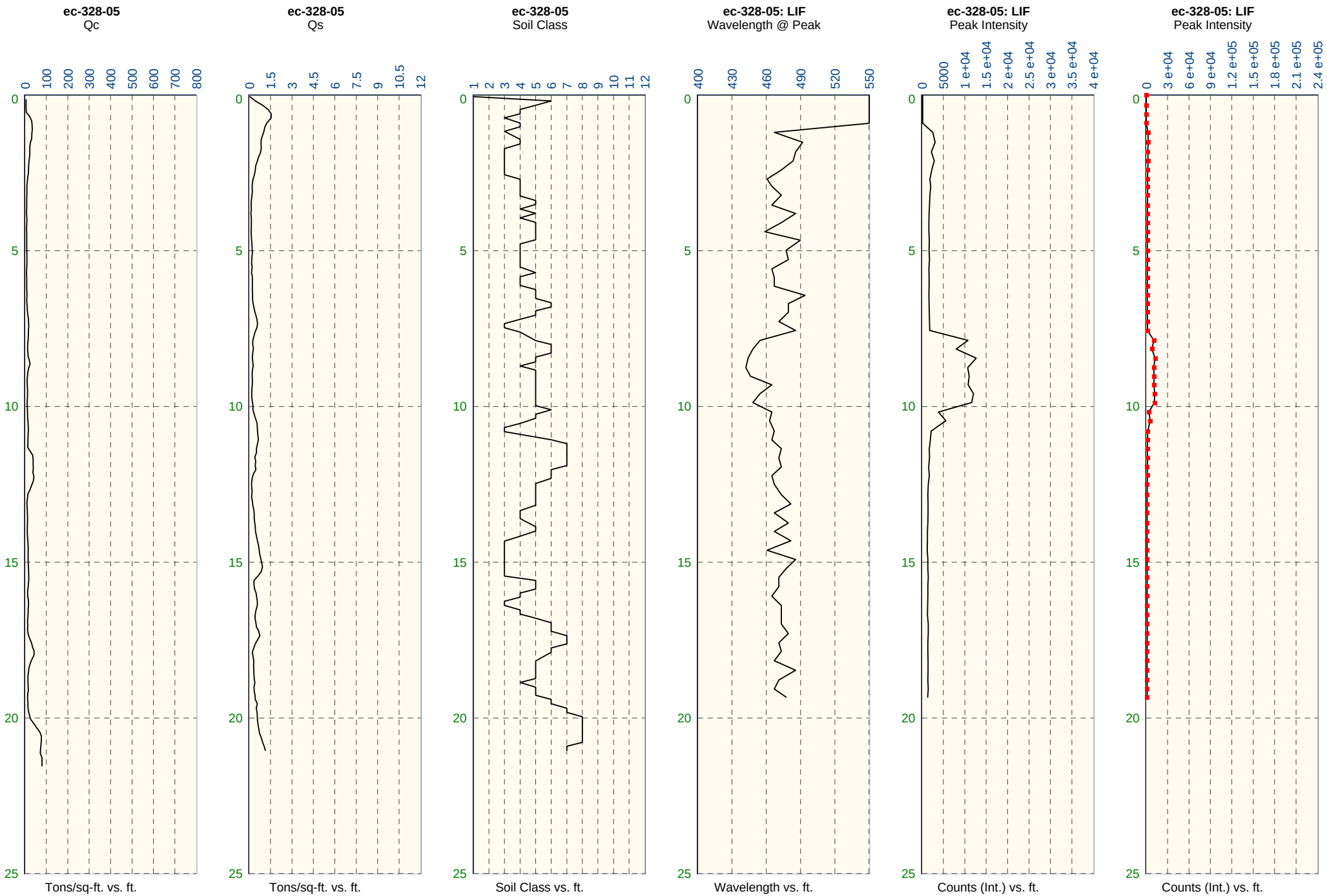
* overconsolidated or cemented


ec-328-01
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-328-01
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-328-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-328-01: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-328-01: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-328-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-328-02
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-328-02
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-328-02
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-328-02: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-328-02: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-328-02: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-328-03
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-328-03
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-328-03
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-328-03: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-328-03: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-328-03: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-328-04
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-328-04
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-328-04
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-328-04: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-328-04: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-328-04: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-328-05
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-328-05
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-328-05
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-328-05: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-328-05: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-328-05: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.

MOBILE GEOCHEMISTRY
H&P

May 20, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – NAS – SITE 328 – EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP051104W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1317).

Project Summary

The following analyses were conducted:

- 3 soils for total petroleum hydrocarbons (TPH) by DHS LUFT/8015M Method

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Blayne Hartman

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
2373 208th Street, Suite F-1, Torrance, California 90501 | 310 782.2929 — Fax 310 782.2798
www.HandPmg.com | 1-800-834-9888

MOBILE GEOCHEMISTRY

H&P

NAVY PUBLIC WORKS PROJECT #1113621902008
NAS
SITE 328
EL CENTRO, CA

H&P Project #NP051104-W1

TPH (DHS LUFT/ 8015M Method) ANALYSES OF SOILS

SAMPLE NUMBER	DATE ANALYZED	TPH-GAS C5-C11 (mg/kg)	TPH-DIESEL C12-C24 (mg/kg)
METHOD BLANK	5/11/2004	ND	ND
EC-328-02-8.5	5/11/2004	ND	ND
EC-328-01-9	5/11/2004	ND	69
EC-328-02-4.5	5/11/2004	ND	2,600
DETECTION LIMITS		10	10

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED ON-SITE IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
5-26-2004

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP051104-W1
DAILY CALIBRATION DATE : 05/11/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ppm)	WATER (ppb)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
TPH GASOLINE - FID1	10-20000	330-660000	7/14/2003	0.878	6.1%	236	0.847	3.5%	229	0.830	5.5%
TPH GASOLINE - FID2	10-20000	330-660000	7/14/2003	0.580	11.9%	378	0.529	8.7%	357	0.538	7.3%
TPH GASOLINE - FID3	10-20000	330-660000	7/14/2003	0.696	10.4%	291	0.687	1.3%	300	0.658	5.5%
TPH DIESEL - FID1	10 - 50000	330 - 1650000	7/11/2003	1.014	9.5%	487	1.027	1.2%	493	1.022	0.8%
TPH DIESEL - FID2	10 - 50000	330 - 1650000	7/11/2003	0.690	13.3%	752	0.665	3.6%	725	0.696	1.0%
TPH DIESEL - FID3	10 - 50000	330 - 1650000	7/11/2003	0.723	7.9%	647	0.773	6.9%	676	0.754	4.3%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED ON-SITE IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR SOILS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (mg/kg)	MS CONC (mg/kg)	%REC MS	MSD CONC (mg/kg)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	211	105.5%	212	106.0%	0.5%	15%	75% - 125%
TPH DIESEL	500	483	96.6%	511	102.2%	5.6%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED ON-SITE IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR SOILS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (mg/kg)	LCS CONC (mg/kg)	%REC LCS	LCSD CONC (mg/kg)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	212	106.0%	213	106.5%	0.5%	15%	75% - 125%
TPH DIESEL	500	505	101.0%	487	97.4%	3.6%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

Chain of Custody Record

HP LABS

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469
☒ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404
☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 5-11-04
HPL Project # NP051104-W1
Outside Lab:

Client: Navy Public Works Code 780
Address: 2730 McKean St Suite 1 Site 328
SD CA 92136
Phone: 619-524-1967 Fax: 619-524-6000

Collector: D Bloom
Client Project # 113621902108
Location: NAS El Centro Site 328
Turn around time:

Page: 2 Of 6
Project Manager David Bloom

Global ID: T0602591148
EDF: Yes / No

Sample Receipt
Intact: ☐ Yes ☐ No
Seal Intact: ☐ Yes ☐ No ☐ N/A
Cold: ☐ Yes ☐ No
N/A (Received on Site)

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B: BTEX / Oxygenates	8260B: Oxygenates	8260B: VOC's	8260B: VOC's and Oxygenates	Methane	Fixed Gases							Total # of containers
EC-328-02-8.5			1325	5/10	SOIL	Sleeve	X																	
EC-328-01-9			1225	↓	↓	↓	X																	
EC-328-02-4.5			1258	↓	↓	↓	X																	
~~EC-328-01~~ 8V																								

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
David M Bloom	Code 780	James Villarreal	HLP	5-11-04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constitu[illegible]horization to proceed with analysis and acceptance of condition on back.

Sample disposal i[illegible]on: ☐ *Disposal @ $2.00 each* ☐ *Return to client* ☐ *Pickup*

Site Assessment Report and
Closure Summary
UST Site 333
Naval Air Facility, El Centro, California

This report is intended to document assessment activities at an Underground Storage Tank (UST) site at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 333 work plan addendum, dated March 2, 2004. Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 333. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 333
Site Address:	West end of Valley Forge Avenue, north of Building 333, north side of water storage facility Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,736,743 Northing: 1,876,746 feet (State Plane 6)
Facility Name:	Pump house
Property Owner: Tank Owner/Operator: Responsible Party:	United States Navy United States Navy United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430019

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	1948 (facility documents)
Construction Materials:	Single-walled steel
Capacity:	125 gallons
Contents:	Diesel
Year Removed:	1991

Figure 1 shows a map of the site location and previous and current assessment locations.

According to the *Final Technical Memorandum Underground Storage Tank Site Investigation,* dated March 2000, prepared by Bechtel National, Inc. (BNI, 2000), a 125-gallon UST was removed in 1991. See Figure 1. No soil or groundwater samples were collected as part of tank removal.

In 1999, BNI advanced one soil boring by hand auger at the former tank location, and one HydroPunch boring approximately 50 feet north (downgradient) from the former tank location. The groundwater sample was collected from a depth range of 10 to 14 feet bgs. Analytical testing results indicate concentrations of total petroleum hydrocarbons quantitated as gasoline (TPH-gasoline) in both hand-auger boring soil samples of 17,000 and 42,000 milligrams per kilogram (mg/kg) exceeded cleanup criteria. In the groundwater sample, a benzene concentration of 51 micrograms per liter (ug/L) exceeded the action level. The other groundwater constituents were detected below action levels or not detected. Although not detected, the detection limit for MTBE was reported at 50 ug/L, which exceeds the site cleanup goal.

PWC Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Soil exceeds cleanup levels for TPH-gasoline. Groundwater exceeds action level for benzene.* Field activities were performed on May 15, 2004.

In accordance with the work plan, Laser Induced Fluorescence (LIF) was measured *in situ* using the Site Characterization and Analysis Penetrometer System (SCAPS) at two locations as shown on Figure 1. The LIF data are summarized and interpreted in Table 2. The push locations were approximately 10 feet north, and 15 feet northeast, respectively, of the former UST location. Fences, numerous subsurface utilities, and other structures precluded additional SCAPS points further west or south. No fluorescence characteristic of petroleum, oil, or lubricants (POL) was encountered at either location. Neither soil nor groundwater samples were collected during this investigation due to time limitations. Sample locations and analytical results are illustrated on Figure 1.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, the vertical and horizontal extent of fuel-impacted soils has been delineated to the extent practicable in the northerly direction. At least one groundwater sample should be collected north and downgradient of the former UST, and tested for constituents of concern to confirm whether or not concentrations exceed cleanup standards. The data obtained during the current investigation indicate that soil contamination is limited in the northerly, downgradient direction, suggesting that impacted soil may be limited in extent. Soil sampling in the southwesterly direction, adjacent to the pumphouse (Building 333) could be accomplished using hand-auger methods or using a limited access probe.

It is the opinion of PWCSD that further assessment of soil southwest of the former UST location and groundwater should be performed at this site.

Site Characterization Information

Description of the former UST:	See Background Information, page 1.
Contaminants Identified:	See attached analytical results table.
Amount of Contaminants Leaked:	Not estimated. See attached analytical results table.
MTBE:	None detected.
Description of the soil/geology:	Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? No. Delineated in accessible areas only to the north and northeast. Previous sampling in the former tank location indicated TPH-gasoline concentrations that exceed cleanup goals.

Estimated volume of contaminated soil left on site and concentration: Not Estimated.

Is groundwater contamination completely delineated? No. Groundwater previously analyzed showed a benzene concentration above the cleanup standard.

Monitoring wells installed, properly permitted? No monitoring wells were installed.

Depth to groundwater: Approximately 13 feet bgs (estimated).

Is groundwater or surface water impacted? Unconfirmed for groundwater.

Remedial action taken? UST removed 1991.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Unknown.

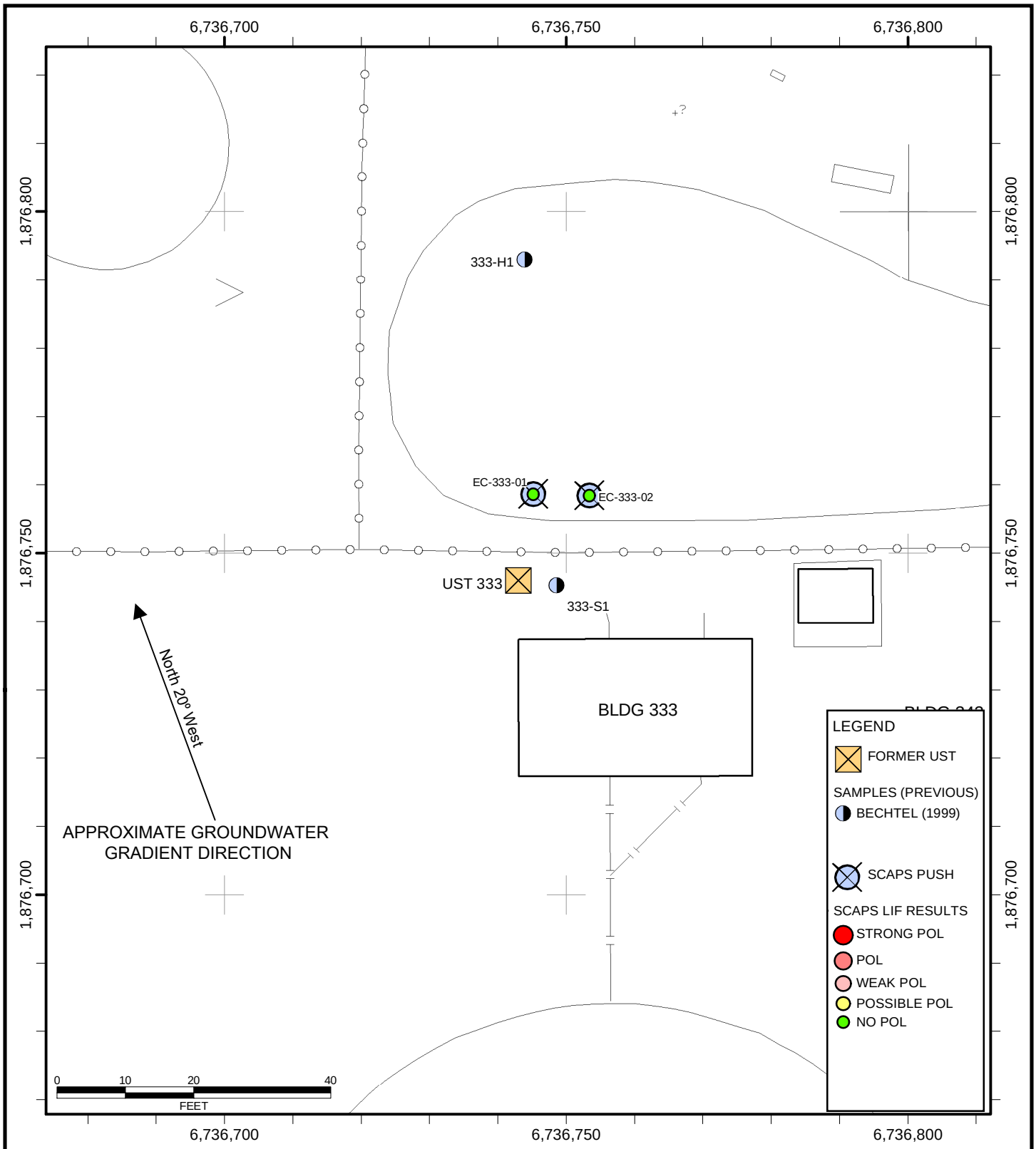
Site Recommendation: Data indicate a limited amount of impacted soil may remain, but contaminated soil delineation is incomplete to the southwest. The actual quantity of contaminated soil is unknown. Groundwater quality unconfirmed downgradient of the former UST. Additional soil and groundwater data will need to be collected to evaluate the level of risk posed by the contaminants that may remain, to human health or the environment. The recommendation for additional assessment is accepted.

Signature: ***Date:***

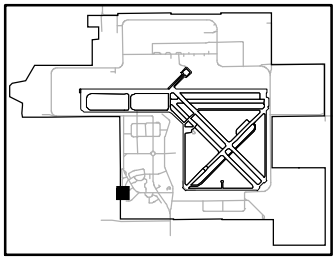
N.R. Wells
Lieutenant Commander, CEC, US Navy
By direction of
The Commanding Officer

Signature: ***Date:***

Liann P. Chavez, R.G.
Senior Engineering Geologist
California Environmental Protection Agency
California Regional Water Quality Control Board
Colorado River Basin Region



OVERVIEW MAP - NAF EL CENTRO



N

MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 333

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC1

FIGURE: 1

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS Results
SCAPS Logs

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence Data Summary

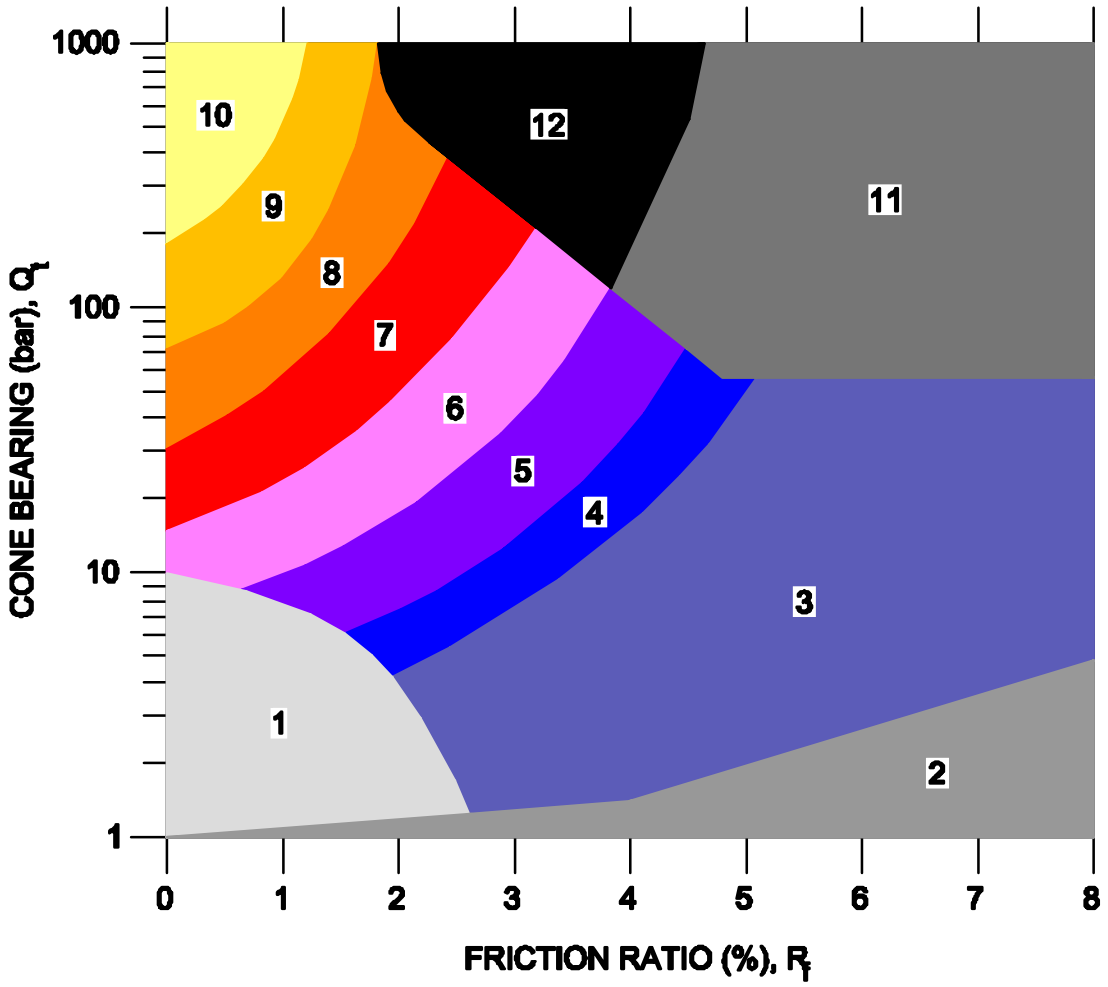
UST Site 333
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-333-01	5/13/2004	19.1	21.3	2,030 @ 7.4	No POL		
EC-333-02	5/13/2004	19.0	21.3	2,264 @ 8.5	No POL		

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

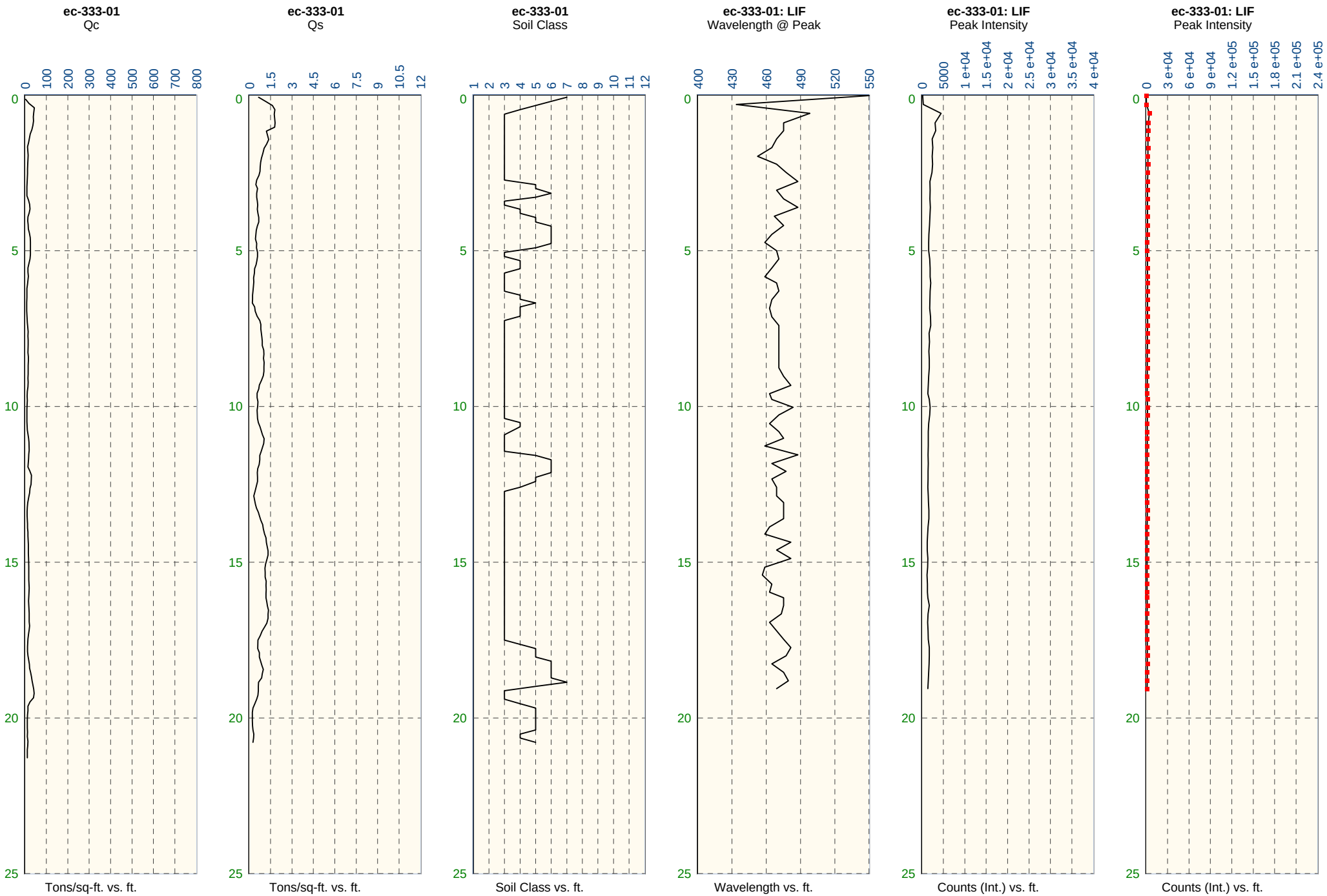
CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)

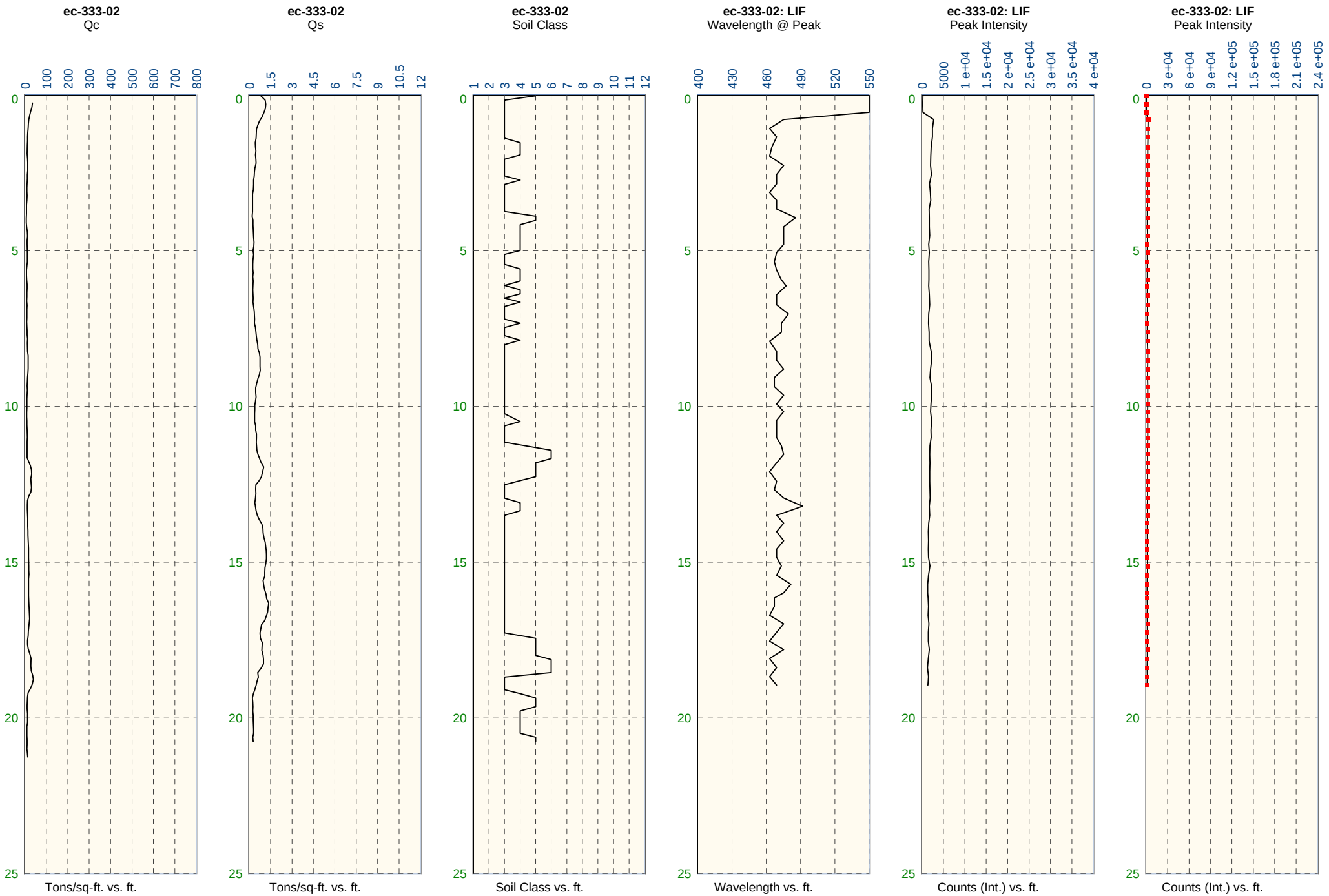


Friction Ratio (R_f) = Sleeve Friction (F_s)/Cone Pressure (Q_t) x 100%
1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

Zone		Q_t/ 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


ec-333-01
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-333-01
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-333-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-333-01: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-333-01: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-333-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-333-02
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-333-02
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-333-02
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-333-02: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-333-02: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-333-02: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25

Site Assessment Report and
Closure Summary
UST Site 364
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 364 at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 364 work plan addendum, dated March 4, 2004, prepared by the Public Works Center San Diego (PWCSD). Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 364. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 364
Site Address:	Southwest of 2nd and "B" Streets, southeast corner of Building 364 Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,737,964 Northing: 1,878,546 feet (State Plane 6)
Facility Name:	Chaplain's Office
Property Owner:	United States Navy
Tank Owner/Operator:	United States Navy
Responsible Party:	United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430020

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	Unknown
Construction Materials:	Unknown
Capacity:	1,200 gallons
Contents:	Diesel
Year Removed:	Closed in place in 1986 by Blackman Plumbing

Figure 1 shows a map of the site location and previous and current assessment locations.

According to *Final Technical Memorandum Underground Storage Tank Site Investigation,* dated March 2000, prepared by Bechtel National, Inc. (BNI, 2000), Blackman Plumbing closed a 1,200-gallon UST in place in 1986 at the location shown on Figure 1. No soil or groundwater samples were collected as part of tank closure.

In 1999, BNI advanced two direct-push soil borings and one HydroPunch groundwater boring. BNI placed the soil borings at the perimeter of the original tank pit, and collected a total of four soil samples (two from each boring at depths of 7.6 and 11 feet below ground surface [bgs]). Analytical testing results indicated that soil concentrations of total petroleum hydrocarbons quantitated as gasoline (TPH-gasoline) and TPH-diesel met the cleanup criteria. The HydroPunch boring was located approximately 60 feet north (downgradient) of the tank site. A groundwater sample collected from a depth range of 12 to 16 feet did not contain constituents of concern greater than cleanup levels. However, the detection limit for benzene and MTBE exceeded their respective action levels. TPH-gasoline was reported at 6,800 micrograms per liter (ug/L) in the groundwater sample, but no cleanup criteria is established for this constituent.

PWC Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Groundwater unconfirmed whether or not action levels for benzene and MTBE are met*. Field activities were performed April 5, 2004.

Geophysical testing for utilities prior to subsurface exploration confirmed the presence of the UST as previously reported. Removal of the tank is not contemplated due to its location in the sidewalk adjoining the foundation of Building 364. In accordance with the work plan, a groundwater sample was collected from a temporary well located approximately 72 feet downgradient of the UST location. The well was installed using the hydraulic probe on the Site Characterization and Analysis Penetrometer System (SCAPS). In addition, SCAPS measured Laser Induced Fluorescence (LIF) in a push boring located adjacent to and east of the UST. Assessment point locations are shown on Figure 1. Building 364, landscaping, underground utilities, and other structures precluded additional sample points. No fluorescence characteristic of petroleum, oil, or lubricants (POL) was encountered by the LIF probe in the location tested (EC-364-01). At location EC-110-02, a groundwater sample was collected from a ¾-inch diameter PVC temporary well screened with 0.010-inch slot from 6 to 16 feet bgs. The groundwater grab sample was collected unpurged using a single-use disposable bailer and was immediately delivered to an on-site mobile laboratory for analytical testing. BTEX and MTBE were not detected in the groundwater sample. Groundwater was measured at approximately 13.7 feet bgs. Sample locations and analytical results are illustrated on Figure 1. The temporary well was abandoned by grouting in place.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, the vertical and horizontal extent of fuel-impacted soils has been delineated to the extent practicable. The data suggests that no soil outside the immediate footprint of the tank is impacted. Groundwater does not appear to be adversely affected by fuel contamination.

It is the opinion of PWCSD that further assessment or remediation at this site is unnecessary. We recommend that no further action be considered for this site.

Site Characterization and Closure Information

Description of the former UST:	See Background Information, page 1.
Contaminants Identified:	See attached analytical results table.
Amount of Contaminants Leaked:	Not estimated. See attached analytical results table.
MTBE:	None detected.
Description of the soil/geology:	Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? Yes. Based on a review of the analytical data, no measurable soil contamination is present.

Estimated volume of contaminated soil left on site and concentration: Negligible to none.

Is groundwater contamination completely delineated? Yes. Current analytical results for groundwater show that constituents of concern are not detected.

Monitoring wells installed, properly permitted? No monitoring wells were installed.

Depth to groundwater: Approximately 13.7 feet bgs.

Is groundwater or surface water impacted? No. All analytical results for groundwater meet cleanup goals for the site (below tap water PRGs and drinking water MCLs).

Remedial action taken? UST closed in place in 1986.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Yes.

Site Closure: Due to negligible impacted soil that is anticipated to remain in place, and no documented groundwater impact from a fuel release from this site, and a site that is covered by asphalt or landscaping, the contaminants that may remain, do not pose an unacceptable risk to human health or the environment. The recommendation for site closure is accepted and no further action is required at this site.

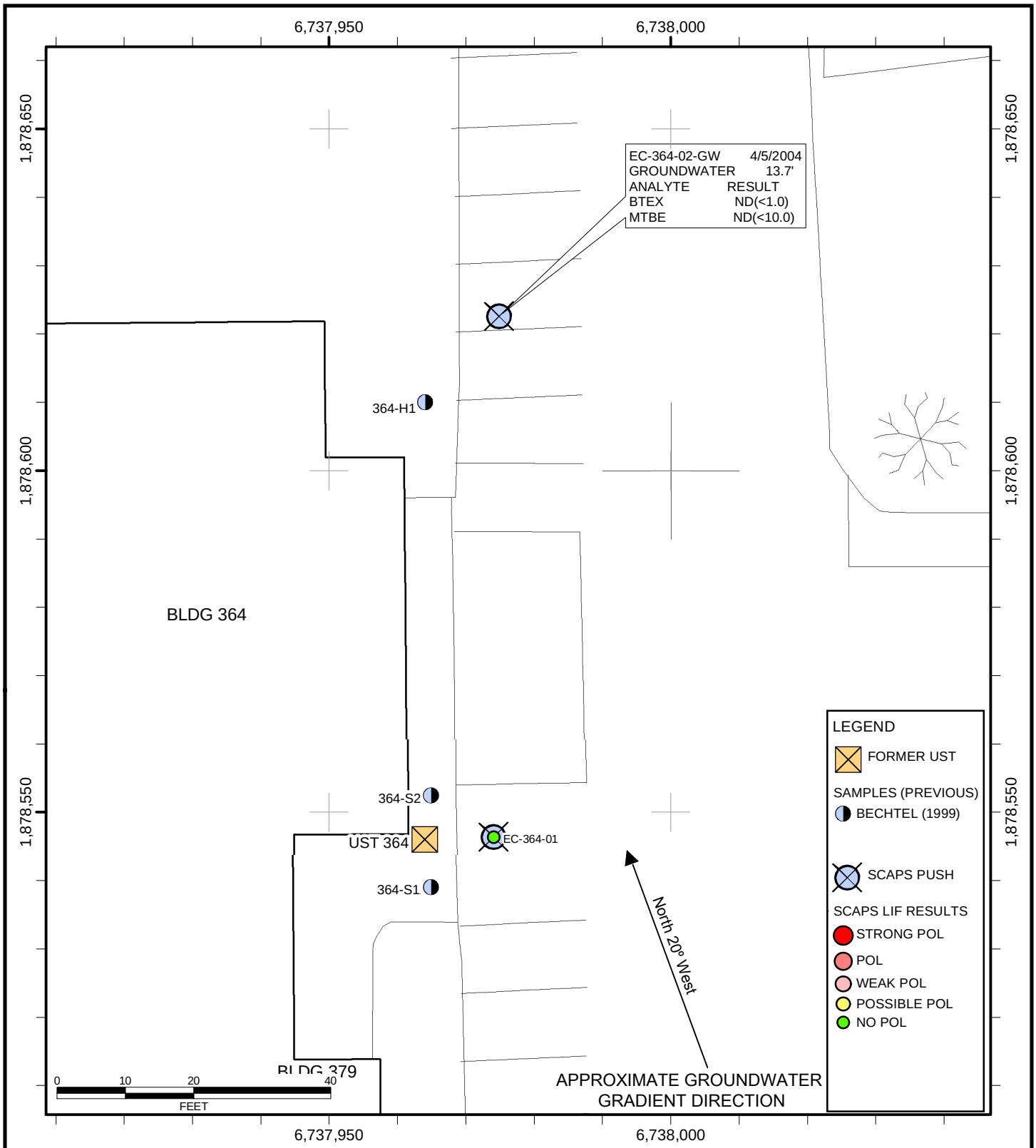
Signature: ***Date:***

N.R. Wells
Lieutenant Commander, CEC, US Navy
By direction of
The Commanding Officer

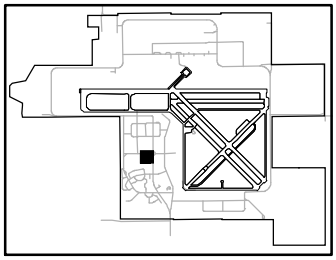
Signature: ***Date:***

Liann P. Chavez, R.G.
Senior Engineering Geologist
California Environmental Protection Agency
California Regional Water Quality Control Board
Colorado River Basin Region

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS and Groundwater Results
SCAPS Log
Laboratory Analytical Report and Chain-of-Custody Documentation



OVERVIEW MAP - NAF EL CENTRO



N

MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 364

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC1

FIGURE: 1

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence, and Groundwater Analytical Data Summary

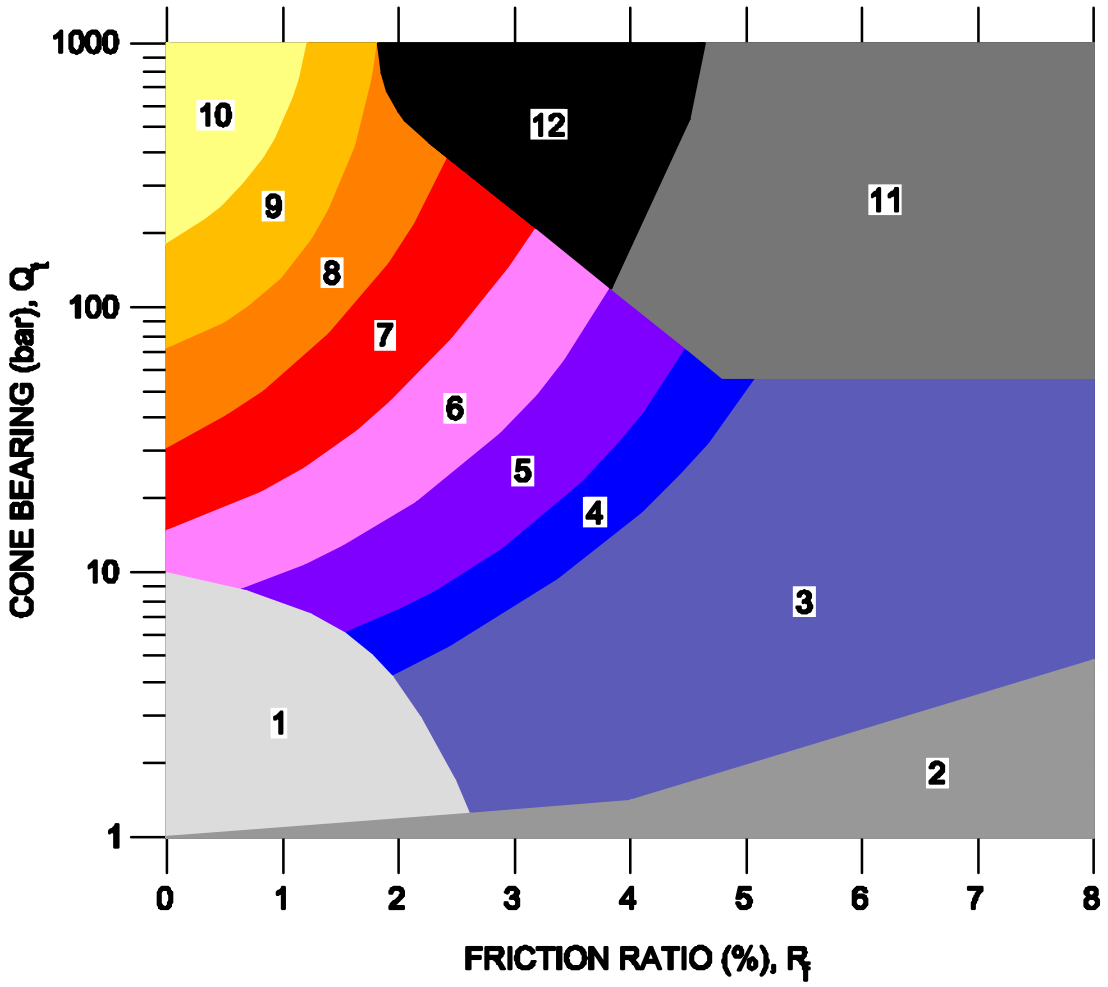
UST Site 364
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-364-01	4/2/2004	19.3	21.5	2,291 @ 11.1	No POL		
EC-364-02-GW	4/5/2004					13.7': BTEX: <1.0 ug/L MTBE: <10.0 ug/L	6'-16'

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)



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1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

Zone		Q_t/ N	Soil Behavior Type
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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
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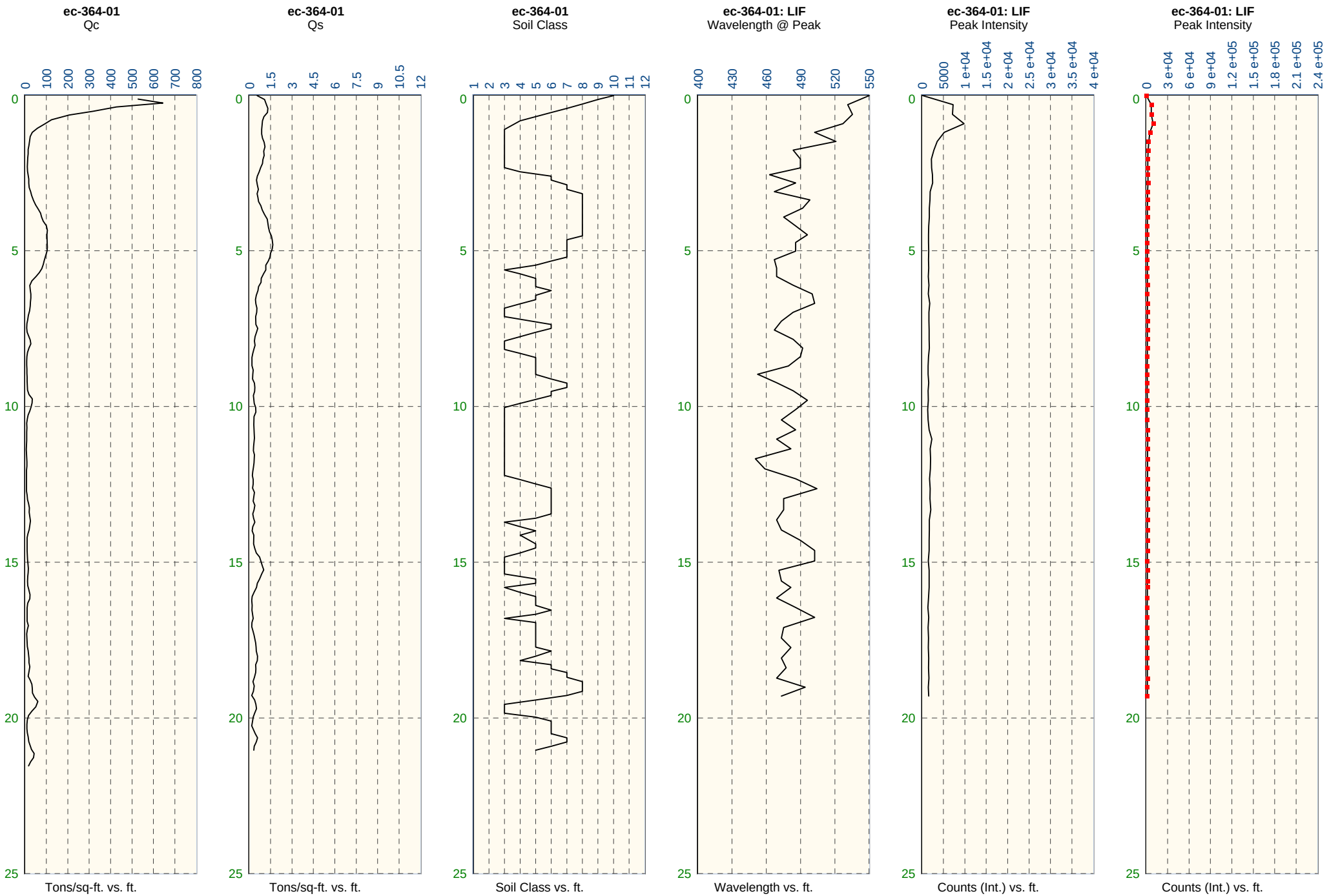

ec-364-01
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-364-01
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-364-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-364-01: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-364-01: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-364-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.

MOBILE GEO CHEMISTRY

H&P

April 13, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – SITE ~~110~~ 364 – NAVAL AIR FACILITY - EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP040504W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1746).

Project Summary

The following analyses were conducted:

- 1 water for volatile aromatic hydrocarbons (BTEX) & MTBE by EPA Method 8021

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Blayne Hartman

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
2373 208th Street, Suite F-1, Torrance, California 90501 | 310 782.2929 — Fax 310 782.2798
www.HandPmg.com | 1-800-834-9888

MOBILE GEOCHEMISTRY

H&P

NAVY PUBLIC WORKS PROJECT #1113621902008
SITE 110
NAVAL AIR FACILITY
EL CENTRO, CA

H&P Project #NP040504-W1

BTEX, MTBE (EPA Method 8021) ANALYSES OF WATERS

SAMPLE NUMBER	DATE ANALYZED	MTBE (ug/l)	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYLBENZ (ug/l)	XYLENES (ug/l)	SURROGATE (%REC)
METHOD BLANK	4/5/2004	ND	ND	ND	ND	ND	106
EC-364-02	4/5/2004	ND	ND	ND	ND	ND	99
REPORTING LIMITS		10.0	1.0	1.0	1.0	1.0	53%-145%
DETECTION LIMITS		1.0	0.5	0.5	0.5	0.5	

J INDICATES VALUE DETERMINED IS BETWEEN DETECTION LIMIT AND REPORTING LIMIT

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
4-15-2004

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP040504-W1
DAILY CALIBRATION DATE : 04/05/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ug/kg)	WATER (ug/L)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
MTBE	500 - 25	2500 - 125	4/2/2004	1.22	13.2%	112	1.12	7.8%	130	1.30	7.0%
BENZENE	500 - 25	2500 - 125	4/2/2004	3.24	10.1%	371	3.71	14.4%	285	2.85	12.1%
TOLUENE	500 - 25	2500 - 125	4/2/2004	15.47	11.2%	413	4.13	*73.3%	715	7.15	*53.8%
TFT	500 - 25	2500 - 125	4/2/2004	1.02	8.5%	117	1.17	14.4%	96	0.96	6.6%
ETHYLBENZENE	500 - 25	2500 - 125	4/2/2004	14.84	6.6%	1,677	16.77	13.0%	1,481	14.81	0.2%
m&p-XYLENES	500 - 25	2500 - 125	4/2/2004	19.14	9.8%	2,063	20.63	7.8%	1,778	17.78	7.1%
o-XYLENES	500 - 25	2500 - 125	4/2/2004	15.74	9.3%	1,708	17.08	8.5%	1,495	14.95	5.0%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

* DUE TO A CONTAMINATION THE % DIFF VALUE WAS OUTSIDE OF CRITERIA. TOLUENE WAS RECALIBRATED ON 04/06/2004 AND DATA WAS REPROCESSED. ALL DATA WAS REPROCESSED AND % DIFF WAS WITHIN CRITERIA.

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR WATERS

ANALYSIS DATE : 04/05/04

H&P Project #NP040504-W1

COMPOUND	SPK CONC (ug/L)	MS CONC (ug/L)	%REC MS	MSD CONC (ug/L)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	10.0	10.0	99.9%	10.2	102.3%	2.4%	15%	75% - 125%
BENZENE	10.0	10.0	100.3%	10.0	99.8%	0.5%	15%	75% - 125%
TOLUENE	10.0	11.3	113.0%	11.0	110.0%	2.7%	15%	75% - 125%
ETHYLBENZENE	10.0	11.1	111.4%	11.8	118.3%	6.0%	15%	75% - 125%
TOTAL XYLENES	20.0	21.7	108.3%	21.7	108.7%	0.4%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR WATERS

ANALYSIS DATE : 04/05/04

H&P Project #NP040504-W1

COMPOUND	SPK CONC (ug/L)	LCS CONC (ug/L)	%REC LCS	LCSD CONC (ug/L)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	10.0	10.1	101.0%	9.6	95.7%	5.4%	15%	75% - 125%
BENZENE	10.0	10.0	99.5%	10.3	102.6%	3.1%	15%	75% - 125%
TOLUENE	10.0	11.1	111.0%	10.4	104.0%	6.5%	15%	75% - 125%
ETHYLBENZENE	10.0	11.0	110.0%	11.3	112.7%	2.4%	15%	75% - 125%
TOTAL XYLENES	20.0	21.5	107.3%	22.0	109.8%	2.3%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

Chain of Custody Record

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469
☑ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404
☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 4-5-04
H&P Project # NP040504-W1
Outside Lab:

Client: NAVY PWL-SD ENV.
Address: 2730 McKean St. Ste 1 Code 980
SD CA 92136
Phone: 619-524-6967 Fax: 619-524-6000

Collector: TWS
Page: 4 Of 5
Client Project # 113621902008
Project Manager D. Bloom
Location: NAF, El Centro Sete 110
Turn around time:

Global ID: T0600250116
EDF: Yes / No

Sample Receipt
Intact: ☑ Yes ☐ No
Seal Intact: ☐ Yes ☐ No ☑ N/A
Cold: ☐ Yes ☐ No
N/A (Received on Site)

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B: BTEX / Oxygenates	8260B: Oxygenates	8260B: VOC's	8260B: VOC's and Oxygenates	Methane	Fixed Gases						Total # of containers
EC-364-02			1210	4/5	W	VOA			X														

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Tim Shay	Navy PWC	Janis Villarreal	H+P	4/5/04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constit[illegible] uthorization to proceed with analysis and acceptance of condition on back.

Sample disposal [illegible]ction: ☐ *Disposal @ $2.00 each* ☐ *Return to client* ☐ *Pickup*

Site Assessment Report
UST Site 400
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 400 at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 400 work plan addendum, dated March 18, 2004. Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 400. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 400
Site Address:	Northwest corner of North and "B" Streets Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,738,223 Northing: 1,880,379 feet (State Plane 6)
Facility Name:	Government Vehicle Fueling Station
Property Owner: Tank Owner/Operator: Responsible Party:	United States Navy United States Navy United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430044

Prepared for: Commander, Navy Region Southwest
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	Unknown
Construction Materials:	Not provided.
Capacity:	Not provided.
Contents:	Gasoline
Year Removed:	1994 by Kroeker, Inc.

Figure 1 shows a map of the site location and previous and current assessment locations.

During UST removal in 1994, Kroeker collected two soil samples from the excavation as discussed in the *Final Technical Memorandum No. 3, Underground Storage Tank Site Investigation*, dated November 2000, prepared by Bechtel National, Inc. (BNI, 2000). The samples were tested for total recoverable petroleum hydrocarbons (TRPH) and BTEX. TRPH soil concentrations were reported at 1,400 and 2,400 milligrams per kilogram (mg/kg). No testing for total petroleum hydrocarbons quantitated as gasoline (TPH-gasoline) or TPH-diesel was performed, and TRPH results are not directly comparable to the TPH-gasoline and TPH-diesel cleanup standards.

In 1999, BNI advanced a groundwater HydroPunch boring approximately 40 feet northwest (downgradient) of the former UST location. The groundwater analytical results indicated that constituents of concern were detected below action levels. The groundwater sample was collected from a depth range of 16.5-20.8 feet bgs.

PWC Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Soil TPH-gasoline and TPH-diesel concentrations unconfirmed.* Field activities were performed May 15, 2004.

Laser Induced Fluorescence (LIF) was measured *in situ* using the Site Characterization and Analysis Penetrometer System (SCAPS) at one location as shown on Figure 1. The LIF data are summarized and interpreted in Table 2. This location is approximately 15 feet southeast of the former UST location. A drainage swale, numerous aboveground utilities (including a utility pole and guy wires), subsurface utilities, and other structures precluded additional SCAPS points in other locations. No fluorescence characteristic of petroleum, oil, or lubricants (POL) was encountered. Neither soil nor groundwater samples were collected at this site due to limited access.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, the vertical and horizontal extent of fuel-impacted soils has been delineated to the extent practicable in the easterly direction. Additional soil data should be collected in the northerly, westerly, and southerly directions using hand-auger methods or a limited access probe. Soil samples from these areas should be tested for constituents of concern (TPH-gasoline and TPH-diesel) to confirm whether or not concentrations exceed cleanup standards.

It is the opinion of PWCSD that further assessment of soil should be performed at this site to confirm the presence or absence of petroleum hydrocarbons that exceed the cleanup standard for TPH-gasoline and TPH-diesel.

Site Characterization Information

Description of the former UST:	See Background Information, page 1.
Contaminants Identified:	See attached analytical results table.
Amount of Contaminants Leaked:	Not estimated. See attached analytical results table.
MTBE:	See previous assessment data.
Description of the soil/geology:	Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? No. Delineated in accessible areas only to the east. Previous sampling in the former tank location during tank removal indicated elevated TRPH concentrations of 1,400 and 2,400 mg/kg, but these results were not confirmed using the TPH-gasoline or TPH-diesel methods.

Estimated volume of contaminated soil left on site and concentration: Not Estimated.

Is groundwater contamination completely delineated? One groundwater sample collected downgradient of the former UST location in 1999 did not indicate the presence of constituents of concern above cleanup standards. Groundwater is not a current medium of concern.

Monitoring wells installed, properly permitted? No monitoring wells were installed.

Depth to groundwater: Approximately 16.5 feet bgs (April 2000, reported by Bechtel).

Is groundwater or surface water impacted? No.

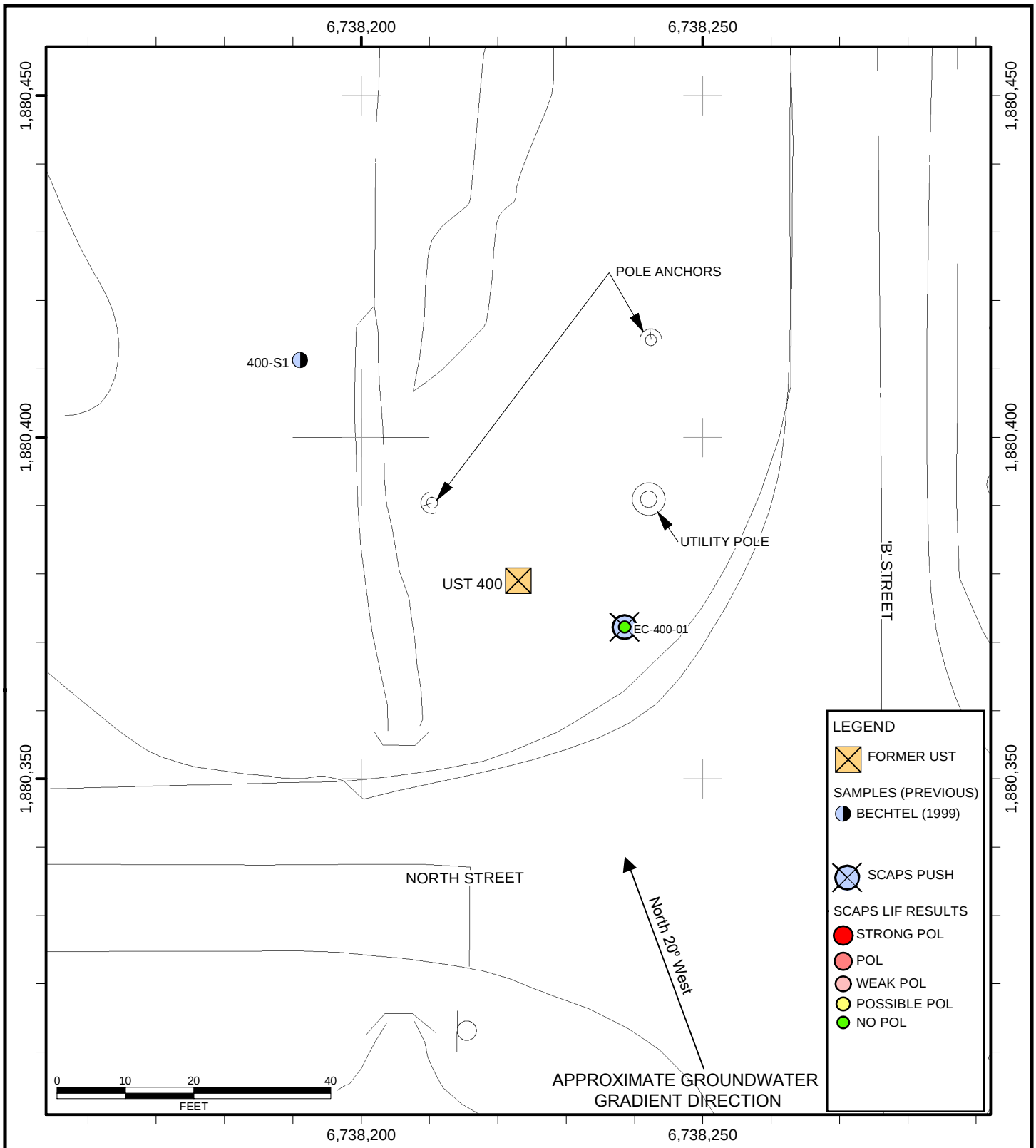
Remedial action taken? UST removed 1994.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Unknown.

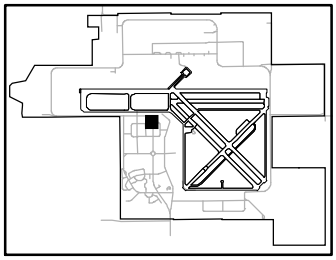
Site Recommendation: Data indicate a limited amount of impacted soil may remain, but soil data incomplete. Actual quantity of contaminated soil is unknown. Groundwater quality previously tested acceptable downgradient of the former UST. Additional soil data will need to be collected to confirm the level of TPH-gasoline and TPH-diesel that may exist at the former tank site. The recommendation for additional soil assessment is accepted.

Signature: ***Date:***	***Signature:*** ***Date:***
N.R. Wells **Lieutenant Commander, CEC, US Navy** **By direction of** **The Commanding Officer**	**Liann P. Chavez, R.G.** **Senior Engineering Geologist** **California Environmental Protection Agency** **California Regional Water Quality Control Board** **Colorado River Basin Region**

Attachments: Figure 1 –Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS Results
SCAPS Log



OVERVIEW MAP - NAF EL CENTRO



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MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 400

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC1

FIGURE: 1

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence Data Summary

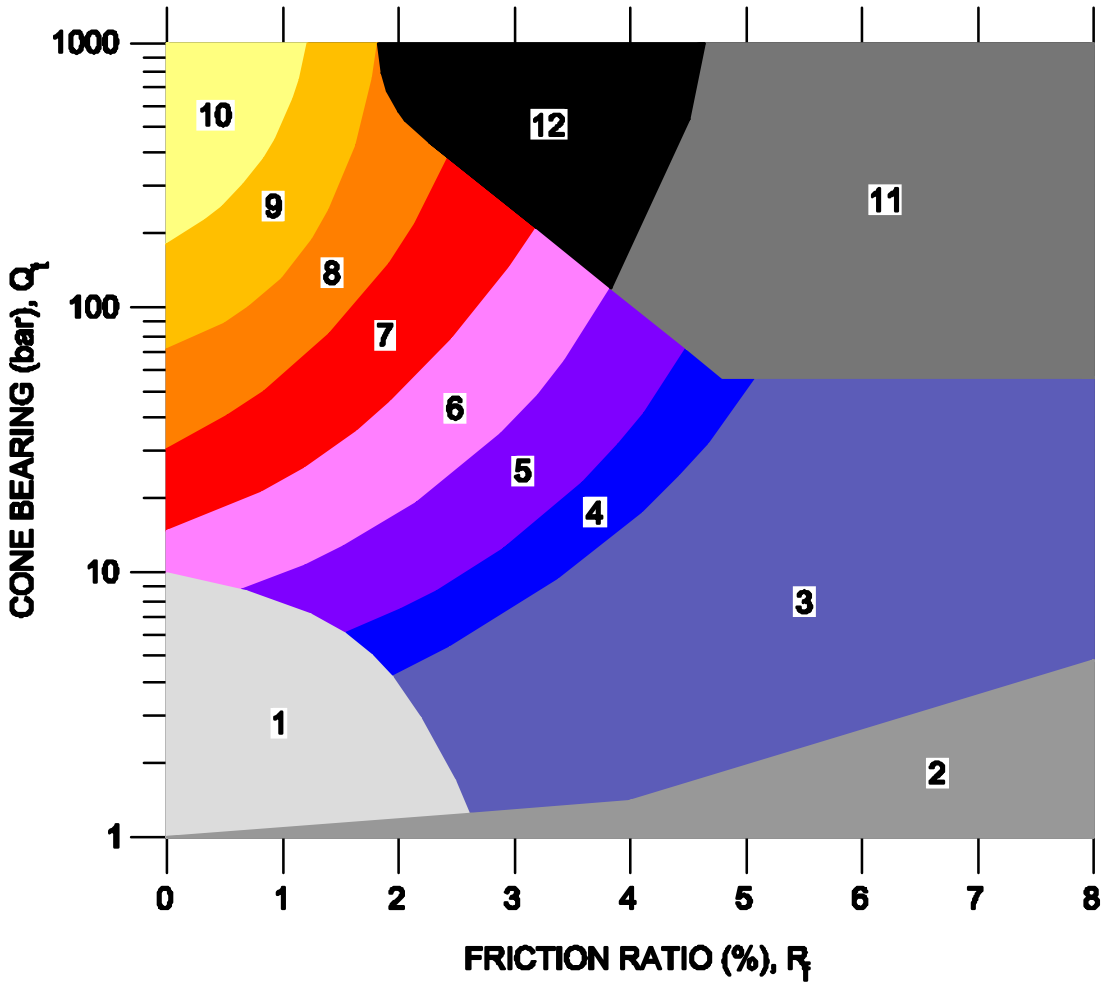
UST Site 400
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-400-01	4/2/2004	19.5	21.5	2,540 @ 5.6	No POL		

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

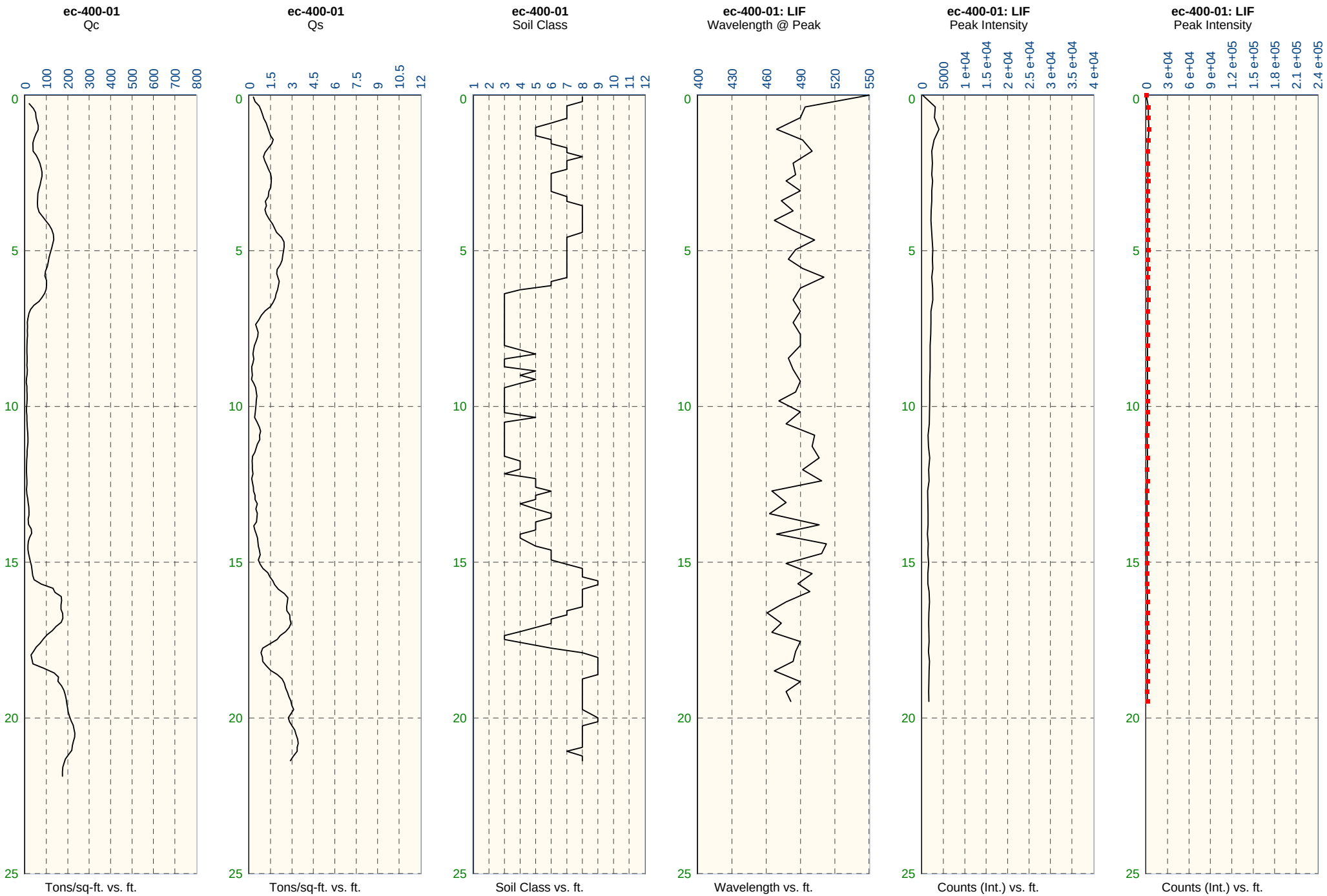
CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)



Friction Ratio (R_f) = Sleeve Friction (F_s)/Cone Pressure (Q_t) x 100%
1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

Zone		Q_t/ 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


ec-400-01
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-400-01
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-400-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-400-01: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-400-01: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-400-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.

Site Assessment Report
UST Sites 400(A)(1) and 400(B)(2)
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Sites 400(A)(1) and 400(B)(2) at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Sites 400(A)(1) and 400(B)(2) work plan addendum dated March 22, 2004, prepared by the Public Works Center San Diego (PWCSD). Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Sites 400(A)(1) and 400(B)(2). It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Sites 400(A)(1) and 400(B)(2)
Site Address:	Northwest corner of North and "B" Streets, west of pump islands of Building 400 Naval Air Facility El Centro, California 92243
Tank Coordinates: (feet, State Plane 6)	400(A)(1): Easting: 6,738,056 Northing: 1,880,397 400(B)(2): Easting: 6,738,056 Northing: 1,880,371
Facility Name:	Government vehicle fueling station
Property Owner: Tank Owner/Operator: Responsible Party:	United States Navy United States Navy United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430045

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	1985
Construction Materials:	Fiberglass
Capacity:	Two: 12,000 gallons each
Contents:	Gasoline and diesel
Year Removed:	1995 by Environmental Chemical Corp. (ECC)

Figure 1 shows the site location and previous and current assessment locations.

According to the *Final Technical Memorandum Addendum No. 2, Underground Storage Tank Site Investigation,* dated November 2000, prepared by Bechtel National, Inc. (BNI, 2000a), ECC removed both 12,000-gallon USTs in 1995 from a single excavation. The former tank locations are shown on Figure 1. Seven soil samples were collected as part of tank removal. The reported low concentrations of TPH-diesel and BTEX is consistent with records that indicate that contaminated soil was removed and disposed off site.

