CONCEPTUAL SITE MODEL AND REMEDIAL ACTION EVALUATION FOR SOIL, GROUNDWATER, AND LNAPL

DEFENSE FUEL SUPPORT POINT NORWALK
15306 NORWALK BOULEVARD
NORWALK, CALIFORNIA

Prepared for

Defense Logistics Agency Energy
8725 John J. Kingman Road
Fort Belvoir, Virginia 22060-6222

September 30, 2013

Prepared by

PARSONS

100 WEST WALNUT STREET • PASADENA • CALIFORNIA 91124

CONCEPTUAL SITE MODEL AND REMEDIAL ACTION EVALUATION FOR SOIL, GROUNDWATER, AND LNAPL

DEFENSE FUEL SUPPORT POINT NORWALK

15306 NORWALK BOULEVARD

NORWALK, CALIFORNIA

Prepared for

Defense Logistics Agency Energy
8725 John J. Kingman Road
Fort Belvoir, Virginia 22060-6222

September 30, 2013

Prepared by

PARSONS
100 West Walnut Street
Pasadena, California 91124

Thomas A. Larson

Thomas A. Larson, PG
Principal Geologist

Redwan Hassan

Redwan Hassan, PG
Senior Project Manager

CONTENTS

TABLES

FIGURES

APPENDIX

ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
1,2-DCA	1,2-dichloroethane
amsl	above mean sea level
API	American Petroleum Institute
AS	air sparging
AST	aboveground storage tank
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CHHSL	California Human Health Screening Level
COPC	chemical of potential concern
CPT	cone penetrometer testing
CSM	conceptual site model
DFSP	Defense Fuel Support Point
DLA	Defense Logistics Agency
DO	dissolved oxygen
DP	direct-push
DPLE	dual pump liquid extraction
EDB	ethylene dibromide
EVS	Environmental Visualization System
EXP	Exposition aquifer
FPR	free product removal
ft^2/day	square feet per day
ft/day	feet per day
ft/ft	foot per foot
GAC	granular activated carbon
GWE	groundwater extraction
GWT	groundwater treatment
HHSE	human health screening evaluation
ISCO	in situ chemical oxidation
ITRC	Interstate Technology & Regulatory Council
JP-4	jet propellant 4
JP-5	jet propellant 5
JP-8	jet propellant 8
KMEP	Kinder Morgan Energy Partners, L.P.
LCSM	light non-aqueous phase liquid conceptual site model
LNAPL	light non-aqueous phase liquid
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MTBE	methyl tertiary-butyl ether
NSZD	natural source zone depletion
ppm	parts per million

ACRONYMS AND ABBREVIATIONS

RAB	Restoration Advisory Board
RAP	remedial action plan
ROI	radius of influence
ROST	Rapid Optical Screening Tool
RWQCB	Regional Water Quality Control Board, Los Angeles
SESR	surfactant enhanced subsurface remediation
SFPP	Santa Fe Pacific Pipeline, L. P.
SCG	soil cleanup goal
SVE	soil vapor extraction
TBA	tertiary-butyl alcohol
TFE	total fluids extraction
the site	Defense Fuel Support Point Norwalk tank farm facility
TPH	total petroleum hydrocarbon
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
UVOST	ultraviolet optical sensing tool
VEW	vapor extraction well
VMP	vapor monitoring probe
VOC	volatile organic compound
WDR	waste discharge requirements

1. INTRODUCTION

Parsons was contracted by the Defense Logistics Agency (DLA) Energy to prepare this conceptual site model (CSM) and remedial action evaluation for soil, groundwater, and light non-aqueous phase liquid (LNAPL) at the Defense Fuel Support Point (DFSP) Norwalk tank farm facility (the site) located at 15306 Norwalk Boulevard, Norwalk, California. The site location and vicinity are shown on Figure 1-1.

This CSM has been prepared in response to the letters dated April 10, 2012, March 20, 2013, and August 7, 2013 from the California Regional Water Quality Control Board (RWQCB). The April 10, 2012, letter requested a soil CSM (RWQCB, 2012). The March 20, 2013 letter (RWQCB, 2013a), requested requirements to provide a workplan for LNAPL CSM (LCSM) and estimations of LNAPL transmissivity. The workplan and addendum were submitted on June 27, 2013 (Parsons, 2013a) and July 30, 2013, respectively. The August 7, 2013 letter (RWQCB, 2013b), approved the workplan for the LCSM and requested submittal of CSM on September 30, 2013.

1.1 BACKGROUND AND PREVIOUS CONCEPTUAL SITE MODEL

The RWQCB initially requested a CSM in a letter dated November 25, 2008 (RWQCB, 2008). The draft CSM was submitted on February 13, 2009 (Parsons, 2009). The 2009 draft CSM summarized and integrated all information relevant to released fuel products into the environment, and the physical, biological, and chemical processes that determined the transport of these contaminants to environmental receptors.

The soil CSM was submitted on September 4, 2012 (Parsons, 2012a), following the April 10, 2012 RWQCB's request. The soil CSM updated the initial CSM with all available soil data and interpretations pertaining to the physical, chemical, transport, and receptor characteristics present at the site. It also provided remedial design and the evaluation of onsite soil reuse as backfill and offsite disposal of soil.

This CSM reflects current understanding of site conditions based on information reviewed to date and focuses on soil vapor, soil, groundwater, and LNAPL impacts beneath the site and adjacent offsite areas. This CSM updates previous submittals and adds the corrective action decision framework requested by the RWQCB.

1.2 OBJECTIVES AND REPORT OUTLINE

The objective of this CSM is to integrate all the available site data and interpretations pertaining to the physical, chemical, transport, and receptor characteristics present at the site. The CSM will be used to aid in remediation efforts and future remedial design and implementation. A more current understanding of the groundwater, soil, and soil vapor hydrocarbon impacts beneath the site and adjacent offsite areas will be described to facilitate effective remedial efforts.

The CSM was developed using guidance provided in the following documents and as requested by the RWQCB:

- *Standard Guide for Development of Conceptual Site Models and Remediation Strategies for Light Nonaqueous-Phase Liquids Released to the Subsurface*, ASTM E2531-06 (ASTM, 2006);
- *Standard Guide for Estimation of LNAPL Transmissivity*, ASTM E2856-12 (ASTM, 2012);
- *Evaluating LNAPL Remedial Technologies for Achieving Project Goals* (Interstate Technology & Regulatory Council [ITRC], December 2009a); and
- *In-situ Chemical Oxidation Engineering Issue Paper*, (USEPA, Huling and Pivetz, 2006).

These documents provide guidance in developing an LCSM upon which a decision framework is applied to assist in selecting remedial actions. The CSM includes complete data set to evaluate soil, groundwater, and LNAPL. The ITRC document provides a detailed framework that uses LCSM information to identify appropriate LNAPL remedial objectives suited to achieve remediation goals and addresses 17 LNAPL remediation technologies that focus primarily on the LNAPL body, or “source zone”.

This report is organized into eight sections including this introductory section which also includes the background and previous CSMs and objectives. Section 2 presents site description and summarizes previous investigations and remedial action. Section 3 provides a discussion about the physical and source characterization. Section 4 provides the details of the CSM including the nature and extent of impacts in the vadose zone, LNAPL, and groundwater and summarizes exposure pathways and potential receptors. Sections 5 through 7 present the remedial action evaluation and proposed action. The references are listed in Section 8.

2. SITE DESCRIPTION AND BACKGROUND

The DFSP Norwalk site encompasses approximately 50 acres (Figure 2-1). The facility is currently bordered on the north, south, and west by residential areas and on the east by a city park (Holifield Park). The DFSP Norwalk facility was constructed in 1923 and was operated by at least four owners, including Tidewater Oil, Jolly Oil Company, Wilshire Oil, and Texaco, until it was acquired by the Air Force in 1951. In 1951, the Air Force added manifolds, gravel sumps, truck loading racks and aboveground and underground piping to the facility. The gravel sumps were located next to each storage tank and are believed to have been used as discharge points for water drawn from the bottom of the tanks. Facility ownership was transferred from the Air Force to the DLA Energy in 1968.

The site previously contained ten 80,000 and two 55,000-barrel aboveground storage tanks (ASTs) that were used to store and distribute jet propellants 5 and 8 (JP-5 and JP-8). Aviation gasoline and JP-4 were also reportedly stored at the site. The former truck loading racks are located in the south-central portion of the site and occupy approximately one acre (Figure 2-1). In the past, fuel was transferred from the facility via tanker trucks filled at the loading racks, but by the early 1990s jet fuel was no longer being routinely transferred from the facility via tanker trucks. Subsequently, a 10-inch diameter, government owned multi-product pipeline, carried fuel from DFSP San Pedro to DFSP Norwalk and a 6-inch diameter pipeline carried fuel from DFSP Norwalk to the former El Toro Marine Corp Air Station. Investigations at the site found that releases had occurred at several locations at the facility.

The site was shut down in 1999 and the ASTs were drained, cleaned, and marine-chemist certified. Within the tank farm, the individual tank lateral pipes were drained, disconnected, and individually cleaned. The main pipe laterals, running form the Powerine Basin to the Air Force and El Toro manifolds, were also drained and individually cleaned.

The ASTs, concrete pads, and connecting pipeline systems were demolished and removed in 2011 and 2012. Following removal of the tanks and pads, soil confirmation samples were collected from beneath the AST locations and included in the *Concrete Demolition and Soil Confirmation Sampling Completion Report* (Parsons, 2013b).

An approximate 2-acre area is leased by SFPP, L.P. (SFPP), an operating partner of Kinder Morgan Energy Partners, L.P. (KMEP), along the southern and eastern property lines (Figure 2-1). Previously, SFPP operated a pump station at the site. The pump station has been decommissioned but three pipelines remain in service.

2.1 REMEDIAL ACTION

A remedial action plan (RAP) was submitted in 1995 for the DFSP Norwalk site (GSI, 1995) and a revised RAP submitted in 2006 (Parsons, 2006a). The 1995 plan was to address impacts in the shallow aquifer underlying the tank farm only. The purpose of the revised 2006 plan was to evaluate if the objectives of the initial RAP were achieved and to assess the effectiveness of the existing remedial systems. The areas of the revised RAP were limited to the tank farm area, the Powerine basin, the vehicle maintenance area to the east, the vapor recovery underground storage tank (UST) to the north-west (located to the south of the thermal oxidizer), the water tank area near just to the north of the truck loading area, the holding/settling pond in the northeast corner, and the pump control house to the west (Figure 2-1).

The DLA Energy has installed remediation systems to treat the hydrocarbon impacted soil and groundwater environmental media. The purposes of these remediation systems are to reduce contaminant concentrations in soil and groundwater to cleanup goals. The ultimate goal is to achieve site closure. The remediation systems at the site by DLA Energy consists of soil vapor extraction (SVE), groundwater extraction (GWE), biosparging, localized bioslurping for free product recovery, absorbent sock installations for passive recovery of free product, total fluids extraction (TFE), and soil vapor and groundwater treatment (GWT). DLA Energy is currently conducting GWE in the northwest corner of the property from two pumping wells (GW-2 and GW-13), and also from two wells (GW-15 and GW-16) in the northeast area bordering Holifield Park. The operation of the GWE system is to contain and reduce the extent of the free product and dissolved plumes. SVE is also underway from the four horizontal wells that span the entire former tank farm area and from the north eastern boundary area. Additionally, localized bioslurping vacuum recovery is conducted as needed from wells exhibiting free product thicknesses greater than 1 foot.

Details of the remediation system operation are presented quarterly to the RWQCB and Restoration Advisory Board (RAB). DLA Energy created a web site (*Norwalkrab.com)* to house project information, which includes agendas, minutes, and presentations from RAB meetings dating back to 1994. In addition, all historical project information and reports can be located in the information repository at the Norwalk Regional Library.

The remediation system operated by SFPP consists of SVE, TFE, GWE, and treatment of extracted soil vapor and groundwater to address three specific areas at and near the site: the south-central area, the southeastern area, and the western area. SFPP discussed their remediation systems and impacted areas in their CSM and proposed alternative remedy (CH2M HILL, 2013).

Figure 2-2 shows the DLA Energy areas of concern and also the CSM boundary. It also shows SFPP's areas of concern which are discussed in detail in the CSM and proposed alternative remedy (CH2M HILL, 2013).

2.2 PREVIOUS INVESTIGATIONS

The subsurface soil and groundwater in and around the DFSP Norwalk facility has been extensively studied. Since 1986, environmental assessments and remedial action have been performed at the site by several consultants on behalf of DLA Energy. During these investigations, wells were installed for monitoring and as components of groundwater remediation activities. These investigations evaluated and defined the extent of liquid-phase, adsorbed-phase, and dissolved-phase hydrocarbons in soil and groundwater beneath the site and offsite to the south, west, and east. There is more than adequate understanding of the types of contaminants and their vertical and areal distribution both on and off of the DFSP Norwalk facility. Figure 2-2 shows the primary areas of concern as identified as north-central, eastern, water tank, and truck loading area. Figure 2-3 presents a map showing all the soil sampling locations used during the preparation of this CSM.

2.2.1 Aboveground Storage Tank Farm Area

The Powerine Basin is located in the north-central portion of the facility in between former ASTs 80002 and 80004. The Powerine Basin was historically used as an effluent discharge area for the previous oil-water separator. Effluent disposal ceased in 1982, when the current oil-water separator (near the oily waste area) was brought on line. An abandoned water well in the Powerine Basin was found to contain JP-5 fuel; in 1981 approximately two barrels of product was extracted from the well, and the well was abandoned under supervision of State personnel. The Powerine Basin also contained a 500-gallon UST used for storage of jet fuel. The steel tank was removed in December 2005 during which the integrity of the tank was observed to be satisfactory. Furthermore, no staining or discoloration of soil was observed around and at the bottom of the excavation activity.

Within the tank farm area, the earliest recorded release occurred in 1968 when an unknown quantity of unspecified petroleum product was released from a former slop tank located adjacent to AST 55003.

In 1996, site remediation activities in the tank farm area were initiated. The remediation system consisted of an SVE system, and a free-product removal and groundwater extraction treatment (FPR/GWT) system. The SVE system became fully operational in May 1996, whereas the FPR/GWT system began full time operation in June 1996.

In July 1998, GTI identified the western portion of the facility, where the southern and northern plumes commingle, and the northwestern corner of the site as main areas of concern for optimization of mass removal and for containment and recovery of the dissolved-phase plume.

In May 1999, a Rapid Optical Screening Tool (ROST) analysis was conducted to assess the hydrocarbon impacts in the subsurface zone. Additionally, the locations of the cone penetrometer test (CPT) locations CPT-1 through CPT-10, and direct-push (DP) technology locations DP-10 through DP-51 were assessed for the presence of petroleum hydrocarbons in soil in the northern tank farm area and for evaluating the success of remedial efforts conducted in this area since May 1996. In addition, soil sample collection for chemical, physical, and/or biological analyses using a DP technology at 57 locations in the tank farm area were conducted. It was concluded that the bulk of the remaining contamination was found to occur at and below the groundwater surface.

The initial remediation system consisted of 16 vertical total fluid recovery wells (TF-8 through TF-11, and TF-13 through TF-24); eight vertical groundwater recovery wells (GW-1 through GW-7, and GW-12); two 30-foot deep vertical vapor extraction wells (VE-01 and VE-02); and 4 horizontal vapor extraction wells (HW-1, HW-3, HW-5 and HW-7).

The results of chemical, physical, and/or biological analyses conducted in the tank farm area during May and June 1999 suggested lack of oxygen within and outside the plume boundaries, because biofouling of well screens and pumps were observed in the plume boundaries. In August 1999 biosparging was proposed in the northern tank farm area. The objectives of the biosparge system were to enhance the aerobic biodegradation of hydrocarbons in the saturate zone and to aerate and volatilize the liquid hydrocarbon trapped in the fine pores within the product/water saturated zone. The biosparge system was also intended to mechanically displace and mobilize liquid hydrocarbons trapped below the water table and increase the dissolved oxygen (DO) above 4 milligrams per liter (mg/L). 16 sparge wells were installed in October 1999 (SP-8, SP-9, SP-11a and SP-11b, SP-13 through SP-18, SP-20 through SP-24 and SP-48). The locations of these wells were selected to provide optimal oxygen enhancement while ensuring that mobilized liquid phase hydrocarbon and vapors would be contained and recovered through the existing TFE wells and the horizontal vapor extraction wells (VEWs). In July 2001, an additional 16 biosparge wells were installed to increase DO in the saturated zone outside the liquid hydrocarbon plume. The system expansion was completed, and the biosparge system restarted in December 2001.

In November 2003, Parsons evaluated the effectiveness of the remediation systems targeting the central-plume area at the site. Performance of the SVE and thermal oxidation system, the groundwater pumping system, the TFE system, and the biosparge system were considered during this evaluation. Based on the observed results, Parsons recommended expanding biosparging to enhance aerobic biodegradation within the dissolved-phase plume by optimizing total fluid recovery; continuing vapor extraction from the horizontal wells with treatment through the thermal oxidizer; allowing periodic monitoring of the horizontal vapor extraction wells remedial progress; and installing vapor monitoring probes (VMP) in selected areas containing elevated soil vapor concentrations.

In order to optimize the removal of residual free-phase liquid hydrocarbons and the dissolved hydrocarbon plume in groundwater at the bulk fuel tank farm, in June 2004 Parsons proposed installation of additional biosparge wells. The operating goals of the biosparging system were to provide oxygen to stimulate aerobic biodegradation of hydrocarbons present in groundwater and vadose zone soils at the site, and to volatilize fuel hydrocarbons in the capillary fuel “smear zone”. The first phase of system expansion consisted of ten sparge wells localized in an area with the highest dissolved total petroleum hydrocarbon (TPH) concentrations and where residual free product remained. In August 2004, ten sparge points were installed within the tank farm area near ASTs 80002, 80006, and 80007 and were connected to the existing central plume SVE treatment system located in the northern portion of the facility.

Nine additional biosparge wells were installed in the eastern boundary near monitoring wells GMW-60 and GMW-61 to treat the dissolved hydrocarbon plume in this area.

In 2004, the SVE system was expanded and 12 VEWs and 16 multiple-depth VMPs were installed to treat impacted soils below the ASTs and were connected with other targeted cleanup areas to the existing central plume and truck fueling area SVE treatment system. An additional 28 vertical soil borings within and around the tanks and 11 angled borings underneath the tanks were installed.

In spring of 2011, the aboveground steel storage tanks were demolished. From May 2011 through October 2012, the concrete AST foundations, all associated tank farm underground concrete structures and piping, asbestos-containing material, pump stations, oil-water separator, storm drain system, fire water/foam prevention system, and the septic tanks were demolished and removed. Subsequently, soil confirmation sampling was conducted from all areas to further define extent of vadose zone impacts (Figure 2-3).

2.2.2 Truck Loading and Water Tank Areas

The truck loading area is located in the south-central portion of the site and occupies approximately one acre. In the past, fuel was transferred from the facility via tanker trucks filled from this area, but by early 1990s jet fuel was no longer being routinely transferred from the facility via tanker trucks. The discussion below describes the past investigation and remedial activities performed at the truck fueling and the water tank areas.

In April 1999, a fuel release from an underground pipeline was discovered in the southern area of the facility west of the water tank and north of truck loading racks. Approximately 80 cubic yards of impacted soil was removed. In addition to the deeper excavation that exposed the leaking pipe, approximately 1 foot of impact soil was removed west and south of the water tank. The excavation was backfilled with clean soil in April 1999, and 23 soil samples were collected and analyzed for TPH as JP-5. Fourteen DP samples were analyzed for volatile organic compounds (VOCs) to assess the impact of fuel release north of truck loading racks. Both TPH as JP-5 and benzene, toluene, ethylbenzene, and total xylenes (BTEX) compounds were reported in soil samples.

Additional field activities were performed in May 1999, which consisted of collecting soil samples at water tank release area using hand auger and DP technology. It was concluded that the bulk of the remaining contamination was found to occur at and below the groundwater surface.

Additional soil investigation was conducted at the truck loading area in September 2001, during which the vertical extents of hydrocarbon contamination in subsurface soils were evaluated for the truck filling racks, vehicle maintenance, vapor recovery UST, and septic tank areas. The extent of commingling of releases from truck filling racks and other known adjacent sources was also evaluated using data collected from current and previous investigations. During this investigation, 15 DP continuous core samples were logged and sampled in and around the truck loading area. The investigation at the truck loading area revealed evidence of past fuel releases. The data suggested that the release occurred at or around the western and central truck loading islands. An area approximately 80 feet by 260 feet, extending from near the surface to the water table at 28 feet below grade had been impacted by releases at the truck loading area. The maximum concentrations detected during the September 2001 investigation were between 26 feet and 27 feet below grade at 21,000 milligrams per kilogram (mg/kg) TPH as gasoline (C8-C12) and 10,000 mg/kg TPH as jet fuel. However, the soil data near the eastern-most truck loading island did not indicate that significant releases occurred from that stand.

In 2003, fuel samples were collected from four locations (GMW-4, GMW-10, MW-9, and MW-15) in and around the truck loading area, one from the eastern area (GMW-58), and one from the tank farm area just north of AST 55004 (TF-18). The analytical data for these samples suggested a varying degree of weathered or degraded fuels, and mixtures of fuels already identified as being historically stored or transported on site. The results also indicated absence of gasoline range hydrocarbons and BTEX constituents, but did indicate the presence of jet fuel hydrocarbons in soils and most likely in groundwater.

In 2004, seven SVE wells and three multi-depth VMPs were installed in the truck loading area and connected via piping to the main SVE system in the north-central site area. The results of the installation, monitoring, and investigation activities were reported in September 2004 (Parsons, 2004). Elevated TPH and VOC concentrations were confirmed within the truck loading area.

Other miscellaneous activities at the truck fueling area involved removal and hauling of the 500-gallon UST located near the truck fill rack in June 2004. The thermal oxidizer located to the west of the truck fill rack was also removed at this time.

2.2.3 Eastern and Northeastern Boundary Plume

From 1990 to 1992, several soil borings were installed by Woodward-Clyde at the site. TPH impacts as high as 14,000 mg/kg were observed in the northeast corner of the site at 3 feet (boring BH103). The TPH impacts were below the laboratory reporting limit at 8 feet below ground surface (bgs) in the same boring. On the contrary, the TPH impacts in the eastern boundary soil borings were all reported below laboratory reporting.

During November 1996, the groundwater monitoring and sampling results indicated elevated levels of free product and dissolved hydrocarbons concentrations in the eastern portion of the site. Monitoring well GMW-48 was reported to contain high dissolved-phase TPH (gasoline range) concentrations. Subsequent to the November 1996 sampling event, monitoring well GMW-48 was found to contain free product with an odor described by the field technician as a “strong gasoline smell”. A product sample collected from GMW-48 was interpreted to be JP-4. As a result, a DP technology assessment of the eastern portion was conducted in June 1997. The sample results suggested a lack of evidence of significant hydrocarbon impacts to soil and groundwater at locations DP-7 through DP-9. Eight Hydropunch™ samples (HP-1 through HP-8) from the eastern portion of the site were subsequently collected, which indicated high TPH impacts in the HP-8 location. HP-8 was reported to contain 35,000 micrograms per liter (µg/L) TPH as jet fuel, 64,000 µg/L TPH as gasoline, and 11,000 µg/L as benzene. Furthermore, HP-20 had 0.310 mg/kg of gasoline at 20 feet bgs.

In order to further evaluate the vertical and lateral extent of adsorbed-phase and dissolved-phase hydrocarbon contamination in subsurface soils and groundwater in the northeast portion of the site, four borings (GMW-56 through GMW-59) were drilled in the northeast area of the site, and completed as groundwater monitoring wells in August 1998. To further determine the eastern extent of the plume and to identify whether impacts extend beyond site boundaries, two groundwater monitoring wells (designated GMW-60 and GMW-61) were installed along the eastern site boundary on April 2004. Groundwater within monitoring wells GMW-60 and GMW-61 showed elevated concentrations of TPH and VOCs. Results of TPH as gasoline were higher than TPH as JP-5 or TPH as fuel product. VOCs included lighter end petroleum compounds typical of gasoline, including BTEX, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene.

Additional drilling and sampling activities were performed in the northeastern area in July 2004. A total of 12 DP borings were installed to either 10 feet bgs or 20 feet bgs. TPH as JP-5 was detected in GMW-60 at 1,100 mg/L. However, BTEX compounds were not detected in the samples. Based on these soil sample results, it appeared that there may have been a source of TPH contamination near GMW-60. However, no impacts were detected during the step-out soil investigation conducted west of the well.

In July 2005 and August 2006, Parsons performed investigations in the eastern boundary and adjacent off-site area in Holifield Park (Parsons, 2006b). Results indicated generally higher hydrocarbon impacts in deeper groundwater samples collected from 31 to 35 feet bgs than those observed either in the vadose zone soil or the shallower groundwater samples. These deeper groundwater impacts primarily consisted of TPH as fuel product (reported as JP-5 during the July 2005 investigation), TPH as gasoline, and/or BTEX compounds. These groundwater impacts could not be attributed to any specific source. The presence of fuel constituents in the easternmost Hydropunch™ sample (approximately 100 feet from the boundary; B-22) suggested the need for additional groundwater delineation in the area beneath Holifield Park. Data from borings B-12 and B-19 suggested that the extent of impacted groundwater was limited to the north and south. No historical data was available to indicate soil and groundwater impacts by these VOCs east of B-22.

Additional soil gas, soil, and groundwater investigations were conducted in December 2006 and June/July 2007. The investigation included 168 soil gas samples, 71 soil boreholes, 40 Hydropunch™ groundwater locations, and 15 CPT locations. In addition, a human health screening evaluation (HHSE) was performed. The results of the HHSE indicate that adverse health effects are not expected from exposure to chemicals of potential concern (COPC) in soil gas, soil, and groundwater beneath the main park area under current site conditions. The results of the investigations indicate that select fuel-related VOCs and TPH as gasoline and fuel product in groundwater have migrated off DLA Energy property and into the subsurface beneath the park. The lateral extent of groundwater impacts above screening/action levels is limited to approximately 90 feet east of the property beneath the main park area. Groundwater impacted above screening/action levels does not extend beneath Dolland Elementary School property. In addition, the northern and southern extents of groundwater impacts in Holifield Park are limited to 120 feet to the south and 200 feet to the north of GMW-62. Soil gas and soil have not been impacted with site-related VOCs above screening levels in the main park area.

3. PHYSICAL AND SOURCE CHARACTERIZATION

Physical characterization of contaminants and sources are presented in this section.

3.1 PHYSICAL CHARACTERIZATION

The following subsections describe the geological and hydrogeological settings of the site.

3.1.1 Regional Geology Setting

DFSP Norwalk is located between the Montebello Forebay and the Downey Plain in the Central Basin pressure area. Approximately 50 to 60 feet of alluvium (primarily sand, silt, and clay) cover the underlying Lakewood Formation in this area. The Lakewood Formation is composed of marine and continental gravel, sand, silt, and clay deposits. The San Pedro Formation underlies the Lakewood Formation, approximately 300 feet below grade, and consists of more than 800 feet of Pleistocene marine and continental gravel, sandy silt, silt, and clay deposits (CDWR, 1961).

3.1.2 Local Hydrogeology Setting

Lithologic logs of borings drilled during previous investigations indicate that sediments beneath the site consist of clayey silt, sandy silt, silty sand, medium to coarse-grained sand, and deeper coarse-grained sand with granitic cobbles. The top of a clay layer (preliminarily identified as the uppermost sediment layer of the Bellflower Aquitard) was encountered at a depth of approximately 55 to 65 feet during previous investigations. Figure 3-1 shows the locations of geologic cross sections. Geologic profiles shown on Figures 3-2 and 3-3 indicate areas and depths with more permeable sandy deposits in yellow, orange, and brown; whereas, the green and pink colors indicate finer grained and less permeable silty and clayey materials. These figures were generated by establishing a stratigraphic hierarchy based on all of the borehole lithologic data available into the Environmental Visualization System (EVS) modeling software.

The potentiometric surface is shown in dark blue on the geologic profiles. The vadose zone is the unsaturated sandy and silty soils from the ground surface to this blue (potentiometric) surface. Groundwater below the site occurs at depths between 23 to 33 feet bgs. A hydrograph for GMW-57 (the longest water level record available) shows that water level was about 48 feet above mean sea level (amsl) in 2003, quickly rose to about 52.8 feet amsl in early 2005. From 2005 to 2009, the water level has gradually dropped back to about 48 feet amsl, where it has remained about the same since. Thus, there is a potential for a 5-foot LNAPL smear zone between these two extremes. Since 2009, there has been about a one foot seasonal fluctuation.

The shallow semi-perched unconfined alluvial aquifer, consisting of silts, fine to medium sands, and coarse sands, is approximately 30 to 35 feet thick, and overlies the Bellflower Aquitard at approximately 55 to 65 feet bgs. The Bellflower Aquitard is composed of approximately 70 feet of interbedded silts and clays with minor gravel and sand. The aquitard separates the shallow semi-perched groundwater from the deeper Exposition and Gage aquifers of the Lakewood Formation. Near the site, the Exposition and Gage aquifers are found at 150 and 250 feet bgs, respectively (GTI, 1994). The potentiometric surface in the Exposition aquifer is approximately 20 feet lower than the semiperched uppermost groundwater zone. This relatively consistent difference in hydraulic heads between the upper groundwater zone and the Exposition aquifer indicates that the Bellflower aquitard is effective at inhibiting vertical groundwater migration. Due to low well yields, local water service companies do not make extensive use of aquifers in the Lakewood Formation. The deeper San Pedro Formation includes the following aquifers, listed from shallowest to deepest: Hollydale, Jefferson, Lynwood, and Silverado.

3.1.3 Groundwater Flow Conditions

Figure 3-4 shows the configuration of the potentiometric surface based on measurements from October 2012. The overall flow in the upper groundwater zone is to the north, with an estimated horizontal hydraulic gradient of approximately 0.003 foot per foot (ft/ft) in the south-central plume area to nearly flat in the truck loading and tank farm north-central areas. Hydraulic conductivity of the unconfined alluvial aquifer has been reported to range between 12 and 73 feet per day (ft/day) in the south-central area to 20 to 60 ft/day in the southeastern area.

Groundwater flow in the Exposition aquifer is generally to the east-southeastward with a horizontal hydraulic gradient of approximately 0.0003 ft/ft. This southeastward flow direction in the Exposition aquifer is roughly opposite the general groundwater flow direction of the uppermost groundwater zone. These distinctly different hydraulic conditions, consistently interpreted over time above and below the Bellflower aquitard, support the interpretation that the Bellflower aquitard in this area is laterally continuous and has a relatively low vertical hydraulic conductivity.

3.1.4 Groundwater Capture Zones

A joint groundwater capture zone memorandum was prepared by Parsons and AMEC on July 22, 2010, on behalf of DLA Energy and SFPP, respectively, in order to simulate typical long-term groundwater flow conditions at the site in response to groundwater extraction by the remediation system. The primary objective was to assess the “capture zones” that exist in response to groundwater extraction and verify that dissolved-phase contamination is being contained within the remediation target areas. A two-dimensional analytical groundwater flow model (Win Flow) was used to meet this objective.

Figure 3-5 presents a simulated flow model and capture zones under typical pumping conditions in the DLA Energy and SFPP remediation areas. Extraction from remediation wells in the northwest, northeast, south-central, and southeastern areas was assumed for this simulation. The capture zones shown by the groundwater flow simulations indicate that dissolved-phase hydrocarbon constituents are being effectively contained within the remediation target areas. The general south-to-north direction of groundwater flow in the uppermost groundwater zone and the reversal in groundwater flow associated with the capture zones is shown in the general CSM block diagram (Figure 3-6). Additional details regarding the modeling effort are included in reports prepared by Parsons (2010).

