Innovative Technical Solutions, Inc.

STID
940 / 3899

November 8, 2001

NOV 13 2001

Port of Oakland
Environmental Health and Safety Compliance Department
530 Water Street, 2nd Floor
Oakland, California 94607
Attn: Mr. John Prall, Associate Environmental Scientist

Workplan for Additional Site Characterization
2225 and 2277 Seventh Street
Oakland, California

Dear Mr. Prall,

This Workplan for Additional Site Characterization has been prepared by Innovative Technical Solutions, Inc. (ITSI) on behalf of the Port of Oakland's Environmental Health and Safety Compliance (EH&SC) Department in compliance with an August 20, 2001 request made by the Alameda County Environmental Health Services Department (Alameda County). If you have any questions or comments regarding this workplan, please contact me at (925) 946-3105.

Sincerely,

Rachel B. Hess
Project Manager

cc: B. Chan, Envi Health Services, Alameda County, 1131 Harbor Bay Parkway, Suite 250, Alameda, CA 94502
M. Heffes, Port Legal Department, 530 Water Street, Oakland, CA 94604
J. Hess (ITSI)

2730 Shadelands Drive, Suite 100
Walnut Creek, CA 94598

(925) 946-3100
fax (925) 256-8998
www.itsi.com

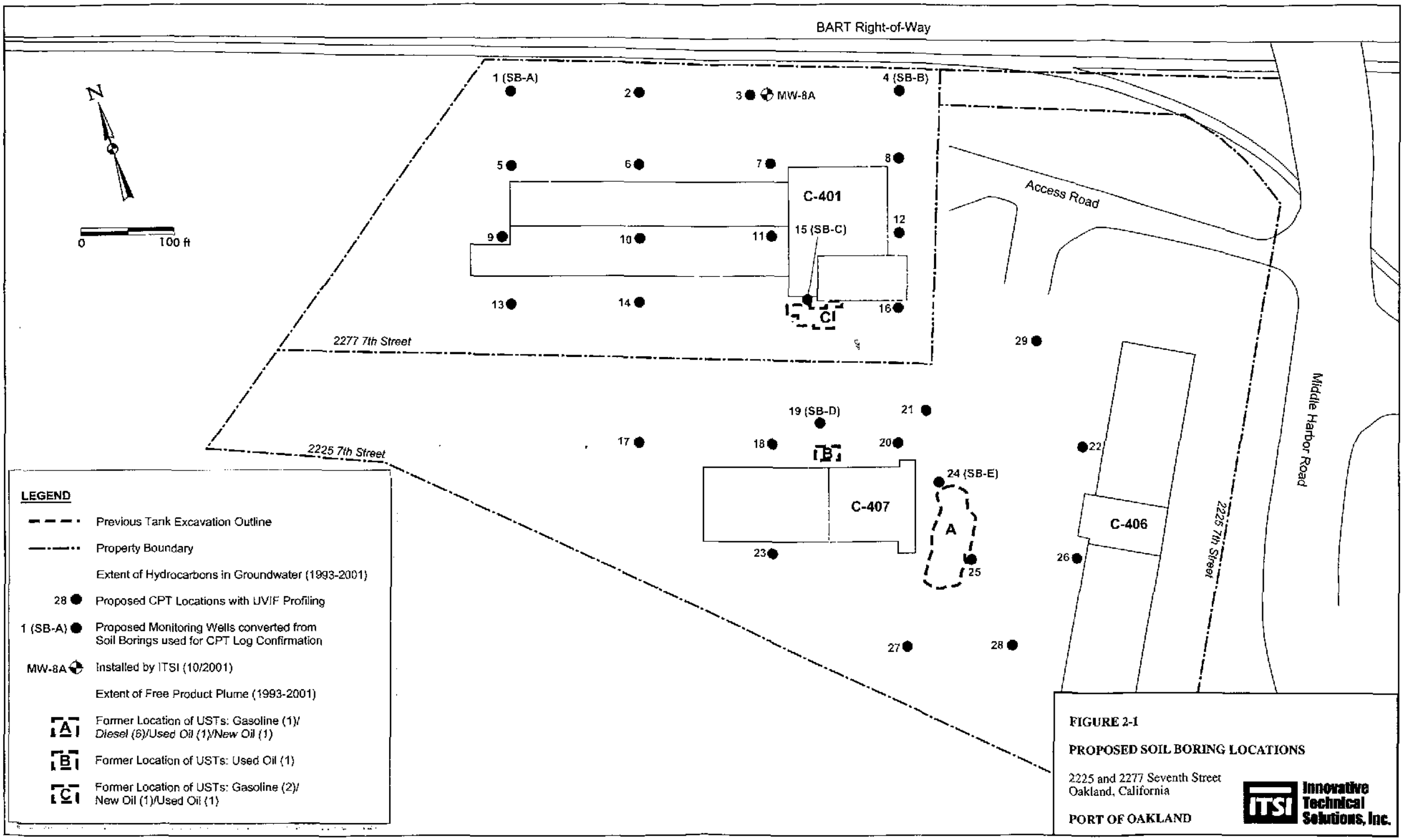


FIGURE 2-1

PROPOSED SOIL BORING LOCATIONS

2225 and 2277 Seventh Street
Oakland, California

PORT OF OAKLAND

ITSI Innovative Technical Solutions, Inc.