In January 2000, BNI advanced two direct-push soil borings at the site of the former tank excavation. BNI advanced a HydroPunch groundwater boring approximately 50 feet northwest of the former excavation. Both soil samples and the groundwater sample were tested for MTBE. The groundwater sample contained MTBE at a concentration of 200 micrograms per liter (ug/L), which exceeds cleanup criteria. Other constituents of concern were not tested.

In April 2000, BNI advanced three additional HydroPunch borings in an arc pattern north (downgradient) of the former tanks locations, as reported in *Final Technical Memorandum Addendum No. 3, Underground Storage Tank Site Investigation,* dated November 2000 (BNI, 2000b). The borings were located approximately 100 to 150 feet from the former tanks to assess lateral extent of groundwater contamination as shown on Figure 1. Total petroleum hydrocarbons quantitated as gasoline (TPH-gasoline), TPH-diesel, BTEX, and MTBE were tested for each groundwater sample. Except for a benzene concentration of 1.2 ug/L reported for sample 400-H2, the constituents of concern met the cleanup standards.

PWC Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Groundwater exceeded action levels for benzene. Confirm extent and severity of MTBE and toluene in groundwater.* Field activities were performed April 5 and May 12, 2004.

In accordance with the work plan, the Site Characterization and Analysis Penetrometer System (SCAPS) was used to collect groundwater samples from temporary wells at four locations as shown on Figure 1. The groundwater points were located at the former tanks locations (EC-400AB-01 between the two former UST locations), and in a line northerly at approximate distances of 50, 120, and 170 feet from the former USTs locations. Lithology and Laser Induced Fluorescence (LIF) were measured at the first three sample locations. As expected, no fluorescence characteristic of petroleum, oil, or lubricants (POL) was encountered at these locations. The temporary wells were screened with ¾-inch diameter 0.010-inch slotted PVC from 10 to 20 feet bgs. Each groundwater grab sample was collected unpurged using a single-use disposable bailer. The samples were immediately delivered to an on-site mobile laboratory for analytical testing. The temporary wells were abandoned by grouting in place.

BTEX compounds were not detected in the groundwater samples. MTBE was detected in each of the four samples, as follows:

Microwell ID	MTBE (ug/L)	Depth to Water (feet bgs)	Distance north from USTs 400(A) and 400(B) (feet)
EC-400AB-01	12	14.49	*Between USTs 400(A) and 400(B)*
EC-400AB-02	110	14.60	50
EC-400AB-03	66	13.5*	120
EC-400AB-04	40	14.66	170

Note: *Depth sounding probe operation erratic. Depth uncertain.

Conclusions and Recommendation

Based on the findings of our assessment and the information from previous assessment activities, the horizontal extent of MTBE at concentrations greater than the action level in groundwater in the northerly direction exceeds 170 feet. The concentration of MTBE at the source meets the groundwater cleanup standard. MTBE concentrations decrease in a downgradient direction between the 50-foot sample (EC-400AB-02) and the 170-foot sample (EC-400AB-04). This trend indicates that the MTBE plume has migrated north away from the source. The absence of BTEX compounds suggests natural attenuation has occurred at the site for these compounds. MTBE degradation is occurring more slowly, thus, it remains a detected compound at the site. Groundwater depth data suggests the water table has been lowered up to 4 feet since 2000. The pumping activities at Site 7, located approximately 800 feet north-northwest may have created a dynamic groundwater regime in which the radius of influence includes UST Site 400(A)(B). If Site 7 pumping has steepened the groundwater gradient, conclusions based on the findings of this assessment must be made in light of this dynamic condition, and are representative of non-equilibrium conditions. Pumping at Site 7 is reaching the end of its lifecycle, so we can expect equilibrium conditions to return after shutdown of the pumping system.

It is the opinion of PWCSD that further assessment of groundwater should be performed at this site. Such a groundwater assessment could include grab sampling from temporary well points and should be conducted approximately 6 to 12 months following shutdown of the Site 7 pumping system to allow for restoration of equilibrium conditions.

Site Characterization Information

Description of the former UST: Two USTs. See Background Information, page 1.

Contaminants Identified: See attached analytical results table.

Amount of Contaminants Leaked: Not estimated. See attached analytical results table.

MTBE: See attached analytical results table.

Description of the soil/geology: Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? Yes. Contaminated soil was removed and disposed of off site during UST removal in 1995 by ECC.

Estimated volume of contaminated soil left on site and concentration: None.

Is groundwater contamination completely delineated? No. Groundwater testing shows MTBE concentrations above the cleanup standard.

Monitoring wells installed, properly permitted? No monitoring wells were installed.

Depth to groundwater: Approximately 14 feet bgs.

Is groundwater or surface water impacted? Groundwater impacted by MTBE.

Remedial action taken? USTs and contaminated soil excavated and removed 1996.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Unknown.

Site Recommendation: Data indicate soil quality meets cleanup standard. Groundwater quality is affected by MTBE downgradient of the former UST. MTBE concentrations exceed cleanup goals, and attenuate in the downgradient direction. Groundwater MTBE concentrations currently exceed drinking water MCLs. A dynamic hydrogeologic system has been created by groundwater extraction at Site 7. Its radius of influence has likely encompassed Sites 400(A)(1) and 400(B)(2). It would be prudent to assess the extent of MTBE contaminated groundwater following a return to equilibrium after the Site 7 extraction system is shut down. The recommendation for additional groundwater assessment at this site is accepted.

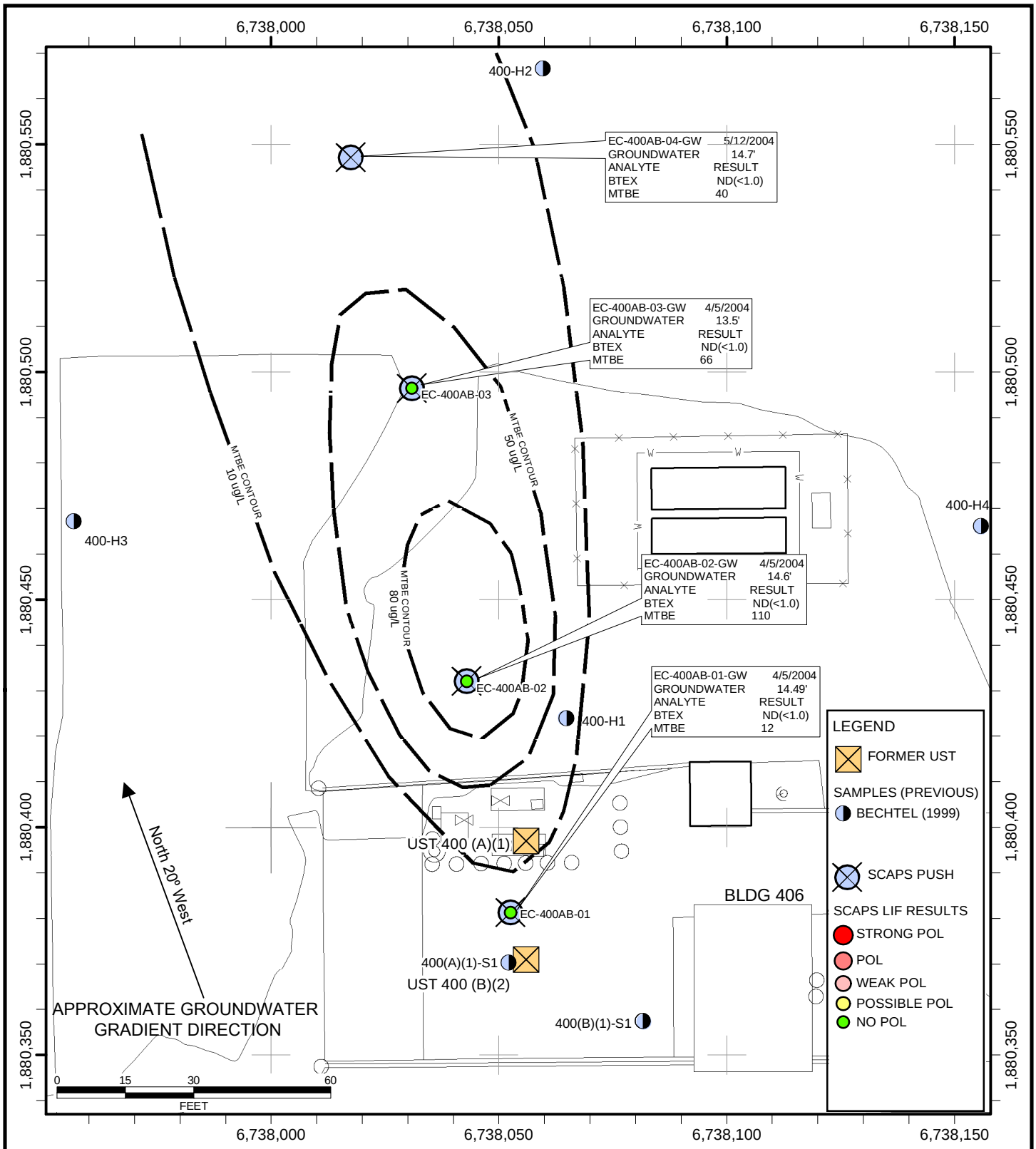
Signature: ***Date:***

N.R. Wells
Lieutenant Commander, CEC, US Navy
By direction of
The Commanding Officer

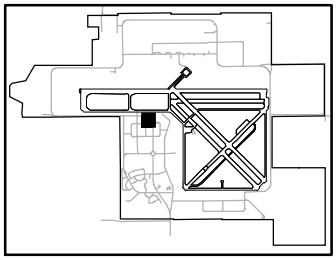
Signature: ***Date:***

Liann P. Chavez, R.G.
Senior Engineering Geologist
California Environmental Protection Agency
California Regional Water Quality Control Board
Colorado River Basin Region

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – Groundwater and SCAPS Results
SCAPS Logs



OVERVIEW MAP - NAF EL CENTRO



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MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITES 400(A)(1) & 400(B)(2)

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC1

FIGURE: 1

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence, and Groundwater Analytical Data Summary

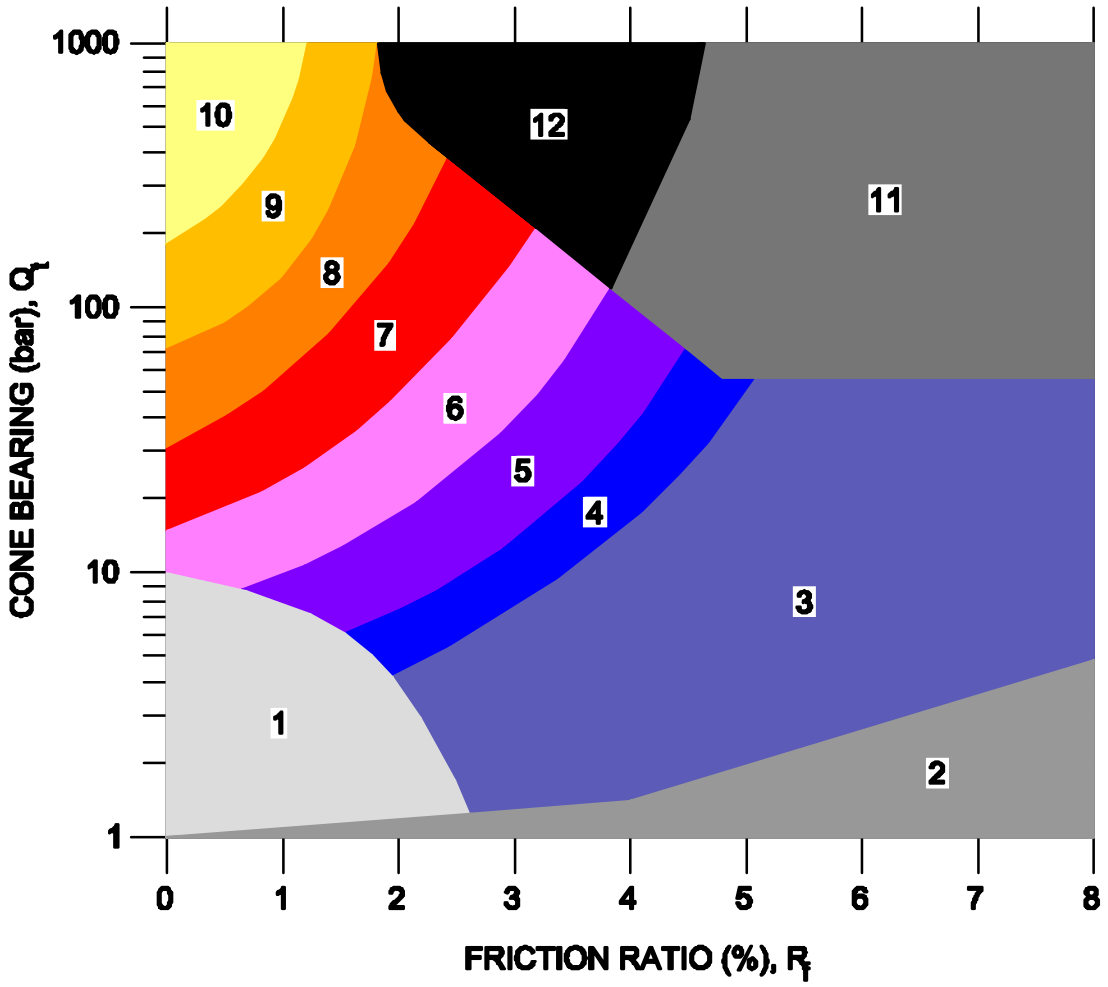
UST Site 400 (A)(1) and 400 (B)(2)
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-400AB-01	4/4/2004	16.0	18.4	3,171 @ 5.3	No POL		
EC-400AB-01-GW						14.49': BTEX: <1.0 ug/L MTBE: 12 ug/L	10'-20'
EC-400AB-02	4/4/2004	16.2	18.5	2,219 @ 6.5	No POL		
EC-400AB-02-GW	4/5/2004					14.60': BTEX: <1.0 ug/L MTBE: 110 ug/L	10'-20'
EC-400AB-03	4/4/2004	15.8	18.3	2,086 @ 5.9	No POL		
EC-400AB-03-GW	4/5/2004					13.5': BTEX: <1.0 ug/L MTBE: 66 ug/L	10'-20'
EC-400AB-04-GW	5/12/2004					14.66': BTEX: <1.0 ug/L MTBE: 40 ug/L	10'-20'

Notes:

[1] Depth is measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
ug/L = micrograms per liter

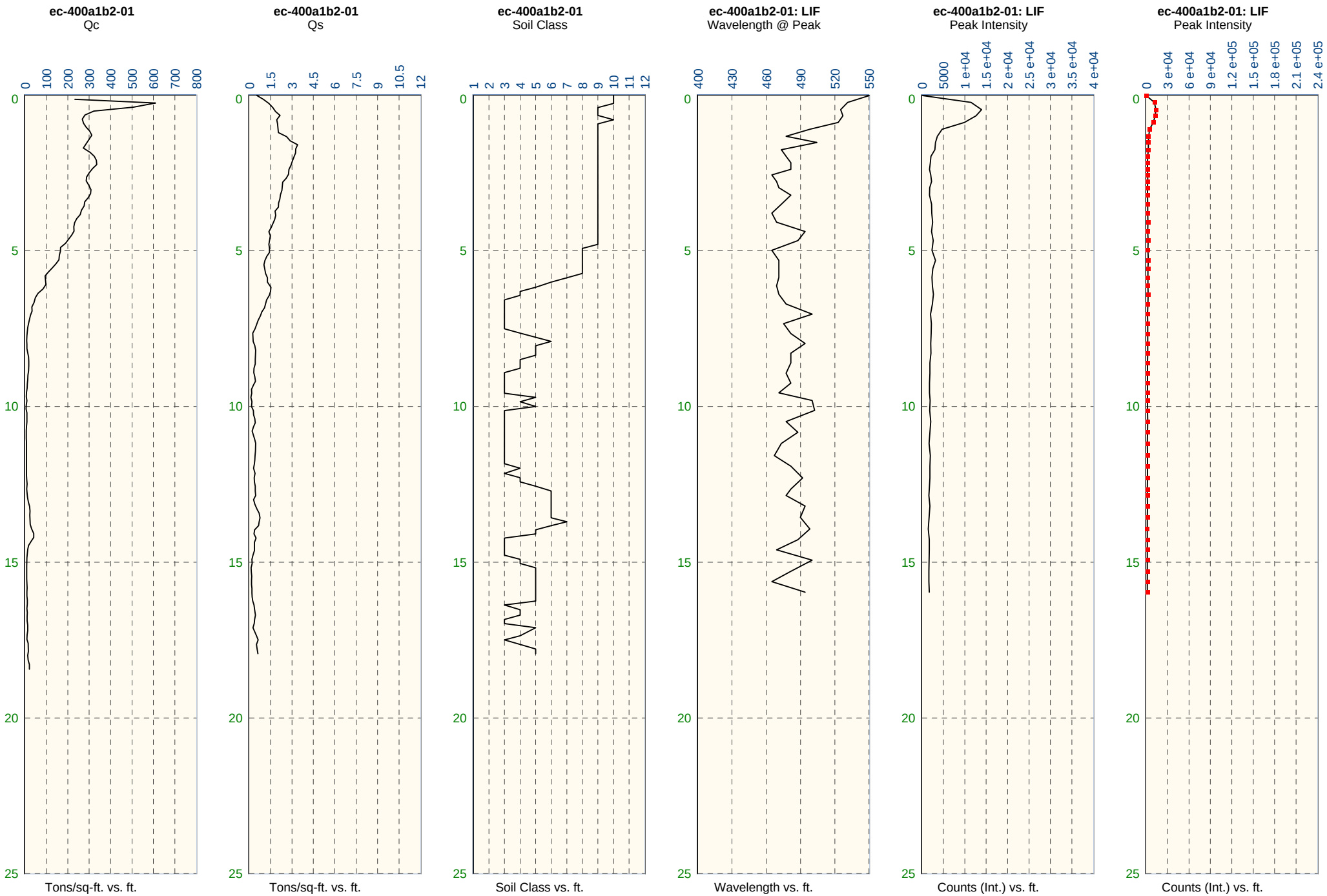
CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)



Friction Ratio (R_f) = Sleeve Friction (F_s)/Cone Pressure (Q_t) x 100%
1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

Zone		Q_t/ 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


ec-400a1b2-01
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-400a1b2-01
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-400a1b2-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-400a1b2-01: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-400a1b2-01: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-400a1b2-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.

MOBILE GEO CHEMISTRY

H&P

April 13, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – SITE ~~110~~ 400 (A)(B) – NAVAL AIR FACILITY - EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP040504W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1746).

Project Summary

The following analyses were conducted:

- 3 waters for volatile aromatic hydrocarbons (BTEX) & MTBE by EPA Method 8021

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Blayne Hartman

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
2373 208th Street, Suite F-1, Torrance, California 90501 | 310 782.2929 — Fax 310 782.2798
www.HandPmg.com | 1-800-834-9888

MOBILE GEOCHEMISTRY
H&P

NAVY PUBLIC WORKS PROJECT #1113621902008
SITE 110
NAVAL AIR FACILITY
EL CENTRO, CA

H&P Project #NP040504-W1

BTEX, MTBE (EPA Method 8021) ANALYSES OF WATERS

SAMPLE NUMBER	DATE ANALYZED	MTBE (ug/l)	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYLBENZ (ug/l)	XYLENES (ug/l)	SURROGATE (%REC)
METHOD BLANK	4/5/2004	ND	ND	ND	ND	ND	106
EC-400AB-3	4/5/2004	66	ND	ND	ND	ND	98
EC-400AB-2	4/5/2004	110	ND	ND	ND	ND	100
EC-400AB-1	4/5/2004	12	ND	ND	ND	ND	94
REPORTING LIMITS		10	1.0	1.0	1.0	1.0	53%-145%
DETECTION LIMITS		1.0	0.5	0.5	0.5	0.5	

J INDICATES VALUE DETERMINED IS BETWEEN DETECTION LIMIT AND REPORTING LIMIT

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
4-15-2004

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP040504-W1
DAILY CALIBRATION DATE : 04/05/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ug/kg)	WATER (ug/L)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
MTBE	500 - 25	2500 - 125	4/2/2004	1.22	13.2%	112.00	1.12	7.8%	130	1.30	7.0%
BENZENE	500 - 25	2500 - 125	4/2/2004	3.24	10.1%	371.00	3.71	14.4%	285	2.85	12.1%
TOLUENE	500 - 25	2500 - 125	4/2/2004	15.47	11.2%	413.00	4.13	*73.3%	715	7.15	*53.8%
TFT	500 - 25	2500 - 125	4/2/2004	1.02	8.5%	117.00	1.17	14.4%	96	0.96	6.6%
ETHYLBENZENE	500 - 25	2500 - 125	4/2/2004	14.84	6.6%	1677.00	16.77	13.0%	1,481	14.81	0.2%
m&p-XYLENES	500 - 25	2500 - 125	4/2/2004	19.14	9.8%	2063.00	20.63	7.8%	1,778	17.78	7.1%
o-XYLENES	500 - 25	2500 - 125	4/2/2004	15.74	9.3%	1708.00	17.08	8.5%	1,495	14.95	5.0%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

* DUE TO A CONTAMINATION THE % DIFF VALUE WAS OUTSIDE OF CRITERIA. TOLUENE WAS RECALIBRATED ON 04/06/2004 AND DATA WAS REPROCESSED. ALL DATA WAS REPROCESSED AND % DIFF WAS WITHIN CRITERIA.

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY
H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR WATERS

ANALYSIS DATE : 04/05/04
H&P Project #NP040504-W1

COMPOUND	SPK CONC (ug/L)	MS CONC (ug/L)	%REC MS	MSD CONC (ug/L)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	10.0	10.0	99.9%	10.2	102.3%	2.4%	15%	75% - 125%
BENZENE	10.0	10.0	100.3%	10.0	99.8%	0.5%	15%	75% - 125%
TOLUENE	10.0	11.3	113.0%	11.0	110.0%	2.7%	15%	75% - 125%
ETHYLBENZENE	10.0	11.1	111.4%	11.8	118.3%	6.0%	15%	75% - 125%
TOTAL XYLENES	20.0	21.7	108.3%	21.7	108.7%	0.4%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY
H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR WATERS

ANALYSIS DATE : 04/05/04
H&P Project #NP040504-W1

COMPOUND	SPK CONC (ug/L)	LCS CONC (ug/L)	%REC LCS	LCSD CONC (ug/L)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	10.0	10.1	101.0%	9.6	95.7%	5.4%	15%	75% - 125%
BENZENE	10.0	10.0	99.5%	10.3	102.6%	3.1%	15%	75% - 125%
TOLUENE	10.0	11.1	111.0%	10.4	104.0%	6.5%	15%	75% - 125%
ETHYLBENZENE	10.0	11.0	110.0%	11.3	112.7%	2.4%	15%	75% - 125%
TOTAL XYLENES	20.0	21.5	107.3%	22.0	109.8%	2.3%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Chain of Custody Record

HP LABS

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469
☒ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404
☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 4/5/04
HPL Project # NP040504 W1
Outside Lab:

Client: NAVY Public Works
Address: 2730 McKean St Ste 1 Code 980 SD CA
Phone: 619-524-6967 Fax: 619-524-6000

Collector: TWS
Page: 5 Of 5
Client Project # 11362190 2008
Project Manager D. Bloom
Location: NAF El Centro CA Site 110
Turn around time:

Global ID: T0602555669
EDF: Yes / No

Sample Receipt
Intact: ☐ Yes ☐ No
Seal Intact: ☐ Yes ☐ No ☐ N/A
Cold: ☐ Yes ☐ No
N/A (Received on Site)

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B: BTEX / Oxygenates	8260B: Oxygenates	8260B: VOC's	8260B: VOC's and Oxygenates	Methane	Fixed Gases							Total # of containers
EC-400AB-3			1440 1450	4/5/04	Water	VOA			X															
EC-400AB-2			1445	4/5/04	Water	VOA			X															
EC-400AB-1			1500	4/5/04	Water	VOA			X															

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
[signature]	Navy PWC	Jesus Villarreal	HP	4-5-04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constitutes authorization to proceed with analysis and acceptance of condition on back. Sample disposal instructions: ☐ Disposal @ $2.00 each ☐ Return to client ☐ Pickup

MOBILE GEOCHEMISTRY
H&P

May 20, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – NAS – SITE 400AB – EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP051104W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1317).

Project Summary

The following analyses were conducted:

- 1 water for volatile aromatic hydrocarbons (BTEX) & MTBE by EPA Method 8021B

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Blayne Hartman

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
2373 208th Street, Suite F-1, Torrance, California 90501 | 310 782.2929 — Fax 310 782.2798
www.HandPmg.com | 1-800-834-9888

MOBILE GEOCHEMISTRY
H&P

NAVY PUBLIC WORKS PROJECT #1113621902008
NAS
SITE 400AB
EL CENTRO, CA

H&P Project #NP051104-W1

BTEX, MTBE (EPA Method 8020 Modified) ANALYSES OF WATERS

SAMPLE NUMBER	DATE ANALYZED	MTBE (ug/l)	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYLBENZ (ug/l)	XYLENES (ug/l)	SURROGATE (%REC)
METHOD BLANK	5/12/2004	ND	ND	ND	ND	ND	108
EC-400AB-04-GW	5/12/2004	40	ND	ND	ND	ND	98
REPORTING LIMITS		10.0	1.0	1.0	1.0	1.0	53%-145%
DETECTION LIMITS		1.0	0.5	0.5	0.5	0.5	

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
5-26-2004

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP051104-W1
DAILY CALIBRATION DATE : 05/12/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ug/kg)	WATER (ug/L)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
MTBE	500 - 25	2500 - 125	4/2/2004	3.07	7.2%	291	2.91	5.1%	322	3.22	5.0%
BENZENE	500 - 25	2500 - 125	5/6/2004	9.44	11.6%	1,035	10.35	9.6%	881	8.81	6.7%
TOLUENE	500 - 25	2500 - 125	5/6/2004	17.80	12.5%	1,710	17.10	4.0%	1,558	15.58	12.5%
TFT	500 - 25	2500 - 125	5/6/2004	5.49	9.8%	582	5.82	6.1%	604	6.04	10.1%
ETHYLBENZENE	500 - 25	2500 - 125	5/6/2004	15.77	5.6%	1,584	15.84	0.5%	1,391	13.91	11.8%
m&p-XYLENES	500 - 25	2500 - 125	5/6/2004	20.54	8.8%	1,925	19.25	6.3%	1,747	17.47	15.0%
o-XYLENES	500 - 25	2500 - 125	5/6/2004	16.61	7.7%	1,592	15.92	4.1%	1,530	15.30	7.9%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR WATERS

ANALYSIS DATE : 05/12/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	MS CONC (ug/L)	%REC MS	MSD CONC (ug/L)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	17.8	89.0%	19.8	99.0%	10.6%	15%	75% - 125%
BENZENE	20.0	17.9	89.5%	19.8	99.0%	10.1%	15%	75% - 125%
TOLUENE	20.0	16.1	80.5%	16.3	81.5%	1.2%	15%	75% - 125%
ETHYLBENZENE	20.0	17.8	89.0%	18.5	92.5%	3.9%	15%	75% - 125%
TOTAL XYLENES	40.0	34.2	85.5%	34.8	87.0%	1.7%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR WATERS

ANALYSIS DATE : 05/12/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	LCS CONC (ug/L)	%REC LCS	LCSD CONC (ug/L)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	19.7	98.5%	20.2	101.0%	2.5%	15%	75% - 125%
BENZENE	20.0	17.4	87.0%	17.2	86.0%	1.2%	15%	75% - 125%
TOLUENE	20.0	16.4	82.0%	16.3	81.5%	0.6%	15%	75% - 125%
ETHYLBENZENE	20.0	17.8	89.0%	17.4	87.0%	2.3%	15%	75% - 125%
TOTAL XYLENES	40.0	33.6	84.0%	33.4	83.5%	0.6%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

Chain of Custody Record

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469

☒ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404

☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 5/12/04

H&P Project # NP051104 W1

Outside Lab:

Client: Navy Public Works Code 950

Address: 2730 McKean St Suite 1
San Diego

Phone: 619-524-6967 Fax: 6195246000

Collector: D Bloom

Client Project # 113621902008

Location: NAS El Centro Site 400AB

Turn around time:

Page: 2 of 6

Project Manager D Bloom

Global ID: T0602500009
check → 2071 gr

EDF Yes / No

Sample Receipt

Intact: ☐ Yes ☐ No

Seal Intact: ☐ Yes ☐ No ☐ N/A

Cold: ☐ Yes ☐ No

N/A (Received on Site)

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B: BTEX / Oxygenates	8260B: Oxygenates	8260B: VOC's	8260B: VOC's and Oxygenates	Methane	Fixed Gases							Total # of containers
—																								
EC-400AB-04-GW			615	5/12	W	VOA			X															

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
David M Bloom	Code 950	Alvis Villarreal	H&P	5/12/04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constitu[illegible]thorization to proceed with analysis and acceptance of condition on back.

Sample disposal i[illegible]ion: ☐ *Disposal @ $2.00 each* ☐ *Return to client* ☐ *Pickup*

Site Assessment Report and
Closure Summary
UST Site 410
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 410 at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 410 work plan addendum, dated February 26, 2004, prepared by the Public Works Center San Diego (PWCSD). Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 410. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 410
Site Address:	North of 3rd Street, between "B" and "C" Streets (north of former Building 410) Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,737,757 Northing: 1,878,926 feet (State Plane 6)
Facility Name:	Transient Housing
Property Owner: Tank Owner/Operator: Responsible Party:	United States Navy United States Navy United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430022

Prepared for: Commander, Navy Region Southwest
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	Unknown
Construction Materials:	concrete
Capacity:	1,500 gallons
Contents:	Diesel
Year Removed:	1993 by Environmental Chemical Corp. (ECC)

Figure 1 shows the site location and previous and current assessment locations.

In 1993, ECC removed a 1,500-gallon diesel UST at the location shown on Figure 1. Five soil samples were collected as part of tank removal. Three of the samples indicated elevated levels of diesel as reported on Table 4-20 in *Final Technical Memorandum Underground Storage Tank Site Investigation,* dated March 2000, prepared by Bechtel National, Inc. (BNI, 2000).

In 1999, BNI advanced one HydroPunch boring to collect a water sample from a depth interval of 6 to 16 feet bgs. The boring was located approximately 30 feet north (downgradient) of the former tank location. Analytical testing results indicated groundwater concentrations of constituents of concern were below action levels or not detected.

In May/June 2000, Geofon, Inc., excavated approximately 251 cubic yards (cy) of fuel-impacted soil from the former tank location, according to *Final Technical Memorandum, Removal of Underground Storage Tanks and Remediation of Fuel-Impacted Soil at Various UST Sites, Naval Air Facility, El Centro, California*, dated November 13, 2000, prepared by Geofon, Inc. From an initial excavation with dimensions 30 × 30 × 13 feet centered on the former UST, the excavation was extended approximately 10 feet to the north, northeast, and east. At the excavation limits, soil samples collected from the northeast and east sidewalls contained total petroleum hydrocarbons quantitated as diesel (TPH-diesel) concentrations of 6,470 and 6,160 milligrams per kilogram (mg/kg), respectively, exceeding the cleanup concentration of 1,000 mg/kg. See Figure 4-12, attached. The groundwater sample did not reveal detectable concentrations of BTEX or MTBE. See Table 4-9, attached.

PWC Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Soil exceeds cleanup levels for TPH-diesel*. Specifically, we focused our assessment northeast of the former tank overexcavation. Field activities were performed on April 2 and May 12, 2004.

In accordance with the work plan, Laser Induced Fluorescence (LIF) was measured *in situ* using the Site Characterization and Analysis Penetrometer System (SCAPS) at six locations as shown on Figure 1. The LIF data are summarized and interpreted in Table 2. At three of the locations, no fluorescence characteristic of petroleum, oil, or lubricants (POL) was encountered. At two locations, single measurements (representing approximately 0.3 feet vertical thickness) characterized by a drop in wavelength coupled with a slightly elevated intensity suggested possible POL. At location EC-410-02, elevated fluorescence intensities coupled with a drop in wavelength, characteristic of POL fluorescence, were encountered between 8.5 and 13 feet bgs.

Soil samples were collected from three locations and were immediately delivered to an on-site mobile laboratory for analytical testing. TPH-diesel was detected at low concentrations in all three soil samples: EC-410-01-12 (100 mg/kg), EC-410-02-12 (200 mg/kg), and EC-410-04-11.5 (400 mg/kg). TPH-gasoline was not detected. Soil sample EC-410-02-12 corresponds to the approximate strongest peak LIF response recorded for the site.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, the vertical and horizontal extent of fuel-impacted soils has been delineated to the extent practicable. Given that 251 cy of contaminated soil has been removed, the LIF response drops off within 10 to 15 feet laterally, and that relatively low concentrations (below the action level) of TPH-diesel have been detected in soil samples, it is concluded that the probability of encountering elevated TPH-diesel concentrations is low. The data obtained during the current investigation indicate that the elevated TPH-diesel concentrations reported on soil in the northeast sidewall in 2000 appear to extend a limited distance from the former test locations (perhaps less than 5 feet laterally), or TPH-diesel concentrations may have naturally attenuated since the excavation.

It is the opinion of PWCSD that further assessment or remediation at this site is unnecessary. We recommend that no further action be considered for this site.

Site Characterization and Closure Information

Description of the former UST:	See Background Information, page 1.
Contaminants Identified:	See attached analytical results table.
Amount of Contaminants Leaked:	Not estimated. See attached analytical results table.
MTBE:	None detected.
Description of the soil/geology:	Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? Yes. Based on a review of the analytical data, the lateral and vertical extent of soil impacted with fuels has been delineated. Greatest concentration of TPH-diesel revealed during the current assessment is 400 mg/kg.

Estimated volume of contaminated soil left on site and concentration: A conservative estimate 4 cy of contaminated soil remaining was calculated using a lateral distance of 20 feet along the north to east wall of the former excavation, a width of 5 feet, and an average thickness of 1 foot.

Is groundwater contamination completely delineated? Yes. Previous analytical results for groundwater show that constituents of concern are not detected.

Monitoring wells installed, properly permitted? No monitoring wells were installed.

Depth to groundwater: Approximately 10 feet bgs (estimated).

Is groundwater or surface water impacted? No. All analytical results for groundwater meet cleanup goals for the site (below tap water PRGs and drinking water MCLs).

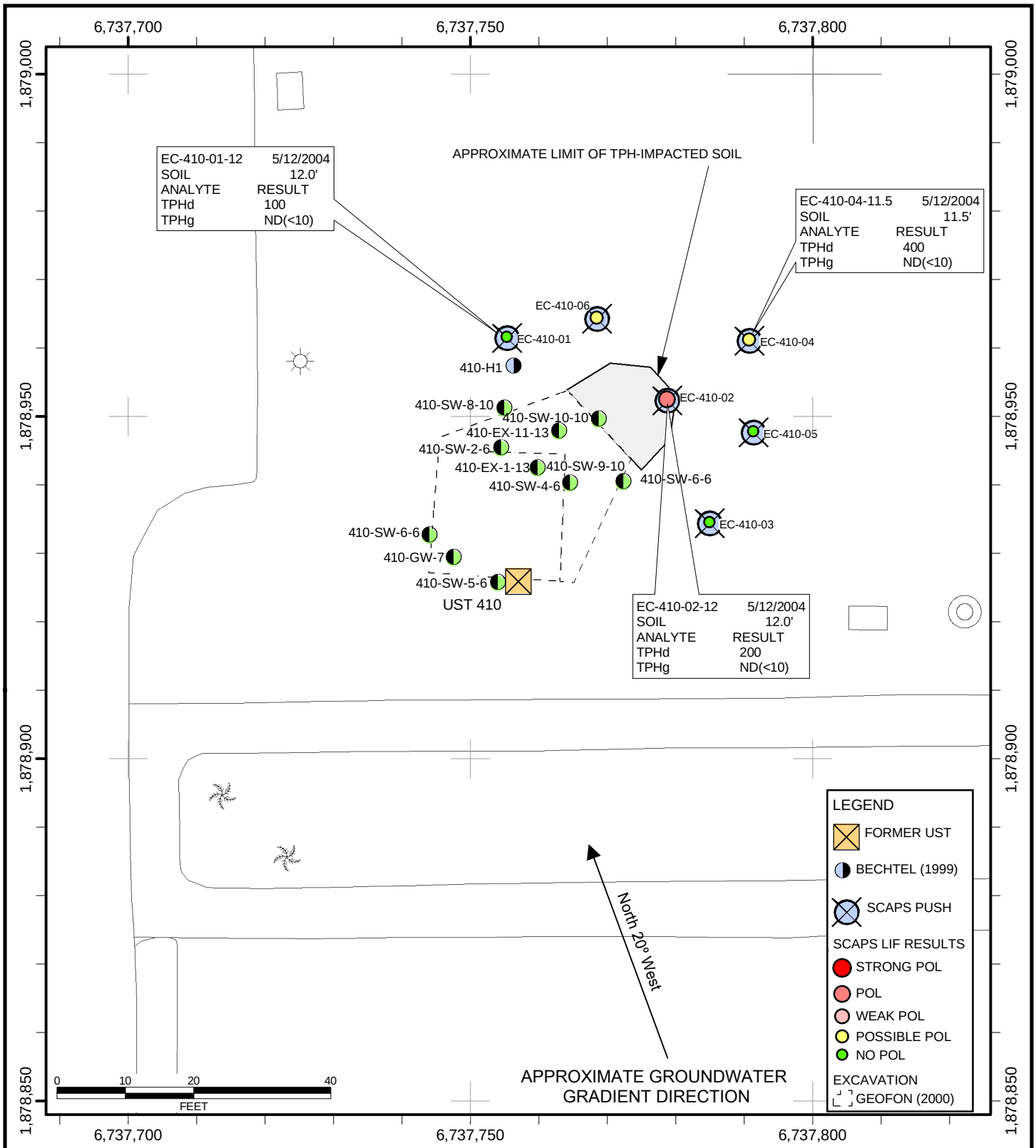
Remedial action taken? UST removed 1993. Approximately 251 cy fuel-containing soil removed in 2000.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Yes.

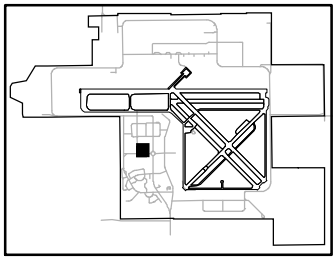
Site Closure: There is no or negligible (estimated up to 4 cy) soil containing elevated TPH-diesel concentrations remaining and no documented groundwater impact from a fuel release from this site, and the site is covered by pavement and landscaping. Thus, the contaminants that may remain do not pose an unacceptable risk to human health or the environment. The recommendation for site closure is accepted and no further action is required at this site.

Signature: ***Date:***	***Signature:*** ***Date:***
N.R. Wells **Lieutenant Commander, CEC, US Navy** **By direction of** **The Commanding Officer**	**Liann P. Chavez, R.G.** **Senior Engineering Geologist** **California Environmental Protection Agency** **California Regional Water Quality Control Board** **Colorado River Basin Region**

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS and Soil Results
Site 410 from Geofon (2000), including Table 4-9, and Figure 4-12
SCAPS Logs
Laboratory Analytical Report and Chain-of-Custody Documentation



OVERVIEW MAP - NAF EL CENTRO



N

MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 410

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC4

FIGURE: **1**

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence, and Soil Analytical Data Summary

UST Site 410
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-410-01	4/2/2004	19.4	21.8	2,408 @ 14.5	No POL		
EC-410-01-12	5/12/2004					12.0': TPHd: 100 mg/kg TPHg: <10 mg/kg	
EC-410-02	4/2/2004	19.4	21.6	34,378 @ 12.6	POL		
EC-410-02-12	5/12/2004					12.0': TPHd: 200 mg/kg TPHg: <10 mg/kg	
EC-410-03	4/2/2004	19.2	21.6	2,179 @ 10.1	No POL		
EC-410-04	5/12/2004	18.9	21.0	5,503 @ 12.1	Possible POL		
EC-410-04-11.5	5/12/2004					11.5': TPHd: 400 mg/kg TPHg: <10 mg/kg	
EC-410-05	5/12/2004	19.9	22.1	2,504 @ 15.0	No POL		
EC-410-06	5/12/2004	19.5	21.7	4,079 @ 12.2	Possible POL		

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

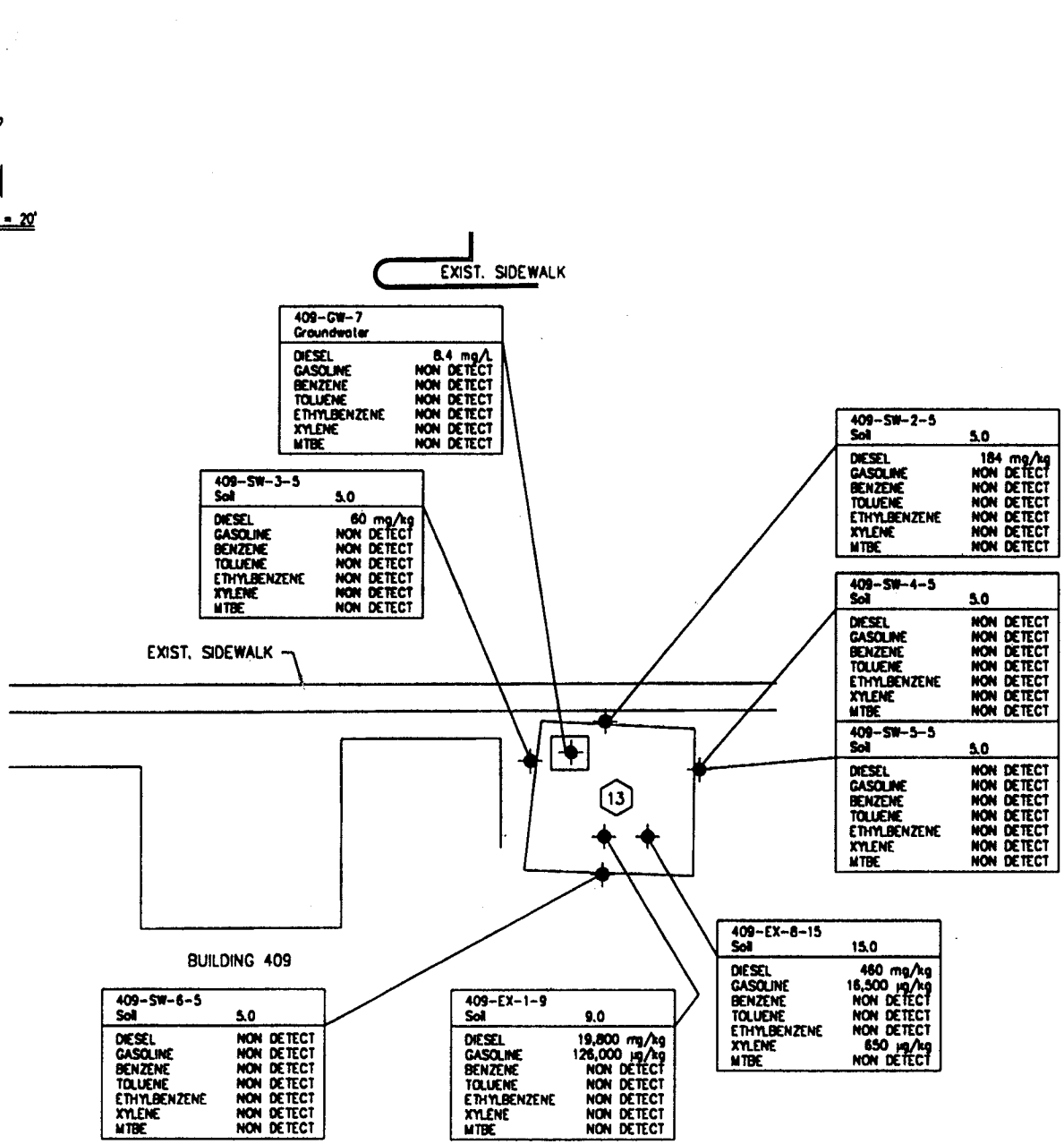
4.12 Site 410: Site Description and Analytical Results

UST 410 was a 1,500-gallon concrete diesel fuel tank removed by ECC (1993). Information on the date of installation was not available. This tank was located near the north/central exterior of Building 410.

Several previous soil and groundwater investigations have been conducted at UST Site 410 (Table 4-9). In 1993, ECC collected five soil samples as part of the tank removal. These soil samples were collected from the base and sidewalls of the tank excavation to approximately 12 feet bgs. In 1999, BNI advanced one HydroPunch boring (410-H1) approximately 20 feet downgradient from the original tank location. The HydroPunch boring was advanced to 16 feet bgs, and a 10-foot PVC 0.010-slotted screen was set from 6 to 16 feet bgs.

As part of this current UST site investigation/cleanup, an initial excavation measuring approximately 30 x 30 x 13 feet was accomplished and approximately 133 cubic yards (cyd) of fuel-impacted soil was removed and disposed of off-site (Appendix D). Upon reaching the limits of excavation, one soil sample (410-EX-1-13) and one groundwater sample (410-GW-7) was collected from the bottom of the excavation, and five soil samples (410-SW-2-6, 410-SW-3-6, 410-SW-4-6, 410-SW-5-6, 410-SW-6-6), including one field duplicate, were collected from the sidewalls of the excavation (Figure 4-12, Table 4-9). The soil sample collected from the bottom (410-EX-1-13) of the excavation contained a concentration of diesel (2,820 mg/kg) above the soil cleanup level of 1,000 mg/kg. The samples collected from the north (410-SW-2-6) and east (410-SW-4-6) sidewalls contained concentrations of diesel (30,900 mg/kg and 69,000 mg/kg, respectively) and gasoline (466,000 µg/kg and 117,000 µg/kg, respectively) above the soil cleanup levels.

Based on the analytical results, and at the direction of the RPM in coordination with the CO, the excavation was further extended to the north, northeast and east approximately 10 feet. Approximately 118 cubic yards of additional fuel-impacted soil was removed and disposed of off-site (Appendix D). Subsequent to excavation, one soil sample (410-EX-11-13) was collected from the bottom of the excavation and three soil samples (410-SW-8-10, 410-SW-9-10 and 410-SW) were collected from the north, northeast and east sidewalls, respectively (Figure 4-12, Table 4-9). The samples collected from the north and northeast sidewalls contained concentrations of diesel above the soil cleanup level. The sample collected from the north sidewall did not have any concentrations above the soil cleanup levels. At the direction of the RPM, no further excavation was performed at this site.



LEGEND

- EXIST. ASPHALT
- EXIST. DIRT
- EXCAVATED AREA
- EXIST. BLDG.
- EXCAVATION SAMPLE POINT
- (13) EXCAVATION DEPTH

NOTES:

ALL ANALYTICAL DATA PRESENTED ON THIS FIGURE IS FROM CURRENT 2000 REMOVAL ACTION

ALL SOIL AND GROUNDWATER SAMPLES COLLECTED DURING THE CURRENT REMOVAL ACTION WERE ANALYZED FOR MTBE

SAMPLE TYPE SOIL OR GROUNDWATER

STATION ID

DEPTH IN FEET (SOIL ONLY)

272-EX14
Soil 8.0
TOLUENE 8.2 J µg/kg

ANALYTE

CONCENTRATION OR NON DETECT AT DETECTION LIMIT

INDICATES AN ESTIMATED VALUE

RESULT UNITS

Technical Memeorandum
Figure 4-11
Site 409 (N,S) - Site Map

NAF El Centro
Imperial County, California

GEOFON INCORPORATED

Date: November 2000
Contract No.: N68711-97-D-8702
DO No.: 0033

Table 4-9
Analytical Results for Site 410

Sample Number	Boring Number	Depth (feet bgs)	TPH-Gas[a]	TPH-Diesel[b]	TRPH	Benzene[c]	Toluene[c]	Ethlybeneze	Xylene[c]	MTBE[c]	Organolead[d]
Soil Results - GEOFON, Soil Removal/Field Investigation, May/June 2000 (µg/kg)											
410-EX-1-13	Excavation	13	50,600	2,820[e]		100 U	660	200	2,300	200 U	
410-SW-2-6	Excavation	6	65,700	30,900[e]		65 J	180 J	435 J	1280 J	50 U	
410-SW-3-6	Excavation	6	257,000	91,400[e]		400 J	1860 J	2720 J	9000 J	200 U	
410-SW-4-6	Excavation	6	144,000	69,900[e]		241 J	983 J	1540 J	5200 J	100 U	
410-SW-5-6	Excavation	6	1,000 U	10 U[e]		5 U	10.2	5 U	10.2	10 U	
410-SW-6-6	Excavation	6	1,000 U	10 U[e]		5 U	5 U	5 U	10 U	10 U	
410-SW-8-10	Excavation	10	14,700	710[e]		25 U	25 U	25 U	1,340	50 U	
410-SW-9-10	Excavation	10	73,000	6,160[e]		100 U	100 U	100 U	3,300	200 U	
410-SW-10-10	Excavation	10	88,200	6,470[e]		50 U	50 U	381 J	3410 J	100 U	
410-EX-11-13	Excavation	13	1,000 U	216[e]		5 U	5 U	5 U	10 U	10 U	
Historical Data, Groundwater Results - GEOFON, Soil Removal/Field Investigation, May/June 2000 (µg/L)											
410-GW-7	Excavation		10 U	17.3[f]		0.5 U	0.5 U	0.5 U	1 U	1 U	
Historical Data, Groundwater Results - BNI, Field Investigation, January/February 1999 (µg/L)											
175HP36	410-H1	6-16[g]		3.8[f]		0.5 U	1.0 U	2.1	2.5	10 U	
Historical Data, Soil Results - Environmental Chemical Corp., UST Removal Phase 1, 1993 (mg/kg)[h]											
410-1		12		11,010							
410-2		12		20,150							
410-3		Unknown		10 U							
410-4		Unknown		4,380							
410A		Unknown		11							

Notes:
[a] analyzed using United States Environmental Protection Agency (U.S. EPA) Method 8015-M; this analysis was calibrated for TPH-gasoline
[b] analyzed using U.S. EPA Method 8015-M; this analysis was calibrated for TPH-diesel
[c] analyzed using U.S. EPA Method 8021B
[d] analyzed by California Leaking Underground Fuel Tank Method
[e] diesel results for soil reported in milligrams per kilogram
[f] diesel results for groundwater reported in milligrams per liter
[g] Hydropunch screened interval
[h] collected during UST removal

Table 4-8 (Continued)
Analytical Results for Site 409(N,S)

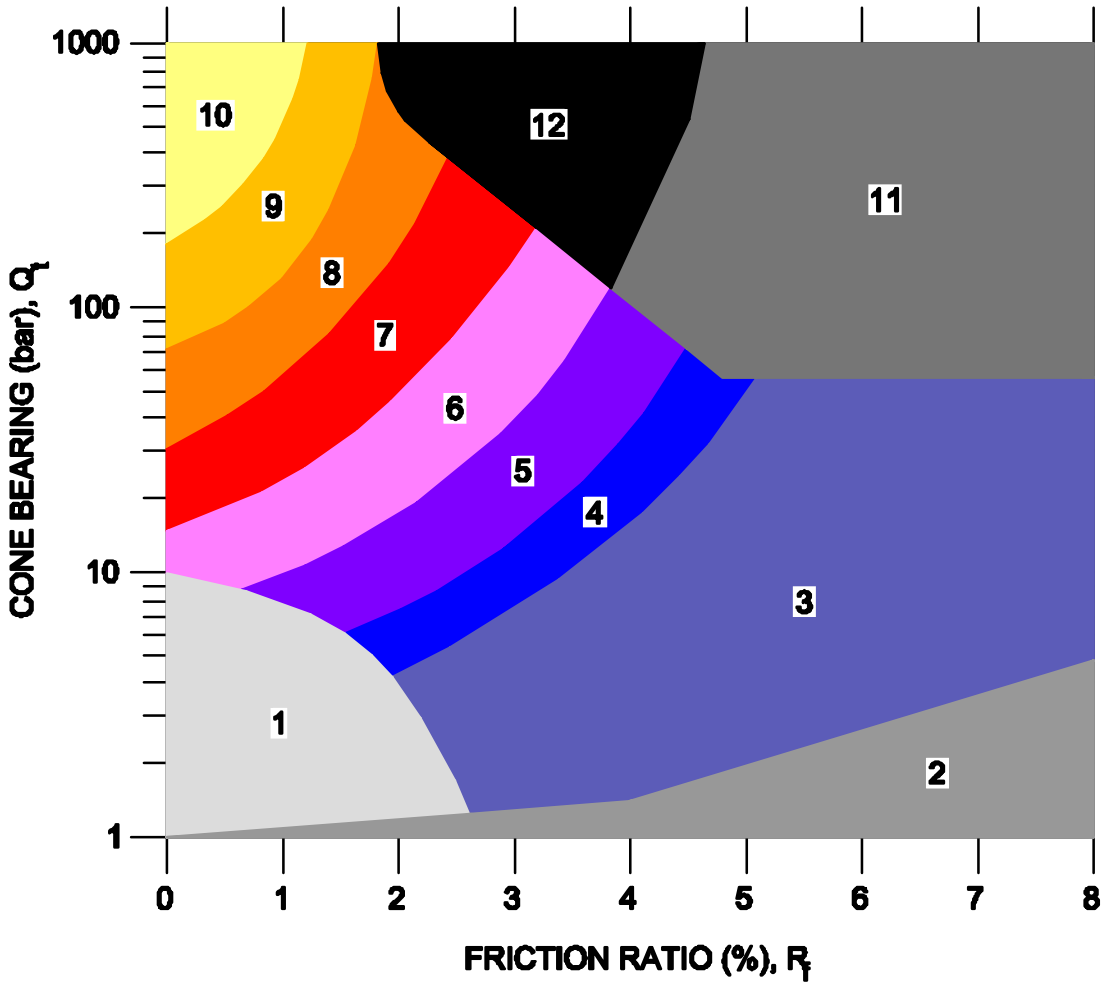
Notes:

[a] analyzed using United States Environmental Protection Agency (U.S. EPA) Method 8015-M; this analysis was calibrated for TPH-gasoline
[b] analyzed using U.S. EPA Method 8015-M; this analysis was calibrated for TPH-diesel
[c] analyzed using U.S. EPA Method 8021B
[d] analyzed by California Leaking Underground Fuel Tank Method
[e] progress sample
[f] diesel results for soil reported in milligrams per kilogram
[g] diesel results for groundwater reported in milligrams per liter
[h] Hydropunch screened interval
[i] collected during UST removal

Acronyms/Abbreviations:

µg/L - micrograms per liter
µg/kg - micrograms per kilogram
bgs - below ground surface
BNI - Bechtel National, Inc.
mg/kg - milligrams per kilogram (parts per million)
MTBE - methyl-tertiary-butyl ether
TRPH - total recoverable petroleum hydrocarbons
U - not detected above the referenced detection limit

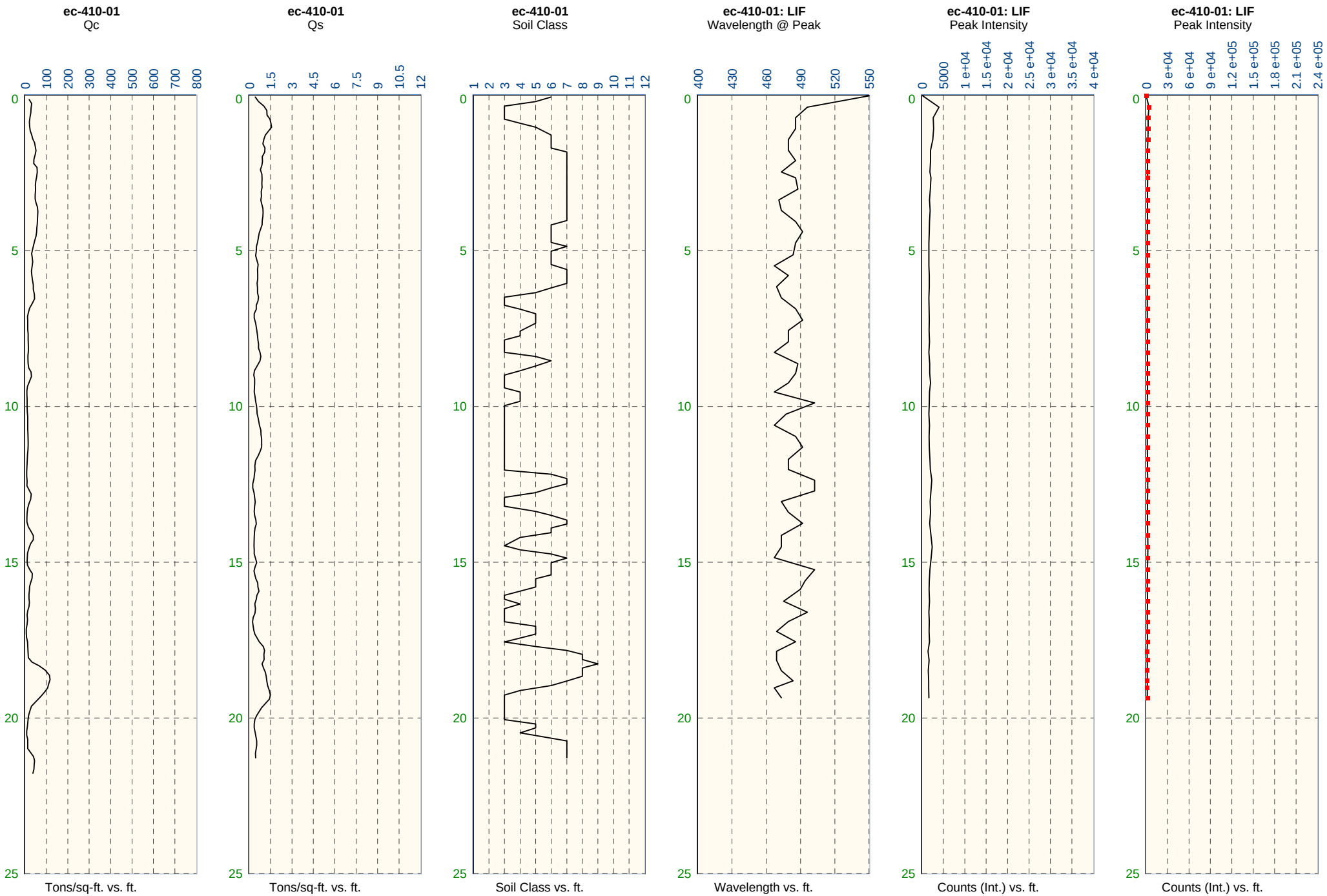
CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)

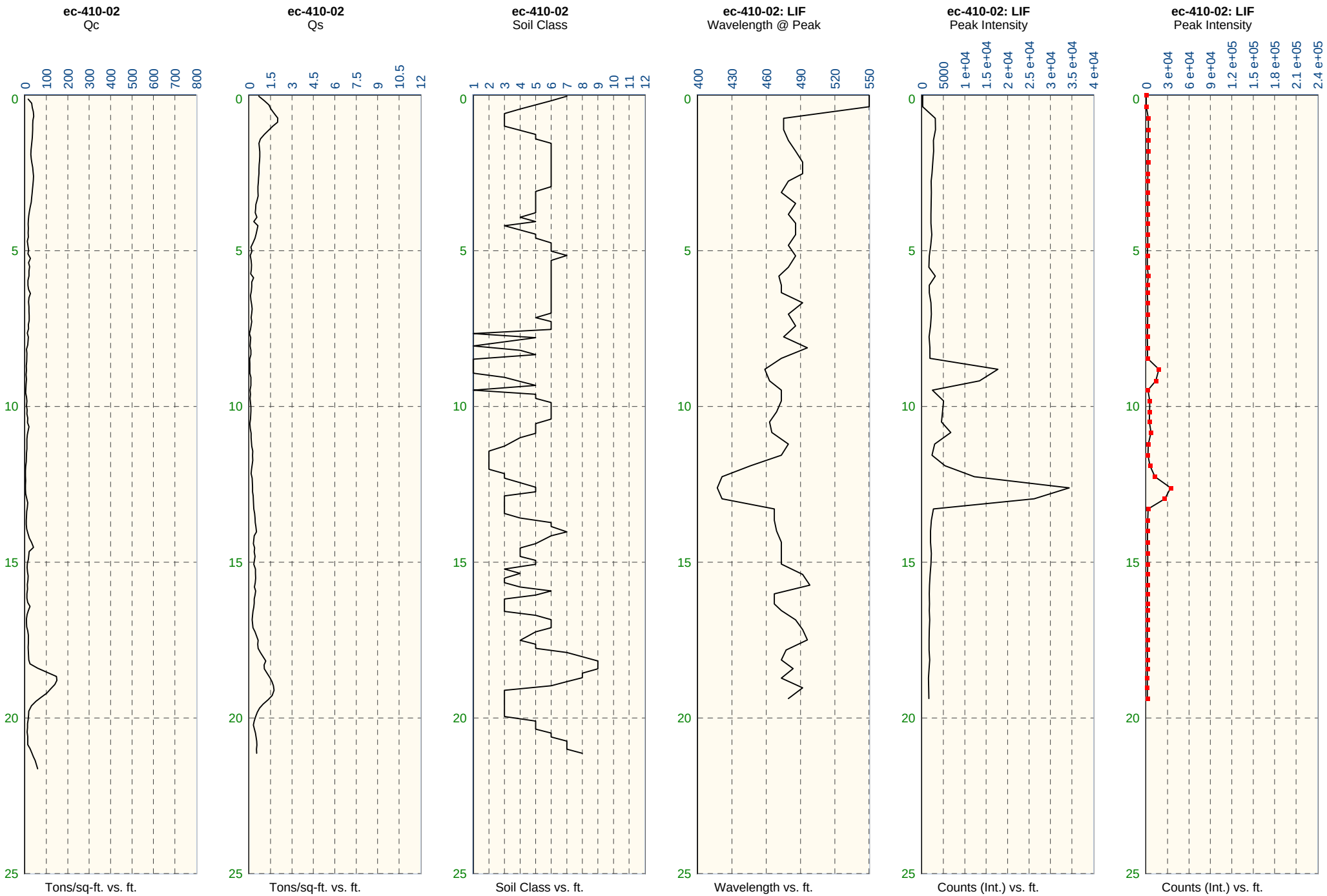


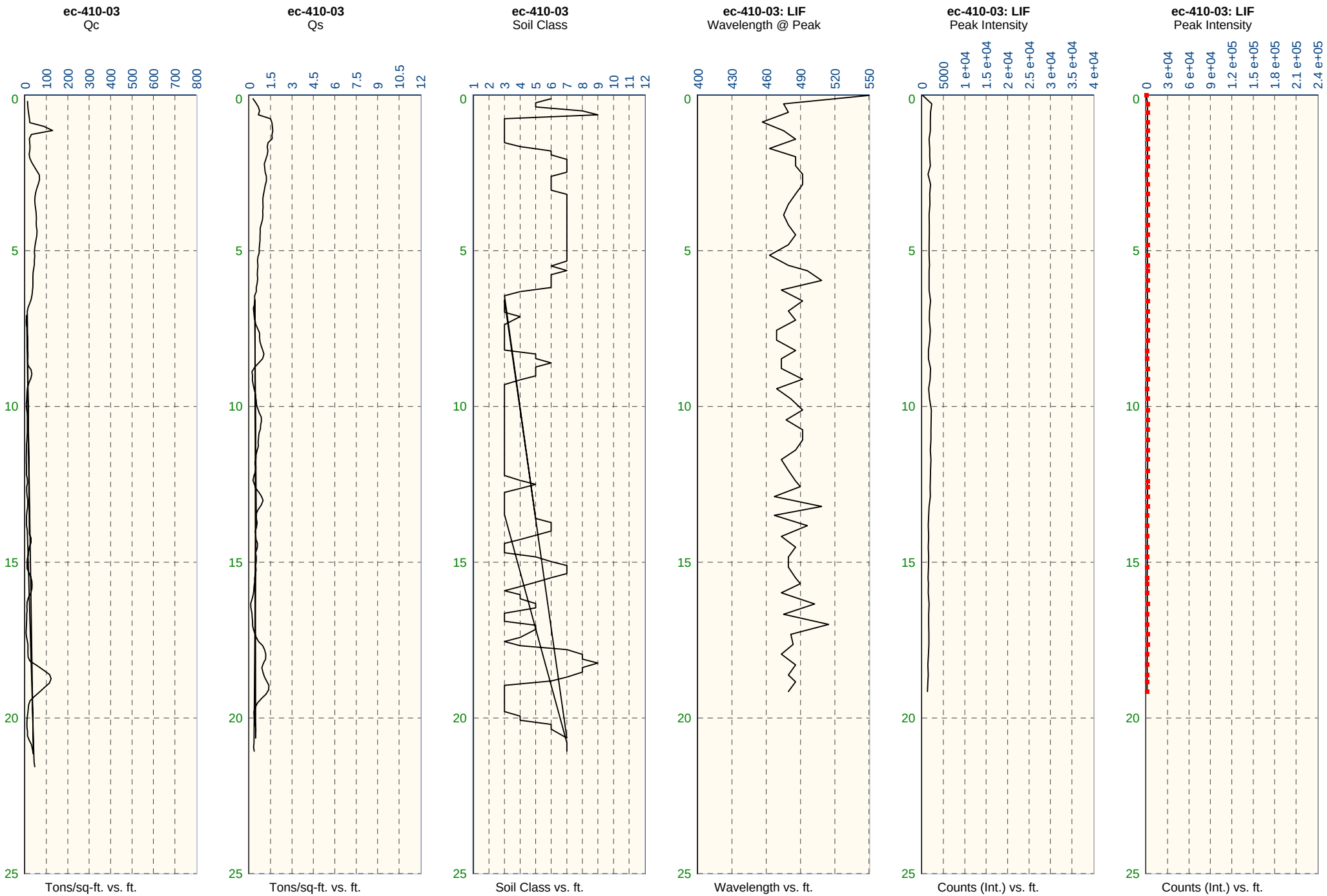
Friction Ratio (R_f) = Sleeve Friction (F_s)/Cone Pressure (Q_t) x 100%
1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

Zone		Q_t/ 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


ec-410-01
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-410-01
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-410-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-410-01: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-410-01: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-410-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-410-02
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-410-02
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-410-02
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-410-02: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-410-02: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-410-02: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-410-03
Qc
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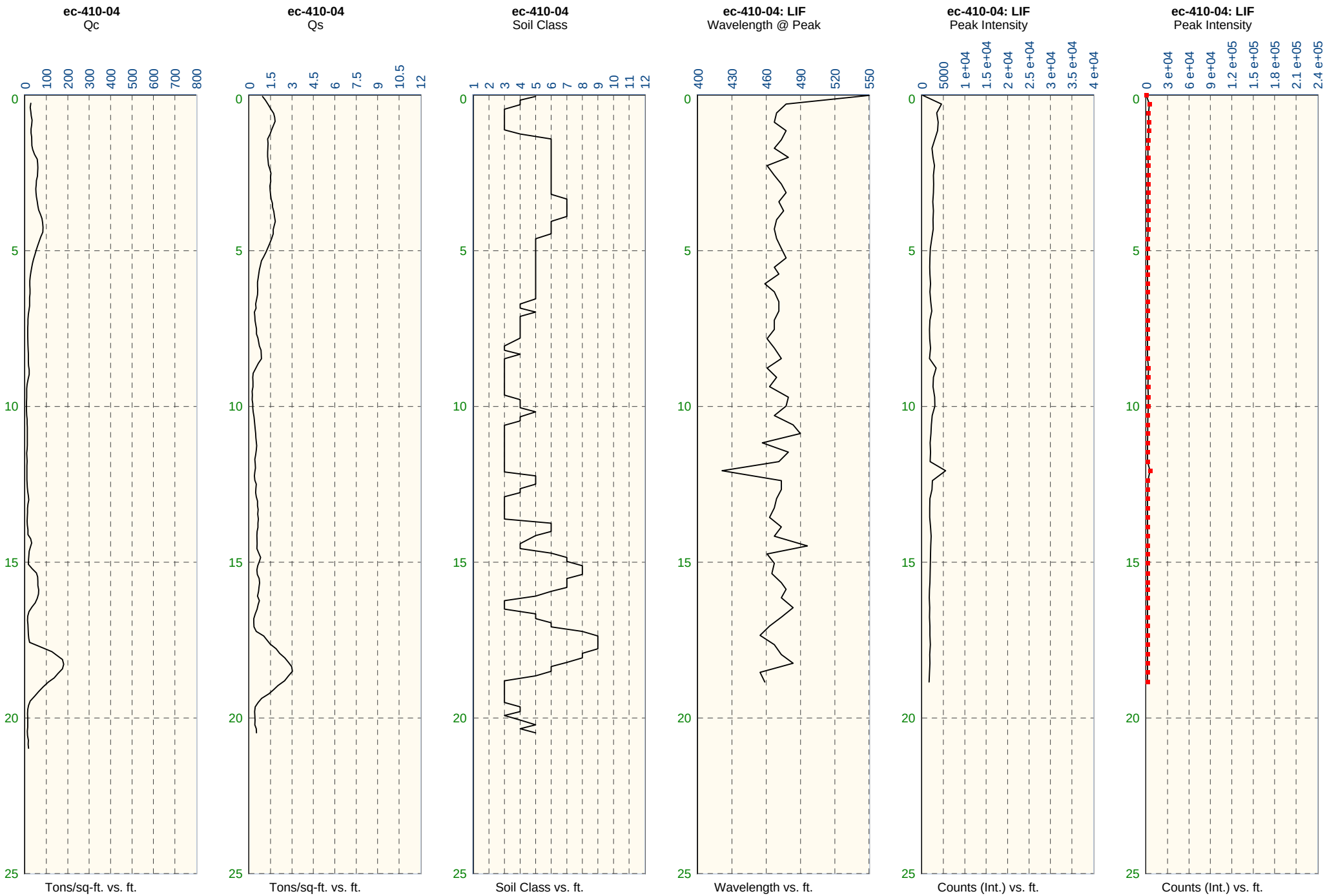
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-410-03
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-410-03
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-410-03: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-410-03: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-410-03: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-410-04
Qc
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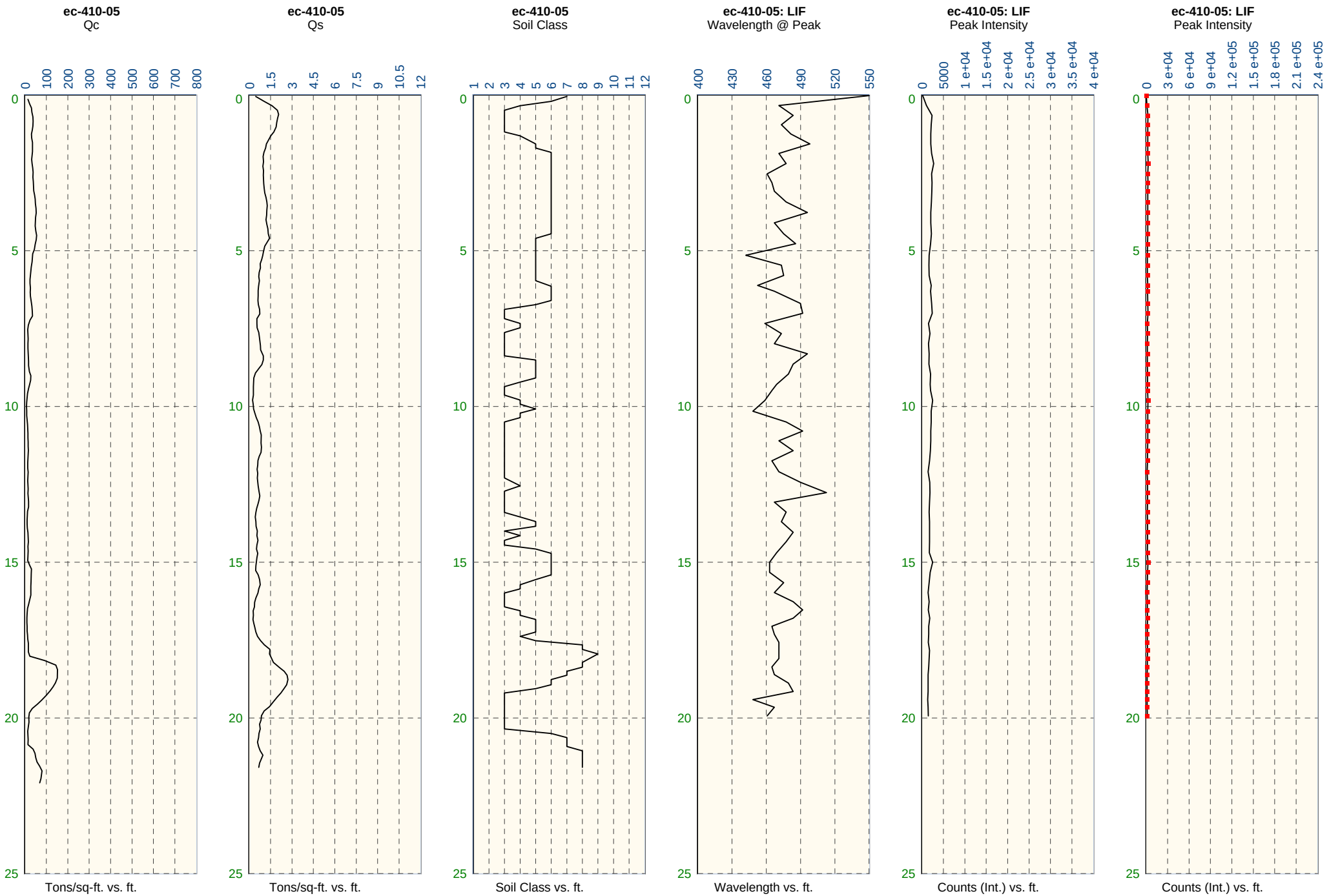
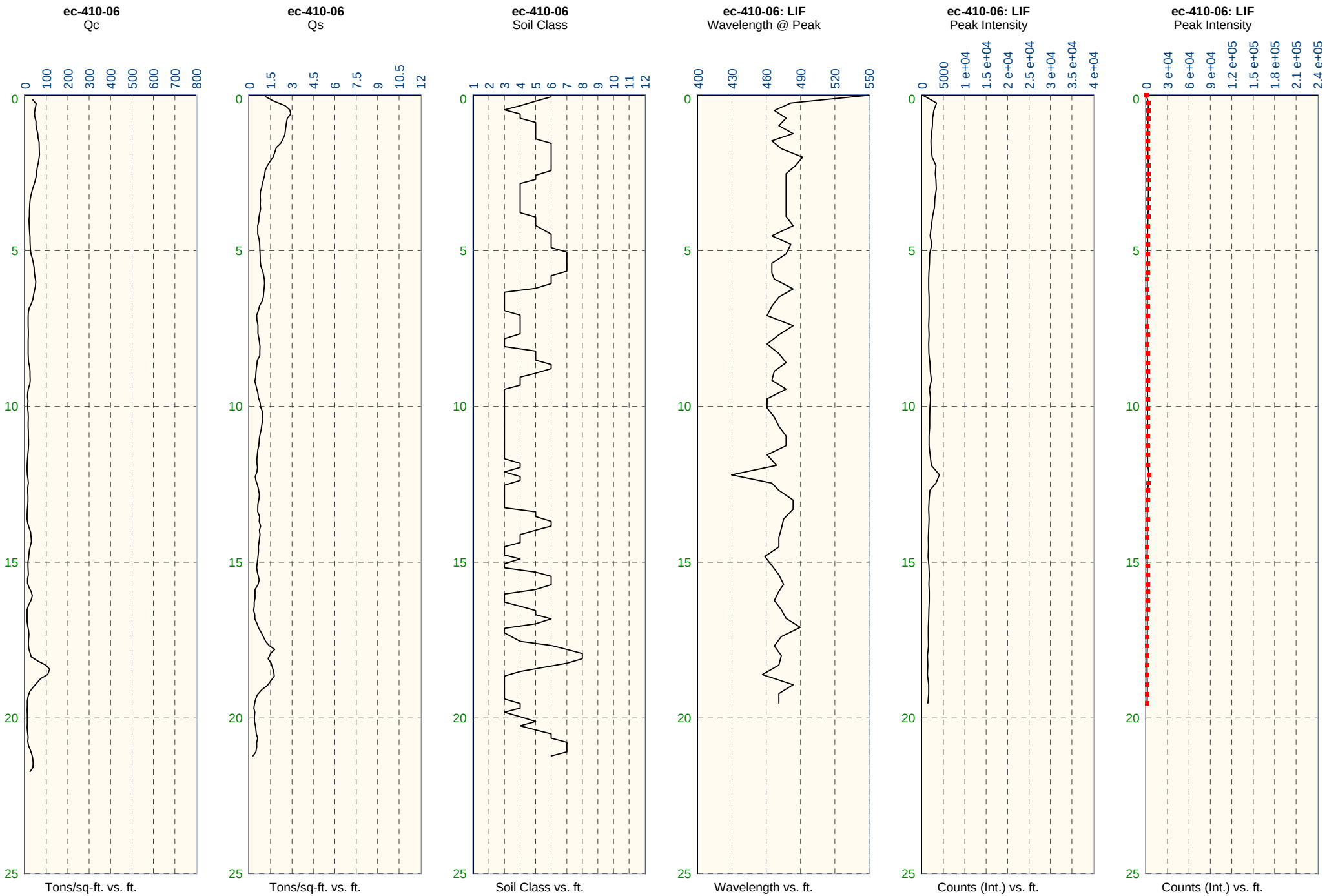
Tons/sq-ft. vs. ft.
ec-410-04
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-410-04
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-410-04: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-410-04: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-410-04: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-410-05
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-410-05
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-410-05
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-410-05: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-410-05: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-410-05: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-410-06
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-410-06
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-410-06
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-410-06: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-410-06: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-410-06: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.