3.2 IDENTIFICATION OF POTENTIAL CONTAMINANTS

Historical records and forensic testing of petroleum products recovered from boreholes and monitoring wells at many locations on the site have indicated that soil and groundwater are impacted with hydrocarbons mainly consisting of JP-4, JP-5, JP-8, and gasoline. JP-4 is a 50-50 blend of kerosene and gasoline. JP-5 is similar to JP-4, but has some napthalenes added. JP-8, which is kerosene based, was introduced in 1990 and completely replaced JP-4 in 1996. JP-8 contains less benzene and hexane than JP-4, but still contains some benzene, toluene, xylenes and naphthalene, as well as other additives (e.g., diethylene glycol monomethyl ether or ethylene glycol monomethyl ether). Gasoline constituents include BTEX; and methyl tertiary-butyl ether (MTBE). In addition, tertiary-butyl alcohol (TBA) has been detected in samples collected in the past few years and, along with other fuel oxygenates, was added to the monitoring program at the site by the RWQCB in March 2009. Ethylene dibromide (EDB) and 1,2-dichloroethane (1,2-DCA) were also integral parts of the tetraethyl lead-based antiknock gasoline additives used through the 1980s. EDB and 1,2-DCA were added to gasoline to prevent buildup of lead oxide deposits within internal combustion engines at an average concentration of about 300 mg/L (Falta, 2004). Because of their high aqueous solubilities, this would be expected to produce equilibrium groundwater concentrations of thousands of µg/L.

The principal COPC at the site are TPH, including TPH quantified as gasoline, diesel fuel, jet fuel, and jet propellant 5 (TPH as JP-5); BTEX; 1,2-DCA; MTBE, and TBA.

3.3 IDENTIFICATION AND CHARACTERIZATION OF SOURCES

Environmental investigations began in the mid-1980s and full-scale cleanup at the site started in 1995. Figure 2-1 shows the site infrastructure and facilities and Figure 2-2 shows areas of concern. The AST area in the northern portion of the site experienced several leaks and spills from the tanks and connecting pipeline system throughout the operational history of the site, and are described below.

3.3.1 Oily Waste Material

In 1985, buried oily wastes were encountered in the southwestern portion of the site. The wastes were located approximately 80 feet southeast of the southeastern corner of the laboratory building and extend to about 25 feet southeast of the southeastern corner of the oil-water separator. The areal extent of the buried material is nearly 28,000 square feet and a depth of approximately 10 feet below grade, with a total volume of approximately 5,000 cubic yards. From 1997 through 2003, various investigations were conducted of this area. The RWQCB issued a No Further Action for the oily waste area on March 28, 2005.

3.3.2 Aboveground Storage Tank Releases

Numerous AST releases led to the contamination in the north central portion of the facility. Aerial photographs from 1958 and 1959 showed discolored soil near AST 80004 and in the western portion of AST 80008; ponded liquid in the southwest corner of the berm surrounding AST 80002; and two areas of discolored soil in the bermed areas surrounding ASTs 80002 and 80008. A spill was reported at AST 80002 in the early 1970s due to overflow of which the amount of product lost is unknown. Aerial photographs also indicate the possible presence of a former settling pond in the northeastern portion of the facility.

Direct evidence of jet fuel leaks from the ASTs is not available. Data suggests subsurface hydrocarbons in the areas of ASTs 80001, 80007, 80008, and 80009 originated from leaks in the bottom of these tanks. Another possible source is a major pipeline junction in the Powerine Basin, but this junction has not been identified as a release point of hydrocarbons. The total volume of fuel in the soil and groundwater underlying the tank farm was calculated during a 2001 Environmental Baseline Survey (IT Corp, 2001) to be approximately 400,000 gallons. To date, 429,000 gallons of hydrocarbons have been removed and destroyed by DLA Energy remediation systems.

An unknown quantity of petroleum product was released to the subsurface in 1968 from the slop tank south of AST 55003. In 1969, an unknown quantity of JP-4 fuel was released from AST 55004.

3.3.3 Truck Loading Racks and Water Tank Area

In 1975 and 1986, abandoned 4- and 12-inch-diameter pipelines (reportedly contained a heavy, viscous, tar-like substance) were discovered near the loading racks and were left in place and backfilled with soil. A former sump located southeast from the water tank was removed in about 1982, at which time observations were reported that underlying soil contained petroleum hydrocarbons. Reportedly, a leaking flange also caused contamination in the south-central section. Surface soil stains were observed by two different environmental contractors in 1984 and again in 1989/90, suggesting that releases have occurred in the past. Investigations show that soil immediately adjacent to the southwestern portion of the loading racks has been impacted by site operations.

The investigation from 2001 at the loading racks revealed evidence of past fuel releases. The data suggested that the release occurred at or around the western and central truck loading islands. An area approximately 80 feet by 260 feet, extending from near the surface to the water table at 28 feet below grade had been impacted by releases at the loading racks. However, the soil data near the eastern-most truck loading island did not indicate that significant releases occurred from that facility.

In 1998, a new release of fuel was observed in the area of the water tank. Impacted soils were excavated and taken offsite for treatment; however, the excavation revealed that underlying soils had been impacted by older releases. Further investigation showed impacted soils surrounded the eastern and southern portions of the water tank.

In 1999, a fuel release from an underground pipeline was discovered in the southern area of the facility west of the water tank and north of loading racks. The terminal operator secured the area, stopped the leak, and removed 80 cubic yards of impacted soil. In addition to the deeper excavation that exposed the leaking pipe, approximately 1 foot of impact soil was removed west and south of the water tank. Confirmation samples were collected from the surrounding area and below the excavated area to assess the impact of the fuel release. Both TPH as JP-5 and BTEX compounds were reported in soil samples.

4. CONCEPTUAL SITE MODEL

This section provides details on the CSM including, soil and soil vapor conditions, LNAPL and groundwater conditions, and a summary of exposure pathways and receptors relating to impacted media. Figure 3-6 presents a generalized CSM block diagram for impacted areas from DLA Energy's known releases. Impacted media from SFPP operations are not detailed in this report as these areas are described in SFPP's CSM (CH2M HILL, 2013). The primary contaminants of concern for this site have been shown to be related to releases of various fuel products. Two constituents were considered representative of the plume extents for fuel related constituents. EVS models were generated for TPH as diesel and benzene. This CSM considers contamination in all media (soil, soil vapor, LNAPL, and dissolved in groundwater) and also confirms non-impacted areas.

As stated above, soil sampling to identify fuels contamination began in 1986. However, only soil samples collected since September 2009 were used for the EVS modeling because this CSM is intended to delineate current conditions (Figure 2-3). Remedial actions including soil excavation, SVE, and product extraction have modified original conditions. Groundwater analytical results from samples collected in April 2013 were used for the EVS modeling the current conditions of dissolved phase contamination. The thickness of the LNAPL in the EVS model is based on actual product thicknesses measured in monitoring wells in April 2013. For the EVS model, the depth of soil contamination was limited to 5 feet below the water table. This assumption is based on the fact that very few soil samples were collected from below the water table and that no fuel product reflectance was observed deeper than the water table smear zone in ultraviolet optical sensing tool (UVOST) logs from 17 boreholes broadly distributed across the site. Without this assumption, the EVS modeling software would have projected soil contamination to extend to the base of the model in the Exposition Aquifer, as there are no soil samples below the smear zone to limit the interpretation.

4.1 NATURE AND EXTENT OF VADOSE ZONE CONTAMINATION

The vadose zone is comprised of the unsaturated soil section from below the ground surface to the water table. In an effort to determine the current extent of soil contamination, only soil borehole data collected within the last 4 years (since September 2009) were utilized for the CSM. A total of 936 soil samples were evaluated from 203 borehole locations positioned to delineate known release areas and areas with elevated concentrations of dissolved-phase hydrocarbons. Soil analytical results for contaminants of concern are summarized in Table 4-1.

4.1.1 Total Petroleum Hydrocarbon as Diesel

As discussed above, several constituents were selected as representative of the nature and extent for all COPCs at the site. TPH in the diesel range (C13 – C22) is probably the most representative of petroleum hydrocarbons remaining at this site.

Figure 4-1 shows the spatial distribution of TPH as diesel in soil with yellow, orange, and brown hues, and the underlying groundwater plumes are shown with blue and purple hues. Green hues are used to designate LNAPL. Several “hot spots” for soil contamination are indicated. The largest area with soil contamination is located north or the tanker truck loading racks and the former slop tank and water tank (Figure 2-1), with a smaller “hot spot” at the western end of the truck loading rack. Figure 4-2 shows a profile view of this contaminated area from an eastern perspective. The model shows that the soil contamination extends from the ground surface to the water table in this area.

Two other areas of TPH as diesel contamination in soil are shown on Figure 4-1 in the northeastern portion of the facility in the vicinity of former AST 80008 and extending to the east-southeast. The profile view shown on Figure 4-3 from a northeastern perspective shows that TPH as diesel occurs in near surface soils, and then again in deeper soils near the water table, but not at intermediate depths. The other northeastern area of contamination is shown on the extreme northeast corner of Figure 4-1, and in the near surface soil on the right edge of the Figure 4-2 profile. The EVS model most likely overestimated the size of the plume in this northeastern area, as there are several limiting boreholes (Figure 2-3) that were not analyzed for TPH as diesel, but had no TPH as gasoline, benzene or other VOC contamination (Table 4-1). Both Figures 4-1 and 4-2 show that there is no groundwater contamination below this northeastern-most soil contaminated area, as defined by groundwater monitoring control points shown on Figure 3-4.

A few smaller areas of TPH as diesel in soil occur in the western half of the tank farm area, as shown on Figure 4-1. These TPH as diesel occurrences in soil are limited both horizontally and vertically as shown on the profile view from the south-southwest perspective on Figure 4-4.

4.1.2 Benzene

Benzene was selected as the most representative VOC because it has the broadest spatial distribution, higher concentrations, and the lowest cleanup goal. Other detected VOCs are less prevalent with smaller spatial distributions. The spatial distribution of benzene is shown on Figure 4-5. A comparison of Figure 4-5 with Figure 4-1 shows that the extent of benzene contamination in soil is less than diesel, but the two “hot spot” areas (truck loading area/slop tank/water tank and AST 80008) are consistent. Note that the EVS model does not show any soil contamination in SFPP’s southern and southeast areas because there were no soil data available from those areas and were not included in soil database for model. Figures 2-3 and 3-4 show there are ample data to delineate contamination on DLA Energy’s area of responsibility.

In the truck loading area, benzene contamination in soil is limited to near surface soil and again near the water table, as shown on the profile view from a southeast perspective on Figure 4-6. In the vicinity of AST 80008, a larger benzene plume occurs from about 15 feet below the ground surface to the water table, as shown on profile Figure 4-6 from the southeast (at the geologic cross-section intersection) and Figure 4-7 from the northeast.

Two smaller benzene plumes in soil are located on the west side of the former storage tank area (Figure 4-5). Both of these plumes have limited horizontal and vertical extent, as shown on Figure 4-8, from a southwest perspective.

4.2 SOIL VAPOR CONDITIONS

This section presents the soil gas investigations, vapor monitoring program, and risk assessments.

4.2.1 2006 and 2007 Soil Vapor Investigation

Soil gas investigations were conducted in the north-eastern onsite area and Holifield Park in 2006 and 2007. COPCs were detected in soil gas samples collected from some specific locations; however, human health risk assessments indicated no adverse effects to human health from exposure to air through potential vapor intrusion (Parsons, 2008).

4.2.2 2010 and 2011 Soil Vapor Monitoring Program

Soil vapor monitoring was conducted for five consecutive quarters from December 2010 through December 2011 and semiannual reports were submitted on August 29, 2011 (Parsons, 2011a) and February 13, 2012 (Parsons, 2012b). The two semiannual reports provided the air laboratory data collected at the site for the vapor monitoring program as requested by the RWQCB and also presented the site-specific calculated soil gas screening levels for the detected site compounds.

The soil vapor samples were collected from seven VMPs that border the northern site property boundary (VMP-32 through VMP-38) and three vapor monitoring locations in Holifield Park along the eastern park boundary (VMP-29, VMP-30, and VMP-31), bordering Dolland Elementary School (Figure 4-9). Soil gas was sampled from each vapor monitoring location at two depths, 5 and 15 feet bgs. Therefore during each quarter, 20 VMPs were purged and sampled.

Table 4-2 presents a summary of the VOCs laboratory analytical results for those chemicals that were detected above the laboratory reporting limit for the five quarterly events. All other chemicals were below the laboratory reporting limit. Specifically looking at the third and fourth quarters 2011, there were 23 compounds detected at low concentrations above their laboratory reporting limit. The VOC detected at the highest concentration was isobutane at 0.45 µg/L in VMP-31 at 15 feet bgs from the fourth quarter 2011. Benzene was not detected during the third and fourth quarters 2011.

Table 4-3 presents a summary of the laboratory fixed gases results for carbon dioxide, carbon monoxide, methane, nitrogen, oxygen plus argon, and total gaseous nonmethane organics. During the third and fourth quarters 2011, methane was detected at one probe, VMP-32 at 5 feet bgs (16 parts per million [ppm]) and at the field blanks.

Concentrations of detected VOCs in soil gas from the five consecutive quarters from December 2010 through December 2011 were all well below their respective proposed screening levels. Based on the CalEPA soil gas advisory (CalEPA 2010), the proposed methane screening level is 1,000 ppm. The highest methane detected was 16 ppm which is well below the screening level.

4.3 NATURE AND EXTENT OF LNAPL

This section presents LNAPL delineation and characteristics, including transmissivity and recoverability.

4.3.1 LNAPL Delineation

Scientific research has demonstrated that, when released to the ground, LNAPL exists as the Vertical Equilibrium Model; in which, saturation and migration potential are a function of the capillary pressure curve of the geologic formation and LNAPL properties (ITRC, 2010). Therefore, within the context of LNAPL delineation, it should be understood that there is a gradation of saturation of LNAPL (both vertically and horizontally) and LNAPL delineation includes varying degrees of LNAPL saturation. In areas of low to moderate saturation, the LNAPL is residual and does not migrate. In areas of high saturation, LNAPL may accumulate in wells, or potentially migrate. However, accumulation of LNAPL in monitoring wells cannot unequivocally indentify LNAPL migration.

Site investigation data to date (such as CPT, UVOST, soil samples, and groundwater samples), have been integrated for the purpose LNAPL delineation (including both free and residual). Figure 3-4 demonstrates the horizontal extent of the LNAPL at the site, and is consistent with other LNAPL delineation efforts (Parsons 2011b, Parsons 2012c, CH2MHILL, 2013). There are two main areas where LNAPL exists: one in the south central section of the site related to the former truck loading area (as well as offsite sources), and another in the central and eastern section of the site. Additionally there are two smaller areas where LNAPL was identified: towards the western central and north-west area of the site.

UVOST borings provide detailed account of LNAPL occurrence at various locations at the site and provide details of percent saturation with depth (Parsons 2011b). Most LNAPL identified at the site is limited to near the water table, with the exception of shallow soils where the LNAPL was released. The vertical extent of the LNAPL impacted areas varies from several feet above the water table to approximately 2 feet below the water table. In associated CSM figures, the LNAPL thickness is based on actual depth to product and water measurements from May 2013, as explained above in Section 4.0. Site investigation data including UVOST supports this assumption.

4.3.2 LNAPL Chemical and Physical Properties

Samples of LNAPL were collected at MW-9 and GMW-4 in 2007 and analyzed for VOC constituents (See Appendix A). Chemical results from MW-9 and GMW-4 are indicative of a low boiling point petroleum distillate such as JP-4, or a mixture of gasoline condensate, JP-4 and a middle distillate such as kerosene, Jet A or JP-5. These results agree with soil and groundwater concentrations.

Physical properties of LNAPL were collected at GMW-62 in 2011 and 2013 (see Appendix A). The NAPL from GMW-62 was approximately 0.77 g/cc and the viscosity varied from 0.607 centipoise to 0.876 centipoise (both at 80 degree Fahrenheit).

4.3.3 LNAPL Body Stability and Declining Percent Saturation

LNAPL stability at the site has been maintained through geological integrity of the soils and large scale LNAPL recovery systems. Site observations indentifying LNAPL stability include:

- Significant reduction in observed in-well LNAPL attributable to recovery systems;
- Lack of new wells with sustained LNAPL observations;
- LNAPL recovery system reduction over time;
- Groundwater plume retraction; and
- Groundwater concentrations over time.

LNAPL gauging has been conducted on a routine basis (semiannual or more frequent) throughout the site since approximately the mid-1990s. Gauging measurements are provided on Figures 4-10 and 4-11, and demonstrate that there has been a significant reduction in product in-well thickness due to the LNAPL recovery systems, and natural degradation of the LNAPL. The in-well thicknesses at numerous wells (both the north-central / northeastern portion of the site and wells in the south-central truck depot area) have decreased from consistently above 2-3 feet (with locations up to as thick as 16 feet) to very low thickness ranging less than 0.2 feet. While the figures show recent increases of in-well thickness, these are likely attributable to the long term decreasing water levels and the recent re-initiation of LNAPL recovery efforts (now conducted manually at specified locations). These recent changes in pore pressure have likely freed LNAPL that was previously suspended under static conditions. These thicknesses will likely depreciate quickly during the intermittent manual extraction. These significant long-term decreases of LNAPL gauging observations are direct evidence of stable LNAPL body and declining percent saturation (ASTM, 2006).

Recent groundwater and LNAPL gauging observations indicated there are relatively few locations where LNAPL currently accumulates in monitoring wells. Furthermore there are no wells where LNAPL is observed consistently in recent events where it was not observed in the past. LNAPL was observed in 12 of the 192 wells measured during the second 2012 semiannual monitoring event, and apparent free product thicknesses ranged from 0.01 foot (TF-22) to 1.02 feet (MW-15). At 6 of these twelve locations the product thickness was less than 0.1 feet. Historical data indicate the second 2012 semiannual monitoring event generally represents current conditions at the site. By comparison, LNAPL has been observed in approximately 73 locations (excluding the southeastern 24-inch block valve area) during pre-2004 events. The lack of new wells with observed LNAPL and the large decrease in wells with LNAPL indicates that the LNAPL body is stable and declining in saturated thickness (ASTM, 2006).

Well recovery data from the former active recovery system provides supporting information regarding the conclusion that the LNAPL body is stable (Parsons 2011b). The site remedy included a formally active LNAPL recovery system which operated from 1996 to 2003. This system was discontinued in 2005 as the system was no longer effective of removing LNAPL. This is likely due to the total amount of LNAPL recovered as well as weathering. Currently there are four locations where LNAPL is extracted via vacuum extraction on a routine basis, approximately once every three weeks. Based on 2013 extraction data the current extraction rate from the four wells is conservatively less than 20 gallons per day, meanwhile the total extraction of LNAPL systems is greater than 50,000 gallons. This equates to a conservative rate of less than 0.04% of the total extraction.

The groundwater concentrations over time indicate a retracting plume, which is likely due to groundwater recovery and natural attenuation (Parsons 2011b and 2012c). A stable or retracting plume indicates a stable LNAPL body (ASTM, 2006).

In addition to the above observations, there are active groundwater extraction systems onsite continuously containing groundwater from various impacted areas at the site. These extraction systems create an inward hydraulic gradient to the site (Figure 3-5). Therefore, if any mobile LNAPL were present at the site, the mobile LNAPL would likely migrate to the extraction wells and remain controlled.

4.3.4 LNAPL Recoverability

4.3.4.1 Extent of Residual and Mobile LNAPL and Magnitude of LNAPL Mobility

The site remedy includes a formally active LNAPL recovery system which operated from 1996 to 2003. This system was discontinued in 2005 as the system was no longer effective of removing LNAPL likely due to the amount recovered and reduction of recovery rates due to weathering. As mentioned above, the recoverability has been demonstrated as very low by the past active and current intermittent extraction systems.

Transmissivity estimates confirm that the recoverably is low (see transmissivity section below).

4.3.4.2 LNAPL Transmissivity Estimate

Transmissivity was calculated by baildown test methods described in ASTM E2856-11 as part of the LCSM development (as referenced in ASTM E2531-061 rev 2009). The data were analyzed using the American Petroleum Institute (API) LNAPL transmissivity workbook with the accompanying Microsoft Excel™ spreadsheets. Although a quantification of the data was attempted, the results of the transmissivity calculation provided herein should be considered qualitative due to LNAPL character at the site (i.e. slow recovery time and complexities of conforming to the test requirements). Furthermore, Batu 2011 discusses certain difficulties with applying slug test methods to LNAPL baildown test data, as given in Huntley 2000. Transmissivity is one component of a multifaceted approach to describing LNAPL risk and remedial strategies. Therefore, although the results are imperfect, they support the overall CSM.

Previously (Parsons, 2012c) a baildown test was conducted at GMW-62 in order to estimate LNAPL transmissivity. Results from this previously reported baildown test indicated that LNAPL transmissivity analysis was impractical due to in-well thickness and recovery rates which were below the threshold needed for analysis. For example, the product thickness immediately recovered 0.02 feet (0.24-inches) and remained that thickness for the first hour, which is a nearly unmeasureable. Over the next five days, the product thickness increased to a maximum thickness of 0.04 feet before decreasing to a thickness of 0.01 feet (Parsons, 2012c).

Due to the lack of usable recovery data from the previous test, an additional baildown test was performed at GMW-62. Appendix A provides the field data of water elevations and product thickness before and during the test. The LNAPL recovery data were analyzed with API baildown spreadsheets. Appendix A provides the tabulated data and API spreadsheet printouts. Results from the GMW-62 test indicate that the transmissivity is low, at approximately 0.1 ft^2/day.

Transmissivity values are used to access recoverability as part of the CSM. For context, Beckett and Lundegard (1997) suggest transmissivity of less than 0.014 ft^2/day is unrecoverable, meanwhile ITRC technical guidance suggests a range of 0.1 to 0.8 ft^2/day for recoverability. The transmissivity value of 0.1 ft^2/day from GMW-62 indicates that the LNAPL is near the range of non-recoverable. This is further supported by the recovery methods currently and the previous operation of a large scale multi-phased recovery system, which was shut down in 2003 due to low recovery rates.

4.4 DISSOLVED-PHASE CONDITIONS

The COPCs for groundwater beneath the site include TPH and several VOCs including BTEX compounds, MTBE, TBA, and 1,2-DCA. Concentrations of TPH as diesel and benzene were utilized as representative of the extents of contamination for the groundwater conceptual site model of dissolved-phase COPCs. The extents of these other constituents are delineated in each groundwater monitoring report submitted to RWQCB semiannually. Groundwater samples from 100 monitoring wells, collected during April 2013, were used for this CSM evaluation of current conditions that may require remedial activities. Table 4-4 provides details of the depths and screen intervals of the wells sampled and utilized for this report. Depths to groundwater and product thickness measurements are summarized in Table 4-5; and groundwater analytical results used for this CSM are summarized in Table 4-6.

4.4.1 Total Petroleum Hydrocarbons

Figure 4.1 shows the lateral extents of TPH as diesel, as interpreted by the EVS modeling software, based on the April 2013 sampling results. Two large plume areas are closely associated with overlying soil contamination source areas.

The plan view image shown on Figure 4-1 shows an underlying contaminated groundwater plume in the vicinity of the truck loading stand and slop tank areas. Only the outer (blue) shell is visible in the profile view shown on Figure 4-2, but the higher concentration core of this plume is visible below the LNAPL layer shown on Figure 4-1. The profile view on Figure 4-2 shows that the groundwater plume is associated with coarser grained (higher permeability) sandy lithologic units. The southern-most groundwater hot spot is associated with the SFPP operations, for which no soil analytical results were included for this CSM.

Figure 4-1 also indicates several hot spots (purple) within a large TPH as diesel groundwater plume in the former AST area, with the primary focus in the AST 80008 containment cell. Figure 4-1 also shows that there is overlying soil contamination (brown) and LNAPL (green) associated with this plume. These groundwater hot spots are not visible in the profile views shown on Figures 4-2 through 4-4 because of the masking by the outer shell of the plume.

A smaller groundwater TPH as diesel plume emanates from AST 80006 (Figure 4-1). Figure 4-4 shows that there is surface soil contamination at this location, but that contamination does not go deeper, and there is no LNAPL associated with this plume.

4.4.2 Benzene

Two major areas with dissolved-phase benzene exceeding its MCL are indicated on Figure 4-5. The large southern plume is primarily associated with operations on the SFPP lease, but extends northward (downgradient) to the vicinity of the truck loading and slop tank areas. Figure 4-6 shows that there is some near surface and deep benzene contamination in the overlying soil in the truck fill stand area, and a thin LNAPL layer is also indicated on Figures 4-5 and 4-6.

A groundwater benzene plume in the AST 80008 area (Figure 4-5) has a smaller aerial extent than the TPH as diesel plume in this area. The highest benzene concentrations in this plume are located in the cell east of former AST 80008 (Figure 4-5). Although there is no overlying surface soil contamination over this hot spot (Figures 4-6 and 4-7), there is deeper soil contamination and LNAPL present at the water table (Figure 4-7).

Two small dissolved-phase plumes are situated in the western portion of the former AST area, as shown on Figure 4-5. These two groundwater plumes do not have overlying benzene contaminated soil (Figures 4-5 and 4-8).

4.5 EXPOSURE EVALUATION

This section presents exposure pathways that describe migration pathways, exposure routes and possible current and future exposure scenarios.

4.5.1 Migration Path Descriptions

A CSM block diagram is shown on Figure 3-6. The profile illustrates two probable source areas where contaminants have been released to the environment. A leaking AST is shown on the left and a surface spill at the truck loading racks is depicted on the right. These releases of petroleum products into the environment have allowed contaminants to infiltrate through the vadose (unsaturated) soil and percolate downward to the water table. Downward migration of the contaminants is interrupted at the water table and, because petroleum is lighter than water, it begins to accumulate as LNAPLs in pore spaces at the water table. Some of the constituents in the petroleum slowly begin to dissolve (partition) into the groundwater and are subsequently transported northward with the groundwater flow. The dissolved contaminant plumes are believed to be slowly migrating northwest due to the fine grained nature of the aquifer and low hydraulic gradient (0.001 ft/ft).

Figure 3-6 also shows that the dissolved contaminants may continue to migrate downward through the Bellflower Aquatard and into the underlying Exposition Aquifer. To date, no contamination has been detected in the Exposition Aquifer.

As the groundwater continues to migrate downgradient, some of the constituents will volatilize and rise back up through the vadose zone and are released at the surface into either the ambient air or into overlying buildings. A diagram showing the various migration pathways to potential receptors is shown on Figure 4-12.

4.5.2 Receptor Indentification and Discussion

This section identifies environmental receptors currently or potentially exposed to site contaminants. This includes humans and the environmental receptors that are in direct contact with the source of contamination, potentially present along the migration pathways, or located in the vicinity of the site.

Risk assessments are conducted to analyze the potential for adverse human health effects or adverse effects to ecological receptors and habitats caused by the COPC to determine the need for remedial action.

4.5.2.1 Human Receptors

The DFSP Norwalk Facility is a 50-acre facility previously occupied by 12 inactive aboveground fuel storage tanks, a truck loading area, and associated piping and facilities. The facility has been decommissioned since 2001 and is no longer used to handle fuel. While the DFSP Norwalk facility is no longer operational, the SFPP leased area contains active 24-inch diameter pipeline. SFPP currently has workers maintaining their pipeline and remediation systems. There are also environmental contractor’s onsite performing remediation activities at the DFSP Norwalk facility.

Neither the SFPP staff nor environmental contractors working at the DFSP Norwalk facility are at the site on a full time basis. However, the DFSP Norwalk facility currently has a full-time security guard. Thus, under current conditions, the only human receptors at the site are industrial workers. Additionally, trespassers may occasionally visit the site. However, it should be noted that trespasser exposures are considerably lower than industrial workers and, therefore, trespasser exposures are generally not evaluated.

In the future, the site will be redeveloped into commercial and light industrial areas and the park to the east of the site will be expanded to cover part of the eastern portion of the site. Thus, future human receptors at the site include construction workers (i.e., to redevelop the site), commercial/industrial workers, and park visitors.

As shown in Figures 4-1 and 4-5, there is some contamination in surficial soils at the site. Thus, under present conditions, human receptors at the site could be exposed to contaminants in soils via direct contact; i.e., incidental ingestion, dermal contact, and the inhalation of dusts. Additionally, some of the contaminants in both soils and groundwater are volatiles. These volatiles can migrate upwards through the soil column until, eventually, they are released into either outdoor air or into overlying buildings. Human receptors at the site may then breathe in those volatiles.

As shown in Figures 1-1 and 2-1, there are residential areas on the northern, western, and southern property boundaries. To the east, the site is bordered by Holifield Park. Dolland Elementary School is located to the east of Holifield Park and is approximately 500 feet from the eastern fence line of the facility. Volatiles in groundwater and soils at the site may be emitted to outdoor air which then may migrate to the park, school, and nearby residences, where the receptors there may be exposed. The nonvolatile contaminates in surface soils at the site may also be picked up by the wind and carried to the adjacent properties in the wind. However, the amount of exposure to volatiles and dusts in outdoor air is generally expected to be relatively minor. The northeastern groundwater plume at the site has migrated offsite to the east underneath Holifield Park. There, the contaminants may migrate upwards and be released to ambient air in the park where the park users may be exposed via inhalation. Volatiles in subsurface contamination may also migrate off-site and be released to indoor air of off-site structures.

Since there are no land use covenants or deed restrictions at the site, groundwater may be used as a drinking water source. Therefore, human receptors may also be exposed via the potable uses of water; i.e., drinking water ingestion, dermal contact during showering/bathing, and inhalation of volatiles emitted during showering or other domestic uses of water.

There is no surface water at the site. Further, the nearest surface water bodies are San Gabriel River, located approximately 2 miles west of the site, and North Fork Coyote Creek, located approximately 3 miles to the east of the site. Based on these distances, surface water is not considered a current or future exposure medium for current and future receptors.

In summary, the following human receptors may be exposed to the COPCs in soil and groundwater (either directly or indirectly via environmental transport):

- Current onsite receptors (trespassers and workers);
- Current and future offsite receptors (residents, park users, and school students and staff); and
- Future onsite receptors (construction workers and industrial workers).

These receptors and exposure pathways are summarized in Figure 4-12.

4.5.2.2 Ecological Receptors

At present, the site is undeveloped and consists of almost entirely unvegetated dirt. The site will be redeveloped in the future and the property is zoned for commercial, light industrial, and park expansion. For the commercial and industrial zones, there will be no ecological receptors, as the area will consist of buildings and parking lots. The park will be maintained by the City of Norwalk and, as such, does not represent suitable habitat for wildlife species. Therefore, under both current and future conditions, there will be no ecological receptors at the site and an ecological risk assessment is not warranted.

5. REMEDIATION OBJECTIVES, GOALS, AND PERFORMANCE METRICS

This section identifies the project remediation objectives, goals, and performance metrics. This is the first step in the decision framework for identifying the appropriate remedial action for the site, based on the ASTM Standard Guide and ITRC guidance document for evaluating LNAPL remediation technologies to achieve project goals (Screening Step 1 in Figure 1-2). A discussion of media-specific cleanup levels is also provided below.