PORT OF OAKLAND

Jeffrey L. Rubin, CPSS,REA
Associate Port Environmental Scientist

Environmental Health and Safety Compliance

530 Water Street
Oakland, CA 94607
Tel: (510) 627-1134
Fax: (510) 451-5916
TDD: (510) 763-5703

E-mail:
jrubin@portoakland.com

IRIS ENVIRONMENTAL
Christopher S. Alger, C.E.G., C.HG.
Principal Engineering Geologist

(510) 834-4747
(510) 834-4199 fax
calger@irisenv.com

The Cathedral Building
1615 Broadway, Suite 1003
Oakland, California 94612

ITSI Innovative Technical Solutions, Inc.

Providing Turnkey Civil/Environmental Engineering and Construction

An award winning 8(a) firm

Rachel B. Hess
Project Manager

7700 Edgewater Drive, Suite 306
Oakland, CA 94621

www.itsi.com

(510) 638-5841
(510) 638-5871 fax
(510) 715-7842 cell
rhess@itsi.com

1/30/02
Mtg w/ C. Alger, J Rubin & R Hess

C406 - likely w/ be demo
C407 - likely w/ remain
Chris - will be involved in ~~a~~ development.
Rachel - will complete investigation, install mw(piez)
discuss F.S.

Potential Schedule of deliverables
ITSI - Investigation/FS report + RAP
IRIS - Design concept, data gap, sampling plan
- meeting
- RISK ASSESSMENT

— Need to setup mtg. w/ RWQCB likely C. Headlee & R. Brewer.

NOV 1 3 2001

TABLE OF CONTENTS

Appendices/List of Tables/List of Figures

Appendices

List of Tables

List of Figures

1.0 BACKGROUND

Innovative Technical Solutions, Inc. (ITSI) has prepared this Workplan for the petroleum release site located at 2225 and 2277 Seventh Street in Oakland, California in response to the letter from Alameda County Health Care Services (ACHCS)[1]. On August 20, 2001, the Port of Oakland received a letter from ACHCS requesting further characterization of the plume beneath the site, installation of a replacement well for the abandoned well, MW-8, expansion of the existing free product recovery system, and preparation of a feasibility study for the project site. [redacted] The scope of work presented in this Workplan addresses the remaining activities requested by ACHCS.

Figure 1-1 presents the site location and Figure 2-1 presents the site map. At 2225 Seventh Street, the tenant removed eight underground storage tanks (UST's) in 1990 and 1992 from a tank cluster located adjacent to and east of Building C-407. In 1992 the tenant also removed one waste oil tank from adjacent to and north of Building C-407. At 2277 Seventh Street, the Port of Oakland removed four UST's in 1993 from a tank cluster located adjacent to and south of Building (Bldg.) C-401.

A series of site investigations were conducted following the UST removals. These investigations indicated the presence of a free product plume composed predominately of diesel fuel-grade petroleum hydrocarbons beneath the site. This free product plume straddles the boundary between 2225 and 2277 Seventh Street. A larger dissolved-phase plume is present in the groundwater beneath the site, and although not fully delineated, appears spatially associated with the free product plume. The dissolved-phase plume is composed primarily of diesel fuel-grade petroleum hydrocarbons with some gasoline fuel-grade petroleum hydrocarbons also present.

[1] Letter to John Prall, Port of Oakland, EH&SC from Barney Chan, Alameda County dated August 20, 2001 regarding 2225 and 2277 Seventh Street UST Sites, Oakland, CA 94607

2.0 SCOPE OF WORK

This Workplan addresses the following activities:

- Fieldwork: Collect geological, hydrogeological and chemical data in order to assess the site hydrostratigraphy and characterize the lateral extent and thickness of the product plume.
- Report Preparation: Upon completion of field activities, assess the resulting data to evaluate expansion of the existing product removal system and conduct a feasibility study to propose appropriate remedial technologies for site cleanup.