MOBILE GEOCHEMISTRY

H&P

May 20, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – NAS – SITE 410 – EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP051104W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1317).

Project Summary

The following analyses were conducted:

- 3 soils for total petroleum hydrocarbons (TPH) by DHS LUFT/8015M Method

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Blayne Hartman

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
2373 208th Street, Suite F-1, Torrance, California 90501 | 310 782.2929 — Fax 310 782.2798
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MOBILE GEOCHEMISTRY

H&P

NAVY PUBLIC WORKS PROJECT #1113621902008
NAS
SITE 410
EL CENTRO, CA

H&P Project #NP051104-W1

TPH (DHS LUFT/ 8015M Method) ANALYSES OF SOILS

SAMPLE NUMBER	DATE ANALYZED	TPH-GAS C5-C11 (mg/kg)	TPH-DIESEL C12-C24 (mg/kg)
METHOD BLANK	5/12/2004	ND	ND
EC-410-02-12	5/12/2004	ND	200
EC-410-01-12	5/12/2004	ND	100
EC-410-04-11.5	5/12/2004	ND	400
DETECTION LIMITS		10	10

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
5-26-2004

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP051104-W1
DAILY CALIBRATION DATE : 05/12/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ppm)	WATER (ppb)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
TPH GASOLINE - FID1	10-20000	330-660000	7/14/2003	0.878	6.1%	228	0.877	0.1%	240	0.830	5.5%
TPH GASOLINE - FID2	10-20000	330-660000	7/14/2003	0.580	11.9%	365	0.548	5.5%	379	0.538	7.3%
TPH GASOLINE - FID3	10-20000	330-660000	7/14/2003	0.696	10.4%	308	0.649	6.7%	296	0.658	5.5%
TPH DIESEL - FID1	10 - 50000	330 - 1650000	7/11/2003	1.014	9.5%	487	1.027	1.2%	493	1.022	0.8%
TPH DIESEL - FID2	10 - 50000	330 - 1650000	7/11/2003	0.690	13.3%	715	0.699	1.4%	780	0.696	1.0%
TPH DIESEL - FID3	10 - 50000	330 - 1650000	7/11/2003	0.723	7.9%	664	0.753	4.1%	680	0.754	4.3%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR SOILS

ANALYSIS DATE : 05/12/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (mg/kg)	MS CONC (mg/kg)	%REC MS	MSD CONC (mg/kg)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	211	105.5%	229	114.5%	8.2%	15%	75% - 125%
TPH DIESEL	600	639	106.5%	613	102.2%	4.2%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR SOILS

ANALYSIS DATE : 05/12/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (mg/kg)	LCS CONC (mg/kg)	%REC LCS	LCSD CONC (mg/kg)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	218	109.0%	217	108.5%	0.5%	15%	75% - 125%
TPH DIESEL	500	514	102.8%	510	102.0%	0.8%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

Chain of Custody Record

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469
☒ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404
☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 5-12-04
H&P Project #: NP 051104W1
Outside Lab:

Client: Navy Public Works Code 980
Address: 2730 Mc Kean St. Suite 1
San Diego
Phone: 619-524-6967 Fax: 619-524-6000

Collector: D Bloom
Page: 3 Of 6
Client Project #: 113 6219 0208 Project Manager: D Bloom
Location: NAS El Centro Site 410
Turn around time:

Global ID: T0602520006 EDF: Yes / No

Sample Receipt
Intact: ☐ Yes ☐ No
Seal Intact: ☐ Yes ☐ No ☐ N/A
Cold: ☐ Yes ☐ No
N/A (Received on Site)

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B: BTEX / Oxygenates	8260B: Oxygenates	8260B: VOC's	8260B: VOC's and Oxygenates	Methane	Fixed Gases							Total # of containers
EC-410-02-12			657	5/12	Soil	Sleeve	X																	
EC-410-01-12			8:02	|	|	|	X																	
EC-410-04-11.5			958	|	|	|	X																	

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
David M Bloom	Code 980	Juan Villarreal	H&P	5/12/04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constitu[illegible]thorization to proceed with analysis and acceptance of condition on back.

Sample disposal i[illegible]ion: ☐ *Disposal @ $2.00 each* ☐ *Return to client* ☐ *Pickup*

Closure Summary
and Site Assessment Report
UST Site 446
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 446 at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 446 work plan addendum, dated March 19, 2004, prepared by the Public Works Center San Diego (PWCSD). Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 446. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 446
Site Address:	Southwest corner of 4th and "B" Streets, east of Building 446 Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,738,152 Northing: 1,880,614 feet (State Plane 6)
Facility Name:	Standby generator
Property Owner: Tank Owner/Operator: Responsible Party:	United States Navy United States Navy United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	(none)

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	1942
Construction Materials:	Steel
Capacity:	250 gallons
Contents:	Diesel
Year Removed:	1995 by Environmental Chemical Corp. (ECC)

Figure 1 shows the site location and previous and current assessment locations.

According to the *Final Technical Memorandum Addendum No.2, Underground Storage Tank Site Investigation,* dated November 2000, prepared by Bechtel National, Inc. (BNI, 2000), ECC removed a 250-gallon UST in 1995 at the location shown on Figure 1. Two soil samples were collected as part of tank closure. The samples were tested for total recoverable petroleum hydrocarbons (TRPH) and BTEX. None of the analytes were detected.

In 2000, BNI advanced a direct-push soil boring and collected a soil sample and grab groundwater sample using a HydroPunch. Both the soil and groundwater samples were tested for MTBE only. No MTBE was detected. BTEX compounds were not part of the analytical program.

PWC Investigation

The purpose of current assessment activity was to address the Problem Statement: *Groundwater unconfirmed whether or not action levels for BTEX are met.* Field activities were performed on May 12, 2004.

Geophysical testing for utilities prior to subsurface exploration indicated the presence of many utilities near the former UST location. In accordance with the work plan, a groundwater sample was collected from a temporary well (EC-446-01) located approximately 30 feet north (downgradient) of the former UST location (Figure 1). The presence of numerous utilities and Building 446 precluded collecting a sample closer to the former UST location. The temporary well was installed using the hydraulic probe on the Site Characterization and Analysis Penetrometer System (SCAPS). The well was screened with ¾-inch diameter PVC from 10 to 20 feet bgs. The groundwater grab sample was collected unpurged using a single-use disposable bailer. The sample was immediately delivered to an on-site mobile laboratory for analytical testing. BTEX and MTBE were not detected in the groundwater sample. Groundwater was measured at approximately 14.32 feet bgs. The temporary well was abandoned by grouting in place.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, groundwater appears to be unaffected by fuel contamination.

It is the opinion of PWCSD that further assessment or remediation at this site is unnecessary. We recommend that no further action be considered for this site.

Site Characterization and Closure Information

Description of the former UST:	See Background Information, page 1.
Contaminants Identified:	None detected. See attached analytical results table.

Amount of Contaminants Leaked:	None.
MTBE:	None detected.
Description of the soil/geology:	Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? Yes. Based on a review of the analytical data, no measurable soil contamination is present.

Estimated volume of contaminated soil left on site and concentration: Negligible to none.

Is groundwater contamination completely delineated? Yes. Current analytical results for groundwater show that constituents of concern are not detected.

Monitoring wells installed, properly permitted? No monitoring wells were installed.

Depth to groundwater: Approximately 13.7 feet bgs.

Is groundwater or surface water impacted? No. All analytical results for groundwater meet cleanup goals for the site (below tap water PRGs and drinking water MCLs).

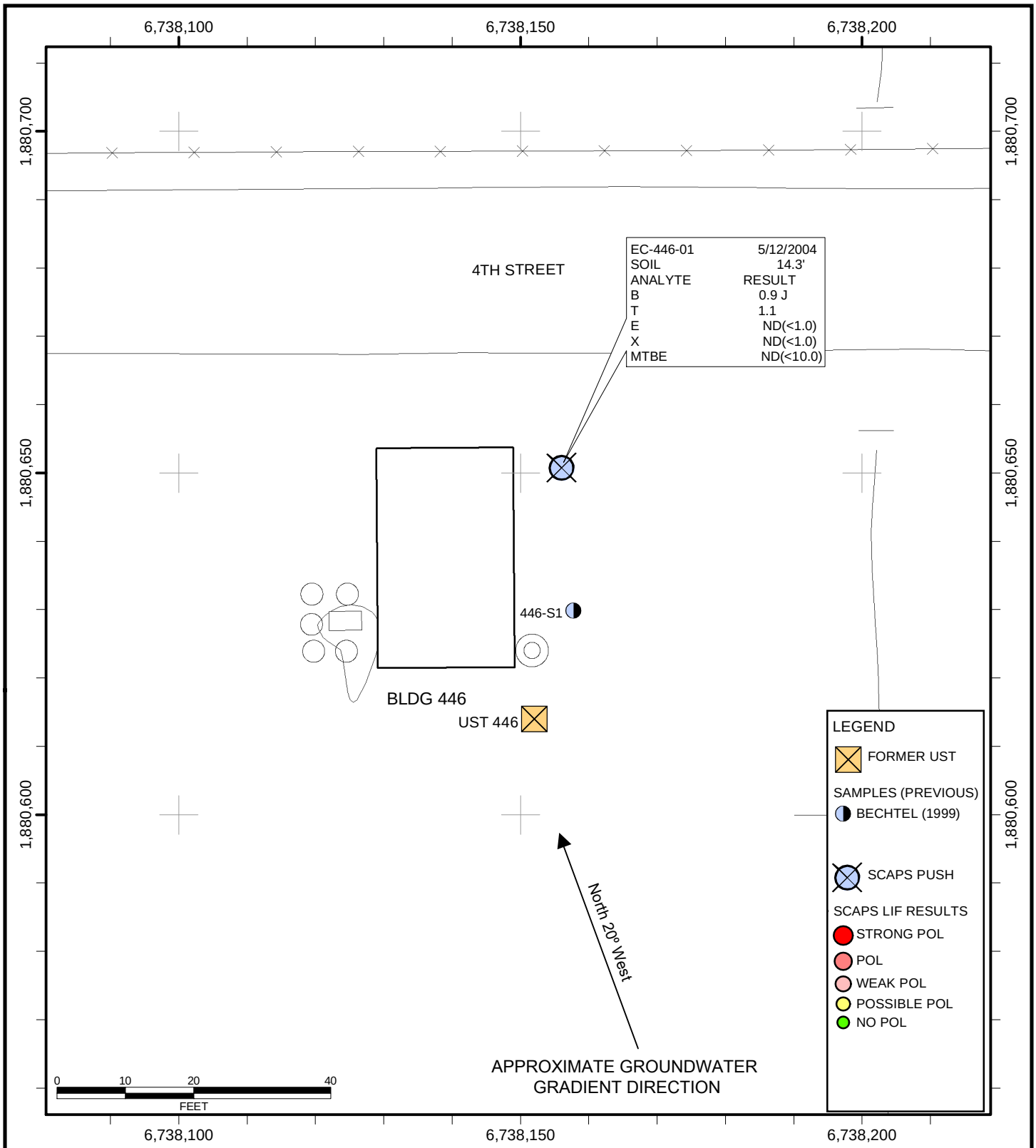
Remedial action taken? UST removed 1995.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Yes.

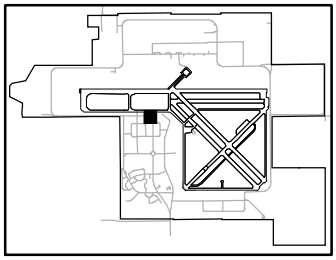
Site Closure: No impacted soil has been reported, and no groundwater impact has been detected from a fuel release from this site. The recommendation for site closure is accepted and no further action is required at this site.

Signature: ***Date:***	***Signature:*** ***Date:***
N.R. Wells **Lieutenant Commander, CEC, US Navy** **By direction of** **The Commanding Officer**	**Liann P. Chavez, R.G.** **Senior Engineering Geologist** **California Environmental Protection Agency** **California Regional Water Quality Control Board** **Colorado River Basin Region**

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS and Groundwater Results
Laboratory Analytical Report and Chain-of-Custody Documentation



OVERVIEW MAP - NAF EL CENTRO



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MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 446

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC1

FIGURE: 1

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - Groundwater Analytical Data Summary

UST Site 446
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-446-01	5/12/2004					14.32': B: 0.9 J ug/L T: 1.1 ug/L E: <1.0 ug/L X: <1.0 ug/L MTBE: <10.0 ug/L	10'-20'

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

MOBILE GEOCHEMISTRY

H&P

May 20, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – NAS – SITE 446 – EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP051104W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1317).

Project Summary

The following analyses were conducted:

- 1 water for volatile aromatic hydrocarbons (BTEX) & MTBE by EPA Method 8021B

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
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MOBILE GEOCHEMISTRY

H&P

NAVY PUBLIC WORKS PROJECT #1113621902008
NAS
SITE 446
EL CENTRO, CA

H&P Project #NP051104-W1

BTEX, MTBE (EPA Method 8020 Modified) ANALYSES OF WATERS

SAMPLE NUMBER	DATE ANALYZED	MTBE (ug/l)	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYLBENZ (ug/l)	XYLENES (ug/l)	SURROGATE (%REC)
METHOD BLANK	5/12/2004	ND	ND	ND	ND	ND	108
EC-446-01-GW	5/12/2004	ND	0.9 J	1.1	ND	ND	93
REPORTING LIMITS		10.0	1.0	1.0	1.0	1.0	53%-145%
DETECTION LIMITS		1.0	0.5	0.5	0.5	0.5	

J INDICATES VALUE DETERMINED IS BETWEEN DETECTION LIMIT AND REPORTING LIMIT

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
5-26-2004

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP051104-W1
DAILY CALIBRATION DATE : 05/12/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ug/kg)	WATER (ug/L)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
MTBE	500 - 25	2500 - 125	4/2/2004	3.07	7.2%	291	2.91	5.1%	322	3.22	5.0%
BENZENE	500 - 25	2500 - 125	5/6/2004	9.44	11.6%	1,035	10.35	9.6%	881	8.81	6.7%
TOLUENE	500 - 25	2500 - 125	5/6/2004	17.80	12.5%	1,710	17.10	4.0%	1,558	15.58	12.5%
TFT	500 - 25	2500 - 125	5/6/2004	5.49	9.8%	582	5.82	6.1%	604	6.04	10.1%
ETHYLBENZENE	500 - 25	2500 - 125	5/6/2004	15.77	5.6%	1,584	15.84	0.5%	1,391	13.91	11.8%
m&p-XYLENES	500 - 25	2500 - 125	5/6/2004	20.54	8.8%	1,925	19.25	6.3%	1,747	17.47	15.0%
o-XYLENES	500 - 25	2500 - 125	5/6/2004	16.61	7.7%	1,592	15.92	4.1%	1,530	15.30	7.9%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
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ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY
H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR WATERS

ANALYSIS DATE : 05/12/04
H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	MS CONC (ug/L)	%REC MS	MSD CONC (ug/L)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	17.8	89.0%	19.8	99.0%	10.6%	15%	75% - 125%
BENZENE	20.0	17.9	89.5%	19.8	99.0%	10.1%	15%	75% - 125%
TOLUENE	20.0	16.1	80.5%	16.3	81.5%	1.2%	15%	75% - 125%
ETHYLBENZENE	20.0	17.8	89.0%	18.5	92.5%	3.9%	15%	75% - 125%
TOTAL XYLENES	40.0	34.2	85.5%	34.8	87.0%	1.7%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR WATERS

ANALYSIS DATE : 05/12/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	LCS CONC (ug/L)	%REC LCS	LCSD CONC (ug/L)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	19.7	98.5%	20.2	101.0%	2.5%	15%	75% - 125%
BENZENE	20.0	17.4	87.0%	17.2	86.0%	1.2%	15%	75% - 125%
TOLUENE	20.0	16.4	82.0%	16.3	81.5%	0.6%	15%	75% - 125%
ETHYLBENZENE	20.0	17.8	89.0%	17.4	87.0%	2.3%	15%	75% - 125%
TOTAL XYLENES	40.0	33.6	84.0%	33.4	83.5%	0.6%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

Chain of Custody Record

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469
☒ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404
☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 5/12/04
H&P Project #: NP051104W1
Outside Lab:

Client: NAVY Public Works
Address: 2730 McKean St Suite 1
San Diego CA
Phone: 619-524-1867 Fax: 6195246000

Collector: D Bloom
Page: 4 Of 6
Client Project #: 113621902008
Project Manager: D Bloom
Location: NAS
Turn around time:

Global ID: NOT ASSIGNED
EDF: Yes / No

Sample Receipt
Intact: ☐ Yes ☐ No
Seal Intact: ☐ Yes ☐ No ☐ N/A
Cold: ☐ Yes ☐ No
N/A (Received on Site)

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B: BTEX / Oxygenates	8260B: Oxygenates	8260B: VOC's	8260B: VOC's and Oxygenates	Methane	Fixed Gases							Total # of containers
EC-446-01-GW			635	5/12	W	V			X															

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date	Time
David M Bloom	Code 980	James Villarreal	H&P	5/12/04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constitutes authorization to proceed with analysis and acceptance of condition on back.

Sample disposal instruction: ☐ *Disposal @ $2.00 each* ☐ *Return to client* ☐ *Pickup*

Site Assessment Report and
Closure Summary
UST Site 459
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 459 at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 459 work plan addendum, dated March 19, 2004, prepared by the Public Works Center San Diego (PWCSD). Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 459. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 459
Site Address:	Northwest corner of 4th and "D" Streets, west of Building 459 Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,736,662 Northing: 1,880,720 feet (State Plane 6)
Facility Name:	Sewer Lift Station
Property Owner:	United States Navy
Tank Owner/Operator:	United States Navy
Responsible Party:	United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430024

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	1989
Construction Materials:	Steel
Capacity:	250 gallons
Contents:	Diesel
Year Removed:	1993 by Environmental Chemical Corp. (ECC)

Figure 1 shows the site location and previous and current assessment locations.

According to the Final Technical Memorandum, Underground Storage Tank Site Investigation, dated March 2000, prepared by Bechtel National, Inc. (BNI, 2000), ECC removed a 250-gallon UST in 1993 at the location shown on Figure 1. Two soil samples were collected as part of tank closure. The concentration of total petroleum hydrocarbons quantitated as diesel (TPH-diesel) in one of the samples exceeded the cleanup level of 1,000 milligrams per kilogram (mg/kg).

In 1999, BNI advanced a hand-auger soil boring and a HydroPunch groundwater boring. The soil boring was located at the former UST location. TPH-gasoline concentrations of 360 and 7,200 milligrams per kilogram (mg/kg) were reported for the soil samples collected at depths of 6 and 10 feet below ground surface (bgs), respectively. The groundwater sample was collected approximately 50 feet north (downgradient) of the former tank location. Concentrations of constituents of concern were below their respective action levels or not detected.

In 2000, Geofon, Inc., removed approximately 151 cubic yards (cy) of fuel impacted soil. Confirmation sampling (one excavation bottom and five excavation sidewall soil samples) showed that cleanup levels for TPH-gasoline and TPH-diesel were met. A groundwater sample collected from the excavation revealed a benzene concentration of 29.7 micrograms per liter (ug/L), and that of toluene of 511 ug/L, which exceed their respective action criteria of 1 ug/L and 150 ug/L, respectively. The other constituents of concern met their respective action criteria.

PWC Investigation

The purpose of current assessment activity was to address the Problem Statement: *Groundwater exceeded action levels for benzene and toluene.* Field activities performed May 12, 2004.

In accordance with the work plan, a groundwater sample was collected from a temporary well located approximately 55 feet north-northwest (downgradient) of the former UST location (see Figure 1). A sloping drainage swale and the presence of numerous utilities precluded collecting a sample closer to the former UST location. The temporary well was installed using the hydraulic probe on the Site Characterization and Analysis Penetrometer System (SCAPS). The well was screened with ¾-inch diameter PVC from 10 to 20 feet bgs. The groundwater grab sample was collected unpurged using a single-use disposable bailer. The sample was immediately delivered to an on-site mobile laboratory for analytical testing. BTEX and MTBE were not detected in the groundwater sample. Groundwater was measured at 17.06 feet bgs; however, the well was given insufficient time to allow it to equilibrate. The temporary well was screened with 1-inch diameter PVC from 10 to 20 feet bgs. The groundwater grab sample was collected unpurged using a single-use disposable bailer. Upon removal of the casing, the lower 15 feet of casing remained in the hole. The temporary well was abandoned by grouting in place.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, the extent of groundwater contamination appears to be limited. The presence of a drainage swale and utilities prevented the collection of a groundwater sample within 55 feet downgradient of the former UST location, where elevated benzene and toluene concentrations had been detected in 2000. However, based on the non-detection of these constituents of concern in the downgradient sample collected during this investigation, it appears that benzene and toluene concentrations decrease significantly downgradient and/or have naturally attenuated with time.

It is the opinion of PWCSD that further assessment or remediation at this site is unnecessary. We recommend that no further action be considered for this site.

Site Characterization and Closure Information

Description of the former UST:	See Background Information, page 1.
Contaminants Identified:	None detected. See attached analytical results table.
Amount of Contaminants Leaked:	None.
MTBE:	None detected.
Description of the soil/geology:	Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? Yes. Based on a review of the analytical data, the highest TPH-diesel concentration measured in soil sidewall samples following excavation in 2000 was 13 mg/kg.

Estimated volume of contaminated soil left on site and concentration: None.

Is groundwater contamination completely delineated? Yes. Current analytical results for groundwater show that constituents of concern are not detected within 55 feet downgradient of the former UST.

Monitoring wells installed, properly permitted? No monitoring wells were installed.

Depth to groundwater: Approximately 17 feet bgs.

Is groundwater or surface water impacted? The analytical results collected during this investigation met cleanup goals for the site (below tap water PRGs and drinking water MCLs). Groundwater with elevated concentrations detected near the UST in 2000 do not appear to have migrated downgradient.

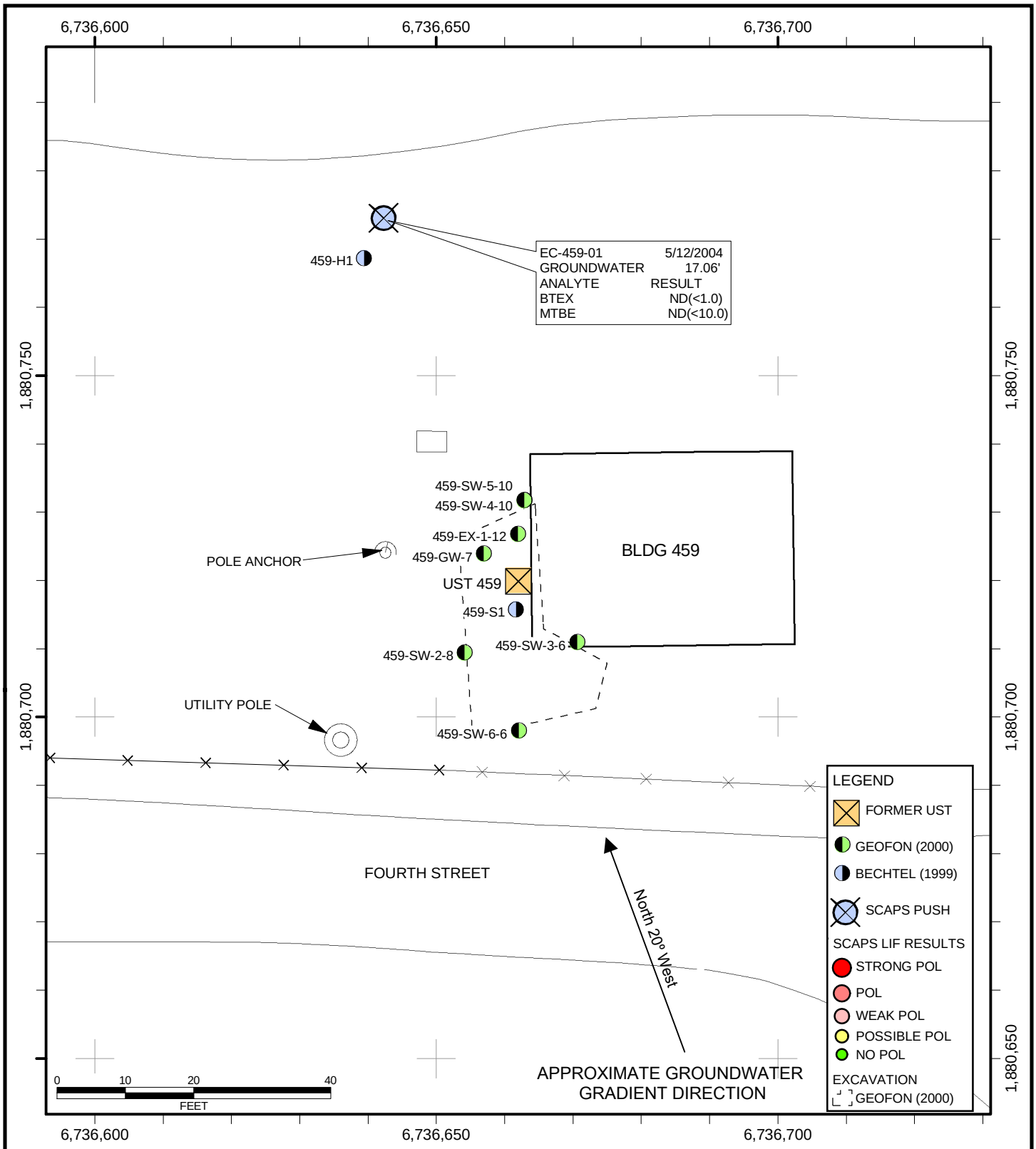
Remedial action taken? UST removed 1993. 151 cubic yards of fuel impacted soil removed 2000.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Yes.

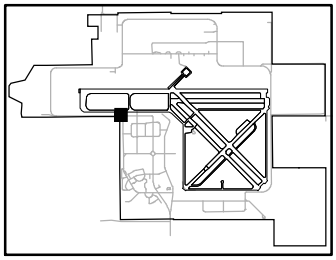
Site Closure: No impacted soil remains. Current testing indicates that contaminant migration in groundwater is not migrating downgradient. The recommendation for site closure is accepted and no further action is required at this site.

Signature: ***Date:***	***Signature:*** ***Date:***
N.R. Wells **Lieutenant Commander, CEC, US Navy** **By direction of** **The Commanding Officer**	**Liann P. Chavez, R.G.** **Senior Engineering Geologist** **California Environmental Protection Agency** **California Regional Water Quality Control Board** **Colorado River Basin Region**

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS and Groundwater Results
Laboratory Analytical Report and Chain-of-Custody Documentation



OVERVIEW MAP - NAF EL CENTRO



N

MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 459

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC4

FIGURE: 1

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - Groundwater Analytical Data Summary

UST Site 459
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-459-01	5/12/2004					17.06': BTEX: <1.0 ug/L MTBE: <10.0 ug/L	10'-20'

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

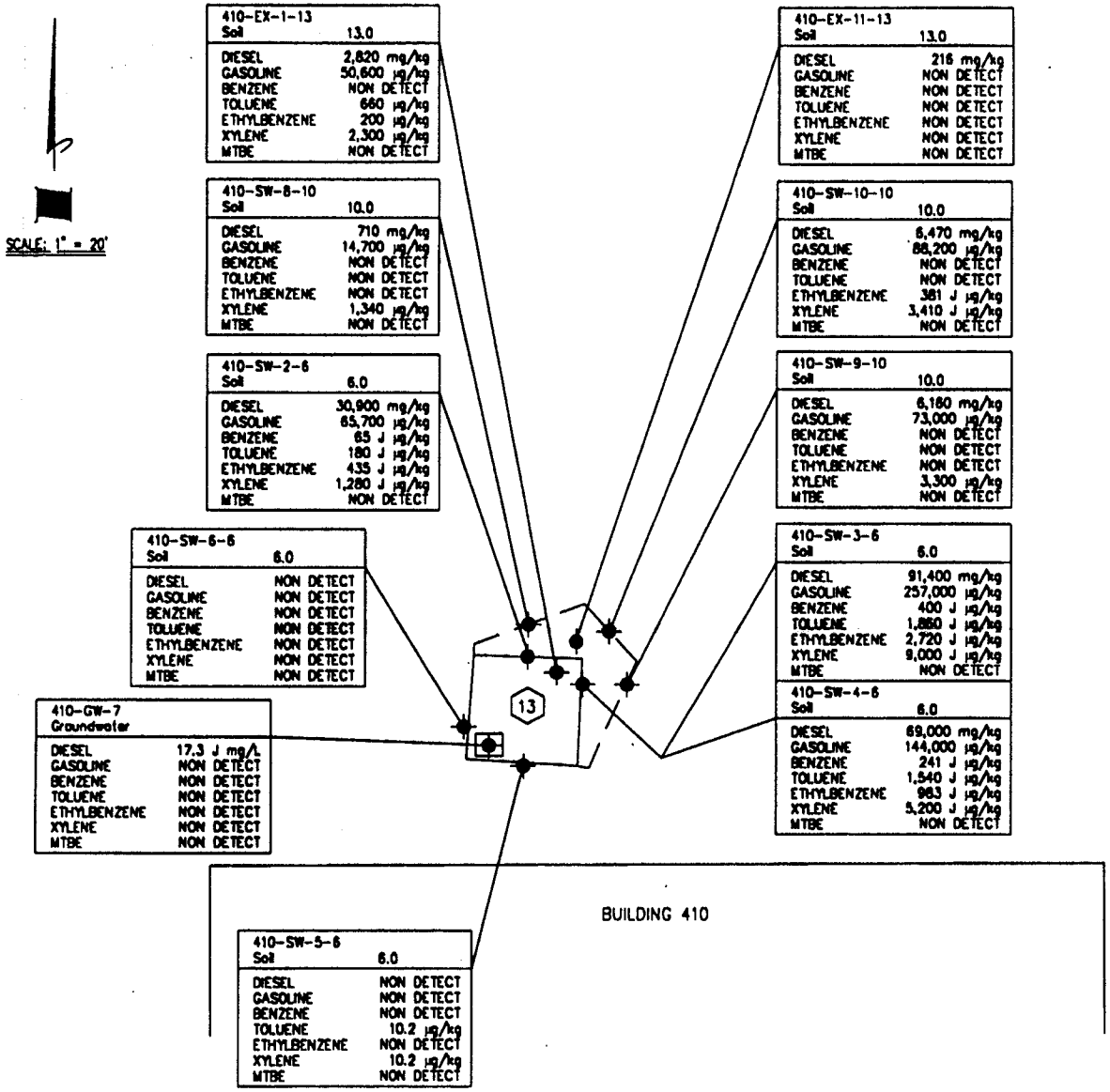
4.13 Site 459: Site Description and Analytical Results

UST 459 was a 250-gallon steel diesel fuel UST removed in 1993 by ECC (1993). According to facility records, UST 459 was installed in 1989. This tank was located on the western exterior of Building 459.

Several previous soil and groundwater investigations have been conducted at UST Site 459 (Table 4-10). In 1993, ECC collected two soil samples as part of the tank removal. The two soil samples were collected directly from the base and sidewalls of the tank excavation to approximately 5 feet bgs. In 1999, BNI advanced one soil boring (459-S1) and one HydroPunch boring (459-H1) at the UST site. Soil boring 459-SI was advanced utilizing a hand auger due to overhead electrical wires. Two soil samples were collected directly out of the auger at approximately 6 and 10 feet bgs. The hand-augering activities were halted at 10 feet due to elevated organic vapor levels in the field crews breathing zone. The HydroPunch boring was advanced approximately 50 feet downgradient from the original tank location to 17 feet bgs. A 10-foot PVC 0.010-slotted screen was set from 7 to 17 feet bgs.

As part of this current UST site investigation/cleanup, an excavation measuring approximately 35 x 15 x 12 feet was accomplished and approximately 151 cubic yards (cyd) of fuel-impacted soil was removed and disposed of off-site (Appendix D). Upon reaching the limits of excavation, one soil sample (459-EX-1-12) and one groundwater sample (459-GW-7) was collected from the bottom of the excavation and five soil samples (459-SW-2-8, 459-SW-3-6, 459-SW-4-10, 459-SW-5-10 and 459-SW-6-6), including a field duplicate, were collected from the sidewalls of the excavation (Figure 4-13, Table 4-10).

All soil samples collected did not have any concentrations above the soil cleanup levels. The groundwater sample (459-GW-7) had a concentration of benzene (29.2 μg/L) above the maximum allowable groundwater concentration of 1 μg/L.



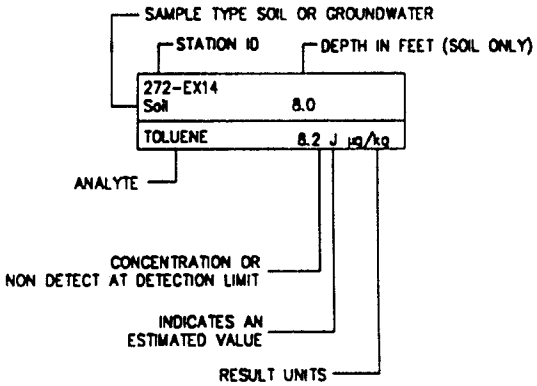
LEGEND

- EXIST. ASPHALT
- EXIST. DIRT
- ORIGINAL EXCAVATED AREA
- ADDITIONAL EXCAVATED AREA
- BUILDING — EXIST. BLDG.
- EXCAVATION SAMPLE POINT
- 13 — EXCAVATION DEPTH

NOTES:

ALL ANALYTICAL DATA PRESENTED ON THIS FIGURE IS FROM CURRENT 2000 REMOVAL ACTION

ALL SOIL AND GROUNDWATER SAMPLES COLLECTED DURING THE CURRENT REMOVAL ACTION WERE ANALYZED FOR MTBE



Technical Memeorandum

Figure 4-12

Site 410 - Site Map

NAF El Centro
Imperial County, California

GEOFON INCORPORATED

Date: November 2000
Contract No.: N68711-97-D-8702
DO No.: 0033

Table 4-10
Analytical Results for Site 459

Sample Number	Boring Number	Depth (feet bgs)	TPH-Gas[a]	TPH-Diesel[b]	TRPH	Benzene[c]	Toluene[c]	Ethlybeneze	Xylene[c]	MTBE[c]	Organolead[d]
Soil Results - GEOFON, Soil Removal/Field Investigation, May/June 2000 (μg/kg)											
459-EX-1-12	Excavation	12	2,170	10 U[e]		39.4	286	61.6	426	10 U	
459-SW-2-8	Excavation	8	1,000 U	10 U[e]		5 U	5 U	5 U	10 U	10 U	
459-SW-3-6	Excavation	6	1,000 U	13[e]		5 U	5 U	5 U	10 U	10 U	
459-SW-4-10	Excavation	10	1,000 U	10 U[e]		19.2	165	26.8	187	10 U	
459-SW-5-10	Excavation	10	1,000 U	10 U[e]		5 U	22	5 U	30.2	10 U	
459-SW-6-6	Excavation	6	1,000 U	10 U[e]		5 U	5 U	5 U	10 U	10 U	
Groundwater Results - GEOFON, Soil Removal/Field Investigation, May/June 2000 (μg/L)											
459-GW-7	Excavation		2,130	1.2[f]		29.2	511	149	748	1 U	
Historical Data, Soil Results - BNI, Field Investigation, January/February 1999 (mg/kg)											
175S049	459-S1	6	360	300		0.12	0.43	0.47	5.1	1.1 U	
175S050	459-S1	10	7,200	290		13	230	100	720	2.3 U	
Historical Data, Groundwater Results - BNI, Field Investigation, January/February 1999 (μg/L)											
175HP20	459-H1	13-17[g]	500 U	0.5 U[f]		0.8	1 U	1 U	3.8	10 U	
Historical Data, Soil Results - Environmental Chemical Corp., UST Removal Phase 1, 1993 (mg/kg)[h]											
459-S1		5		6,640							
459-S2		Unknown		759							

Notes:
[a] analyzed using United States Environmental Protection Agency (U.S. EPA) Method 8015-M; this analysis was calibrated for TPH-gasoline
[b] analyzed using U.S. EPA Method 8015-M; this analysis was calibrated for TPH-diesel
[c] analyzed using U.S. EPA Method 8021B
[d] analyzed by California Leaking Underground Fuel Tank Method
[e] diesel results for soil reported in milligrams per kilogram
[f] diesel results for groundwater reported in milligrams per liter
[g] Hydropunch screened interval
[h] collected during UST removal

Table 4-9 (Continued)
Analytical Results for Site 410

Acronyms/Abbreviations:

- µg/L - micrograms per liter
- µg/kg - micrograms per kilogram
- bgs - below ground surface
- BNI - Bechtel National, Inc.
- mg/kg - milligrams per kilogram (parts per million)
- MTBE - methyl-tertiary-butyl ether
- TRPH - total recoverable petroleum hydrocarbons
- U - not detected above the referenced detection limit
- J - an estimated value

MOBILE GEOCHEMISTRY

H&P

May 20, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – NAS – SITE 459 – EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP051104W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1317).

Project Summary

The following analyses were conducted:

- 1 water for volatile aromatic hydrocarbons (BTEX) & MTBE by EPA Method 8021B

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Blayne Hartman

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
2373 208th Street, Suite F-1, Torrance, California 90501 | 310 782.2929 — Fax 310 782.2798
www.HandPmg.com | 1-800-834-9888

MOBILE GEOCHEMISTRY

H&P

NAVY PUBLIC WORKS PROJECT #1113621902008
NAS
SITE 459
EL CENTRO, CA

H&P Project #NP051104-W1

BTEX, MTBE (EPA Method 8020 Modified) ANALYSES OF WATERS

SAMPLE NUMBER	DATE ANALYZED	MTBE (ug/l)	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYLBENZ (ug/l)	XYLENES (ug/l)	SURROGATE (%REC)
METHOD BLANK	5/12/2004	ND	ND	ND	ND	ND	108
EC-459-01-GW	5/12/2004	ND	ND	ND	ND	ND	98
REPORTING LIMITS		10.0	1.0	1.0	1.0	1.0	53%-145%
DETECTION LIMITS		1.0	0.5	0.5	0.5	0.5	

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
5-26-2004

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP051104-W1
DAILY CALIBRATION DATE : 05/12/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ug/kg)	WATER (ug/L)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
MTBE	500 - 25	2500 - 125	4/2/2004	3.07	7.2%	291	2.91	5.1%	322	3.22	5.0%
BENZENE	500 - 25	2500 - 125	5/6/2004	9.44	11.6%	1,035	10.35	9.6%	881	8.81	6.7%
TOLUENE	500 - 25	2500 - 125	5/6/2004	17.80	12.5%	1,710	17.10	4.0%	1,558	15.58	12.5%
TFT	500 - 25	2500 - 125	5/6/2004	5.49	9.8%	582	5.82	6.1%	604	6.04	10.1%
ETHYLBENZENE	500 - 25	2500 - 125	5/6/2004	15.77	5.6%	1,584	15.84	0.5%	1,391	13.91	11.8%
m&p-XYLENES	500 - 25	2500 - 125	5/6/2004	20.54	8.8%	1,925	19.25	6.3%	1,747	17.47	15.0%
o-XYLENES	500 - 25	2500 - 125	5/6/2004	16.61	7.7%	1,592	15.92	4.1%	1,530	15.30	7.9%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR WATERS

ANALYSIS DATE : 05/12/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	MS CONC (ug/L)	%REC MS	MSD CONC (ug/L)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	17.8	89.0%	19.8	99.0%	10.6%	15%	75% - 125%
BENZENE	20.0	17.9	89.5%	19.8	99.0%	10.1%	15%	75% - 125%
TOLUENE	20.0	16.1	80.5%	16.3	81.5%	1.2%	15%	75% - 125%
ETHYLBENZENE	20.0	17.8	89.0%	18.5	92.5%	3.9%	15%	75% - 125%
TOTAL XYLENES	40.0	34.2	85.5%	34.8	87.0%	1.7%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR WATERS

ANALYSIS DATE : 05/12/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	LCS CONC (ug/L)	%REC LCS	LCSD CONC (ug/L)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	19.7	98.5%	20.2	101.0%	2.5%	15%	75% - 125%
BENZENE	20.0	17.4	87.0%	17.2	86.0%	1.2%	15%	75% - 125%
TOLUENE	20.0	16.4	82.0%	16.3	81.5%	0.6%	15%	75% - 125%
ETHYLBENZENE	20.0	17.8	89.0%	17.4	87.0%	2.3%	15%	75% - 125%
TOTAL XYLENES	40.0	33.6	84.0%	33.4	83.5%	0.6%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

Chain of Custody Record

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469

☒ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404

☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 5-12-04

H&P Project # NP051104W1

Outside Lab:

Client: Navy Public Works

Address: 2730 McKean St. Suite 1
San Diego

Phone: Fax:

Collector: D. Bloom

Page: 5 Of 6

Client Project # 113621902008

Project Manager D Bloom

Location: NAS El Centro Site 459

Turn around time:

Global ID: T0602258680

EDF: (Yes) No

Sample Receipt

Intact: ☐ Yes ☐ No

Seal Intact: ☐ Yes ☐ No ☐ N/A

Cold: ☐ Yes ☐ No

(N/A (Received on Site))

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B: BTEX / Oxygenates	8260B: Oxygenates	8260B: VOC's	8260B: VOC's and Oxygenates	Methane	Fixed Gases							Total # of containers
EC-459-01-GW			1054	5/12	W	V			X															

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
David M Bloom	CODE 980	James Villarreal	H&P	5/12/04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constitutes authorization to proceed with analysis and acceptance of condition on back.

Sample disposal instruction: ☐ *Disposal @ $2.00 each* ☐ *Return to client* ☐ *Pickup*

Site Assessment Report and
Closure Summary
UST Site 490
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 490 at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 490 work plan addendum, dated March 2, 2004, prepared by the Public Works Center San Diego (PWCSD). Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 490. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 490
Site Address:	North of 3rd Street, east of "D" Street (immediately south of Building 490) Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,737,059 Northing: 1,878,799 feet (State Plane 6)
Facility Name:	Standby generator building
Property Owner: Tank Owner/Operator: Responsible Party:	United States Navy United States Navy United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430026

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	Unknown
Construction Materials:	Single-wall steel
Capacity:	150 gallons
Contents:	Diesel
Year Removed:	1993 by Environmental Chemical Corp. (ECC)

Figure 1 shows the site location and previous and current assessment locations.

In 1993, ECC removed a 150-gallon diesel UST at the location shown on Figure 1. Three soil samples were collected from the sidewalls and bottom of the tank excavation. The sample collected from the bottom of the tank cavity indicated the greatest concentration of diesel at 26,380 milligrams per kilogram (mg/kg) as reported in *Final Technical Memorandum Underground Storage Tank Site Investigation,* dated March 2000, prepared by Bechtel National, Inc. (BNI, 2000).

In 1999, BNI collected a groundwater sample from a depth range of 6 to 16 feet below ground surface (bgs) from a HydroPunch boring approximately 5 feet northwest (downgradient) from the former tank location. Analytical testing results indicate a benzene groundwater concentration of 7.4 micrograms per liter (ug/L), which exceeds site cleanup goals. The other groundwater constituents analyzed for were detected below action levels or not detected.

PWC Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Soil exceeds cleanup levels for TPH-diesel. Groundwater exceeds action level for benzene.* Field activities were performed between May 12 and 13, 2004.

In accordance with the work plan, Laser Induced Fluorescence (LIF) was measured *in situ* using the Site Characterization and Analysis Penetrometer System (SCAPS) at four locations as shown on Figure 1. The LIF data are summarized and interpreted in Table 2. At three of the locations, no fluorescence characteristic of petroleum, oil, or lubricants (POL) was encountered. At the remaining location, EC-490-03 (located within 10 feet south of the former UST), weak fluorescence suggesting petroleum, oil, or lubricants (POL) (*i.e.,* intensity above background) was encountered between approximately 4 and 6.5 feet below ground surface.

A soil sample was collected from EC-490-03 from a depth of 4.5 to 5.0 feet bgs. At location EC-490-04, a groundwater sample was collected from a ¾-inch diameter PVC temporary well screened with 0.010-inch slot from 7 to 17 feet bgs. The groundwater grab sample was collected unpurged using a single-use disposable bailer. The samples were immediately delivered to an on-site mobile laboratory for analytical testing. The soil sample contained 1,300 mg/kg total petroleum hydrocarbons quantitated as diesel (TPH-diesel) which exceeds the cleanup standard of 1,000 mg/kg. Benzene was detected in the groundwater sample at a concentration of 1.1 ug/L, slightly exceeding the cleanup goal of 1.0 ug/L; the other BTEX compounds and MTBE were not detected above their respective laboratory detection limits. Groundwater was measured at approximately 8.28 feet bgs. The temporary well was abandoned by grouting in place.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, the vertical and horizontal extent of fuel-impacted soils has been delineated to the north, west, and east to the extent practicable. Groundwater approximately 25 feet north (downgradient) of the former UST contains benzene at a level slightly in excess of the cleanup standard (1.1 ug/L). Comparing the 7.4 ug/L benzene concentration measured in 1999 at the approximate former UST location, a marked decrease in concentration is noted across a relatively short distance over a five-year period. The data suggest that natural attenuation is reducing benzene concentrations in groundwater.

To delineate the extent of soil contamination to the south, a soil sampling program consisting of one or more 10-foot step-out soil borings south of EC-490-03 would provide data to assess the extent of soil contamination. Based on the findings at this site and other UST sites at NAF El Centro, it is likely that soil contamination is localized in a pocket near assessment point EC-490-03. It is noted that the detected TPH-diesel concentration is just above the cleanup goal, and was found in sample from the relatively shallow depth of 4.5 to 5.0 feet bgs. Due to the presence of two water mains and other underground utilities, excavation is currently an unrealistic option. If site use is significantly changed, such as would involve the demolition of utilities or Building 490, soil excavation would become a viable option.

Based on the observed decreasing benzene concentration trend in groundwater, and the limited extent of TPH-diesel at concentrations exceeding the cleanup action level in soil samples, it is the opinion of PWCSD that further assessment or remediation of groundwater at this site is unnecessary. Therefore, we recommend that no further action for groundwater be considered for this site. For soil, although the concentration of TPH-diesel detected slightly exceeded the cleanup standard, the concentration trends measured in soil show well over an order of magnitude decrease since tank removal in 1993. In three of the four cardinal directions, soil contamination was not indicated. Soil does not appear to be a significant contributor to groundwater contamination. Therefore, we recommend no further action for soil at this site.

Site Characterization and Closure Information

Description of the former UST:	See Background Information (page 2).
Contaminants Identified:	TPH-diesel in soil. Benzene in groundwater. See attached analytical results tables.
Amount of Contaminants Leaked:	Not estimated. See attached analytical results tables.
MTBE:	None detected.
Description of the soil/geology:	Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? Soil contamination is delineated to the north, east, and west. Due to the presence of utilities the extent of soil contamination could not be fully delineated to the south. The depth of soil contamination is approximately 4.5 to 5.5 feet bgs. The maximum TPH-diesel concentration measured during this investigation is 1,300 mg/kg.

Estimated volume of contaminated soil left on site and concentration: Not Estimated.

Is groundwater contamination completely delineated? Benzene concentration of 1.1 ug/L measured 25 feet north of the former UST indicates decreasing concentration trend and approximate northerly (downgradient) extent of groundwater contamination. Current analytical results for groundwater show that MTBE and other constituents of concern are not detected.

Monitoring wells installed, properly permitted? No monitoring wells were installed.

Depth to groundwater: Approximately 8 feet bgs.

Is groundwater or surface water impacted? Yes. Analytical results for groundwater indicate benzene at 1.1 ug/L slightly exceeds the cleanup goal of 1.0 ug/L.

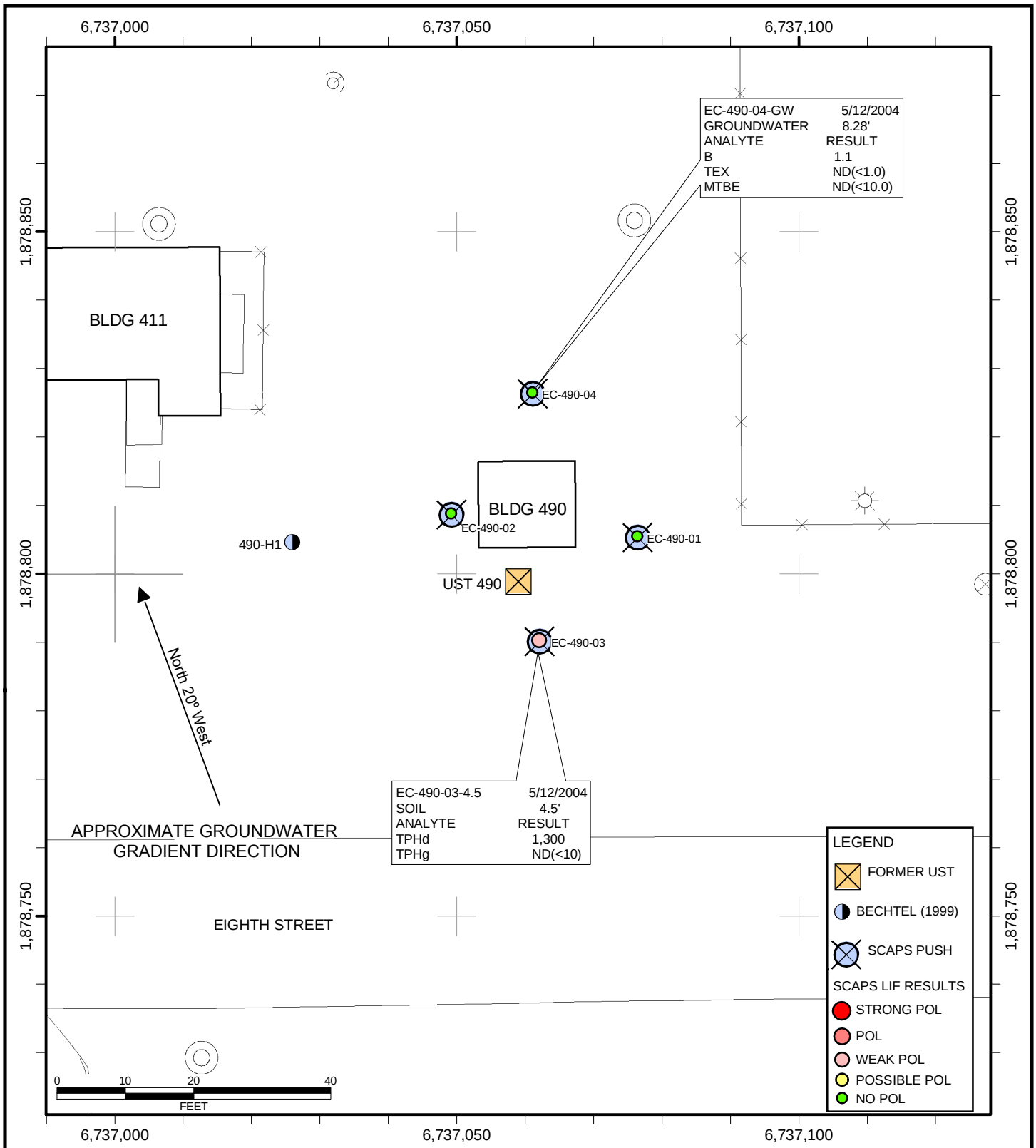
Remedial action taken? UST removed 1993.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Yes.

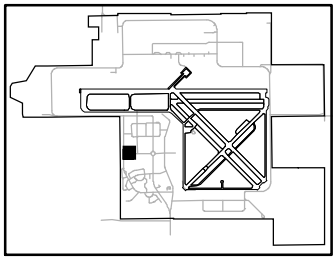
Site Closure: Due to limited amount of impacted soil that may remain, and groundwater benzene impact shown to be essentially at the cleanup level, and a site that is covered by asphalt, the contaminants that may remain do not pose an unacceptable risk to human health or the environment. The recommendation for site closure is accepted and no further action is required at this site.