5.1 CONCERNS AND REMEDIATION OBJECTIVES

The concerns that are associated with the LNAPL, adsorbed- and gas-phases in the vadose zone, and dissolved-phase in groundwater present at the site and the remediation objectives developed to address these concerns are provided in Table 5-1.

5.2 REMEDIATION GOALS AND METRICS

The remediation goals specify the condition or endpoint to be achieved to satisfy the remediation objectives for the site. Performance metrics are measureable characteristics that relate to the remedial progress of a technology in abating the concern. The performance metrics used to demonstrate progress toward and achievement of the LNAPL, vadose zone, and groundwater remediation goals are dependent on the technology used. A summary of the remediation goals and metrics are provided in Table 5-1.

5.3 CLEANUP LEVELS

This section summarizes the cleanup levels for soil, soil vapor, and groundwater at the site.

5.3.1 Soil

Soil cleanup goals (SCGs) were calculated for the site according to the methods provided in the RWQCB Interim Site Assessment and Cleanup Guidebook (Guidebook) (RWQCB, 1996). SCGs were calculated for TPH, BTEX compounds, and other detected VOCs from Parsons' soil investigations at the site. TPH and BTEX cleanup goals were calculated based on the values provided in Table 4-1 of the Guidebook, Maximum Soil Screening Levels for TPH and BTEX above Drinking Water Aquifers. Cleanup goals for other VOCs detected in soil were calculated based on established Maximum Contaminant Levels (MCLs) and attenuation factors provided in Table 5-1 of the Guidebook, *Average Attenuation Factor for Different Distance above Groundwater and Lithology*. For other VOCs without MCLs, SCGs were established using a hierarchy of groundwater objectives, as outlined in comments provided by the RWQCB. Calculations were based primarily on average lithologic types and thicknesses between the sampling depths and the underlying groundwater.

RWQCB approved site-specific SCGs for the DFSP Norwalk site as shown in Table 5-2. Parsons provided the SCG calculations and assumptions for the final approved SCGs. The SCGs were calculated using the procedures proscribed in the Interim Site Assessment & Cleanup Guidebook (RWQCB, 1996), and are site specific goals calculated to be protective of leaching to groundwater pathway. The SCGs are calculated by multiplying an attenuation factor by a water quality standard. The attenuation factor is calculated by using a soil to groundwater leaching model which takes into consideration the physical properties of the site specific soil types, physical properties of the chemicals, the average infiltration rates through the site specific lithology, and the distance to groundwater. SCGs were calculated in five foot intervals and are based on depths to groundwater of 25.5 feet, 21 feet, 16 feet, 11 feet, 6 feet, and 1 foot.

5.3.2 Soil Vapor

Soil vapor cleanup levels have not been established for the site. Soil vapor results thus far have been compared to California Human Health Screening Levels (CHHSLs), under commercial scenarios, using indoor air attenuation factors derived from DTSC's most current guidance as shown in Table 5-3. Soil gas screening levels have been calculated for each compound at 5 feet bgs and 15 feet bgs as shown on the table. Soil gas VOC data collected at the site was directly compared to the proposed commercial worker screening levels. Under most circumstances, chemicals in soil or soil gas at concentrations below screening levels can be assumed to pose an acceptable risk to people who may work at the site. The presence of chemicals at concentrations in excess of screening levels does not necessarily indicate that adverse impacts to human health are occurring but indicates that a potential for adverse risk may exist and that additional evaluation is warranted.

5.3.3 Groundwater

Cleanup goals for groundwater constituents have not been established for the site. For the purpose of this CSM, the assumed water quality cleanup goals were the most conservative of the values from the:

1) California Drinking Water MCLs;
2) California drinking water notification levels; and
3) US EPA Tapwater Regional Screening Levels.

These presumed groundwater cleanup levels were used because they were used as the basis for developing the SCGs and are estimated to be conservative values.

6. TECHNOLOGY SCREENING AND SELECTION OF ALTERNATIVE REMEDY

This section evaluates the effectiveness of the existing remediation system at achieving the project remediation objectives, goals, and performance metrics identified in Section 5.

This section also identifies and screens remedial technologies provided in ITRC guidance documents for evaluating LNAPL, dissolved-phase, and insitu chemical oxidation remediation technologies to achieve project goals; and selects LNAPL remediation technologies for an alternate interim remedy that best meets the project remediation objectives, goals, and performance metrics identified in Section 5. The feasibility of each potential technology was evaluated during the screening process.

6.1 EVALUATION OF CURRENT REMEDIATION SYSTEM

The objectives of the existing remediation system are to contain and control the migration of hydrocarbon constituents in groundwater and soil vapor, and to remove hydrocarbon mass from soil and groundwater.

DLA Energy currently operates remediation systems consisting of SVE, GWE, and treatment of extracted soil vapors and groundwater to address the entire former tank farm, the former water tank, former truck fueling, and pump house areas.

The GWE system consists of five vertical extraction wells (including one 4-inch and four 6-inch diameter wells). The groundwater treatment system includes process units in the following order: a 2,000 gallon surge tank, three bag filter vessels, two MYCELX vessels, three granular activated carbon (GAC) vessels, and two ion exchange vessels. Four wells (GW-2, GW-13, GW-15, and GW-16) are currently in operation and extracting groundwater for treatment at the site. The groundwater is treated and discharged in accordance with the NPDES permit No. CAG994004, CI No. 7585.

In general, the GWE wells have been in operation since 1996. Improvements, including the installation and extraction from additional wells, have been conducted over time to improve the effectiveness of the system at removing LNAPL, dissolved-phase mass, and vapor-phase mass from the subsurface.

With reference to Figure 6-1, approximately 430,000 equivalent gallons of TPH have been removed by the SVE and GWE systems since 1996. The cumulative mass removed by SVE does not include the mass removed by biodegradation. As shown in Figure 6-1, mass recovery by the SVE and GWE systems have become asymptotic or “flat lined” since approximately 2008.

Since 1996, approximately 66 million gallons of groundwater have been extracted from the GWE wells; and about 1,400 gallons of free product have been recovered from the GWE and TFE wells. System operations data indicate that dissolved phase and free product recovery rates have decreased to extremely low levels and have become asymptotic. From the dissolved phase alone, only about 0.125 pounds of TPH product have been removed in the past two years. The decrease in the product extraction rate appears to correspond to the significant decreases in the extent and thickness of LNAPL at the site and the decrease in transmissivity. Free product recovery was substantial when recovery operations first commenced in the mid-1990s through early 2000. From about 2008, product recovery has been negligible, indicating that transmissivity is reduced and the LNAPL is at or near residual saturation and can no longer be recovered effectively using the current removal and treatment system.

Performance data indicate that continued operation of the existing SVE and GWE systems will not achieve the remediation objectives, goals, or performance metrics outlined in Section 5.

6.2 IDENTIFICATION OF POTENTIALLY APPLICABLE TECHNOLOGIES

The remediation technologies identified in the referenced guidance documents were screened and evaluated relative to meeting the remedial objectives, goals, and performance metrics described in Section 5. The technologies are listed and described in Table 6-1. LNAPL skimming, dual pump liquid extraction (DPLE), multi-phase extraction with SVE, water flooding, surfactant-enhanced subsurface remediation, co-solvent flushing, steam hot-air injection, radio frequency heating, and electrical resistance heating were immediately screened out relative to the site objectives and goals. Note that radio frequency heating and electrical resistance heating (three- and six-phase) were also screened out due not only to their lesser inefficiencies with the coarser-grained lithology present beneath the site, but also due to their elevated capital and operational costs.

The potentially applicable technologies retained for achieving project goals are presented in Table 6-2.

6.3 TECHNOLOGY SCREENING

For the initial screening, each technology was evaluated based on effectiveness, relative cost, implementability, and third-party impacts. A brief description of each technology, its respective advantages and disadvantages, and the results of the screening evaluation are summarized in Table 6-2. A discussion of the results is presented below.

6.3.1 Physical Liquids Recovery

Of the remediation technologies provided in ITRC guidance documents, several mass recovery (that is, physical liquids removal) technologies were considered to achieve project remediation goals. These include DPLE, multiphase extraction using single or dual pumps, bioslurping/enhanced fluid recovery, and LNAPL skimming. These technologies generally include the use of one or two pumps to remove mobile LNAPL and/or groundwater. Multiphase extraction and enhanced fluid recovery can also employ the use of vapor extraction to enhance mass recovery in the unsaturated zone. These technologies address mobile LNAPL but not residual LNAPL. Capital cost is relatively low, but the cost for treatment and discharge of treated groundwater is high. Time to achieve project goals is very long since these technologies do not address residual LNAPL, which can serve as a source for dissolved-phase constituents for many years.

DLA Energy is currently implementing SVE removal and gas-phase GAC treatment along with GWE and associated groundwater treatment as described previously. The systems have essentially been operational since the mid-1990s and were successful in reducing LNAPL, dissolved phase vadose zone TPH concentrations and containment of the groundwater TPH dissolved phase. LNAPL is essentially at residual saturation as indicated by asymptotic mass removal data. Continuation of operations with these technologies would be high in cost and would not sufficiently meet cleanup goals in the next three to five years as is targeted by DLA Energy.

The above mass recovery technologies were not retained as potential interim remedies to achieve remediation project goals. Continued operation of DLA Energy’s SVE and GWE systems will be contingent on the effectiveness of the selected remedy and whether it can be used in parallel to enhance mass removal or contain vapor- or dissolved-phase migration of constituents.

6.3.2 Water Flooding

Water flooding was also considered as a mass recovery technology to achieve project goals. Water flooding involves groundwater recirculation in a combined injection/extraction well configuration, where groundwater flow is directed through the LNAPL zone to increase the hydraulic gradient and enhance LNAPL flow, displacement, and removal. The mobilized LNAPL is recovered via hydraulic recovery. Hot water also may be injected to reduce interfacial tension and viscosity of the LNAPL to further enhance LNAPL removal by hydraulic recovery. Water flooding has the potential for a short timeframe to achieve project goals; however, this technology was not retained due to high capital and energy costs, and potential vapor intrusion to nearby residents. Water flooding would probably also not be effective due to the fine grained and lenticular nature of the aquifer strata, yielding low hydraulic conductivity and resulting in poor sweep efficiency. The residual TPH is most likely in the finer grained stratigraphic units, which would be bypassed by flooding.

6.3.3 Surfactant Enhanced Subsurface Remediation (SESR)

SESR involves the use of injection wells to deliver a surfactant solution to the LNAPL smear zone while extraction wells capture mobilized/solubilized LNAPL. SESR enhances LNAPL mobility and recovery by significantly reducing LNAPL/water interfacial tension; it can potentially have a short to moderate timeframe to achieve project goals. Project costs would be moderate to high due to injectate and treatment system costs. This technology was screened out, however, primarily due to its limited success rate and access restrictions.

Injection well coverage may not be adequate, and access for additional well construction would be limited. A waste discharge requirement (WDR) permit, possible UIC registration, and a modification to the existing NPDES permit also may be required. SESR was not retained as a potential interim remedy to meet project objectives.

6.3.4 Steam/Hot Air Injection

Steam/hot air injection (or thermal remediation) removes LNAPL and the dissolved phase by forcing steam into the aquifer to vaporize, solubilize, and induct LNAPL flow. The mobilized LNAPL and dissolved phase is recovered from extraction wells, and volatilized LNAPL is collected via vapor extraction wells. The timeframe to achieve project goals can be very short and this technology treats both mobile and residual LNAPL. Disadvantages to this technology would be very high capital and energy costs associated with the new and existing treatment systems. Potential vapor intrusion, extensive process controls, and safety issues associated with the system operation would be problematic. Therefore, this technology was not retained as a potential interim remedy.

6.3.5 Co-Solvent Flushing

Co-solvent flushing involves the use of injection wells to add a solvent to the aquifer that increases LNAPL solubilization and LNAPL mobility. The dissolved-phase and mobile LNAPL are then recovered by means of hydraulic recovery. This technology was not retained as an interim remedy due to the reasons cited above for SESR. Co-solvent flushing has had a limited success at other similar sites, and the use of a solvent would also further complicate permitting and waste management under this remedy.

6.3.6 Air Sparging (AS)/SVE and Biosparging

AS technology involves the injection of ambient air or other gases (for example, oxygen) into groundwater, typically beneath the smear zone, to increase dissolved oxygen levels that enhance naturally occurring biodegradation of hydrocarbon constituents. The air injection also may volatilize some LNAPL constituents that migrate upward through the vadose zone. Volatilized constituents can then be captured using SVE wells and the vapors treated using aboveground technologies (for example, thermal or catalytic oxidizers).

SVE can also increase the oxygen content of the unsaturated zone, which enhances aerobic respiration of heavier-phase LNAPLs. Heterogeneity within the subsurface may result in preferential pathways that prevent injected air from contacting contaminated areas. More shallow SVE systems, such as the DFSP Norwalk site, also operate more favorably and efficiently at in conjunction with a cap system, a naturally impermeable surficial soil layer, or the equivalent; otherwise ambient air tends to diffuse more immediately from the soil surface which “short circuits” and leads to a more direct pathway to SVE well screened sections. These factors affect the number and spacing of AS wells, flow rates, and length of time required for treatment. AS also has the potential to cause lateral spread of dissolved- or separate-phase contaminant plumes. For example, in formations of laterally oriented clays interbedded with sand, there is a possibility of spreading the contamination when using AS.

Biosparging, a form of AS, generally utilizes the same principles as traditional AS but at a lower and/or “pulsed” air injection rate. In addition, the primary mechanism for reducing residual LNAPL is through enhanced biodegradation rather than stripping or volatilization of constituents. The decreased delivery rate of air reduces the potential for “off-gassing” (upward migration of volatilized constituents), which could cause vapor intrusion issues beneath nearby buildings or residential homes.

AS/SVE is effective on only the volatile fraction of the LNAPL. AS/SVE performed on an LNAPL or dissolved phase with a small volatile fraction (e.g., jet fuel or a strongly weathered gasoline) does not result in significant volatile mass removal, but may contribute to aerobic biodegradation as briefly presented above. Because the site does not have an impermeable cap layer or equivalent, AS/SVE has a high tendency to short circuit. In addition, USEPA suggests AS not be used if free product exists (i.e., free product must be removed prior to AS), which may increase potential for inducing migration of constituents. AS is highly dependent not only on the soil type, but the volatility of the TPH. Heavier TPH, such as TPH as diesel and jet fuel require more time to remediate – typically greater than five years.

Based on the *CSM and Proposed Alternate Interim Remedy for Soil, Groundwater, and LNAPL* report (CH2M HILL, 2013), it is understood that a pilot study may be conducted on the SFPP site and that this information would be shared with DLA Energy. DLA Energy wishes to evaluate the results and effectiveness of the pilot study and applicability to the site. Therefore, air and biosparge technology with SVE was retained as a potential interim remedy to meet project objectives.

6.3.7 In Situ Chemical Oxidation (ISCO)

ISCO is a technology in which an oxidant, and other amendments as necessary, is introduced into contaminated media to react with hydrocarbon constituents, converting them to innocuous products such as carbon dioxide and water. The oxidant must be matched to the site conditions and the project goals. Effective oxidant delivery and contact with the target treatment media as well as delivery of an adequately aggressive and stoichiometrically correct oxidant dose are requisites for effective ISCO application. Typical oxidants that have been used to treat hydrocarbon-impacted media include hydrogen peroxide, ozone, permanganate, or activated persulfate. All of these compounds react, either directly or through generation of highly reactive free radicals, with organic compounds to break down hydrocarbon bonds and form degradation products such as alcohols, carbon dioxide, and water.

ISCO is a proven technology to treat residual LNAPL and dissolved phases in the vadose zone and groundwater. It should be noted that oxidant costs are typically high. However, the timeframe required to achieve project goals can be very short, i.e., typically less than one year. Additionally, running costs for equipment operations and a support/monitoring team are also reduced.

The typical radius of influence (ROI) for ISCO injections range from 2.5 feet for tight clays to 25 feet in permeable saturated and unsaturated soils. In addition to lithology, the ROI varies based on the oxidant properties, the injection technique, and pressure. Based on a conservatively high coverage of 16 acres for the site (about 1/3 of the total site area) and an estimated average ROI of 20-feet, an estimated 440 to 550 injection (conservatively high) point locations would be potentially needed. Each injection point does not necessarily need to be an injection well. DP injection is often used where the depth to contamination is less than 100 feet and there are no geologic barriers that result in refusal. The advantages of DP injection are that it is easy to move the injection locations during additional treatment events to target specific hot spots. Additionally, injection tools can target 1-foot intervals, ensuring uniform vertical distribution of reagents in the treatment zone. Where injections are required in public streets or through building floors, DP injection can result in less disturbance in daily operations and more advantageous site access conditions. DP injection is very cost effective as compared to the use of more permanent injection wells and can utilize a high-oxidant loading or iterative oxidant loading approach.

Due to the effectiveness of ISCO and its typical short remedial time frame, this technology was retained as a primary remedy to meet project goals.

6.3.8 Natural Source Zone Depletion (NSZD)

NSZD is a combination of processes that acts to physically redistribute LNAPL components to the aqueous or gaseous phase and biologically break down source zone components. These processes include the dissolution of LNAPL constituents into groundwater and, in some cases, volatilization of LNAPL constituents into the vadose zone. In turn, LNAPL constituents dissolved to groundwater and volatilized to the vadose zone can be biodegraded by microbial and/or enzymatic activity. Biodegradation of hydrocarbons in groundwater and the vadose zone is well documented in ITRC's guidance document on NSZD (ITRC, 2009b).

NSZD is likely not a stand-alone technology with current LNAPL saturations/composition and dissolved phase soil and groundwater conditions, but it may be viable as a residual long-term stand-alone technology without the need for hydraulic containment once primary cleanup objectives of the LNAPL, dissolved phase vadose zone, and partial dissolved-phase of the groundwater are addressed.

6.3.8.1 Groundwater

Multiple microorganisms are capable of biodegrading not only hydrocarbon constituents in the dissolved phase, but also with MTBE, TBA, and other oxygenates. Where these microbes are present, natural biodegradation or limited biostimulation, are effective in reducing the concentrations of hydrocarbons in impacted groundwater. Typically, only those sites that have aerobic conditions because of shallow water tables and high rates of groundwater recharge achieve significant natural biodegradation of hydrocarbons. These conditions are present at the site.

In general, hydrocarbon constituents are relatively biodegradable in contrast to oxygenate constituents, which are more resistant to biodegradation. The rate at which biodegradation of hydrocarbons and oxygenates will occur at a site is affected by a number of site conditions, including groundwater chemistry, presence of other contaminants, and number of native microbes capable of degrading constituents of concern. Conditions that will determine what types of microbes may be able to grow and what type of biodegradation pathway may be followed include:

1. If aerobic or anaerobic conditions (i.e., nitrate-reducing, iron-reducing, sulfate-reducing, or methanogenic) are more prominent in the contaminated zone; and
2. The levels or concentrations of other chemical parameters (e.g., pH, alkalinity, and inorganic content) at the site.

Previous groundwater sampling at the site for electron acceptor chemistry data has demonstrated that biodegradation is actively occurring.

6.3.8.2 Vadose Zone

It is understood that previous soil gas sampling has indicated relatively high oxygen and low carbon dioxide and methane content in the upper 15 feet of the vadose zone, which would indicate an aerobic environment. It is likely that aerobic biodegradation of hydrocarbon constituents in soil vapor has been occurring. This is further supported by the lack of measurable hydrocarbons in soil gas samples previously collected in 2012.

NSZD will not be retained as the sole interim remedy primarily due to the very long timeframe required to achieve project goals. However, NSZD could be used to supplement a more aggressive approach, such as ISCO, to further reduce constituent concentrations in impacted media to acceptable cleanup levels.

6.4 SELECTION OF ALTERNATE INTERIM REMEDY

Based on the evaluation of the relative cost, technology effectiveness, typical timeframe required for treatment, implementability, and third-party impacts for each of the potentially applicable screening technologies, ISCO coupled with shallow excavation and in-situ soil mixing of the excavation bottom with chemical oxidant is selected as the suggested remedy approach for achieving project goals.

DLA Energy tentatively plans to conduct a pilot study in the former AST 80008 plume area to evaluate the effectiveness of ISCO using DP injection of activated persulfate with a chelated iron (III) activator as the ISCO agent. It is estimated that an initial 30 to 60 day treatability study would be conducted to determine suggested dosage parameters. Thereafter, pilot testing data would be collected during ISCO injection activities over a period of approximately three to four months. Pilot study test data would be used to support the full ISCO design coupled with excavation followed by in-situ chemical oxidation mixing at the bottom excavation interface for full-scale implementation at the site.

Monitoring along with NSZD testing would be implemented in parallel and series with ISCO activities to demonstrate enhanced mass removal at the site via chemical oxidation and potentially natural biodegradation and other natural attenuation mechanisms. NSZD monitoring also would assist with the evaluation of ISCO effectiveness and potential for off-gassing beneath the residential area.

Only peripheral operation of the current remediation system would continue during pilot testing. The current system would be operated to continue to contain the dissolved phase groundwater plume at the perimeter areas of the site.

As stated in Section 6.3.6 above, the results of the SFPP biosparge pilot study will be evaluated. Based on results, the technology will be evaluated to DLA Energy’s areas of concern for its effectiveness and applicability and if technology will meet project objectives.

7. IMPLEMENTATION PLAN OF PROPOSED REMEDY

This section provides the plan and schedule for implementing the interim remedy - ISCO coupled with shallow excavation and in-situ soil mixing of the excavation bottom with chemical oxidant and initiation of monitoring at the site. Details for implementation of the pilot-scale and full-scale systems are also presented below.

7.1 PERSULFATE OXIDATION SYSTEM

Implementation of the interim remedy would include the installation and testing of a pilot-scale activated persulfate oxidation system in the former AST 80008 area of the site. The pilot test system would include an estimated 12 DP injection points for a total estimated vertical depth of approximately 40 feet bgs each. Existing nearby vadose zone, soil gas, and groundwater monitoring wells would be used for periodic monitoring. Additional monitoring wells may be needed, but would be further assessed during development of the pilot study workplan.

Operation of the existing GWE system would only continue at the east and west portions of the site and operation of the SVE system would cease. Further details would be provided in the workplan as discussed below.

7.1.1 Workplan

A workplan would be prepared and submitted to the RWQCB for review prior to implementation of the pilot system. It would include design and execution details for the activated persulfate application and aboveground appurtenances required for pilot testing. A vadose zone and groundwater monitoring plan would also be included. Common field monitoring parameters and suggested analyte techniques are summarized as follows:

- Contaminants, EPA SW 846 8260B (BTEX);
- Oxidant, field test kit;
- Metals, EPA Method 200.7 (ICP), SM 3120B;
- Major ions (Na, K, Ca, Mg, Fe), EPA Method 200.7 (ICP) SM 3120B;
- Nitrate, sulfate, and chloride, EPA Method 300—ion chromatography;
- Alkalinity, as CaCO, EPA Method 310.1, SM 2320B;
- Oxidation reduction potential (Eh) field measurement, SM 18 ED 2580B;
- pH, hydrogen ion field measurement EPA Method 150.1, 18 ED;
- Temperature, field measurement EPA Method 170.1, 18 ED; and
- Specific conductance, field measurement EPA Method 120.1, 18 ED.

Groundwater samples would additionally be analyzed for VOCs including fuel oxygenates (for example, MTBE and TBA) using EPA Method 8260B, and TPH as gasoline, TPH as diesel, and TPH as jet fuel using EPA Method 8015M.

7.1.2 Schedule

Figure 7-1 presents a draft and tentative conceptual schedule for implementation of the pilot-scale and full-scale ISCO system. This is an approximate schedule and is subject to change based on contractor availability, unforeseen implementation or startup issues, and performance of the system during pilot testing. It also may change based on other site pilot test results, client preference, and/or regulatory concerns or permitting issues.

It is anticipated that the pilot test workplan would be completed mid-first quarter 2014. Site implementation activities would commence after formal approval from the RWQCB, anticipated to be one month following completion and submittal of the workplan. Treatability and subsequent pilot testing activities would commence at the end of the first quarter 2014 and continue for a duration of approximately four months.

7.1.3 Evaluation Report

After sufficient pilot test data have been collected, the data would be compiled into an evaluation report that would include tabulated summaries of chemical oxidant injection quantities, groundwater and soil vapor analytical data, evaluation of results, and recommendations regarding implementation of a full ISCO treatment system for the remainder of the site. The evaluation report is anticipated to be submitted to the RWQCB in mid 2014.

7.2 REMEDY EXPANSION

After it has been determined whether ISCO technology and complete remedy is effective at meeting the remediation goals and performance metrics (based on pilot test results), DLA Energy tentatively plans to expand the treatment methodology to the impacted areas in the remainder of the site, e.g., the truck fill area, the northeastern area, and other selected areas of the site. This would require additional DP injection points both onsite and offsite areas. The proposed layout of the excavation and ISCO expansion system would be included in a design and execution plan provided to the RWQCB prior to implementation. It is anticipated that the design and execution plan would be submitted to the RWQCB in the third quarter of 2014. Subsequent evaluation or progress reports would be submitted to the RWQCB on a quarterly basis, at a minimum, while the system is fully operational.

7.3 MONITORING

Monitoring including NSZD testing and monitoring would be performed to evaluate the potential future use of this technology as a stand-alone remedy once all concerns and objectives are addressed with the fully implemented remedy. This testing and monitoring would include the following, as described in the ITRC (2009b) guidance document:

- **Groundwater Zone Testing:** Collection of groundwater samples from key monitoring wells located upgradient and downgradient of the plume centers.

Samples also would be collected from wells located in the plume centers and plume edges. Samples would be analyzed for parameters as referenced in Section 7.1.1. The frequency of monitoring would be quarterly or potentially semiannual and would likely occur during routine semiannual sampling at the site.

- **Vadose Zone Testing:** Installation and collection of soil vapor samples from multi-depth soil VMPs completed to the top of the water table at or near the source areas (for example, within the plume core, upgradient, or downgradient). Multiple screen intervals may be required in order to establish the soil gas profiles necessary to evaluate oxidation and biodegradation rates in the vadose zone. Soil vapor samples would be analyzed for VOCs using EPA Method 8260 or TO-15, TPH as gasoline using EPA Method TO-3, and fixed gases (carbon dioxide, oxygen, and methane) using ASTM D1946.

Additional details regarding monitoring, NSZD testing, including soil vapor probe construction, would be provided in the pilot test workplan.

8. REFERENCES

American Chemical Society, Environmental Science and Technology. *Proof-of-Concept Study of an Aerobic Vapor Migration Barrier Beneath a Building at a Petroleum Hydrocarbon-Impacted Site. (dx.doi.org/10.1021/es3045532 Environ. Sci. Technol. 2013, 47, pgs. 1977−1984).*

ASTM. 2006. ASTM E2531-06. *Standard Guide for Development of Conceptual Site Models and Remediation Strategies for Light Nonaqueous-Phase Liquids Released to the Subsurface*.

BIOX Process, 2009. *Controlled In-Situ Chemical Oxidation, In-Situ Bioremediation, and Ex-Situ Remediation* (www.bioxtech.com).

California Department of Water Resources (CDWR). 1961. *Planned Utilization of the Groundwater Basins of the Coastal Plains of Los Angeles County*, Groundwater Geology, Appendix A, Bulletin 104.

CH2M HILL. 2013. *Conceptual Site Model and Proposed Alternate Interim Remedy for Soil, Groundwater, and LNAPL, Defense Fuel Support Point Norwalk, California.* September 3.

Falta, Ronald W. 2004. Groundwater Quality: *Securing Groundwater Quality in Urban and Industrial Environments* (Proc. 6th International Groundwater Quality Conference held in Fremantle, Western Australia, December 2007), IAHS Publ. 324, 2008, 164-169; *EDB and 1,2-DCA from Leaded Gasoline May Dominate Health Risk at Underground Storage Tank Sites* and Ground Water Monitoring & Remediation 24, no. 3, Summer 2004, pages 76-87; *The Potential for Ground Water Contamination by the Gasoline Lead Scavengers Ethylene Dibromide and 1,2-Dichloroethane.*

Groundwater Technology Government Service Inc. (GSI). 1995. *Final Remedial Action Plan Report, Defense Fuel Supply Point Tank Farm Area*, Norwalk, California. September 14.

GTI. 1994. *Assessment Report, Tank Farm Area, DFSP*, October 21.

Interstate Technology & Regulatory Council (ITRC). 2009a. *Evaluating LNAPL Remedial Technologies for Achieving Project Goals, LNAPL-2*. Washington, DC. December.

ITRC, 2005, January, 2nd Ed. *Technical and Regulatory Guidance for In Situ Chemical Oxidation of Contaminated Soil and Groundwater*.

ITRC. 2009b. *Evaluating Natural Source Zone Depletion at Sites with LNAPL*. LNAPL-1. Washington, D.C.: Interstate Technology & Regulatory Council, LNAPLs Team. April.

ITRC. 2010. LNAPL Training Part 2: LNAPL Characterization and Recoverability – Improved Analysis, 444 North Capitol Street, NW, Suite 445, Washington, DC 20001.

Parsons. 2004. *Truck Fill Stand Area Soil Vapor Extraction System Installation and Startup Report, DFSP Norwalk*, September 2.

Parsons. 2006a. *Revised Remedial Action Plan Defense Fuel Support Point Norwalk 15306 Norwalk Boulevard, Norwalk, California*. September 7.

Parsons. 2006b. *Eastern Boundary and Eastern Boundary Off-Site Area Soil & Groundwater Preliminary Investigation Report, Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California.* October 9.

Parsons. 2008. *Final Investigation Report for Holifield Park and Dolland Elementary School, Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California.* January 10.

Parsons. 2009. *Draft Conceptual Site Model, Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California (SCP No. 0286A, Site No. 16638).* February 13.

Parsons. 2010. *Groundwater Capture Report, Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California*. June 17.

Parsons. 2011a. *First Semiannual 2011 Soil Vapor Monitoring Report, Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California (SCP No. 0286A, Site ID No. 16638)*. August 29.

Parsons. 2011b. *Investigation Report for LNAPL Characterization and Vapor Monitoring Program, Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California (SCP No. 0286A, Site ID No. 16638)*. January 14.

Parsons. 2012a. *Soil Conceptual Site Model, Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California*. September 4.

Parsons. 2012b. *Second Semiannual 2011 Soil Vapor Monitoring Report, Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California (SCP No. 0286A, Site ID No. 16638)*. February 13.

Parsons. 2012c. *Second Investigation Report for Light Non-Aqueous Phase Liquid (LNAPL) Characterization, Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California (SCP No. 0286A, Site ID No. 16638)*. January 12.

Parsons. 2013a. *Workplan for Light Non-Aqueous Phase Liquid (LNAPL) Conceptual Site Model, Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California (SCP No. 0286A, Site No. 16638).* June 27.

Parsons. 2013b. *Concrete Demolition and Soil Confirmation Sampling Completion Report, Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California.* February 13.

Regional Water Quality Control Board (RWQCB). 2008. *Directive – Development Update of a Conceptual Site Model for Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California (SCP No. 0286A, Site No. 16638)*. November 25.

RWQCB. 1996. *Interim Site Assessment & Cleanup Guidebook.* California Regional Water Quality Control Board, Los Angeles and Ventura Counties, Region 4. May.

RWQCB. 2012. *Comments on the Onsite Soil Management Plan, Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California (SCP No. 0286A, Site No. 16638).* April 10.

RWQCB. 2013a. *Requirements to Provide a Workplan For Light Non-Aqueous Phase Liquid (LNAPL) Conceptual Site Model and Estimation of LNAPL Transmissivity, Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California (SCP No. 0286A, Site No. 16638)*. March 20.