Section 2.1 presents the approach to accomplish project objectives. Section 2.2 discusses the utility clearance to be performed at the site. Section 2.3 presents the hydrostratigraphic data collection methodology. Section 2.4 presents the sampling and analysis methodology for product and associated contaminants in groundwater. Section 2.5 discusses the implementation of the Phase II effort (if warranted) for characterizing the extent of the soil and groundwater contamination. Section 2.6 discusses use of this data to address the feasibility study for determining appropriate remedial technologies for site cleanup.

2.1 PROJECT APPROACH

The available geologic data for the site has been collected from the logging of monitoring wells and soil borings installed during multiple previous site investigations. However, correlation of geologic and hydrogeologic units across the site from information collected during the previous investigations is difficult. The proposed scope of work is designed to enhance the understanding of site geologic and hydrogeologic units as a key element to accomplish project objectives. Variation in lithology of fill deposits across the site will be evaluated by utilizing a common lithologic baseline. Additional soil borings and monitoring wells will then be installed based on the interpretation of lithologic data collected from this effort.

2.2 UTILITY CLEARANCE

Each proposed sample location will be cleared prior to initiating drilling or other subsurface activities. The sample locations will be marked in the field using water-based marking paint. An independent underground utility locating service will be used to clear the proposed sample locations for the possible presence of underground utilities. Additionally, Underground Service

Alert (USA) will be notified at least 48-hours prior to mobilization to the site. Tenant and Port of Oakland personnel (including the Wharfinger and personnel potentially familiar with the underground utilities at the site) will also be notified of upcoming subsurface activities. Suspect locations will be hand-dug to a depth of three feet to evaluate the potential presence of buried utilities or conduits prior to initiation of drilling activities.

2.3 LITHOLOGIC TESTING

Approximately 29 Cone Penetration Test (CPT) borings are proposed to evaluate subsurface [redacted], aligned in a pattern to facilitate the creation of cross-sections both parallel and perpendicular to the axis of the plume, and to evaluate the potential "groundwater barrier" between Building C-401 and MW-8. Figure 2-1 presents the location of the proposed CPT borings superimposed on the known extent of the groundwater plume (compiled from data collected during 1993–2001). The CPT borings are anticipated to extend to a depth of approximately 15 to 20 feet, depending on field conditions encountered during drilling.

Dissipation tests will be performed within the saturated zone in at least 10 CPT test locations, selected. The results of the dissipation tests will be evaluated relative to estimating in-situ hydraulic conductivity of the saturated soils. Additional hydraulic testing may be recommended for follow-~~on~~ up work, if warranted, based on results of analysis of the dissipation tests.

[redacted] CPT rig at all locations to qualitatively identify the presence of petroleum hydrocarbons. The UVIF module uses a down-hole high energy UV light that causes fluorescence of aromatic hydrocarbons (Appendix A). Thus at the locations using the UVIF, a profile of contaminant levels and soil stratigraphy will be generated real-time and available by hard-copy printout.

How can these be predetermined?

To correlate the soil behavior type, generated by the CPT, with site-specific lithologic units, an estimated five soil borings are proposed for installation [redacted] [redacted] exploratory locations using a conventional hollow-stem auger rig. Where appropriate, these conventional soil borings will be converted to monitoring wells to measure product thickness and/or plume extent at the site. These estimated five soil borings (designated SB–A through

SB–E on Figure 2-1) will be installed adjacent to CPT locations No. 1, 4, 15, 19 and 24. The soil borings will be continuously logged according to ASTM methodology (ASTM Method D-2488), with soil descriptions recorded on a boring log. The decision to convert the additional soil borings to monitoring wells will be based on the presence of free product or visual soil contamination. (ffp or contam, will install mw ?)

Soil samples representing each major lithologic unit encountered in one or more soil borings will be collected for geotechnical analysis (grain-size distribution [ASTM Method D422], and liquid limit, plastic limit and plasticity index [ASTM Method D4318]). The major lithologic units will be determined in the field by correlating the results of the CPT logs with descriptions of soils encountered in the soil borings.

Monitoring wells are anticipated to be constructed of 2-inch diameter Schedule 40 PVC, with 0.010-inch machine-cut slotted PVC screen from approximately 5 feet below ground surface to total depth, a filter pack of number 2/12 sand, and an anticipated total depth of between 15 and 20 feet. A threaded bottom plug will be installed at the end of the slotted casing. A minimum 1-foot thick bentonite seal will be placed approximately one foot above the top of screen interval, followed by a cement/bentonite grout to the ground surface. An approximately 6-inch diameter traffic-rated well box will be placed flush with existing ground surface. Actual well diameter, screened interval, and depth will be based on findings from the field activities. Newly constructed monitoring wells will be surveyed for elevation and location using the Port-specified coordinate system[2], along with the existing monitoring wells present on the site.