Signature: ***Date:***	***Signature:*** ***Date:***
N.R. Wells **Lieutenant Commander, CEC, US Navy** **By direction of** **The Commanding Officer**	**Liann P. Chavez, R.G.** **Senior Engineering Geologist** **California Environmental Protection Agency** **California Regional Water Quality Control Board** **Colorado River Basin Region**

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS, Soil, and Groundwater Results
SCAPS Logs
Laboratory Analytical Report and Chain-of-Custody Documentation



OVERVIEW MAP - NAF EL CENTRO



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MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 490

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC4

FIGURE: 1

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence, Soil, and Groundwater Analytical Data Summary

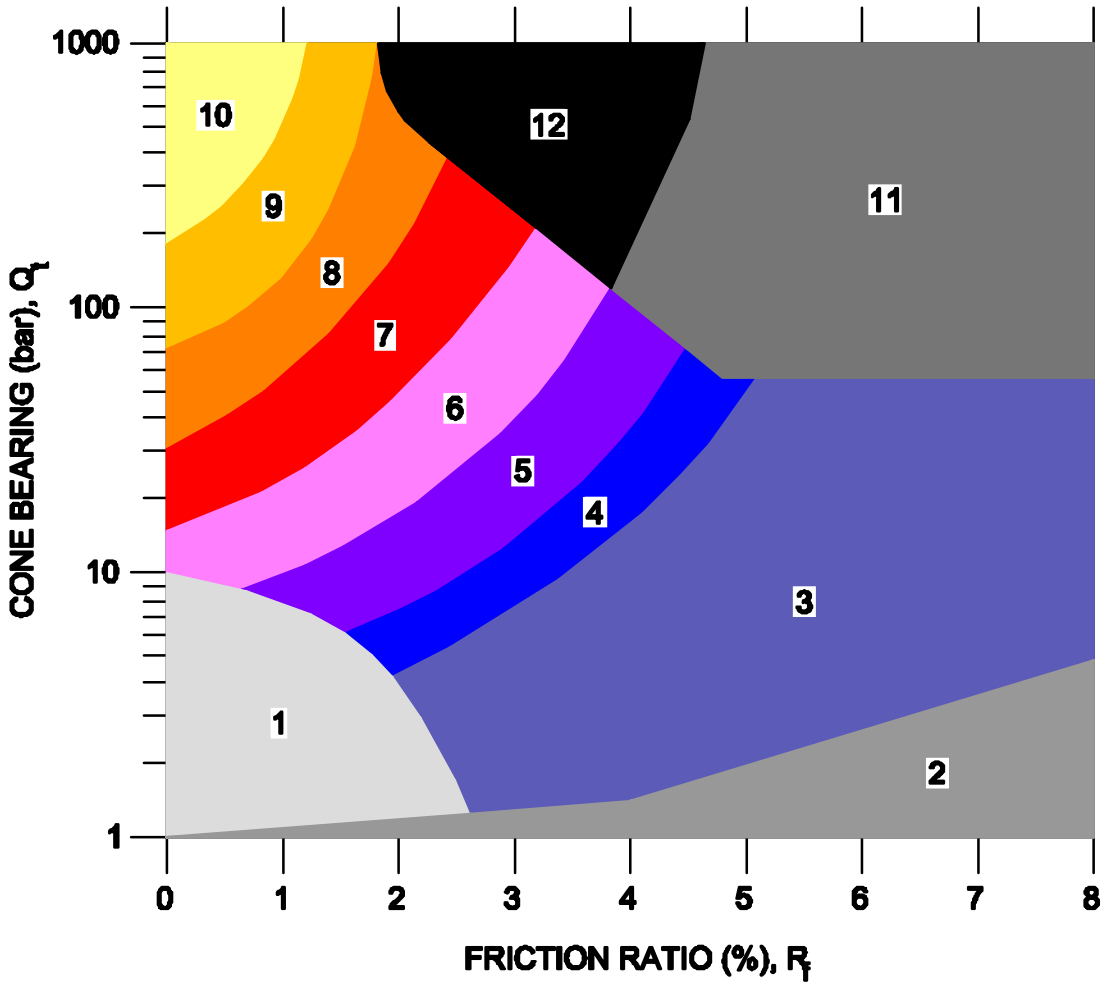
UST Site 490
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-490-01	4/2/2004	19.2	21.5	2,168 @ 10.5	No POL		
EC-490-02	4/2/2004	19.7	21.9	2,085 @ 11.0	No POL		
EC-490-03	4/2/2004	19.4	21.7	6,494 @ 5.3	Weak POL		
EC-490-03-4.5	5/12/2004					4.5': TPHd: 1,300 mg/kg TPHg: <10 mg/kg	
EC-490-04	4/2/2004	19.0	21.4	2,222 @ 11.1	No POL		
EC-490-04-GW	5/12/2004					8.28': B: 1.1 ug/L TEX: <1.0 ug/L MTBE: <10.0 ug/L	7'-17'

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

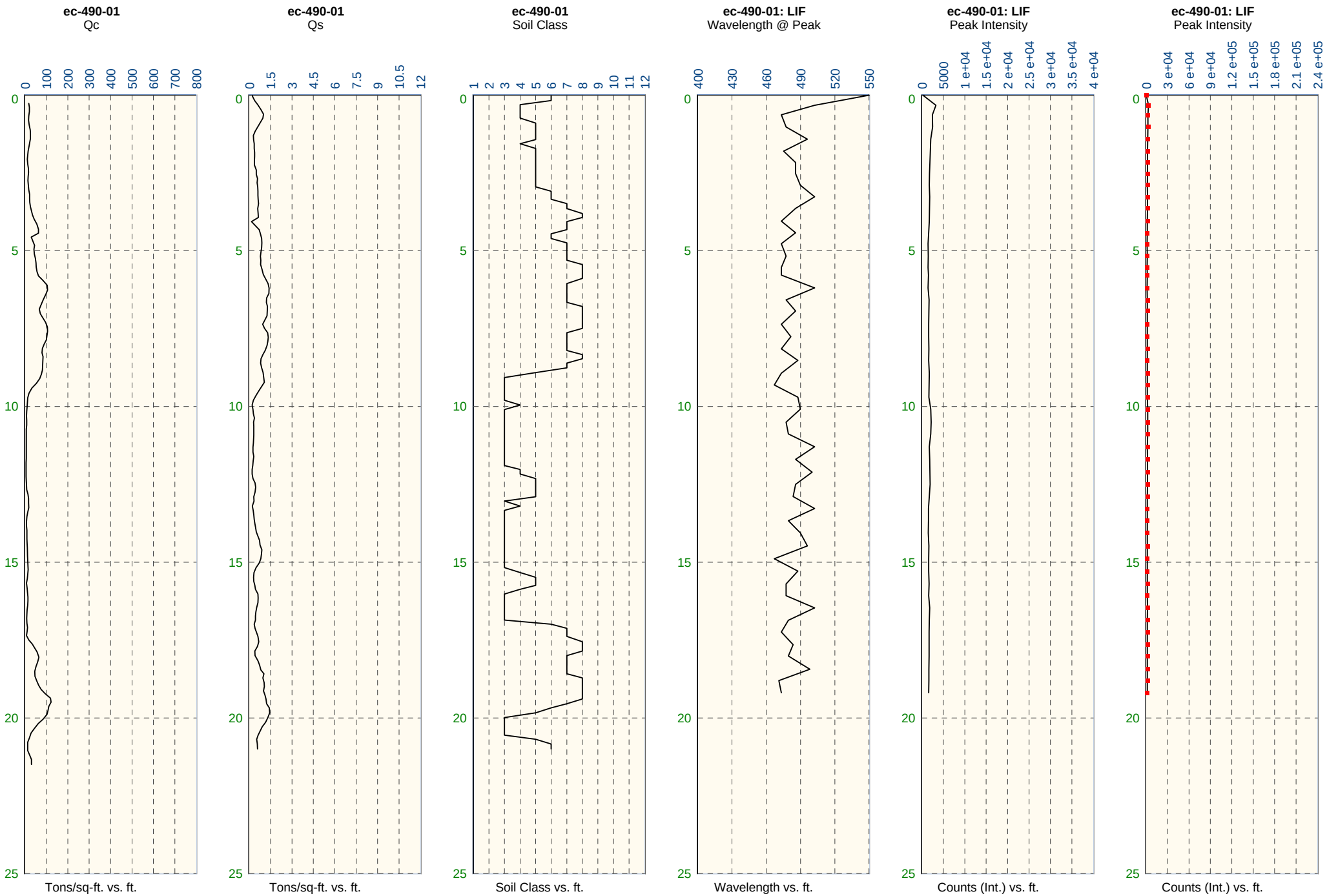
CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)

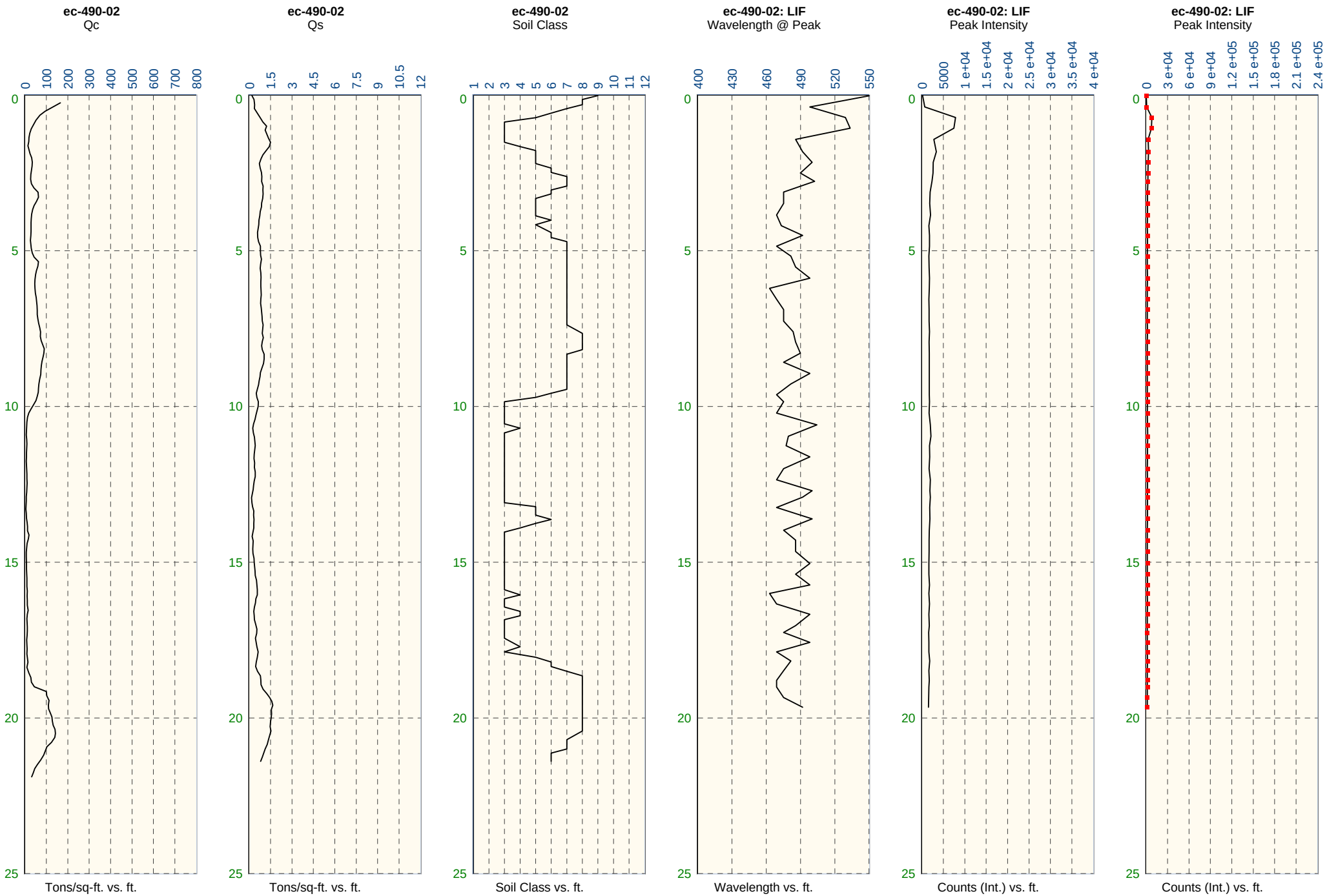


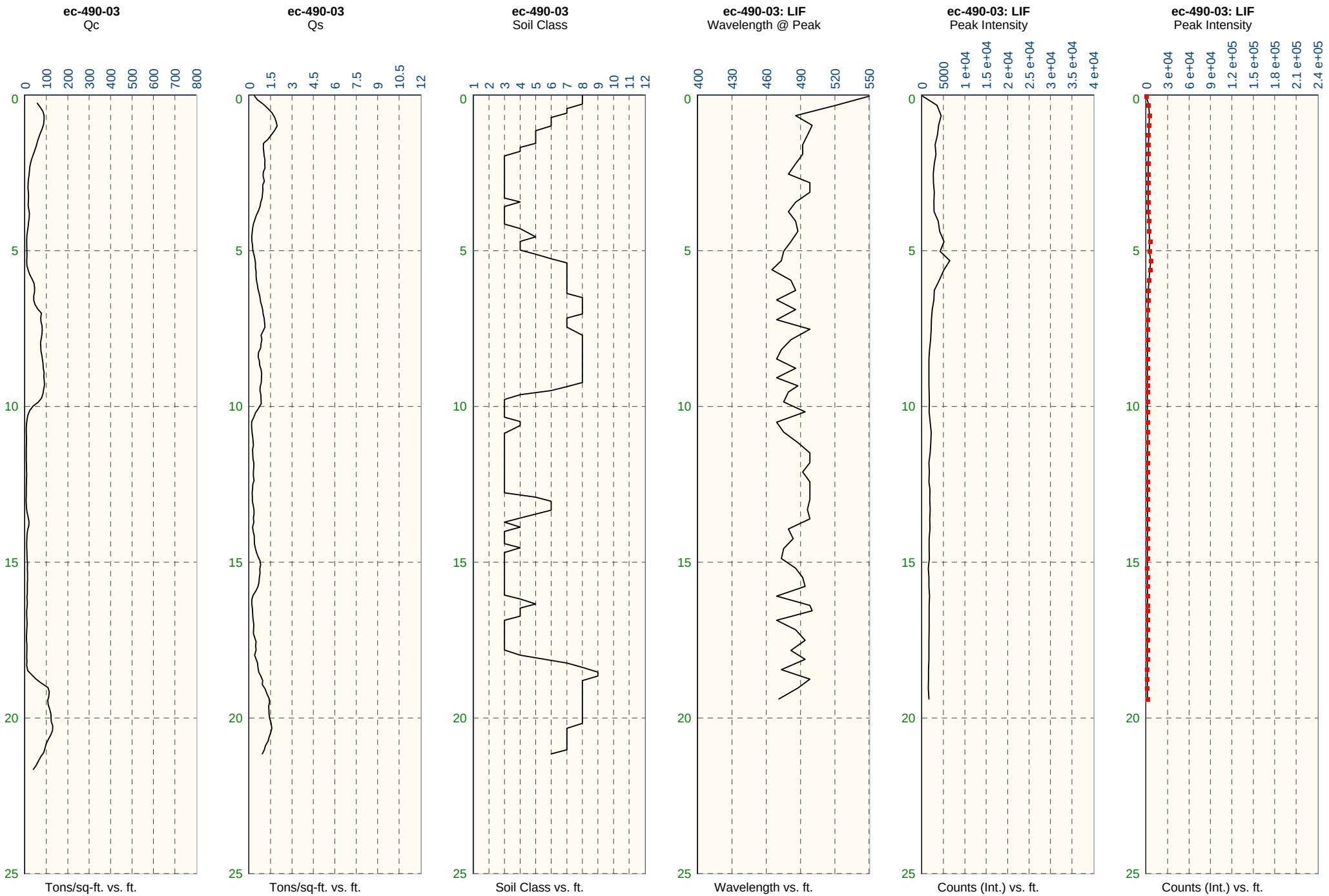
Friction Ratio (R_f) = Sleeve Friction (F_s)/Cone Pressure (Q_t) x 100%
1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

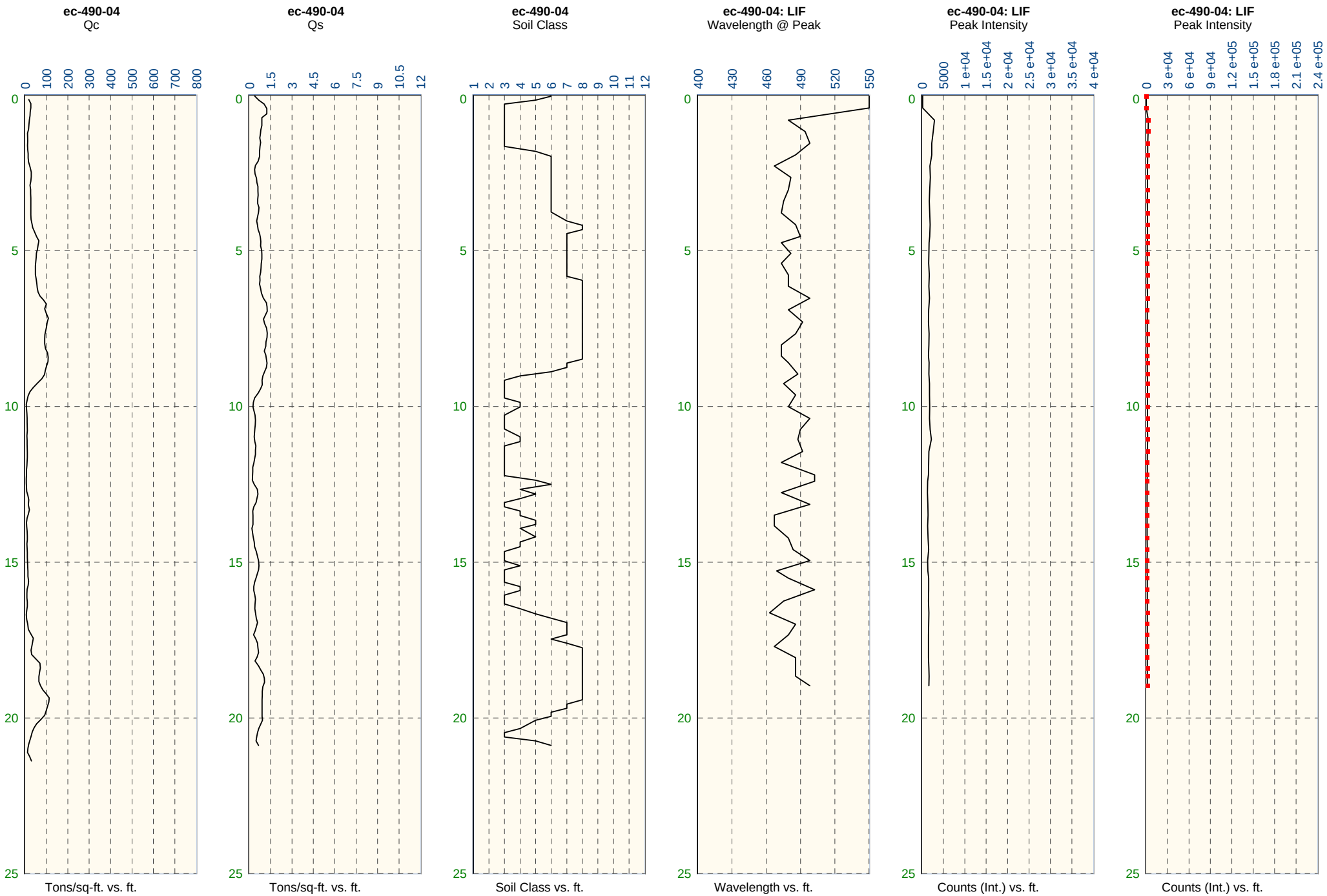
Zone		Q_t/ N	Soil Behavior Type
1		2	sensitive fine grained
2		1	organic material
3		1	clay
4		1.5	silty clay to clay
5		2	clayey silt to silty clay
6		2.5	sandy silt to clayey silt
7		3	silty sand to sandy silt
8		4	sand to silty sand
9		5	sand
10		6	gravelly sand to sand
11		1	very stiff fine grained*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

* overconsolidated or cemented


ec-490-01
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-490-01
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-490-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-490-01: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-490-01: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-490-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-490-02
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-490-02
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-490-02
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-490-02: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-490-02: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-490-02: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-490-03
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-490-03
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-490-03
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-490-03: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-490-03: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-490-03: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-490-04
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-490-04
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-490-04
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-490-04: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-490-04: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-490-04: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.

MOBILE GEOCHEMISTRY

H&P

May 20, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – NAS – SITE 490 – EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP051104W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1317).

Project Summary

The following analyses were conducted:

- 1 soil for total petroleum hydrocarbons (TPH) by DHS LUFT/8015M Method
- 1 water for volatile aromatic hydrocarbons (BTEX) & MTBE by EPA Method 8021B

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Blayne Hartman

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
2373 208th Street, Suite F-1, Torrance, California 90501 | 310 782.2929 — Fax 310 782.2798
www.HandPmg.com | 1-800-834-9888

MOBILE GEOCHEMISTRY

H&P

NAVY PUBLIC WORKS PROJECT #1113621902008
NAS
SITE 490
EL CENTRO, CA

H&P Project #NP051104-W1

TPH (DHS LUFT/ 8015M Method) ANALYSES OF SOILS

SAMPLE NUMBER	DATE ANALYZED	TPH-GAS C5-C11 (mg/kg)	TPH-DIESEL C12-C24 (mg/kg)
METHOD BLANK	5/12/2004	ND	ND
EC-490-3-4.5	5/12/2004	ND	1,300
DETECTION LIMITS		10	10

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
5-26-2004

MOBILE GEOCHEMISTRY

H&P

NAVY PUBLIC WORKS PROJECT #1113621902008
NAS
SITE 490
EL CENTRO, CA

H&P Project #NP051104-W1

BTEX, MTBE (EPA Method 8020 Modified) ANALYSES OF WATERS

SAMPLE NUMBER	DATE ANALYZED	MTBE (ug/l)	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYLBENZ (ug/l)	XYLENES (ug/l)	SURROGATE (%REC)
METHOD BLANK	5/12/2004	ND	ND	ND	ND	ND	108
EC-490-04-GW	5/12/2004	ND	1.1	ND	ND	ND	100
REPORTING LIMITS		10.0	1.0	1.0	1.0	1.0	53%-145%
DETECTION LIMITS		1.0	0.5	0.5	0.5	0.5	

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
5-26-2004

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP051104-W1
DAILY CALIBRATION DATE : 05/12/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ppm)	WATER (ppb)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
TPH GASOLINE - FID1	10-20000	330-660000	7/14/2003	0.878	6.1%	228	0.877	0.1%	240	0.830	5.5%
TPH GASOLINE - FID2	10-20000	330-660000	7/14/2003	0.580	11.9%	365	0.548	5.5%	379	0.538	7.3%
TPH GASOLINE - FID3	10-20000	330-660000	7/14/2003	0.696	10.4%	308	0.649	6.7%	296	0.658	5.5%
TPH DIESEL - FID1	10 - 50000	330 - 1650000	7/11/2003	1.014	9.5%	487	1.027	1.2%	493	1.022	0.8%
TPH DIESEL - FID2	10 - 50000	330 - 1650000	7/11/2003	0.690	13.3%	715	0.699	1.4%	780	0.696	1.0%
TPH DIESEL - FID3	10 - 50000	330 - 1650000	7/11/2003	0.723	7.9%	664	0.753	4.1%	680	0.754	4.3%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP051104-W1
DAILY CALIBRATION DATE : 05/12/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ug/kg)	WATER (ug/L)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
MTBE	500 - 25	2500 - 125	4/2/2004	3.07	7.2%	291	2.91	5.1%	322	3.22	5.0%
BENZENE	500 - 25	2500 - 125	5/6/2004	9.44	11.6%	1,035	10.35	9.6%	881	8.81	6.7%
TOLUENE	500 - 25	2500 - 125	5/6/2004	17.80	12.5%	1,710	17.10	4.0%	1,558	15.58	12.5%
TFT	500 - 25	2500 - 125	5/6/2004	5.49	9.8%	582	5.82	6.1%	604	6.04	10.1%
ETHYLBENZENE	500 - 25	2500 - 125	5/6/2004	15.77	5.6%	1,584	15.84	0.5%	1,391	13.91	11.8%
m&p-XYLENES	500 - 25	2500 - 125	5/6/2004	20.54	8.8%	1,925	19.25	6.3%	1,747	17.47	15.0%
o-XYLENES	500 - 25	2500 - 125	5/6/2004	16.61	7.7%	1,592	15.92	4.1%	1,530	15.30	7.9%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR SOILS

ANALYSIS DATE : 05/12/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (mg/kg)	MS CONC (mg/kg)	%REC MS	MSD CONC (mg/kg)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	211	105.5%	229	114.5%	8.2%	15%	75% - 125%
TPH DIESEL	600	639	106.5%	613	102.2%	4.2%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY
H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR WATERS

ANALYSIS DATE : 05/12/04
H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	MS CONC (ug/L)	%REC MS	MSD CONC (ug/L)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	17.8	89.0%	19.8	99.0%	10.6%	15%	75% - 125%
BENZENE	20.0	17.9	89.5%	19.8	99.0%	10.1%	15%	75% - 125%
TOLUENE	20.0	16.1	80.5%	16.3	81.5%	1.2%	15%	75% - 125%
ETHYLBENZENE	20.0	17.8	89.0%	18.5	92.5%	3.9%	15%	75% - 125%
TOTAL XYLENES	40.0	34.2	85.5%	34.8	87.0%	1.7%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR SOILS

ANALYSIS DATE: 05/12/2004
H&P Project #NP051104-W1

COMPOUND	SPK CONC (mg/kg)	LCS CONC (mg/kg)	%REC LCS	LCSD CONC (mg/kg)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	218	109.0%	217	108.5%	0.5%	15%	75% - 125%
TPH DIESEL	500	514	102.8%	510	102.0%	0.8%	15%	75% - 125%

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR WATERS

ANALYSIS DATE: 05/12/2004
H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	LCS CONC (ug/L)	%REC LCS	LCSD CONC (ug/L)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	19.7	98.5%	20.2	101.0%	2.5%	15%	75% - 125%
BENZENE	20.0	17.4	87.0%	17.2	86.0%	1.2%	15%	75% - 125%
TOLUENE	20.0	16.4	82.0%	16.3	81.5%	0.6%	15%	75% - 125%
ETHYLBENZENE	20.0	17.8	89.0%	17.4	87.0%	2.3%	15%	75% - 125%
TOTAL XYLENES	40.0	33.6	84.0%	33.4	83.5%	0.6%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

Chain of Custody Record

SITE 490

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469
☒ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404
☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 5-12-04
H&P Project # NP051104W1
Outside Lab:

Client: NAVY Public Works Code 980
Address: 2730 Mc Kean St. Suite 1
SD CA
Phone: 619-524-6967 Fax: 6195246000

Collector: D Bloom
Page: 1 Of 6
Client Project # 1136 219 62008 Project Manager D. Bloom
Location: NAS El Centro Site 490
Turn around time:

Global ID: T06025447I
EDF: Yes / No

Sample Receipt
Intact: ☐ Yes ☐ No
Seal Intact: ☐ Yes ☐ No ☐ N/A
Cold: ☐ Yes ☐ No
N/A (Received on Site)

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B BTEX / Oxygenates	8260B Oxygenates	8260B VOC's	8260B VOC's and Oxygenates	Methane	Fixed Gases						Total # of containers
EC 490-3-4.5			623	5/12	SOIL	Sleeve	X																
EC 490-04-CN			700	5/12	W	VOA			X														

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
David M Bloom	Code 980	Janis Villarreal	H+P	5-12-04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constit[illegible] authorization to proceed with analysis and acceptance of condition on back.

Sample disposal i[illegible]tion: ☐ *Disposal @ $2.00 each* ☐ *Return to client* ☐ *Pickup*

Site Assessment Report
UST Site 528
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 528 at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 528 work plan addendum, dated February 25, 2004, prepared by the Public Works Center San Diego (PWCSD). Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 528. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 528
Site Address:	South of 8th Street, between "G" and "J" Streets (near the northwest corner of Building 528) Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,741,546 Northing: 1,876,246 feet (State Plane 6)
Facility Name:	Special Warfare (Former Parachute Packing and Fabrication)
Property Owner: Tank Owner/Operator: Responsible Party:	United States Navy United States Navy United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430027

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	Unknown
Construction Materials:	Single-wall steel
Capacity:	5,000 gallons
Contents:	Diesel
Year Removed:	1996 by Geofon

Figure 1 shows the site location and previous and current assessment locations.

In 1996, Geofon removed a 5,000-gallon diesel UST at the location shown on Figure 1. Five soil samples were collected as part of tank removal. The three samples collected from the tank cavity indicated elevated levels of diesel in *Final Technical Memorandum Underground Storage Tank Site Investigation,* dated March 2000, prepared by Bechtel National, Inc. (BNI, 2000).

In 1999, BNI advanced two soil borings and one HydroPunch boring. Analytical testing results indicate both soil and groundwater concentrations exceeded the site cleanup goals. The soil and groundwater samples were collected from depths of 10.3 feet below ground surface (bgs), and 8 to 12 feet bgs, respectively. Total petroleum hydrocarbons quantitated as diesel (TPH-diesel) was detected at concentrations of 1,600 and 1,900 milligrams per kilogram (mg/kg) in the soil samples. Benzene was detected in groundwater at a concentration of 43 micrograms per liter (ug/L). The other groundwater and soil constituents analyzed for were detected below actions levels or not detected. However, the detection limit for MTBE in groundwater exceeded the cleanup goal due to an elevated detection limit of 200 ug/L.

PWC Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Soil exceeds cleanup levels for TPH-diesel. Groundwater exceeds action level for benzene. The presence and magnitude of MTBE in groundwater has not been confirmed*. Field activities were performed March 31 and between May 10 and 11, 2004.

In accordance with the work plan, Cone Penetrometer Test (CPT) and Laser Induced Fluorescence (LIF) was measured *in situ* using the Site Characterization and Analysis Penetrometer System (SCAPS) at five locations as shown on Figure 1. The LIF data are summarized and interpreted in Table 2. The CPT results for four of the locations show silty sand through most of the push interval, and a roughly one-foot-thick clay layer at about 11 feet below ground surface. At these four locations, weak fluorescence suggesting petroleum, oil, or lubricants (POL) (*i.e.*, intensity above background) was encountered at approximately 8.5 feet below ground surface and extending downward to the underlying clay layer. Soil sampling was attempted at one of these locations, however insufficient sample was recovered for analysis. The small amount of soil recovered from this location consisted of sand and pea gravel. It is likely excavation backfill from the tank removal was encountered at these four locations.

The remaining location, EC-528-04, had a different CPT profile, consisting of clay to 9 feet bgs, overlying sand and silty sand. This push had background levels of fluorescence, with no characteristics of POL. A soil sample collected within three feet of the LIF location from 8.5 feet bgs consisted of silt with possible very faint hydrocarbon odor, and a trace of dark gray to black staining. The sample had a

TPH-diesel concentration of 2,700 mg/kg, which is unexpectedly high compared to the LIF measurements. Although the LIF is known to be more sensitive in matrices with relatively low surface area, such as sand, and less sensitive in matrices with high surface area, such as clay, in our experience this discrepancy between the analytical and SCAPS LIF data set at this one push location is anomalous. Other SCAPS investigations at sites with fine-grained soils have shown that relatively small-scale lateral heterogeneity in contaminant distributions can occur and be a significant factor when comparing LIF and analytical results. It is our opinion that such heterogeneity may be a factor at this location. However, if it is assumed that lateral heterogeneity is not a significant factor, the soil sample results suggests that the LIF detection threshold in soils with a CPT classification of clay at this site may be above 2,700 mg/kg. This comparison of data sets is not applicable to the other four locations at this site, which have soils that typically yield a detection threshold well below 1,000 mg/kg.

In addition to the soil sample, a ¾-inch diameter PVC temporary well screened with 0.010-inch slot from 5.5 to 15.5 bgs was installed at EC-528-04. A groundwater grab sample was collected unpurged using a single-use disposable bailer and was immediately delivered to an on-site mobile laboratory for analytical testing. Benzene and MTBE were detected in groundwater at 13 ug/L and 1.3 ug/L, respectively. The other BTEX compounds were not detected. Groundwater was measured at approximately 8.84 feet bgs. The temporary well was abandoned by grouting in place.

The groundwater sample was taken from approximately the same location as a groundwater sample collected by Bechtel in 1999. The benzene concentration has dropped from 43 ug/L in 1999 to 13.0 ug/L in 2004, suggesting that concentrations are naturally decreasing through time.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, the horizontal extent of fuel-impacted soils has been delineated to the east and south. Groundwater is affected by benzene above the cleanup standard. However, benzene concentrations show a strong decreasing trend and are expected to naturally attenuate to below the cleanup standard. The data obtained during the current investigation indicate elevated TPH-diesel concentrations in soil are present, and that soil contamination may be expected to the north and west.

It is the opinion of PWCSD that further assessment may be conducted to delineate the extent of soil contamination to the north and west. The presence of underground utilities for water, sewer, and natural gas to the north is a concern for both the protection of those utilities and as possible conduits for contaminant migration through the backfill. Of the three utilities present in this area, the natural gas pipeline is closest to the former tank site. A proposed assessment could include using direct-push collection of soil samples in the impacted interval to the north and west to measure the concentration of TPH-diesel.

Site Characterization Information

Description of the former UST:	See Background Information (page 2).
Contaminants Identified:	See attached analytical results tables.
Amount of Contaminants Leaked:	Not estimated. See attached analytical results tables.
MTBE:	Detected in Groundwater at 1.3 J ug/L.

Description of the soil/geology: Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? No. Based on a review of the analytical data, the lateral extent of soil impacted with fuels has been delineated to the east and south, and is uncertain to the north and west. TPH-diesel was detected at 8.5 feet bgs at a concentration of 2,700 mg/kg.

Estimated volume of contaminated soil left on site and concentration: Not estimated.

Is groundwater contamination completely delineated? No. Current analytical results for groundwater show that benzene exceeds site cleanup standard. However, benzene levels have decreased from 1999 to 2004 from 43 to 13.0 ug/L, and can be expected to reach cleanup levels without an active remediation program.

Monitoring wells installed, properly permitted? No monitoring wells were installed.

Depth to groundwater: Approximately 8.8 feet bgs.

Is groundwater or surface water impacted? Yes. Groundwater benzene concentration exceeds cleanup goals for the site. However, benzene concentrations are expected to decrease with time.

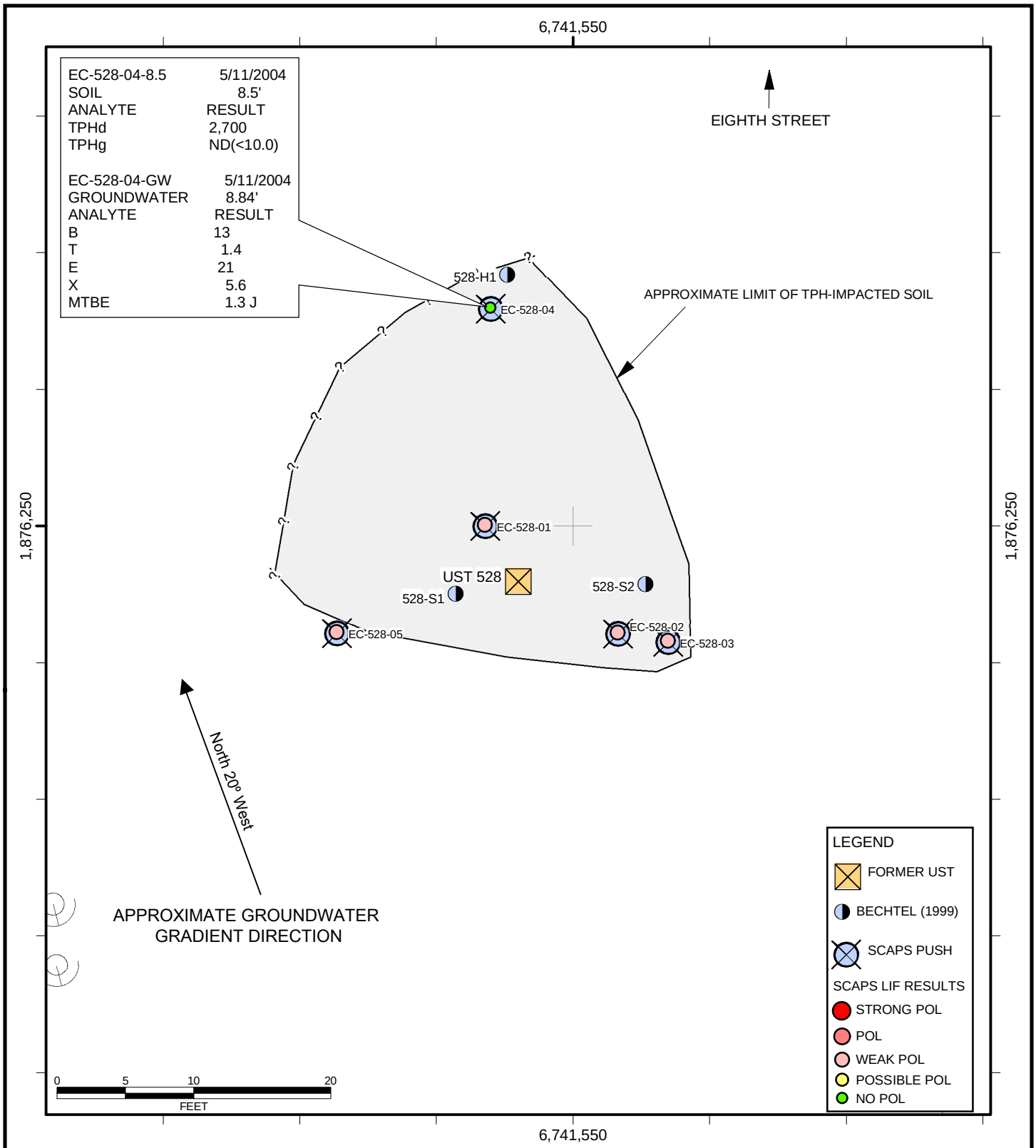
Remedial action taken? UST removed 1996.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Yes.

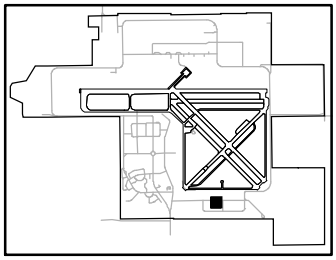
Site Recommendation: The volume of impacted soil that may remain in place is uncertain to the north and west of the former UST location. Groundwater contamination levels are expected to continue to decrease naturally. Groundwater is not used for drinking water purposes, and the site is unpaved or landscaped, therefore, the groundwater contaminants that are present do not pose an unacceptable risk to human health or the environment. The recommendation for soil assessment to the north and west is accepted.

Signature: ***Date:***	***Signature:*** ***Date:***
N.R. Wells **Lieutenant Commander, CEC, US Navy** **By direction of** **The Commanding Officer**	**Liann P. Chavez, R.G.** **Senior Engineering Geologist** **California Environmental Protection Agency** **California Regional Water Quality Control Board** **Colorado River Basin Region**

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS, Soil, and Groundwater Results
SCAPS Logs
Laboratory Analytical Report and Chain-of-Custody Documentation



OVERVIEW MAP - NAF EL CENTRO



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MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 528

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC4

FIGURE: **1**

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence, Soil, and Groundwater Analytical Data Summary

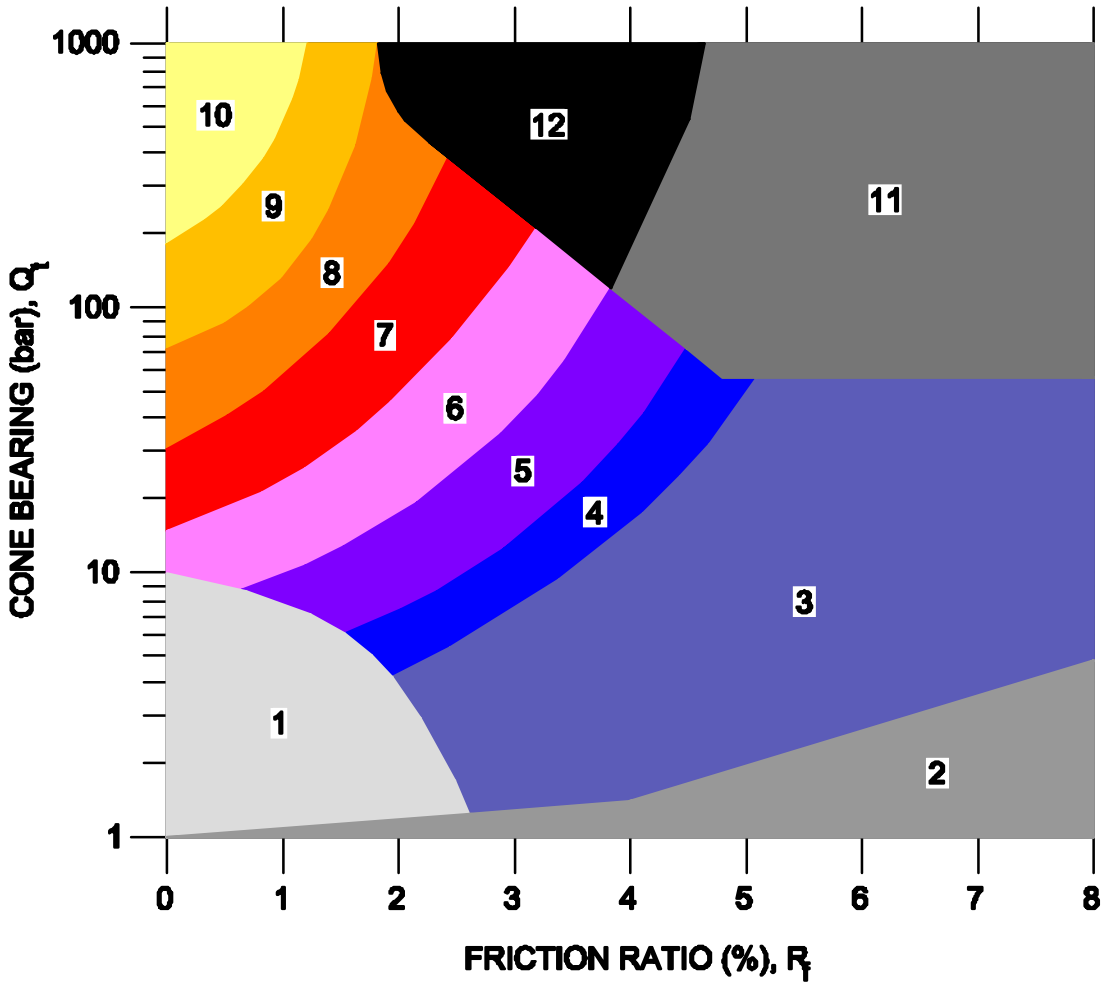
UST Site 528
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-528-01	3/31/2004	15.8	18.0	8,928 @ 9.8	weak POL		
EC-528-02	3/31/2004	15.3	17.5	11,914 @ 8.8	weak POL		
EC-528-03	3/31/2004	18.7	21.1	9,100 @ 8.8	weak POL		
EC-528-04	3/31/2004	15.4	17.6	2,427 @ 7.3	No POL		
EC-528-04-8.5	5/11/2004					8.5': TPHd: 2,700 mg/kg TPHg: <10 mg/kg	
EC-528-04-GW	5/11/2004					8.84': B: 13 ug/L T: 1.4 ug/L E: 21 ug/L X: 5.6 ug/L MTBE: 1.3 ug/L	5.5'-15.5'
EC-528-05	3/31/2004	15.7	17.9	14,607 @ 9.5	weak POL		

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

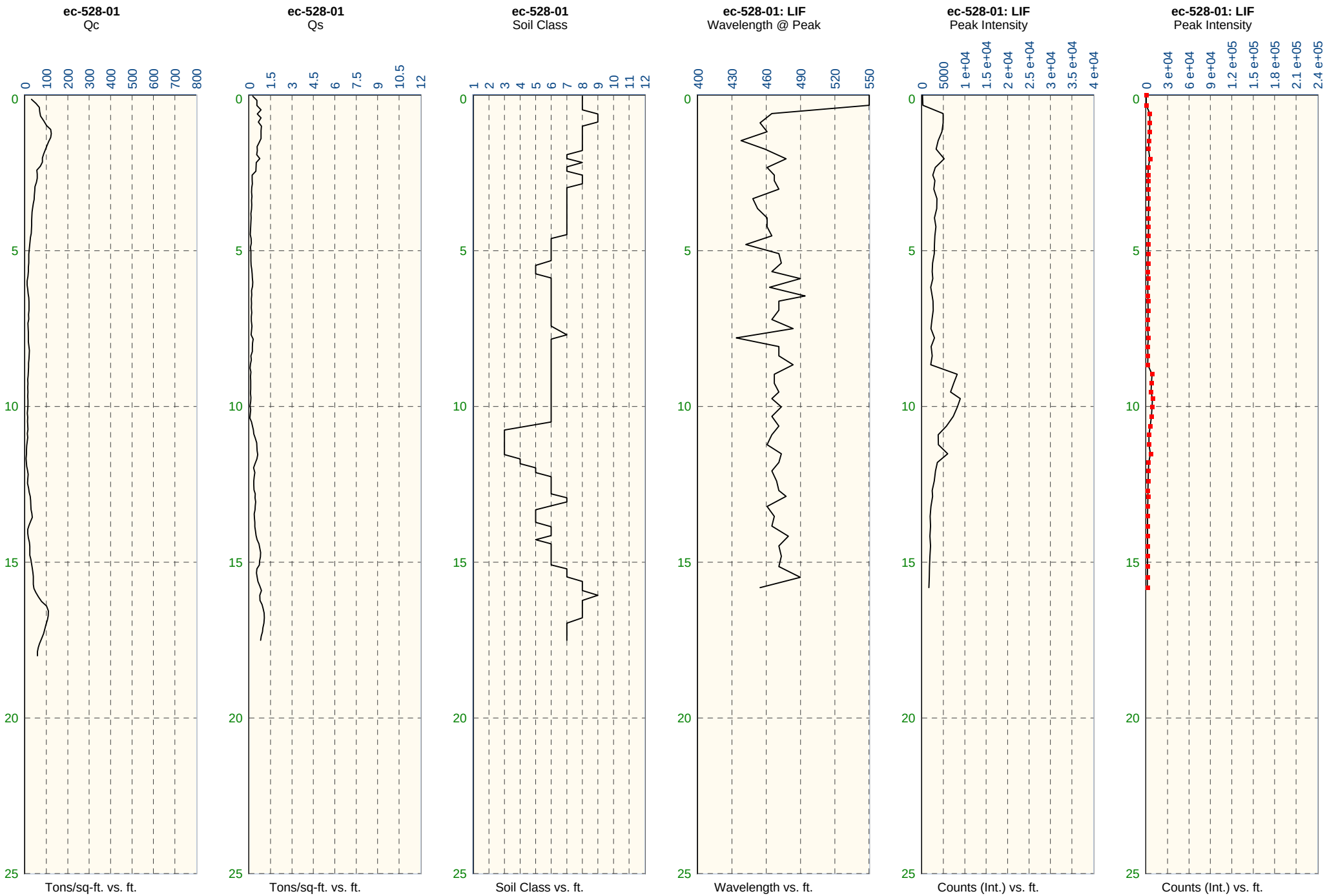
CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)

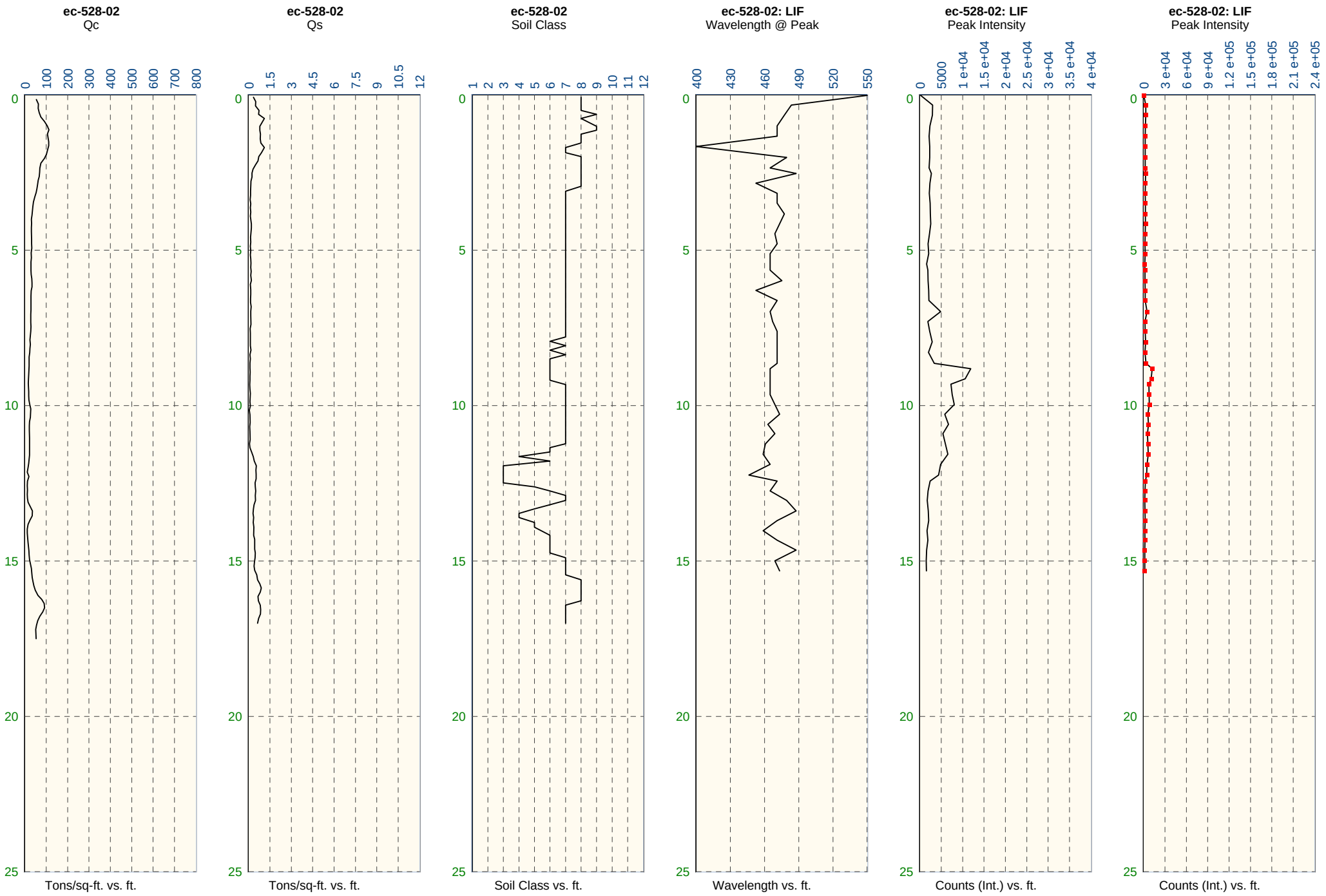


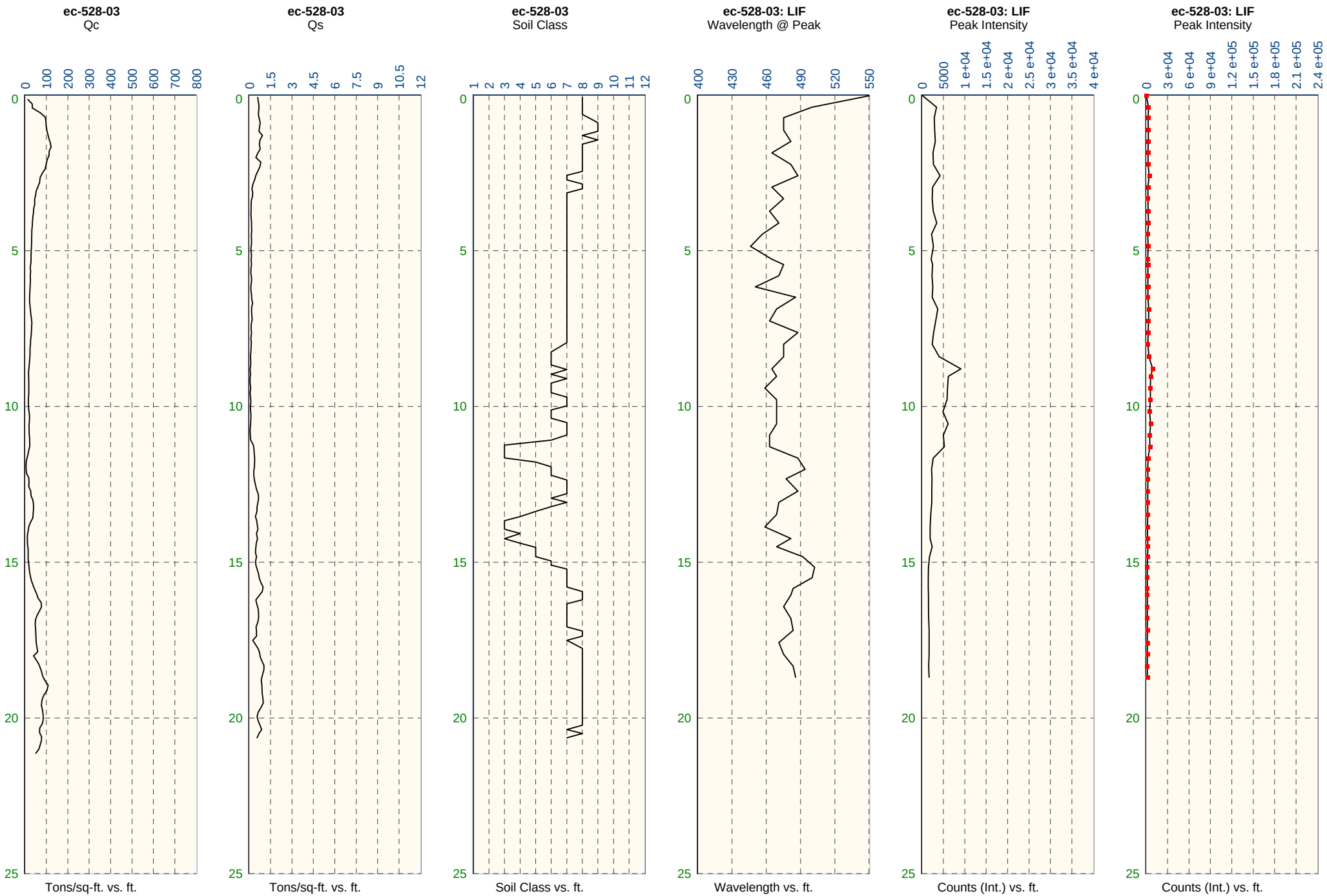
Friction Ratio (R_f) = Sleeve Friction (F_s)/Cone Pressure (Q_t) x 100%
1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

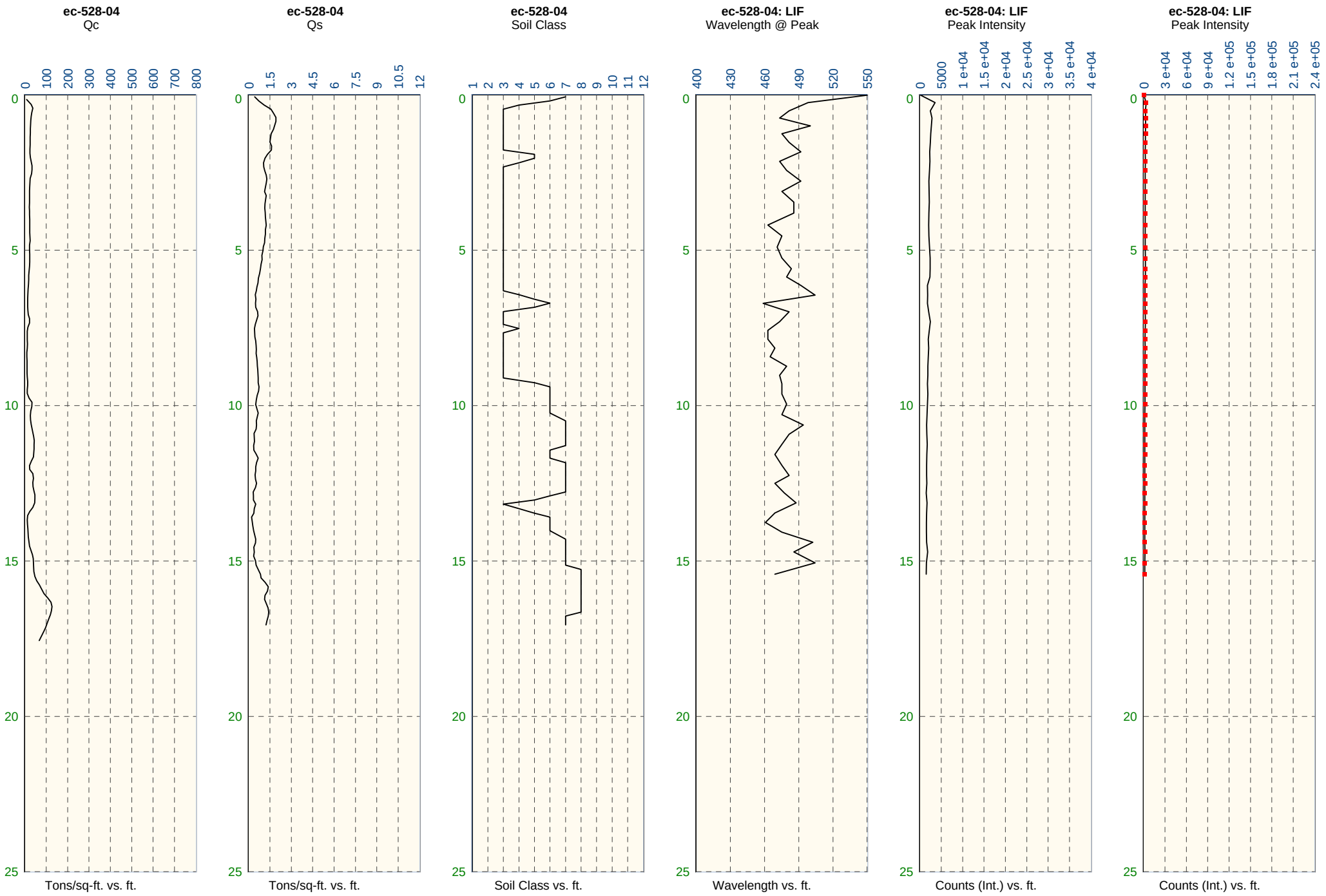
Zone		Q_t/ N	Soil Behavior Type
1		2	sensitive fine grained
2		1	organic material
3		1	clay
4		1.5	silty clay to clay
5		2	clayey silt to silty clay
6		2.5	sandy silt to clayey silt
7		3	silty sand to sandy silt
8		4	sand to silty sand
9		5	sand
10		6	gravelly sand to sand
11		1	very stiff fine grained*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

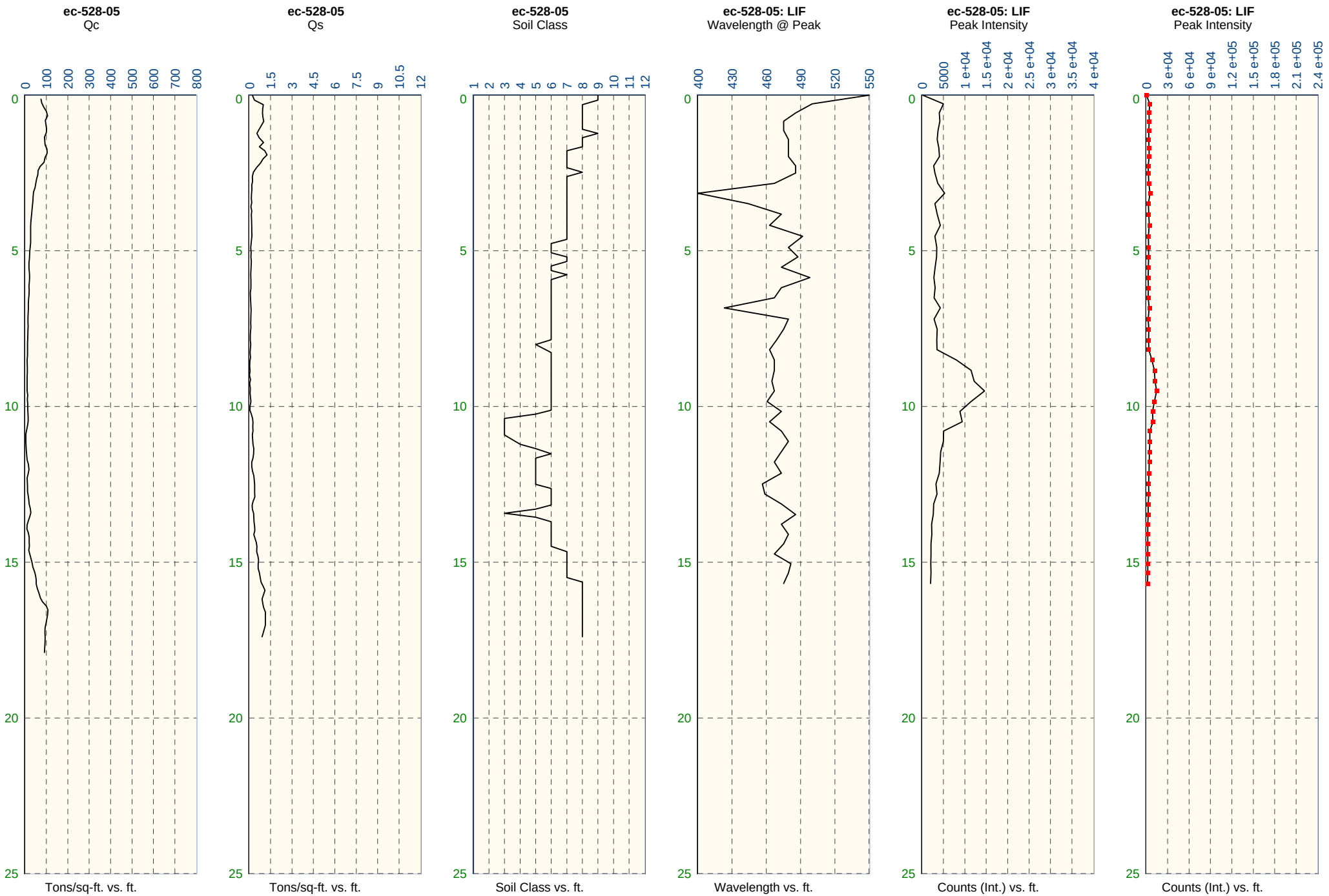
* overconsolidated or cemented


ec-528-01
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-528-01
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-528-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-528-01: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-528-01: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-528-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-528-02
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-528-02
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-528-02
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-528-02: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-528-02: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-528-02: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-528-03
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-528-03
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-528-03
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-528-03: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-528-03: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-528-03: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-528-04
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-528-04
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-528-04
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-528-04: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-528-04: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-528-04: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-528-05
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-528-05
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-528-05
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-528-05: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-528-05: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-528-05: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25

MOBILE GEOCHEMISTRY

H&P

May 20, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – NAS – SITE 528 – EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP051104W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1317).

Project Summary

The following analyses were conducted:

- 1 soil for total petroleum hydrocarbons (TPH) by DHS LUFT/8015M Method
- 1 water for volatile aromatic hydrocarbons (BTEX) & MTBE by EPA Method 8021B

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Blayne Hartman

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
2373 208th Street, Suite F-1, Torrance, California 90501 | 310 782.2929 — Fax 310 782.2798
www.HandPmg.com | 1-800-834-9888

MOBILE GEOCHEMISTRY

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NAVY PUBLIC WORKS PROJECT #1113621902008
NAS
SITE 528
EL CENTRO, CA

H&P Project #NP051104-W1

TPH (DHS LUFT/ 8015M Method) ANALYSES OF SOILS

SAMPLE NUMBER	DATE ANALYZED	TPH-GAS C5-C11 (mg/kg)	TPH-DIESEL C12-C24 (mg/kg)
METHOD BLANK	5/11/2004	ND	ND
EC-528-04-8.5	5/11/2004	ND	2,700
DETECTION LIMITS		10	10

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
5-26-2004

MOBILE GEOCHEMISTRY

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NAVY PUBLIC WORKS PROJECT #1113621902008
NAS
SITE 528
EL CENTRO, CA

H&P Project #NP051104-W1

BTEX, MTBE (EPA Method 8020 Modified) ANALYSES OF WATERS

SAMPLE NUMBER	DATE ANALYZED	MTBE (ug/l)	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYLBENZ (ug/l)	XYLENES (ug/l)	SURROGATE (%REC)
METHOD BLANK	5/11/2004	ND	ND	ND	ND	ND	110
EC-528-04-GW	5/11/2004	1.3 J	13	1.4	21	5.6	80
REPORTING LIMITS		10.0	1.0	1.0	1.0	1.0	53%-145%
DETECTION LIMITS		1.0	0.5	0.5	0.5	0.5	

J INDICATES VALUE DETERMINED IS BETWEEN DETECTION LIMIT AND REPORTING LIMIT

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
5-26-2004

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP051104-W1
DAILY CALIBRATION DATE : 05/11/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ppm)	WATER (ppb)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
TPH GASOLINE - FID1	10-20000	330-660000	7/14/2003	0.878	6.1%	236	0.847	3.5%	229	0.830	5.5%
TPH GASOLINE - FID2	10-20000	330-660000	7/14/2003	0.580	11.9%	378	0.529	8.7%	357	0.538	7.3%
TPH GASOLINE - FID3	10-20000	330-660000	7/14/2003	0.696	10.4%	291	0.687	1.3%	300	0.658	5.5%
TPH DIESEL - FID1	10 - 50000	330 - 1650000	7/11/2003	1.014	9.5%	487	1.027	1.2%	493	1.022	0.8%
TPH DIESEL - FID2	10 - 50000	330 - 1650000	7/11/2003	0.690	13.3%	752	0.665	3.6%	725	0.696	1.0%
TPH DIESEL - FID3	10 - 50000	330 - 1650000	7/11/2003	0.723	7.9%	647	0.773	6.9%	676	0.754	4.3%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP051104-W1
DAILY CALIBRATION DATE : 05/11/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ug/kg)	WATER (ug/L)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
MTBE	500 - 25	2500 - 125	4/2/2004	3.07	7.2%	272	2.72	11.3%	323	3.23	5.4%
BENZENE	500 - 25	2500 - 125	5/6/2004	9.44	11.6%	1,023	10.23	8.3%	840	8.40	11.0%
TOLUENE	500 - 25	2500 - 125	5/6/2004	17.80	12.5%	1,702	17.02	4.4%	1,546	15.46	13.2%
TFT	500 - 25	2500 - 125	5/6/2004	5.49	9.8%	556	5.56	1.4%	471	4.71	14.1%
ETHYLBENZENE	500 - 25	2500 - 125	5/6/2004	15.77	5.6%	1,528	15.28	3.1%	1,447	14.47	8.2%
m&p-XYLENES	500 - 25	2500 - 125	5/6/2004	20.54	8.8%	1,896	18.96	7.7%	1,747	17.47	15.0%
o-XYLENES	500 - 25	2500 - 125	5/6/2004	16.61	7.7%	1,553	15.53	6.5%	1,498	14.98	9.8%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR SOILS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (mg/kg)	MS CONC (mg/kg)	%REC MS	MSD CONC (mg/kg)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	211	105.5%	212	106.0%	0.5%	15%	75% - 125%
TPH DIESEL	500	483	96.6%	511	102.2%	5.6%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

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QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR WATERS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	MS CONC (ug/L)	%REC MS	MSD CONC (ug/L)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	21.5	107.5%	21.8	109.0%	1.4%	15%	75% - 125%
BENZENE	20.0	18.8	94.0%	18.4	92.0%	2.2%	15%	75% - 125%
TOLUENE	20.0	17.4	87.0%	17.1	85.5%	1.7%	15%	75% - 125%
ETHYLBENZENE	20.0	19.2	96.0%	18.8	94.0%	2.1%	15%	75% - 125%
TOTAL XYLENES	40.0	34.5	86.3%	33.8	84.5%	2.0%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR SOILS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (mg/kg)	LCS CONC (mg/kg)	%REC LCS	LCSD CONC (mg/kg)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	212	106.0%	213	106.5%	0.5%	15%	75% - 125%
TPH DIESEL	500	505	101.0%	487	97.4%	3.6%	15%	75% - 125%

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR WATERS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	LCS CONC (ug/L)	%REC LCS	LCSD CONC (ug/L)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	19.8	99.0%	19.6	98.0%	1.0%	15%	75% - 125%
BENZENE	20.0	18.8	94.0%	18.4	92.0%	2.2%	15%	75% - 125%
TOLUENE	20.0	17.5	87.5%	17.2	86.0%	1.7%	15%	75% - 125%
ETHYLBENZENE	20.0	19.9	99.5%	18.7	93.5%	6.2%	15%	75% - 125%
TOTAL XYLENES	40.0	37.9	94.8%	34.9	87.3%	8.2%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

Chain of Custody Record

E

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469
☒ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404
☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 5-11-04
H&P Project # NP051104WI
Outside Lab:

Client: Navy Public Works Ste 528
Address: 2730 McKean St Suite 1 SD
Phone: 619 524 6967 Fax: 619 524-6000

Collector: D Bloom
Page: 6 Of 6
Client Project # 1136 21902008
Project Manager D. Bloom
Location: NAS El Centro Site 528
Turn around time:

Global ID: T060254936
EDF: (Yes) / No

Sample Receipt
Intact: ☐ Yes ☐ No
Seal Intact: ☐ Yes ☐ No ☐ N/A
Cold: ☐ Yes ☐ No
(N/A) (Received on Site)

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B: BTEX / Oxygenates	8260B: Oxygenates	8260B: VOC's	8260B: VOC's and Oxygenates	Methane	Fixed Gases						Total # of containers
EC-528-04-8.5			1215	5/11	SOIL	Sleeve	X																
EC-528-04-GW			1255		W	VOA			X														

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
David M Bloom	Cole 980	James Villarreal	H&P	5-11-04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constit[illegible] authorization to proceed with analysis and acceptance of condition on back.

Sample disposal i[illegible]tion: ☐ *Disposal @ $2.00 each* ☐ *Return to client* ☐ *Pickup*

Site Assessment Report and
Closure Summary
UST Site 537
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 537 at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 537 work plan addendum, dated March 2, 2004, prepared by the Public Works Center San Diego (PWCSD). Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 537. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 537
Site Address:	South of 7th Street, between Buildings 537 and 577 Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,741,417 Northing: 1,875,653 feet (State Plane 6)
Facility Name:	Former barracks
Property Owner: Tank Owner/Operator: Responsible Party:	United States Navy United States Navy United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430029

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
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Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	Unknown
Construction Materials:	Reinforced concrete
Capacity:	1,400 gallons
Contents:	Diesel
Year Removed:	1993 by Environmental Chemical Corp. (ECC)

Figure 1 shows the site location and previous and current assessment locations.

In 1993, ECC removed a 1,400-gallon diesel UST at the location shown on Figure 1. Four soil samples were collected from the tank removal excavation sidewalls and bottom (samples 537-1 through –4), and three soil samples were collected from the pipeline trenches (samples 437 A, B, and C). The four tank cavity samples contained total petroleum hydrocarbons quantitated as diesel (TPH-diesel) concentrations ranging from 12,400 to 32,360 milligrams per kilogram (mg/kg) in *Final Technical Memorandum Underground Storage Tank Site Investigation,* dated March 2000, prepared by Bechtel National, Inc. (BNI, 2000).

In 1999, BNI advanced one HydroPunch boring approximately 50 feet northeast (cross-gradient) from the former tank location. Analytical testing results indicate a benzene groundwater concentration of 1.2 micrograms per liter (ug/L), which slightly exceeds the site cleanup goal of 1.0 ug/L. The groundwater sample was collected from a depth range of 5 to 15 feet bgs. The other groundwater constituents were detected below action levels or not detected.

PWC Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Soil exceeds cleanup levels for TPH-diesel. Groundwater exceeds action level for benzene.* Field activities were performed April 1 and May 11, 2004.

In accordance with the work plan, Laser Induced Fluorescence (LIF) was measured *in situ* using the Site Characterization and Analysis Penetrometer System (SCAPS) at 14 locations as shown on Figure 1. The LIF data are summarized and interpreted in Table 2. (Note that groundwater sample location [no LIF data] EC-537-05 and LIF location EC-537-10 are nearly co-located.) At five of the locations, no fluorescence characteristic of petroleum, oil, or lubricants (POL) was encountered. At eight locations, fluorescence consistent with POL was encountered (*i.e.*, intensity above background coupled with a drop in wavelength). At six of the eight locations, the fluorescence intensity was notably strong. Location EC-537-06 had a single measurement (representing approximately 0.3 feet vertical thickness) characterized by a slightly elevated intensity coupled with a drop in wavelength suggesting possible POL. In general, the elevated fluorescence is distributed in two depth intervals. The shallower interval is characterized by relatively low intensity in the 7 to 8 foot range, and is relatively limited in lateral extent to the proximity of the former UST location. The deeper interval extends farther north and east, and is characterized by strong intensity of varying thickness to a depth up to 16 feet bgs.

A soil sample with a cone-penetrometer classification of clay was collected at location EC-537-09 from a depth of 9.0 to 9.5 feet bgs, near the upper fringe of the fluorescence interval. The sample had a TPH diesel concentration of 640 mg/kg. This result is consistent with the expected LIF response in

clay (LIF is known to be more sensitive in matrices with relatively low surface area, such as sand, and less sensitive in matrices with high surface area, such as clay).

A groundwater sample was collected from a ¾-inch diameter PVC temporary well screened with 0.010-inch slot from 5.5 to 15.5 feet bgs at location EC-537-05, which is within three feet of LIF location EC-537-10. The groundwater grab sample was collected unpurged using a single-use disposable bailer. The samples were immediately delivered to an on-site mobile laboratory for analytical testing. The soil sample contained 640 mg/kg TPH-diesel. Benzene was detected in the groundwater sample at a concentration of 2.7 ug/L, slightly exceeding the cleanup goal of 1.0 ug/L; the other BTEX compounds and MTBE were not detected. Groundwater was measured at approximately 8.48 feet bgs.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, the vertical and horizontal extent of fuel-impacted soils has been delineated to the north, east, and south. The presence of Building 537 precluded assessment to the west. There is some uncertainty as to the lateral extent of fuel-impacted soil to the southeast, but is generally constrained by LIF locations to the south and east. Groundwater approximately 32 feet north by northwest (downgradient) of the former UST contains benzene at a level slightly in excess of the cleanup standard (2.7 ug/L). Comparing the benzene concentration in 1999 of 1.2 ug/L with the current result must be made knowing that the 1999 sample was collected approximately 80 feet northeast of the former UST location. The difference in both space and time make conclusions regarding a trend speculative. The current groundwater collection point is closer to the former UST and closer to the presumed downgradient direction. Thus, the observation is made that the current benzene level is relatively low. Similar to other sites at NAFEC, we expect that natural attenuation will continue to reduce benzene concentrations in groundwater.