RWQCB. 2013b. *Approval of Workplan for Light Non-Aqueous Phase Liquid (LNAPL) Conceptual Site Model, Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California (SCP No. 0286A, Site No. 16638).* August 7.

TABLES

TABLE 4-1
Summary of Soil Analytical Results (µg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-1	10	65.26	36 [4/]	2400	-- [5/]	0.075	0.095	0.07	8.5
DPT-1	20	55.26	36.5	2400	--	0.08	0.1	0.075	9
DPT-1	25	50.26	34	2400	--	0.1	0.125	0.095	11
DPT-2	15	60.18	25.5	2400	--	0.065	0.08	0.065	7.5
DPT-2	20	55.18	34.5	2400	--	0.075	0.09	0.07	8
DPT-2	25	50.18	33	2400	--	0.075	0.095	0.075	8.5
DPT-3	15	60.30	28.5	2400	--	0.06	0.08	0.06	7
DPT-3	20	55.30	24	2400	--	0.05	0.065	0.05	6
DPT-3	25	50.30	33	2400	--	0.08	0.1	0.08	9
DPT-4	5	70.21	480000	3100000	--	6	7.5	6	700
DPT-4	10	65.21	31.5	15000	--	0.07	0.09	0.07	8
DPT-4	15	60.21	33	2400	--	0.07	0.09	0.07	8
DPT-4	20	55.21	850000	640000	--	5.5	7	5.5	650
DPT-4	25	50.21	11000000	6100000	--	390	7.5	6	700
DPT-5	10	65.27	28.5	2400	--	0.07	0.09	0.07	8
DPT-5	15	60.27	32.5	2400	--	0.075	0.095	0.07	8.5
DPT-5	20	55.27	2000000	2800000	--	5.5	7	5.5	600
DPT-6	15	60.61	34	2400	--	0.075	0.09	0.07	8
DPT-6	20	55.61	3100000	8600000	--	7	9	7	800
DPT-6	25	50.61	1300	2400	--	6	7.5	6	650
DPT-7	15	60.43	26000	15000	--	0.09	0.11	0.085	10
DPT-7	20	55.43	4400000	2000000	--	29.5	37.5	29	3350
DPT-7	25	50.43	16000000	11000000	--	75	90	70	8000
DPT-8	10	65.39	770000	2700000	--	7.5	9.5	7.5	850
DPT-8	15	60.39	870000	2000000	--	7.5	9	7	800
DPT-8	20	55.39	5500	1000000	--	1.5	0.08	0.065	7
DPT-8	25	50.39	460	2400	--	1.1	0.065	0.05	6
DPT-9	10	65.29	1200	2400	--	2	0.07	0.055	6
DPT-9	15	60.29	8200	39000	--	0.075	0.095	0.075	8.5
DPT-9	20	55.29	850000	1200000	--	7	9	7	800
DPT-9	25	50.29	9800000	4300000	--	140	175	135	15500
DPT-10	15	60.82	240000	490000	--	0.075	0.09	0.07	8
DPT-10	20	55.82	2800000	3200000	--	28	35.5	27.5	3200
DPT-10	25	50.82	830000	990000	--	7.5	9.5	7.5	850
DPT-11	15	61.09	34	2400	--	0.05	0.065	0.05	6
DPT-11	20	56.09	1900000	1800000	--	6	7.5	5.5	650
DPT-11	25	51.09	1200	2400	--	1.2	0.075	0.055	6.5
DPT-12	10	66.15	540000	1600000	--	6.5	8.5	6.5	750
DPT-12	15	61.15	3500000	5600000	--	6.5	8	6.5	750
DPT-12	20	56.15	130000	87000	--	1.9	0.065	0.05	6
DPT-12	25	51.15	570	2400	--	0.075	0.095	0.075	8.5
DPT-13	5	72.24	32.5	2400	--	0.075	0.09	0.07	8
DPT-13	10	67.24	25.5	2400	--	1.9	0.075	0.055	6.5
DPT-14	5	72.48	29	2400	--	0.065	0.085	0.065	7.5
DPT-14	10	67.48	27.5	2400	--	0.06	0.08	0.06	7
DPT-15	5	72.13	33.5	2400	--	0.08	0.1	0.075	9
DPT-15	10	67.13	34	2400	--	0.075	0.095	0.07	8.5
DPT-16	5	72.31	30	2400	--	0.065	0.085	0.065	7.5
DPT-16	10	67.31	28.5	2400	--	1.4	0.085	0.065	7.5
DPT-17	5	70.51	14000000	11000000	--	70	85	65	7500
DPT-17	10	65.51	5000000	6800000	--	6.5	8.5	6.5	750
DPT-17	15	60.51	7200000	10000000	--	75	95	75	8500
DPT-17	20	55.51	860	7000	--	3.1	0.08	0.06	7
DPT-17	25	50.51	370000	200000	--	6.5	8	6.5	750
DPT-18	15	60.59	630	2400	--	0.07	0.09	0.07	8

TABLE 4-1
Summary of Soil Analytical Results (µg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-18	20	55.59	160000	23000	--	6	7.5	5.5	650
DPT-19	10	65.61	830000	910000	--	6	7.5	5.5	650
DPT-19	15	60.61	720	2400	--	0.075	0.095	0.07	8.5
DPT-19	20	55.61	450	2400	--	1.2	0.07	0.055	6
DPT-20	25	49.31	1600	2400	--	0.1	0.13	0.125	11
DPT-21	10	64.90	210	12000	--	0.1	0.13	0.125	11
DPT-21	15	59.90	6900	8400	--	0.1	0.13	0.125	11
DPT-21	20	54.90	5100	11000	--	0.1	0.13	0.125	11
DPT-21	25	49.90	210	2400	--	0.1	0.13	0.125	11
DPT-22	20	55.40	210	2400	--	0.1	0.13	0.125	11
DPT-22	25	50.40	970000	1700000	--	36	13	12.5	1100
DPT-23	10	65.27	1200000	2100000	--	10	13	12.5	1100
DPT-23	15	60.27	4000	2400	--	0.1	0.13	0.125	11
DPT-23	20	55.27	210	2400	--	0.1	0.13	0.125	11
DPT-23	25	50.27	3100	6000	--	0.1	0.13	0.125	11
DPT-24	10	65.29	210	2400	--	0.1	0.13	0.125	11
DPT-24	15	60.29	2700000	5200000	--	20	26	24.5	2200
DPT-24	20	55.29	780000	1300000	--	10	13	12.5	1100
DPT-24	25	50.29	70000	74000	--	0.1	0.13	0.125	11
DPT-25	10	65.38	2600000	150000	--	10	13	12.5	1100
DPT-25	15	60.38	2700000	3800000	--	20	26	24.5	2200
DPT-25	20	55.38	680000	720000	--	10	13	12.5	1100
DPT-25	25	50.38	190000	520000	--	10	13	12.5	1100
DPT-27	25	50.64	210	2400	--	0.1	0.13	0.125	11
DPT-28	25	50.78	17000	53000	--	10	13	12.5	1100
DPT-29	20	55.78	1600000	580000	--	10	13	12.5	1100
DPT-29	25	50.78	770000	520000	--	10	13	12.5	1100
DPT-30	15	59.84	840000	1300000	--	10	13	12.5	1100
DPT-30	20	54.84	770000	2900000	--	10	13	12.5	1100
DPT-30	25	49.84	1700000	8000	--	0.1	0.13	0.125	11
DPT-31	12	63.27	210	5200	--	0.1	0.13	0.125	11
DPT-33	25	50.00	1700000	2200000	--	10	13	12.5	1100
DPT-34	20	55.06	650	2400	--	0.1	0.13	0.125	11
DPT-34	25	50.06	8400000	12000000	--	10	13	12.5	1100
DPT-35	15	60.03	570	2400	--	0.1	0.13	0.125	11
DPT-35	20	55.03	6400	14000000	--	0.1	0.13	0.125	11
DPT-35	25	50.03	1400000	2000000	--	10	13	12.5	1100
DPT-36	20	54.66	1100	8800	--	0.1	0.13	0.125	11
DPT-36	25	49.66	900	14000	--	0.1	0.13	0.125	11
DPT-37	15	59.51	210	2400	--	0.1	0.13	0.125	11
DPT-37	20	54.51	520000	440000	--	10	13	12.5	1100
DPT-37	25	49.51	1000	2400	--	0.31	0.13	0.125	11
DPT-38	15	59.52	210	2400	--	0.1	0.13	0.125	11
DPT-38	20	54.52	530	2400	--	0.1	0.13	0.125	11
DPT-38	25	49.52	13000000	11000000	--	45	26	24.5	2200
DPT-39	20	54.57	1700	11000	--	0.1	0.13	0.125	11
DPT-40	20	54.79	210	2400	--	0.1	0.13	0.125	11
DPT-40	25	49.79	670	2400	--	0.1	0.13	0.125	11
DPT-41	0.5	74.32	2400000	5300000	8700000	370	7.5	7	125
DPT-41	5	69.82	2200	2400	2400	15	0.28	0.26	27
DPT-41	12	62.82	1800	2400	2400	26	0.145	0.14	7
DPT-41	15	59.82	7500	2400	2400	86	8	7.5	130
DPT-41	20	54.82	31.5	2400	2400	1	0.165	0.155	2.7
DPT-42	0.5	74.38	2300000	3400000	7600000	3900	45.5	43	750
DPT-42	5	69.88	910000	2400	2400	340	6.5	6	110

TABLE 4-1
Summary of Soil Analytical Results (µg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-42	10	64.88	2800	2400	2400	120	7	6.5	115
DPT-42	16	58.88	23000	2400	2400	70	8.5	8	135
DPT-42	19	55.88	49000	42000000	40000000	990	7	7	120
DPT-42	24	50.88	15.5	2400	2400	0.47	0.16	0.15	2.65
DPT-43	0.5	75.01	32.5	2400	74000	5.4	0.17	0.16	2.75
DPT-43	5	70.51	30.5	2400	2400	1.8	0.155	0.15	2.6
DPT-43	10	65.51	28	2400	2400	32	0.14	0.135	2.35
DPT-43	15	60.51	32.5	2400	2400	0.07	0.17	0.16	2.8
DPT-43	20	55.51	25.5	2400	2400	0.53	0.12	0.115	2
DPT-43	25	50.51	31.5	2400	2400	0.47	0.16	0.15	2.65
DPT-44	0.5	74.84	30	2400	18000	6	0.165	0.155	2.7
DPT-44	5	70.34	29.5	2400	2400	1.2	0.155	0.145	2.6
DPT-44	10	65.34	26	2400	2400	2.7	0.14	0.135	2.35
DPT-44	15	60.34	31	2400	2400	0.8	0.165	0.155	2.7
DPT-44	20	55.34	30	2400	2400	0.18	0.175	0.16	2.85
DPT-44	25	50.34	27	2400	240000	0.57	0.125	0.12	2.05
DPT-45	0.5	74.72	24.5	2400	2400	6.2	0.135	0.13	2.25
DPT-45	5	70.22	29.5	2400	2400	0.94	0.155	0.15	2.6
DPT-45	10	65.22	26	2400	6300	0.96	0.135	0.125	2.2
DPT-45	15	60.22	33	2400	2400	0.07	0.17	0.16	2.8
DPT-45	20	55.22	30.5	2400	2400	0.29	0.155	0.145	2.55
DPT-45	25	50.22	25	12000	580000	0.48	0.12	0.11	1.95
DPT-46	0.5	75.63	29	2400	340000	2.5	0.145	0.14	2.4
DPT-46	5	71.13	25	2400	2400	2.1	0.13	0.125	2.15
DPT-46	10	66.13	29.5	2400	260000	2	0.145	0.135	2.35
DPT-46	15	61.13	29	2400	2400	0.67	0.145	0.135	2.35
DPT-46	20	56.13	24.5	2400	2400	1.4	0.15	0.14	2.5
DPT-46	28	48.13	29	2400	2400	0.18	0.155	0.145	2.55
DPT-46	33	43.13	33	17000	380000	0.91	0.13	0.125	2.15
DPT-47	0.5	74.93	29	2400	2400	5.6	0.15	0.14	2.5
DPT-47	5	70.43	24	2400	2400	2	0.13	0.12	2.1
DPT-47	10	65.43	26	2400	2400	1.1	0.12	0.115	1.95
DPT-47	15	60.43	31.5	2400	2400	0.24	0.16	0.15	2.65
DPT-47	20	55.43	24.5	2400	2400	0.97	0.13	0.125	2.2
DPT-47	24	51.43	27.5	2400	2400	0.28	0.135	0.125	2.2
DPT-48	0.5	75.06	32	2400	13000	8.2	0.165	0.155	2.7
DPT-48	5	70.56	29	2400	2400	1.2	0.15	0.14	2.45
DPT-48	10	65.56	27.5	2400	2400	3.2	0.13	0.125	2.15
DPT-48	15.5	60.06	29.5	2400	2400	0.19	0.155	0.145	2.55
DPT-48	20	55.56	23.5	2400	2400	0.21	0.145	0.135	2.4
DPT-48	23.5	52.06	24.5	2400	2400	1.9	0.12	0.115	2
DPT-49	0.5	75.60	28.5	2400	59000	6.3	0.14	0.13	2.3
DPT-49	5	71.10	32	2400	2400	1.2	0.15	0.14	9.4
DPT-49	10	66.10	5300	13000	13000	21	0.125	0.115	420
DPT-49	15	61.10	6600	9000	8600	42	0.16	0.15	210
DPT-49	18	58.10	1500000	520000	490000	300	13	12	210
DPT-49	20	56.10	2200	14000	14000	240	0.12	0.11	22
DPT-49	27.5	48.60	490	2400	2400	49	0.14	0.13	7.3
DPT-50	0.5	76.06	29	2400	2400	7.1	0.17	0.16	2.8
DPT-50	5	71.56	27.5	2400	2400	1.5	0.13	0.12	2.15
DPT-50	10	66.56	29.5	2400	2400	0.89	0.165	0.155	2.7
DPT-50	16	60.56	27	2400	2400	1.2	0.15	0.14	2.45
DPT-50	20	56.56	1300	2400	2400	1.4	0.33	0.14	63
DPT-50	25	51.56	1000	14000	170000	1.4	0.135	0.125	12
DPT-51	0.5	75.60	28.5	7400	100000	6.9	0.17	0.16	2.8

TABLE 4-1
Summary of Soil Analytical Results (µg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-51	5	71.10	28	2400	17000	1.1	0.15	0.14	2.45
DPT-51	10	66.10	27	2400	9100	2.3	0.12	0.11	1.95
DPT-51	14	62.10	31	2400	2400	0.61	0.15	0.145	2.5
DPT-51	20	56.10	6000000	4300000	4100000	1200	75	70	1250
DPT-52	0.5	75.68	30.5	2400	2400	8.9	0.17	0.16	2.8
DPT-52	5	71.18	26.5	2400	2400	2	0.13	0.125	2.2
DPT-52	12	64.18	440	2400	2400	4.4	0.15	0.14	12
DPT-52	15.5	60.68	1100	2400	2400	2.5	0.175	0.165	100
DPT-52	20	56.18	2600	2400	2400	16	1.4	0.14	18
DPT-52	24	52.18	450	2400	2400	2.3	1	0.14	14
DPT-53	0.5	76.85	32	2400	36000	3.5	0.165	0.155	2.7
DPT-53	6	71.35	33	2400	2400	2	0.2	0.19	3.3
DPT-53	12	65.35	29	2400	2400	0.94	0.16	0.15	2.65
DPT-53	16	61.35	26.5	2400	2400	0.65	0.16	0.15	2.65
DPT-53	20	57.35	33	2400	2400	0.43	0.17	0.16	2.75
DPT-54	0.5	76.84	33	2400	2400	6	0.16	0.15	2.65
DPT-54	6	71.34	34	2400	2400	0.61	0.175	0.165	2.85
DPT-54	12	65.34	26	2400	2400	1.9	0.135	0.13	2.25
DPT-54	16	61.34	28.5	2400	2400	0.65	0.165	0.155	2.75
DPT-54	20	57.34	31.5	2400	2400	0.065	0.16	0.15	2.65
DPT-55	0.5	77.41	30.5	2400	70000	1.7	0.155	0.145	2.55
DPT-55	5	72.91	35.5	2400	2400	1	0.165	0.155	2.7
DPT-55	11.5	66.41	27	2400	2400	1	0.13	0.125	2.15
DPT-55	15	62.91	33.5	2400	2400	0.17	0.15	0.145	2.5
DPT-55	20	57.91	35.5	2400	2400	0.07	0.165	0.155	2.7
DPT-55	24	53.91	26	2400	2400	0.75	0.125	0.12	2.1
DPT-56	0.5	77.14	31.5	2400	200000	3	0.15	0.145	2.5
DPT-56	5	72.64	38.5	2400	2400	1.1	0.165	0.155	2.7
DPT-56	11.5	66.14	25	2400	2400	0.72	0.145	0.135	2.35
DPT-56	15	62.64	33	2400	2400	0.06	0.145	0.135	2.35
DPT-56	20	57.64	31.5	2400	2400	0.45	0.175	0.165	2.85
DPT-57	0.5	75.41	25.5	2400	20000	8.8	0.16	0.15	2.65
DPT-57	5	70.91	26.5	2400	2400	2.2	0.145	0.135	2.35
DPT-57	11	64.91	27.5	2400	2400	4.2	0.14	0.13	2.3
DPT-57	15	60.91	32	2400	2400	0.21	0.14	0.13	2.3
DPT-57	19.5	56.41	460000	9500	9000	37	7	6.5	115
DPT-57	23	52.91	8200	2400	2400	23	0.16	23	15
DPT-58	0.5	76.12	30.5	2400	2400	8.7	0.14	0.13	2.3
DPT-58	5	71.62	32.5	2400	2400	2.2	0.175	0.165	2.85
DPT-58	10.5	66.12	25	2400	2400	1	0.14	0.13	2.3
DPT-58	15	61.62	30.5	2400	2400	0.31	0.16	0.15	2.6
DPT-58	20	56.62	25.5	2400	2400	2.2	0.125	0.12	2.1
DPT-58	24	52.62	340	2400	2400	0.33	0.145	0.68	2.4
DPT-59	0.5	75.68	33	2400	2400	5.9	0.17	0.16	2.75
DPT-59	5	71.18	23.5	2400	2400	1.4	0.125	0.115	2.05
DPT-59	10	66.18	30	2400	2400	0.14	0.165	0.155	2.75
DPT-59	15	61.18	31	2400	2400	0.23	0.175	0.165	2.9
DPT-59	20	56.18	38	2400	2400	0.31	0.165	0.155	2.7
DPT-59	24	52.18	790	2400	2400	0.97	0.165	0.76	2.7
DPT-59	28	48.18	4600	2400	2400	4.4	0.13	1.2	2.15
DPT-60	0.5	75.28	31	2400	27000	6.5	0.175	0.16	2.85
DPT-60	5	70.78	39	2400	2400	1.2	0.16	0.15	2.65
DPT-60	11.5	64.28	28.5	2400	2400	4.4	0.16	0.15	2.6
DPT-60	15	60.78	34	2400	2400	0.07	0.17	0.16	2.75
DPT-60	19	56.78	220000	180000	170000	2.9	7	6.5	115

TABLE 4-1
Summary of Soil Analytical Results (µg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-61	0.5	74.98	28	2400	31000	6.6	0.14	0.135	2.35
DPT-61	5	70.48	25	2400	2400	0.91	0.125	0.12	2.1
DPT-61	10.5	64.98	29	2400	2400	0.06	0.145	0.14	2.4
DPT-61	15	60.48	32.5	2400	2400	13	0.175	0.165	2.9
DPT-61	20	55.48	24.5	2400	2400	3.2	0.125	0.115	2.05
DPT-61	23.5	51.98	32.5	2400	2400	10	0.25	0.235	4.1
DPT-62	0.5	74.64	30	2400	12000	0.24	0.165	0.155	2.7
DPT-62	6	69.14	32.5	2400	2400	0.31	0.165	0.155	2.75
DPT-62	10	65.14	28.5	2400	2400	2.8	0.14	0.135	2.35
DPT-62	15	60.14	15	2400	2400	0.33	0.155	0.145	2.55
DPT-62	20	55.14	26	2400	2400	1.3	0.125	0.12	2.05
DPT-62	24	51.14	26.5	2400	2400	0.34	0.13	0.125	2.15
DPT-63	0.5	74.72	34	2400	2400	13	0.135	0.13	2.25
DPT-63	6	69.22	30.5	2400	2400	1.1	0.155	0.145	2.5
DPT-63	11	64.22	26.5	2400	2400	5.3	0.135	0.125	2.2
DPT-63	15	60.22	27.5	2400	2400	0.14	0.16	0.15	2.6
DPT-63	19.5	55.72	25.5	2400	2400	1.7	0.125	0.12	2.1
DPT-63	24	51.22	31.5	2400	2400	0.065	0.16	0.15	2.6
DPT-64	0.5	74.93	31.5	2400	2400	16	0.225	0.21	3.65
DPT-64	6	69.43	27	2400	2400	1.4	0.135	0.125	2.2
DPT-64	11	64.43	25	2400	2400	5.4	0.14	0.135	2.35
DPT-64	16	59.43	34	2400	2400	0.27	0.16	0.15	2.6
DPT-64	20	55.43	22	2400	2400	0.84	0.13	0.125	2.15
DPT-64	24	51.43	37	2400	2400	0.33	0.185	0.175	3.05
DPT-65	0.5	74.59	33	160000	2600000	1.3	0.18	0.17	2.95
DPT-65	5	70.09	32.5	2400	23000	1.2	0.17	0.16	2.8
DPT-65	10	65.09	8300000	9400000	8700000	600	330	310	5500
DPT-66	0.5	76.59	33	340000	5900000	0.69	0.17	0.16	2.8
DPT-66	6	71.09	31.5	2400	2400	0.97	0.165	0.155	2.7
DPT-66	12	65.09	29	2400	2400	8.2	0.165	0.155	2.75
DPT-66	15	62.09	29.5	2400	2400	0.35	0.155	0.145	2.55
DPT-66	20	57.09	34.5	2400	2400	0.27	0.175	0.165	2.9
DPT-66	26.5	50.59	28	2400	2400	0.92	0.165	0.155	2.75
DPT-67	0.5	76.66	31	2400	2400	0.15	0.155	0.145	2.6
DPT-67	5	72.16	29.5	2400	2400	0.72	0.155	0.15	2.6
DPT-67	12	65.16	29.5	2400	2400	0.49	0.145	0.135	2.4
DPT-67	16	61.16	33	2400	2400	0.075	0.185	0.175	3.05
DPT-67	20	57.16	34.5	2400	2400	0.15	0.175	0.165	2.9
DPT-67	27.5	49.66	30	2400	2400	9.1	0.21	0.2	3.45
DPT-68	0.5	76.41	28.5	2400	2400	0.66	0.155	0.145	2.55
DPT-68	5	71.91	26.5	2400	2400	2.8	0.145	0.135	2.35
DPT-68	11.5	65.41	26.5	2400	2400	14	0.125	0.12	2.05
DPT-68	16	60.91	31.5	2400	2400	0.39	0.16	0.15	2.65
DPT-68	20	56.91	31.5	2400	2400	0.065	0.16	0.15	2.65
DPT-68	28	48.91	22.5	2400	2400	240	0.13	3.4	2.15
DPT-69	0.5	76.75	34	6800	260000	0.28	0.17	0.16	2.75
DPT-69	5.5	71.75	35	2400	2400	0.15	0.175	0.165	2.9
DPT-69	10	67.25	36	2400	2400	3.1	0.14	0.13	2.3
DPT-69	15	62.25	30	2400	2400	0.24	0.165	0.155	2.7
DPT-69	20	57.25	33	2400	2400	0.16	0.165	0.155	2.7
DPT-69	28	49.25	1800	6600000	6300000	2	0.135	0.125	2.2
DPT-70	0.5	74.57	27	2400	2400	3.1	0.145	0.14	2.4
DPT-70	6.5	68.57	26.5	2400	2400	3.7	0.15	0.14	2.45
DPT-70	11	64.07	25.5	2400	2400	0.55	0.145	0.135	2.4
DPT-70	15.5	59.57	33	2400	2400	0.2	0.16	0.15	2.65

TABLE 4-1
Summary of Soil Analytical Results (µg/kg) 1/
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH /2 as Gasoline	TPH as JP-5 3/	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-70	19	56.07	23	2400	2400	2.1	0.12	0.115	1.95
DPT-70	26	49.07	34	2400	2400	0.065	0.16	0.15	2.65
DPT-71	0.5	74.85	28	2400	2400	3.1	0.155	0.145	2.5
DPT-71	6	69.35	33	2400	2400	2.1	0.14	0.13	2.3
DPT-71	10	65.35	30	2400	2400	0.65	0.145	0.135	2.4
DPT-71	15	60.35	33.5	2400	2400	0.07	0.17	0.16	2.75
DPT-71	20	55.35	24	2400	2400	4.6	0.1	0.095	1.65
DPT-71	26.5	48.85	29	2400	2400	0.23	0.15	0.14	2.5
DPT-72	16	58.50	27.5	38000	1300000	1.8	0.13	0.125	2.15
DPT-72	20	54.50	26	2400	48000	1.6	0.13	0.125	2.15
DPT-72	23	51.50	25	2400	2400	2.5	0.14	0.135	2.35
DPT-73	15	59.37	26	7900	170000	1.5	0.13	0.12	2.15
DPT-73	22	52.37	26.5	2400	2400	2.2	0.13	3.4	14
DPT-74	0	75.31	33.5	920000	14000000	0.81	0.145	0.135	2.4
DPT-74	0.5	74.81	27	2400	39000	5	0.16	0.15	2.6
DPT-74	6	69.31	33.5	2400	2400	0.075	0.175	0.165	2.9
DPT-74	11	64.31	27	2400	2400	1.4	0.14	0.135	2.35
DPT-74	16	59.31	33	2400	2400	0.065	0.155	0.15	2.6
DPT-74	20	55.31	24.5	2400	2400	3.8	0.13	0.12	2.15
DPT-74	27	48.31	32	2400	2400	0.07	0.175	0.16	2.85
DPT-75	0.5	74.95	31.5	25000	330000	2	0.16	0.15	2.6
DPT-75	7	68.45	26.5	2400	2400	1.9	0.14	0.135	2.35
DPT-75	11	64.45	26.5	2400	2400	2.8	0.135	0.125	2.2
DPT-75	15	60.45	32.5	2400	2400	0.065	0.16	0.15	2.6
DPT-75	18.5	56.95	31	2400	2400	0.37	0.175	0.165	2.9
DPT-75	23	52.45	32.5	2400	2400	0.07	0.17	0.16	2.75
DPT-75	27	48.45	26.5	2400	24000	0.64	0.135	0.13	2.25
DPT-75	31	44.45	31	2400	2400	0.065	0.155	0.145	2.55
DPT-76	0.5	75.83	31.5	2400	6300	3.2	0.16	0.15	2.65
DPT-76	7	69.33	28	2400	2400	1.6	0.135	0.125	2.2
DPT-76	11	65.33	26.5	2400	2400	0.96	0.135	0.125	2.2
DPT-76	15	61.33	34.5	2400	2400	0.075	0.185	0.175	3.05
DPT-76	19.5	56.83	24.5	2400	2400	1.6	0.13	0.125	2.15
DPT-76	23.5	52.83	32	2400	2400	0.075	0.18	0.17	2.95
DPT-76	26.5	49.83	33.5	2400	2400	0.33	0.2	0.19	3.3
DPT-77	0.5	75.87	32	2400	75000	1.6	0.155	0.145	2.6
DPT-77	5.5	70.87	34	2400	2400	0.08	0.19	0.175	3.1
DPT-77	11	65.37	23	2400	2400	1.1	0.125	0.115	2.05
DPT-77	15	61.37	22	2400	2400	1	0.14	0.13	2.25
DPT-77	20	56.37	26.5	2400	2400	0.74	0.13	0.125	2.2
DPT-77	26.5	49.87	25.5	2400	2400	0.31	0.125	0.115	2.05
DPT-78	0.5	75.98	31	2400	140000	0.22	0.155	0.145	2.6
DPT-78	5.5	70.98	35.5	2400	2400	0.22	0.175	0.165	2.85
DPT-78	11	65.48	25.5	2400	2400	0.64	0.145	0.135	2.35
DPT-78	15	61.48	26.5	2400	2400	0.92	0.12	0.11	1.95
DPT-78	20	56.48	23.5	2400	2400	1.1	0.155	0.145	2.55
DPT-78	27	49.48	26	2400	2400	0.97	0.12	0.115	2
DPT-79	0.5	76.15	34	2400	28000	1.3	0.17	0.16	2.75
DPT-79	6	70.65	36	2400	2400	0.075	0.175	0.165	2.9
DPT-79	11.5	65.15	24	2400	2400	1.9	0.12	0.115	2
DPT-79	16	60.65	30.5	2400	2400	0.86	0.15	0.14	7.3
DPT-79	20	56.65	23	2400	2400	0.61	0.125	0.12	2.05
DPT-79	26	50.65	24.5	2400	2400	1.7	0.165	0.155	2.7
DPT-80	0.5	76.24	35.5	2400	54000	1.3	0.175	0.16	2.85
DPT-80	6	70.74	34.5	2400	2400	0.18	0.185	0.175	3.1