No sooner than 72 hours following installation, the monitoring wells will be developed by surging and pumping until water clarity improves, water quality as measured by pH, electrical conductivity, and temperature stabilizes, or until a maximum of 10 well volumes has been removed. The monitoring wells will then be sampled.

[2] Port of Oakland Datum is measured at 3.23 feet below mean sea level (msl) and NAD 83 for horizontal control.

Investigation-derived wastes (drill cuttings, decontamination and purge water, and PPE [personal protective equipment]) will be properly contained, labeled, inventoried, and stored on-site in an area designated by the Port for subsequent disposal under a separate contract with the Port's waste disposal contractor. The inventory of the wastes and the analytical results from the soil borings will be provided to the Port for waste profiling.

2.4 SAMPLING AND ANALYSIS

2.4.1 Sampling Locations and Rationale

Installation of new monitoring wells is anticipated in soil boring locations SB-A through SB-E. These locations were selected downgradient from potential source areas (e.g., former UST's), and the rationale for the locations is presented in Table 2-1 below.

Table 2-1: Rationale for Sample Locations

Sample Location	Rationale
SB-A (north of Bldg. C-401)	To potentially identify the leading edge of the plume.
SB-B (northeast of Bldg. C-401)	To evaluate whether petroleum hydrocarbons previously identified in this area are from an isolated source or related to the plume.
SB-C (South of Bldg. C-401) SB-D (North of Bldg. C-407) SB-E (East of Bldg. C-407)	To determine the concentrations and thickness of the product plume at the former UST areas.

2.4.2 Analytical Criteria

The newly installed monitoring wells will be sampled following installation. The groundwater samples will be collected using a peristaltic pump or disposable bailer, and transferred to clean sample containers provided by the laboratory. The samples will be sealed, labeled, placed in an iced cooler, and transported under chain-of-custody procedures to a *California-certified* laboratory selected by the Port of Oakland.

The samples will be analyzed for petroleum hydrocarbons and associated compounds previously detected at the site during previous sampling of the soil, groundwater and product conducted at the site since 1990. Analytical criteria for the groundwater samples would include the following:

- Total petroleum hydrocarbons (TPH) as gasoline
  (modified EPA Method 8015)

- TPH as diesel and motor oil (mo) with silica gel cleanup (modified EPA Method 8015)

- Benzene, toluene, ethylbenzene and xylenes (BTEX), and methyl-tert butyl ether (MTBE) (EPA Method 8020 with confirmation of MTBE by GC/MS if detected)

Groundwater samples will not be collected from monitoring wells where measurable free product is present. Wells with free product will be measured for product thickness and water level only using an oil/water interface probe. Following the initial sampling, the new monitoring wells will be included in scheduled quarterly groundwater monitoring activities at the site.

2.4.3 Quality Assurance/Quality Control

Duplicate samples will be collected of approximately 10% of water and product samples collected during this investigation for quality control purposes. These samples will be designated as Dup-A, Dup-B, etc. on the chain-of-custody, and the source of the duplicate samples will be recorded in the daily field notes.

Drill rods, augers, split-spoon samplers and other non-disposable equipment will be cleaned by high-temperature pressure washing between sample locations and samples for chemical analysis. Clean packaged casing will be used for the construction of the monitoring wells.