Current data is lacking at and underneath Building 537. Thus, an estimate of contaminated soil extending to the west beneath the building cannot currently be calculated. Roughly 2 feet out from the roofline of Building 537, SCAPS data provides a good constraint of lateral and vertical extent of soil contamination. The contaminated area extends east approximately 35 feet and reaches a north-south extent of approximately 35 feet with an irregular boundary. The areal extent encompassed approximately 2,400 square feet. The approximate thickness is 2.5 feet. The estimated volume of contaminated soil remaining is 90 cubic yards (cy), exclusive of an unknown amount of contaminated soil underlying Building 537. However, it is reasonable to assume an additional quantity on that order of magnitude.

The greatest uncertainty regarding remediation is the unknown amount of contaminated soil under Building 537. According to NAFEC planners, this building is planned for demolition. Further delineation of contaminated soil would be made feasible following demolition, at which time excavation of contaminated soil could be performed.

It is the opinion of PWCSD that further assessment or remediation of groundwater at this site is unnecessary at this time. Therefore, we recommend that no further action for groundwater be considered for this site. For soil, we recommend that if demolition of Building 537 will occur within two years, that an assessment and remediation by soil excavation be performed at that time.

Site Characterization Information

Description of the former UST:	See Background Information (page 2).
Contaminants Identified:	TPH-diesel in soil. Benzene in groundwater. See attached analytical results tables.
Amount of Contaminants Leaked:	Not estimated. See attached analytical results tables.
MTBE:	None detected.
Description of the soil/geology:	Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? Soil contamination is delineated to the north, east, and south of the former UST. The extent of soil contamination to the west under Building 537 is not known. The depths of elevated levels of contamination range from approximately 11 to 14.5 feet. The highest measured TPH-diesel concentration detected during this investigation was 640 mg/kg. However, clipped LIF indicates higher TPH-diesel concentrations could be expected.

Estimated volume of contaminated soil left on site and concentration: Approximately 90 to 180 cy of TPH-diesel contaminated soil with an estimated concentration exceeding 1,000 mg/kg.

Is groundwater contamination completely delineated? Benzene concentration of 2.7 ug/L measured 32 feet north of the former UST location indicates that the approximate northerly (downgradient) extent of groundwater contamination is north of the sampling point. Current analytical results for groundwater show that MTBE and other constituents of concern are not detected.

Monitoring wells installed, properly permitted? No monitoring wells were installed.

Depth to groundwater: Approximately 8.5 feet bgs.

Is groundwater or surface water impacted? Yes. Analytical results for groundwater indicate benzene at 2.7 ug/L slightly exceeds the cleanup goal of 1.0 ug/L.

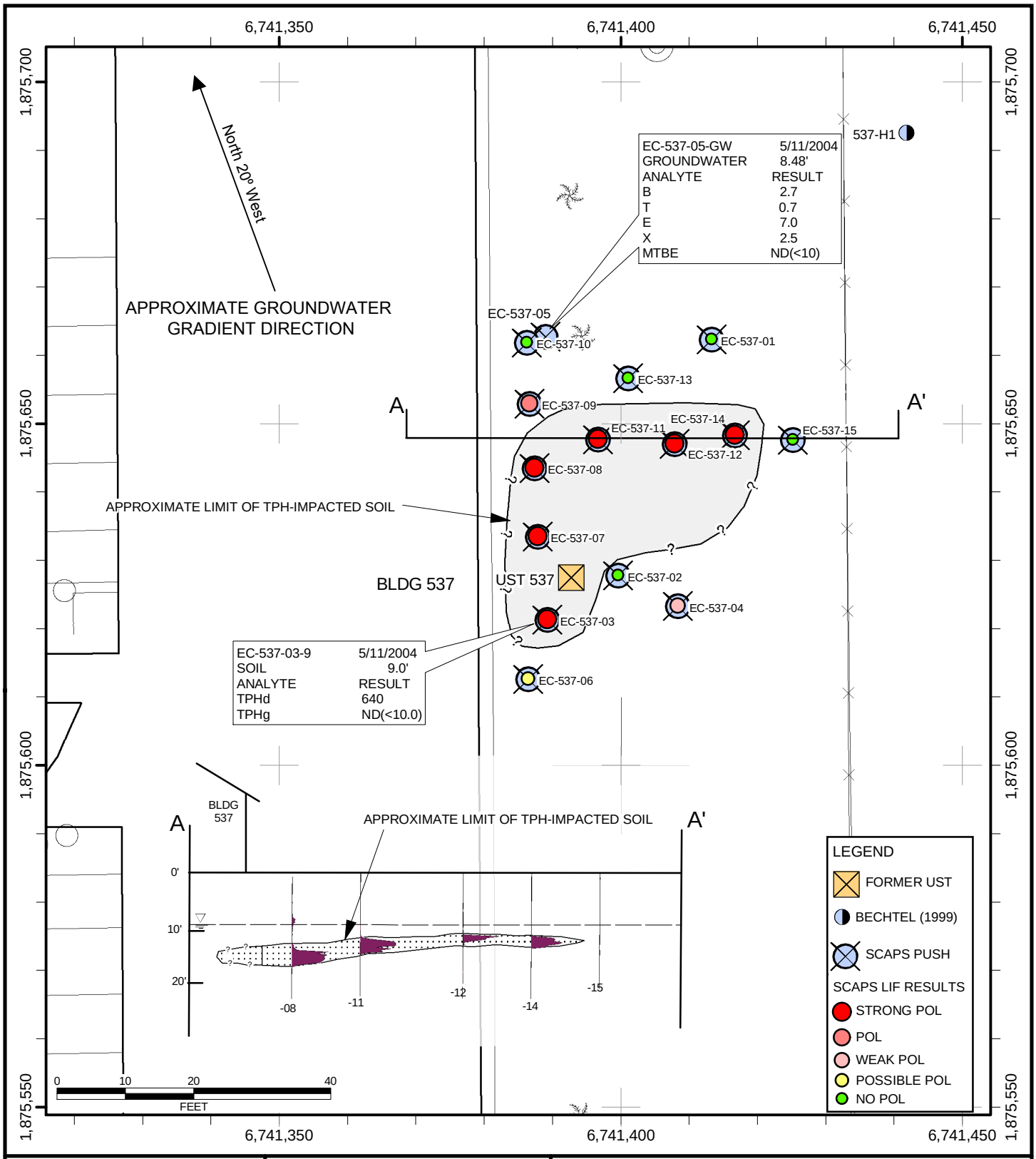
Remedial action taken? UST removed 1993.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Yes.

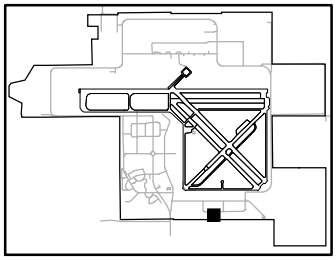
Site Recommendation for Closure: Groundwater benzene impact shown to be relatively close to the drinking water MCL, and a site that is landscaped or covered by a concrete building slab. Thus, the contaminants that may remain in groundwater do not pose an unacceptable risk to human health or the environment at this time. Due to uncertainties regarding contaminated soil underneath the building, when the building is demolished, the recommendation for soil assessment and remediation by excavation at this site is accepted. Following soil assessment and remediation, the recommendation for additional groundwater assessment to confirm contaminant levels is accepted.

Signature: ***Date:***	***Signature:*** ***Date:***
N.R. Wells **Lieutenant Commander, CEC, US Navy** **By direction of** **The Commanding Officer**	**Liann P. Chavez, R.G.** **Senior Engineering Geologist** **California Environmental Protection Agency** **California Regional Water Quality Control Board** **Colorado River Basin Region**

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS, Soil, and Groundwater Results
SCAPS Logs
Laboratory Analytical Report and Chain-of-Custody Documentation



OVERVIEW MAP - NAF EL CENTRO



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MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 537

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC4

FIGURE: 1

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence, Soil, and Groundwater Analytical Data Summary

UST Site 537
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-537-01	4/1/2004	19.3	21.8	2,852 @ 2.3	No POL		
EC-537-02	4/1/2004	19.3	21.7	4,576 @ 9.6	No POL		
EC-537-03	4/1/2004	19.5	21.8	89,109 @ 9.6	Strong POL		
EC-537-03-9	5/11/2004					9.0': TPHd: 640 mg/kg TPHg: <10 mg/kg	
EC-537-04	4/1/2004	19.3	21.6	8,756 @ 7.0	POL		
EC-537-05-GW	5/11/2004			*See EC-537-10 for associated LIF data.*		8.48': B: 2.7 ug/L T: 0.7 J ug/L E: 7.0 ug/L X: 2.5 ug/L MTBE: <10 ug/L	5.5'-15.5'
EC-537-06	5/13/2004	19.2	21.4	5,107 @ 12.7	Possible POL		
EC-537-07	5/13/2004	22.4	24.6	106,682 @ 13.4	Strong POL		
EC-537-08	5/13/2004	22.2	24.5	239,399 @ 13.6	Strong POL		
EC-537-09	5/13/2004	22.5	24.9	33,760 @ 10.9	POL		
EC-537-10	5/13/2004	19.2	21.3	3,004 @ 10.7	No POL		
EC-537-11	5/13/2004	22.4	24.7	234,695 @ 13.3	Strong POL		
EC-537-12	5/13/2004	22.7	25.0	238,362 @ 12.9	Strong POL		
EC-537-13	5/13/2004	19.1	21.4	2,516 @ 10.2	No POL		
EC-537-14	5/13/2004	19.0	21.2	205,996 @ 12.6	Strong POL		
EC-537-15	5/13/2004	18.9	21.1	3,059 @ 9.9	No POL		

Notes listed on following page.

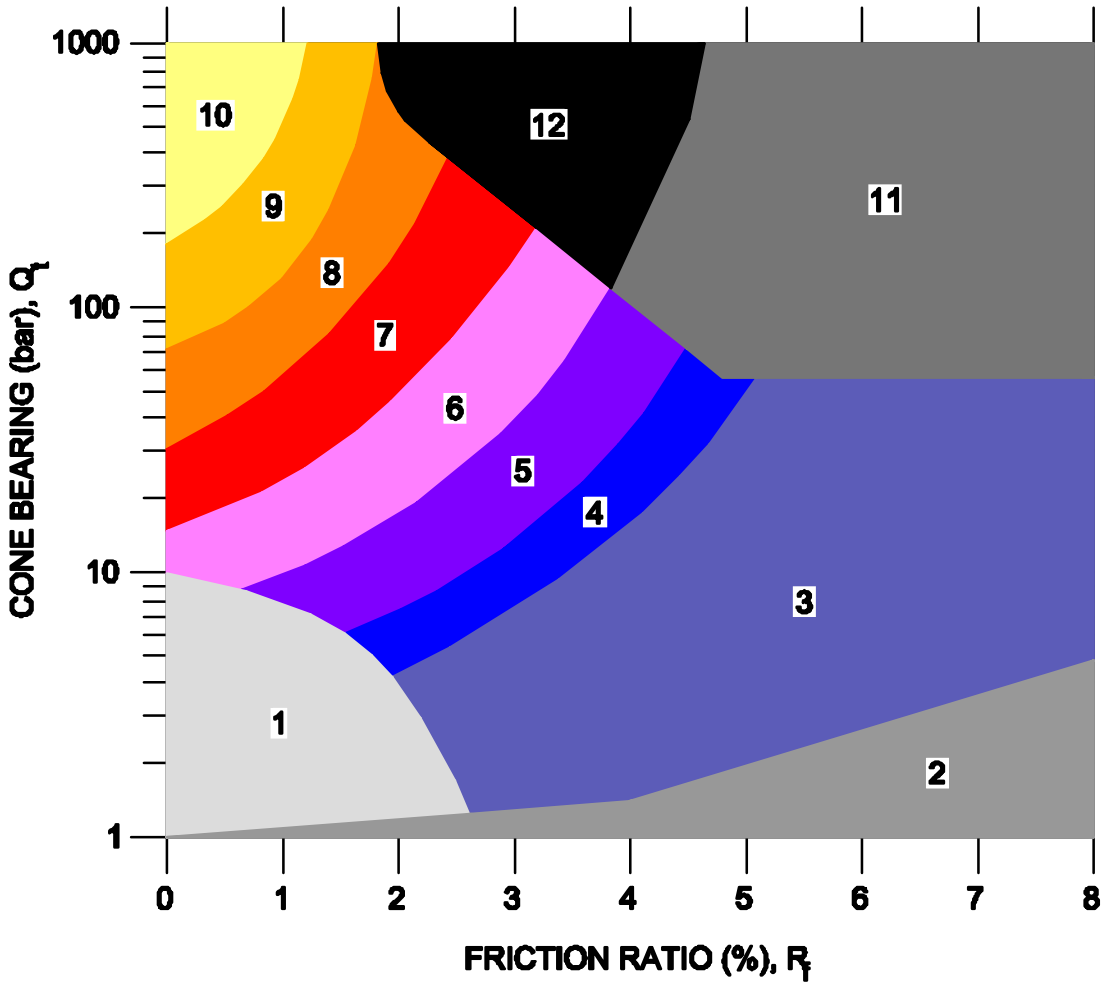
Table 2 - SCAPS Fluorescence, Soil, and Groundwater Analytical Data Summary

UST Site 537
Naval Air Facility, El Centro

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

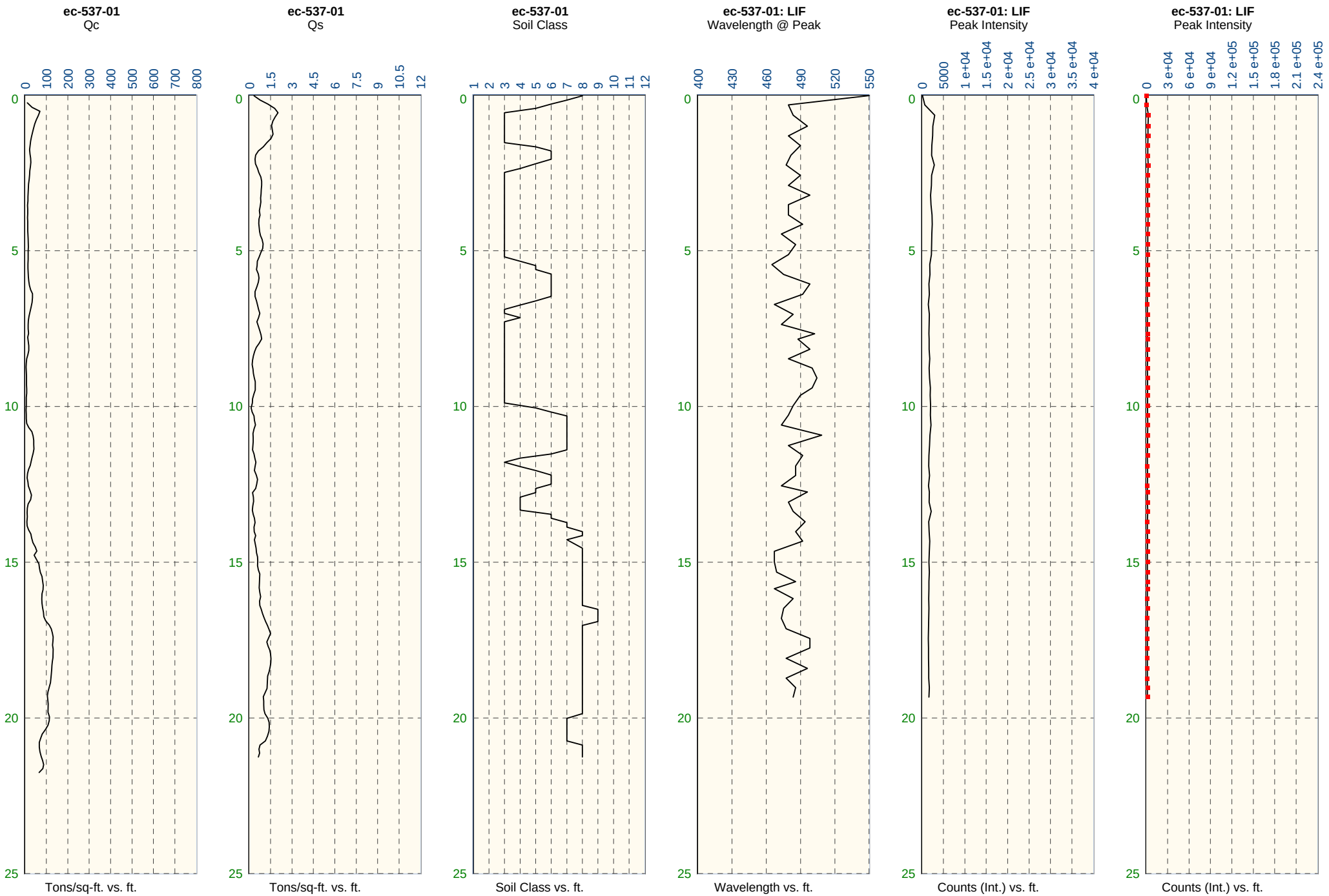
CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)

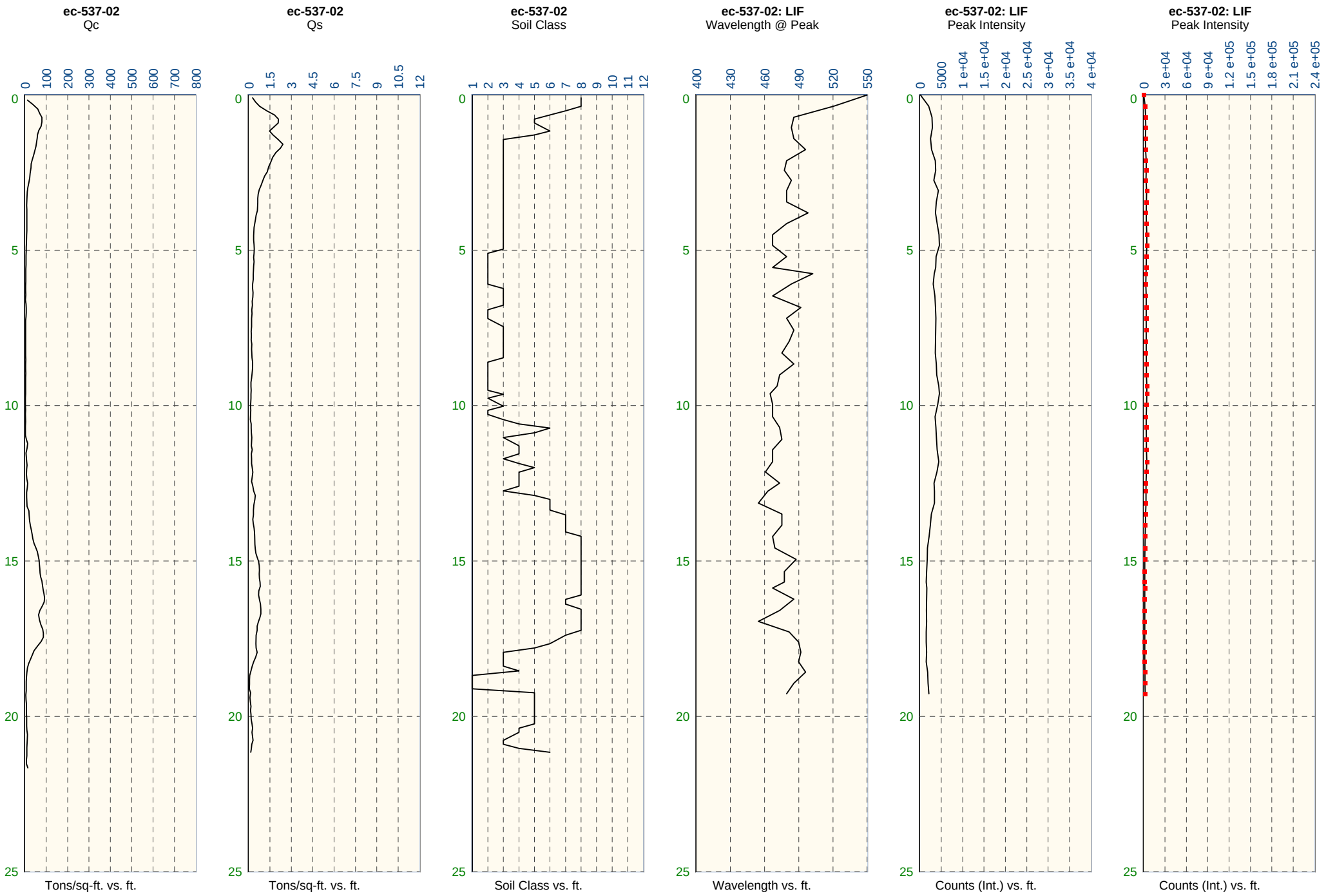


Friction Ratio (R_f) = Sleeve Friction (F_s)/Cone Pressure (Q_t) x 100%
1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

Zone		Q_t/ 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


ec-537-01
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-537-01
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-537-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-537-01: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-537-01: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-537-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.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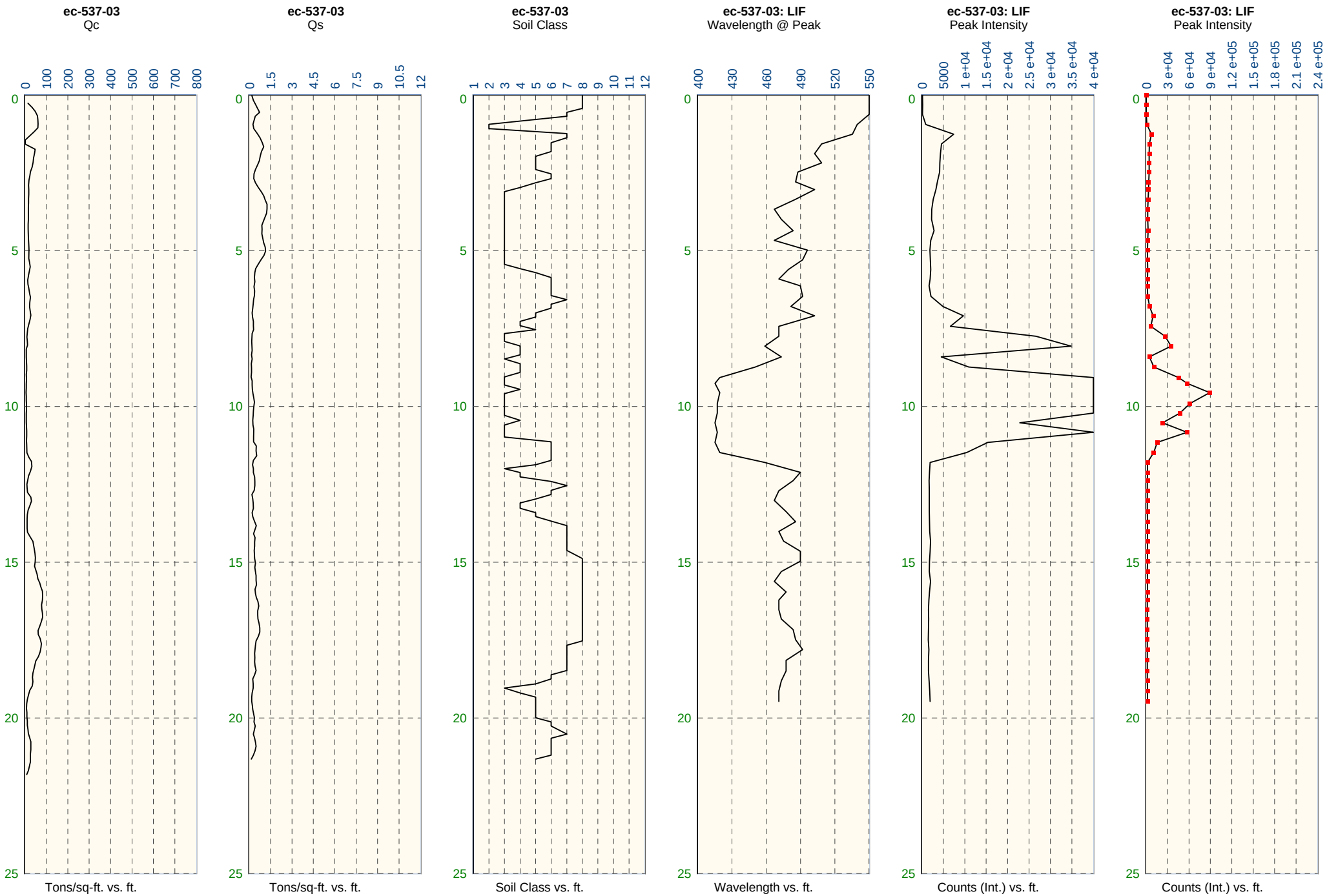
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-537-02
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-537-02
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-537-02: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-537-02: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-537-02: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.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Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-537-03
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-537-03
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-537-03: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-537-03: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-537-03: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
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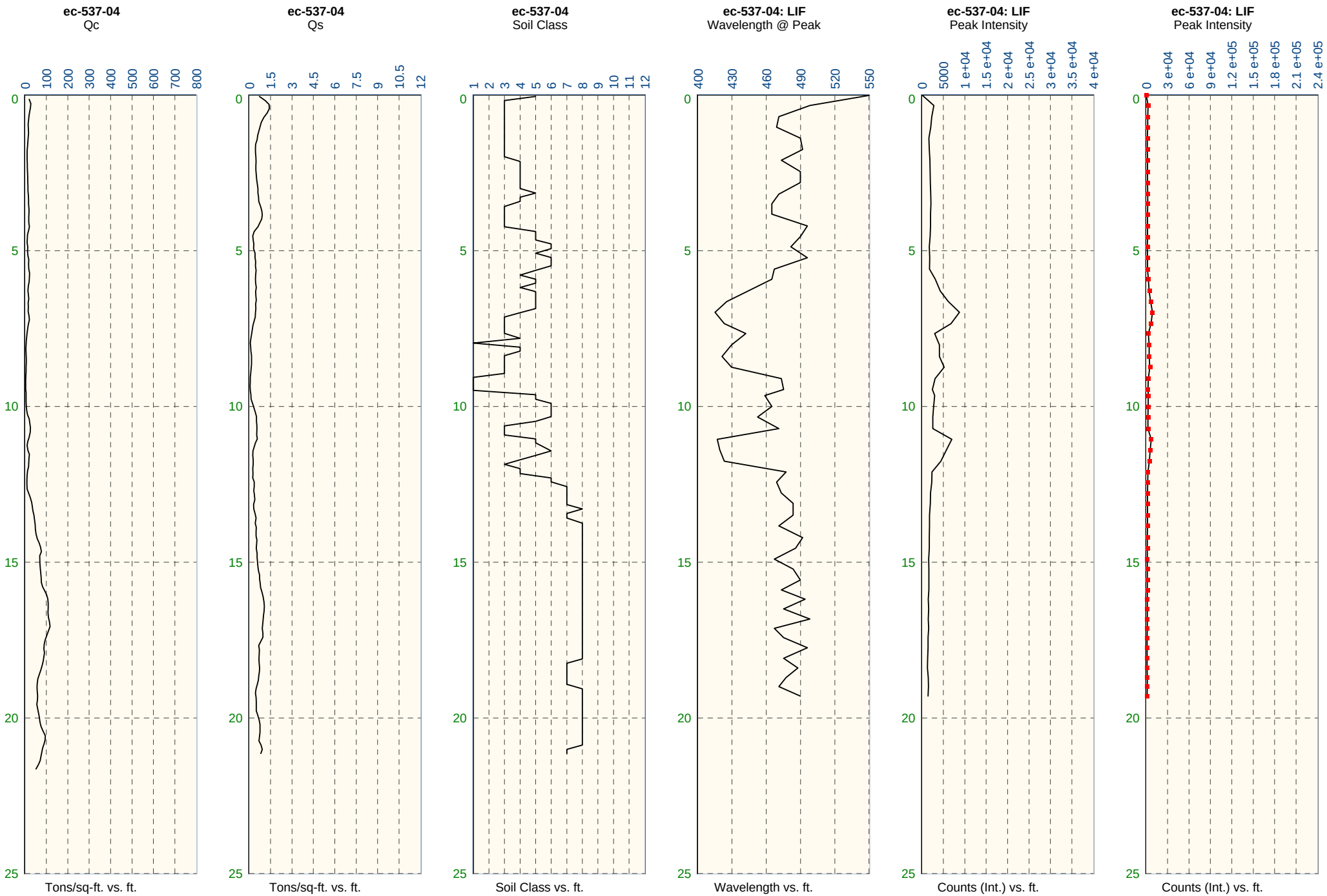
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Tons/sq-ft. vs. ft.
ec-537-04
Qs
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Tons/sq-ft. vs. ft.
ec-537-04
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-537-04: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-537-04: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
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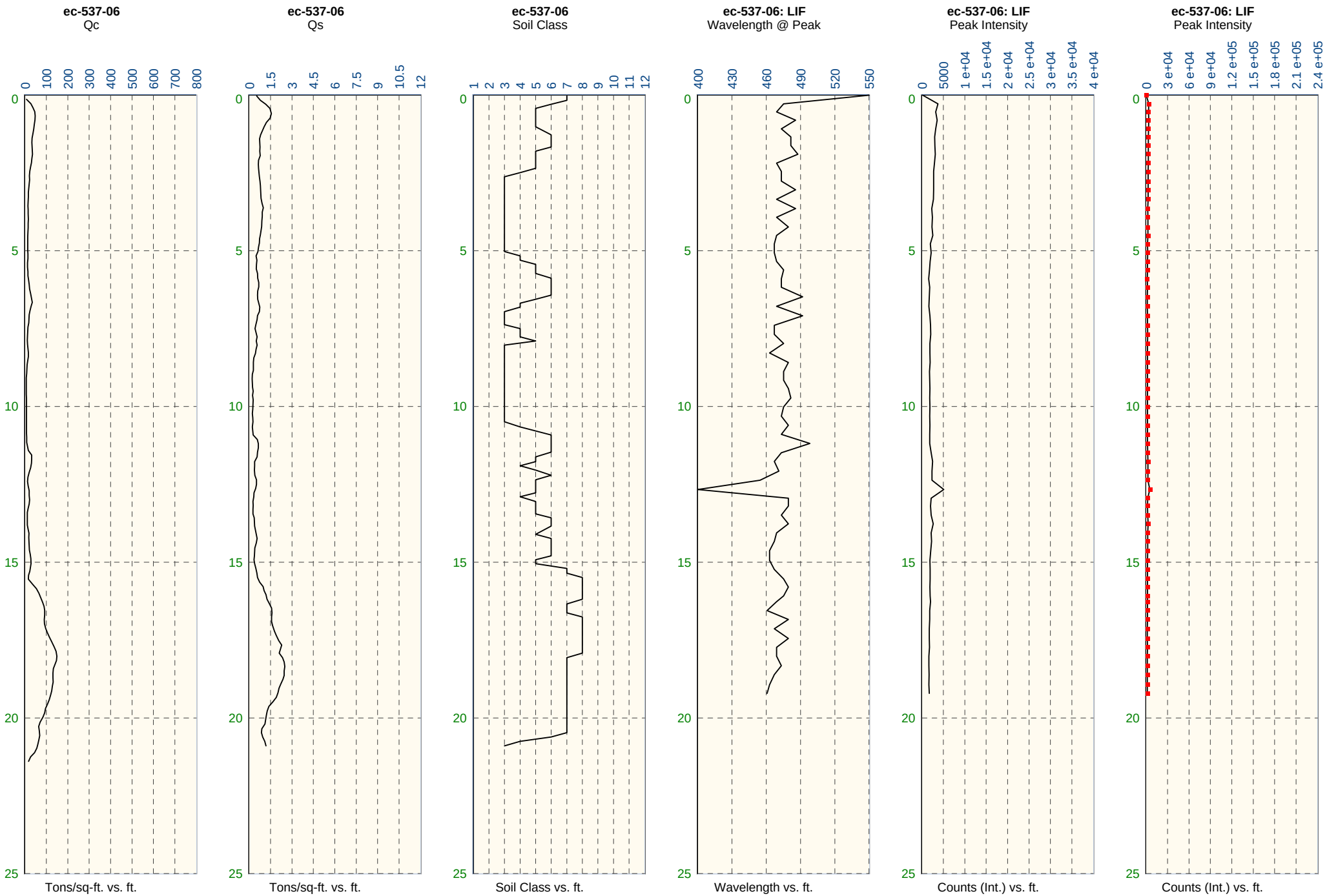
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25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Tons/sq-ft. vs. ft.
ec-537-06
Qs
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0 5 10 15 20 25
Tons/sq-ft. vs. ft.
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Soil Class
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0 5 10 15 20 25
Soil Class vs. ft.
ec-537-06: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-537-06: LIF
Peak Intensity
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0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-537-06: LIF
Peak Intensity
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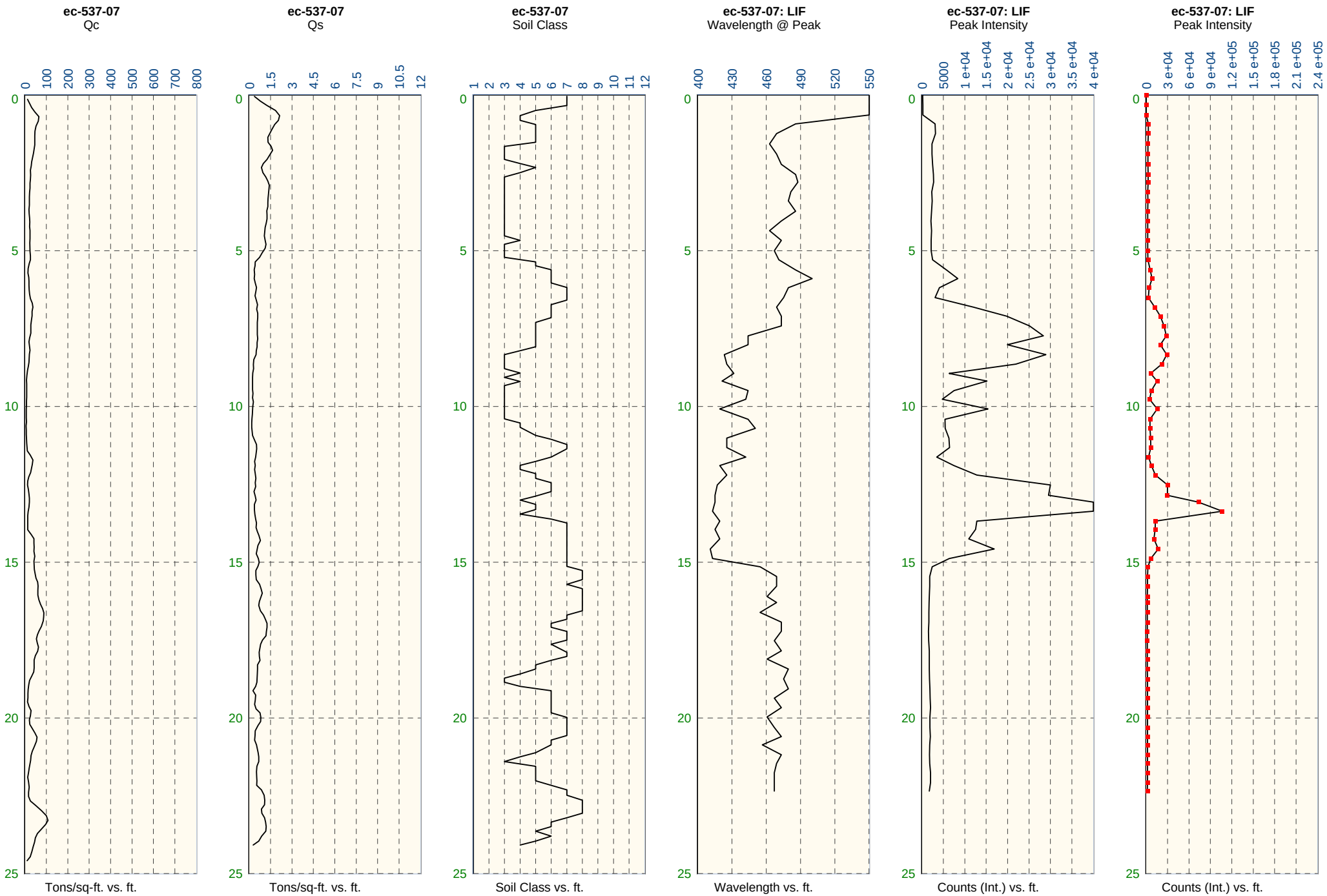
Counts (Int.) vs. ft.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ec-537-07
Qs
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0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-537-07
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-537-07: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-537-07: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-537-07: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
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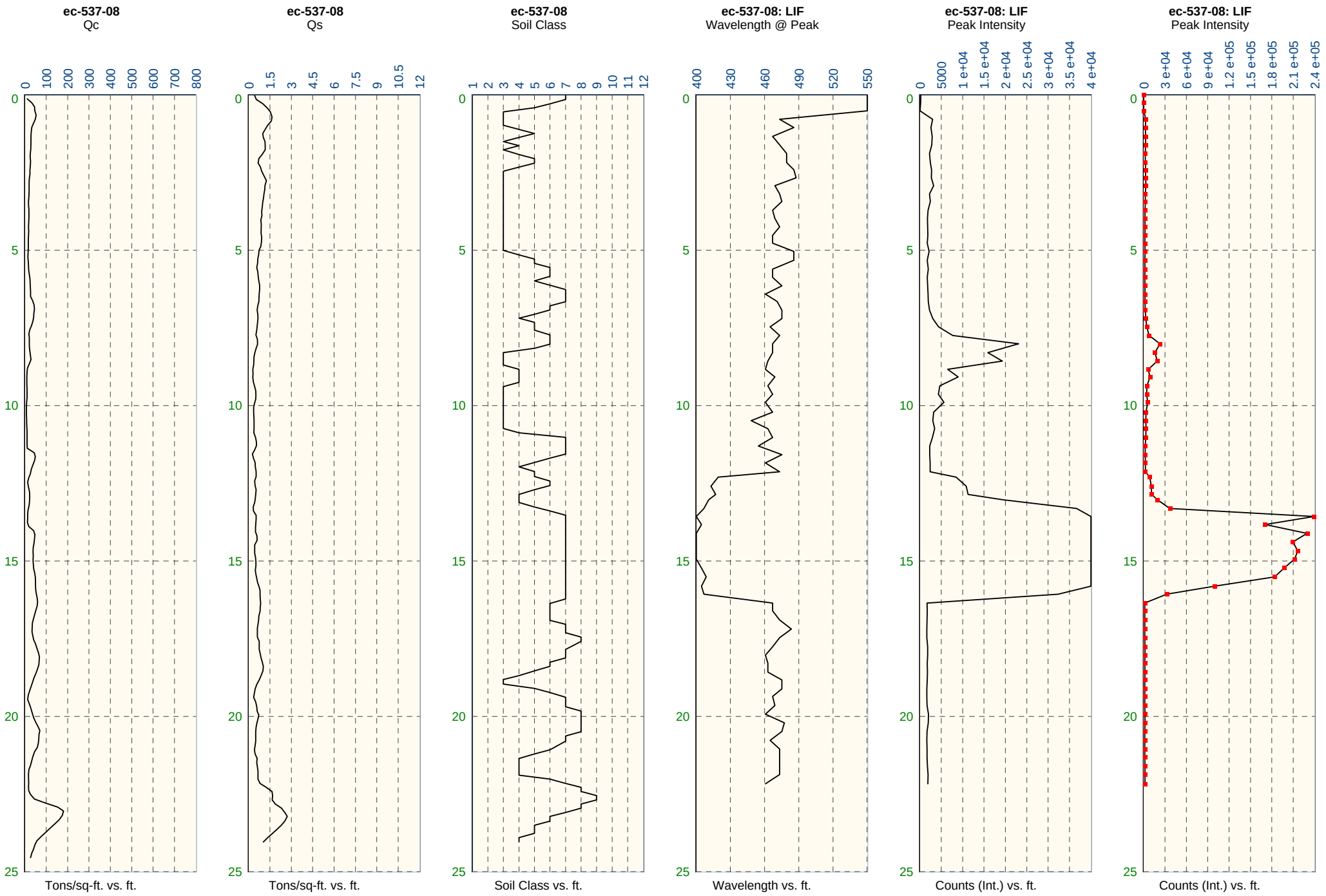
Counts (Int.) vs. ft.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ec-537-08
Qs
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0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-537-08
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-537-08: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-537-08: LIF
Peak Intensity
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0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-537-08: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
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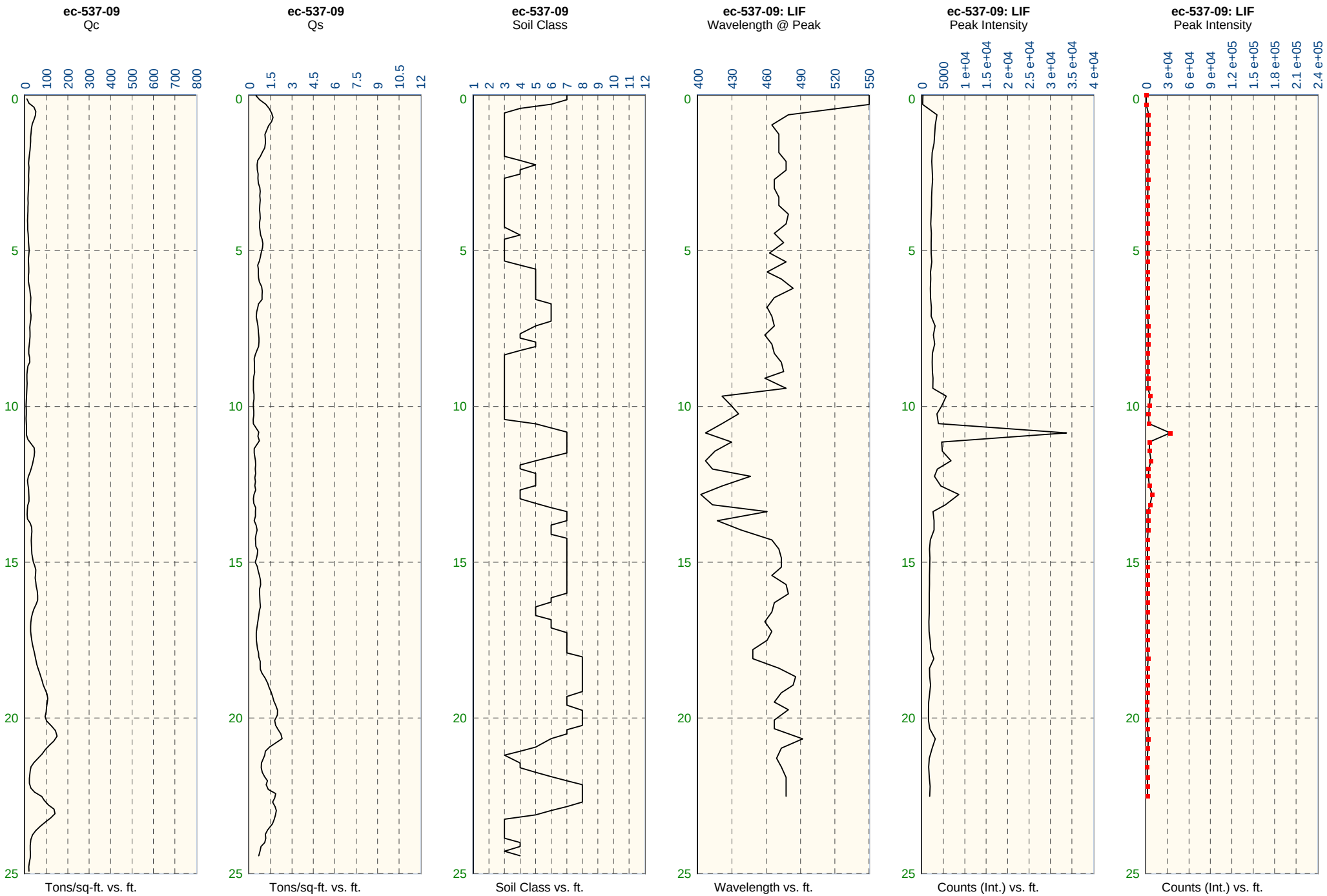
Counts (Int.) vs. ft.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Counts (Int.) vs. ft.
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Counts (Int.) vs. ft.
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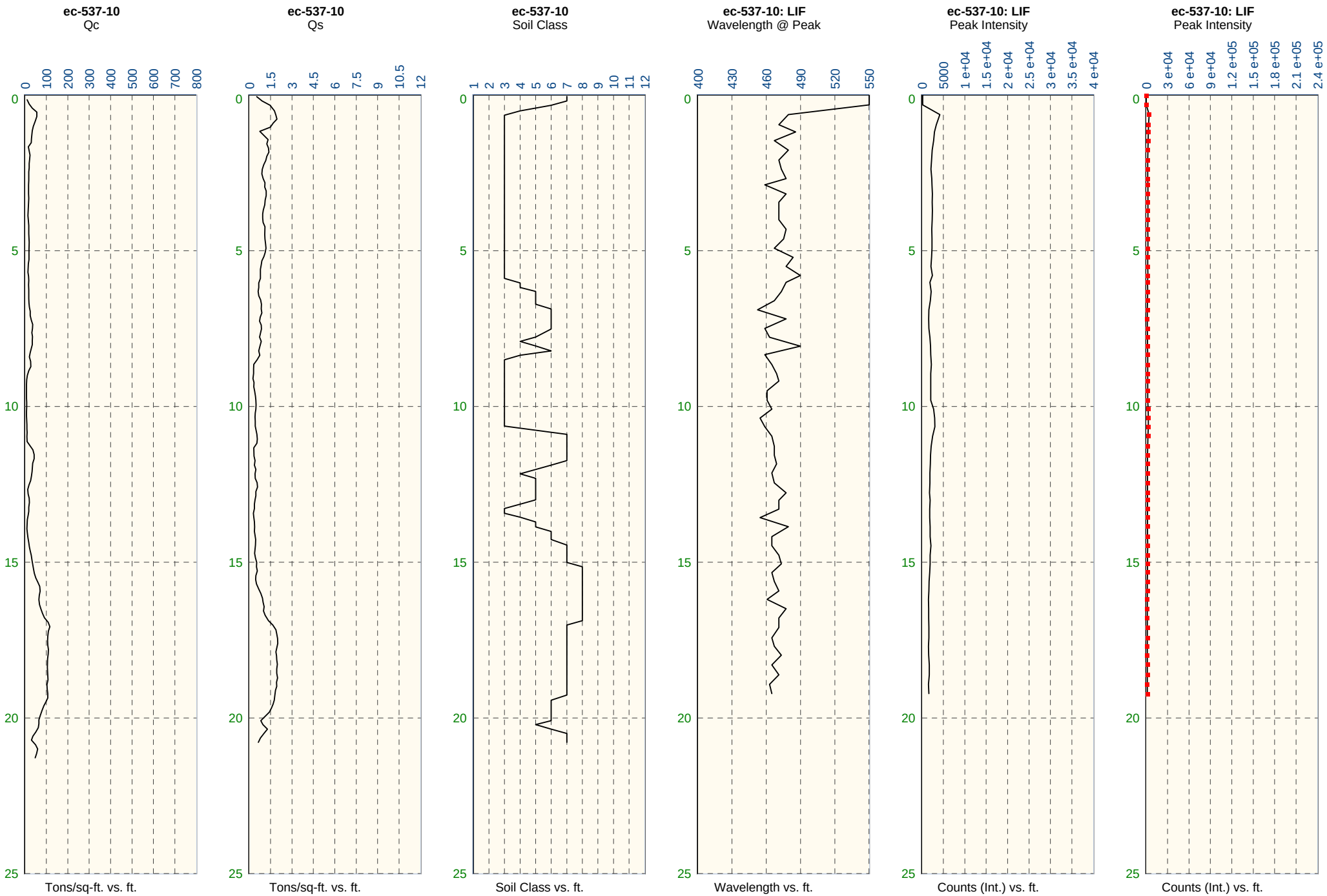
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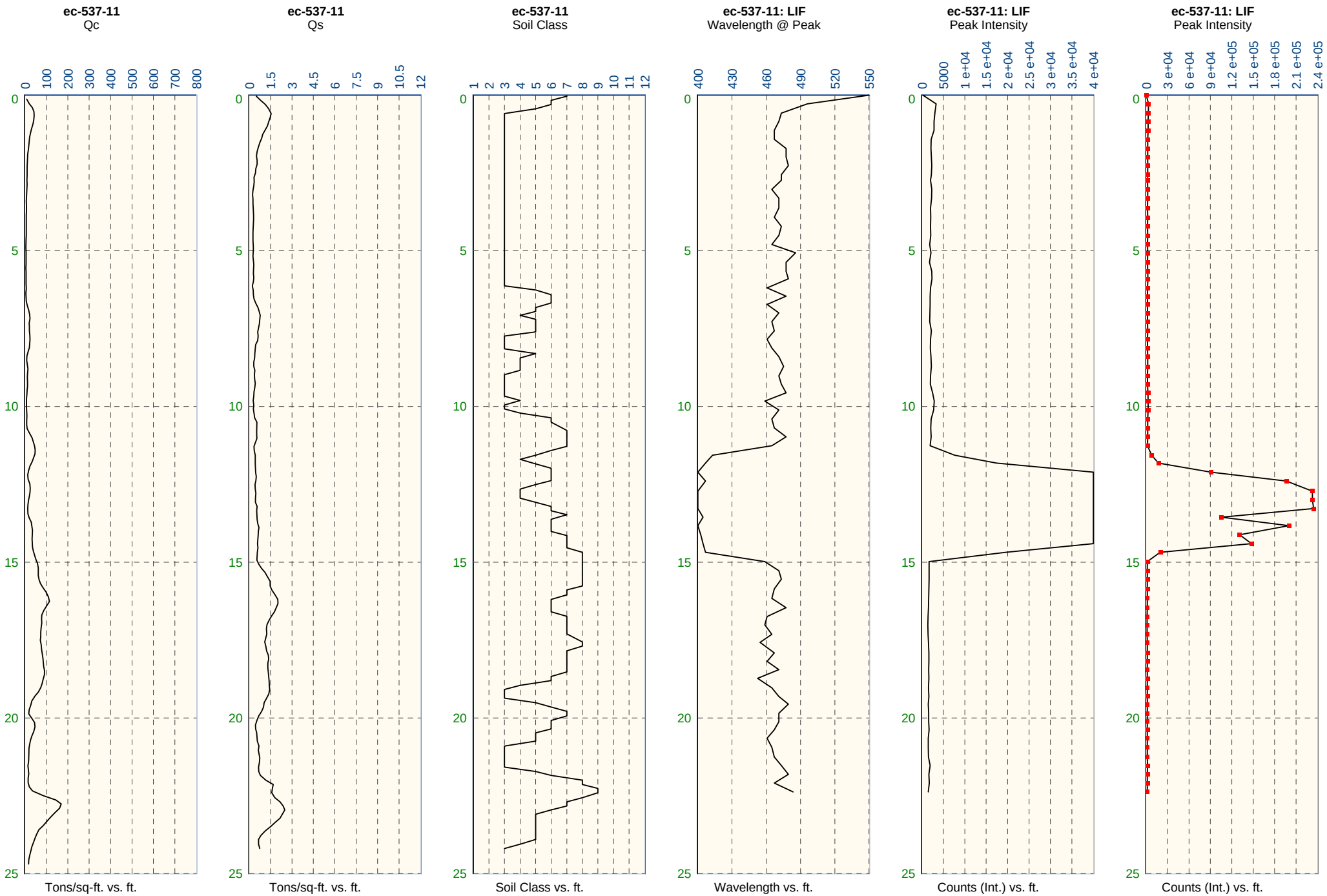
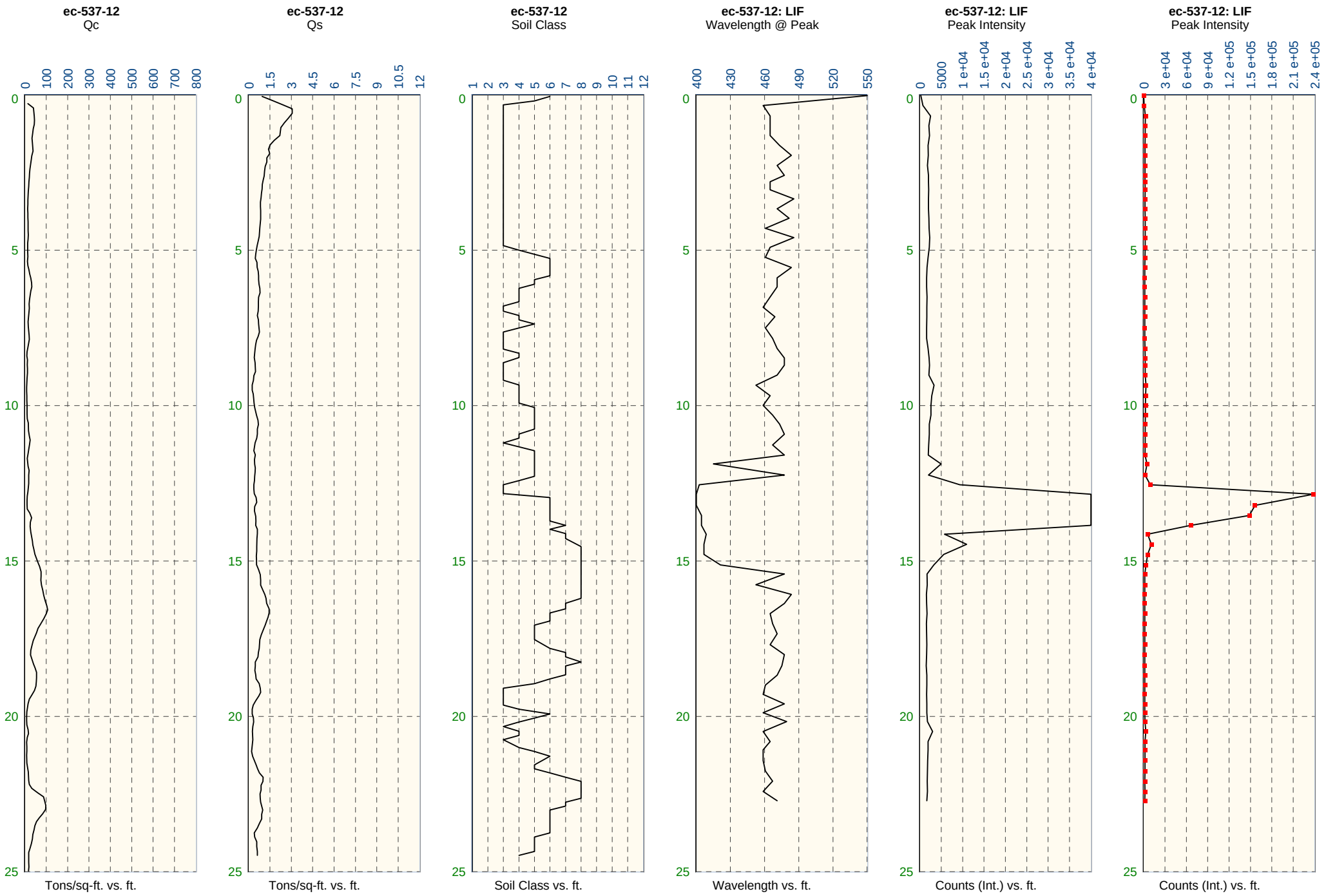
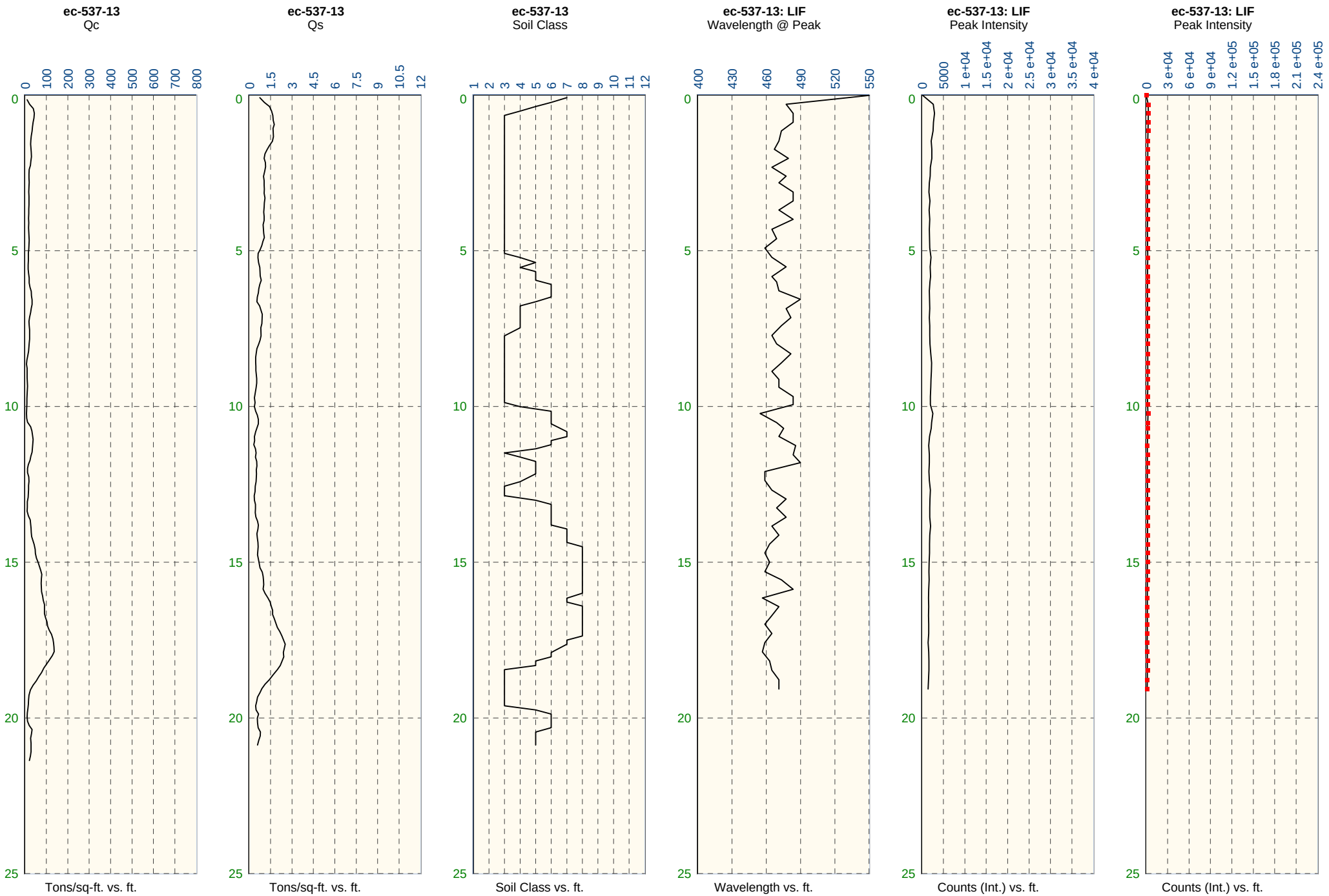
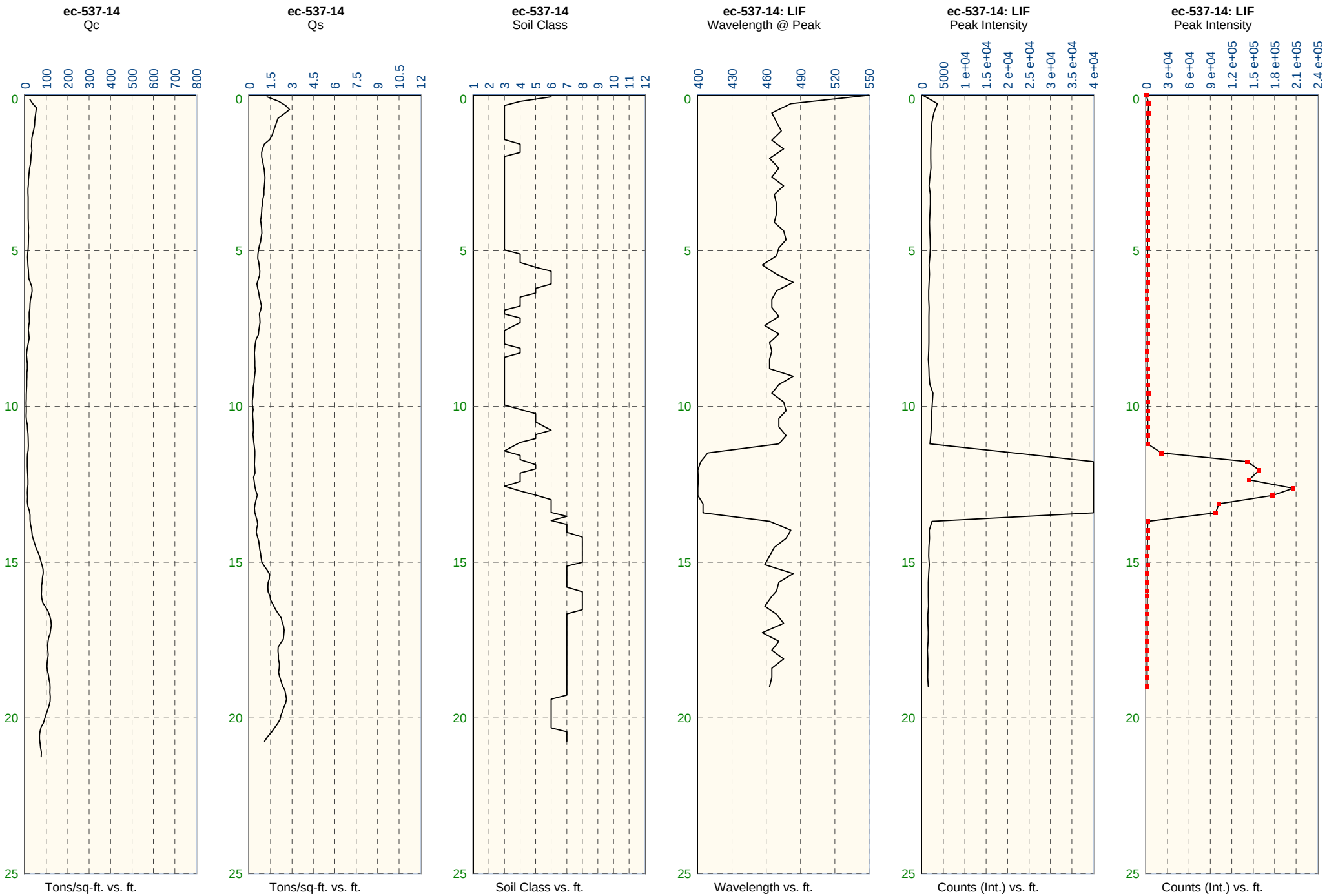
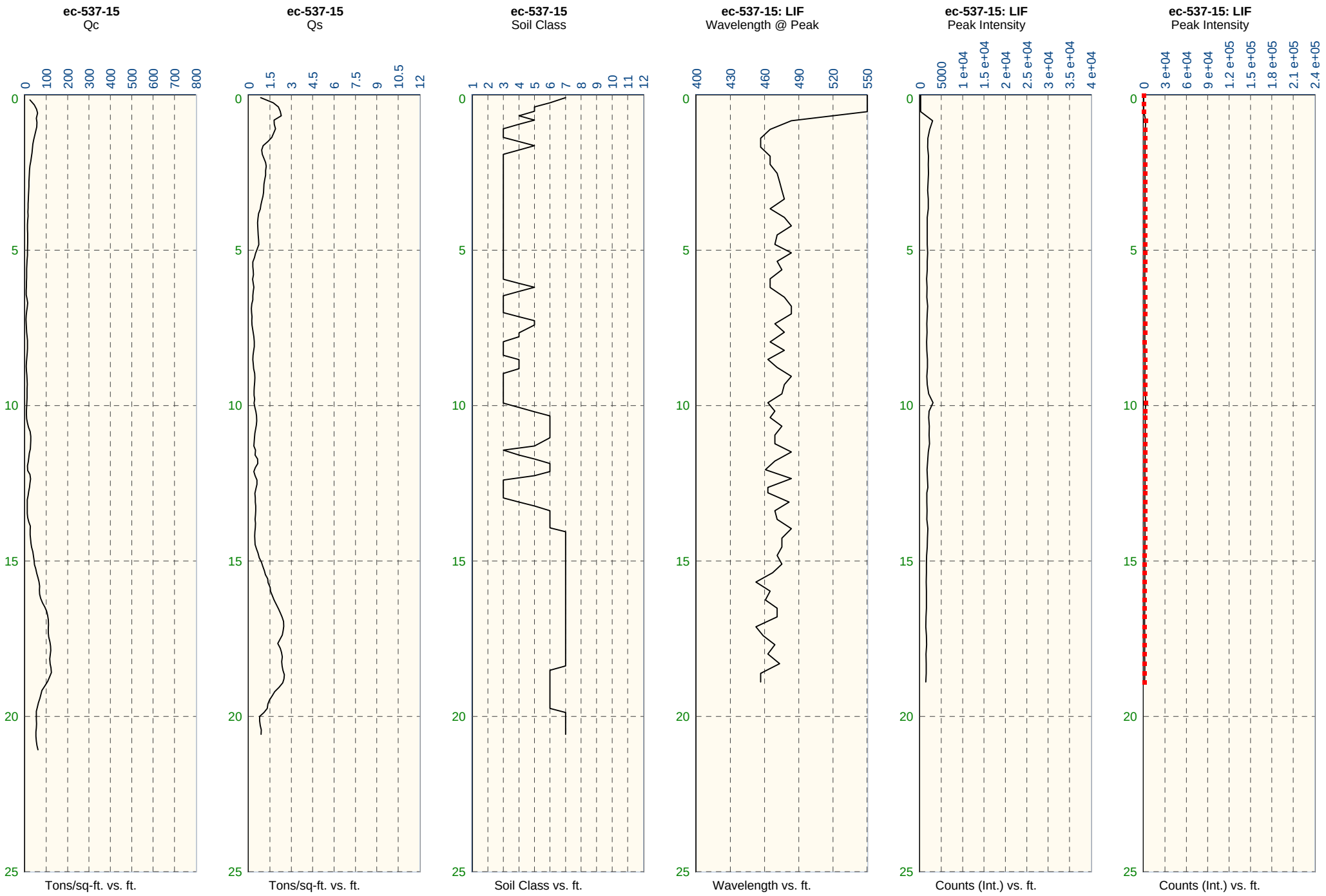
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-537-10
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-537-10
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-537-10: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-537-10: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-537-10: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-537-11
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-537-11
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-537-11
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-537-11: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-537-11: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-537-11: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-537-12
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-537-12
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-537-12
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-537-12: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-537-12: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-537-12: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-537-13
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-537-13
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-537-13
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-537-13: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-537-13: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-537-13: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-537-14
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-537-14
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-537-14
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-537-14: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-537-14: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-537-14: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-537-15
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-537-15
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-537-15
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-537-15: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-537-15: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-537-15: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25

MOBILE GEOCHEMISTRY
H&P

May 20, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – NAS – SITE 537 – EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP051104W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1317).