TABLE 4-1
Summary of Soil Analytical Results (μg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-80	11	65.74	24	2400	2400	0.61	0.13	0.125	2.15
DPT-80	15	61.74	25.5	2400	2400	0.48	0.135	0.125	2.2
DPT-80	20	56.74	27.5	2400	2400	0.47	0.13	0.12	2.15
DPT-80	24	52.74	24	2400	2400	1.1	0.115	0.11	1.9
DPT-81	0.5	74.04	25.5	2400	15000	1.4	0.135	0.125	2.2
DPT-81	6	68.54	810000	3200000	10000000	14	7.5	7	120
DPT-81	10.5	64.04	360000	200000	240000	2.7	6.5	6	105
DPT-81	15	59.54	590	2400	2400	0.07	0.17	0.16	2.8
DPT-81	18	56.54	480000	1500000	1600000	3.65	9	8.5	145
DPT-81	20	54.54	690000	170000	180000	5	12.5	11.5	205
DPT-81	24	50.54	1500000	870000	910000	25	8	7.5	135
DPT-82	0.5	74.22	31	370000	2200000	1.8	0.155	0.145	2.55
DPT-82	6	68.72	470000	1800000	6100000	0.83	0.15	0.14	2.45
DPT-82	11	63.72	33000	2400	2400	2.3	0.145	0.135	2.4
DPT-82	16	58.72	970	2400	2400	3.8	0.125	0.115	2.05
DPT-82	20	54.72	4500000	1800000	1900000	21	9.5	9	155
DPT-82	23	51.72	2200000	2700000	2800000	19	8.5	8	140
DPT-83	0.5	74.19	390	1300000	3700000	0.9	0.135	0.125	2.2
DPT-83	6	68.69	420000	3200000	10000000	8.3	7	7	120
DPT-83	11	63.69	250	2400	2400	0.96	0.135	0.13	2.25
DPT-83	15	59.69	330	2400	2400	0.075	0.18	0.17	3
DPT-83	18	56.69	1300	13000	12000	1.6	0.13	0.12	2.15
DPT-84	0.5	74.43	36	2400	82000	5.8	0.175	0.165	2.85
DPT-84	5	69.93	30	9500	11000	0.6	0.17	0.16	2.8
DPT-84	10	64.93	2200000	3400000	3200000	3.75	9	8.5	150
DPT-84	16	58.93	1300000	3000000	2800000	3.5	8.5	8	140
DPT-84	20	54.93	2100000	5100000	4900000	4.65	11	10.5	185
DPT-84	23	51.93	2100000	4300000	4100000	3.55	8.5	8	140
DPT-85	0.5	74.42	36	630000	9900000	2.4	0.16	0.15	2.65
DPT-85	5.5	69.42	33	12000	51000	0.95	0.16	0.15	2.65
DPT-85	10.5	64.42	560000	1300000	1300000	3.35	8	7.5	135
DPT-85	15	59.92	1600000	3700000	3500000	3.35	8	7.5	135
DPT-85	20	54.92	1000	2400	2400	1	0.125	0.12	2.05
DPT-85	24	50.92	7200000	3500000	3300000	12	28.5	27	475
DPT-86	0.5	73.59	32.5	2400	47000	6.6	0.175	0.165	2.85
DPT-86	6	68.09	3400000	11000000	13000000	3.1	7.5	7	125
DPT-86	10	64.09	860000	3000000	3100000	0.2	0.155	0.145	2.55
DPT-86	16	58.09	950000	2900000	2800000	3.45	8.5	8	135
DPT-86	20	54.09	340000	120000	120000	2.65	6.5	6	105
DPT-86	24	50.09	1100000	1300000	1300000	3.5	8.5	8	140
DPT-87	0.5	73.93	31.5	13000	810000	3.2	0.16	0.15	2.65
DPT-87	6	68.43	25	2400	2400	0.37	0.12	0.115	2
DPT-87	10.5	63.93	29	2400	2400	0.22	0.17	0.16	2.8
DPT-87	15	59.43	33.5	2400	2400	0.07	0.175	0.165	2.85
DPT-87	20	54.43	34	2400	2400	0.14	0.16	0.15	2.65
DPT-87	24	50.43	29	2400	2400	0.37	0.145	0.135	2.35
DPT-88	0.5	75.67	31	11000	240000	1.6	0.165	0.155	2.7
DPT-88	5	71.17	25	2400	2400	3.1	0.205	0.195	3.4
DPT-88	10	66.17	23	2400	2400	0.64	0.12	0.11	1.95
DPT-88	15	61.17	28	2400	2400	2	0.13	1.4	5.5
DPT-88	19	57.17	2800000	1900000	1900000	17000	135	125	2200
DPT-88	23	53.17	1400000	7300000	7600000	19000	12	11.5	200
DPT-88	26	50.17	570000	2200000	2400000	22000	13.5	400	220
DPT-89	0.5	76.02	34	2400	11000	0.95	0.16	0.15	2.6
DPT-89	5	71.52	33	2400	2400	1.2	0.14	0.135	2.35

TABLE 4-1
Summary of Soil Analytical Results (µg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-89	10	66.52	22.5	2400	2400	3.8	0.13	0.125	2.15
DPT-89	14	62.52	27.5	2400	2400	0.34	0.15	0.14	2.45
DPT-89	18	58.52	2500000	1900000	2000000	780	55	55	950
DPT-89	25	51.52	29000	2400	2400	1700	6	18	95
DPT-90	0.5	77.21	38.5	2400	2400	0.47	0.18	0.17	2.95
DPT-90	5	72.71	36.5	2400	2400	1.3	0.175	0.16	2.85
DPT-90	8.5	69.21	24	2400	2400	2.2	0.13	0.125	2.15
DPT-90	14	63.71	270	2400	2400	1.7	0.13	0.125	2.15
DPT-90	20	57.71	860000	240000	250000	6300	6.5	6	105
DPT-90	26	51.71	1800000	150000	180000	1800	7	6.5	115
DPT-91	0.5	76.00	30	2400	2400	1.2	0.155	0.145	2.55
DPT-91	5	71.50	27	2400	2400	6.3	0.14	0.13	2.3
DPT-91	10	66.50	23.5	2400	2400	1.3	0.125	0.12	2.1
DPT-91	16	60.50	31	2400	2400	0.4	0.165	0.155	2.7
DPT-91	18	58.50	1700000	320000	300000	3800	65	65	1100
DPT-91	25	51.50	5000000	20000000	18000000	140000	335	315	5500
DPT-92	0.5	75.27	31	57000	1100000	0.47	0.155	0.145	2.6
DPT-92	5	70.77	34	2400	2400	0.58	0.185	0.175	3.1
DPT-92	10	65.77	540	2400	2400	3.8	0.15	0.145	2.5
DPT-92	15	60.77	34	2400	2400	0.21	0.175	0.165	2.9
DPT-92	20	55.77	730	2400	2400	1.6	0.125	0.12	2.05
DPT-92	25.5	50.27	600	2400	2400	1.3	0.15	0.14	2.45
DPT-93	0.5	75.14	29.5	2400	2400	0.69	0.15	0.14	2.5
DPT-93	5	70.64	32.5	2400	2400	0.22	0.17	0.16	2.8
DPT-93	10	65.64	25	2400	2400	1.5	0.105	0.1	1.7
DPT-93	14.5	61.14	24.5	2400	2400	0.66	0.125	0.12	2.05
DPT-93	22	53.64	2500	2400	2400	0.57	0.135	0.125	2.25
DPT-93	25	50.64	13000	340000	320000	0.72	0.12	0.115	2
DPT-94	0.5	75.29	33	2400	14000	0.26	0.175	0.16	2.85
DPT-94	5	70.79	36	2400	18000	0.07	0.17	0.16	2.8
DPT-94	10	65.79	380000	3300000	5200000	2.65	6.5	6	105
DPT-94	14.5	61.29	1700	2400	6900	0.065	0.165	0.155	2.7
DPT-94	20	55.79	1500	2400	2400	1.5	0.14	0.13	2.25
DPT-94	25	50.79	500000	480000	480000	8.9	9	8.5	145
DPT-95	0.5	75.28	30	2400	47000	0.25	0.15	0.145	2.5
DPT-95	5	70.78	34.5	2400	2400	0.065	0.165	0.155	2.7
DPT-95	10	65.78	24	2400	2400	0.73	0.12	0.11	1.95
DPT-95	14.5	61.28	31	2400	2400	0.065	0.165	0.155	2.7
DPT-95	20	55.78	210	2400	2400	1.3	0.13	0.125	2.15
DPT-95	25	50.78	26	2400	2400	1.7	0.14	0.135	2.35
DPT-96	0.5	74.03	30	32000	420000	7.8	0.145	0.135	2.35
DPT-96	5	69.53	34.5	2400	2400	0.075	0.18	0.17	2.95
DPT-96	10	64.53	23	2400	2400	0.66	0.14	0.13	2.3
DPT-96	16	58.53	24	2400	2400	0.95	0.135	0.125	2.2
DPT-96	20	54.53	26	2400	2400	0.39	0.13	0.125	2.15
DPT-96	25.5	49.03	28.5	2400	2400	1.4	0.135	0.13	2.25
DPT-97	0.5	73.86	31	7400	120000	8.4	0.16	0.15	2.6
DPT-97	5	69.36	34.5	2400	13000	0.48	0.165	0.155	2.75
DPT-97	10	64.36	27	2400	2400	1	0.135	0.13	2.25
DPT-97	16	58.36	23.5	2400	2400	0.79	0.125	0.115	2.05
DPT-97	20	54.36	24	2400	2400	0.85	0.12	0.115	2
DPT-98	0.5	74.03	32.5	2400	17000	6.9	0.155	0.15	2.6
DPT-98	5	69.53	33	2400	2400	0.075	0.175	0.165	2.9
DPT-98	10	64.53	26.5	2400	2400	0.25	0.15	0.145	2.5
DPT-98	16	58.53	32.5	2400	2400	0.07	0.165	0.155	2.75

TABLE 4-1
Summary of Soil Analytical Results (μg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-98	20	54.53	27.5	2400	2400	0.57	0.14	0.13	2.3
DPT-99	0.5	73.83	35.5	2400	2400	4.1	0.165	0.155	2.75
DPT-99	5	69.33	31.5	2400	2400	0.19	0.185	0.175	3.05
DPT-99	10	64.33	28.5	2400	2400	0.79	0.135	0.13	2.25
DPT-99	16	58.33	25	2400	2400	1.4	0.13	0.125	2.15
DPT-99	20	54.33	28.5	2400	2400	0.58	0.165	0.155	2.75
DPT-99	24	50.33	25	2400	2400	0.89	0.13	0.125	2.15
DPT-100	0.5	75.97	31	28000	160000	1.2	0.175	0.165	2.85
DPT-100	5	71.47	30.5	2400	2400	0.39	0.145	0.14	2.4
DPT-100	10	66.47	34	2400	2400	0.18	0.185	0.175	3.05
DPT-100	16	60.47	37.5	2400	2400	0.18	0.18	0.17	2.95
DPT-100	26	50.47	3300	50000	48000	2.6	0.135	0.13	2.25
DPT-101	0.5	73.68	34.5	64000	750000	0.48	0.18	0.17	3
DPT-101	5	69.18	26	2400	2400	1.5	0.15	0.14	2.45
DPT-101	10	64.18	35	2400	2400	0.075	0.18	0.17	2.95
DPT-101	16	58.18	36.5	2400	2400	0.28	0.18	0.17	2.95
DPT-101	21.5	52.68	27	2400	2400	0.52	0.14	0.135	2.35
DPT-101	24	50.18	26.5	2400	2400	0.31	0.13	0.125	2.15
DPT-102	0.5	74.81	33	2400	5200	0.67	0.215	0.2	3.55
DPT-102	5	70.31	38.5	2400	2400	0.99	0.185	0.175	3.05
DPT-102	10	65.31	31	2400	2400	0.19	0.17	0.16	2.8
DPT-102	17	58.31	26.5	2400	2400	1.6	0.135	0.125	2.2
DPT-102	20	55.31	33.5	2400	2400	0.07	0.17	0.16	2.8
DPT-102	25	50.31	1700	2400	2400	9.2	0.12	0.115	2
DPT-103	5	70.40	27.5	2400	800	0.24	0.165	0.155	2.75
DPT-103	10	65.40	27.5	2400	800	0.25	0.165	0.155	2.7
DPT-103	15	60.40	27	2400	800	0.075	0.175	0.165	2.9
DPT-103	22	53.40	21	16000	15000	1.2	0.125	0.115	2.05
DPT-103	26.5	48.90	21	2400	800	0.74	0.065	0.06	1.05
DPT-104	5	69.49	25	2400	30000	0.065	0.16	0.15	2.65
DPT-104	10	64.49	1300000	1200000	1300000	3.35	8	7.5	135
DPT-104	15.5	58.99	1300000	13000000	13000000	3.35	8	7.5	135
DPT-104	18	56.49	21000	210000	210000	2.6	6	6	105
DPT-105	6	69.25	26	2400	800	0.76	0.17	0.16	2.75
DPT-105	10	65.25	25	2400	800	0.91	0.15	0.14	2.45
DPT-105	15	60.25	27	2400	800	0.55	0.165	0.155	2.75
DPT-105	20	55.25	19.5	5800	44000	1.2	0.13	0.12	2.15
DPT-106	0.5	74.81	800000	3000000	14000000	150	14.5	13.5	240
DPT-106	5	70.31	23.5	2400	800	1.5	0.14	0.13	2.3
DPT-106	10	65.31	25.5	5900	59000	0.07	0.17	0.16	2.75
DPT-106	16	59.31	21	10000	79000	0.26	0.14	0.135	2.3
DPT-106	19.5	55.81	270000	380000	400000	2.65	6.5	6	105
DPT-106	25	50.31	30000	2400	800	3.4	8	7.5	135
DPT-107	12	62.57	450000	760000	790000	3	7.5	7	120
DPT-107	16	58.57	5600000	7000000	6600000	290	700	650	11500
DPT-107	20	54.57	670	2400	800	0.79	0.16	0.15	2.6
DPT-107	24.5	50.07	1100000	1300000	1200000	3.35	8	7.5	135
DPT-108	0.5	74.66	26.5	--	74000	0.19	0.155	0.15	2.6
DPT-108	5	70.16	27	--	800	0.37	0.175	0.16	2.85
DPT-108	10	65.16	25.5	--	23000	0.45	0.165	0.155	2.7
DPT-108	15	60.16	25	--	800	1.2	0.165	0.155	2.7
DPT-108	19	56.16	25.5	--	800	1.1	0.135	0.125	2.2
DPT-108	22	53.16	25.5	--	800	0.07	0.175	0.16	2.85
DPT-109	0.5	74.02	30	--	77000	0.61	0.18	0.17	3
DPT-109	5	69.52	28	--	800	0.23	0.175	0.165	2.9

TABLE 4-1
Summary of Soil Analytical Results (μg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-109	10	64.52	25	--	6100	0.33	0.17	0.16	2.8
DPT-109	15	59.52	25	--	800	0.64	0.155	0.145	2.55
DPT-109	22	52.52	26.5	--	800	0.075	0.175	0.165	2.9
DPT-109	23.5	51.02	21.5	--	800	1.6	0.15	0.14	2.45
DPT-110	0.5	73.84	24	--	6000	1.1	0.155	0.145	2.55
DPT-110	5	69.34	27.5	--	800	0.32	0.175	0.165	2.9
DPT-110	10.5	63.84	22	--	800	0.63	0.15	0.14	2.5
DPT-110	15	59.34	27.5	--	800	0.54	0.155	0.145	2.55
DPT-110	19	55.34	20	--	800	1.3	0.13	0.12	2.1
DPT-110	23	51.34	27	--	800	0.42	0.17	0.16	2.8
DPT-111	0.5	74.08	25	--	190000	1.2	0.155	0.145	2.5
DPT-111	6.5	68.08	26.5	--	800	0.95	0.16	0.15	2.6
DPT-111	10	64.58	24	--	800	0.51	0.155	0.15	2.6
DPT-111	15	59.58	24.5	--	800	0.54	0.13	0.125	2.15
DPT-111	19	55.58	21.5	--	800	2	0.13	0.125	2.15
DPT-111	23.5	51.08	21.5	--	800	1.3	0.145	0.14	2.4
DPT-112	0.5	74.60	26	--	390000	1.6	0.155	0.145	2.55
DPT-112	5	70.10	25	--	800	1.1	0.155	0.145	2.55
DPT-112	10	65.10	26	--	800	0.47	0.16	0.15	2.6
DPT-112	15	60.10	19	--	800	1.4	0.115	0.11	1.9
DPT-112	19.5	55.60	26	--	800	0.16	0.165	0.155	2.75
DPT-112	24	51.10	21.5	--	800	1.6	0.135	0.125	2.2
DPT-113	0.5	77.12	23.5	--	800	0.26	0.175	0.165	2.9
DPT-113	5	72.62	24	--	800	1	0.15	0.145	2.5
DPT-113	10	67.62	19.5	--	800	1.1	0.115	0.11	1.9
DPT-113	15	62.62	26	--	800	0.075	0.175	0.165	2.9
DPT-113	19.5	58.12	23.5	--	800	0.17	0.165	0.155	2.7
DPT-113	23	54.62	25.5	--	800	0.075	0.175	0.165	2.9
DPT-114	0.5	76.85	26	--	10000	0.24	0.155	0.15	2.6
DPT-114	5	72.35	28	--	800	0.075	0.185	0.175	3.05
DPT-114	10.5	66.85	20	--	800	4.3	0.13	0.12	2.15
DPT-114	15	62.35	23	--	800	0.79	0.125	0.12	2.1
DPT-114	19	58.35	28	--	800	0.52	0.18	0.17	3
DPT-114	23.5	53.85	22.5	--	800	0.21	0.155	0.145	2.55
DPT-115	0.5	76.47	27.5	--	800	0.075	0.185	0.175	3.05
DPT-115	5	71.97	28	--	800	0.24	0.175	0.165	2.85
DPT-115	10	66.97	26.5	--	800	0.07	0.165	0.155	2.7
DPT-115	14.5	62.47	27.5	--	800	1.5	0.175	0.16	2.85
DPT-115	19.5	57.47	23	--	800	0.25	0.14	0.13	4.7
DPT-115	23	53.97	25.5	--	800	0.24	0.17	0.16	2.8
DPT-116	0.5	76.93	23	--	800	0.45	0.235	0.22	3.9
DPT-116	5	72.43	29.5	--	800	0.075	0.18	0.17	3
DPT-116	10.5	66.93	22	--	800	0.34	0.135	0.125	2.2
DPT-116	15	62.43	27	--	800	0.19	0.16	0.15	2.6
DPT-116	17.5	59.93	21.5	--	800	1.4	0.135	0.13	2.25
DPT-116	23.5	53.93	29	--	800	0.2	0.165	0.155	2.75
DPT-117	0.5	76.20	27	--	5200	0.38	0.16	0.15	2.65
DPT-117	5	71.70	26.5	--	800	0.42	0.16	0.15	2.65
DPT-117	10	66.70	24	--	27000	0.39	0.15	0.14	2.45
DPT-117	15	61.70	25	--	800	0.21	0.175	0.165	2.85
DPT-117	19	57.70	27	--	800	0.15	0.16	0.15	2.6
DPT-117	23	53.70	23	--	800	0.34	0.125	0.12	2.1
DPT-118	0.5	75.85	24.5	--	20000	4.7	0.15	0.14	2.45
DPT-118	5	71.35	26	--	800	2.1	0.15	0.14	2.45
DPT-118	10	66.35	21.5	--	800	0.48	0.14	0.13	2.3

TABLE 4-1
Summary of Soil Analytical Results (μg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-118	15	61.35	28	--	800	0.07	0.175	0.165	2.85
DPT-118	20	56.35	320	--	800	6.3	0.125	0.12	2.1
DPT-118	23.5	52.85	25.5	--	800	0.18	0.17	0.16	2.75
DPT-119	0.5	75.72	23.5	--	800	2.9	0.145	0.14	2.4
DPT-119	5	71.22	21.5	--	100000	1.7	0.13	0.125	2.15
DPT-119	10	66.22	23.5	--	800	1.1	0.14	0.13	2.3
DPT-119	15	61.22	28.5	--	800	0.075	0.18	0.17	3
DPT-119	19.5	56.72	19	--	800	3.4	0.12	0.115	2
DPT-119	23	53.22	25	--	800	0.21	0.155	0.145	2.55
DPT-120	0.5	76.78	25	--	1700000	0.99	0.165	0.155	2.7
DPT-120	5	72.28	25.5	--	50000	1.8	0.185	0.175	3.05
DPT-120	10	67.28	23.5	--	800	0.61	0.145	0.135	2.4
DPT-120	15	62.28	27.5	--	800	0.18	0.17	0.16	2.8
DPT-120	20	57.28	28	--	800	0.07	0.17	0.16	2.8
DPT-120	23.5	53.78	21	--	800	0.65	0.11	0.105	1.85
DPT-120-S1	0.5	76.78	--	--	600000	--	--	--	--
DPT-120-S2	0.5	76.83	--	--	1400000	--	--	--	--
DPT-120-S3	0.5	76.63	--	--	2300000	--	--	--	--
DPT-120-S4	0.5	76.60	--	--	1000000	--	--	--	--
DPT-120-S5	0.5	76.88	--	--	330000	--	--	--	--
DPT-120-S6	0.5	76.50	--	--	2000000	--	--	--	--
DPT-121	0.5	75.20	25.5	--	32000	4.3	0.16	0.15	2.6
DPT-121	5	70.70	23.5	--	800	2.8	0.145	0.135	2.35
DPT-121	10	65.70	25	--	800	0.3	0.145	0.135	2.35
DPT-121	15	60.70	26.5	--	800	0.07	0.175	0.165	2.85
DPT-121	18	57.70	21	--	800	2.7	0.125	0.12	2.05
DPT-121	23.5	52.20	25	--	800	0.065	0.155	0.145	2.55
DPT-122	0.5	75.06	27	--	130000	0.7	0.18	0.17	3
DPT-122	5	70.56	22.5	--	800	1.3	0.135	0.13	2.25
DPT-122	8	67.56	20.5	--	800	2	0.13	0.12	2.15
DPT-122	10	65.56	23.5	--	800	0.4	0.145	0.135	2.4
DPT-122	15	60.56	27.5	--	800	0.21	0.165	0.155	2.75
DPT-122	19	56.56	3700000	--	2000000	270	115	105	1900
DPT-122	25.5	50.06	6500000	--	4400000	1300	140	135	2350
DPT-123	0.5	74.53	29.5	--	39000	0.69	0.195	0.185	3.2
DPT-123	5	70.03	22.5	--	800	3.1	0.145	0.135	2.4
DPT-123	10	65.03	24	--	800	0.63	0.145	0.135	2.4
DPT-123	15	60.03	27.5	--	800	0.53	0.18	0.17	3
DPT-123	21.5	53.53	21.5	--	800	0.41	0.135	0.125	2.2
DPT-123	25	50.03	25	--	800	0.16	0.145	0.135	2.35
DPT-124	0.5	73.98	24	--	170000	1.6	0.16	0.15	2.65
DPT-124	5	69.48	20.5	--	800	2	0.13	0.125	2.15
DPT-124	10	64.48	23.5	--	800	0.32	0.145	0.135	2.35
DPT-124	15	59.48	26.5	--	800	0.07	0.175	0.165	2.85
DPT-124	21.5	52.98	24	--	800	0.06	0.15	0.14	2.5
DPT-124	25	49.48	26	--	800	0.065	0.16	0.15	2.6
DPT-125	0.5	74.88	320	--	390000	0.57	0.18	0.17	3
DPT-125	5	70.38	22.5	--	10000	1.3	0.16	0.15	2.65
DPT-125	10	65.38	25	--	800	0.46	0.125	0.12	2.1
DPT-125	15	60.38	29	--	800	0.07	0.175	0.165	2.85
DPT-125	19	56.38	1300	--	800	12	0.135	0.125	2.2
DPT-125	25	50.38	1800	--	800	8.6	0.14	0.13	2.3
DPT-126	0.5	74.85	28	--	410000	5	0.165	0.155	2.7
DPT-126	5	70.35	26.5	--	800	0.92	0.17	0.16	2.8
DPT-126	10	65.35	19.5	--	800	1.3	0.12	0.11	1.95

TABLE 4-1
Summary of Soil Analytical Results (µg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-126	15	60.35	27.5	--	800	0.14	0.175	0.16	2.85
DPT-126	19	56.35	26.5	--	800	0.23	0.165	0.155	2.7
DPT-126	25	50.35	21.5	--	800	0.56	0.13	0.125	2.15
DPT-127	0.5	74.43	580	--	350000	1	0.185	0.175	3.1
DPT-127	5	69.93	24.5	--	800	1.2	0.145	0.14	2.45
DPT-127	10	64.93	19	--	800	0.87	0.125	0.12	2.1
DPT-127	15	59.93	21.5	--	800	0.79	0.14	0.13	2.3
DPT-127	19.5	55.43	27.5	--	800	0.15	0.17	0.16	2.8
DPT-127	26	48.93	21.5	--	800	0.56	0.135	0.125	2.25
DPT-128	0.5	73.83	31	--	610000	1.9	0.185	0.175	3.05
DPT-128	5	69.33	30	--	800	1.1	0.175	0.16	2.85
DPT-128	10	64.33	20	--	800	0.62	0.125	0.115	2.05
DPT-128	15	59.33	25	--	800	0.26	0.175	0.16	2.85
DPT-128	19	55.33	27.5	--	800	0.39	0.165	0.155	2.7
DPT-128	25	49.33	19.5	--	800	0.65	0.14	0.13	2.3
DPT-129	0.5	73.51	27	--	190000	1.4	0.155	0.145	2.55
DPT-129	5	69.01	23.5	--	800	1.9	0.155	0.145	2.5
DPT-129	10	64.01	22.5	--	800	0.51	0.135	0.13	2.25
DPT-129	15	59.01	27	--	800	0.31	0.175	0.165	2.9
DPT-129	20	54.01	650	--	800	0.77	0.135	0.125	2.2
DPT-129	25	49.01	27	--	800	0.44	0.18	0.17	3
DPT-130	0.5	74.59	25.5	--	170000	1.7	0.155	0.145	2.6
DPT-130	5	70.09	26.5	--	5700	1.3	0.175	0.165	2.85
DPT-130	10	65.09	20.5	--	800	14	0.125	0.115	2.05
DPT-130	15	60.09	25.5	--	800	0.36	0.17	0.16	2.8
DPT-130	19.5	55.59	28.5	--	800	0.43	0.17	0.16	2.8
DPT-130	24.5	50.59	26	--	800	0.28	0.16	0.15	2.65
DPT-131	0.5	73.80	28.5	--	680000	2.4	0.175	0.165	2.85
DPT-131	5	69.30	23	--	800	1.7	0.15	0.145	2.5
DPT-131	10	64.30	20	--	800	0.8	0.145	0.135	2.35
DPT-131	15	59.30	27	--	800	0.35	0.16	0.15	2.6
DPT-131	19.5	54.80	850	--	800	0.97	0.125	0.115	2.05
DPT-131	24	50.30	28	--	800	0.15	0.175	0.16	2.85
DPT-132	0.5	73.47	29.5	--	350000	1.9	0.17	0.16	2.8
DPT-132	5	68.97	25.5	--	800	1.3	0.175	0.165	2.9
DPT-132	10	63.97	23	--	800	0.45	0.14	0.13	2.25
DPT-132	15	58.97	24	--	800	0.39	0.155	0.145	2.6
DPT-132	18.5	55.47	25.5	--	800	0.065	0.165	0.155	2.7
DPT-132	26.5	47.47	19	--	800	0.38	0.135	0.125	2.2
DPT-133	0.5	73.56	26	--	540000	2.6	0.155	0.15	2.6
DPT-133	5	69.06	24.5	--	800	2.3	0.17	0.16	2.8
DPT-133	10	64.06	22	--	800	2.4	0.125	0.12	2.1
DPT-133	15	59.06	28.5	--	800	0.19	0.185	0.175	3.05
DPT-133	22.5	51.56	25	--	800	0.19	0.15	0.14	2.45
DPT-133	25	49.06	25.5	--	800	0.065	0.165	0.155	2.7
DPT-134	0.5	74.96	24.5	--	460000	0.4	0.15	0.14	2.5
DPT-134	5	70.46	28.5	--	800	1.1	0.17	0.16	2.8
DPT-134	10	65.46	21	--	800	0.38	0.13	0.125	2.15
DPT-134	15	60.46	27	--	800	0.065	0.16	0.15	2.65
DPT-134	19.5	55.96	310	--	800	0.47	0.125	0.115	2.05
DPT-134	25	50.46	430	--	800	0.14	0.155	0.15	2.6
DPT-135	0.5	75.15	22	--	290000	3.7	0.165	0.155	2.7
DPT-135	5	70.65	33	--	800	1.5	0.19	0.18	3.15
DPT-135	10	65.65	22.5	--	800	0.42	0.145	0.135	2.35
DPT-135	15	60.65	28.5	--	800	0.075	0.18	0.17	3

TABLE 4-1
Summary of Soil Analytical Results (µg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-135	19	56.65	4500	--	170000	1.5	0.125	0.12	2.1
DPT-135	25	50.65	1100	--	800	3.35	8	7.5	135
DPT-136	0.5	74.75	29	--	320000	2.2	0.19	0.175	3.1
DPT-136	5	70.25	27.5	--	800	2.7	0.18	0.17	2.95
DPT-136	10	65.25	26.5	--	800	0.55	0.155	0.145	2.55
DPT-136	15	60.25	26	--	800	0.23	0.155	0.15	2.6
DPT-136	19	56.25	1500	--	800	7	0.135	0.125	2.2
DPT-136	25	50.25	3300	--	800	7.1	0.155	0.15	2.6
DPT-137	0.5	76.17	29.5	--	770000	1.9	0.17	0.16	2.75
DPT-137	5	71.67	31	--	800	0.82	0.205	0.195	3.4
DPT-137	10	66.67	25	--	800	0.94	0.16	0.15	2.65
DPT-137	15	61.67	27	--	800	0.2	0.16	0.15	2.65
DPT-137	19.5	57.17	25.5	--	800	0.07	0.17	0.16	2.75
DPT-137	25	51.67	30	--	800	0.65	0.205	0.19	3.35
DPT-138	0.5	75.58	24	--	96000	0.61	0.165	0.155	2.7
DPT-138	5	71.08	34	--	800	0.62	0.215	0.2	3.55
DPT-138	10	66.08	21	--	800	1.3	0.125	0.12	2.05
DPT-138	15	61.08	27	--	800	0.07	0.17	0.16	2.8
DPT-138	19.5	56.58	28	--	800	0.07	0.175	0.165	2.85
DPT-138	25	51.08	25.5	--	800	0.065	0.165	0.155	2.7
DPT-139	0.5	75.99	26.5	--	420000	0.29	0.185	0.175	3.05
DPT-139	5	71.49	40.5	--	800	0.16	0.185	0.175	3.1
DPT-139	10	66.49	29	--	800	0.07	0.17	0.16	2.8
DPT-139	15.5	60.99	21	--	800	0.87	0.145	0.14	2.4
DPT-139	19	57.49	26.5	--	800	0.075	0.175	0.165	2.9
DPT-139	25	51.49	25	--	800	0.07	0.17	0.16	2.75
DPT-140	0.5	75.75	27.5	--	310000	0.065	0.165	0.155	2.7
DPT-140	5	71.25	48	--	800	0.21	0.185	0.175	3.1
DPT-140	10	66.25	30	--	800	0.075	0.175	0.165	2.9
DPT-140	15	61.25	24	--	800	0.29	0.16	0.15	2.65
DPT-140	18.5	57.75	550	--	800	0.19	0.175	0.165	2.85
DPT-140	25	51.25	15000000	--	16000000	4100	165	155	2700
DPT-141	0.5	74.99	28	--	290000	0.07	0.165	0.155	2.75
DPT-141	5	70.49	23.5	--	28000	0.28	0.185	0.175	3.05
DPT-141	10	65.49	20.5	--	800	1.7	0.13	0.125	2.15
DPT-141	14.5	60.99	28	--	800	0.27	0.165	0.155	2.7
DPT-141	19.5	55.99	520	--	800	1.6	0.11	0.105	1.85
DPT-141	25	50.49	2300000	--	6300000	1600	75	70	1250
DPT-142	0.5	75.62	25	--	250000	1.6	0.155	0.145	2.55
DPT-142	5	71.12	29.5	--	100000	0.27	0.175	0.165	2.85
DPT-142	10	66.12	19.5	--	800	1.9	0.115	0.11	1.95
DPT-142	15	61.12	26	--	800	0.19	0.16	0.15	2.65
DPT-142	19	57.12	20	--	800	1.9	0.125	0.12	2.1
DPT-142	25	51.12	25.5	--	73000	0.76	0.13	0.12	2.15
DPT-143	0.5	75.82	26	--	560000	0.16	0.17	0.16	2.8
DPT-143	5	71.32	26.5	--	800	0.43	0.155	0.145	2.6
DPT-143	10	66.32	26.5	--	800	0.07	0.17	0.16	2.8
DPT-143	15	61.32	30	--	800	0.16	0.18	0.17	3
DPT-143	19.5	56.82	21.5	--	800	1	0.13	0.12	2.1
DPT-143	25.5	50.82	780	--	800	0.96	0.15	0.14	2.5
DPT-144	0.5	74.87	25	--	780000	0.99	0.155	0.15	2.6
DPT-144	5	70.37	29	--	59000	0.075	0.18	0.17	3
DPT-144	10	65.37	20	--	800	0.49	0.125	0.115	2.05
DPT-144	15	60.37	24.5	--	800	0.49	0.14	0.13	2.3
DPT-144	19	56.37	500	--	800	1.5	0.13	0.12	2.15