2.5 PHASE II FIELD EFFORT

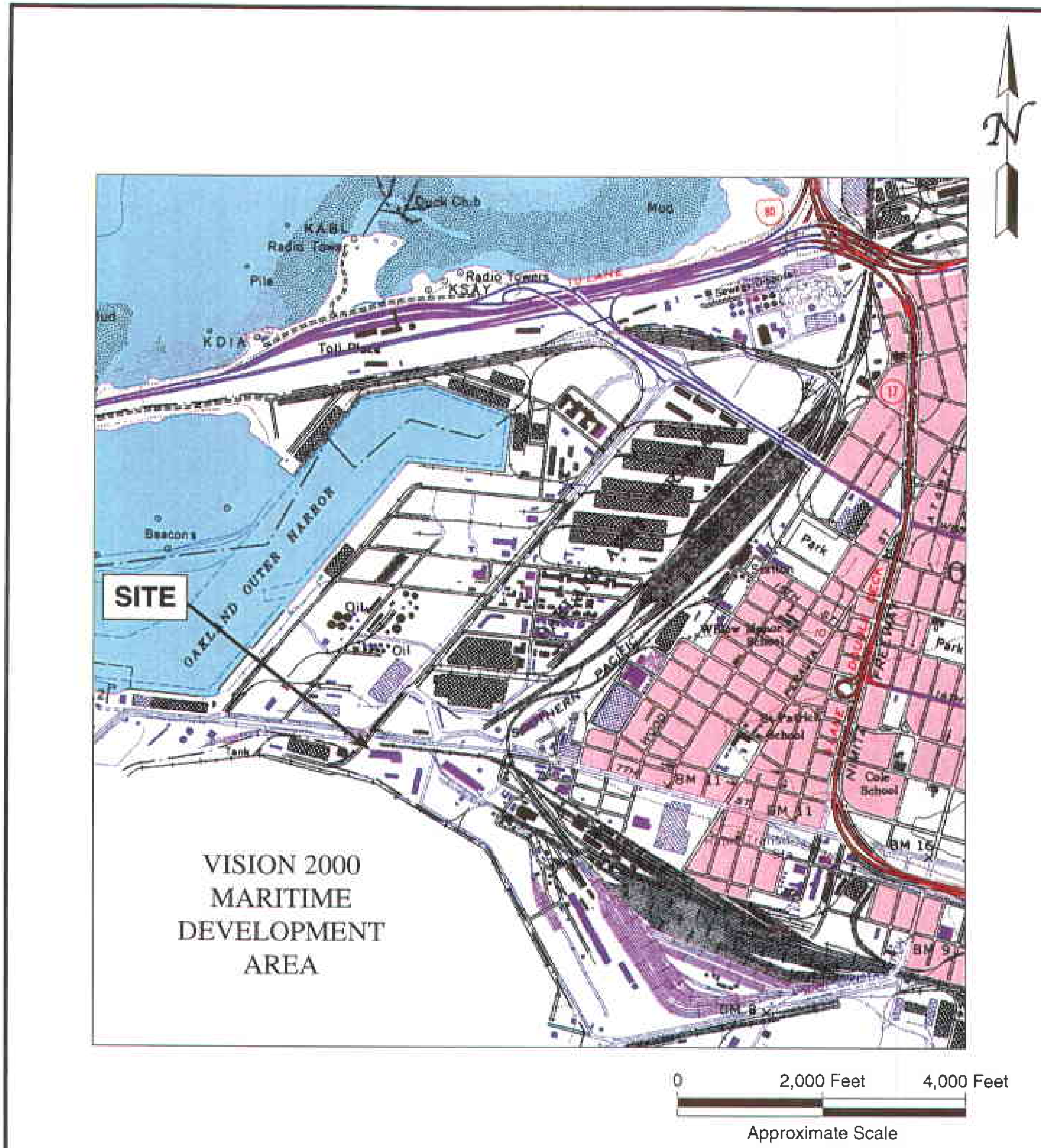
Phase II field activities may be performed if warranted based on the results of the Phase I investigation to additionally delineate and characterize the extent of the soil and groundwater contamination at the site. Specific activities will be identified, if necessary, upon completion of the Phase I investigative effort.

3.0 INVESTIGATION REPORT AND FEASIBILITY STUDY

The results of the Phase I activities, along with results of recent quarterly monitoring activities for the site, will be evaluated to determine whether sufficient information is known and available to delineate the extent of the free product and dissolved-phase plumes. Additionally, the lithologic information obtained from the CPT testing will be used to prepare a preliminary geologic and hydrogeologic model of the subsurface conditions. Data gaps will be identified and addressed in specific Phase II recommendations.

The information collected will be presented in the form of an investigative report. This report will include tabulated chemical and geotechnical laboratory results, groundwater potentiometric map, and at least eight geologic cross sections. Copies of the CPT and boring logs, well completion diagrams, laboratory results, and survey results will also be included.

This report will also include an evaluation of expanding the existing product recovery system, and a preliminary feasibility study to evaluate potential remedial options for impacted soil and groundwater at the site.



Source: Oakland West 7.5-minute U.S.G.S. Quadrangle, dated 1959, and photorevised in 1980.

FIGURE 1-1

SITE LOCATION

2225 and 2277 Seventh Street
Oakland, California

PORT OF OAKLAND

ITSI Innovative Technical Solutions, Inc.