Project Summary

The following analyses were conducted:

- 1 soil for total petroleum hydrocarbons (TPH) by DHS LUFT/8015M Method
- 1 water for volatile aromatic hydrocarbons (BTEX) & MTBE by EPA Method 8021B

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Blayne Hartman

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
2373 208th Street, Suite F-1, Torrance, California 90501 | 310 782.2929 — Fax 310 782.2798
www.HandPmg.com | 1-800-834-9888

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NAVY PUBLIC WORKS PROJECT #1113621902008
NAS
SITE 537
EL CENTRO, CA

H&P Project #NP051104-W1

TPH (DHS LUFT/ 8015M Method) ANALYSES OF SOILS

SAMPLE NUMBER	DATE ANALYZED	TPH-GAS C5-C11 (mg/kg)	TPH-DIESEL C12-C24 (mg/kg)
METHOD BLANK	5/11/2004	ND	ND
EC-537-3-09	5/11/2004	ND	640
DETECTION LIMITS		10	10

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
5-26-2004

MOBILE GEOCHEMISTRY

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NAVY PUBLIC WORKS PROJECT #1113621902008
NAS
SITE 537
EL CENTRO, CA

H&P Project #NP051104-W1

BTEX, MTBE (EPA Method 8020 Modified) ANALYSES OF WATERS

SAMPLE NUMBER	DATE ANALYZED	MTBE (ug/l)	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYLBENZ (ug/l)	XYLENES (ug/l)	SURROGATE (%REC)
METHOD BLANK	5/11/2004	ND	ND	ND	ND	ND	110
EC-537-05-GW	5/11/2004	ND	2.7	0.7 J	7.0	2.5	90
REPORTING LIMITS		10.0	1.0	1.0	1.0	1.0	53%-145%
DETECTION LIMITS		1.0	0.5	0.5	0.5	0.5	

J INDICATES VALUE DETERMINED IS BETWEEN DETECTION LIMIT AND REPORTING LIMIT

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
5-26-2004

MOBILE GEOCHEMISTRY

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QA/QC REPORT - CALIBRATION DATA

H&P Project #NP051104-W1
DAILY CALIBRATION DATE : 05/11/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ppm)	WATER (ppb)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
TPH GASOLINE - FID1	10-20000	330-660000	7/14/2003	0.878	6.1%	236	0.847	3.5%	229	0.830	5.5%
TPH GASOLINE - FID2	10-20000	330-660000	7/14/2003	0.580	11.9%	378	0.529	8.7%	357	0.538	7.3%
TPH GASOLINE - FID3	10-20000	330-660000	7/14/2003	0.696	10.4%	291	0.687	1.3%	300	0.658	5.5%
TPH DIESEL - FID1	10 - 50000	330 - 1650000	7/11/2003	1.014	9.5%	487	1.027	1.2%	493	1.022	0.8%
TPH DIESEL - FID2	10 - 50000	330 - 1650000	7/11/2003	0.690	13.3%	752	0.665	3.6%	725	0.696	1.0%
TPH DIESEL - FID3	10 - 50000	330 - 1650000	7/11/2003	0.723	7.9%	647	0.773	6.9%	676	0.754	4.3%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP051104-W1
DAILY CALIBRATION DATE : 05/11/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ug/kg)	WATER (ug/L)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
MTBE	500 - 25	2500 - 125	4/2/2004	3.07	7.2%	272	2.72	11.3%	323	3.23	5.4%
BENZENE	500 - 25	2500 - 125	5/6/2004	9.44	11.6%	1,023	10.23	8.3%	840	8.40	11.0%
TOLUENE	500 - 25	2500 - 125	5/6/2004	17.80	12.5%	1,702	17.02	4.4%	1,546	15.46	13.2%
TFT	500 - 25	2500 - 125	5/6/2004	5.49	9.8%	556	5.56	1.4%	471	4.71	14.1%
ETHYLBENZENE	500 - 25	2500 - 125	5/6/2004	15.77	5.6%	1,528	15.28	3.1%	1,447	14.47	8.2%
m&p-XYLENES	500 - 25	2500 - 125	5/6/2004	20.54	8.8%	1,896	18.96	7.7%	1,747	17.47	15.0%
o-XYLENES	500 - 25	2500 - 125	5/6/2004	16.61	7.7%	1,553	15.53	6.5%	1,498	14.98	9.8%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR SOILS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (mg/kg)	MS CONC (mg/kg)	%REC MS	MSD CONC (mg/kg)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	211	105.5%	212	106.0%	0.5%	15%	75% - 125%
TPH DIESEL	500	483	96.6%	511	102.2%	5.6%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

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QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR WATERS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	MS CONC (ug/L)	%REC MS	MSD CONC (ug/L)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	21.5	107.5%	21.8	109.0%	1.4%	15%	75% - 125%
BENZENE	20.0	18.8	94.0%	18.4	92.0%	2.2%	15%	75% - 125%
TOLUENE	20.0	17.4	87.0%	17.1	85.5%	1.7%	15%	75% - 125%
ETHYLBENZENE	20.0	19.2	96.0%	18.8	94.0%	2.1%	15%	75% - 125%
TOTAL XYLENES	40.0	34.5	86.3%	33.8	84.5%	2.0%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

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QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR SOILS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (mg/kg)	LCS CONC (mg/kg)	%REC LCS	LCSD CONC (mg/kg)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	212	106.0%	213	106.5%	0.5%	15%	75% - 125%
TPH DIESEL	500	505	101.0%	487	97.4%	3.6%	15%	75% - 125%

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR WATERS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	LCS CONC (ug/L)	%REC LCS	LCSD CONC (ug/L)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	19.8	99.0%	19.6	98.0%	1.0%	15%	75% - 125%
BENZENE	20.0	18.8	94.0%	18.4	92.0%	2.2%	15%	75% - 125%
TOLUENE	20.0	17.5	87.5%	17.2	86.0%	1.7%	15%	75% - 125%
ETHYLBENZENE	20.0	19.9	99.5%	18.7	93.5%	6.2%	15%	75% - 125%
TOTAL XYLENES	40.0	37.9	94.8%	34.9	87.3%	8.2%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

Chain of Custody Record

D

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469
☒ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404
☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 5-11-04
H&P Project #: NP051104-W1
Outside Lab:

Client: Navy Public Works Code 980
Address: 2730 McKean Suite 1 Site 537
SD
Phone: 619-524-6967 Fax: 619524-6000

Collector: D Bloom
Page: 5 Of 6
Client Project #: 113621902008
Project Manager: D. Bloom
Location: NAS El Centro Site 537
Turn around time:

Global ID: T0602539165
EDF: (Yes) No

Sample Receipt
Intact: ☐ Yes ☐ No
Seal Intact: ☐ Yes ☐ No ☐ N/A
Cold: ☐ Yes ☐ No
(N/A) (Received on Site)

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B: BTEX / Oxygenates	8260B: Oxygenates	8260B: VOC's	8260B: VOC's and Oxygenates	Methane	Fixed Gases							Total # of containers
EC-537-05	GW		1140	5/11	W	V			X															
EC-537-3-09			1135		SOIL	sleeve	X																	

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
David M Bloom	Code 980	James Villarreal	H&P	5-11-04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constitu[illegible]horization to proceed with analysis and acceptance of condition on back.

Sample disposal i[illegible]ion: ☐ *Disposal @ $2.00 each* ☐ *Return to client* ☐ *Pickup*

Site Assessment Report and
Closure Summary
UST Site 547
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 547 at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 537 work plan addendum, dated March 18, 2004, prepared by the Public Works Center San Diego (PWCSD). Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 547. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 547
Site Address:	Southwest corner of 7th and "E" Streets Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,742,794 Northing: 1,875,719 feet (State Plane 6)
Facility Name:	KBR Corp. Storage Yard (Former barracks)
Property Owner: Tank Owner/Operator: Responsible Party:	United States Navy United States Navy United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430053

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	Unknown
Construction Materials:	Concrete
Capacity:	1,400 gallons
Contents:	Diesel
Year Removed:	No information

Figure 1 shows the site location and previous and current assessment locations.

Under the direction of SOTA Environmental Technology, Inc. (SOTA), Subsurface Surveys, Inc., performed a geophysical survey to locate USTs at NAF El Centro in January 1997 (SOTA, 1997). SOTA reported a possible candidate tank anomaly slightly east of suspected UST 547. Subsequent confirmation with an air knife indicated a probable junction of two stormdrains.

Bechtel National, Inc. (BNI) advanced one direct-push soil/HydroPunch groundwater boring at the location of UST Site 547 and collected a soil and a groundwater sample. According to the *Final Technical Memorandum No. 2, Underground Storage Tank Site Investigation,* dated November 2000, prepared by BNI, the groundwater sample was collected from a depth range of 14.5 to 18 feet below ground surface (bgs), and the analytical results indicated that constituents of concern were either not detected or were detected below project action levels. The soil sample, collected from depths of 4.4 to 4.9 feet bgs revealed total petroleum hydrocarbons quantitated as diesel (TPH-diesel) at a concentration of 2,300 mg/kg.

In May 2003, PWCSD Code 980 investigated Site 547 for the presence of a UST. Two faint electromagnetic anomalies using EM-61 equipment indicated possible tank locations. In June 2003, PWCSD potholed the two locations using a backhoe. No tank was found. The electromagnetic signal and pothole locations are shown on Figure 1.

PWC Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Soil exceeds cleanup levels for TPH-diesel.* We also addressed a RWQCB concern outlined in a May 6, 2004, letter to test for constituents of concern in a groundwater sample collected downgradient of the former tank location from an interval screened across the water table. Field activities were performed on April 1 and May 11, 2004.

In accordance with the work plan, Laser Induced Fluorescence (LIF) was measured *in situ* using the Site Characterization and Analysis Penetrometer System (SCAPS) at nine locations as shown on Figure 1. The LIF data are summarized and interpreted in Table 2. At one of the locations, EC-547-06, no fluorescence characteristic of petroleum, oil, or lubricants (POL) was encountered. Three locations showed single measurements (representing approximately 0.3 feet vertical thickness) characterized by a slightly elevated intensity suggesting possible POL. Two of these locations showed a corresponding drop in wavelength, which is an additional factor suggesting POL fluorescence. Relatively high fluorescence intensities coupled with a drop in wavelength, characteristic of strong POL fluorescence, was encountered at three locations. Elevated fluorescence intensity with a wavelength drop, characteristic of POL fluorescence, was encountered at one other location. In general, the elevated fluorescence is distributed in two depth intervals. The shallower interval is seen at locations EC-547-

02 and –04, and is strongest in the 6 to 7 foot range at location EC-547-04. This shallow fluorescence appears to be relatively limited in lateral extent to the proximity of the former UST and supply line. The deeper interval extends farther southeast, is characterized by elevated fluorescence in an interval ranging from less than 1 foot thick to approximately 6 feet thick at depths ranging from 12 to 17 feet bgs.

Soil samples were collected at locations EC-547-03, -04, and -05 at the depths indicated with results on Table 2. The samples were collected within 3 lateral feet of the associated LIF push location. At location EC-547-03, the sample of clayey silt from 8 feet bgs (above the fluorescence interval) had a TPH diesel concentration of 640 mg/kg, while the sample of silty sand from 14 feet bgs (within the fluorescence interval) had 1,550 mg/kg TPH-diesel. At location EC-547-04, the sample of clayey silt from 6 feet bgs (within the fluorescence interval) had a TPH diesel concentration of 8,300 mg/kg. At location EC-547-05, samples were collected from intervals of background fluorescence at depths of 6.5 and 14 feet bgs. The TPH-diesel concentrations were 190 mg/kg and non-detect, respectively. The LIF is known to be more sensitive in matrices with relatively low surface area, such as sand, and less sensitive in matrices with high surface area, such as clay. The analytical results from the site confirm this. If it is assumed that lateral heterogeneity is not a significant factor, the soil sample results suggests that the LIF detection threshold in clayey silt at this site is above 640 mg/kg. The analytical results compared with the fluorescence from the silty sand at 14 feet bgs suggest that the fluorescence detection threshold in silty sand at the site is much lower than 1,000 mg/kg for TPH-diesel.

A groundwater sample was collected from a temporary well screened with 0.010-inch slot ¾-inch diameter PVC from 7.0 to 17.0 feet bgs at location EC-547-04. The groundwater grab sample was collected unpurged using a single-use disposable bailer. Samples were immediately delivered to an on-site mobile laboratory for analytical testing. Groundwater analytical results revealed BTEX compounds below their respective cleanup levels, and MTBE was not detected. Groundwater was measured at approximately 7.7 feet bgs. The temporary well was abandoned by grouting in place.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, the vertical and horizontal extent of fuel-impacted soils has been fairly well delineated. There is some uncertainty as to the lateral extent of fuel-impacted soil in the vicinity of EC-547-04, and the vertical extent in the vicinity of EC-547-03-14. However, the LIF results show the impacted layer is overall relatively thin, approximately 0.3 foot between 6.04 and 6.32 feet bgs. Groundwater collected from the same location showed benzene levels below the cleanup level which further indicates impact related to the shallower zone of contamination has had little to no effect on groundwater.

We estimate approximately 80 cubic yards of contaminated soil containing TPH-diesel concentrations greater than 1,000 mg/kg remains at the site. Our estimate assumes an impacted extent using a 30-foot diameter circle centered roughly on EC-547-03 (the approximate location of the former UST). The depth of contamination is assumed to be a thickness of 3 feet across the circle.

It is the opinion of PWCSD that further assessment or remediation of groundwater at this site is unnecessary at this time. Therefore, we recommend that no further action for groundwater be considered for this site. For soil, we recommend remediation by soil excavation.

Site Characterization Information

Description of the former UST:	See Background Information (page 2).
Contaminants Identified:	TPH-diesel in soil. See attached analytical results tables.
Amount of Contaminants Leaked:	Not estimated. See attached analytical results tables.
MTBE:	None detected.
Description of the soil/geology:	Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? Greatest TPH-diesel concentration of 8,300 mg/kg detected during most recent assessment.

Estimated volume of contaminated soil left on site and concentration: Approximately 80 cubic yards of TPH-diesel contaminated soil exceeding 1,000 mg/kg.

Is groundwater contamination completely delineated? Yes. Benzene concentration of 0.9 ug/L to northwest indicates approximate northerly (downgradient) extent of groundwater contamination. Current analytical results show other constituents of concern well below cleanup standards. MTBE was not detected.

Monitoring wells installed, properly permitted? No monitoring wells were installed.

Depth to groundwater: Approximately 8 to 10 feet bgs.

Is groundwater or surface water impacted? No. Groundwater analytical results show the constituents of concern meet project cleanup levels.

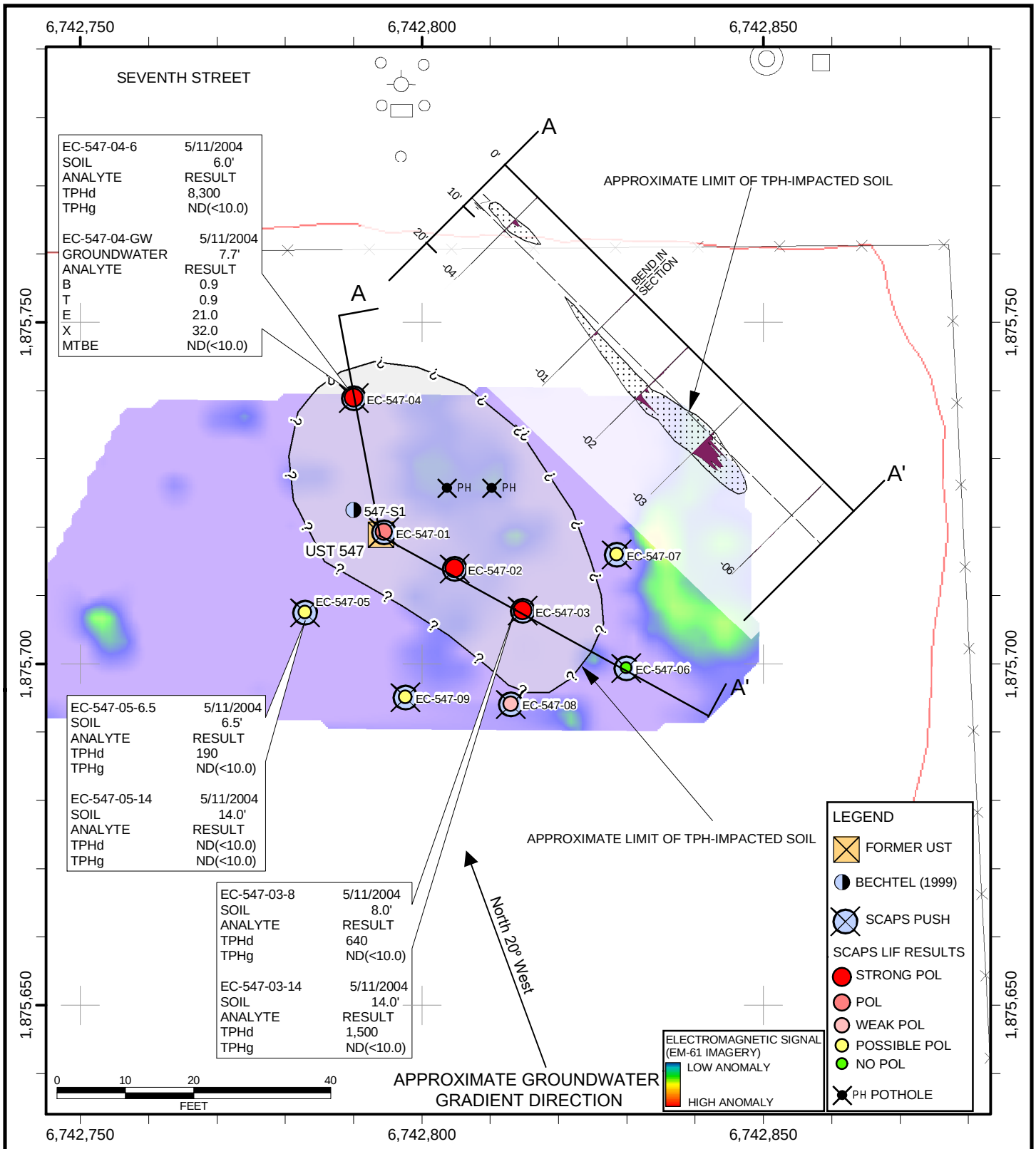
Remedial action taken? None documented.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Yes.

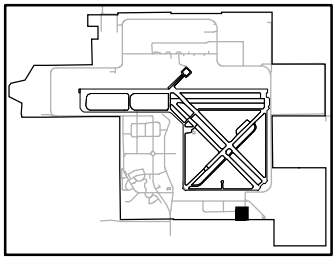
Site Recommendation for Closure: Groundwater meets cleanup standards. The recommendation for removal of groundwater as a medium of concern at this site is accepted and no further action is required for groundwater at this site. Soil assessment adequately characterizes the nature and extent of contaminated soil. Remediation by excavation of approximately 80 cy of soil at this site is accepted.

Signature: ***Date:***	***Signature:*** ***Date:***
N.R. Wells **Lieutenant Commander, CEC, US Navy** **By direction of** **The Commanding Officer**	**Liann P. Chavez, R.G.** **Senior Engineering Geologist** **California Environmental Protection Agency** **California Regional Water Quality Control Board** **Colorado River Basin Region**

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS, Soil, and Groundwater Results
SCAPS Logs
Laboratory Analytical Report and Chain-of-Custody Documentation



OVERVIEW MAP - NAF EL CENTRO



N

MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 547

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC4

FIGURE: 1

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence, Soil, and Groundwater Analytical Data Summary

UST Site 547
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-547-01	4/1/2004	22.1	24.5	16,744 @ 12.1	POL		
EC-547-02	4/1/2004	21.9	24.2	176,804 @ 14.0	Strong POL, deeper; weak POL, shallower		
EC-547-03	4/1/2004	22.7	25.1	229,389 @ 14.5	Strong POL (10.5'-17.1')		
EC-547-03-8	5/11/2004					8.0': TPHd: 640 mg/kg TPHg: <10 mg/kg	
EC-547-03-14	5/11/2004					14.0': TPHd: 1,500 mg/kg TPHg: <10 mg/kg	
EC-547-04	4/1/2004	18.9	21.2	57,057 @ 6.0	Strong POL, 6.04'-6.32'		
EC-547-04-06	5/11/2004					6.0': TPHd: 8,300 mg/kg TPHg: <10 mg/kg	
EC-547-04-GW	5/11/2004					7.7': B: 0.9 J ug/L T: 0.9 J ug/L E: 21 ug/L X: 32 ug/L MTBE: <10 ug/L	7'-17'
EC-547-05	4/1/2004	19.6	22.0	4,783 @ 9.6	Possible POL		
EC-547-05-6.5	5/11/2004					6.5': TPHd: 190 mg/kg TPHg: <10 mg/kg	
EC-547-05-14	5/11/2004					14.0': TPHd: <10 mg/kg TPHg: <10 mg/kg	
EC-547-06	5/11/2004	20.2	21.9	3,158 @ 12.8	No POL		
EC-547-07	5/11/2004	19.0	21.2	4,347 @ 10.6	Possible POL		
EC-547-08	5/11/2004	22.6	25.0	14,423 @ 13.8	Weak POL		
EC-547-09	5/11/2004	19.0	21.1	7,641 @ 11.2	Possible POL		

Notes listed on following page.

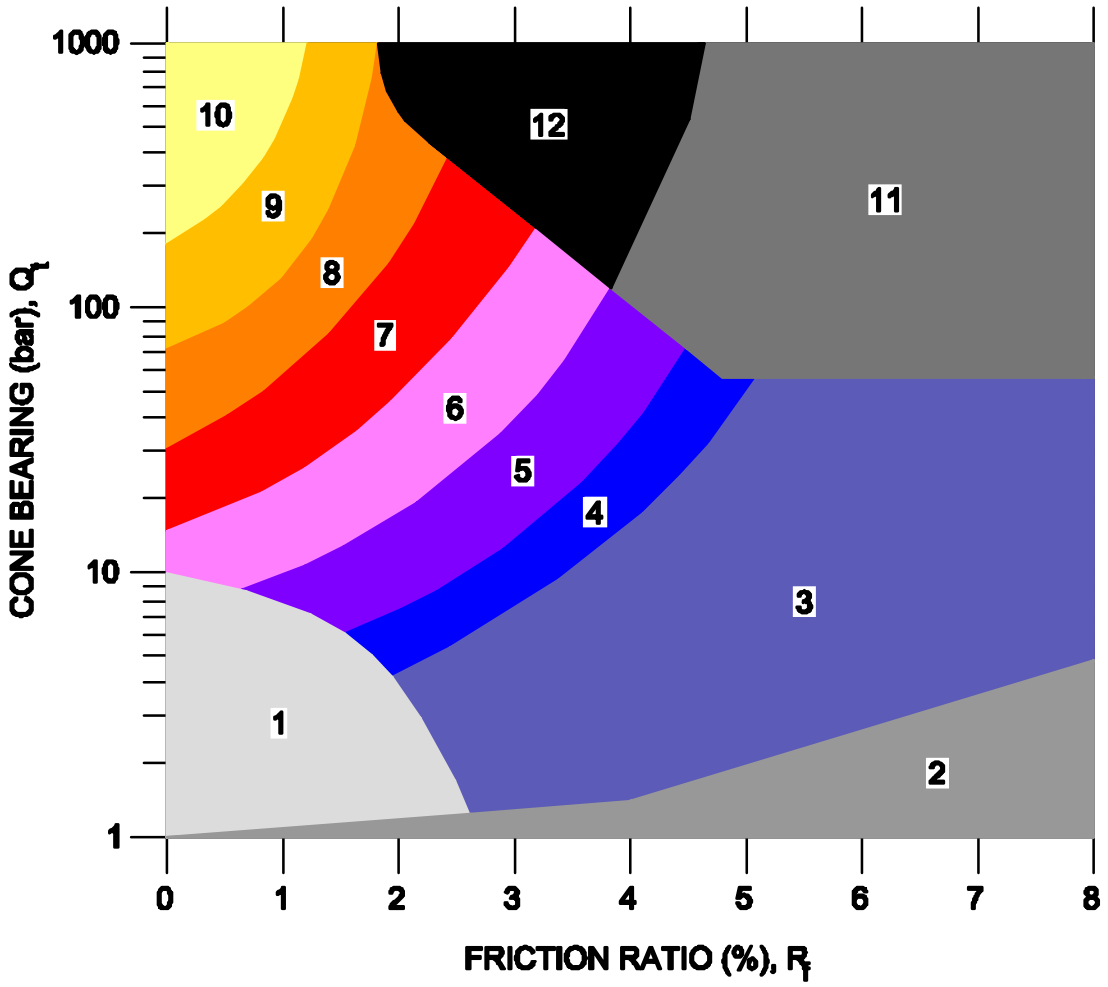
Table 2 - SCAPS Fluorescence, Soil, and Groundwater Analytical Data Summary

UST Site 547
Naval Air Facility, El Centro

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

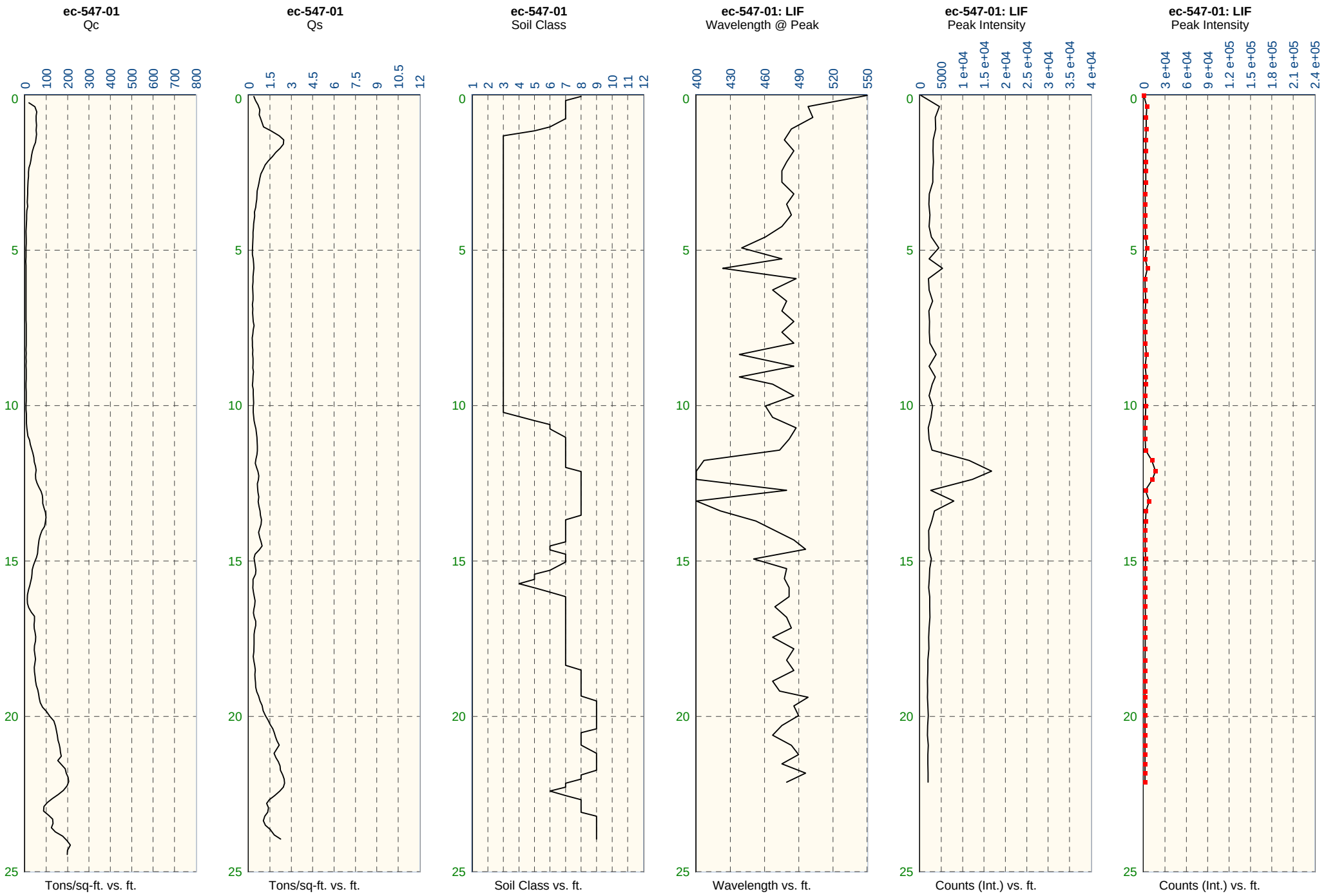
CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)

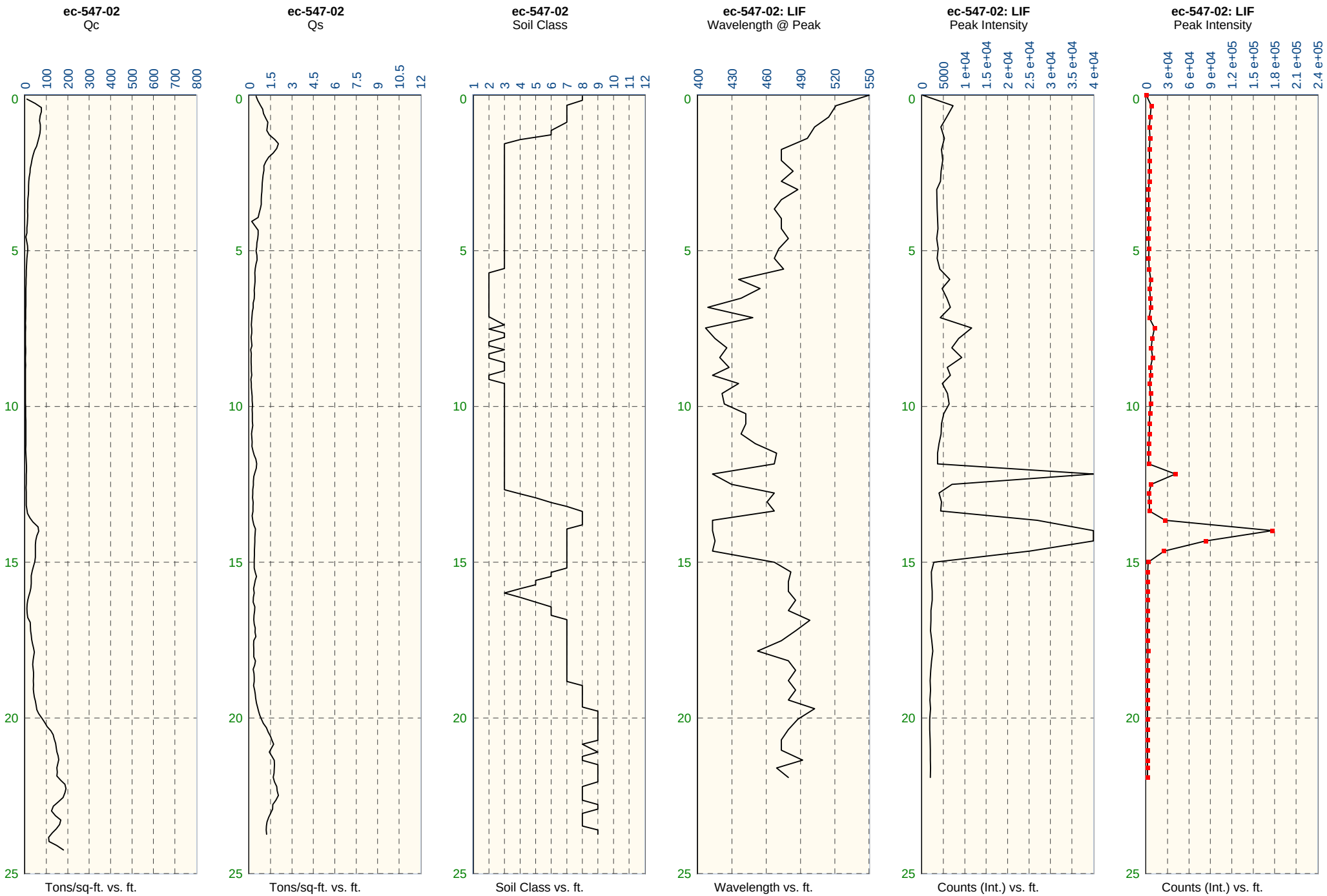


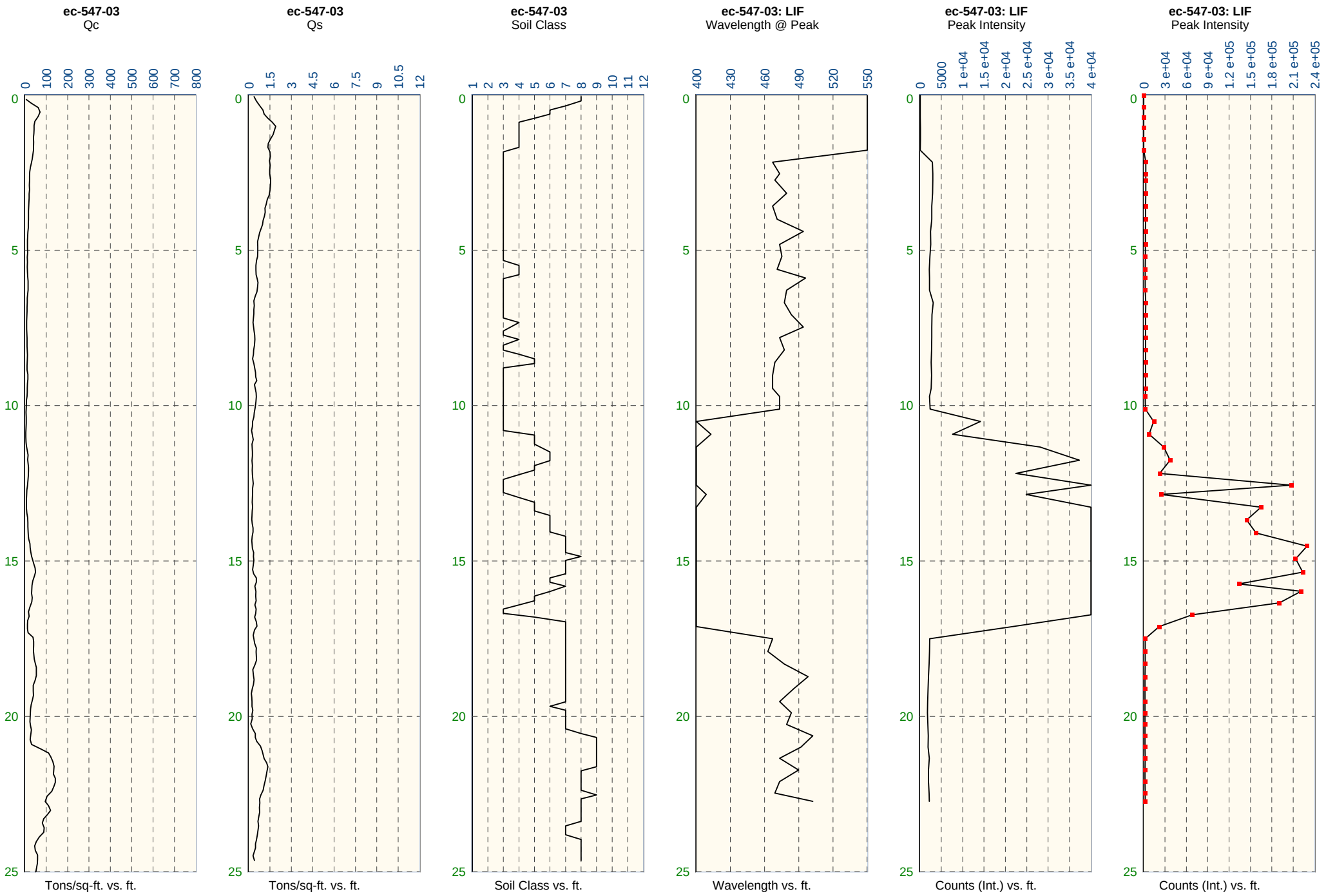
Friction Ratio (R_f) = Sleeve Friction (F_s)/Cone Pressure (Q_t) x 100%
1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

Zone		Q_t/ 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


ec-547-01
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-547-01
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-547-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-547-01: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-547-01: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-547-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-547-02
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-547-02
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-547-02
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-547-02: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-547-02: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-547-02: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25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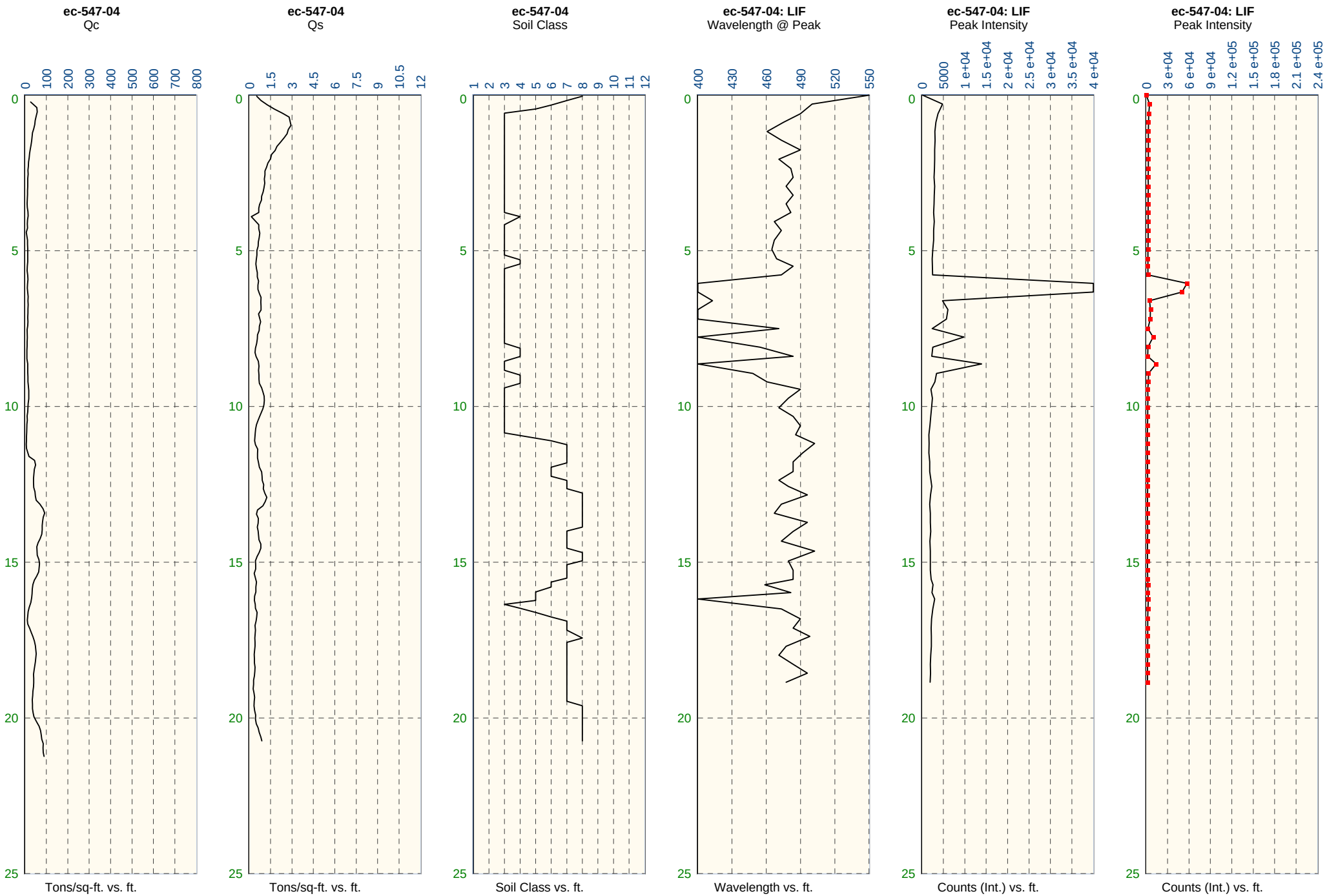
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-547-03
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-547-03
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-547-03: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-547-03: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-547-03: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25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Qc
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Tons/sq-ft. vs. ft.
ec-547-04
Qs
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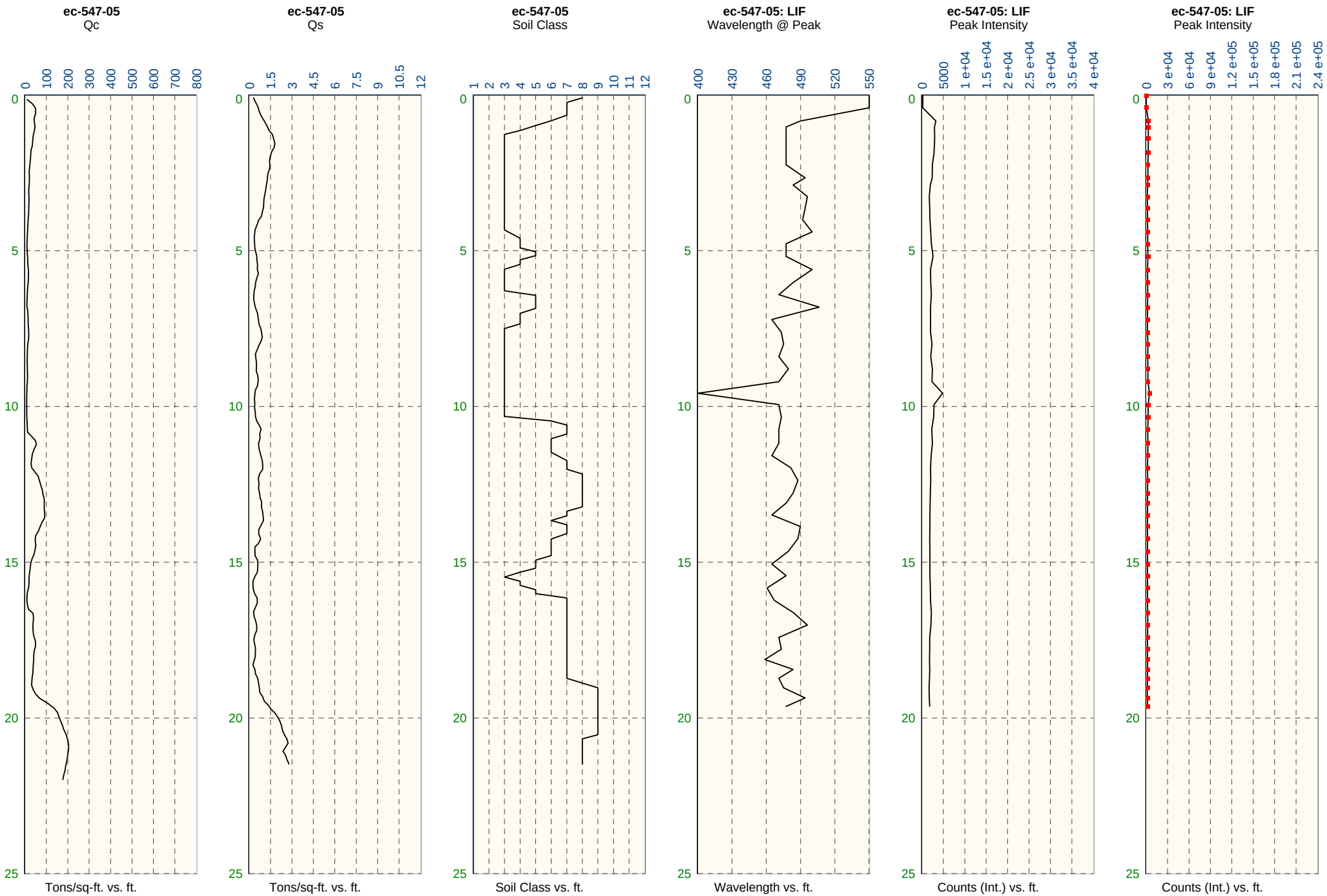
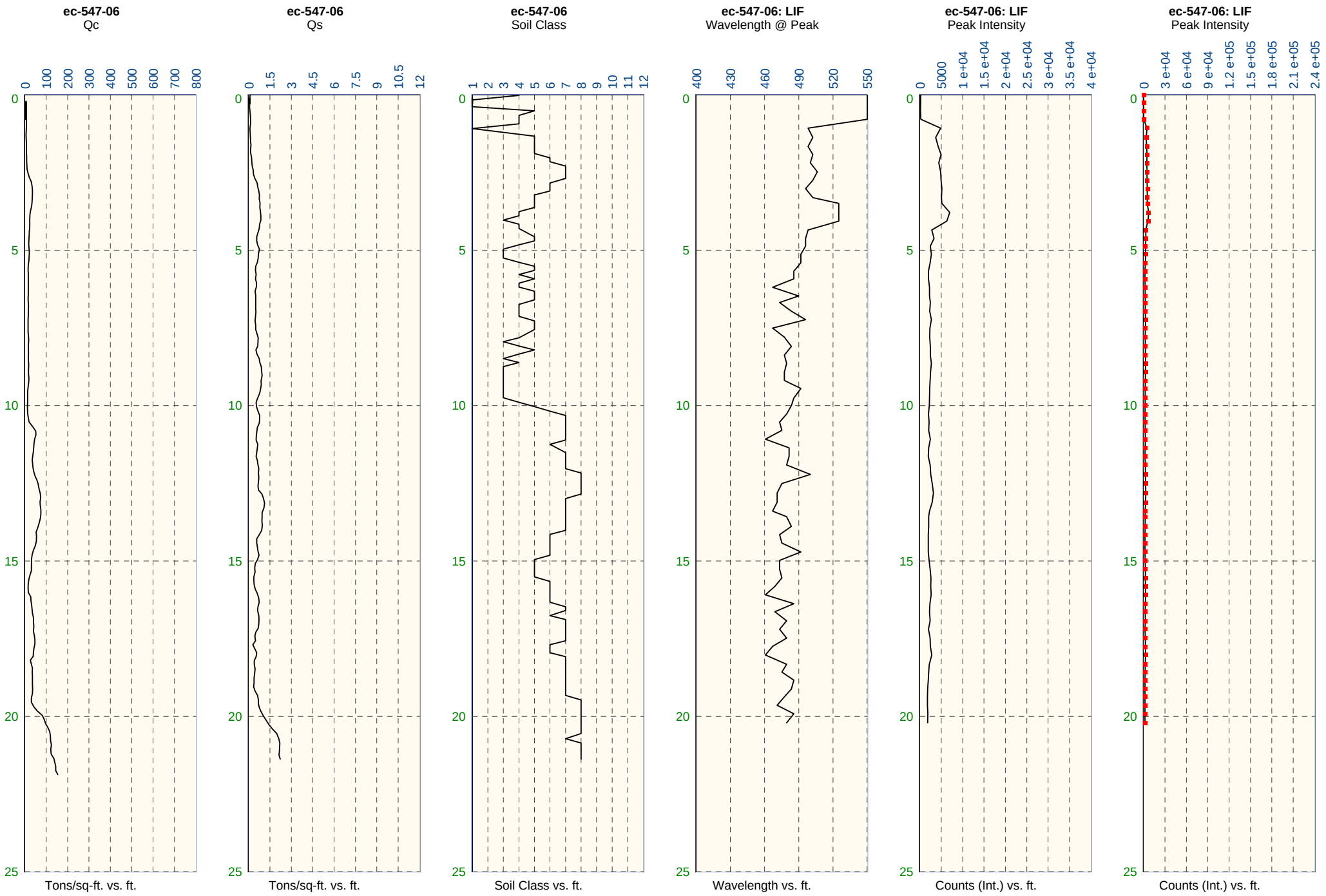
Tons/sq-ft. vs. ft.
ec-547-04
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-547-04: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-547-04: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-547-04: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-547-05
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-547-05
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-547-05
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-547-05: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-547-05: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-547-05: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-547-06
Qc
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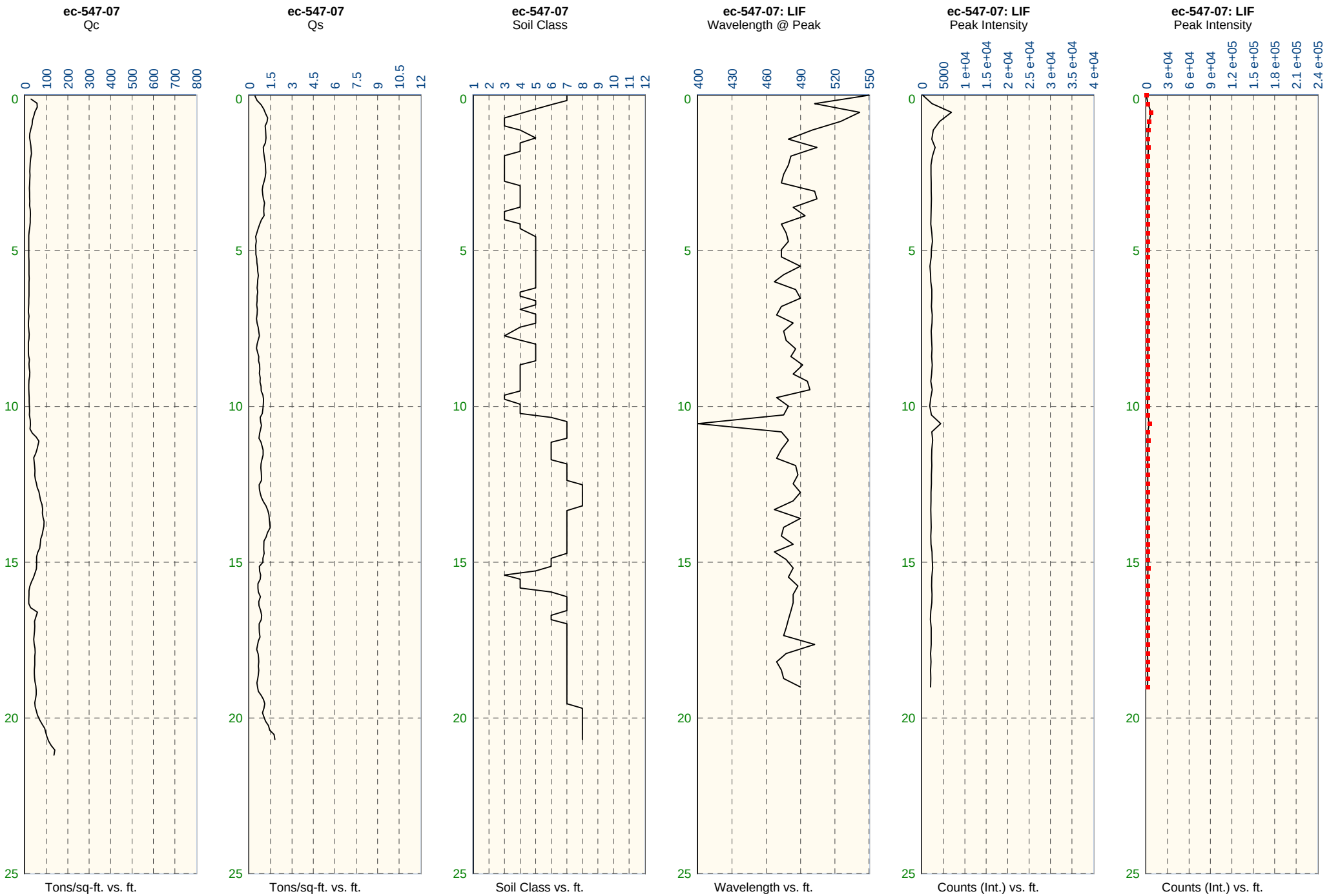
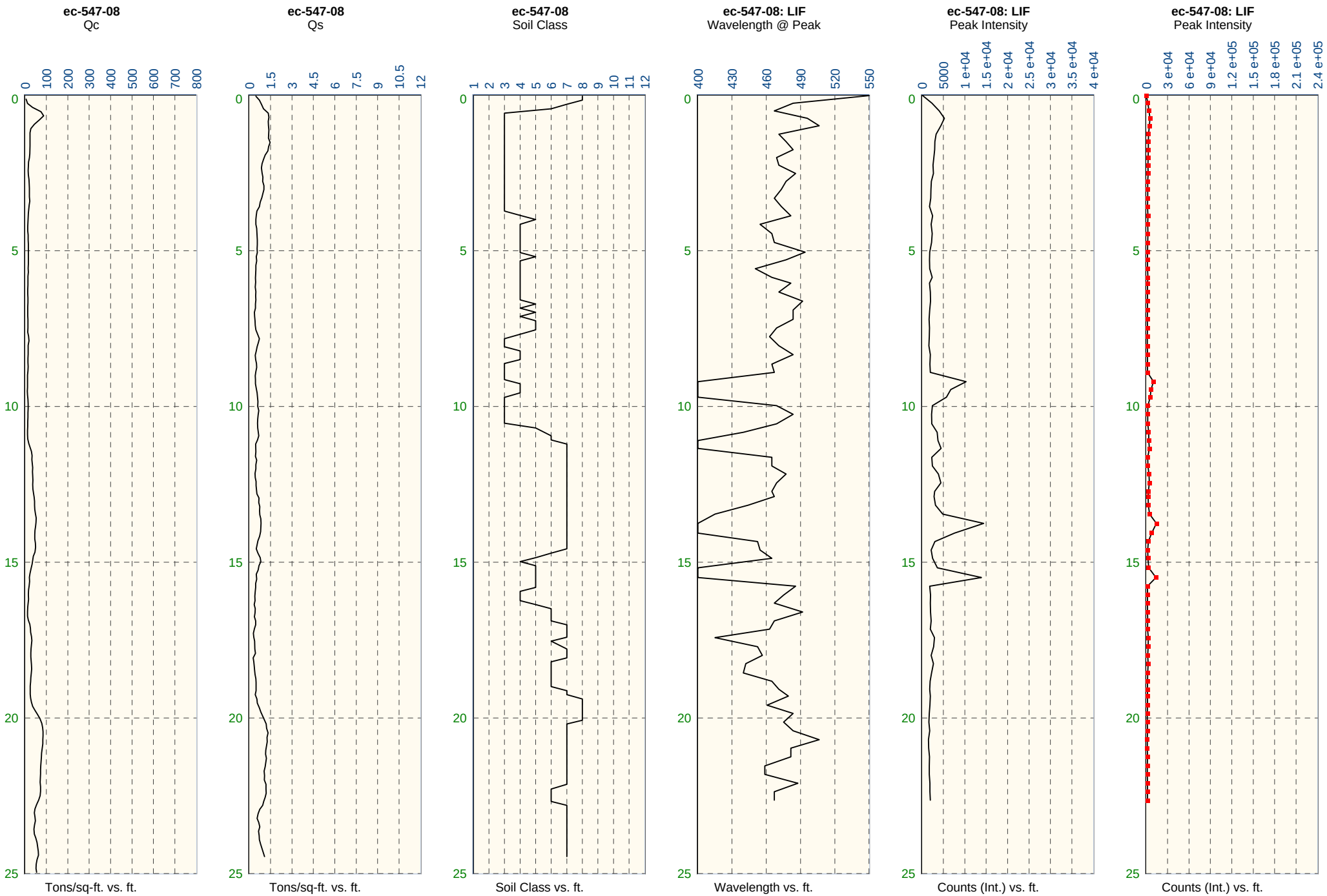
Tons/sq-ft. vs. ft.
ec-547-06
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-547-06
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-547-06: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-547-06: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-547-06: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-547-07
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-547-07
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-547-07
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-547-07: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-547-07: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-547-07: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-547-08
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-547-08
Qs
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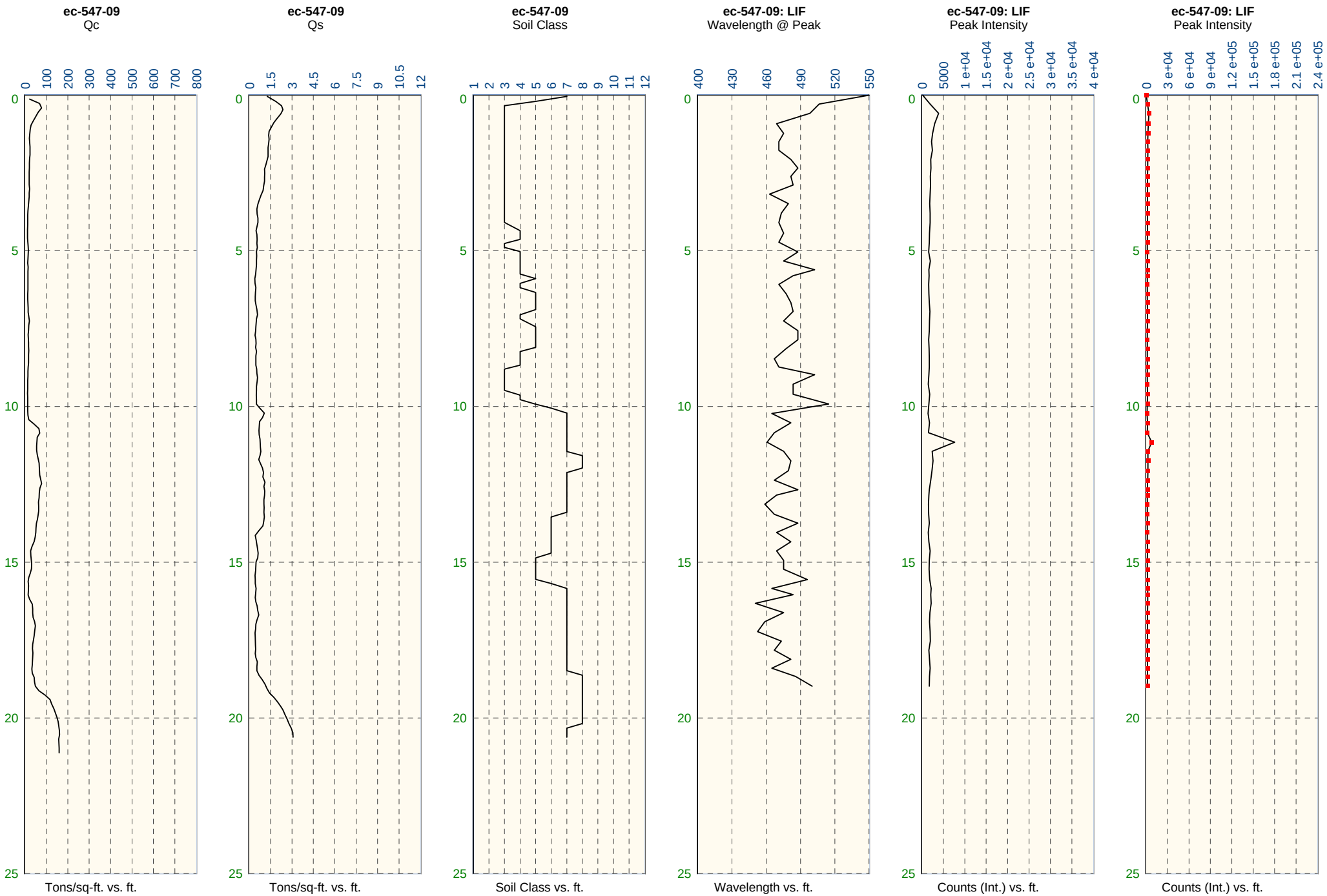
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-547-08
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-547-08: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-547-08: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-547-08: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-547-09
Qc
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0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-547-09
Qs
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0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-547-09
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-547-09: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-547-09: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-547-09: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.

MOBILE GEOCHEMISTRY

H&P

May 20, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – NAS – SITE 547 – EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP051104W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1317).

Project Summary

The following analyses were conducted:

- 5 soils for total petroleum hydrocarbons (TPH) by DHS LUFT/8015M Method
- 1 water for volatile aromatic hydrocarbons (BTEX) & MTBE by EPA Method 8021B

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Blayne Hartman

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
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MOBILE GEOCHEMISTRY

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NAVY PUBLIC WORKS PROJECT #1113621902008
NAS
SITE 547
EL CENTRO, CA

H&P Project #NP051104-W1

TPH (DHS LUFT/ 8015M Method) ANALYSES OF SOILS

SAMPLE NUMBER	DATE ANALYZED	TPH-GAS C5-C11 (mg/kg)	TPH-DIESEL C12-C24 (mg/kg)
METHOD BLANK	5/11/2004	ND	ND
EC-547-05-14	5/11/2004	ND	ND
EC-547-04-06	5/11/2004	ND	8,300
EC-547-03-8.0	5/11/2004	ND	640
EC-547-03-14	5/11/2004	ND	1,500
EC-547-05-6.5	5/11/2004	ND	190
DETECTION LIMITS		10	10

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
5-26-04

MOBILE GEOCHEMISTRY

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NAVY PUBLIC WORKS PROJECT #1113621902008
NAS
SITE 547
EL CENTRO, CA

H&P Project #NP051104-W1

BTEX, MTBE (EPA Method 8020 Modified) ANALYSES OF WATERS

SAMPLE NUMBER	DATE ANALYZED	MTBE (ug/l)	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYLBENZ (ug/l)	XYLENES (ug/l)	SURROGATE (%REC)
METHOD BLANK	5/11/2004	ND	ND	ND	ND	ND	110
EC-547-04-GW	5/11/2004	ND	0.9 J	0.9 J	21	32	83
REPORTING LIMITS		10.0	1.0	1.0	1.0	1.0	53%-145%
DETECTION LIMITS		1.0	0.5	0.5	0.5	0.5	

J INDICATES VALUE DETERMINED IS BETWEEN DETECTION LIMIT AND REPORTING LIMIT

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
5-26-04

MOBILE GEOCHEMISTRY

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QA/QC REPORT - CALIBRATION DATA

H&P Project #NP051104-W1
DAILY CALIBRATION DATE : 05/11/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ppm)	WATER (ppb)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
TPH GASOLINE - FID1	10-20000	330-660000	7/14/2003	0.878	6.1%	236	0.847	3.5%	229	0.830	5.5%
TPH GASOLINE - FID2	10-20000	330-660000	7/14/2003	0.580	11.9%	378	0.529	8.7%	357	0.538	7.3%
TPH GASOLINE - FID3	10-20000	330-660000	7/14/2003	0.696	10.4%	291	0.687	1.3%	300	0.658	5.5%
TPH DIESEL - FID1	10 - 50000	330 - 1650000	7/11/2003	1.014	9.5%	487	1.027	1.2%	493	1.022	0.8%
TPH DIESEL - FID2	10 - 50000	330 - 1650000	7/11/2003	0.690	13.3%	752	0.665	3.6%	725	0.696	1.0%
TPH DIESEL - FID3	10 - 50000	330 - 1650000	7/11/2003	0.723	7.9%	647	0.773	6.9%	676	0.754	4.3%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP051104-W1
DAILY CALIBRATION DATE : 05/11/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ug/kg)	WATER (ug/L)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
MTBE	500 - 25	2500 - 125	4/2/2004	3.07	7.2%	272	2.72	11.3%	323	3.23	5.4%
BENZENE	500 - 25	2500 - 125	5/6/2004	9.44	11.6%	1,023	10.23	8.3%	840	8.40	11.0%
TOLUENE	500 - 25	2500 - 125	5/6/2004	17.80	12.5%	1,702	17.02	4.4%	1,546	15.46	13.2%
TFT	500 - 25	2500 - 125	5/6/2004	5.49	9.8%	556	5.56	1.4%	471	4.71	14.1%
ETHYLBENZENE	500 - 25	2500 - 125	5/6/2004	15.77	5.6%	1,528	15.28	3.1%	1,447	14.47	8.2%
m&p-XYLENES	500 - 25	2500 - 125	5/6/2004	20.54	8.8%	1,896	18.96	7.7%	1,747	17.47	15.0%
o-XYLENES	500 - 25	2500 - 125	5/6/2004	16.61	7.7%	1,553	15.53	6.5%	1,498	14.98	9.8%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
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ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR SOILS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (mg/kg)	MS CONC (mg/kg)	%REC MS	MSD CONC (mg/kg)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	211	105.5%	212	106.0%	0.5%	15%	75% - 125%
TPH DIESEL	500	483	96.6%	511	102.2%	5.6%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR WATERS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	MS CONC (ug/L)	%REC MS	MSD CONC (ug/L)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	21.5	107.5%	21.8	109.0%	1.4%	15%	75% - 125%
BENZENE	20.0	18.8	94.0%	18.4	92.0%	2.2%	15%	75% - 125%
TOLUENE	20.0	17.4	87.0%	17.1	85.5%	1.7%	15%	75% - 125%
ETHYLBENZENE	20.0	19.2	96.0%	18.8	94.0%	2.1%	15%	75% - 125%
TOTAL XYLENES	40.0	34.5	86.3%	33.8	84.5%	2.0%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR SOILS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (mg/kg)	LCS CONC (mg/kg)	%REC LCS	LCSD CONC (mg/kg)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	212	106.0%	213	106.5%	0.5%	15%	75% - 125%
TPH DIESEL	500	505	101.0%	487	97.4%	3.6%	15%	75% - 125%

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR WATERS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	LCS CONC (ug/L)	%REC LCS	LCSD CONC (ug/L)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	19.8	99.0%	19.6	98.0%	1.0%	15%	75% - 125%
BENZENE	20.0	18.8	94.0%	18.4	92.0%	2.2%	15%	75% - 125%
TOLUENE	20.0	17.5	87.5%	17.2	86.0%	1.7%	15%	75% - 125%
ETHYLBENZENE	20.0	19.9	99.5%	18.7	93.5%	6.2%	15%	75% - 125%
TOTAL XYLENES	40.0	37.9	94.8%	34.9	87.3%	8.2%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Chain of Custody Record

HP LABS

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469
☒ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404
☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 5-11-04
HPL Project # NP051104-W1
Outside Lab:

Client: Navy Public Works Code 980 Site 547
Address: 2730 McKean St Suite 1 Code 980
San Diego CA 92136
Phone: 619-524-6987 Fax: 619-524-6000

Collector: D Bloom
Client Project # 11 3621702008
Location: NAS El Centro Site 547
Turn around time:

Page: 1 of 6
Project Manager: David Bloom

Global ID: T060252849
EDF: (Yes) No

Sample Receipt
Intact: ☐ Yes ☐ No
Seal Intact: ☐ Yes ☐ No ☐ N/A
Cold: ☐ Yes ☐ No
N/A (Received on Site)

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B: BTEX / Oxygenates	8260B: Oxygenates	8260B: VOC's	8260B: VOC's and Oxygenates	Methane	Fixed Gases							Total # of containers
EC-547-05-14			545	5/11	soil	sleeve	X																	
EC-547--04-06			652	↓	↓	↓	↓																	
EC-547-03-8.0			605	↓	↓	↓	↓																	
EC-547-03-14			628	↓	↓	↓	↓																	
EC-547-05-6.5			515	↓	↓	↓	↓																	
EC-547 04-GW		7.7'	840		W	VOA			X															

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
David M Bloom	Code 980	James Villarreal	HTP	5-11-04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constitu[illegible]horization to proceed with analysis and acceptance of condition on back.

Sample disposal il[illegible]on: ☐ *Disposal @ $2.00 each* ☐ *Return to client* ☐ *Pickup*

Site Assessment Report and
Closure Summary
UST Site 550
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 550 at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 550 work plan addendum, dated March 15, 2004, prepared by the Public Works Center San Diego (PWCSD). Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 550. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 550
Site Address:	South of 7th Street, West of "E" Street (between former Buildings 549 and 550) Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,742,536 Northing: 1,875,714 feet (State Plane 6)
Facility Name:	Fenced outdoor storage area for PWC contractor
Property Owner: Tank Owner/Operator: Responsible Party:	United States Navy United States Navy United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430054

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	Unknown
Construction Materials:	Concrete
Capacity:	1,400 gallons
Contents:	Diesel
Year Removed:	Unknown

Figure 1 shows the site location and previous and current assessment locations.

In 1997, SOTA Environmental, Inc., reported fencing, a waterline and other structures may have masked a geophysical indication of a possible UST. In January 1998, OHM Remediation Services Corp. performed a supplemental geophysical survey, which identified an anomaly approximately 50 feet south of the presumed UST location (OHM, 1999). OHM dug two trenches, one at the geophysical anomaly and the other at the suspected tank location. No evidence of a tank or contamination was encountered at the anomaly, and a tank was not encountered at the suspect tank location. However, hydrocarbon odors were reported at the suspected tank location, suggesting this location is actually at or near the former UST. A soil sample collected at a depth of 8 feet below ground surface (bgs) from this location revealed total petroleum hydrocarbons quantitated as diesel (TPH-diesel) at 720 milligrams per kilogram (mg/kg) as reported in their *Closure Report for Various UST Sites*, dated August 9, 1999 (OHM, 1999).

Bechtel National, Inc. (BNI) subsequently obtained additional base maps indicating a possible alternate location for UST 550. A direct-push soil sample and HydroPunch groundwater sample were collected from this location as reported in their *Final Underground Storage Tank Technical Memorandum Addendum No. 3* (BNI, 2000). The soil and groundwater samples were collected from depths of 9.25 to 10 feet bgs, and 16.5 to 20 feet bgs, respectively. TPH-diesel was detected at a concentration of 79,000 mg/kg in the soil sample. The constituents in groundwater and the other soil constituents were either detected below project actions levels or were not detected above the laboratory detection limits.

PWC Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Soil exceeds cleanup levels for TPH-diesel.* We also addressed a RWQCB concern as outlined in a May 6, 2004, letter to test for constituents of concern in a groundwater sample collected downgradient of the former tank location from an interval screened across the water table. Field activities were performed during two mobilizations on March 31 and between May 10 to 11, 2004.