TABLE 4-1
Summary of Soil Analytical Results (µg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-144	25	50.37	16000	--	800	55	130	125	2150
DPT-145	0.5	74.62	28.5	--	130000	0.075	0.18	0.17	3
DPT-145	5	70.12	30	--	800	0.075	0.185	0.175	3.05
DPT-145	10.5	64.62	21	--	800	1.4	0.135	0.125	2.2
DPT-145	15	60.12	26.5	--	800	0.18	0.165	0.155	2.7
DPT-145	19	56.12	6800000	--	2700000	8200	140	135	2350
DPT-145	25	50.12	7800000	--	4700000	11000	140	135	2350
DPT-146	0.5	76.01	25.5	--	130000	0.63	0.165	0.155	2.7
DPT-146	5	71.51	28	--	800	0.43	0.185	0.175	3.05
DPT-146	10	66.51	280	--	800	2.2	0.125	0.115	2.05
DPT-146	15	61.51	25	--	800	0.81	0.155	0.145	2.55
DPT-146	19	57.51	25	--	800	0.27	0.15	0.14	2.45
DPT-146	25	51.51	21	--	800	1.1	0.125	0.115	2.05
DPT-147	0.5	75.62	27	--	62000	1.2	0.17	0.16	2.8
DPT-147	5	71.12	14.5	--	800	0.57	0.18	0.17	2.95
DPT-147	10	66.12	21	--	800	1.8	0.125	0.12	2.1
DPT-147	15	61.12	26	--	800	0.52	0.155	0.145	2.55
DPT-147	20	56.12	20	--	800	1.1	0.125	0.12	2.1
DPT-147	25	51.12	340	--	800	0.9	0.12	0.115	2
DPT-148	0.5	75.03	29	--	84000	0.8	0.175	0.165	2.9
DPT-148	5	70.53	28.5	--	800	0.26	0.17	0.16	2.8
DPT-148	10	65.53	20	--	800	4.1	0.125	0.115	2.05
DPT-148	15	60.53	21.5	--	800	0.44	0.135	0.125	2.2
DPT-148	19.5	56.03	30	--	800	0.08	0.19	0.18	3.15
DPT-148	25	50.53	28.5	--	800	0.075	0.18	0.17	2.95
DPT-149	0.5	74.70	29	--	110000	1.7	0.175	0.165	2.9
DPT-149	5	70.20	28	--	800	2.5	0.18	0.17	3
DPT-149	9.5	65.70	27.5	--	800	0.07	0.175	0.16	2.85
DPT-149	15	60.20	21	--	800	0.45	0.12	0.115	2
DPT-149	25	50.20	490	--	800	0.76	0.125	0.115	2.05
DPT-150	0.5	73.84	30	--	210000	11	0.16	0.15	2.65
DPT-150	5	69.34	28	--	800	0.46	0.165	0.155	2.75
DPT-150	10	64.34	20	--	800	2.1	0.13	0.12	2.15
DPT-150	15	59.34	20	--	800	0.76	0.13	0.12	2.1
DPT-150	20	54.34	19	--	800	0.81	0.12	0.11	1.95
DPT-150	25	49.34	24	--	5900	1.1	0.155	0.15	2.6
DPT-151	0.5	74.21	24.5	--	68000	2.4	0.165	0.155	2.75
DPT-151	5	69.71	27.5	--	8700	0.41	0.175	0.165	2.85
DPT-151	10	64.71	25	--	800	0.17	0.165	0.155	2.75
DPT-151	15	59.71	20	--	800	0.67	0.125	0.12	2.1
DPT-151	19.5	55.21	20.5	--	800	0.47	0.13	0.12	2.1
DPT-151	25	49.71	19.5	--	6900	0.32	0.13	0.125	2.15
DPT-152	0.5	75.16	26.5	--	850000	0.57	0.16	0.15	2.6
DPT-152	5	70.66	29	--	21000	0.075	0.18	0.17	3
DPT-152	10	65.66	26.5	--	800	0.065	0.155	0.145	2.55
DPT-152	15	60.66	21	--	9900	0.28	0.145	0.135	2.35
DPT-152	20	55.66	28	--	800	0.07	0.165	0.155	2.7
DPT-152	25	50.66	2300000	--	320000	3.6	8.5	8	145
DPT-153	0.5	74.55	24.5	--	1500000	1.2	0.16	0.15	2.65
DPT-153	5	70.05	27	--	64000	0.065	0.155	0.145	2.5
DPT-153	10	65.05	22	--	800	1.4	0.155	0.145	2.55
DPT-153	12	63.05	8200	--	1200000	2.4	6	5.5	95
DPT-153	14.5	60.55	500000	--	280000	32.5	80	75	1300
DPT-153	19.5	55.55	270000	--	790000	2.7	6.5	6	105
DPT-153	25	50.05	30000	--	32000	2.35	5.5	5.5	95

TABLE 4-1
Summary of Soil Analytical Results (µg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-154	0.5	74.37	27	--	990000	0.35	0.16	0.15	2.65
DPT-154	5	69.87	28	--	33000	0.075	0.175	0.165	2.9
DPT-154	10	64.87	300000	--	590000	5	12.5	11.5	205
DPT-154	15	59.87	420000	--	2200000	3.4	8	7.5	135
DPT-154	19.5	55.37	2100	--	5500	3.8	9	8.5	150
DPT-154	25	49.87	420	--	800	1.5	0.135	0.125	2.2
DPT-155	0.5	75.85	25	--	160000	0.82	0.15	0.14	2.5
DPT-155	5	71.35	20	--	800	3.2	0.12	0.115	2
DPT-155	10	66.35	26.5	--	800	2.3	0.17	0.16	2.75
DPT-155	15	61.35	22	--	800	0.89	0.145	0.14	2.4
DPT-155	20	56.35	20	--	800	1.4	0.14	0.13	2.25
DPT-155	25	51.35	20	--	800	1.3	0.135	0.125	2.2
DPT-156	0.5	76.49	29.5	--	5300000	2.5	0.17	0.16	2.8
DPT-156	2	74.99	21.5	--	800	2.6	0.19	0.175	3.1
DPT-156	5	71.99	29.5	--	4000000	1.2	0.2	0.19	3.3
DPT-156	10	66.99	21.5	--	800	2.2	0.135	0.13	2.25
DPT-156	15	61.99	28	--	800	0.075	0.185	0.175	3.05
DPT-156	19.75	57.24	31	--	800	0.07	0.165	0.155	2.7
DPT-157	0.5	76.65	36.5	--	930000	1.6	0.135	0.13	2.25
DPT-157	5	72.15	27.5	--	800	0.3	0.17	0.16	2.8
DPT-157	10	67.15	27	--	800	0.2	0.155	0.145	2.55
DPT-157	15	62.15	27	--	800	0.27	0.165	0.155	2.7
DPT-157	19.75	57.40	25.5	--	800	0.065	0.165	0.155	2.7
DPT-157	25	52.15	23.5	--	79000	0.3	0.145	0.135	2.35
DPT-158	0.5	77.08	25	--	330000	2.5	0.155	0.145	2.55
DPT-158	5	72.58	28	--	800	3.9	0.17	0.16	2.8
DPT-158	7	70.58	520000	--	67000000	0.21	0.14	0.135	2.35
DPT-158	10	67.58	29	--	800	0.41	0.165	0.155	2.7
DPT-158	15	62.58	29.5	--	800	0.07	0.175	0.16	2.85
DPT-158	19.5	58.08	29	--	800	0.07	0.175	0.165	2.85
DPT-158	25.5	52.08	24	--	800	1.1	0.15	0.14	2.45
DPT-158-S1	7	70.51	28.5	--	800	0.18	0.185	0.175	3.05
DPT-158-S2	5	72.50	28	--	8300000	3.2	0.185	0.175	3.05
DPT-158-S2	7	70.50	670	--	9300000	0.55	0.155	0.145	2.5
DPT-158-S3	5.5	71.94	2700	--	50000000	0.22	0.205	0.195	3.4
DPT-158-S3	8	69.44	29.5	--	800	0.07	0.165	0.155	2.7
DPT-158-S4	3	74.48	33.5	--	14000000	0.25	0.185	0.175	3.05
DPT-158-S4	7.5	69.98	180000	--	48000000	2.6	6.5	6	105
DPT-158-S5	7	70.39	28	--	800	0.22	0.175	0.165	2.9
DPT-158-S6	7	70.41	29.5	--	800	0.065	0.165	0.155	2.7
DPT-158-S7	0.5	76.87	28	--	--	--	--	--	--
DPT-158-S7	5	72.37	27.5	--	--	3.8	0.17	0.16	2.75
DPT-158-S7	7	70.37	27.5	--	--	0.2	0.175	0.165	2.9
DPT-159	0.5	74.27	25	--	360000	0.63	0.155	0.145	2.55
DPT-159	5	69.77	29.5	--	800	0.075	0.18	0.17	3
DPT-159	10	64.77	23.5	--	800	0.69	0.135	0.13	2.25
DPT-159	15	59.77	20.5	--	800	1.6	0.125	0.115	2.05
DPT-159	19.5	55.27	20	--	800	0.72	0.125	0.12	2.1
DPT-159	25	49.77	25	--	800	0.68	0.155	0.145	2.55
DPT-160	0.5	75.70	26	--	410000	0.4	0.155	0.145	2.5
DPT-160	3	73.20	30	--	800	0.28	0.17	0.16	2.75
DPT-160	10	66.20	20.5	--	800	1.1	0.13	0.125	2.15
DPT-160	15.5	60.70	20.5	--	800	0.73	0.12	0.115	2
DPT-160	21.5	54.70	22.5	--	800	0.31	0.14	0.13	2.3
DPT-160	25	51.20	24	--	800	0.64	0.145	0.14	2.4

TABLE 4-1
Summary of Soil Analytical Results (µg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-161	0.5	76.16	27	--	2400000	0.23	0.16	0.15	2.6
DPT-161	5	71.66	29	--	800	0.07	0.17	0.16	2.8
DPT-161	11.5	65.16	19.5	--	800	0.44	0.145	0.14	2.45
DPT-161	15.5	61.16	19.5	--	800	0.85	0.12	0.115	1.95
DPT-161	20	56.66	26	--	76000	0.065	0.155	0.145	2.5
DPT-161	25	51.66	23.5	--	800	0.27	0.135	0.13	2.25
DPT-161-S1	0.5	75.81	--	--	80000	--	--	--	--
DPT-161-S2	0.5	75.69	--	--	15000	--	--	--	--
DPT-161-S3	0.5	75.78	--	--	42000	--	--	--	--
DPT-161-S4	0.5	75.66	--	--	900000	--	--	--	--
DPT-162	0.5	74.66	34.5	--	2100000	0.79	0.19	0.18	3.15
DPT-162	5	70.16	27.5	--	800	1.7	0.18	0.17	3
DPT-162	10	65.16	19	--	800	1.5	0.13	0.125	2.15
DPT-162	15	60.16	29	--	800	0.2	0.17	0.16	2.8
DPT-162	19	56.16	970	--	800	2.6	0.115	0.11	1.9
DPT-162	25	50.16	1300000	--	4400000	17	41	38.5	650
DPT-162-S1	0.5	74.59	--	--	1500000	1.6	0.17	0.16	2.8
DPT-162-S2	0.5	74.58	--	--	2600000	1.2	0.165	0.155	2.7
DPT-162-S3	0.5	74.56	--	--	820000	1.2	0.175	0.165	2.9
DPT-163	0.5	73.81	29.5	--	380000	2.5	0.165	0.155	2.75
DPT-163	5	69.31	31	--	9500	0.98	0.185	0.175	3.05
DPT-163	6.5	67.81	26.5	--	800	0.99	0.165	0.155	2.7
DPT-163	10	64.31	23.5	--	800	0.63	0.155	0.145	2.55
DPT-163	15	59.31	28	--	2500	0.17	0.175	0.165	2.9
DPT-163	19.5	54.81	20000	--	31000	2.45	6	5.5	100
DPT-163	25	49.31	2700000	--	7100000	27.5	65	65	1100
DPT-164	0.5	74.82	27	--	1100000	1.5	0.17	0.16	2.75
DPT-164	5	70.32	28	--	110000	0.51	0.165	0.155	2.7
DPT-164	10	65.32	19.5	--	800	1.3	0.135	0.125	2.2
DPT-164	15	60.32	19.5	--	800	0.69	0.125	0.12	2.1
DPT-164	19	56.32	19	--	800	1.7	0.13	0.12	2.1
DPT-164	25	50.32	24.5	--	6400	0.15	0.155	0.15	2.6
DPT-165	0.5	74.64	24	--	670000	0.87	0.155	0.145	5.2
DPT-165	5	70.14	28	--	49000	0.15	0.175	0.165	2.9
DPT-165	11	64.14	23.5	--	92000	0.62	0.14	0.135	2.35
DPT-165	15	60.14	28.5	--	800	0.075	0.175	0.165	2.9
DPT-165	19	56.14	27.5	--	8000	0.07	0.175	0.165	2.85
DPT-165	25	50.14	61000	--	16000	0.065	0.16	0.15	2.65
DPT-165-S1	0.5	74.70	--	--	760000	0.14	0.115	0.105	1.9
DPT-165-S2	0.5	74.60	--	--	580000	2.7	0.16	0.15	2.65
DPT-166	0.5	74.75	25	--	9500	2.3	0.16	0.15	2.65
DPT-166	5	70.25	24	--	800	0.84	0.165	0.155	2.7
DPT-166	10	65.25	26	--	800	0.075	0.18	0.17	2.95
DPT-166	15	60.25	28.5	--	800	0.075	0.185	0.175	3.1
DPT-166	19.5	55.75	19	--	800	1.9	0.125	0.12	2.05
DPT-166	25	50.25	24	--	800	0.4	0.15	0.14	2.45
DPT-167	0.5	74.26	25.5	--	4600000	0.92	0.155	0.145	2.55
DPT-167	5	69.76	28	--	800	1.4	0.17	0.16	2.75
DPT-167	10	64.76	20.5	--	800	3	0.12	0.115	2
DPT-167	15	59.76	29.5	--	800	0.07	0.175	0.165	2.85
DPT-167	19.5	55.26	280	--	800	1.7	0.115	0.105	1.9
DPT-167	25	49.76	250	--	800	0.28	0.15	0.14	2.5
DPT-167-S1	0.5	74.30	--	--	120000	--	--	--	--
DPT-167-S2	0.5	74.34	--	--	680000	--	--	--	--
DPT-167-S3	0.5	74.29	--	--	720000	--	--	--	--

TABLE 4-1
Summary of Soil Analytical Results (µg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-168	0.5	74.96	27	--	390000	1	0.15	0.14	2.45
DPT-168	5	70.46	26.5	--	800	1.9	0.155	0.145	2.55
DPT-168	9.5	65.96	25.5	--	800	0.59	0.15	0.14	2.45
DPT-168	15	60.46	29	--	800	0.075	0.18	0.17	3
DPT-168	19	56.46	29	--	800	0.07	0.165	0.155	2.75
DPT-168	25	50.46	24.5	--	800	0.065	0.16	0.15	2.65
DPT-169	0.5	74.81	28.5	--	140000	5.4	0.165	0.155	2.7
DPT-169	5	70.31	27.5	--	7700	1.1	0.175	0.165	2.9
DPT-169	10	65.31	22	--	800	1.5	0.13	0.12	2.1
DPT-169	15	60.31	28.5	--	800	0.075	0.175	0.165	2.9
DPT-169	19.5	55.81	28.5	--	800	0.68	0.19	0.175	3.1
DPT-169	22	53.31	22	--	800	0.92	0.155	0.15	2.6
DPT-169	25.5	49.81	20.5	--	800	1.3	0.155	0.15	2.6
DPT-170	0.5	75.02	27	--	750000	5.3	0.17	0.16	2.8
DPT-170	5	70.52	21	--	800	1.1	0.155	0.15	2.6
DPT-170	10	65.52	23	--	800	0.26	0.155	0.145	2.55
DPT-170	15	60.52	27.5	--	800	0.075	0.175	0.165	2.9
DPT-170	19	56.52	630	--	5700	0.23	0.145	0.135	2.35
DPT-170	25	50.52	27	--	800	0.07	0.175	0.16	2.85
DPT-171	0.5	75.24	26.5	--	27000	6.8	0.165	0.155	2.7
DPT-171	5	70.74	24.5	--	800	1.5	0.165	0.155	2.7
DPT-171	10	65.74	21.5	--	800	0.3	0.145	0.135	2.4
DPT-171	15	60.74	28.5	--	800	0.14	0.16	0.15	2.65
DPT-171	19.5	56.24	23000	--	23000	52	6	6	100
DPT-171	25	50.74	1700000	--	33000	110	30	28	490
DPT-172	0.5	74.46	23.5	--	200000	1.5	0.155	0.145	2.55
DPT-172	5	69.96	27.5	--	800	0.77	0.2	0.19	3.3
DPT-172	10	64.96	22	--	800	1.4	0.14	0.13	2.3
DPT-172	15	59.96	30.5	--	800	0.075	0.185	0.175	3.05
DPT-172	19.5	55.46	19.5	--	800	0.59	0.12	0.115	2
DPT-172	25	49.96	28	--	800	0.065	0.16	0.15	2.65
DPT-173	0.5	74.12	24	--	650000	0.89	0.165	0.155	2.7
DPT-173	5	69.62	32	--	800	0.98	0.175	0.165	2.85
DPT-173	10	64.62	21	--	800	2.2	0.13	0.125	2.2
DPT-173	15	59.62	23.5	--	800	0.34	0.15	0.14	2.5
DPT-173	19	55.62	21.5	--	800	0.95	0.135	0.125	2.2
DPT-173	27	47.62	25	--	800	0.07	0.17	0.16	2.8
DPT-174	0.5	74.40	31	--	2700000	1.4	0.16	0.15	2.6
DPT-174	1.5	73.40	30	--	4900000	2	0.17	0.16	2.8
DPT-174	5	69.90	29.5	--	800	1.8	0.205	0.195	3.4
DPT-174	10	64.90	24.5	--	25000	5.7	0.14	0.135	2.35
DPT-174	15	59.90	23.5	--	800	0.35	0.16	0.15	2.65
DPT-174	19.5	55.40	23	--	500000	1.3	0.13	0.12	2.1
DPT-174	25	49.90	21.5	--	800	0.87	0.125	0.115	2
DPT-174-S1	0.5	74.37	--	--	840000	4.2	0.165	0.155	2.7
DPT-174-S1	5	69.87	--	--	800	3.4	0.185	0.175	3.05
DPT-174-S1	9.5	65.37	--	--	800	6.2	0.14	0.135	2.35
DPT-174-S2	0.5	74.34	--	--	3800000	5.7	0.18	0.17	2.95
DPT-174-S2	5	69.84	--	--	800	1.3	0.2	0.19	3.3
DPT-174-S2	8	66.84	--	--	800	2.2	0.14	0.13	2.3
DPT-174-S3	0.5	74.43	--	--	3400000	4.9	0.18	0.17	3
DPT-174-S3	5	69.93	--	--	800	1.3	0.18	0.17	3
DPT-174-S3	10	64.93	--	--	800	1.2	0.135	0.125	2.25
DPT-174-S4	0.5	74.47	--	--	980000	4.1	0.155	0.145	2.6
DPT-174-S4	5	69.97	--	--	--	1.1	0.2	0.185	3.25

TABLE 4-1
Summary of Soil Analytical Results (µg/kg) [1/]
DFSP Norwalk Site, Norwalk California

Sample Location	Sample Depth	Sample Elevation	TPH [/2] as Gasoline	TPH as JP-5 [3/]	TPH as Diesel	Benzene	1,2-Dichloro-ethane (1,2-DCA)	Methyl-t-Butyl Ether (MTBE)	Tert-Butyl Alcohol (TBA)
DPT-174-S4	10	64.97	--	--	--	3.2	0.135	0.13	2.25

Notes:

[1/] all results in micrograms per kilogram (µg/kg)
[2/] TPH = Total Petroleum Hydrocarbons
[3/] JP-5 = Jet Propellant 5
[4/] All non-detects are reported at one-half of the method detection limit for use in the EVS modeling program.
[5/] -- = Not analyzed

TABLE 4-2
Summary of Detected Soil Gas VOC Analytical Results
DFSP Norwalk Site, Norwalk California

Chemcial Name	Unit	VMP-29-05			VMP-29-15			VMP-30-05			VMP-30-15			VMP-31-05		
		2Q2011	3Q2011	4Q2011	2Q2011	3Q2011	4Q2011	2Q2011	3Q2011	4Q2011	2Q2011	3Q2011	4Q2011	2Q2011	3Q2011	4Q2011
1,2,4-Trimethylbenzene	µg/L	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074
1,2-Dichlorobenzene	µg/L	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030
1,2-Dichloroethane	µg/L	**0.0068**	< 0.0020	< 0.0020	**0.0045**	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020
1,3,5-Trimethylbenzene	µg/L	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025
1,3-Dichlorobenzene	µg/L	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030
1,4-Dichlorobenzene	µg/L	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030
2-Butanone	µg/L	< 0.0044	**0.013**	< 0.0044	< 0.0044	**0.0097**	< 0.0044	< 0.0044	**0.017**	**0.0072**	< 0.0044	**0.017**	**0.0048**	< 0.0044	**0.01**	< 0.0044
2-Hexanone	µg/L	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061
4-Ethyltoluene	µg/L	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025
Acetone	µg/L	**0.02**	**0.026**	< 0.0048	**0.021**	**0.04**	**0.014**	**0.021**	**0.054**	**0.042**	**0.023**	**0.08**	**0.018**	**0.012**	**0.042**	**0.0096**
Benzene	µg/L	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016
Bromodichloromethane	µg/L	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0043**	< 0.0034
c-1,2-Dichloroethene	µg/L	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020
Carbon Disulfide	µg/L	< 0.0062	**0.014**	< 0.0062	< 0.0062	**0.022**	< 0.0062	< 0.0062	< 0.0062	< 0.0062	< 0.0062	**0.022**	< 0.0062	< 0.0062	**0.017**	< 0.0062
Carbon Tetrachloride	µg/L	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031
Chloroform	µg/L	**0.0063**	**0.011**	**0.0028**	< 0.0024	**0.003**	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	**0.021**	**0.065**	**0.013**
Chloromethane	µg/L	**0.0056**	**0.0047**	**0.0042**	< 0.0010	**0.0084**	**0.0032**	< 0.0010	**0.0034**	**0.0034**	< 0.0010	**0.0048**	< 0.0010	< 0.0010	**0.011**	**0.0029**
e	µg/L	**0.0031**	**0.0027**	**0.0032**	**0.0027**	**0.0027**	**0.0034**	< 0.0025	**0.0025**	**0.0032**	< 0.0025	**0.0027**	**0.0032**	**0.0029**	**0.0028**	**0.0032**
Ethylbenzene	µg/L	< 0.0022	**0.0022**	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	**0.0027**	< 0.0022
Isobutane	µg/L	< 0.012	< 0.012	< 0.012	< 0.012	< 0.012	**0.024**	< 0.012	< 0.012	< 0.012	< 0.012	**0.26**	**0.015**	< 0.012	< 0.012	< 0.012
Methylene Chloride	µg/L	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
o-Xylene	µg/L	< 0.0022	**0.0025**	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	**0.0046**	**0.0068**	< 0.0022
p/m-Xylene	µg/L	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087
(TBA)	µg/L	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061
Tetrachloroethene	µg/L	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0042**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Toluene	µg/L	< 0.0019	**0.0061**	< 0.0019	< 0.0019	**0.0029**	< 0.0019	< 0.0019	**0.0044**	**0.0023**	< 0.0019	**0.002**	< 0.0019	< 0.0019	**0.0025**	< 0.0019
Trichloroethene	µg/L	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027
Vinyl Acetate	µg/L	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070

Notes:
4Q2010 = fourth quarter 2010 (sampled in December 2010)
1Q2011 = first quarter 2011 (sampled in March 2011)
2Q2011 = second quarter 2011 (sampled in June 2011)
3Q2011 = third quarter 2011 (sampled in September 2011)
4Q2011 = fourth quarter 2011 (sampled in December 2011)
µg/L = micrograms per liter

TABLE 4-2
Summary of Detected Soil Gas VOC Analytical Results
DFSP Norwalk Site, Norwalk California

Chemcial Name	Unit	VMP-31-15			VMP-32-05					VMP-32-15				
		2Q2011	3Q2011	4Q2011	4Q2010	1Q2011	2Q2011	3Q2011	4Q2011	4Q2010	1Q2011	2Q2011	3Q2011	4Q2011
1,2,4-Trimethylbenzene	µg/L	< 0.0074	< 0.0074	< 0.0074	< 0.018	< 0.0074	< 0.018	< 0.0074	< 0.0074	< 0.017	< 0.0089	< 0.0074	< 0.0074	< 0.0074
1,2-Dichlorobenzene	µg/L	< 0.0030	< 0.0030	< 0.0030	< 0.0074	< 0.0030	< 0.0075	< 0.0030	**0.041**	< 0.0071	< 0.0036	< 0.0030	< 0.0030	< 0.0030
1,2-Dichloroethane	µg/L	< 0.0020	< 0.0020	< 0.0020	< 0.0050	< 0.0020	< 0.0051	< 0.0020	< 0.0020	< 0.0048	**0.011**	< 0.0020	< 0.0020	< 0.0020
1,3,5-Trimethylbenzene	µg/L	< 0.0025	< 0.0025	< 0.0025	< 0.0060	< 0.0025	< 0.0061	< 0.0025	< 0.0025	< 0.0058	< 0.0030	< 0.0025	< 0.0025	< 0.0025
1,3-Dichlorobenzene	µg/L	< 0.0030	< 0.0030	< 0.0030	< 0.0074	< 0.0030	< 0.0075	< 0.0030	**0.0031**	< 0.0071	< 0.0036	< 0.0030	< 0.0030	< 0.0030
1,4-Dichlorobenzene	µg/L	< 0.0030	< 0.0030	< 0.0030	< 0.0074	< 0.0030	< 0.0075	< 0.0030	**0.012**	< 0.0071	< 0.0036	< 0.0030	< 0.0030	< 0.0030
2-Butanone	µg/L	**0.0067**	**0.033**	< 0.0044	< 0.011	< 0.0044	< 0.011	**0.013**	**0.016**	**0.028**	< 0.0054	**0.0074**	**0.015**	< 0.0044
2-Hexanone	µg/L	< 0.0061	< 0.0061	< 0.0061	< 0.015	< 0.0061	< 0.015	< 0.0061	< 0.0061	< 0.015	< 0.0074	< 0.0061	< 0.0061	< 0.0061
4-Ethyltoluene	µg/L	< 0.0025	< 0.0025	< 0.0025	< 0.0060	< 0.0025	< 0.0061	< 0.0025	< 0.0025	< 0.0058	< 0.0030	< 0.0025	< 0.0025	< 0.0025
Acetone	µg/L	**0.028**	**0.11**	**0.019**	**0.031**	**0.047**	**0.023**	**0.023**	**0.079**	**0.15**	**0.036**	**0.042**	**0.016**	**0.014**
Benzene	µg/L	< 0.0016	< 0.0016	< 0.0016	< 0.0039	< 0.0016	< 0.0040	< 0.0016	< 0.0016	< 0.0038	< 0.0019	< 0.0016	< 0.0016	< 0.0016
Bromodichloromethane	µg/L	< 0.0034	< 0.0034	< 0.0034	< 0.0082	< 0.0034	< 0.0084	< 0.0034	< 0.0034	< 0.0079	< 0.0041	< 0.0034	< 0.0034	< 0.0034
c-1,2-Dichloroethene	µg/L	< 0.0020	< 0.0020	< 0.0020	< 0.0049	< 0.0020	< 0.0050	< 0.0020	< 0.0020	< 0.0047	< 0.0024	< 0.0020	< 0.0020	< 0.0020
Carbon Disulfide	µg/L	< 0.0062	**0.014**	< 0.0062	< 0.015	< 0.0062	< 0.016	**0.014**	**0.0066**	< 0.015	< 0.0075	< 0.0062	< 0.0062	**0.0092**
Carbon Tetrachloride	µg/L	< 0.0031	< 0.0031	< 0.0031	< 0.0077	< 0.0031	< 0.0079	**0.0033**	< 0.0031	< 0.0075	< 0.0038	< 0.0031	< 0.0031	< 0.0031
Chloroform	µg/L	**0.03**	**0.039**	< 0.0024	< 0.0060	< 0.0024	< 0.0061	< 0.0024	< 0.0024	< 0.0058	< 0.0030	< 0.0024	< 0.0024	< 0.0024
Chloromethane	µg/L	< 0.0010	**0.0074**	**0.0035**	< 0.0025	< 0.0010	**0.0042**	**0.007**	**0.0026**	< 0.0024	< 0.0012	**0.0059**	< 0.0010	**0.0034**
e	µg/L	**0.0029**	**0.0027**	**0.0033**	< 0.0061	< 0.0025	< 0.0062	**0.0031**	**0.0028**	< 0.0059	< 0.0030	**0.0026**	< 0.0025	< 0.0025
Ethylbenzene	µg/L	< 0.0022	**0.003**	< 0.0022	< 0.0053	< 0.0022	< 0.0054	**0.0025**	< 0.0022	**0.0064**	< 0.0026	**0.019**	< 0.0022	< 0.0022
Isobutane	µg/L	**0.013**	**0.022**	**0.45**	--	**0.11**	**24**	**0.36**	< 0.012	--	< 0.014	**5.5**	< 0.012	< 0.012
Methylene Chloride	µg/L	< 0.017	< 0.017	< 0.017	< 0.043	< 0.017	< 0.043	< 0.017	< 0.017	< 0.041	< 0.021	< 0.017	< 0.017	< 0.017
o-Xylene	µg/L	**0.0062**	**0.0067**	< 0.0022	< 0.0053	< 0.0022	< 0.0054	**0.0031**	< 0.0022	**0.015**	< 0.0026	**0.0053**	< 0.0022	< 0.0022
p/m-Xylene	µg/L	< 0.0087	< 0.0087	< 0.0087	< 0.021	< 0.0087	< 0.022	< 0.0087	< 0.0087	**0.024**	< 0.011	**0.013**	< 0.0087	< 0.0087
(TBA)	µg/L	< 0.0061	< 0.0061	< 0.0061	< 0.015	< 0.0061	< 0.015	< 0.0061	**0.027**	< 0.014	< 0.0073	< 0.0061	< 0.0061	< 0.0061
Tetrachloroethene	µg/L	< 0.0034	< 0.0034	< 0.0034	**0.11**	**0.073**	**0.014**	< 0.0034	**0.076**	**0.31**	**0.16**	< 0.0034	**0.14**	**0.28**
Toluene	µg/L	< 0.0019	**0.0033**	**0.0036**	< 0.0046	< 0.0019	< 0.0047	**0.006**	**0.0032**	**0.0067**	< 0.0023	**0.002**	**0.0036**	< 0.0019
Trichloroethene	µg/L	< 0.0027	< 0.0027	< 0.0027	< 0.0066	< 0.0027	< 0.0067	< 0.0027	< 0.0027	< 0.0064	**0.015**	< 0.0027	< 0.0027	< 0.0027
Vinyl Acetate	µg/L	< 0.0070	< 0.0070	< 0.0070	< 0.017	< 0.0070	< 0.018	< 0.0070	**0.011**	< 0.017	< 0.0085	< 0.0070	< 0.0070	< 0.0070

Notes:
4Q2010 = fourth quarter 2010 (samplec
1Q2011 = first quarter 2011 (sampled ir
2Q2011 = second quarter 2011 (sample
3Q2011 = third quarter 2011 (sampled i
4Q2011 = fourth quarter 2011 (samplec
µg/L = micrograms per liter