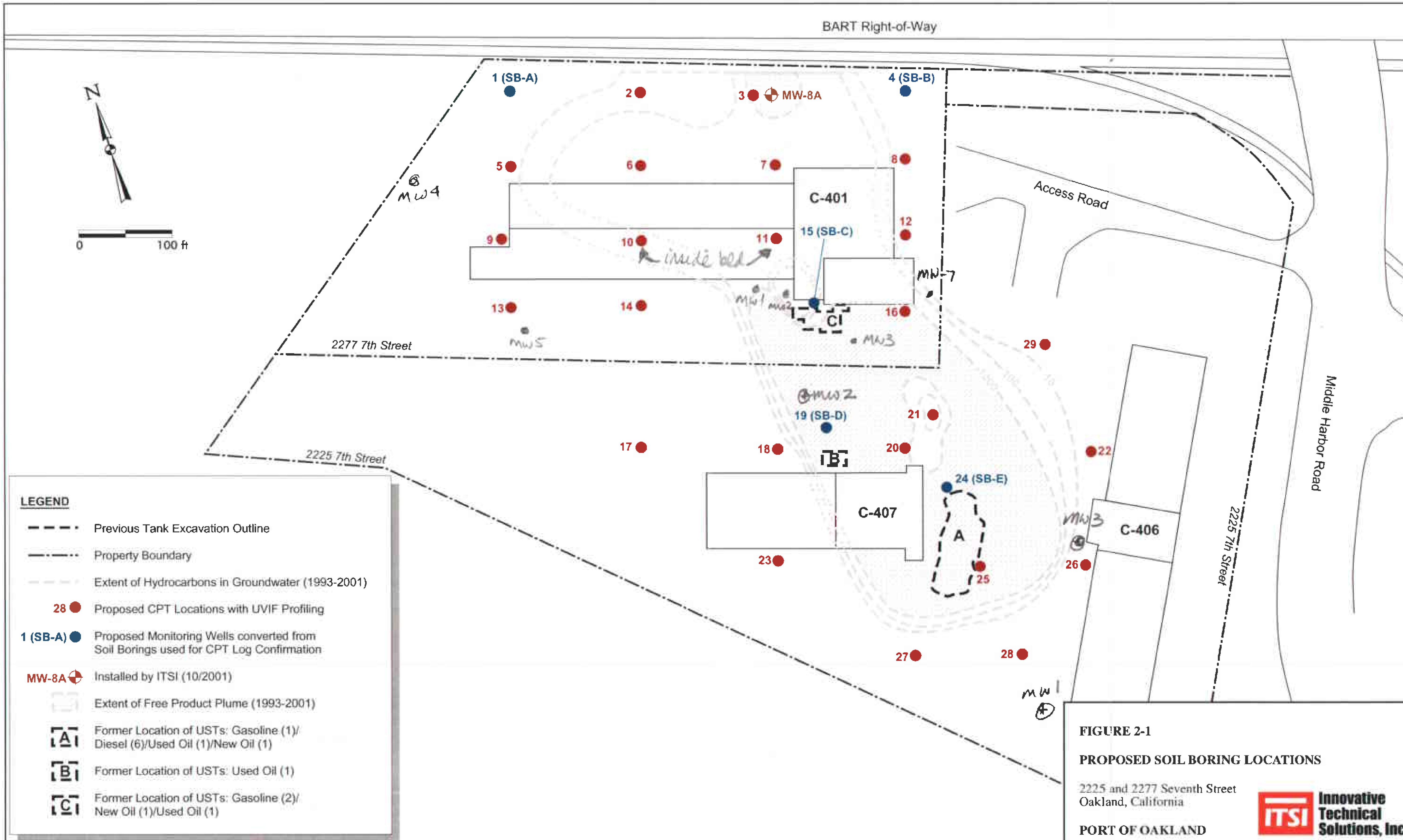


FIGURE 2-1

PROPOSED SOIL BORING LOCATIONS

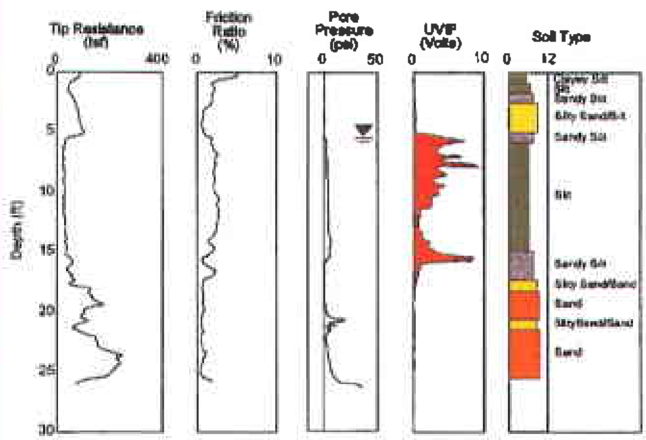
2225 and 2277 Seventh Street
Oakland, California