In accordance with the work plan, Laser Induced Fluorescence (LIF) was measured *in situ* using the Site Characterization and Analysis Penetrometer System (SCAPS) at seven locations as shown on Figure 1. The LIF data are summarized and interpreted in Table 2. (Note that the sequential push identification number EC-550-05 was inadvertently skipped as the second mobilization began.) At five of the locations, no fluorescence characteristic of petroleum, oil, or lubricants (POL) was encountered. At the two other locations, fluorescence suggesting POL was encountered. At EC-550-03, fluorescence characterized by a drop in wavelength coupled with a slightly elevated intensity was encountered at two distinct depths (8.0-8.3 feet and 11.4-11.9 feet bgs). At EC-550-01, A single

measurement (representing approximately 0.3 feet vertical thickness) characterized by a drop in wavelength coupled with a slightly elevated intensity was detected at 10.3 feet bgs.

A total of three soil samples and a groundwater sample were collected at Site 550. The sample results are shown in Table 2. The samples were collected within 3 lateral feet of the associated LIF push location. At location EC-550-03, soil samples were collected from depths of 5.5 bgs (above the fluorescence interval) and 11.0 feet bgs (near the upper fringe of the lower fluorescence interval). At location EC-550-04 (a location with no POL fluorescence characteristics), a sample was collected from a depth of 11.0 feet bgs. The samples were immediately delivered to an on-site mobile laboratory for analytical testing. TPH-gasoline was not detected (<10 mg/kg) in the soil samples. TPH-diesel was only detected at a concentration of 840 mg/kg in sample EC-550-04-11. The soil sample results appear to confirm the heterogeneous contaminant distribution suggested by the LIF profile at EC-550-03. At location EC-550-04, if it is assumed that lateral heterogeneity is not a significant factor, the soil sample result suggests that the LIF detection threshold in clay and silt at this site is above 840 mg/kg.

A groundwater sample was collected unpurged from EC-550-04 using a single-use disposable bailer from a temporary well screened with ¾-inch diameter PVC with 0.010-inch stainless steel pre-pack well screen from 5.0 to 15.0 feet bgs. MTBE was not detected in the groundwater sample. Benzene was detected at an estimated concentration ("J" flag) of 0.7 microgram per liter (ug/L). The other BTEX compounds were not detected or were detected at concentrations well below their respective action levels. The analytical results are summarized on Table 2. An attempt was made to measure groundwater; however, due to instrument malfunction, the depth to water was not obtained. Groundwater was estimated at approximately 8 feet bgs, based on the wetness of the tape. The lower 10 feet of pre-pack well screen stayed in the hole when well materials were being extracted. A cement-bentonite slurry was used to grout the hole to the surface.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, the vertical and horizontal extent of fuel-impacted soils has been delineated. Groundwater testing shows that levels of fuel components meet cleanup standards. Soil data obtained during the current investigation show that TPH-diesel concentrations in the former UST vicinity meet project cleanup levels.

It is the opinion of PWCSD that further assessment or remediation at this site is unnecessary. Therefore, we recommend that no further action be considered for this site.

Site Characterization and Closure Information

Description of the former UST:	See Background Information (page 2).
Contaminants Identified:	TPH-diesel in soil. See attached analytical results tables.
Amount of Contaminants Leaked:	Not estimated. See attached analytical results tables.
MTBE:	None detected.

Description of the soil/geology: Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? Yes. Based on a review of the analytical data, the lateral and vertical extent of soil impacted with fuels has been delineated.

Estimated volume of contaminated soil left on site and concentration: Not Estimated. TPH-gasoline not detected. Greatest measured TPH-diesel soil concentration is 840 mg/kg.

Is groundwater contamination completely delineated? Yes. Current analytical results for groundwater show that constituents of concern meet cleanup levels.

Monitoring wells installed, properly permitted? No monitoring wells were installed.
Depth to groundwater: Approximately 8 feet bgs.

Is groundwater or surface water impacted? No. All analytical results for groundwater meet cleanup goals for the site (below tap water PRGs and drinking water MCLs).

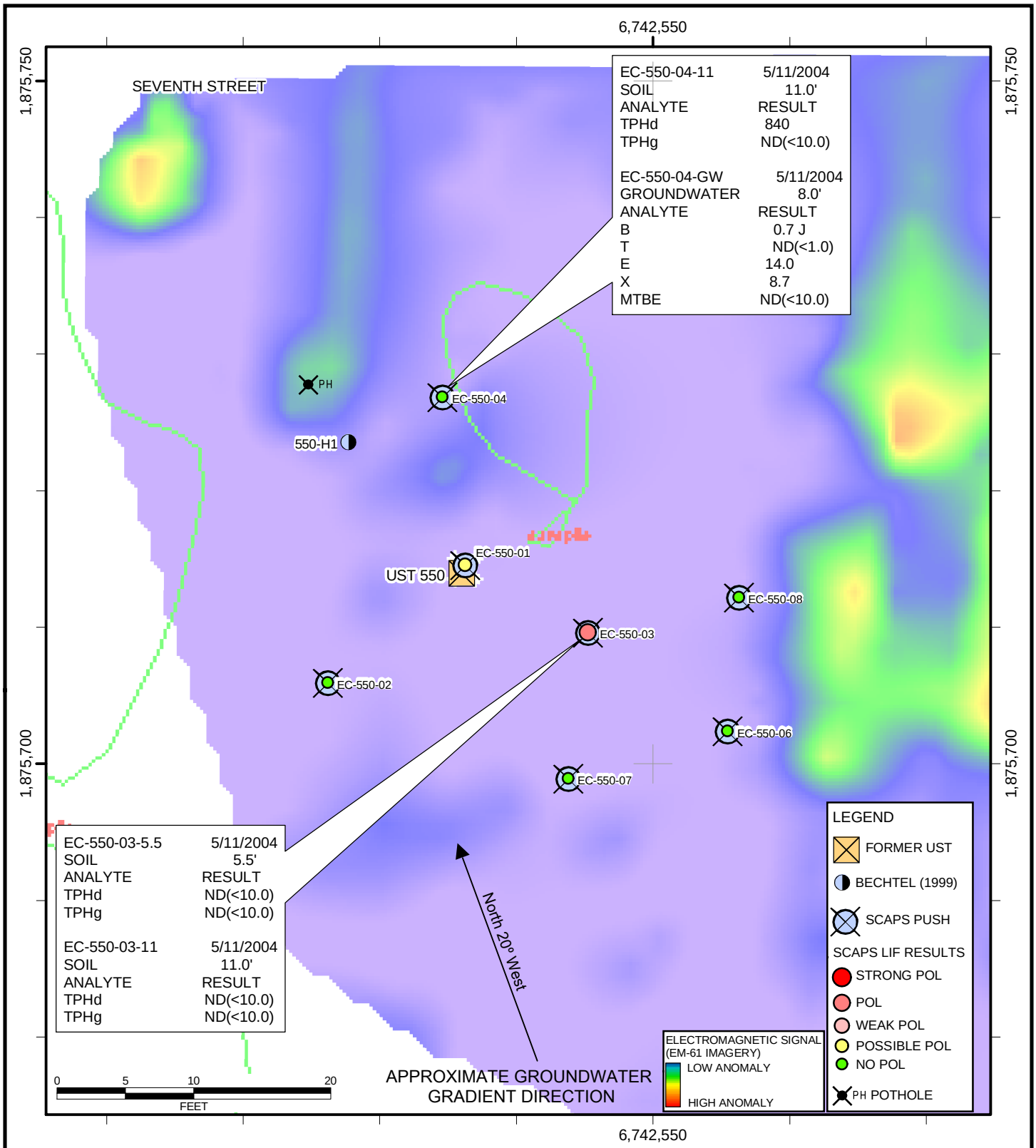
Remedial action taken? UST removed.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Yes.

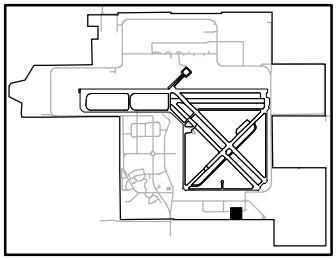
Site Closure: Because soil and groundwater meet cleanup standards for constituents of concern, the recommendation for site closure is accepted and no further action is required at this site.

Signature: ***Date:***	***Signature:*** ***Date:***
N.R. Wells **Lieutenant Commander, CEC, US Navy** **By direction of** **The Commanding Officer**	**Liann P. Chavez, R.G.** **Senior Engineering Geologist** **California Environmental Protection Agency** **California Regional Water Quality Control Board** **Colorado River Basin Region**

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS, Soil, and Groundwater Results
SCAPS Logs
Laboratory Analytical Report and Chain-of-Custody Documentation



OVERVIEW MAP - NAF EL CENTRO



N

MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 550

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC4

FIGURE: 1

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence, Soil, and Groundwater Analytical Data Summary

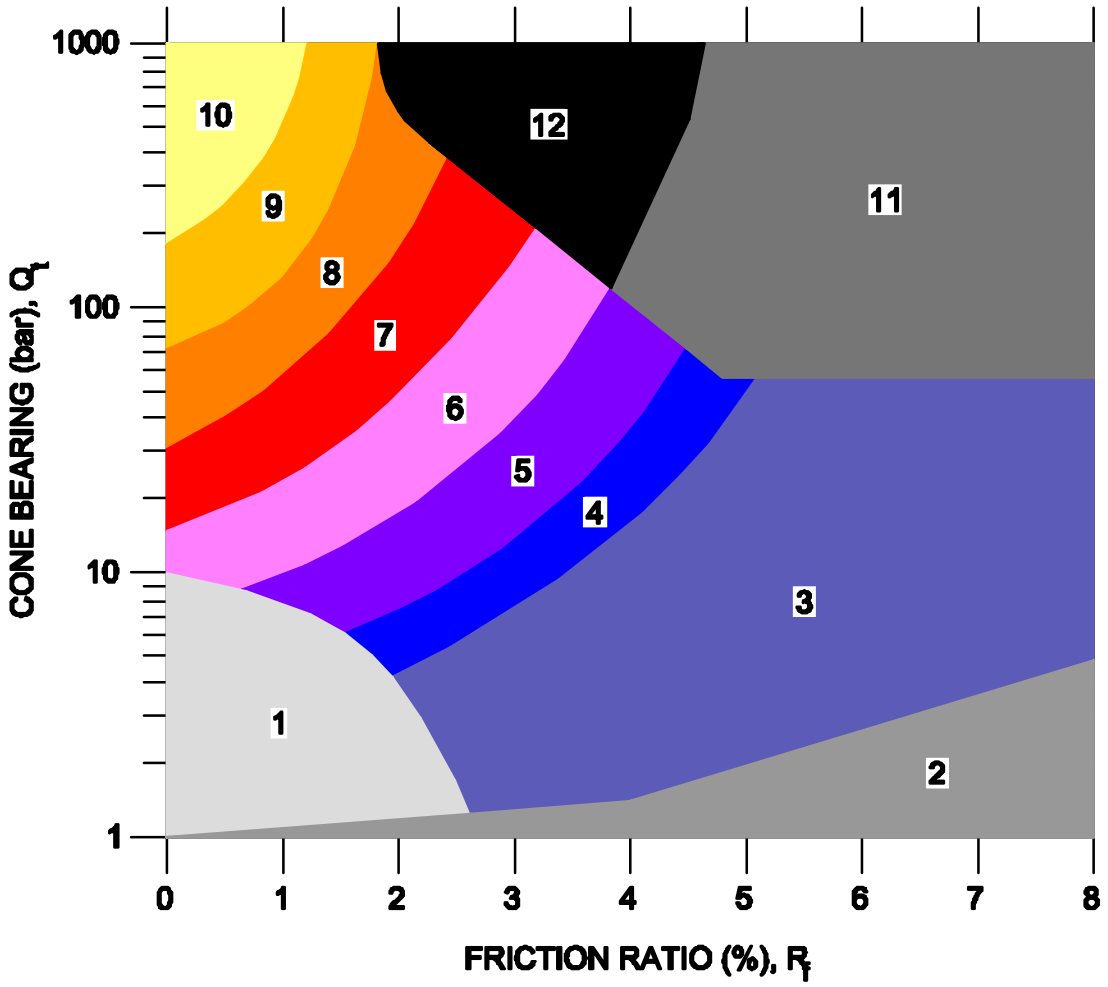
UST Site 550
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-550-01	3/31/2004	18.7	20.9	12,090 @ 10.3	Possible POL		
EC-550-02	3/31/2004	16.1	18.5	3,621 @ 8.6	No POL		
EC-550-03	3/31/2004	18.7	21.0	17,680 @ 11.9	POL		
EC-550-03-5.5	5/11/2004					5.5': TPHd: <10 mg/kg. TPHg: <10 mg/kg	
EC-550-03-11	5/11/2004					11.0': TPHd: <10 mg/kg. TPHg: <10 mg/kg	
EC-550-04	3/31/2004	18.3	18.3	2,819 @ 2.2	No POL		
EC-550-04-11	5/11/2004					11.0': TPHd: 840 mg/kg. TPHg: <10 mg/kg	
EC-550-04-GW	5/11/2004					8.0': B: 0.7 J ug/L	5'-15'
						T: <1.0 ug/L	
						E: 14 ug/L	
						X: 8.7 ug/L	
						MTBE: <10 ug/L	
EC-550-06	5/10/2004	19.6	21.8	3,561 @ 8.4	No POL		
EC-550-07	5/10/2004	18.8	21.2	3,898 @ 6.2	No POL		
EC-550-08	5/10/2004	19.1	21.3	1,989 @ 4.7	No POL		

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

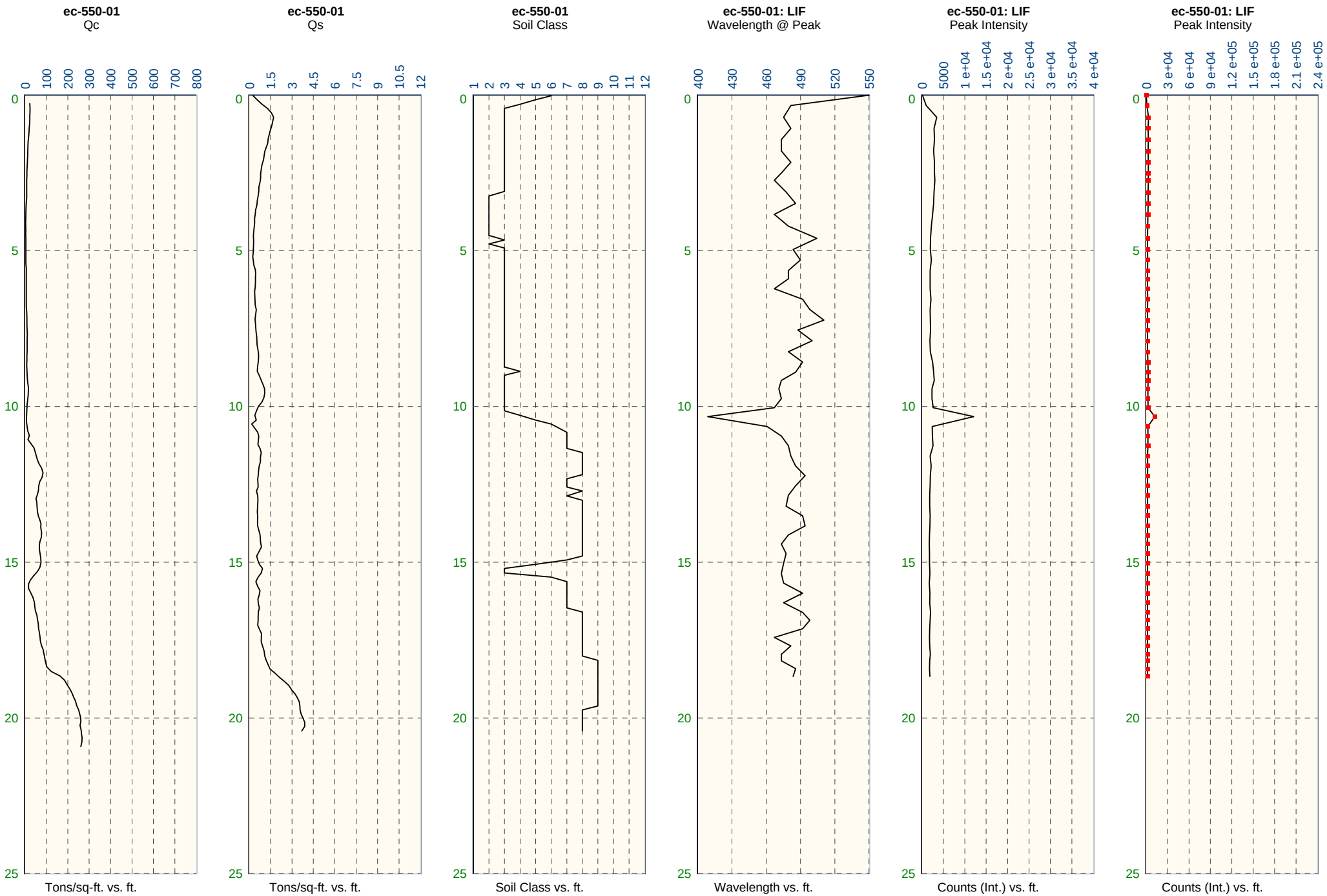
CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)

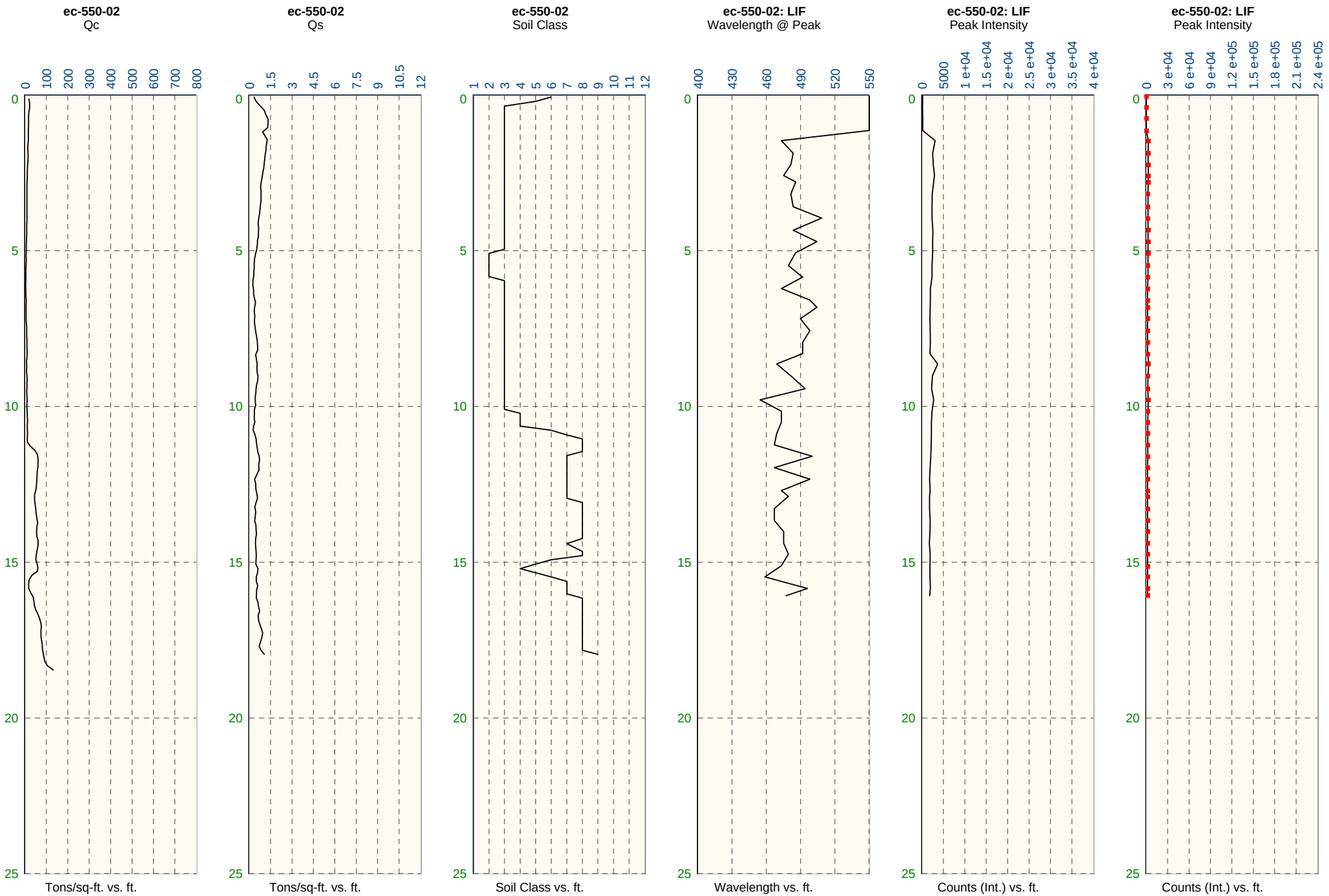


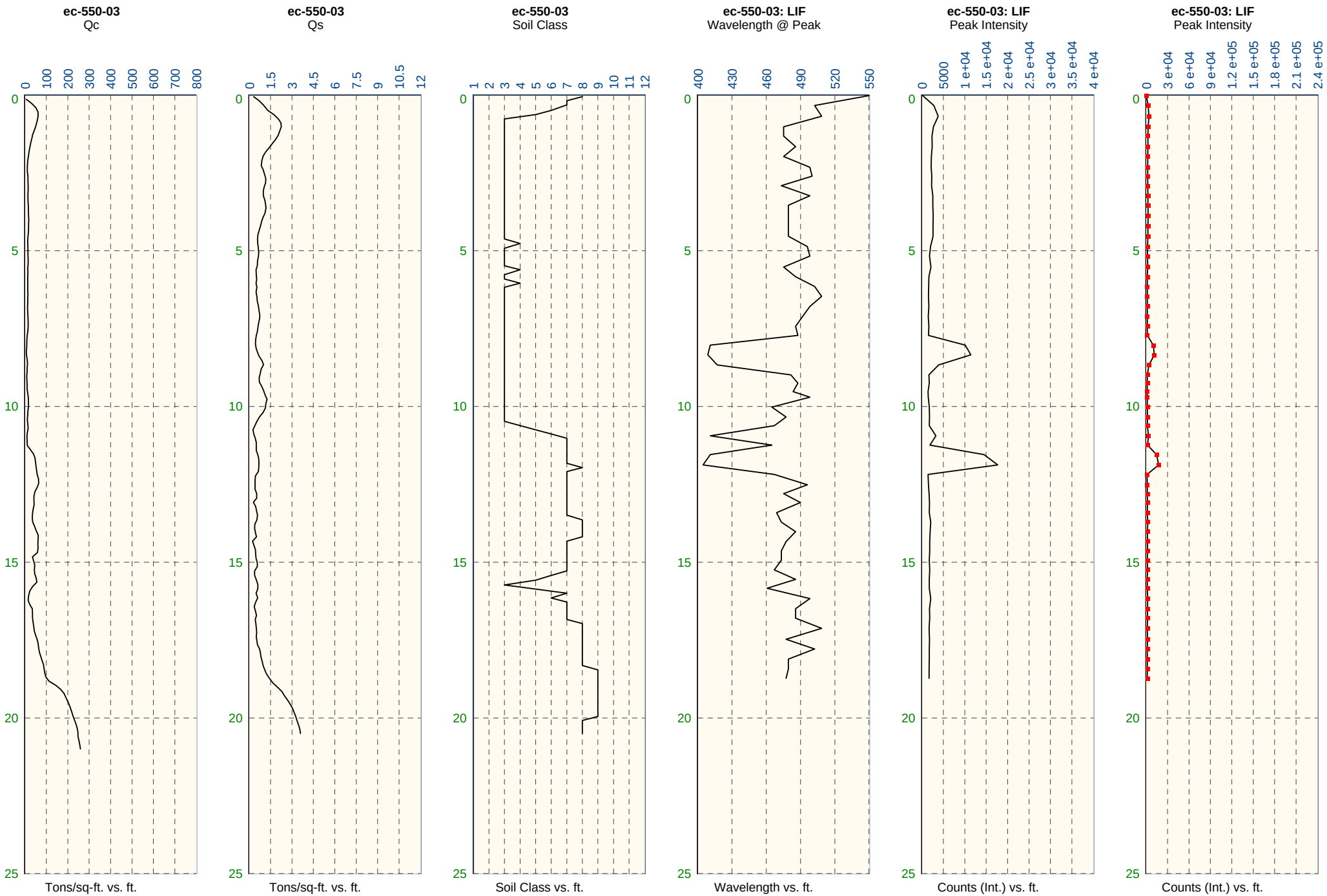
Friction Ratio (R_f) = Sleeve Friction (F_s)/Cone Pressure (Q_t) x 100%
1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

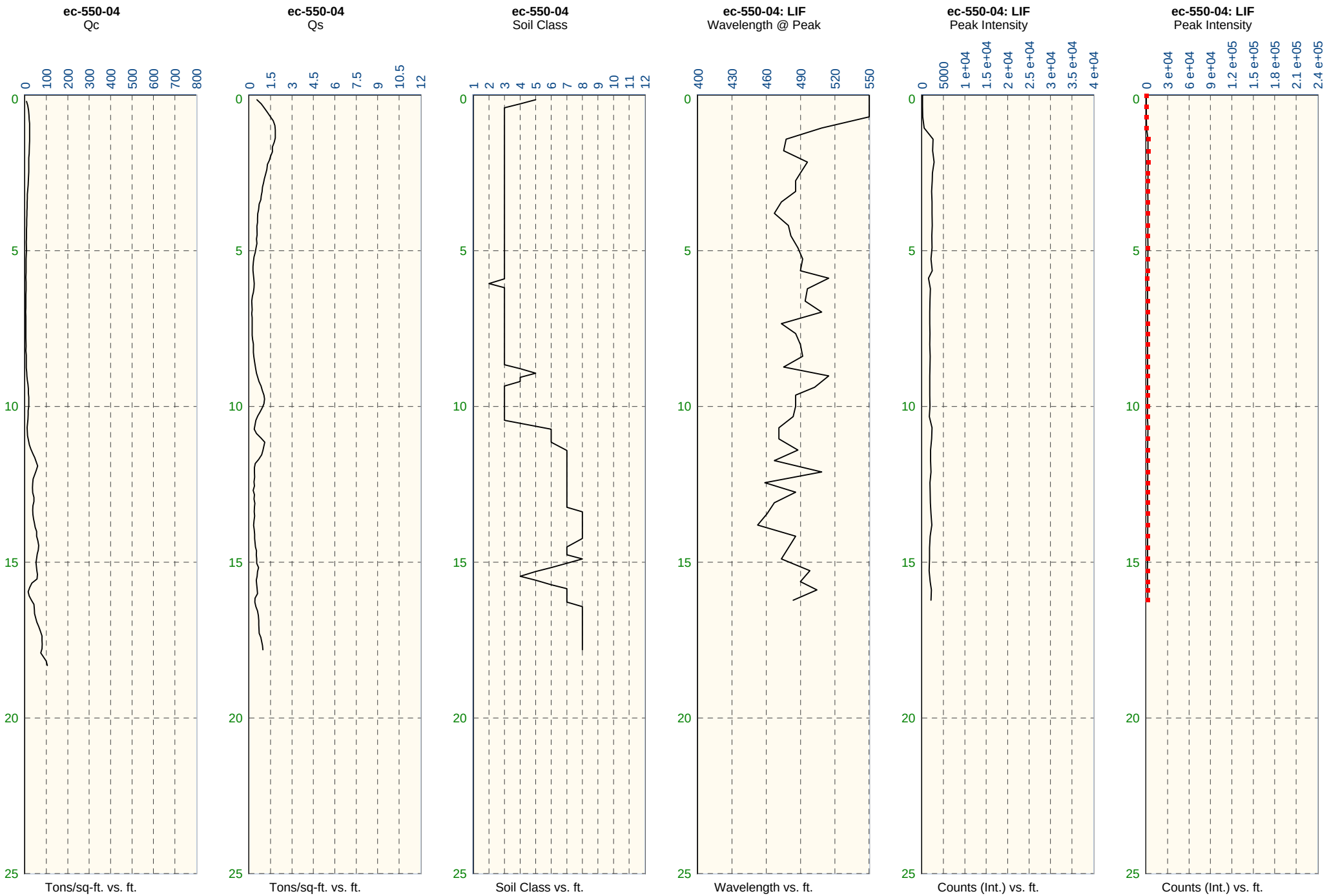
Zone		Q_t/ N	Soil Behavior Type
1		2	sensitive fine grained
2		1	organic material
3		1	clay
4		1.5	silty clay to clay
5		2	clayey silt to silty clay
6		2.5	sandy silt to clayey silt
7		3	silty sand to sandy silt
8		4	sand to silty sand
9		5	sand
10		6	gravelly sand to sand
11		1	very stiff fine grained*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

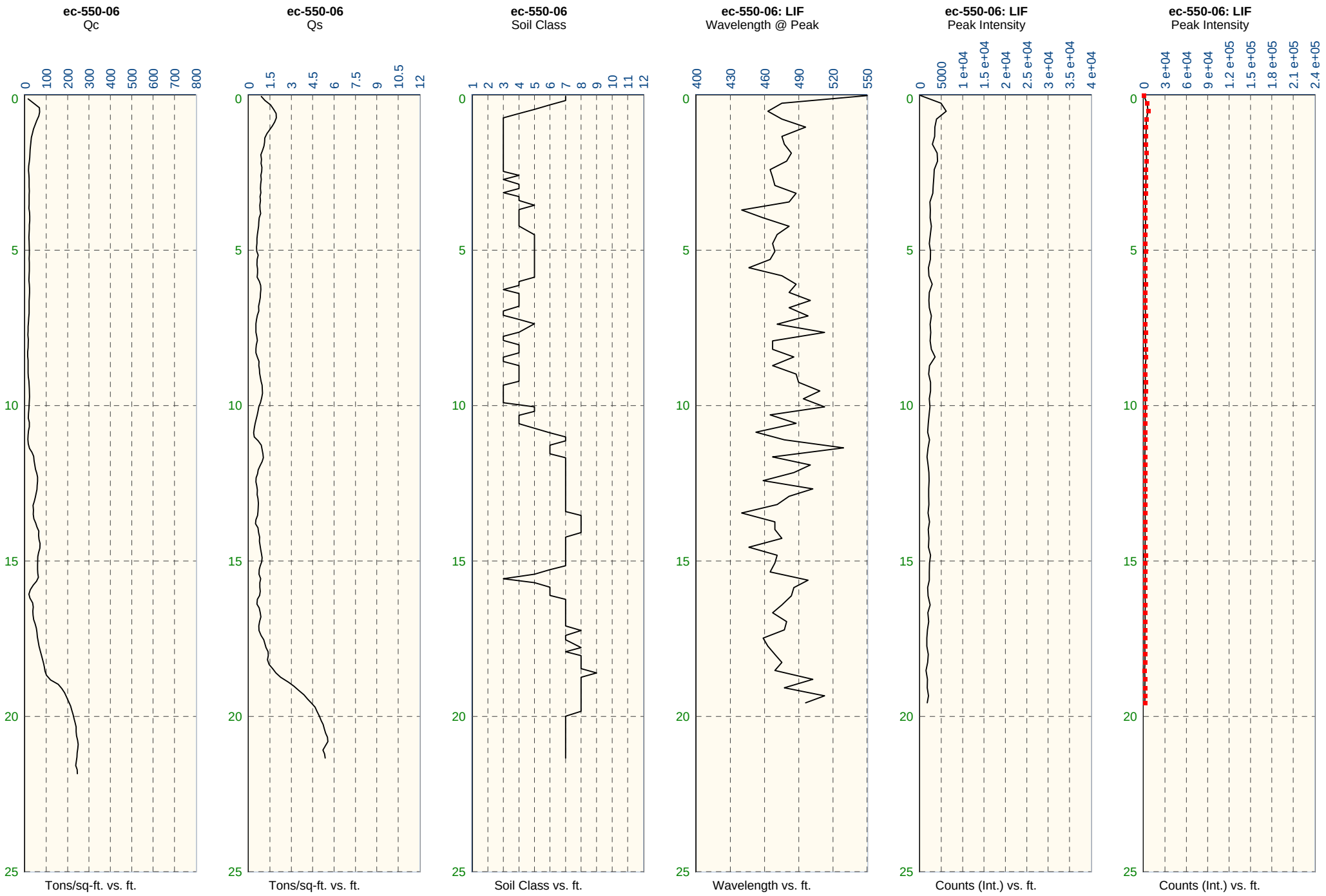
* overconsolidated or cemented

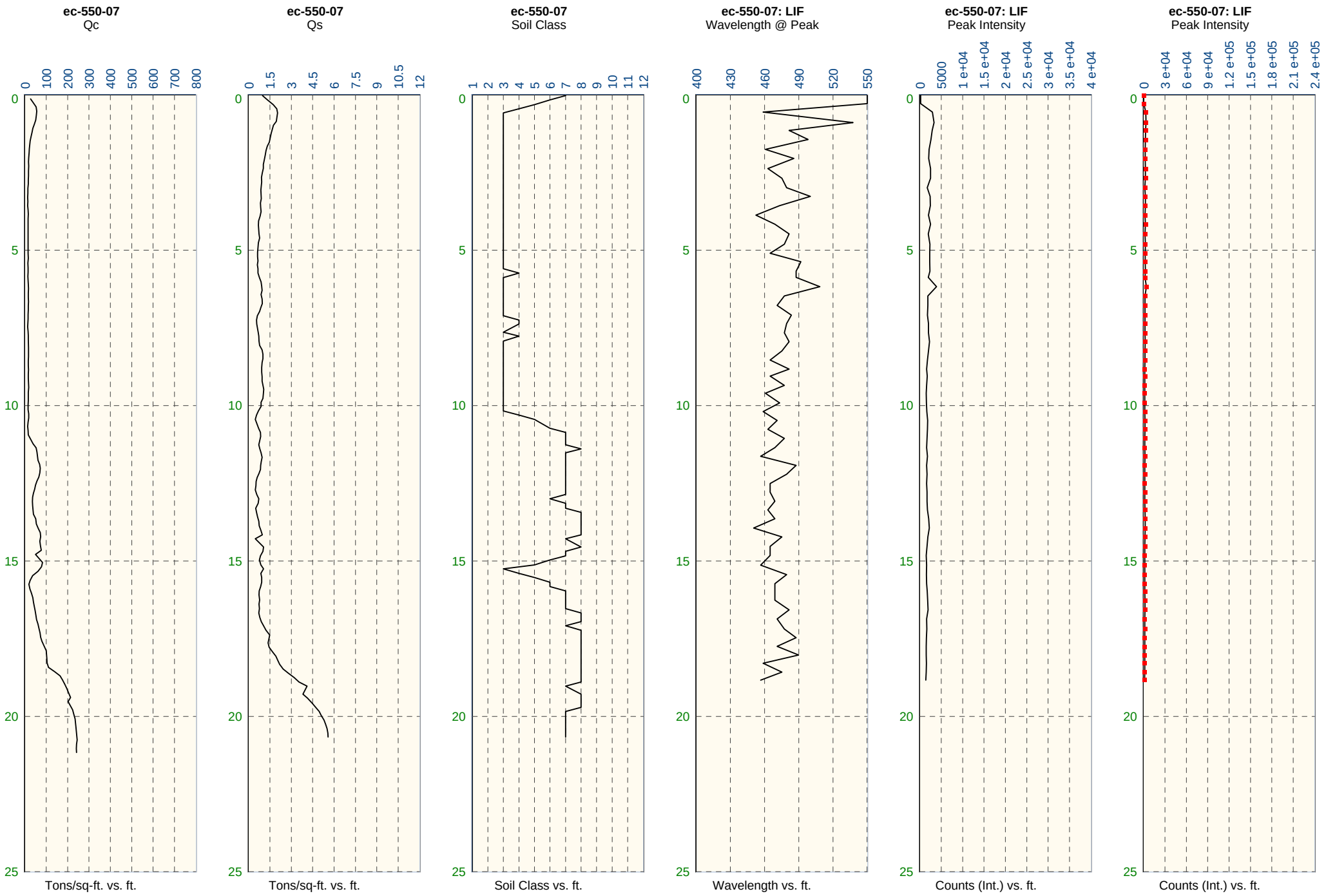

ec-550-01
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-550-01
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-550-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-550-01: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-550-01: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-550-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25

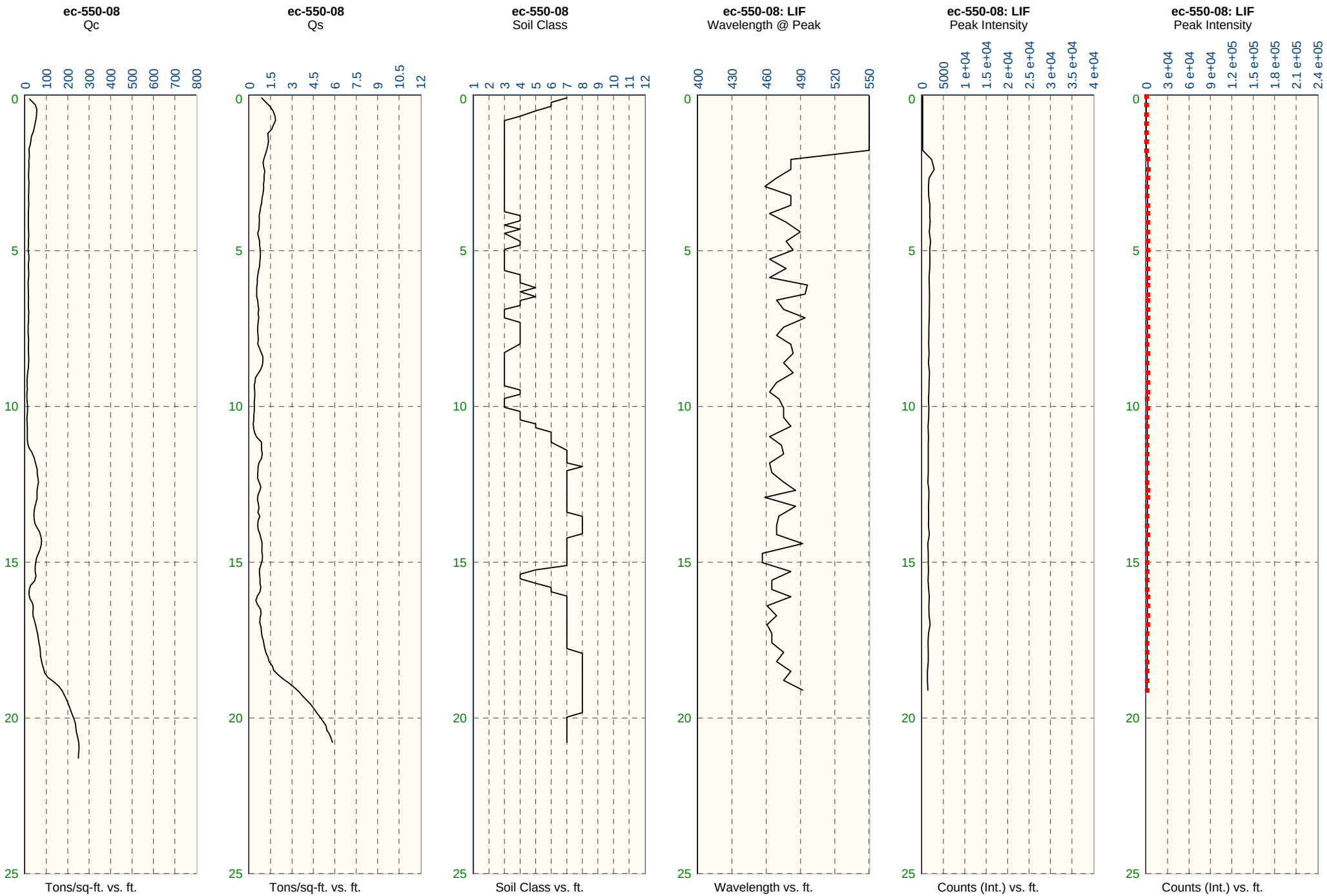

ec-550-02
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-550-02
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-550-02
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-550-02: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-550-02: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-550-02: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-550-03
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-550-03
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-550-03
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-550-03: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-550-03: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-550-03: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-550-04
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-550-04
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-550-04
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-550-04: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-550-04: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-550-04: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-550-06
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-550-06
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-550-06
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-550-06: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-550-06: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-550-06: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-550-07
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-550-07
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-550-07
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-550-07: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-550-07: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-550-07: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-550-08
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-550-08
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-550-08
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-550-08: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-550-08: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-550-08: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25

MOBILE GEOCHEMISTRY

H&P

May 20, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – NAS – SITE 550 – EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP051104W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1317).

Project Summary

The following analyses were conducted:

- 3 soils for total petroleum hydrocarbons (TPH) by DHS LUFT/8015M Method
- 1 water for volatile aromatic hydrocarbons (BTEX) & MTBE by EPA Method 8021B

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Blayne Hartman

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
2373 208th Street, Suite F-1, Torrance, California 90501 | 310 782.2929 — Fax 310 782.2798
www.HandPmg.com | 1-800-834-9888

MOBILE GEOCHEMISTRY

H&P

NAVY PUBLIC WORKS PROJECT #1113621902008
NAS
SITE 550
EL CENTRO, CA

H&P Project #NP051104-W1

TPH (DHS LUFT/ 8015M Method) ANALYSES OF SOILS

SAMPLE NUMBER	DATE ANALYZED	TPH-GAS C5-C11 (mg/kg)	TPH-DIESEL C12-C24 (mg/kg)
METHOD BLANK	5/11/2004	ND	ND
EC-550-03-5.5	5/11/2004	ND	ND
EC-550-03-11	5/11/2004	ND	ND
EC-550-04-11	5/11/2004	ND	840
DETECTION LIMITS		10	10

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
5-26-2004

MOBILE GEOCHEMISTRY

H&P

NAVY PUBLIC WORKS PROJECT #1113621902008
NAS
SITE 550
EL CENTRO, CA

H&P Project #NP051104-W1

BTEX, MTBE (EPA Method 8020 Modified) ANALYSES OF WATERS

SAMPLE NUMBER	DATE ANALYZED	MTBE (ug/l)	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYLBENZ (ug/l)	XYLENES (ug/l)	SURROGATE (%REC)
METHOD BLANK	5/11/2004	ND	ND	ND	ND	ND	110
EC-550-04-GW	5/11/2004	ND	0.7 J	ND	14	8.7	89
REPORTING LIMITS		10.0	1.0	1.0	1.0	1.0	53%-145%
DETECTION LIMITS		1.0	0.5	0.5	0.5	0.5	

J INDICATES VALUE DETERMINED IS BETWEEN DETECTION LIMIT AND REPORTING LIMIT

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
5-26-2004

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP051104-W1
DAILY CALIBRATION DATE : 05/11/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ppm)	WATER (ppb)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
TPH GASOLINE - FID1	10-20000	330-660000	7/14/2003	0.878	6.1%	236	0.847	3.5%	229	0.830	5.5%
TPH GASOLINE - FID2	10-20000	330-660000	7/14/2003	0.580	11.9%	378	0.529	8.7%	357	0.538	7.3%
TPH GASOLINE - FID3	10-20000	330-660000	7/14/2003	0.696	10.4%	291	0.687	1.3%	300	0.658	5.5%
TPH DIESEL - FID1	10 - 50000	330 - 1650000	7/11/2003	1.014	9.5%	487	1.027	1.2%	493	1.022	0.8%
TPH DIESEL - FID2	10 - 50000	330 - 1650000	7/11/2003	0.690	13.3%	752	0.665	3.6%	725	0.696	1.0%
TPH DIESEL - FID3	10 - 50000	330 - 1650000	7/11/2003	0.723	7.9%	647	0.773	6.9%	676	0.754	4.3%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP051104-W1
DAILY CALIBRATION DATE : 05/11/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ug/kg)	WATER (ug/L)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
MTBE	500 - 25	2500 - 125	4/2/2004	3.07	7.2%	272	2.72	11.3%	323	3.23	5.4%
BENZENE	500 - 25	2500 - 125	5/6/2004	9.44	11.6%	1,023	10.23	8.3%	840	8.40	11.0%
TOLUENE	500 - 25	2500 - 125	5/6/2004	17.80	12.5%	1,702	17.02	4.4%	1,546	15.46	13.2%
TFT	500 - 25	2500 - 125	5/6/2004	5.49	9.8%	556	5.56	1.4%	471	4.71	14.1%
ETHYLBENZENE	500 - 25	2500 - 125	5/6/2004	15.77	5.6%	1,528	15.28	3.1%	1,447	14.47	8.2%
m&p-XYLENES	500 - 25	2500 - 125	5/6/2004	20.54	8.8%	1,896	18.96	7.7%	1,747	17.47	15.0%
o-XYLENES	500 - 25	2500 - 125	5/6/2004	16.61	7.7%	1,553	15.53	6.5%	1,498	14.98	9.8%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR SOILS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (mg/kg)	MS CONC (mg/kg)	%REC MS	MSD CONC (mg/kg)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	211	105.5%	212	106.0%	0.5%	15%	75% - 125%
TPH DIESEL	500	483	96.6%	511	102.2%	5.6%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR WATERS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	MS CONC (ug/L)	%REC MS	MSD CONC (ug/L)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	21.5	107.5%	21.8	109.0%	1.4%	15%	75% - 125%
BENZENE	20.0	18.8	94.0%	18.4	92.0%	2.2%	15%	75% - 125%
TOLUENE	20.0	17.4	87.0%	17.1	85.5%	1.7%	15%	75% - 125%
ETHYLBENZENE	20.0	19.2	96.0%	18.8	94.0%	2.1%	15%	75% - 125%
TOTAL XYLENES	40.0	34.5	86.3%	33.8	84.5%	2.0%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR SOILS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (mg/kg)	LCS CONC (mg/kg)	%REC LCS	LCSD CONC (mg/kg)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	212	106.0%	213	106.5%	0.5%	15%	75% - 125%
TPH DIESEL	500	505	101.0%	487	97.4%	3.6%	15%	75% - 125%

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR WATERS

ANALYSIS DATE : 05/11/04

H&P Project #NP051104-W1

COMPOUND	SPK CONC (ug/L)	LCS CONC (ug/L)	%REC LCS	LCSD CONC (ug/L)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	20.0	19.8	99.0%	19.6	98.0%	1.0%	15%	75% - 125%
BENZENE	20.0	18.8	94.0%	18.4	92.0%	2.2%	15%	75% - 125%
TOLUENE	20.0	17.5	87.5%	17.2	86.0%	1.7%	15%	75% - 125%
ETHYLBENZENE	20.0	19.9	99.5%	18.7	93.5%	6.2%	15%	75% - 125%
TOTAL XYLENES	40.0	37.9	94.8%	34.9	87.3%	8.2%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Chain of Custody Record

HP LABS

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469
☒ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404
☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 5-11-04
HPL Project # NP051104-W1
Outside Lab:

Client: NAVY Public Works Site 550
Address: 2730 McKean St Suite 1 SD
Phone: 619 524 6967 Fax: 619-524-6000

Collector: D Bloom
Page: 3 Of 6
Client Project # 11 3621902008 Project Manager D Bloom
Location: NAS El Centro Site 550
Turn around time:

Global ID: T0602531 75 EDF: Yes / No

Sample Receipt
Intact: ☐ Yes ☐ No
Seal Intact: ☐ Yes ☐ No ☐ N/A
Cold: ☐ Yes ☐ No
N/A (Received on Site)

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B: BTEX / Oxygenates	8260B: Oxygenates	8260B: VOC's	8260B: VOC's and Oxygenates	Methane	Fixed Gases							Total # of containers
EC 550 03-5.5			831	5/11	Soil	sleeve	X																	
EC 550-03-11			851	↓	↓	↓	X																	
EC 550-04-11			953	↓	↓	↓	X																	
EC 550 04-GW			1020	5/11	W	VOA			X															
~~EC 550 IN-04-GW~~ gV			~~1035~~	↓	~~W~~	~~VOA~~			X															

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
David M Bloom	Code 980	James Villarreal	HHP	5-11-04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constitu[illegible]horization to proceed with analysis and acceptance of condition on back. *Sample disposal i[illegible]on:* ☐ *Disposal @ $2.00 each* ☐ *Return to client* ☐ *Pickup*

Site Assessment Report and
Closure Summary
UST Site 551
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 551 at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 551 work plan addendum, dated March 18, 2004, prepared by the Public Works Center San Diego (PWCSD). Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 551. It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 551
Site Address:	South side of 7th Street, between "G" and "E" Streets Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,742,259 Northing: 1,875,712 feet (State Plane 6)
Facility Name:	NAVAIR Storage Yard (Former barracks)
Property Owner: Tank Owner/Operator: Responsible Party:	United States Navy United States Navy United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430055

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	Unknown
Construction Materials:	Unknown
Capacity:	1,400 gallons
Contents:	Diesel
Year Removed:	No information

Figure 1 shows the site location and previous and current assessment locations.

Subsurface Surveys, Inc., under the direction of SOTA Environmental Technology, Inc. (SOTA), performed a geophysical survey to locate USTs at NAF El Centro in January 1997 (SOTA, 1997). SOTA reported no candidate anomalies of a tank were located at Site 551.

Bechtel National, Inc. (BNI) advanced one direct-push soil/HydroPunch groundwater boring at the assumed location of UST Site 551 and collected a soil sample and a groundwater sample. According to the *Final Technical Memorandum No. 2, Underground Storage Tank Site Investigation*, dated November 2000, prepared by BNI, the analytical results of the groundwater sample collected from a depth range of 14.5 to 18 feet below ground surface (bgs) indicated that constituents of concern were not detected or detected below action levels. The analytical results of the soil sample, collected from depths of 10.7 to 11.3 feet bgs, revealed total petroleum hydrocarbons quantitated as diesel (TPH-diesel) concentration of 2,000 milligrams per kilogram (mg/kg).

In May 2003, Navy Public Works Center, San Diego, Environmental Department Code 980 investigated Site 551 for the presence of a tank. A faint electromagnetic anomaly using EM-61 equipment did not support the presence of a UST at this site.

PWC Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Soil exceeds cleanup levels for TPH-diesel.* We also addressed a RWQCB concern outlined in a May 6, 2004, letter to test for constituents of concern in a groundwater sample collected downgradient of the former tank location. Field activities were performed on April 1 and 5, 2004.

In accordance with the work plan, Laser Induced Fluorescence (LIF) was measured *in situ* using the Site Characterization and Analysis Penetrometer System (SCAPS) at five locations as shown on Figure 1. The LIF data are summarized and interpreted in Table 2. At one of the locations, EC-551-05, no fluorescence characteristic of petroleum, oil, or lubricants (POL) was encountered. At the four other locations, fluorescence suggesting POL was encountered. This fluorescence was a relatively weak rise in intensity above background levels at depths ranging from 9.3 to 11.4 feet bgs. This depth range, just above the water table, is consistent with expected fuel contaminant migration patterns. The fluorescence at two of these four locations, EC-551-02 and 03, showed a drop in wavelength coupled with a slightly elevated intensity, which is an additional factor suggesting POL fluorescence.

Three soil samples and a groundwater sample were collected at this site. Soil samples were collected from depths of 7.0 feet bgs (above the fluorescence interval) and 10.0 feet bgs (within the fluorescence interval) at location EC-551-03, and from a depth of 10.0 feet at location EC-551-05. TPH-gasoline was not detected (<10 mg/kg) in the three soil samples. The sample results are shown in Table 2. In

summary, TPH-diesel was detected at relatively low concentrations ranging from 59 to 260 mg/kg in the soil samples. The soil sample results are consistent with the LIF results.

A groundwater sample was collected unpurged at location EC-551-05 using a single-use disposable bailer from a temporary well screened with ¾-inch diameter 0.010-inch slotted PVC from 7.0 to 17.0 feet bgs. The samples were immediately delivered to an on-site mobile laboratory for analytical testing. BTEX and MTBE were not detected in the groundwater sample. The results are summarized on Table 2. Groundwater depth was measured at 12.66 feet bgs.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, the vertical and horizontal extent of fuel-impacted soils has been delineated. Groundwater testing shows that fuel components BTEX and MTBE are not detected. Soil data obtained during the current investigation show that TPH-diesel concentrations in the former UST vicinity meet cleanup levels.

It is the opinion of PWCSD that further assessment or remediation at this site is unnecessary. Therefore, we recommend that no further action be considered for this site.

Site Characterization and Closure Information

Description of the former UST:	See Background Information (page 2).
Contaminants Identified:	TPH-diesel in soil. See attached analytical results tables.
Amount of Contaminants Leaked:	Not estimated. See attached analytical results tables.
MTBE:	None detected.
Description of the soil/geology:	Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? Yes. Based on a review of the analytical data, the lateral and vertical extent of soil impacted with fuels has been delineated.

Estimated volume of contaminated soil left on site and concentration: Not Estimated. TPH-gasoline not detected. Greatest TPH-diesel soil concentration 260 mg/kg.

Is groundwater contamination completely delineated? Yes. Current analytical results for groundwater show that constituents are not detected.

Monitoring wells installed, properly permitted? No monitoring wells were installed.
Depth to groundwater: Approximately 12.7 feet bgs.

Is groundwater or surface water impacted? No. All analytical results for groundwater meet cleanup goals for the site (below tap water PRGs and drinking water MCLs).

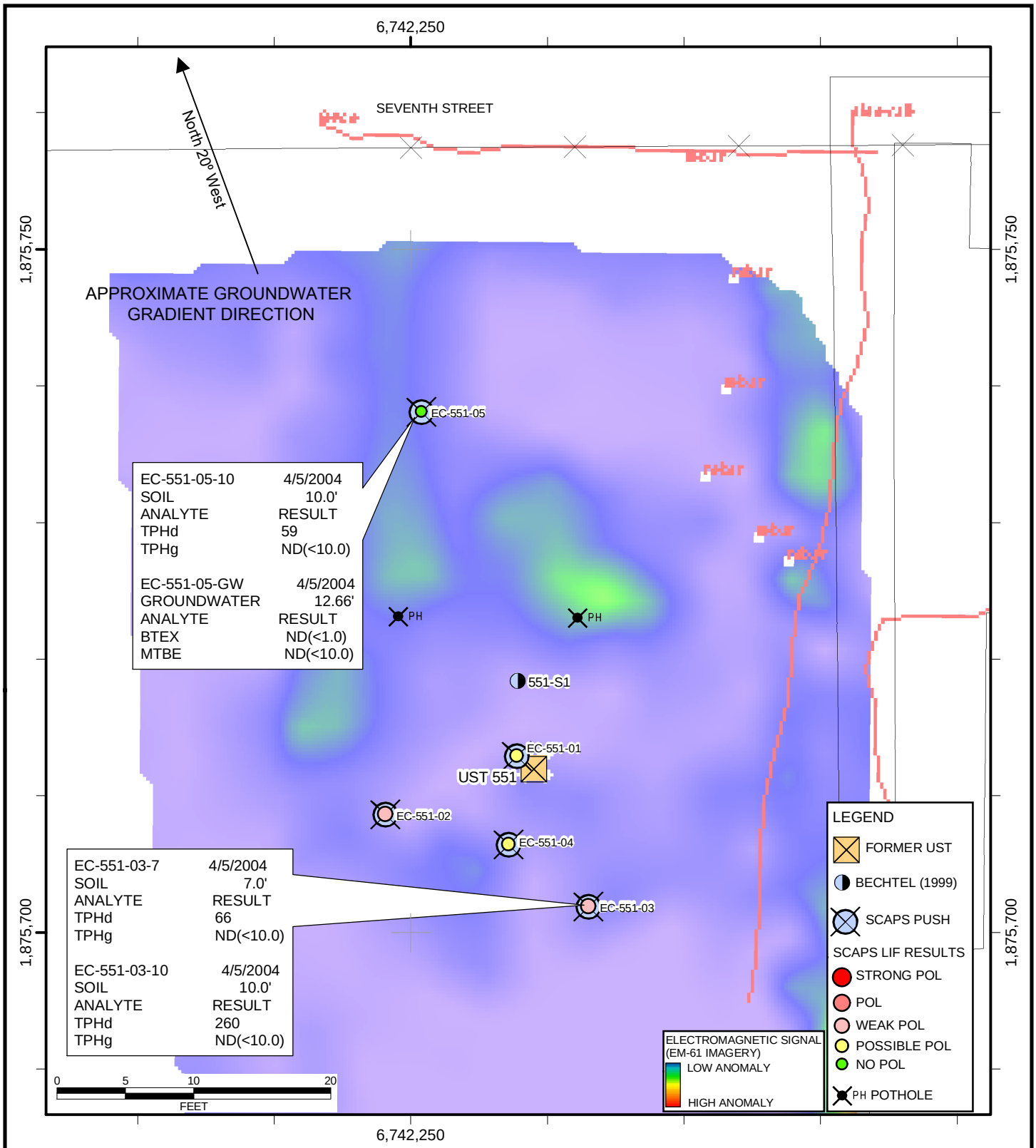
Remedial action taken? UST removed.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Yes.

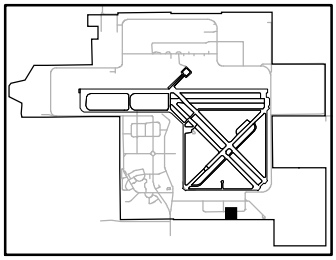
Site Closure: Because soil and groundwater meet cleanup standards for constituents of concern, the recommendation for site closure is accepted and no further action is required at this site.

Signature: ***Date:***	***Signature:*** ***Date:***
N.R. Wells **Lieutenant Commander, CEC, US Navy** **By direction of** **The Commanding Officer**	**Liann P. Chavez, R.G.** **Senior Engineering Geologist** **California Environmental Protection Agency** **California Regional Water Quality Control Board** **Colorado River Basin Region**

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS, Soil, and Groundwater Results
SCAPS Logs
Laboratory Analytical Report and Chain-of-Custody Documentation



OVERVIEW MAP - NAF EL CENTRO



N

MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 551

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC4

FIGURE: 1

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence, Soil, and Groundwater Analytical Data Summary

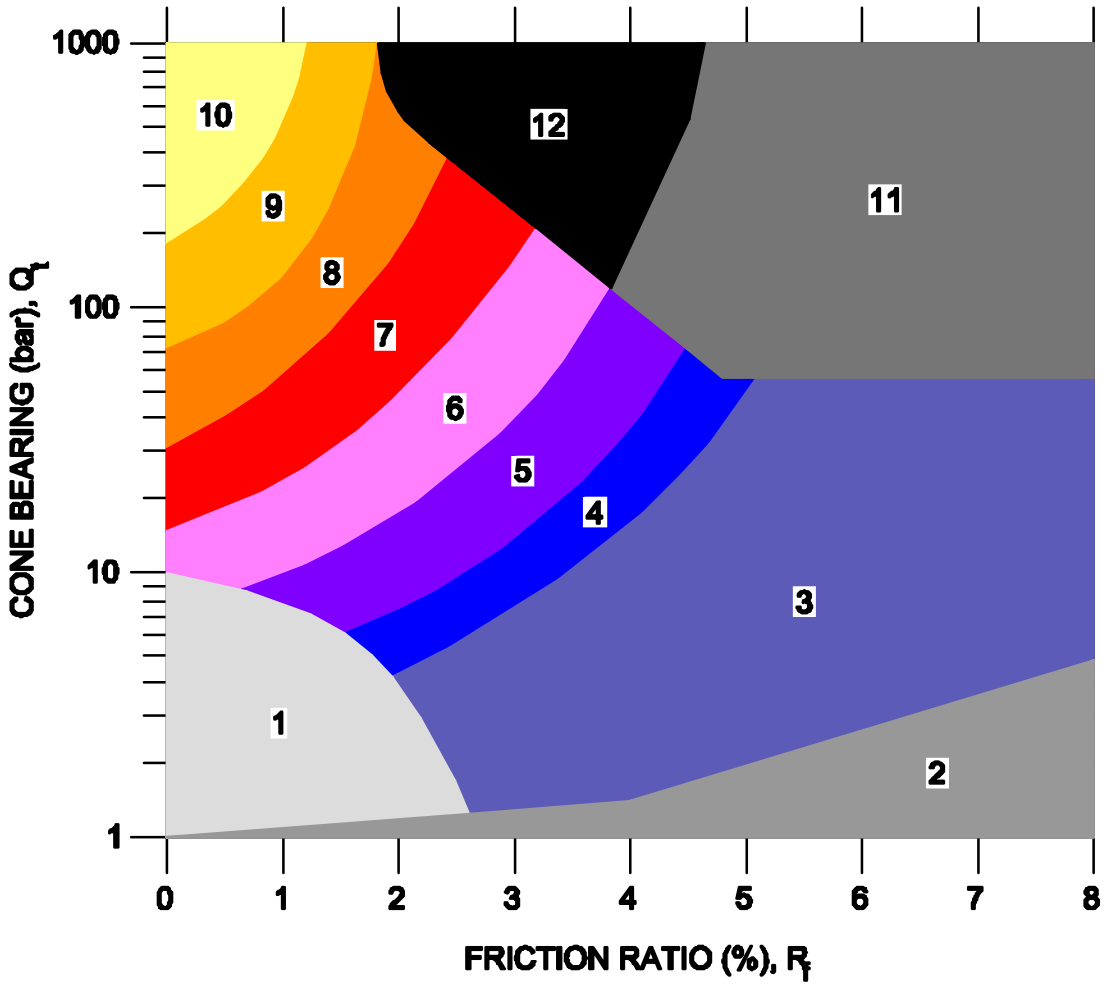
UST Site 551
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-551-01	4/1/2004	19.1	21.3	4,990 @ 11.5	Possible POL		
EC-551-02	4/1/2004	19.5	21.9	5,288 @ 11.0	Weak POL		
EC-551-03	4/1/2004	19.4	21.7	10,704 @ 10.0	Weak POL		
EC-551-03-7	4/5/2004					7.0': TPHd: 66 mg/kg TPHg: <10 mg/kg	
EC-551-03-10	4/5/2004					10.0': TPHd: 260 mg/kg TPHg: <10 mg/kg	
EC-551-04	4/1/2004	19.5	21.8	6,211 @ 9.4	Possible POL		
EC-551-05	4/1/2004	19.4	21.9	2,542 @ 10.5	No POL		
EC-551-05-10	4/5/2004					10.0': TPHd: 59 mg/kg TPHg: <10 mg/kg	
EC-551-05-GW	4/5/2004					12.66': BTEX: <1.0 ug/L MTBE: <10.0 ug/L	7.0'-17.0'

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

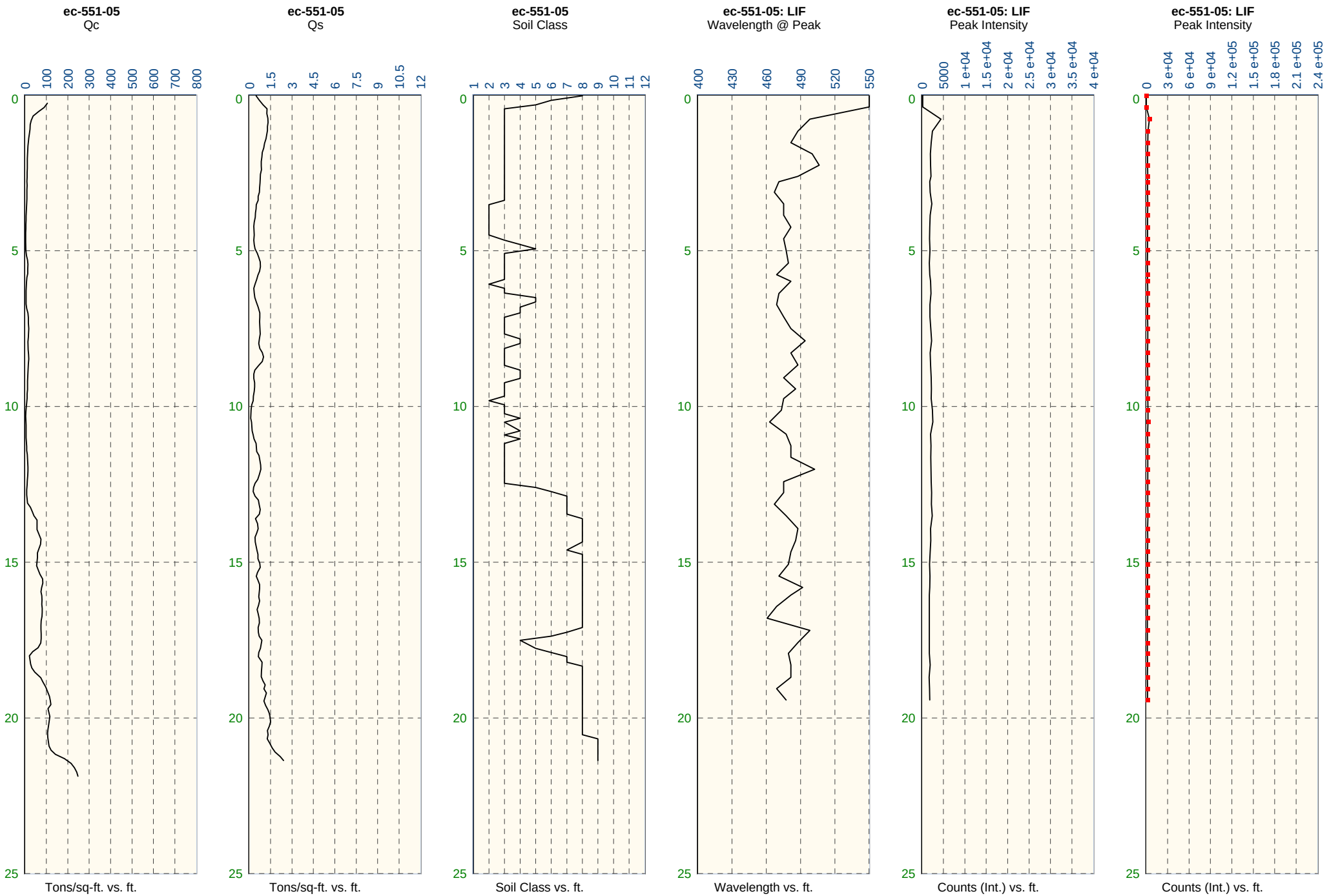
CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)