TABLE 4-2
Summary of Detected Soil Gas VOC Analytical Results
DFSP Norwalk Site, Norwalk California

		VMP-33-05					VMP-33-15					VMP-34-05				
Chemcial Name	**Unit**	**4Q2010**	**1Q2011**	**2Q2011**	**3Q2011**	**4Q2011**	**4Q2010**	**1Q2011**	**2Q2011**	**3Q2011**	**4Q2011**	**4Q2010**	**1Q2011**	**2Q2011**	**3Q2011**	**4Q2011**
1,2,4-Trimethylbenzene	µg/L	< 0.019	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.010	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.018	**0.0095**	< 0.0074	< 0.0074	< 0.0074
1,2-Dichlorobenzene	µg/L	< 0.0076	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0041	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0073	< 0.0030	< 0.0030	< 0.0030	< 0.0030
1,2-Dichloroethane	µg/L	< 0.0051	**0.0035**	< 0.0020	< 0.0020	< 0.0020	< 0.0028	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0049	< 0.0020	< 0.0020	< 0.0020	< 0.0020
1,3,5-Trimethylbenzene	µg/L	< 0.0062	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0033	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0060	**0.0043**	< 0.0025	< 0.0025	< 0.0025
1,3-Dichlorobenzene	µg/L	< 0.0076	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0041	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0073	< 0.0030	< 0.0030	< 0.0030	< 0.0030
1,4-Dichlorobenzene	µg/L	< 0.0076	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0041	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0073	< 0.0030	< 0.0030	< 0.0030	< 0.0030
2-Butanone	µg/L	< 0.011	< 0.0044	< 0.0044	**0.0058**	**0.0071**	< 0.0060	< 0.0044	**0.0051**	**0.0051**	< 0.0044	< 0.011	**0.0051**	**0.0057**	**0.011**	**0.01**
2-Hexanone	µg/L	< 0.016	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0084	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.015	< 0.0061	< 0.0061	< 0.0061	< 0.0061
4-Ethyltoluene	µg/L	< 0.0062	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0033	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0060	**0.0025**	< 0.0025	< 0.0025	< 0.0025
Acetone	µg/L	< 0.012	**0.041**	**0.014**	**0.011**	**0.025**	**0.01**	**0.052**	**0.036**	**0.017**	**0.024**	< 0.012	**0.043**	**0.034**	**0.022**	**0.043**
Benzene	µg/L	< 0.0041	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0022	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0039	< 0.0016	< 0.0016	< 0.0016	< 0.0016
Bromodichloromethane	µg/L	< 0.0085	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0046	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0082	< 0.0034	< 0.0034	< 0.0034	< 0.0034
c-1,2-Dichloroethene	µg/L	< 0.0050	< 0.0020	< 0.0020	< 0.0020	**0.0029**	< 0.0027	< 0.0020	< 0.0020	**0.003**	< 0.0020	< 0.0048	< 0.0020	< 0.0020	< 0.0020	< 0.0020
Carbon Disulfide	µg/L	< 0.016	< 0.0062	< 0.0062	**0.011**	**0.01**	< 0.0085	< 0.0062	< 0.0062	**0.011**	**0.0069**	< 0.015	< 0.0062	< 0.0062	**0.0069**	**0.0082**
Carbon Tetrachloride	µg/L	< 0.0080	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0043	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0077	< 0.0031	< 0.0031	< 0.0031	< 0.0031
Chloroform	µg/L	< 0.0062	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0033	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0060	< 0.0024	< 0.0024	< 0.0024	< 0.0024
Chloromethane	µg/L	< 0.0026	< 0.0010	< 0.0010	**0.0024**	**0.0033**	< 0.0014	< 0.0010	**0.0023**	**0.0041**	**0.0031**	< 0.0025	< 0.0010	**0.0085**	**0.0087**	**0.0052**
e	µg/L	< 0.0063	**0.0027**	**0.0028**	**0.0028**	**0.003**	< 0.0034	< 0.0025	**0.0028**	**0.0028**	**0.0025**	**0.0067**	< 0.0025	**0.0027**	**0.0028**	**0.0026**
Ethylbenzene	µg/L	< 0.0055	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0030	< 0.0022	**0.013**	< 0.0022	< 0.0022	< 0.0053	**0.0051**	< 0.0022	< 0.0022	< 0.0022
Isobutane	µg/L	--	**0.013**	< 0.012	< 0.012	< 0.012	--	**0.013**	**0.9**	< 0.012	< 0.012	--	< 0.012	< 0.012	< 0.012	< 0.012
Methylene Chloride	µg/L	< 0.044	< 0.017	< 0.017	< 0.017	< 0.017	< 0.024	< 0.017	< 0.017	< 0.017	< 0.017	< 0.042	< 0.017	< 0.017	< 0.017	< 0.017
o-Xylene	µg/L	< 0.0055	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0030	< 0.0022	**0.0045**	< 0.0022	< 0.0022	< 0.0053	**0.0028**	< 0.0022	< 0.0022	< 0.0022
p/m-Xylene	µg/L	< 0.022	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.012	< 0.0087	**0.011**	< 0.0087	< 0.0087	< 0.021	**0.013**	< 0.0087	< 0.0087	< 0.0087
(TBA)	µg/L	< 0.015	< 0.0061	< 0.0061	< 0.0061	**0.011**	< 0.0082	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.015	< 0.0061	< 0.0061	< 0.0061	< 0.0061
Tetrachloroethene	µg/L	< 0.0086	**0.0037**	< 0.0034	< 0.0034	**0.0067**	**0.016**	< 0.0034	< 0.0034	**0.0046**	**0.0055**	< 0.0083	< 0.0034	< 0.0034	**0.01**	**0.0091**
Toluene	µg/L	**0.0057**	< 0.0019	< 0.0019	**0.0023**	**0.0028**	**0.0071**	< 0.0019	< 0.0019	< 0.0019	**0.0029**	**0.0051**	< 0.0019	< 0.0019	**0.0023**	**0.0025**
Trichloroethene	µg/L	< 0.0068	**0.0048**	< 0.0027	< 0.0027	**0.41**	< 0.0037	< 0.0027	< 0.0027	< 0.0027	**0.0043**	< 0.0066	< 0.0027	< 0.0027	< 0.0027	< 0.0027
Vinyl Acetate	µg/L	< 0.018	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0096	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.017	< 0.0070	< 0.0070	< 0.0070	**0.0078**

Notes:
4Q2010 = fourth quarter 2010 (samplec
1Q2011 = first quarter 2011 (sampled ir
2Q2011 = second quarter 2011 (sample
3Q2011 = third quarter 2011 (sampled i
4Q2011 = fourth quarter 2011 (samplec
µg/L = micrograms per liter

TABLE 4-2
Summary of Detected Soil Gas VOC Analytical Results
DFSP Norwalk Site, Norwalk California

		VMP-34-15						VMP-35-05					
Chemcial Name	**Unit**	**4Q2010**	**1Q2011**	**2Q2011**	**3Q2011**	**4Q2011**	**4Q2011 (dup)**	**4Q2010**	**4Q2010 (dup)**	**1Q2011**	**2Q2011**	**3Q2011**	**4Q2011**
1,2,4-Trimethylbenzene	µg/L	< 0.018	**0.064**	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.018	< 0.020	< 0.0074	< 0.0074	< 0.0074	< 0.0074
1,2-Dichlorobenzene	µg/L	< 0.0074	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0072	< 0.0080	< 0.0030	< 0.0030	< 0.0030	< 0.0030
1,2-Dichloroethane	µg/L	< 0.0050	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0048	< 0.0054	< 0.0020	< 0.0020	< 0.0020	< 0.0020
1,3,5-Trimethylbenzene	µg/L	< 0.0060	**0.039**	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0058	< 0.0066	< 0.0025	< 0.0025	< 0.0025	< 0.0025
1,3-Dichlorobenzene	µg/L	< 0.0074	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0072	< 0.0080	< 0.0030	< 0.0030	< 0.0030	< 0.0030
1,4-Dichlorobenzene	µg/L	< 0.0074	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0072	< 0.0080	< 0.0030	< 0.0030	< 0.0030	< 0.0030
2-Butanone	µg/L	< 0.011	**0.0063**	**0.028**	**0.0075**	**0.012**	**0.01**	< 0.011	< 0.012	< 0.0044	**0.01**	**0.0096**	< 0.0044
2-Hexanone	µg/L	< 0.015	< 0.0061	**0.0079**	< 0.0061	< 0.0061	< 0.0061	< 0.015	< 0.016	< 0.0061	< 0.0061	< 0.0061	< 0.0061
4-Ethyltoluene	µg/L	< 0.0060	**0.016**	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0058	< 0.0066	< 0.0025	< 0.0025	< 0.0025	< 0.0025
Acetone	µg/L	< 0.012	**0.053**	**0.089**	**0.024**	**0.033**	**0.034**	< 0.011	**0.013**	**0.041**	**0.043**	**0.023**	**0.018**
Benzene	µg/L	**0.011**	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0038	< 0.0043	< 0.0016	< 0.0016	< 0.0016	< 0.0016
Bromodichloromethane	µg/L	< 0.0082	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0080	< 0.0089	< 0.0034	< 0.0034	< 0.0034	< 0.0034
c-1,2-Dichloroethene	µg/L	< 0.0049	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0047	< 0.0053	< 0.0020	< 0.0020	< 0.0020	< 0.0020
Carbon Disulfide	µg/L	< 0.015	< 0.0062	< 0.0062	< 0.0062	< 0.0062	< 0.0062	< 0.015	< 0.017	< 0.0062	< 0.0062	**0.0085**	**0.0095**
Carbon Tetrachloride	µg/L	< 0.0077	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0075	< 0.0084	< 0.0031	< 0.0031	< 0.0031	< 0.0031
Chloroform	µg/L	< 0.0060	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0058	< 0.0065	< 0.0024	< 0.0024	< 0.0024	< 0.0024
Chloromethane	µg/L	< 0.0025	**0.0013**	**0.0054**	**0.0022**	**0.0019**	< 0.0010	< 0.0025	< 0.0028	< 0.0010	**0.0063**	**0.0032**	**0.0045**
e	µg/L	< 0.0061	**0.0028**	**0.0026**	**0.0028**	**0.0033**	**0.0027**	< 0.0059	< 0.0066	**0.0031**	**0.0027**	**0.0027**	**0.0026**
Ethylbenzene	µg/L	< 0.0053	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0052	< 0.0058	< 0.0022	< 0.0022	< 0.0022	< 0.0022
Isobutane	µg/L	--	**0.11**	**0.016**	**0.013**	**0.03**	**0.15**	--	--	**0.015**	< 0.012	< 0.012	< 0.012
Methylene Chloride	µg/L	< 0.043	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.041	< 0.046	< 0.017	< 0.017	< 0.017	< 0.017
o-Xylene	µg/L	< 0.0053	**0.01**	< 0.0022	< 0.0022	**0.0022**	< 0.0022	< 0.0052	**0.0069**	< 0.0022	< 0.0022	< 0.0022	< 0.0022
p/m-Xylene	µg/L	< 0.021	**0.013**	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.021	< 0.023	< 0.0087	< 0.0087	< 0.0087	< 0.0087
(TBA)	µg/L	< 0.015	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.014	< 0.016	< 0.0061	< 0.0061	< 0.0061	**0.03**
Tetrachloroethene	µg/L	**0.013**	< 0.0034	**0.0036**	**0.0045**	**0.013**	**0.011**	< 0.0081	< 0.0091	< 0.0034	< 0.0034	**0.0059**	**0.027**
Toluene	µg/L	**0.026**	**0.0021**	< 0.0019	< 0.0019	**0.0029**	**0.0019**	< 0.0045	**0.016**	< 0.0019	< 0.0019	< 0.0019	< 0.0019
Trichloroethene	µg/L	< 0.0066	< 0.0027	< 0.0027	< 0.0027	**0.047**	**0.075**	< 0.0064	< 0.0072	< 0.0027	< 0.0027	< 0.0027	**0.19**
Vinyl Acetate	µg/L	< 0.017	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.017	< 0.019	< 0.0070	< 0.0070	< 0.0070	< 0.0070

Notes:
4Q2010 = fourth quarter 2010 (samplec
1Q2011 = first quarter 2011 (sampled ir
2Q2011 = second quarter 2011 (sample
3Q2011 = third quarter 2011 (sampled i
4Q2011 = fourth quarter 2011 (samplec
µg/L = micrograms per liter

TABLE 4-2
Summary of Detected Soil Gas VOC Analytical Results
DFSP Norwalk Site, Norwalk California

Chemcial Name	Unit	VMP-35-15					VMP-36-05					VMP-36-15					
		4Q2010	1Q2011	2Q2011	3Q2011	4Q2011	4Q2010	1Q2011	2Q2011	3Q2011	4Q2011	4Q2010	1Q2011	2Q2011	2Q2011 (dup)	3Q2011	4Q2011
1,2,4-Trimethylbenzene	µg/L	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074
1,2-Dichlorobenzene	µg/L	< 0.0030	< 0.0030	< 0.0030	**0.013**	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030
1,2-Dichloroethane	µg/L	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020
1,3,5-Trimethylbenzene	µg/L	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025
1,3-Dichlorobenzene	µg/L	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030
1,4-Dichlorobenzene	µg/L	< 0.0030	< 0.0030	< 0.0030	**0.0049**	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030
2-Butanone	µg/L	< 0.0044	**0.0088**	**0.011**	**0.014**	**0.0076**	< 0.0044	< 0.0044	**0.0045**	**0.011**	< 0.0044	< 0.0044	< 0.0044	**0.0061**	< 0.0044	**0.014**	< 0.0044
2-Hexanone	µg/L	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061
4-Ethyltoluene	µg/L	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025
Acetone	µg/L	**0.011**	**0.032**	**0.053**	**0.089**	**0.084**	**0.0074**	**0.011**	**0.025**	**0.055**	**0.019**	**0.0071**	**0.02**	**0.041**	**0.023**	**0.083**	**0.017**
Benzene	µg/L	< 0.0016	< 0.0016	< 0.0016	**0.002**	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016
Bromodichloromethane	µg/L	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
c-1,2-Dichloroethene	µg/L	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020
Carbon Disulfide	µg/L	**0.0072**	< 0.0062	**0.0093**	**0.031**	**0.028**	< 0.0062	< 0.0062	< 0.0062	**0.023**	< 0.0062	< 0.0062	< 0.0062	< 0.0062	< 0.0062	**0.014**	**0.0076**
Carbon Tetrachloride	µg/L	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031
Chloroform	µg/L	**0.0027**	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024
Chloromethane	µg/L	< 0.0010	**0.0012**	< 0.0010	**0.0065**	**0.017**	< 0.0010	< 0.0010	< 0.0010	**0.0024**	**0.0018**	< 0.0010	< 0.0010	**0.0011**	**0.0015**	**0.0044**	**0.0023**
e	µg/L	< 0.0025	**0.0029**	**0.0028**	**0.0027**	**0.0026**	< 0.0025	**0.003**	**0.0028**	**0.0026**	**0.0028**	< 0.0025	**0.0032**	**0.0027**	**0.0028**	**0.0026**	< 0.0025
Ethylbenzene	µg/L	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022
Isobutane	µg/L	--	< 0.012	**0.019**	**0.014**	**0.025**	--	< 0.012	< 0.012	< 0.012	**0.021**	--	**0.32**	< 0.012	**0.12**	< 0.012	< 0.012
Methylene Chloride	µg/L	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
o-Xylene	µg/L	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022
p/m-Xylene	µg/L	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087
(TBA)	µg/L	< 0.0061	**0.011**	< 0.0061	< 0.0061	**0.0086**	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061
Tetrachloroethene	µg/L	**0.0064**	< 0.0034	< 0.0034	**0.0057**	**0.0039**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0065**	**0.0036**	< 0.0034	< 0.0034	**0.0038**	**0.0071**
Toluene	µg/L	**0.0039**	**0.0022**	< 0.0019	< 0.0019	< 0.0019	**0.0033**	< 0.0019	< 0.0019	< 0.0019	< 0.0019	**0.003**	< 0.0019	**0.0031**	**0.0045**	< 0.0019	< 0.0019
Trichloroethene	µg/L	< 0.0027	< 0.0027	< 0.0027	< 0.0027	**0.005**	< 0.0027	< 0.0027	< 0.0027	< 0.0027	**0.0031**	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027
Vinyl Acetate	µg/L	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070

Notes:
4Q2010 = fourth quarter 2010 (samplec
1Q2011 = first quarter 2011 (sampled ir
2Q2011 = second quarter 2011 (sample
3Q2011 = third quarter 2011 (sampled i
4Q2011 = fourth quarter 2011 (samplec
µg/L = micrograms per liter

TABLE 4-2
Summary of Detected Soil Gas VOC Analytical Results
DFSP Norwalk Site, Norwalk California

Chemcial Name	Unit	VMP-37-05					VMP-37-15					
		4Q2010	1Q2011	2Q2011	3Q2011	4Q2011	4Q2010	1Q2011	2Q2011	3Q2011	3Q2011 (dup)	4Q2011
1,2,4-Trimethylbenzene	µg/L	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	**0.0077**
1,2-Dichlorobenzene	µg/L	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030
1,2-Dichloroethane	µg/L	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020
1,3,5-Trimethylbenzene	µg/L	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025
1,3-Dichlorobenzene	µg/L	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030
1,4-Dichlorobenzene	µg/L	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030
2-Butanone	µg/L	< 0.0044	< 0.0044	< 0.0044	**0.0059**	< 0.0044	< 0.0044	< 0.0044	**0.0081**	**0.015**	**0.008**	**0.0062**
2-Hexanone	µg/L	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061
4-Ethyltoluene	µg/L	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	**0.0025**
Acetone	µg/L	**0.0078**	**0.016**	**0.024**	**0.046**	**0.025**	**0.0048**	**0.037**	**0.052**	**0.091**	**0.041**	**0.033**
Benzene	µg/L	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016	< 0.0016
Bromodichloromethane	µg/L	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
c-1,2-Dichloroethene	µg/L	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020
Carbon Disulfide	µg/L	< 0.0062	< 0.0062	< 0.0062	**0.011**	**0.0073**	< 0.0062	< 0.0062	< 0.0062	**0.01**	< 0.0062	**0.014**
Carbon Tetrachloride	µg/L	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031
Chloroform	µg/L	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024
Chloromethane	µg/L	< 0.0010	< 0.0010	< 0.0010	**0.0034**	**0.0032**	< 0.0010	< 0.0010	**0.0017**	**0.0041**	**0.0016**	**0.0039**
e	µg/L	**0.0026**	**0.0032**	**0.0028**	**0.0026**	**0.0031**	**0.0028**	**0.003**	**0.0029**	**0.0027**	< 0.0025	**0.0026**
Ethylbenzene	µg/L	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	**0.0025**	< 0.0022	< 0.0022	< 0.0022
Isobutane	µg/L	--	< 0.012	< 0.012	< 0.012	< 0.012	--	**1.1**	**2.4**	**0.028**	**0.012**	**0.033**
Methylene Chloride	µg/L	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	**0.032**
o-Xylene	µg/L	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022	< 0.0022
p/m-Xylene	µg/L	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087
(TBA)	µg/L	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061
Tetrachloroethene	µg/L	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.0045**	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
Toluene	µg/L	< 0.0019	< 0.0019	< 0.0019	< 0.0019	< 0.0019	**0.0023**	< 0.0019	< 0.0019	**0.0028**	< 0.0019	< 0.0019
Trichloroethene	µg/L	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027
Vinyl Acetate	µg/L	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070

Notes:
4Q2010 = fourth quarter 2010 (samplec
1Q2011 = first quarter 2011 (sampled ir
2Q2011 = second quarter 2011 (sample
3Q2011 = third quarter 2011 (sampled i
4Q2011 = fourth quarter 2011 (samplec
µg/L = micrograms per liter

TABLE 4-2
Summary of Detected Soil Gas VOC Analytical Results
DFSP Norwalk Site, Norwalk California

Chemcial Name	Unit	VMP-38-05 4Q2010	VMP-38-05 1Q2011	VMP-38-05 1Q2011 (dup)	VMP-38-05 2Q2011	VMP-38-05 3Q2011	VMP-38-05 4Q2011	VMP-38-15 4Q2010	VMP-38-15 1Q2011	VMP-38-15 2Q2011	VMP-38-15 3Q2011	VMP-38-15 4Q2011
1,2,4-Trimethylbenzene	µg/L	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	< 0.0074	**0.016**	< 0.0074	< 0.0074	< 0.0074
1,2-Dichlorobenzene	µg/L	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030
1,2-Dichloroethane	µg/L	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020
1,3,5-Trimethylbenzene	µg/L	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	**0.0046**	< 0.0025	< 0.0025	< 0.0025
1,3-Dichlorobenzene	µg/L	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030
1,4-Dichlorobenzene	µg/L	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030
2-Butanone	µg/L	**0.0081**	**0.007**	**0.0073**	**0.0078**	**0.019**	**0.005**	< 0.0044	< 0.0044	< 0.0044	**0.014**	**0.0067**
2-Hexanone	µg/L	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061
4-Ethyltoluene	µg/L	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	**0.0027**	< 0.0025	< 0.0025	< 0.0025
Acetone	µg/L	**0.0096**	**0.032**	**0.029**	**0.035**	**0.089**	**0.029**	**0.01**	**0.066**	**0.041**	**0.11**	**0.052**
Benzene	µg/L	< 0.0016	**0.0026**	**0.0026**	< 0.0016	< 0.0016	< 0.0016	**0.0036**	**0.0047**	< 0.0016	< 0.0016	< 0.0016
Bromodichloromethane	µg/L	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034
c-1,2-Dichloroethene	µg/L	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020	< 0.0020
Carbon Disulfide	µg/L	< 0.0062	< 0.0062	< 0.0062	< 0.0062	**0.023**	< 0.0062	< 0.0062	< 0.0062	< 0.0062	**0.0089**	< 0.0062
Carbon Tetrachloride	µg/L	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031	< 0.0031
Chloroform	µg/L	< 0.0024	< 0.0024	< 0.0024	**0.0027**	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024	< 0.0024
Chloromethane	µg/L	< 0.0010	< 0.0010	**0.0014**	**0.001**	**0.0091**	**0.0034**	< 0.0010	< 0.0010	**0.0046**	**0.0022**	< 0.0010
e	µg/L	**0.0029**	**0.0032**	**0.003**	**0.0028**	**0.0027**	**0.0029**	< 0.0025	< 0.0025	**0.0025**	< 0.0025	**0.0028**
Ethylbenzene	µg/L	< 0.0022	**0.0023**	**0.0022**	< 0.0022	< 0.0022	< 0.0022	< 0.0022	**0.0022**	< 0.0022	< 0.0022	< 0.0022
Isobutane	µg/L	--	**0.051**	**0.049**	< 0.012	**0.026**	< 0.012	--	**1.3**	< 0.012	< 0.012	**0.016**
Methylene Chloride	µg/L	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
o-Xylene	µg/L	< 0.0022	**0.0022**	**0.0022**	< 0.0022	< 0.0022	< 0.0022	< 0.0022	**0.005**	< 0.0022	< 0.0022	< 0.0022
p/m-Xylene	µg/L	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087	< 0.0087
(TBA)	µg/L	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 0.0061
Tetrachloroethene	µg/L	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	< 0.0034	**0.014**	**0.011**	**0.013**	**0.013**	**0.017**
Toluene	µg/L	**0.0032**	**0.0043**	**0.0042**	< 0.0019	< 0.0019	< 0.0019	**0.0097**	**0.0021**	< 0.0019	< 0.0019	< 0.0019
Trichloroethene	µg/L	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027	< 0.0027
Vinyl Acetate	µg/L	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070	< 0.0070

Notes:
4Q2010 = fourth quarter 2010 (samplec
1Q2011 = first quarter 2011 (sampled ir
2Q2011 = second quarter 2011 (sample
3Q2011 = third quarter 2011 (sampled i
4Q2011 = fourth quarter 2011 (samplec
µg/L = micrograms per liter

TABLE 4-3
Summary of Laboratory Fixed Gases Results
DFSP Norwalk Site, Norwalk California

Sample Location	Date Sampled	Carbon Dioxide %V	Carbon Dioxide ppm (v/v)	Carbon Monoxide ppm (v/v)	Methane ppm (v/v)	Nitrogen %V	Oxygen + Argon %V	TGNMO ppm (v/v)
Field Blank	10-Jun-11	--	**570**	< 5.0	**1.9**	**78**	**22**	< 5.0
Field Blank	27-Sep-11	--	**450**	< 5.0	**2.4**	**78**	**22**	< 5.0
Field Blank	22-Dec-11	--	**430**	< 5.0	**2**	**77**	**23**	< 5.0
VMP-29-05	10-Jun-11	**2.3**	--	< 5.0	< 1.0	**78**	**20**	< 5.0
	27-Sep-11	**3.4**	--	< 5.0	< 1.0	**78**	**19**	< 5.0
	23-Dec-11	**2.5**	--	< 5.0	< 1.0	**77**	**21**	< 5.0
VMP-29-15	08-Jun-11	**2.5**	--	< 5.0	< 1.0	**78**	**19**	< 5.0
	27-Sep-11	**3.2**	--	< 5.0	< 1.0	**78**	**19**	< 5.0
	23-Dec-11	**3.4**	--	< 5.0	< 1.0	**77**	**20**	**6**
VMP-30-05	08-Jun-11	**4.2**	--	< 5.0	< 1.0	**77**	**18**	< 5.0
	27-Sep-11	**5.8**	--	< 5.0	< 1.0	**77**	**17**	< 5.0
	23-Dec-11	**4.1**	--	< 5.0	< 1.0	**76**	**20**	< 5.0
VMP-30-15	08-Jun-11	**4.8**	--	< 5.0	< 1.0	**78**	**17**	< 5.0
	27-Sep-11	**5.5**	--	< 5.0	< 1.0	**77**	**18**	< 5.0
	23-Dec-11	**5.5**	--	< 5.0	< 1.0	**75**	**19**	< 5.0
VMP-31-05	08-Jun-11	**3**	--	< 5.0	< 1.0	**78**	**19**	< 5.0
	27-Sep-11	**5.6**	--	< 5.0	< 1.0	**78**	**17**	< 5.0
	23-Dec-11	**4.3**	--	< 5.0	< 1.0	**76**	**19**	< 5.0
VMP-31-15	08-Jun-11	< 0.50	--	< 5.0	< 1.0	**75**	**17**	< 5.0
	27-Sep-11	**5.4**	--	< 5.0	< 1.0	**77**	**18**	< 5.0
	23-Dec-11	**4.1**	--	< 5.0	< 1.0	**76**	**19**	**9.5**
VMP-32-05	09-Jun-11	**1**	--	< 5.0	**1.6**	**78**	**21**	**42**
	26-Sep-11	--	**760**	< 5.0	**16**	**78**	**22**	< 5.0
	22-Dec-11	**5.8**	--	< 5.0	< 1.0	**77**	**17**	< 5.0
VMP-32-15	09-Jun-11	--	**2500**	< 5.0	**1.7**	**78**	**22**	**25**
	26-Sep-11	**13**	--	< 5.0	< 1.0	**79**	**7.9**	< 5.0
	22-Dec-11	**12**	--	< 5.0	< 1.0	**77**	**11**	< 5.0
VMP-33-05	09-Jun-11	**1.1**	--	< 5.0	< 1.0	**79**	**20**	< 5.0
	26-Sep-11	**1.4**	--	< 5.0	< 1.0	**78**	**21**	< 5.0
	22-Dec-11	**0.91**	--	< 5.0	< 1.0	**78**	**21**	**9.3**
VMP-33-15	09-Jun-11	--	**720**	< 5.0	**1.7**	**78**	**22**	< 5.0
	26-Sep-11	**2.1**	--	< 5.0	< 1.0	**78**	**20**	< 5.0
	22-Dec-11	**2**	--	< 5.0	< 1.0	**77**	**21**	**8**
VMP-34-05	09-Jun-11	**1.2**	--	< 5.0	< 1.0	**78**	**21**	< 5.0
	26-Sep-11	**0.95**	--	< 5.0	< 1.0	**77**	**22**	< 5.0
	22-Dec-11	**0.98**	--	< 5.0	< 1.0	**77**	**22**	**9.9**
VMP-34-15	09-Jun-11	**2.5**	--	< 5.0	< 1.0	**78**	**19**	< 5.0
	26-Sep-11	**2.8**	--	< 5.0	< 1.0	**77**	**20**	< 5.0
	22-Dec-11	**2.9**	--	< 5.0	< 1.0	**76**	**21**	**5.7**
dup	22-Dec-11	**2.8**	--	< 5.0	< 1.0	**76**	**21**	**7.3**
VMP-35-05	09-Jun-11	--	**4000**	< 5.0	< 1.0	**78**	**21**	< 5.0
	26-Sep-11	--	**4500**	< 5.0	< 1.0	**78**	**22**	**5.4**
	22-Dec-11	--	**4300**	< 5.0	< 1.0	**77**	**23**	**8.6**

TABLE 4-3
Summary of Laboratory Fixed Gases Results
DFSP Norwalk Site, Norwalk California

Sample Location	Date Sampled	Carbon Dioxide %V	Carbon Dioxide ppm (v/v)	Carbon Monoxide ppm (v/v)	Methane ppm (v/v)	Nitrogen %V	Oxygen + Argon %V	TGNMO ppm (v/v)
VMP-35-15	09-Jun-11	**1.2**	--	< 5.0	< 1.0	**78**	**21**	< 5.0
	26-Sep-11	**1.6**	--	< 5.0	< 1.0	**77**	**21**	< 5.0
	22-Dec-11	**1.6**	--	< 5.0	< 1.0	**77**	**22**	**8.5**
VMP-36-05	09-Jun-11	**0.83**	--	< 5.0	< 1.0	**78**	**21**	< 5.0
	26-Sep-11	**0.61**	--	< 5.0	< 1.0	**78**	**22**	< 5.0
	22-Dec-11	--	**3600**	< 5.0	< 1.0	**77**	**23**	**8.9**
VMP-36-15	10-Jun-11	**2.2**	--	< 5.0	< 1.0	**78**	**20**	< 5.0
dup	10-Jun-11	**1.2**	--	< 5.0	< 1.0	**78**	**21**	< 5.0
	26-Sep-11	**2.8**	--	< 5.0	< 1.0	**78**	**20**	< 5.0
	22-Dec-11	**2.7**	--	< 5.0	< 1.0	**77**	**21**	**5.7**
VMP-37-05	09-Jun-11	**1.2**	--	< 5.0	< 1.0	**78**	**21**	< 5.0
	26-Sep-11	**1.1**	--	< 5.0	< 1.0	**77**	**21**	**5.1**
	22-Dec-11	**0.8**	--	< 5.0	< 1.0	**77**	**22**	**8.7**
VMP-37-15	10-Jun-11	--	**2200**	< 5.0	**1.6**	**78**	**22**	< 5.0
	26-Sep-11	**1.4**	--	< 5.0	< 1.0	**77**	**21**	**5.1**
dup	26-Sep-11	**1.4**	--	< 5.0	< 1.0	**77**	**21**	< 5.0
	22-Dec-11	**1.1**	--	< 5.0	< 1.0	**77**	**22**	**8**
VMP-38-05	10-Jun-11	**1.3**	--	< 5.0	< 1.0	**78**	**21**	< 5.0
	26-Sep-11	**0.82**	--	< 5.0	< 1.0	**78**	**22**	< 5.0
	22-Dec-11	**0.6**	--	< 5.0	< 1.0	**77**	**22**	**8.8**
VMP-38-15	10-Jun-11	**5**	--	< 5.0	< 1.0	**79**	**16**	< 5.0
	26-Sep-11	**5.9**	--	< 5.0	< 1.0	**78**	**16**	< 5.0
	22-Dec-11	**5.2**	--	< 5.0	< 1.0	**77**	**18**	< 5.0

Notes:

%V = percent by volume

ppm (v/v) = parts per million

TGNMO = total gaseous nonmethane organics

dup = duplicate

Second quarter 2011 sampled June 8-10, 2011.