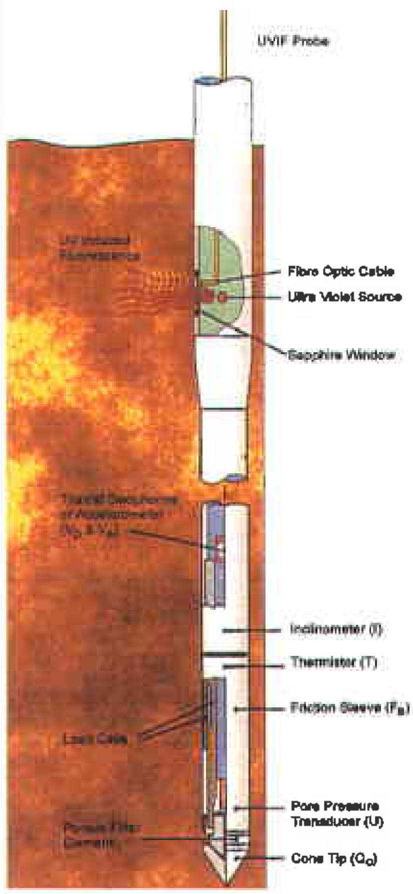
PORT OF OAKLAND

APPENDIX A

Ultraviolet Induced Fluorescence Technology Summary

UVIF Cone Penetrometer





The combination of the ultra violet induced fluorescence (UVIF) module and the cone penetrometer with pore pressure measurement (CPTU) provides a powerful site characterization tool for geo-environmental investigations.

The UVIF module has a downhole high energy ultra violet light directed through a sapphire window into the soil and groundwater being penetrated. The ultra violet light causes fluorescence of hydrocarbons contained within the soil and groundwater. The fluorescence amplitude is returned to the surface thru a fiber optic cable.

As the UVIF module defines the extent of the contaminant, the CPTU characterizes the ground in terms of soil type, soil permeability, soil strength and phreatic surface. At each test location an integrated vertical profile of relative contaminant concentration, soil stratigraphy and groundwater profile are generated in realtime on site. Having all of this information allows for on-site assessment and ultimately a reduction in site characterization costs.

Fuel Fluorescence Detector (FFD)

EFFICIENT *IN-SITU*

HYDROCARBON PLUME

INVESTIGATION

RAPID SITE CHARACTERIZATION - VERTEK's Fuel Fluorescence Detector (FFD) detects the fluorescence produced by hydrocarbons when excited by an ultraviolet light source. Pushed with Cone Penetrometer Technology (CPT) equipment, it will drastically cut the time needed to delineate the extent of hydrocarbon plumes from fuel spills or leaking storage tanks.

CONTINUOUS MEASUREMENT - As shown in Figure 1 (reverse), the FFD provides a continuous output of fluorescence over the entire depth of the investigation. This information can be viewed graphically in real time with a VERTEK CPT data acquisition system as the probe is advanced, providing a much more complete and easily interpreted view of the plume than traditional discrete sampling methods. Multiple FFD profiles across a site can be used to develop a three-dimensional model of the plume.

IMMEDIATE SAVINGS - This breakthrough technology will produce savings at each step in the site characterization process. The delivery system (CPT) generates minimal investigation-derived waste, reducing the cost of containerization and disposal. There are fewer physical samples collected, cutting down the costs associated with sample collection, preparation, handling and analysis. The continuity of the data reduces the time and effort required for data interpretation and presentation. And, of course, there is the immediate savings from reducing the number of field days required to complete the job. The data from each of the soundings shown in Figure 1 were in the hands of the customer within 15 minutes after the CPT probe pierced the asphalt.

ACCURATE FIELD SCREENING - Due to linear correlation between fluorescence and hydrocarbon contamination in a given soil matrix (Figure 2, reverse), the VERTEK FFD system can be used for site-specific relative screening of contamination levels. Total petroleum hydrocarbon (TPH) values as low as 100 PPM can be detected in sandy soils. what does fp look like?