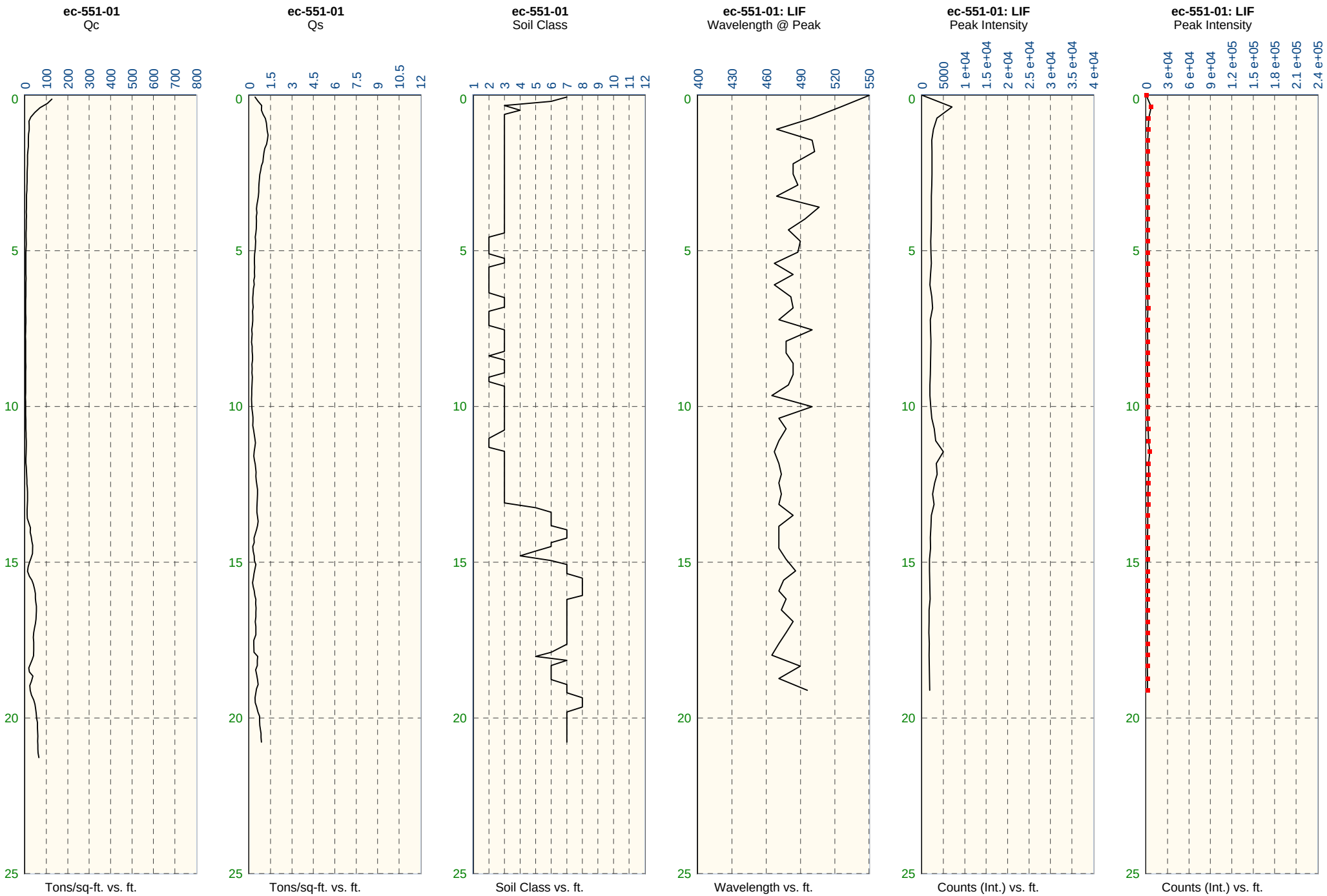


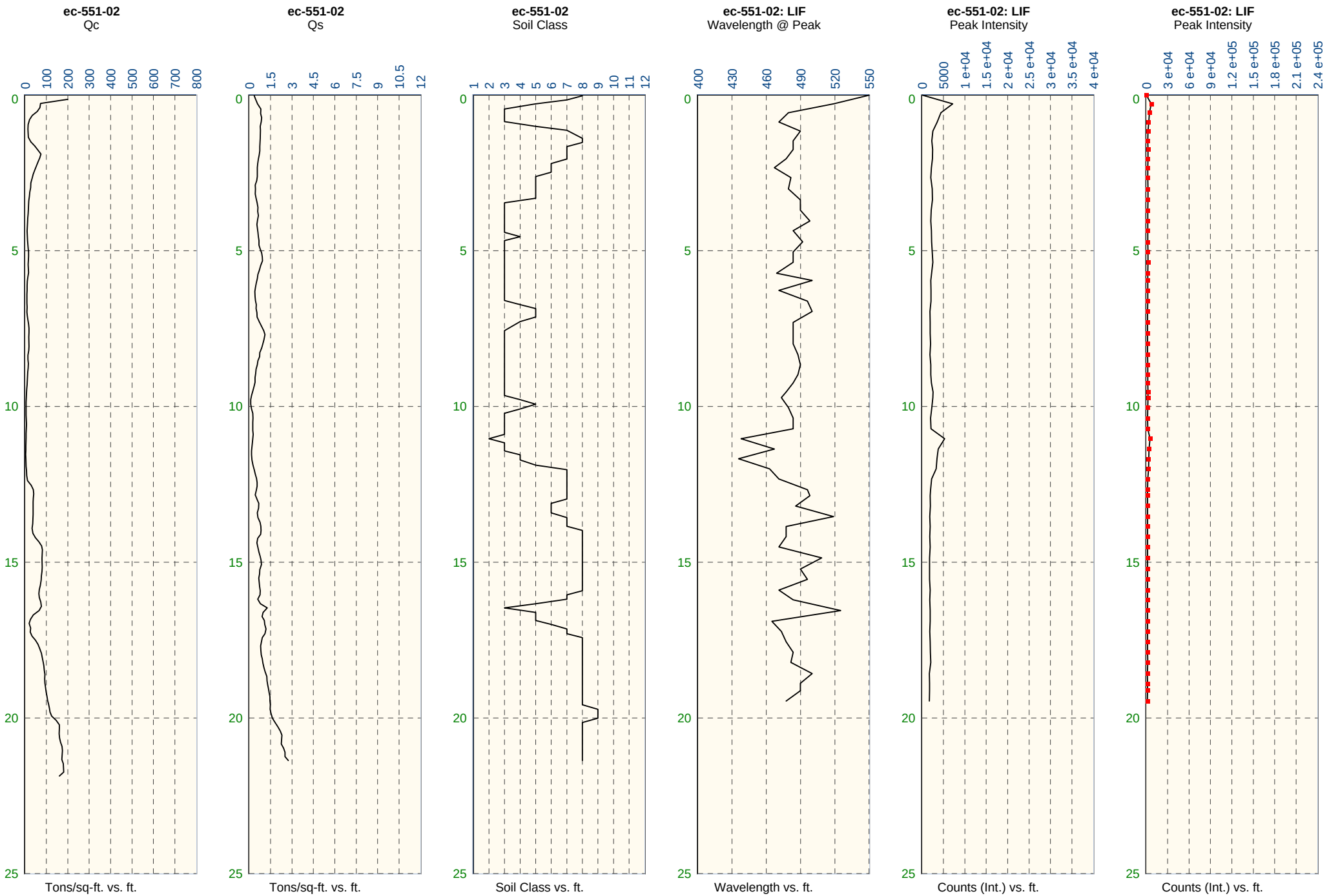
Friction Ratio (R_f) = Sleeve Friction (F_s)/Cone Pressure (Q_t) x 100%
1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

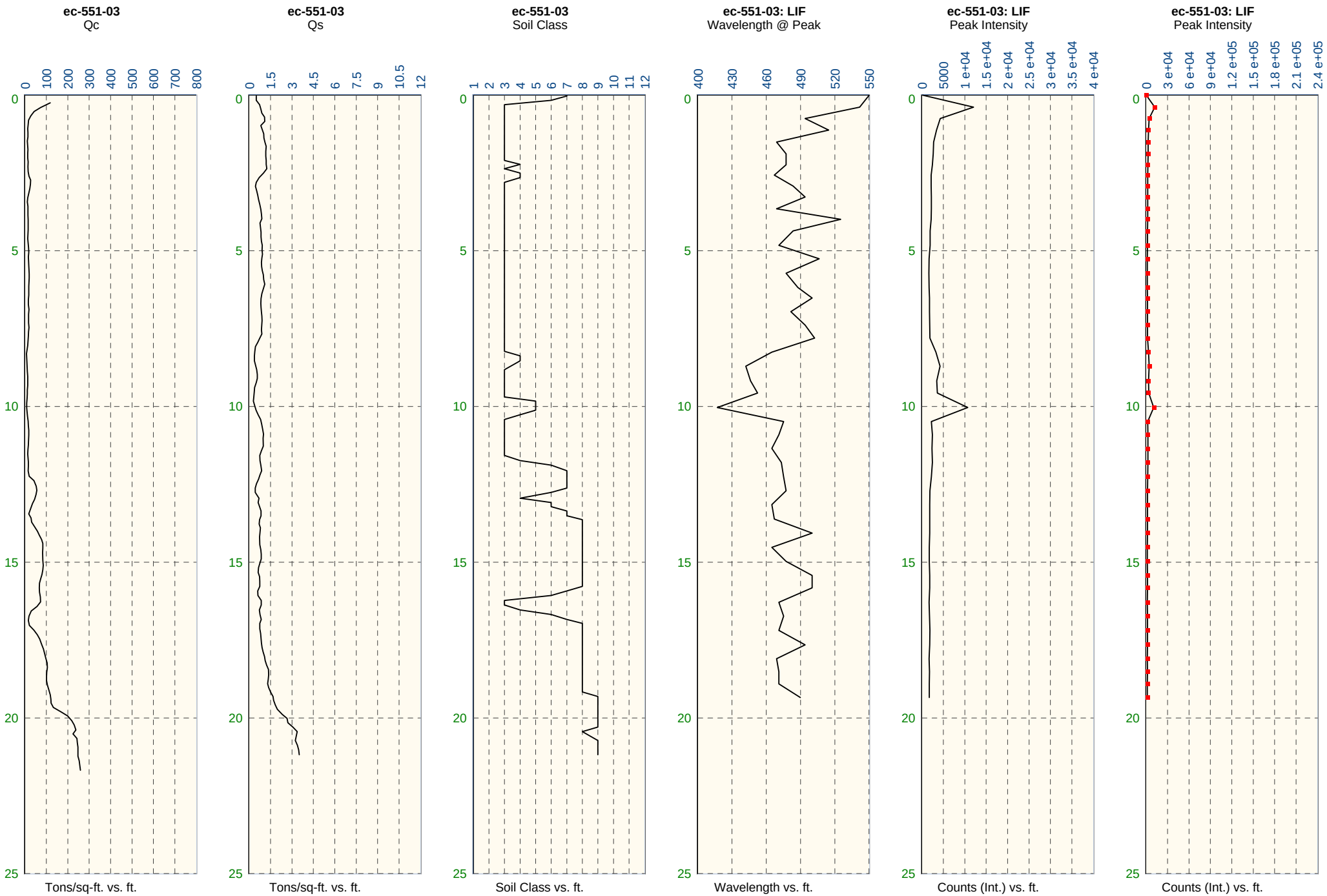
Zone		Q_t/ N	Soil Behavior Type
1		2	sensitive fine grained
2		1	organic material
3		1	clay
4		1.5	silty clay to clay
5		2	clayey silt to silty clay
6		2.5	sandy silt to clayey silt
7		3	silty sand to sandy silt
8		4	sand to silty sand
9		5	sand
10		6	gravelly sand to sand
11		1	very stiff fine grained*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

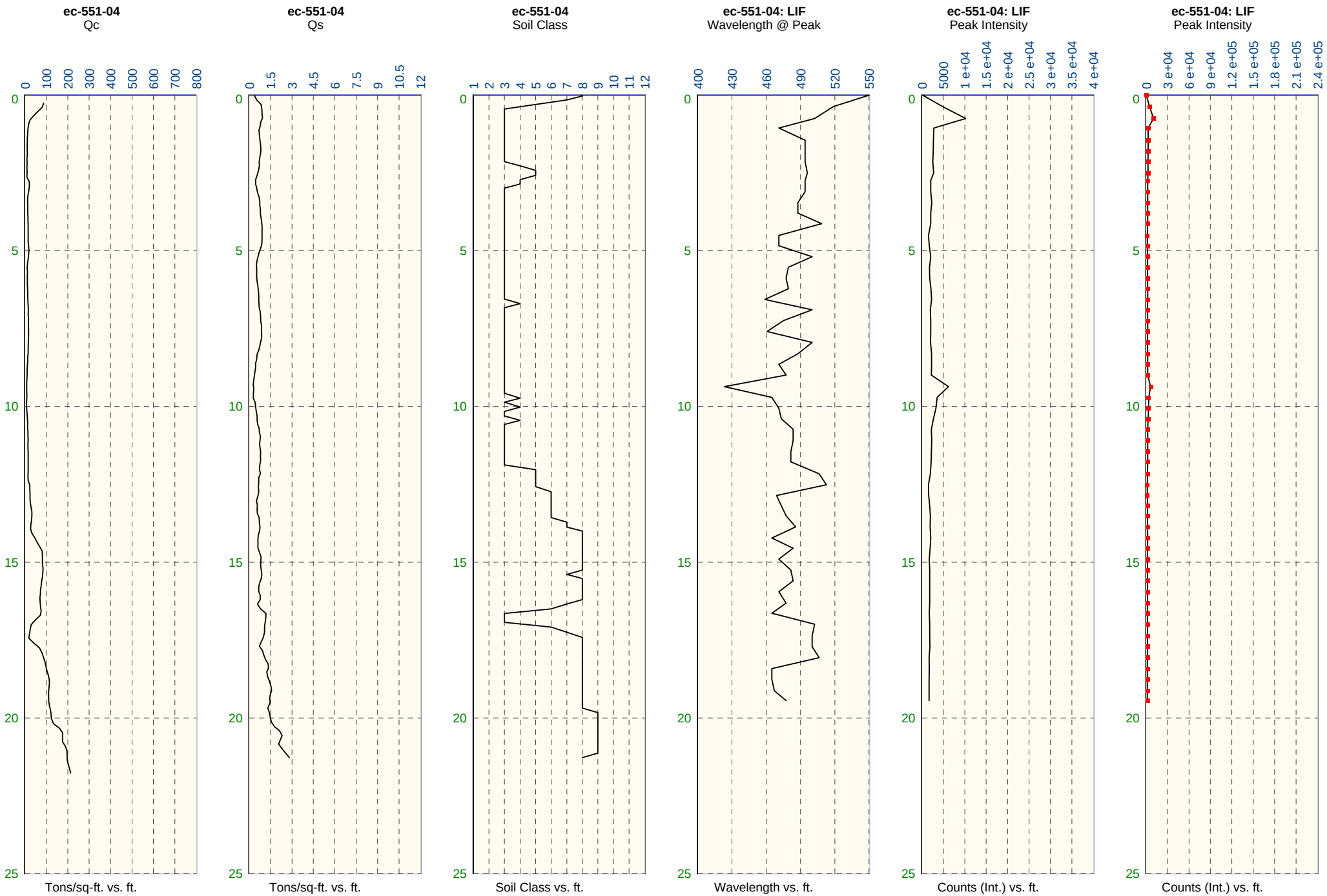
* overconsolidated or cemented


ec-551-05
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-551-05
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-551-05
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-551-05: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-551-05: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-551-05: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-551-01
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-551-01
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-551-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-551-01: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-551-01: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-551-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-551-02
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-551-02
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-551-02
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-551-02: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-551-02: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-551-02: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-551-03
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-551-03
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-551-03
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-551-03: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-551-03: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-551-03: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25


ec-551-04
Qc
0 100 200 300 400 500 600 700 800
Tons/sq-ft. vs. ft.
ec-551-04
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
Tons/sq-ft. vs. ft.
ec-551-04
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
Soil Class vs. ft.
ec-551-04: LIF
Wavelength @ Peak
400 430 460 490 520 550
Wavelength vs. ft.
ec-551-04: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
Counts (Int.) vs. ft.
ec-551-04: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
Counts (Int.) vs. ft.
0 5 10 15 20 25

MOBILE GEO CHEMISTRY

H&P

April 13, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – SITE ~~110~~ 551 – NAVAL AIR FACILITY - EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP040504W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1746).

Project Summary

The following analyses were conducted:

- 3 soils for total petroleum hydrocarbons (TPH) by DHS LUFT/8015M Method
- 1 water for volatile aromatic hydrocarbons (BTEX) & MTBE by EPA Method 8021

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Blayne Hartman

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
2373 208th Street, Suite F-1, Torrance, California 90501 | 310 782.2929 — Fax 310 782.2798
www.HandPmg.com | 1-800-834-9888

MOBILE GEOCHEMISTRY

H&P

NAVY PUBLIC WORKS PROJECT #1113621902008
SITE 110
NAVAL AIR FACILITY
EL CENTRO, CA

H&P Project #NP040504-W1

TPH (DHS LUFT/ 8015M Method) ANALYSES OF SOILS

SAMPLE NUMBER	DATE ANALYZED	TPH-GAS C5-C11 (mg/kg)	TPH-DIESEL C12-C24 (mg/kg)
METHOD BLANK	4/5/2004	ND	ND
EC-551-05-10	4/5/2004	ND	59
EC-551-03-7	4/5/2004	ND	66
EC-551-03-10	4/5/2004	ND	260
DETECTION LIMITS		10	10

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
4-15-2004

MOBILE GEOCHEMISTRY

H&P

NAVY PUBLIC WORKS PROJECT #1113621902008
SITE 110
NAVAL AIR FACILITY
EL CENTRO, CA

H&P Project #NP040504-W1

BTEX, MTBE (EPA Method 8021) ANALYSES OF WATERS

SAMPLE NUMBER	DATE ANALYZED	MTBE (ug/l)	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYLBENZ (ug/l)	XYLENES (ug/l)	SURROGATE (%REC)
METHOD BLANK	4/5/2004	ND	ND	ND	ND	ND	106
EC-551-05-GW	4/5/2004	ND	ND	ND	ND	ND	103
REPORTING LIMITS		10.0	1.0	1.0	1.0	1.0	53%-145%
DETECTION LIMITS		1.0	0.5	0.5	0.5	0.5	

J INDICATES VALUE DETERMINED IS BETWEEN DETECTION LIMIT AND REPORTING LIMIT

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
4-15-2004

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP040504-W1
DAILY CALIBRATION DATE : 04/05/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ppm)	WATER (ppb)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
TPH GASOLINE - FID1	10-20000	330-660000	7/14/2003	0.878	6.1%	241	0.830	5.5%	241	0.830	5.5%
TPH GASOLINE - FID2	10-20000	330-660000	7/14/2003	0.580	11.9%	372	0.538	7.3%	368	0.538	7.3%
TPH GASOLINE - FID3	10-20000	330-660000	7/14/2003	0.696	10.4%	304	0.658	5.5%	293	0.658	5.5%
TPH DIESEL - FID1	10 - 50000	330 - 1650000	7/11/2003	1.014	9.5%	489	1.022	0.8%	489	1.022	0.8%
TPH DIESEL - FID2	10 - 50000	330 - 1650000	7/11/2003	0.690	13.3%	718	0.696	1.0%	731	0.696	1.0%
TPH DIESEL - FID3	10 - 50000	330 - 1650000	7/11/2003	0.723	7.9%	663	0.754	4.3%	667	0.754	4.3%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP040504-W1
DAILY CALIBRATION DATE : 04/05/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ug/kg)	WATER (ug/L)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
MTBE	500 - 25	2500 - 125	4/2/2004	1.22	13.2%	112	1.12	7.8%	130	1.30	7.0%
BENZENE	500 - 25	2500 - 125	4/2/2004	3.24	10.1%	371	3.71	14.4%	285	2.85	12.1%
TOLUENE	500 - 25	2500 - 125	4/2/2004	15.47	11.2%	413	4.13	*73.3%	715	7.15	*53.8%
TFT	500 - 25	2500 - 125	4/2/2004	1.02	8.5%	117	1.17	14.4%	96	0.96	6.6%
ETHYLBENZENE	500 - 25	2500 - 125	4/2/2004	14.84	6.6%	1,677	16.77	13.0%	1,481	14.81	0.2%
m&p-XYLENES	500 - 25	2500 - 125	4/2/2004	19.14	9.8%	2,063	20.63	7.8%	1,778	17.78	7.1%
o-XYLENES	500 - 25	2500 - 125	4/2/2004	15.74	9.3%	1,708	17.08	8.5%	1,495	14.95	5.0%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

* DUE TO A CONTAMINATION THE % DIFF VALUE WAS OUTSIDE OF CRITERIA. TOLUENE WAS RECALIBRATED ON 04/06/2004 AND DATA WAS REPROCESSED. ALL DATA WAS REPROCESSED AND % DIFF WAS WITHIN CRITERIA.

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR SOILS

ANALYSIS DATE : 04/05/04

H&P Project #NP040504-W1

COMPOUND	SPK CONC (mg/kg)	MS CONC (mg/kg)	%REC MS	MSD CONC (mg/kg)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	210	105.0%	214	107.0%	1.9%	15%	75% - 125%
TPH DIESEL	500	514	102.8%	506	101.2%	1.6%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY
H&P

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR WATERS

ANALYSIS DATE : 04/05/04
H&P Project #NP040504-W1

COMPOUND	SPK CONC (ug/L)	MS CONC (ug/L)	%REC MS	MSD CONC (ug/L)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	10.0	10.0	99.9%	10.2	102.3%	2.4%	15%	75% - 125%
BENZENE	10.0	10.0	100.3%	10.0	99.8%	0.5%	15%	75% - 125%
TOLUENE	10.0	11.3	113.0%	11.0	110.0%	2.7%	15%	75% - 125%
ETHYLBENZENE	10.0	11.1	111.4%	11.8	118.3%	6.0%	15%	75% - 125%
TOTAL XYLENES	20.0	21.7	108.3%	21.7	108.7%	0.4%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR SOILS

ANALYSIS DATE : 04/05/04

H&P Project #NP040504-W1

COMPOUND	SPK CONC (mg/kg)	LCS CONC (mg/kg)	%REC LCS	LCSD CONC (mg/kg)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	212	106.0%	218	109.0%	2.8%	15%	75% - 125%
TPH DIESEL	500	506	101.2%	490	98.0%	3.2%	15%	75% - 125%

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR WATERS

ANALYSIS DATE : 04/05/04

H&P Project #NP040504-W1

COMPOUND	SPK CONC (ug/L)	LCS CONC (ug/L)	%REC LCS	LCSD CONC (ug/L)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	10.0	10.1	101.0%	9.6	95.7%	5.4%	15%	75% - 125%
BENZENE	10.0	10.0	99.5%	10.3	102.6%	3.1%	15%	75% - 125%
TOLUENE	10.0	11.1	111.0%	10.4	104.0%	6.5%	15%	75% - 125%
ETHYLBENZENE	10.0	11.0	110.0%	11.3	112.7%	2.4%	15%	75% - 125%
TOTAL XYLENES	20.0	21.5	107.3%	22.0	109.8%	2.3%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

Chain of Custody Record

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469
☒ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404
☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 4-5-04

H&P Project # NP 040504-W1

Outside Lab:

Client: NAVY PWC-SD ENVIRONMENTAL

Address: 2730 McKean St. Ste 1 Code 980 SD CA

Phone: 619-524-6967 Fax: 619-524-6000

Collector: TWS

Client Project # 113621902008

Location: NAF El Centro Site 110

Page: 3 of 5

Project Manager: D. Bloom

Turn around time:

Global ID: T0602558 10

EDF: Yes / No

Sample Receipt

Intact: ☐ Yes ☐ No

Seal Intact: ☐ Yes ☐ No ☐ N/A

Cold: ☐ Yes ☐ No

N/A (Received on Site)

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B: BTEX / Oxygenates	8260B: Oxygenates	8260B: VOC's	8260B: VOC's and Oxygenates	Methane	Fixed Gases							Total # of containers
EC-551-05-10		10'	0945	4/5/04	Soil	ss tube																		
EC-551-03-7		7'	1040	4/5/04	Soil	Jar																		
EC-551-03-10		10'	1050	4/5/04	Soil	ss tube																		
EC-551-05-GW			1120	4/5/04	Water	40ml VOA																		

Jill Nolan

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Jim Shuey	Navy PWC	Janis Villarreal	H+P	4-5-04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constit[illegible] authorization to proceed with analysis and acceptance of condition on back.

Sample disposal [illegible]ction: ☐ *Disposal @ $2.00 each* ☐ *Return to client* ☐ *Pickup*

Site Assessment Report and
Closure Summary
UST Site 551 (I)(N)
Naval Air Facility, El Centro, California

The assessment activities documented herein refer to Underground Storage Tank (UST) Site 551 (I)(N) at Naval Air Facility, El Centro, California. The work was performed under a generic work plan, dated November 24, 2003, and Site 551 (I)(N) work plan addendum, dated March 18, 2004, prepared by the Public Works Center San Diego (PWCSD). Both documents were approved by the California Regional Water Quality Control Board (RWQCB) – Colorado River Basin Region. Refer to the work plan and addendum for particulars of field quality assurance/quality control, sampling and analysis, safety and health, and investigation-derived waste handling. This document is limited to the site-specific elements for Site 551 (I)(N). It documents field activities, contains data results, summarizes findings, and provides conclusions and recommendations. Where field activities deviate from the work plan, additional information is contained herein. Information pertinent to the RWQCB's Closure Summary is provided at the end of this report.

Site Information

Site Name:	UST Site 551 (I)(N)
Site Address:	South side of 7th Street, between "G" and "E" Streets Naval Air Facility El Centro, California 92243
Tank Coordinates:	Easting: 6,742,358 Northing: 1,875,750 feet (State Plane 6)
Facility Name:	NAVAIR Storage Yard (Former barracks)
Property Owner: Tank Owner/Operator: Responsible Party:	United States Navy United States Navy United States Navy
Contact Person:	Robert Fischer, Environmental Protection Specialist 1605 Third Street, Building 504, Code 45RF Naval Air Facility El Centro, CA 92243-5001 (760) 339-2284
RWQCB File Number:	7DODT22430032

Prepared for: **Commander, Navy Region Southwest**
Naval Air Facility El Centro, Code N45ECW

Prepared by:

David M. Bloom, RG #6192
Project Manager, PWC Code 980

Approved by:

Rod Soule
Division Director
Navy Public Works Center, San Diego
Environmental Department Code 980

Background Information

Year Installed:	Unknown
Construction Materials:	Not provided
Capacity:	1,400 gallons
Contents:	Diesel
Year Removed:	1993 by Environmental Chemical Corp. (ECC)

Figure 1 shows the site location and previous and current assessment locations.

ECC collected five soil samples as part of UST removal in 1993. The four samples collected from the tank excavation contained concentrations of total petroleum hydrocarbons quantitated as diesel (TPH-diesel) ranging from 5,400 to 20,720 milligrams per kilogram (mg/kg) according to the *Final Technical Memorandum, Underground Storage Tank Site Investigation*, dated March 2000, prepared by Bechtel National, Inc. (BNI).

In 1999, BNI advanced a HydroPunch groundwater boring approximately 20 feet north (downgradient) from the former tank location. Groundwater sample results indicated that benzene, at a concentration of 15 micrograms per liter (ug/L), exceeded its action level, and that MTBE, while not detected, reported a detection limit of 100 ug/L, which exceeds its action level of 13 ug/L. The groundwater sample was collected from a depth range of 5 to 15 feet below ground surface (bgs).

PWC Investigation

The purpose of our current assessment activity was to address the Problem Statement: *Soil exceeds cleanup levels for TPH-diesel. Groundwater exceeds action level for benzene and unconfirmed for MTBE.* Field activities were performed on April 1 and May 11, 2004.

In accordance with the work plan, Laser Induced Fluorescence (LIF) was measured *in situ* using the Site Characterization and Analysis Penetrometer System (SCAPS) at four locations as shown on Figure 1. The LIF data are summarized and interpreted in Table 2. No fluorescence characteristic of petroleum, oil, or lubricants (POL) was encountered.

A groundwater sample was collected unpurged at location EC-551I-04 using a single-use disposable bailer from a temporary well screened with ¾-inch diameter PVC with 0.010-inch stainless steel pre-pack well screen from 5.0 to 15.0 feet bgs. The sample was immediately delivered to an on-site mobile laboratory for analytical testing. BTEX and MTBE were not detected in the groundwater sample. The analytical results are summarized on Table 2. Groundwater depth was measured at 11.9 feet bgs. Although the PVC was removed from the ground, the stainless steel screen from the pre-pack remained in the ground. A cement-bentonite slurry was used to grout the hole to the surface.

Conclusions and Recommendation

Based on the findings of our assessment, and the information from previous assessment activities, the vertical and horizontal extent of fuel-impacted soils has been delineated. Groundwater testing shows that fuel components BTEX and MTBE are not detected. SCAPS LIF data obtained during the current investigation show no indication of petroleum contamination in soil.

It is the opinion of PWCSD that further assessment or remediation at this site is unnecessary. Therefore, we recommend that no further action be considered for this site.

Site Characterization and Closure Information

Description of the former UST:	See Background Information (page 2).
Contaminants Identified:	None. See attached analytical results tables.
Amount of Contaminants Leaked:	Not estimated. See attached analytical results tables.
MTBE:	None detected.
Description of the soil/geology:	Subsurface geology consists of predominately fine grained lithology with laterally discontinuous lenses of interbedded fine sands, silts, and clays.

Is soil contamination completely delineated (to what levels)? Yes. Based on a review of the SCAPS LIF data, no fuel contamination was indicated.

Estimated volume of contaminated soil left on site and concentration: Not Estimated.

Is groundwater contamination completely delineated? Yes. Current analytical results for groundwater show that constituents are not detected.

Monitoring wells installed, properly permitted? No monitoring wells were installed.
Depth to groundwater: Approximately 11.9 feet bgs.

Is groundwater or surface water impacted? No. All analytical results for groundwater meet cleanup goals for the site (below tap water PRGs and drinking water MCLs).

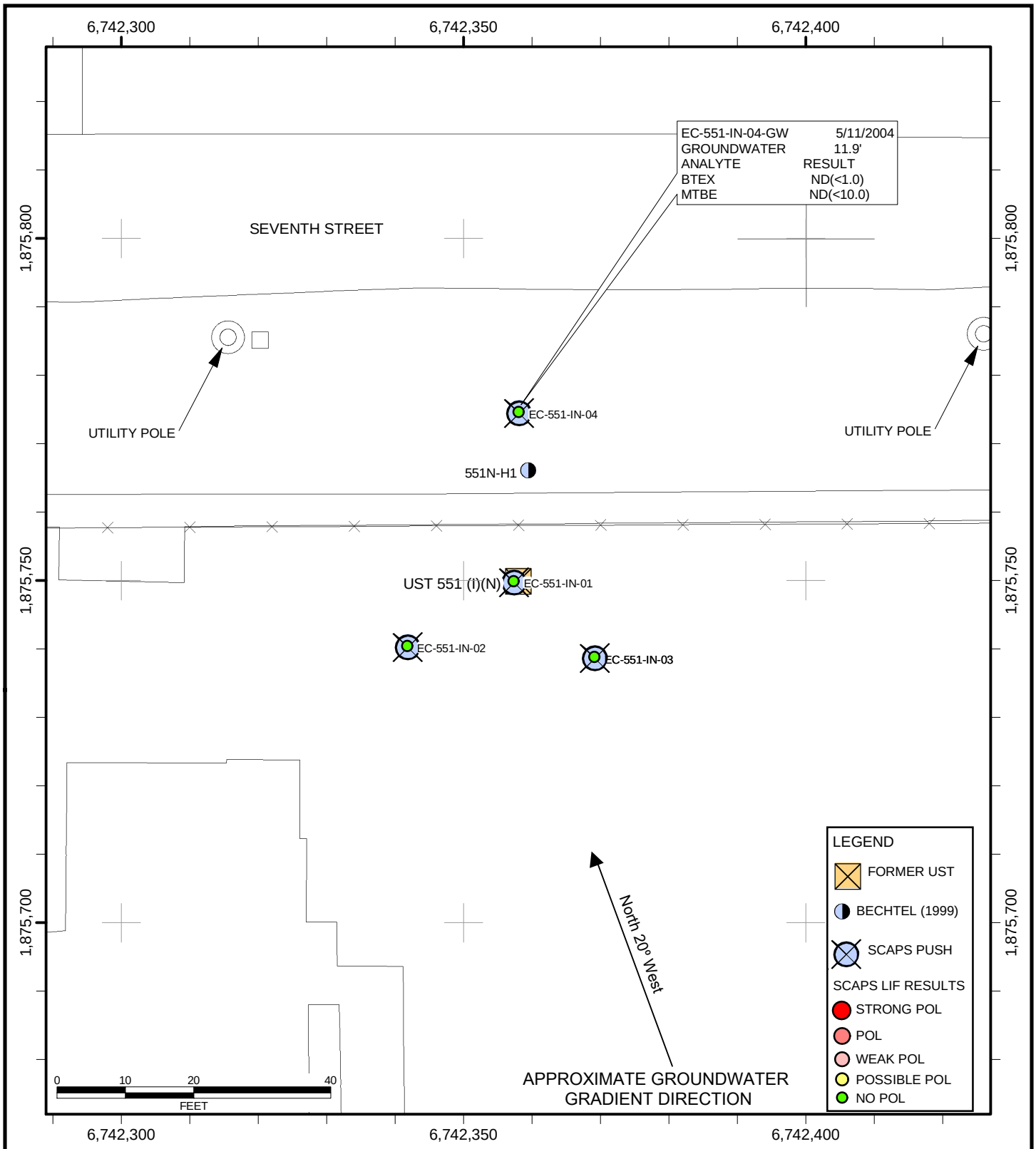
Remedial action taken? UST removed in 1993.

Does complete corrective action protect beneficial uses per the RWQCB Basin Plan? Yes.

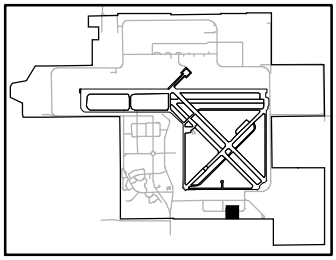
Site Closure: Because soil contamination was not indicated, and groundwater concentrations meet cleanup standards for constituents of concern, the recommendation for site closure is accepted and no further action is required at this site.

Signature: ***Date:***	***Signature:*** ***Date:***
N.R. Wells **Lieutenant Commander, CEC, US Navy** **By direction of** **The Commanding Officer**	**Liann P. Chavez, R.G.** **Senior Engineering Geologist** **California Environmental Protection Agency** **California Regional Water Quality Control Board** **Colorado River Basin Region**

Attachments: Figure 1 – Assessment Results
Table 1 – Site Cleanup Goals
Table 2 – SCAPS and Groundwater Results
SCAPS Logs
Laboratory Analytical Report and Chain-of-Custody Documentation



OVERVIEW MAP - NAF EL CENTRO



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MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

ASSESSMENT RESULTS
UST SITE 551(I)(N)

NAVAL AIR FACILITY EL CENTRO
EL CENTRO, CA

NAVY PUBLIC WORKS CENTER
ENVIRONMENTAL DEPARTMENT
2730 MCKEAN STREET
SAN DIEGO, CALIFORNIA 92136

DATE: Oct 21, 2004
FILE: ElCentroPWC4

FIGURE: 1

Notes on Figure 1 (previous page):

UST = Underground Storage Tank
SCAPS = Site Characterization and Analysis Penetrometer System
LIF = Laser Induced Fluorescence
POL = Petroleum, oils, and lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method in soil samples, reported in milligrams per kilogram.
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed using EPA test method 8021 in water samples.
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021 in water samples.
Reporting units for BTEX and MTBE results are micrograms per liter.
ND = Analyte not detected. Detection limit shown in parentheses.
Cross sections show relative intensity of fluorescence using red tint in SCAPS LIF soundings. (See text and attached SCAPS LIF logs.)
Base map after San-Lo Aerial Surveys, Inc., planimetry from aerial photography, February 2004.

Table 1 – Chemical Constituents of Potential Concern
UST Assessment Sites
Naval Air Facility, El Centro

Chemical	Soil Cleanup Concentration (mg/kg)	Groundwater Maximum Allowable Concentration (µg/L)
TPH-Gasoline	100	N/A
TPH-Diesel	1,000	N/A
Benzene	1.4[a]	1.0[b]
Toluene	520[a]	150[b]
Ethylbenzene	230[a]	700[b]
Total Xylenes	210[a]	1,750[b]
MTBE	N/A	13[c]

Notes:
Concentrations are approved project action levels as presented on Table 3-1 of Bechtel National, Inc., *Final Technical Memorandum No. 2 UST Site Investigation, NAF El Centro*, except for (c), below, which was revised based on a comment from the RWQCB in a letter dated September 23, 2003.
a = based on the 1998 US EPA Region 9 preliminary remediation goal for industrial soil
b = based on the 1995 State of California maximum contaminant level for drinking water
c = based on the May 2000 State of California maximum contaminant level for drinking water (Office of Environmental Health Hazard Assessment).
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
TPH = Total petroleum hydrocarbons (separate gasoline and diesel analytical ranges)
N/A = Not Applicable
MTBE = Methyl-tertiary-butyl ether

Table 2 - SCAPS Fluorescence, and Groundwater Analytical Data Summary

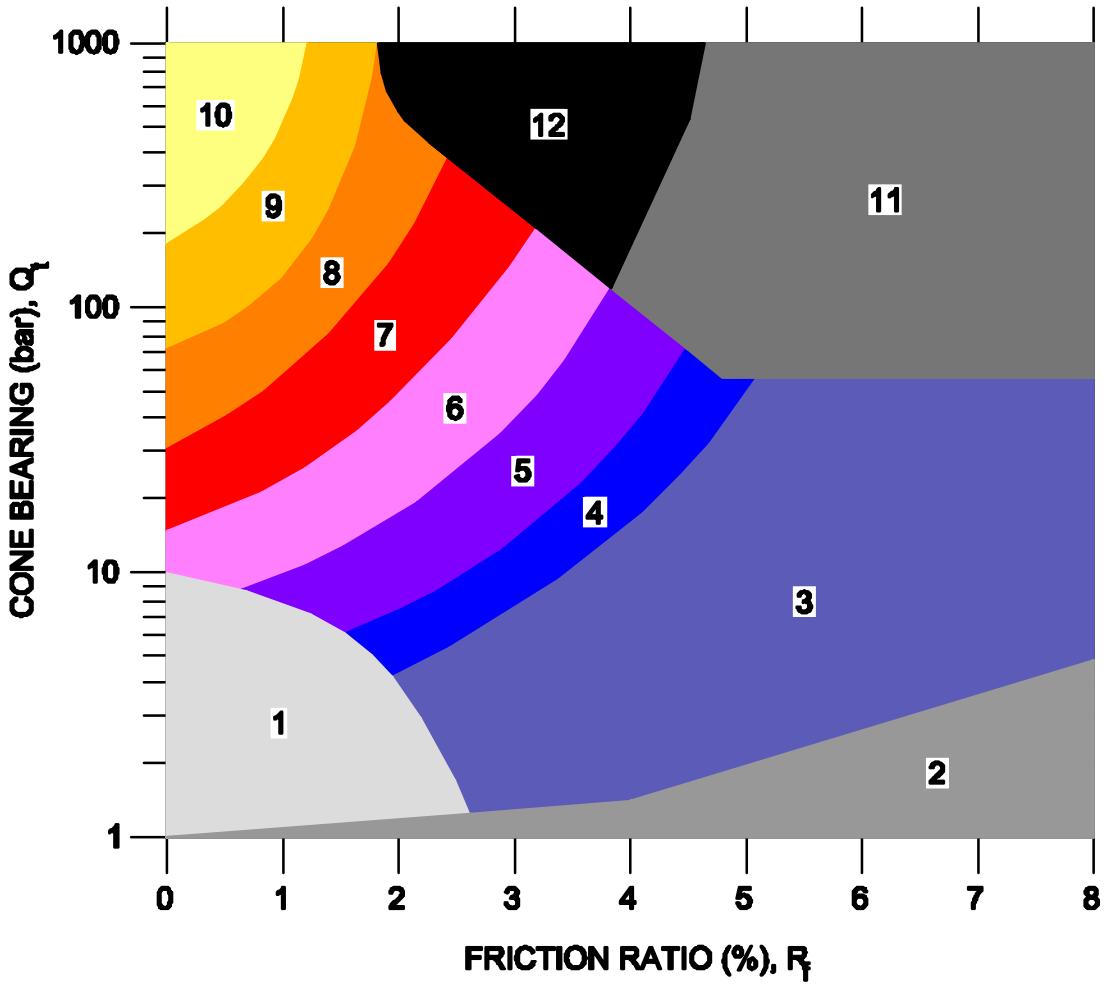
UST Site 551 (I)(N)
Naval Air Facility, El Centro

Push/Sample ID	Date	Max. LIF Depth (feet)	Max. Depth (feet, bgs)	Max. Fluorescence (counts) @ depth (feet, bgs)	Interpretation	Sample Results at depth in feet bgs[1]	Well Screened Interval (feet)
EC-551-IN-01	4/1/2004	19.6	21.9	3,384 @ 9.1	No POL		
EC-551-IN-02	4/1/2004	19.2	21.7	2,928 @ 5.1	No POL		
EC-551-IN-03	4/1/2004	19.5	21.7	3,261 @ 7.1	No POL		
EC-551-IN-04	4/1/2004	19.5	21.8	2,731 @ 9.6	No POL		
EC-551-IN-04-GW	5/11/2004					11.9': BTEX: <1.0 ug/L MTBE: <10.0 ug/L	5'-15'

Notes:

[1] Depth is sampling depth for soil samples, measured depth to water for groundwater samples.
LIF = Laser Induced Fluorescence
bgs = below ground surface
POL = Petroleum, oils, or lubricants
TPHd,g = Total Petroleum Hydrocarbons as diesel, gasoline analyzed using the California Department of Health Services method
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes analyzed using EPA test method 8021
MTBE = Methyl-tertiary-butyl ether analyzed using EPA test method 8021
mg/kg = milligrams per kilogram
ug/L = micrograms per liter

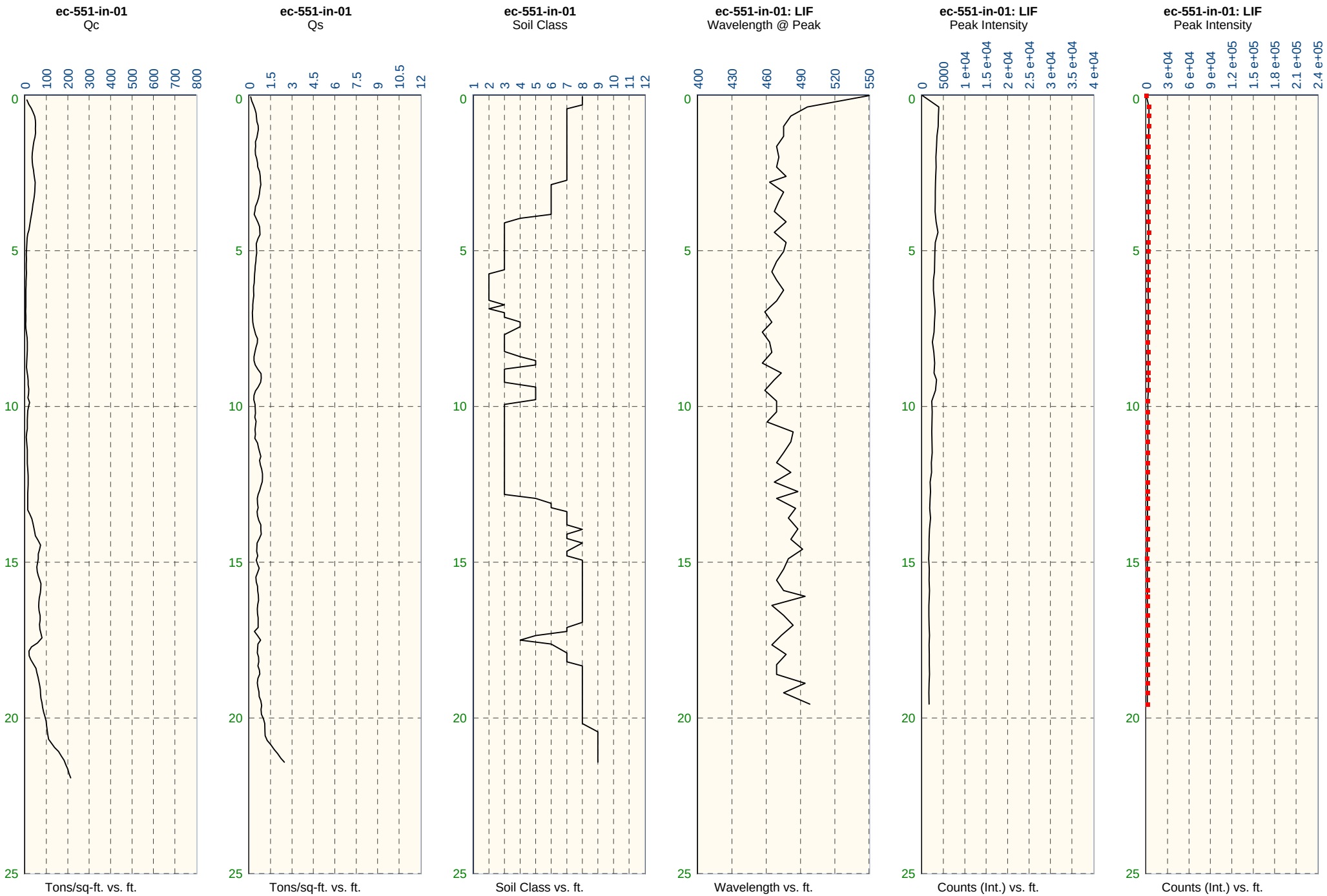
CPT CLASSIFICATION CHART
(after Robertson and Campanella, 1988)

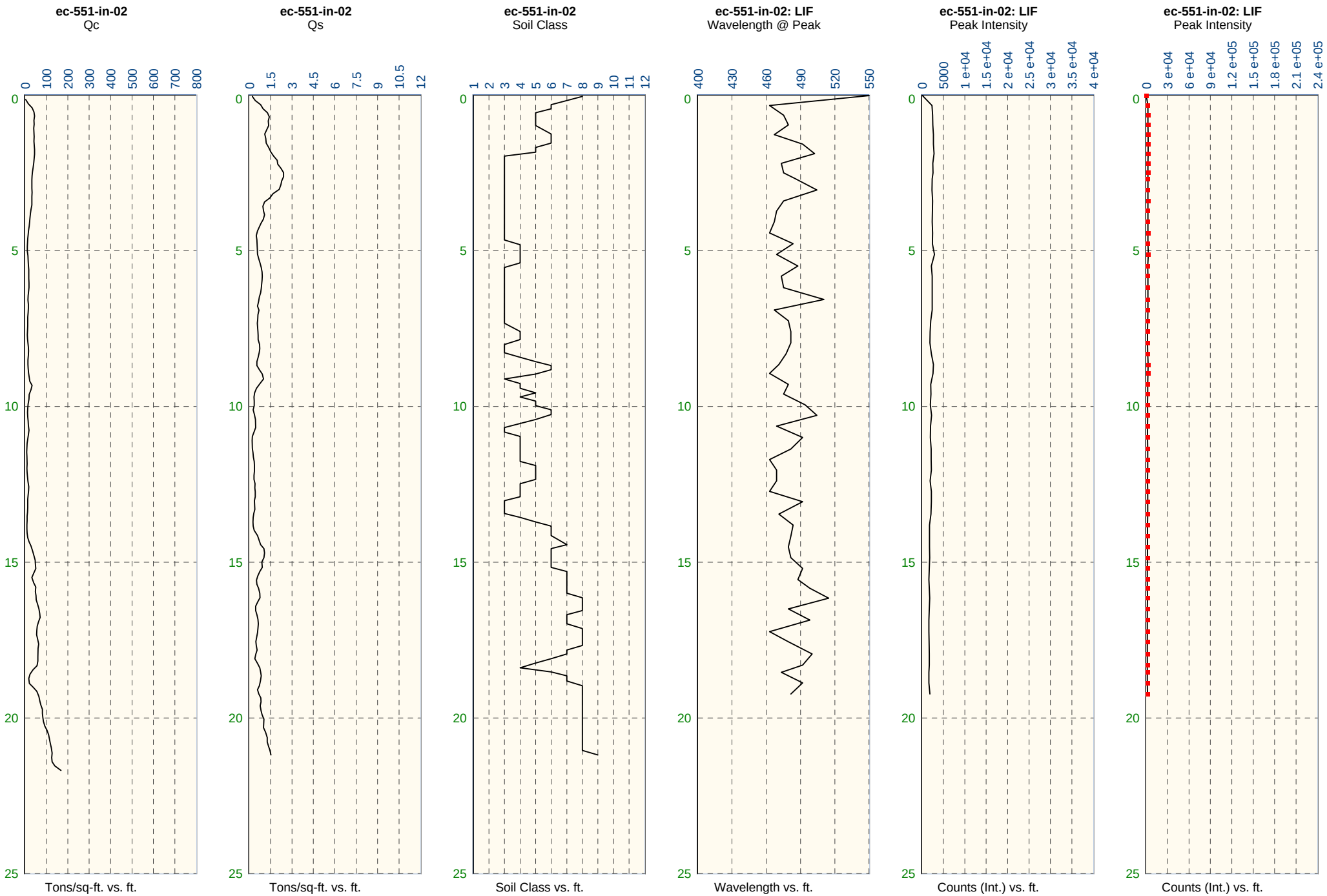


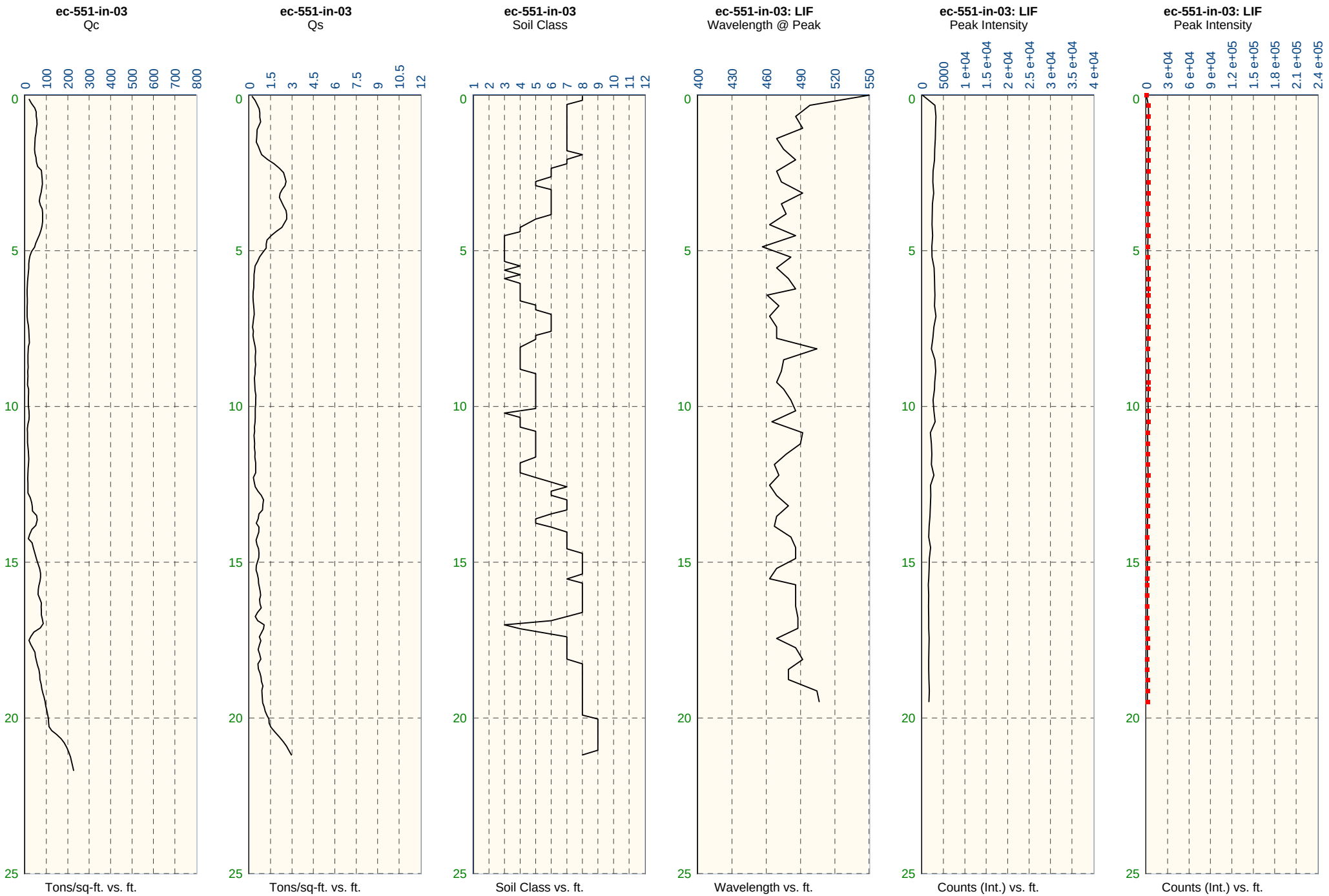
Friction Ratio (R_f) = Sleeve Friction (F_s)/Cone Pressure (Q_t) x 100%
1 bar ≈ 0.9576 tons per square foot (tsf)
N = Standard penetration value, blows/foot

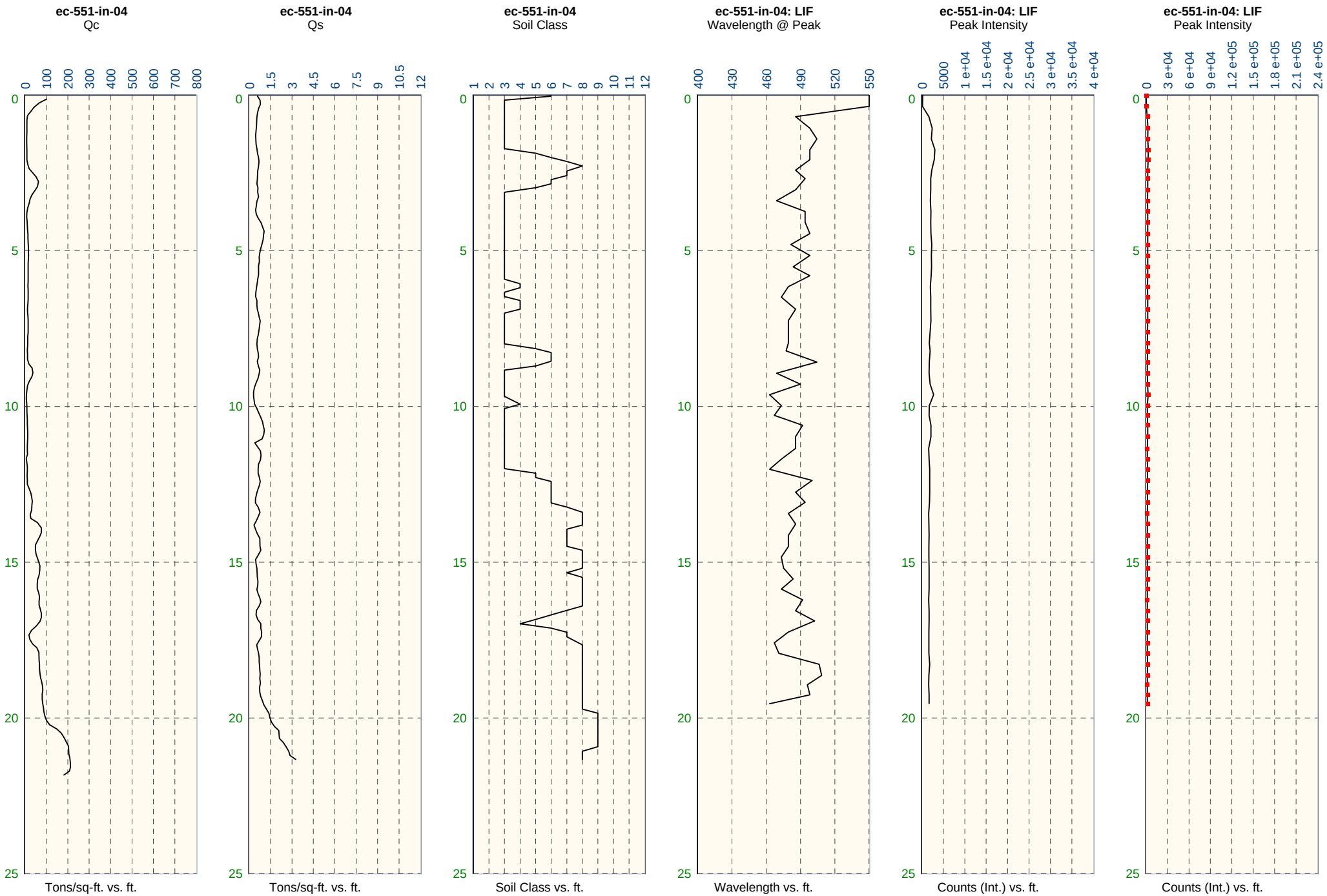
Zone		Q_t/ N	Soil Behavior Type
1		2	sensitive fine grained
2		1	organic material
3		1	clay
4		1.5	silty clay to clay
5		2	clayey silt to silty clay
6		2.5	sandy silt to clayey silt
7		3	silty sand to sandy silt
8		4	sand to silty sand
9		5	sand
10		6	gravelly sand to sand
11		1	very stiff fine grained*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

* overconsolidated or cemented


ec-551-in-01
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-551-in-01
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-551-in-01
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-551-in-01: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-551-in-01: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-551-in-01: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-551-in-02
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-551-in-02
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-551-in-02
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-551-in-02: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-551-in-02: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-551-in-02: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-551-in-03
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-551-in-03
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-551-in-03
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-551-in-03: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-551-in-03: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-551-in-03: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.


ec-551-in-04
Qc
0 100 200 300 400 500 600 700 800
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-551-in-04
Qs
0 1.5 3 4.5 6 7.5 9 10.5 12
0 5 10 15 20 25
Tons/sq-ft. vs. ft.
ec-551-in-04
Soil Class
1 2 3 4 5 6 7 8 9 10 11 12
0 5 10 15 20 25
Soil Class vs. ft.
ec-551-in-04: LIF
Wavelength @ Peak
400 430 460 490 520 550
0 5 10 15 20 25
Wavelength vs. ft.
ec-551-in-04: LIF
Peak Intensity
0 5000 1 e+04 1.5 e+04 2 e+04 2.5 e+04 3 e+04 3.5 e+04 4 e+04
0 5 10 15 20 25
Counts (Int.) vs. ft.
ec-551-in-04: LIF
Peak Intensity
0 3 e+04 6 e+04 9 e+04 1.2 e+05 1.5 e+05 1.8 e+05 2.1 e+05 2.4 e+05
0 5 10 15 20 25
Counts (Int.) vs. ft.

MOBILE GEO CHEMISTRY

H&P

April 13, 2004

Mr. David Bloom
Navy Public Works Center
2730 McKean Street
Suite 1
San Diego, CA 92136-5294

SUBJECT: DATA REPORT – SITE ~~110~~ 551 – NAVAL AIR FACILITY - EL CENTRO, CA - NAVY PWC PROJECT #1113621902008

H&P Project # NP040504W1

Mr. Bloom:

Please find enclosed a data report for the above referenced location. Samples were analyzed on-site in DOHS certified mobile laboratory (CERT #1746).

Project Summary

The following analyses were conducted:

- 3 soils for total petroleum hydrocarbons (TPH) by DHS LUFT/8015M Method
- 1 water for volatile aromatic hydrocarbons (BTEX) & MTBE by EPA Method 8021

The samples were received on-site in appropriate containers with appropriate labels, seals, and chain-of-custody documentation.

Project Narrative

The results for all analyses and required QA/QC analyses are summarized in the enclosed tables. All calibrations, blanks, surrogates, and spike recoveries fulfill quality control criteria.

H&P Mobile GeoChemistry appreciates the opportunity to provide analytical services to Navy Public Works Center on this project. If you have any questions relating to this data or report, please do not hesitate to contact us.

Sincerely,

Blayne Hartman

Dr. Blayne Hartman

432 North Cedros Avenue, Solana Beach, California 92075 | 858 793.0401 — Fax 858 793.0404
148 South Vinewood Street, Escondido, California 92029 | 760 735.3208 — Fax 760 735.2469
2373 208th Street, Suite F-1, Torrance, California 90501 | 310 782.2929 — Fax 310 782.2798
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MOBILE GEOCHEMISTRY

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NAVY PUBLIC WORKS PROJECT #1113621902008
SITE 110
NAVAL AIR FACILITY
EL CENTRO, CA

H&P Project #NP040504-W1

TPH (DHS LUFT/ 8015M Method) ANALYSES OF SOILS

SAMPLE NUMBER	DATE ANALYZED	TPH-GAS C5-C11 (mg/kg)	TPH-DIESEL C12-C24 (mg/kg)
METHOD BLANK	4/5/2004	ND	ND
EC-551-05-10	4/5/2004	ND	59
EC-551-03-7	4/5/2004	ND	66
EC-551-03-10	4/5/2004	ND	260
DETECTION LIMITS		10	10

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
4-15-2004

MOBILE GEOCHEMISTRY

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NAVY PUBLIC WORKS PROJECT #1113621902008
SITE 110
NAVAL AIR FACILITY
EL CENTRO, CA

H&P Project #NP040504-W1

BTEX, MTBE (EPA Method 8021) ANALYSES OF WATERS

SAMPLE NUMBER	DATE ANALYZED	MTBE (ug/l)	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYLBENZ (ug/l)	XYLENES (ug/l)	SURROGATE (%REC)
METHOD BLANK	4/5/2004	ND	ND	ND	ND	ND	106
EC-551-05-GW	4/5/2004	ND	ND	ND	ND	ND	103
REPORTING LIMITS		10.0	1.0	1.0	1.0	1.0	53%-145%
DETECTION LIMITS		1.0	0.5	0.5	0.5	0.5	

J INDICATES VALUE DETERMINED IS BETWEEN DETECTION LIMIT AND REPORTING LIMIT

ND INDICATES NOT DETECTED AT LISTED DETECTION LIMITS

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

Blayne Hartman
4-15-2004

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP040504-W1
DAILY CALIBRATION DATE : 04/05/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ppm)	WATER (ppb)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
TPH GASOLINE - FID1	10-20000	330-660000	7/14/2003	0.878	6.1%	241	0.830	5.5%	241	0.830	5.5%
TPH GASOLINE - FID2	10-20000	330-660000	7/14/2003	0.580	11.9%	372	0.538	7.3%	368	0.538	7.3%
TPH GASOLINE - FID3	10-20000	330-660000	7/14/2003	0.696	10.4%	304	0.658	5.5%	293	0.658	5.5%
TPH DIESEL - FID1	10 - 50000	330 - 1650000	7/11/2003	1.014	9.5%	489	1.022	0.8%	489	1.022	0.8%
TPH DIESEL - FID2	10 - 50000	330 - 1650000	7/11/2003	0.690	13.3%	718	0.696	1.0%	731	0.696	1.0%
TPH DIESEL - FID3	10 - 50000	330 - 1650000	7/11/2003	0.723	7.9%	663	0.754	4.3%	667	0.754	4.3%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - CALIBRATION DATA

H&P Project #NP040504-W1
DAILY CALIBRATION DATE : 04/05/04

	CALIBRATION RANGE		INITIAL	INITIAL		OPENING			CLOSING / LCS		
COMPOUND	SOIL (ug/kg)	WATER (ug/L)	CALIB DATE	RF	%RSD	AREA	RF	%DIFF	AREA	RF	%DIFF
MTBE	500 - 25	2500 - 125	4/2/2004	1.22	13.2%	112	1.12	7.8%	130	1.30	7.0%
BENZENE	500 - 25	2500 - 125	4/2/2004	3.24	10.1%	371	3.71	14.4%	285	2.85	12.1%
TOLUENE	500 - 25	2500 - 125	4/2/2004	15.47	11.2%	413	4.13	*73.3%	715	7.15	*53.8%
TFT	500 - 25	2500 - 125	4/2/2004	1.02	8.5%	117	1.17	14.4%	96	0.96	6.6%
ETHYLBENZENE	500 - 25	2500 - 125	4/2/2004	14.84	6.6%	1,677	16.77	13.0%	1,481	14.81	0.2%
m&p-XYLENES	500 - 25	2500 - 125	4/2/2004	19.14	9.8%	2,063	20.63	7.8%	1,778	17.78	7.1%
o-XYLENES	500 - 25	2500 - 125	4/2/2004	15.74	9.3%	1,708	17.08	8.5%	1,495	14.95	5.0%

INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

* DUE TO A CONTAMINATION THE % DIFF VALUE WAS OUTSIDE OF CRITERIA. TOLUENE WAS RECALIBRATED ON 04/06/2004 AND DATA WAS REPROCESSED. ALL DATA WAS REPROCESSED AND % DIFF WAS WITHIN CRITERIA.

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

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QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR SOILS

ANALYSIS DATE : 04/05/04

H&P Project #NP040504-W1

COMPOUND	SPK CONC (mg/kg)	MS CONC (mg/kg)	%REC MS	MSD CONC (mg/kg)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	210	105.0%	214	107.0%	1.9%	15%	75% - 125%
TPH DIESEL	500	514	102.8%	506	101.2%	1.6%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY
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QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD) FOR WATERS

ANALYSIS DATE : 04/05/04
H&P Project #NP040504-W1

COMPOUND	SPK CONC (ug/L)	MS CONC (ug/L)	%REC MS	MSD CONC (ug/L)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	10.0	10.0	99.9%	10.2	102.3%	2.4%	15%	75% - 125%
BENZENE	10.0	10.0	100.3%	10.0	99.8%	0.5%	15%	75% - 125%
TOLUENE	10.0	11.3	113.0%	11.0	110.0%	2.7%	15%	75% - 125%
ETHYLBENZENE	10.0	11.1	111.4%	11.8	118.3%	6.0%	15%	75% - 125%
TOTAL XYLENES	20.0	21.7	108.3%	21.7	108.7%	0.4%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX
MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)
ANALYSES PERFORMED BY: MS. JANIS VILLARREAL
DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

QA/QC REPORT - LCS/LCSD DATA

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR SOILS

ANALYSIS DATE : 04/05/04

H&P Project #NP040504-W1

COMPOUND	SPK CONC (mg/kg)	LCS CONC (mg/kg)	%REC LCS	LCSD CONC (mg/kg)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TPH GASOLINE	200	212	106.0%	218	109.0%	2.8%	15%	75% - 125%
TPH DIESEL	500	506	101.2%	490	98.0%	3.2%	15%	75% - 125%

LABORATORY CONTROL SAMPLES (LCS &LCSD) FOR WATERS

ANALYSIS DATE : 04/05/04

H&P Project #NP040504-W1

COMPOUND	SPK CONC (ug/L)	LCS CONC (ug/L)	%REC LCS	LCSD CONC (ug/L)	%REC LCSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
MTBE	10.0	10.1	101.0%	9.6	95.7%	5.4%	15%	75% - 125%
BENZENE	10.0	10.0	99.5%	10.3	102.6%	3.1%	15%	75% - 125%
TOLUENE	10.0	11.1	111.0%	10.4	104.0%	6.5%	15%	75% - 125%
ETHYLBENZENE	10.0	11.0	110.0%	11.3	112.7%	2.4%	15%	75% - 125%
TOTAL XYLENES	20.0	21.5	107.3%	22.0	109.8%	2.3%	15%	75% - 125%

SPK CONC - CONCENTRATION SPIKED INTO MATRIX

LCS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE

% REC - PERCENT RECOVERY OF SPIKE FROM LAB CONTROL SAMPLE

RPD - RELATIVE PERCENT DIFFERENCE BETWEEN LAB CONTROL AND LAB CONTROL DUPLICATE RECOVERIES

ANALYSES PERFORMED IN CA DOHS CERTIFIED MOBILE LABORATORY (CERT #1317)

ANALYSES PERFORMED BY: MS. JANIS VILLARREAL

DATA REVIEWED BY: DR. BLAYNE HARTMAN

MOBILE GEOCHEMISTRY

H&P

Chain of Custody Record

☐ 148 S. Vinewood St., Escondido, CA 92029 • ph 760.735.3208 • fax 760.735.2469
☒ 432 N. Cedros Ave., Solana Beach, CA 92075 • ph 858.793.0401 • fax 858.793.0404
☐ 2373 208th Street Unit F-1, Torrance, CA 90501 • ph 310.782.2929 • fax 310.782.2798

Date: 4-5-04

H&P Project # NP 040504-W1

Outside Lab:

Client: NAVY PWC-SD ENVIRONMENTAL

Address: 2730 McKean St. Ste 1 Code 980 SD CA

Phone: 619-524-6967 Fax: 619-524-6000

Collector: TWS

Client Project # 113621902008

Location: NAF El Centro Site 110

Page: 3 of 5

Project Manager: D. Bloom

Turn around time:

Global ID: T0602558 10

EDF: Yes / No

Sample Receipt

Intact: ☐ Yes ☐ No

Seal Intact: ☐ Yes ☐ No ☐ N/A

Cold: ☐ Yes ☐ No

N/A (Received on Site)

Sample Name	Field Point Name	Depth	Time	Date	Sample Type	Container Type	TPH gasoline / diesel	TPH extended	8021 for BTEX/MTBE	8021 for Halogenated compounds	418.1 TRPH	8260B: BTEX / Oxygenates	8260B: Oxygenates	8260B: VOC's	8260B: VOC's and Oxygenates	Methane	Fixed Gases							Total # of containers
EC-551-05-10		10'	0945	4/5/04	Soil	ss tube																		
EC-551-03-7		7'	1040	4/5/04	Soil	Jar																		
EC-551-03-10		10'	1050	4/5/04	Soil	ss tube																		
EC-551-05-GW			1120	4/5/04	Water	40ml VOA																		

Jill Nolan

Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Jim Shuey	Navy PWC	Janis Villarreal	H+P	4-5-04	
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:
Relinquished by: (Signature)	(company)	Received by: (Signature)	(company)	Date:	Time:

*Signature constit[illegible] authorization to proceed with analysis and acceptance of condition on back.

Sample disposal [illegible]ction: ☐ *Disposal @ $2.00 each* ☐ *Return to client* ☐ *Pickup*