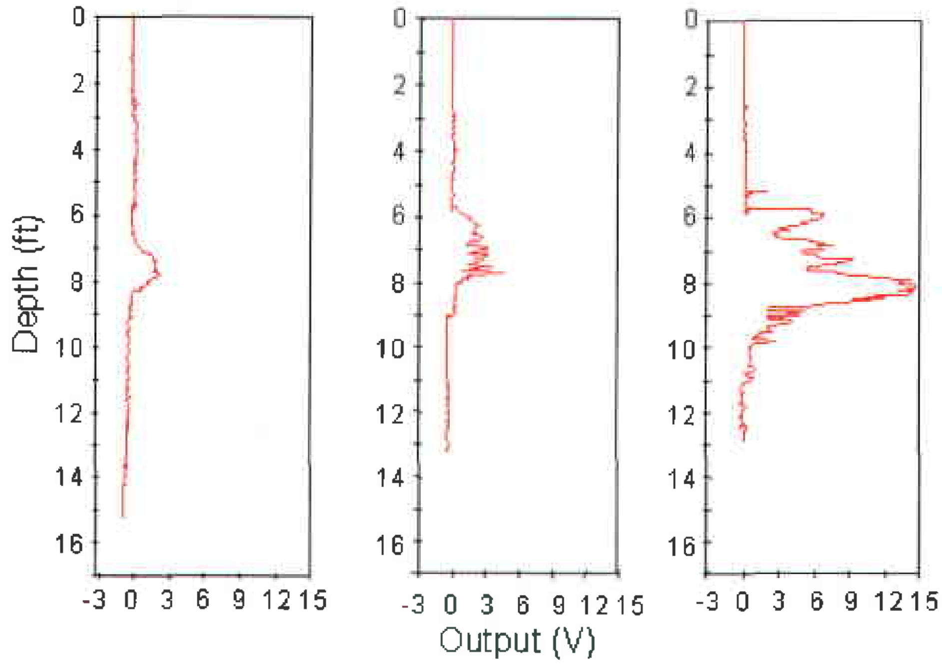
will the TPH be distinguis

VERSATILITY - VERTEK's FFD system can be configured to detect a wide range of contaminants such as jet fuel, diesel, unleaded gasoline, home heating and motor oil, and by changing the PMT filter, coal tars and creosote. Easily interchangeable up-hole optic filters also allow the operator to optimize the sensitivity of the system to specific contaminants. In contrast to laser-based fluorescence systems, the hardware is affordable, easily portable and simple to use. The fluorescence is displayed on an LCD meter and provided as a 0-12 VDC signal for recording on standard data acquisition systems.

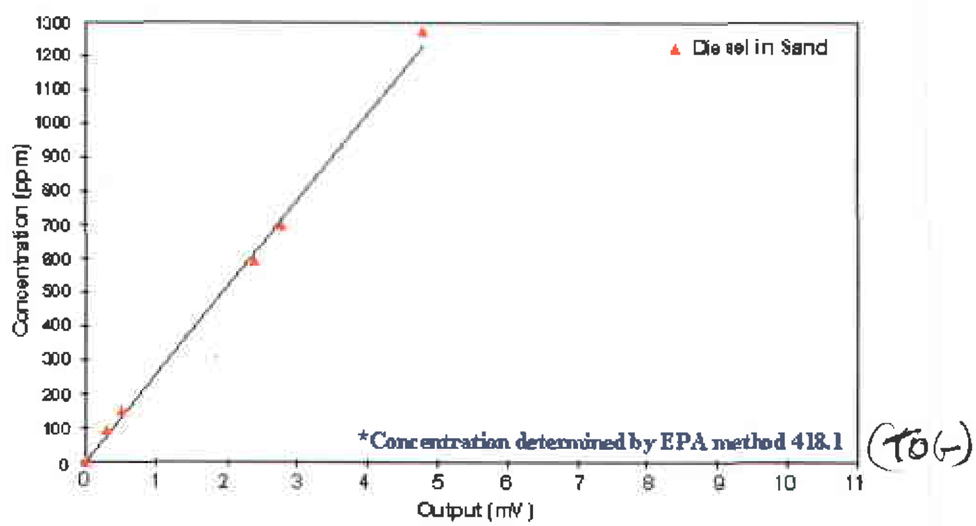
SYSTEM DESCRIPTION - The FFD system consists of a down-hole module and an up-hole controller. The module can be attached directly to a VERTEK CPT cone (or other CPT probe with appropriate optional adapters) for simultaneous stratigraphy analysis and contaminant screening, and contains a 254 nm ultraviolet light source. The filtered excitation light is directed to the soil at the surface of the probe through a sapphire window, and the resulting fluorescence is returned as an optic signal to the controller. Various optional filters narrow the spectrum of the signal light, which is converted to an electric current for amplification and signal conditioning. Offset controls allow the operator to adjust for background fluorescence levels, and internal safety logic protects the optical sensor if exposed to direct sunlight.

EXPANDABLE - The basic FFD system can be combined with VERTEK CPT cones and other VERTEK sensor modules to acquire multiple channels during a single push, greatly reducing site characterization time and expense.

Plot from 3 Pushes Conducted in a Line Transect Across a Hydrocarbon Contaminant Plume.
(*source: HANDEX Corp.*)



FFD Laboratory Results



SPECIFICATIONS	
UV LIGHT SOURCE:	Hg LAMP
EXCITATION WAVELENGTH:	254 nm
DETECTION WAVELENGTH:	280 to 460 nm
OPTICAL WINDOW:	Sapphire
DETECTION LIMIT:	100 ppm (TPH) in sandy soil
POWER:	120 VAC, 500 W
OUTPUT:	0-12 VDC, analog
OPTIONAL FILTERS:	Coal Tar, Creosote

415 Waterman Road, South Royalton, Vermont ° 05068° USA
TEL: (800) 639-6315 or (802)763-7003°° FAX:° (802) 763-8283,
EMAIL: vertek@ara.com