Third quarter 2011 sampled September 26-27, 2011.

Fourth quarter 2011 sampled December 22-23, 2011.

TABLE 4-4
Summary of Monitoring Well Details
DFSP Norwalk Site, Norwalk California

Well	Installation Date	Installed By	Total Depth (ft bgs)[1]	Casing Diameter (inches)	Screen Interval (ft bgs)	Slot Size (inches)	Casing Elevation (ft msl)[2]
BW-1	05/16/96	GMX[3]	55	5	31.9 - 51.4	0.01	73.17
BW-2	05/20/96	GMX	53.5	5	27 - 46.5	0.01	73.57
BW-3	05/17/96	GMX	55.5	5	30.6 - 50	0.01	74.16
BW-4	05/20/96	GMX	53.1	5	28.2 - 47	0.01	74.61
BW-5	05/23/96	GMX	52.5	5	27 - 45.5	0.01	73.59
BW-6	05/22/96	GMX	52.4	5	27.6 - 46.9	0.01	73.48
BW-7	05/22/96	GMX	52	5	27.1 - 46.3	0.01	74.65
BW-8	05/21/96	GMX	51.5	5	27 - 46.4	0.01	75.08
BW-9	05/21/96	GMX	52.5	5	26.9 - 46.4	0.01	76.19
EXP-1	03/06/92	WC[4]	128.5	4	82 - 122	0.01	78.44
EXP-2	10/15/92	WC	149	4	90 - 120	0.02	79.43
EXP-3	10/20/92	WC	150	4	85 - 115	0.01	77.58
EXP-4	07/07/98	GMX	118	4	96.1 - 115.2	0.02	79.81
EXP-5	07/08/98	GMX	120	4	94.4 - 113.4	0.02	72.41
GMW-1	05/16/91	GTI[5]	50	4	20 - 50	0.01	74.77
GMW-2	05/16/91	GTI	50	4	20 - 50	0.01	73.57
GMW-3	05/17/91	GTI	50	4	20 - 50	0.01	75.10
GMW-4	05/21/91	GTI	50	4	20 - 50	0.01	75.45
GMW-5	05/21/91	GTI	50	4	20 - 50	0.01	77.61
GMW-6	07/09/91	GTI	50	4	25 - 50	0.01	77.31
GMW-7	07/09/91	GTI	50	4	25 - 50	0.01	75.84
GMW-8	07/10/91	GTI	50	4	25 - 50	0.01	73.20
GMW-9	07/08/91	GTI	50	4	20 - 50	0.01	77.16
GMW-10	07/08/91	GTI	50	4	25 - 50	0.01	74.67
GMW-11	07/09/91	GTI	50	4	20 - 50	0.01	72.90
GMW-12	07/09/91	GTI	50	4	25 - 50	0.01	75.21
GMW-13	07/08/91	GTI	50	4	25 - 50	0.01	74.17
GMW-14	07/10/91	GTI	50	4	25 - 50	0.01	74.72
GMW-15	07/30/91	GTI	50	4	25 - 50	0.01	76.21
GMW-16	08/01/91	GTI	50	4	25 - 50	0.01	77.00
GMW-17	08/01/91	GTI	50	4	25 - 50	0.01	74.66
GMW-18	07/31/91	GTI	50	4	25 - 50	0.01	75.36
GMW-19	07/31/91	GTI	50	4	25 - 50	0.01	76.83
GMW-20	08/01/91	GTI	50	4	25 - 50	0.01	75.10
GMW-21[6]	08/02/91	GTI	50	4	25 - 50	0.01	76.23
GMW-22	08/02/91	GTI	61	4	25 - 60	0.01	77.24
GMW-23	08/02/91	GTI	60	4	25 - 60	0.01	74.85
GMW-24	08/05/91	GTI	60	4	25 - 60	0.01	77.48
GMW-25	01/10/92	GTI	50	6	20 - 50	0.01	78.14
GMW-26	01/07/92	GTI	51.5	4	20 - 50	0.01	74.52
GMW-27	01/10/92	GTI	50	4	20 - 50	0.01	74.41

TABLE 4-4
Summary of Monitoring Well Details
DFSP Norwalk Site, Norwalk California

Well	Installation Date	Installed By	Total Depth (ft bgs)[1]	Casing Diameter (inches)	Screen Interval (ft bgs)	Slot Size (inches)	Casing Elevation (ft msl)[2]
GMW-28	01/07/92	GTI	50	4	20 - 50	0.01	74.68
GMW-29	01/09/92	GTI	50	4	20 - 50	0.01	77.57
GMW-30	01/09/92	GTI	51.5	6	20 - 50	0.01	74.91
GMW-31	06/02/93	GTI	65	4	25 - 65	0.01	76.50
GMW-32	06/01/93	GTI	50	4	20 - 50	0.02	74.62
GMW-33	06/01/93	GTI	50	4	20 - 50	0.02	74.88
GMW-34	06/03/93	GTI	50	4	20 - 50	0.02	75.25
GMW-35	06/04/93	GTI	50	4	20 - 50	0.02	76.12
GMW-36	04/11/94	GTI	50	4	20 - 50	0.01	76.66
GMW-37	04/11/94	GTI	50	4	20 - 50	0.01	77.32
GMW-38	04/12/94	GTI	50	4	20 - 50	0.01	75.47
GMW-39	0'4/12/94	GTI	50	4	20 - 50	0.01	75.05
GMW-40	06/29/94	GTI	50.5	4	20 - 50	0.01	73.13
GMW-41	06/30/94	GTI	50.5	4	20 - 50	0.01	74.46
GMW-42	06/30/94	GTI	50.5	4	20 - 50	0.01	75.50
GMW-43	07/01/94	GTI	50.5	4	20 - 50	0.01	74.44
GMW-44	07/01/94	GTI	50.5	4	20 - 50	0.01	74.45
GMW-45	07/01/94	GTI	50.5	4	20 - 50	0.01	75.67
GMW-46	07/05/94	GTI	50.5	4	20 - 50	0.01	76.10
GMW-47	07/05/94	GTI	50.5	4	20 - 50	0.01	75.98
GMW-48	07/05/94	GTI	50.5	4	20 - 50	0.01	75.03
GMW-49	07/06/94	GTI	50.5	4	20 - 50	0.01	74.75
GMW-50	12/19/94	GTI	46.5	4	15 - 45	0.01	75.51
GMW-51	12/19/94	GTI	41.5	4	15 - 40	0.01	75.93
GMW-52	12/19/94	GTI	41.5	4	15 - 40	0.01	75.03
GMW-53	12/19/94	GTI	46.5	4	15 - 45	0.01	74.90
GMW-54	12/20/94	GTI	46.5	4	15 - 45	0.01	75.16
GMW-55	12/20/94	GTI	41.5	4	15 - 40	0.01	74.60
GMW-56	08/12/98	FDGTI[7]	55	2	20 - 55	0.02	76.50
GMW-56	08/12/98	FDGTI	55	4	20 - 55	0.02	76.52
GMW-57	08/13/98	FDGTI	55	2	19 - 54	0.02	76.66
GMW-57	08/13/98	FDGTI	55	4	19 - 54	0.02	76.66
GMW-58	08/14/98	FDGTI	55	2	20 - 55	0.02	75.46
GMW-58	08/14/98	FDGTI	55	4	20 - 55	0.02	75.48
GMW-59	08/14/98	FDGTI	55	2	20 - 55	0.02	75.28
GMW-59	08/14/98	FDGTI	55	4	20 - 55	0.02	75.28
GMW-60	04/14/04	Parsons	50	4	25 - 40	0.01	76.24
GMW-61	04/14/04	Parsons	50	4	30 - 40	0.01	75.60
GMW-62	07/02/07	Parsons	40.5	4	20 - 40	0.01	76.34
GMW-63	09/29/08	Parsons	41	4	20 - 40	0.02	77.32
GMW-64	09/29/08	Parsons	41	4	19.5 - 39.5	0.02	75.84

TABLE 4-4
Summary of Monitoring Well Details
DFSP Norwalk Site, Norwalk California

Well	Installation Date	Installed By	Total Depth (ft bgs)[1]	Casing Diameter (inches)	Screen Interval (ft bgs)	Slot Size (inches)	Casing Elevation (ft msl)[2]
GMW-65	07/06/09	Parsons	41.5	4	21 - 41	0.02	76.78
GMW-66	09/08/09	Parsons	40.5	4	20 - 40	0.02	77.00
GMW-O-1	03/04/92	GTI	51.5	4	19 - 49.5	0.01	71.45
GMW-O-2	03/02/92	GTI	51.5	4	20 - 50	0.01	72.54
GMW-O-3	03/02/92	GTI	51.5	4	20 - 50	0.01	72.19
GMW-O-4	03/03/92	GTI	51.5	4	20 - 50	0.01	71.95
GMW-O-4 (MID)	03/03/92	GTI	66.5	4	54.5 - 64.5	0.01	72.24
GMW-O-5	03/04/92	GTI	51.5	4	20 - 50	0.01	72.36
GMW-O-6	05/18/92	GTI	51.5	4	20 - 50	0.01	71.41
GMW-O-7	05/19/92	GTI	51.5	4	20 - 50	0.01	70.98
GMW-O-8	05/18/92	GTI	51	4	19.5 - 49.5	0.01	70.91
GMW-O-9	07/29/92	GTI	51.5	4	20 - 50	0.01	73.50
GMW-O-10	07/29/92	GTI	51.5	4	20 - 50	0.01	73.98
GMW-O-11	05/20/92	GTI	51.5	4	20 - 50	0.01	74.17
GMW-O-12	05/21/92	GTI	51.5	4	20 - 50	0.01	73.49
GMW-O-14	05/20/92	GTI	51.5	4	20 - 50	0.01	74.08
GMW-O-15	04/19/94	GTI	50	4	20 - 50	0.02	74.23
GMW-O-16	04/19/94	GTI	50	4	20 - 50	0.02	74.10
GMW-O-17	07/26/94	GMX	41	4	20.4 - 39.5	0.01	73.78
GMW-O-18	07/25/94	GMX	41	4	20.8 - 40.4	0.01	74.36
GMW-O-19	07/29/94	GMX	41.5	4	20.2 - 39.9	0.01	74.46
GMW-O-20	06/15/95	GMX	45.9	4	---[8]	---	73.32
GMW-O-21	06/19/97	GMX	45.9	4	25.5 - 45.5	0.01	71.43
GMW-O-22	---	GMX	41	4	---	---	74.36
GMW-O-23	06/25/07	GMX	44	4	20 - 40	0.02	73.63
GMW-O-24	09/24/12	CH2MHill	45	4	20 - 40	0.01	74.39
GMW-SF-7	07/27/94	GMX	41	4	20.1 - 39.9	0.01	75.26
GMW-SF-8	07/28/94	GMX	41	4	19.5 - 39.5	0.01	76.75
GMW-SF-9	04/01/03	GMX	47	4	36.6 - 46.2	0.02	73.05
GMW-SF-10	04/02/03	GMX	47	4	36.7 – 46.4	0.02	75.77
GW-1	06/12/95	GTI	63	1	25 - 60	0.02	75.46
GW-1	06/12/95	GTI	63	4	25 - 60	0.02	75.97
GW-2	06/12/95	GTI	63	1	25 - 60	0.02	76.39
GW-2	06/12/95	GTI	63	4	25 - 60	0.02	75.78
GW-3	06/13/95	GTI	63	1	25 - 60	0.02	76.56
GW-3	06/13/95	GTI	63	4	25 - 60	0.02	75.79
GW-4	06/13/95	GTI	63	1	24 - 59	0.02	74.77
GW-4	06/13/95	GTI	63	4	24 - 59	0.02	73.86
GW-5	06/15/95	GTI	63	1	25.5 - 60.5	0.02	77.09
GW-5	06/15/95	GTI	63	4	25.5 - 60.5	0.02	76.99
GW-6	06/15/95	GTI	63	1	25 - 60	0.02	77.41

TABLE 4-4
Summary of Monitoring Well Details
DFSP Norwalk Site, Norwalk California

Well	Installation Date	Installed By	Total Depth (ft bgs)[1]	Casing Diameter (inches)	Screen Interval (ft bgs)	Slot Size (inches)	Casing Elevation (ft msl)[2]
GW-6	06/15/95	GTI	63	4	25 - 60	0.02	76.38
GW-7	06/16/95	GTI	63	1	25 - 60	0.02	76.76
GW-7	06/16/95	GTI	63	4	25 - 60	0.02	75.02
GW-8	06/14/95	GTI	63	1	24 - 59	0.02	76.88
GW-8	06/14/95	GTI	63	4	24 - 59	0.02	76.15
GW-13	04/26/07	Parsons	65	1	25 - 65	0.02	77.00
GW-13	04/26/07	Parsons	67	6	25 - 65	0.02	76.85
GW-14	04/26/07	Parsons	65	1	25 - 65	0.02	76.55
GW-14	04/26/07	Parsons	67	6	25 - 65	0.02	76.54
GW-15	04/26/07	Parsons	62.5	1	20.5 - 60.5	0.02	75.36
GW-15	04/26/07	Parsons	60.5	6	20.5 - 60.6	0.02	74.94
GW-16p	07/07/09	Parsons	61.3	1	21 - 61	0.02	76.55
GW-16	07/07/09	Parsons	63	6	20.5 - 60.5	0.02	76.33
GWR-1	07/11/91	GTI	50	4	25 - 50	0.01	77.40
GWR-2	07/12/91	GTI	50	4	25 - 50	0.01	73.66
GWR-3	01/10/92	GTI	50	6	20 - 50	0.01	77.60
HL-1	10/14/86	HLA[9]	39	4	18 - 38	0.01	75.83
HL-2	10/13/86	HLA	39	4	16.5 - 36.5	0.01	76.94
HL-3	10/15/86	HLA	44	4	19 - 39	0.01	76.86
HL-4	10/16/86	HLA	39	4	18 - 38.5	0.01	75.75
HL-5	10/16/86	HLA	39.5	4	18.5 - 39	0.01	76.13
MW-6	08/09/90	WC	50	4	18 - 48	0.01	77.20
MW-7	08/27/90	WC	50	4	19 - 48	0.01	78.13
MW-8	08/24/90	WC	51	4	18 - 48	0.01	76.06
MW-9	08/08/90	WC	50	4	18 - 48	0.01	77.11
MW-10	08/24/90	WC	51	4	18 - 48	0.01	79.12
MW-11	08/09/90	WC	50	4	18 - 48	0.01	78.17
MW-12	08/27/90	WC	50	4	18 - 48	0.01	75.76
MW-13	08/23/90	WC	50	4	18 - 48	0.01	78.25
MW-14	08/07/90	WC	50	4	18 - 48	0.01	78.60
MW-15	08/07/90	WC	50	4	18 - 48	0.01	76.99
MW-16	08/08/90	WC	50	4	18 - 48	0.01	76.87
MW-17	08/06/90	WC	50	4	18 - 48	0.01	77.86
MW-18 (MID)	06/10/91	WC	62.2	4	50 - 60	0.01	75.67
MW-19 (MID)	06/11/91	WC	62.2	4	49.5 - 59.5	0.01	78.14
MW-20 (MID)	06/12/91	WC	65.7	4	43 - 53	0.01	77.19
MW-21 (MID)	06/12/91	WC	62.4	4	47 - 57	0.01	77.55
MW-22 (MID)	06/13/91	WC	57.9	4	42 - 52	0.01	79.57
MW-23 (MID)	06/14/91	WC	57.1	4	42 - 52	0.01	79.59
MW-24	06/14/91	WC	47	4	14 - 44	0.01	78.51
MW-25	06/17/91	WC	47.2	4	22.5 - 42.5	0.01	79.15

TABLE 4-4
Summary of Monitoring Well Details
DFSP Norwalk Site, Norwalk California

Well	Installation Date	Installed By	Total Depth (ft bgs)[1]	Casing Diameter (inches)	Screen Interval (ft bgs)	Slot Size (inches)	Casing Elevation (ft msl)[2]
MW-26	06/17/91	WC	47.3	4	23.5 - 43.5	0.01	77.40
MW-27	06/17/91	WC	52.3	4	18 - 48	0.01	78.46
MW-28	6/19/91	WC	51.5	4	16.5 - 46.5	0.01	78.53
MW-29	06/19/91	WC	52.4	4	17.5 - 47.5	0.01	79.13
MW-O-1	01/22/91	GMX	40	2	25 - 40	0.02	75.48
MW-O-2	01/23/91	GMX	40	2	25 - 40	0.02	71.90
MW-O-3	10/25/91	GMX	41	6	20.5 - 41	0.01	74.53
MW-O-4	10/25/91	GMX	41	4	20.5 - 41	0.01	75.00
MW-SF-1	06/18/90	GMX	40	4	25 - 40	0.02	78.93
MW-SF-2	06/18/90	GMX	40	4	25 - 40	0.02	78.53
MW-SF-3	06/18/90	GMX	40	4	25 - 40	0.02	78.12
MW-SF-4	06/19/90	GMX	40	4	25 - 40	0.02	79.38
MW-SF-5	09/19/90	GMX	40	4	23 - 38	0.02	79.74
MW-SF-6	09/19/90	GMX	40	4	24 - 39	0.02	76.80
MW-SF-9	06/15/95	GMX	40	4	---	---	74.10
MW-SF-10	09/23/03	GMX	30.5	4	10.3 - 29.9	0.02	76.53
MW-SF-11	06/19/07	GMX	44	4	20 - 40	0.02	78.56
MW-SF-12	06/18/07	GMX	44	4	20 - 40	0.02	78.07
MW-SF-13	06/19/07	GMX	44	4	20 - 40	0.02	73.40
MW-SF-14	06/21/07	GMX	44	4	20 - 40	0.02	78.16
MW-SF-15	06/21/07	GMX	44	4	20 - 40	0.02	78.27
MW-SF-16	06/20/07	GMX	44	4	20 - 40	0.02	78.21
PO-7	05/01/89	GW[10]	56	4	29 - 49	0.02	80.26
PW-1	01/06/92	GTI	51.5	4	20 - 50	0.01	75.52
PW-2	01/06/92	GTI	50	4	20 - 50	0.01	74.71
PW-3	01/06/92	GTI	50	4	20 - 50	0.01	73.71
PZ-1	07/12/91	GTI	50	2	25 - 50	0.01	73.74
PZ-2	07/12/91	GTI	50	2	25 - 50	0.01	73.96
PZ-3	06/03/93	GTI	65	2	25 - 65	0.02	76.17
PZ-4	06/02/93	GTI	60	2	25 - 60	0.02	76.13
PZ-5	09/26/00	GMX	40.3	4	20.6 - 39.4	0.01	73.97
PZ-6	09/26/00	GMX	37.5	4	22.8 - 37.8	0.01	73.91
PZ-7A	04/07/03	GMX	32	2	21.5 - 31.2	0.01	73.87
PZ-7B	04/07/03	GMX	47.5	2	42 - 46.7	0.01	73.79
PZ-8A	04/08/03	GMX	31.5	2	21.2 - 31	0.01	75.81
PZ-8B	04/08/03	GMX	47	2	41.4 - 46.2	0.01	75.69
PZ-9A	04/09/03	GMX	32	2	21.6 - 30.9	0.01	76.14
PZ-9B	04/09/03	GMX	47	2	41.5 - 46.2	0.01	76.26
PZ-10	04/10/03	GMX	38.5	2	23.2 - 37.9	0.02	74.34
TF-8	09/22/95	GTI	63	1.5	25 - 60	0.02	75.60
TF-8	09/22/95	GTI	63	4	25 - 60	0.02	74.86

TABLE 4-4
Summary of Monitoring Well Details
DFSP Norwalk Site, Norwalk California

Well	Installation Date	Installed By	Total Depth (ft bgs)[1]	Casing Diameter (inches)	Screen Interval (ft bgs)	Slot Size (inches)	Casing Elevation (ft msl)[2]
TF-9	09/22/95	GTI	63	1.5	25 - 60	0.02	75.27
TF-9	09/22/95	GTI	63	4	25 - 60	0.02	74.47
TF-10	09/25/95	GTI	63	1.5	25 - 60	0.02	74.19
TF-10	09/25/95	GTI	63	4	25 - 60	0.02	73.61
TF-11	09/25/95	GTI	63	1.5	25 - 60	0.02	74.95
TF-11	09/25/95	GTI	63	4	25 - 60	0.02	74.40
TF-13	09/26/95	GTI	63	1.5	25 - 60	0.02	75.90
TF-13	09/26/95	GTI	63	4	25 - 60	0.02	75.47
TF-14	09/27/95	GTI	63	1.5	25 - 60	0.02	74.78
TF-14	09/27/95	GTI	63	4	25 - 60	0.02	74.35
TF-15	09/28/95	GTI	63	1.5	25 - 60	0.02	75.40
TF-15	09/28/95	GTI	63	4	25 - 60	0.02	74.78
TF-16	09/28/95	GTI	63	1.5	25 - 60	0.02	76.48
TF-16	09/28/95	GTI	63	4	25 - 60	0.02	75.89
TF-17	09/29/95	GTI	63	1.5	25 - 60	0.02	75.26
TF-17	09/29/95	GTI	63	4	25 - 60	0.02	74.88
TF-18	07/06/94	GTI	50.5	4	20 - 50	0.02	73.94
TF-19	10/03/95	GTI	63	1.5	25 - 60	0.02	75.61
TF-19	10/03/95	GTI	63	4	25 - 60	0.02	75.07
TF-20	10/03/95	GTI	63	1.5	25 - 60	0.02	75.59
TF-20	10/03/95	GTI	63	4	25 - 60	0.02	75.08
TF-21	09/29/95	GTI	63	1.5	25 - 60	0.02	75.60
TF-21	09/29/95	GTI	63	4	25 - 60	0.02	74.96
TF-22	10/02/95	GTI	63	1.5	25 - 60	0.02	74.95
TF-22	10/02/95	GTI	63	4	25 - 60	0.02	74.76
TF-23	07/05/94	GTI	50.5	4	20 - 50	0.02	75.31
TF-24[11]	09/26/95	GTI	63	1.5	25 - 60	0.02	76.35
TF-24[11]	09/26/95	GTI	63	4	25 - 60	0.02	76.43
TF-25	04/04/01	GTI	47	1.5	41 - 46	0.02	---
TF-25	04/04/01	GTI	47	4	26 - 36	0.02	74.85
TF-26	04/03/01	GTI	47	1.5	41 - 46	0.02	---
TF-26	04/03/01	GTI	47	4	26 - 36	0.02	75.85
WCW-1	02/18/92	WC	52	4	20 - 50	0.01	72.86
WCW-2	02/21/92	WC	52	4	20 - 50	0.01	75.34
WCW-3	02/19/92	WC	56.5	4	19 - 49	0.01	76.16
WCW-4	02/20/92	WC	56.5	4	20 - 50	0.01	78.05
WCW-5	04/30/92	WC	52	4	19 - 49	0.01	73.49
WCW-6	04/20/92	WC	53.5	4	20 - 50	0.01	75.52
WCW-7	04/29/92	WC	53	4	20 - 50	0.01	76.44
WCW-8	04/21/92	WC	53.5	4	20 - 50	0.01	77.34
WCW-9	04/28/92	WC	53.5	4	20 - 50	0.01	77.74

TABLE 4-4
Summary of Monitoring Well Details
DFSP Norwalk Site, Norwalk California

Well	Installation Date	Installed By	Total Depth (ft bgs)[1]	Casing Diameter (inches)	Screen Interval (ft bgs)	Slot Size (inches)	Casing Elevation (ft msl)[2]
WCW-10	09/11/92	WC	56.5	4	25 - 55	0.01	74.06
WCW-11	09/09/92	WC	61.5	4	30 - 60	0.01	75.29
WCW-12	09/08/92	WC	61.5	4	30 - 60	0.01	76.27
WCW-13	09/10/92	WC	61.5	4	30 - 60	0.01	77.70
WCW-14	08/12/98	FDGTI	59	4	24 - 59	0.01	78.81

Notes:

1. ft bgs = feet below ground surface.
2. ft msl = feet above mean sea level.
3. GMX = Geomatrix Consultants.
4. WC = Woodward-Clyde.
5. GTI = Groundwater Technology/Groundwater Technology Government Services.
6. GMW-21 is also referred to as TF-24.
7. FDGTI - Fluor Daniel GTI.
8. --- = information not available.
9. HLA = Harding Lawson Associates.
10. GW = Golden West
11. TF-24 is also referred to as "old TF-24" or "former TF-24". See also Note 6.
12. Biosparge and additional soil vapor extraction wells used for remediation purposes only are not listed here.

TABLE 4-5
Summary of Groundwater Elevations October 2012
DFSP Norwalk Site, Norwalk California

Well	Date	Top of Casing Elevation[1]	Depth to Product (feet)[2]	Depth to Water (feet)[2]	Apparent Product Thickness (feet)	Groundwater Elevation[1]
BW-1	10/15/12	73.17	---[3]	25.26	---	47.91
BW-2	10/15/12	73.57	---	25.58	---	47.99
BW-3	10/15/12	74.16	---	26.19	---	47.97
BW-4	10/15/12	74.61	---	26.93	---	47.68
BW-5	10/15/12	73.59	---	26.11	---	47.48
BW-6	10/15/12	73.48	---	26.00	---	47.48
BW-7	10/15/12	74.65	---	27.15	---	47.50
BW-8	10/15/12	75.08	---	29.61	---	45.47
BW-9	10/15/12	76.19	---	29.22	---	46.97
EXP-1	10/11/12	78.44	---	53.96	---	24.48
EXP-1	10/15/12	78.44	---	53.63	---	24.81
EXP-2	10/11/12	79.43	---	54.09	---	25.34
EXP-2	10/15/12	79.43	---	53.96	---	25.47
EXP-3	10/11/12	77.58	---	52.88	---	24.70
EXP-3	10/15/12	77.58	---	52.80	---	24.78
EXP-4	10/15/12	79.81	---	53.74	---	26.07
EXP-5	10/15/12	72.41	---	47.78	---	24.63
GMW-1	10/15/12	74.77	---	29.49	---	45.28
GMW-2	10/15/12	73.57	---	---	---	---
GMW-3	10/15/12	75.10	---	---	---	---
GMW-4	10/15/12	75.45	29.65	29.80	0.15	NC[6]
GMW-5	10/11/12	77.61	---	31.98	---	45.63
GMW-6	10/11/12	77.31	---	31.52	---	45.79
GMW-8	10/15/12	73.20	---	---	---	---
GMW-9	10/15/12	77.16	---	31.82	---	45.34
GMW-10	10/15/12	74.67	29.02	29.15	0.13	NC
GMW-11	10/15/12	72.90	---	27.05	---	45.85
GMW-12	10/11/12	75.21	---	29.27	---	45.94
GMW-13	10/15/12	74.17	---	27.89	---	46.28
GMW-14	10/15/12	74.72	---	28.91	---	45.81
GMW-15	10/11/12	76.21	---	30.47	---	45.74
GMW-16	10/11/12	77.00	---	31.32	---	45.68
GMW-17	10/11/12	74.66	---	---	---	---
GMW-19	10/11/12	76.83	---	31.09	---	45.74
GMW-21	10/11/12	76.23	---	30.32	---	45.91
GMW-22	10/15/12	77.24	---	31.05	---	46.19
GMW-23	10/15/12	74.85	---	28.45	---	46.40
GMW-24	10/15/12	77.48	---	31.34	---	46.14
GMW-25	10/15/12	78.14	---	31.88	---	46.26
GMW-26	10/15/12	74.52	---	28.40	---	46.12
GMW-27	10/15/12	74.41	---	29.05	---	45.36
GMW-28	10/15/12	74.68	---	28.50	---	46.18
GMW-29	10/15/12	77.57	---	28.41	---	49.16
GMW-30	10/15/12	74.91	---	28.40	---	46.51
GMW-31	10/11/12	76.50	---	30.87	---	45.63
GMW-32	10/11/12	74.62	---	28.69	---	45.93

TABLE 4-5
Summary of Groundwater Elevations October 2012
DFSP Norwalk Site, Norwalk California

Well	Date	Top of Casing Elevation[1]	Depth to Product (feet)[2]	Depth to Water (feet)[2]	Apparent Product Thickness (feet)	Groundwater Elevation[1]
GMW-33	10/15/12	74.88	---	27.43	---	47.45
GMW-34	10/15/12	75.25	---	27.85	---	47.40
GMW-35	10/15/12	76.12	---	28.73	---	47.39
GMW-36	10/15/12	76.66	---	32.11	---	44.55
GMW-37	10/15/12	77.32	---	30.90	---	46.42
GMW-38	10/15/12	75.47	---	29.75	---	45.72
GMW-39	10/15/12	75.05	---	29.58	---	45.47
GMW-41	10/11/12	74.46	---	28.62	---	45.84
GMW-43	10/11/12	74.44	---	29.74	---	44.70
GMW-44	10/11/12	74.45	---	28.98	---	45.47
GMW-45	10/11/12	75.67	---	29.97	---	45.70
GMW-47	10/11/12	75.98	---	30.29	---	45.69
GMW-48	10/11/12	75.03	---	28.50	---	46.53
GMW-56	10/11/12	76.52	---	30.68	---	45.84
GMW-57	10/11/12	76.66	---	30.91	---	45.75
GMW-58	10/11/12	75.48	---	28.78	---	46.70
GMW-59	10/11/12	75.28	---	28.28	---	47.00
GMW-60	10/11/12	76.24	---	30.40	---	45.84
GMW-61	10/11/12	75.60	---	29.84	---	45.76
GMW-62	10/11/12	76.34	30.18	30.67	0.49	46.08 [5]
GMW-63	10/11/12	77.32	---	31.03	---	46.29
GMW-64	10/11/12	75.84	---	29.48	---	46.36
GMW-65	10/11/12	76.78	---	30.81	---	45.97
GMW-66	10/11/12	77.00	---	31.14	---	45.86
GMW-O-1	10/15/12	71.45	---	24.33	---	47.12
GMW-O-2	10/15/12	72.54	---	25.50	---	47.04
GMW-O-3	10/15/12	72.19	---	25.33	---	46.86
GMW-O-4	10/15/12	71.95	---	25.14	---	46.81
GMW-O-4 MID	10/15/12	72.24	---	32.25	---	39.99
GMW-O-5	10/15/12	72.36	---	25.68	---	46.68
GMW-O-6	10/15/12	71.41	---	23.41	---	48.00
GMW-O-7	10/15/12	70.98	---	22.83	---	48.15
GMW-O-8	10/15/12	70.91	---	22.87	---	48.04
GMW-O-9	10/15/12	73.50	---	26.74	---	46.76
GMW-O-10	10/15/12	73.98	---	28.40	---	45.58
GMW-O-11	10/15/12	74.17	---	28.12	---	46.05
GMW-O-12	10/15/12	73.49	25.44	25.48	0.04	NC
GMW-O-14	10/15/12	74.08	---	27.96	---	46.12
GMW-O-15	10/15/12	74.23	---	31.82	---	42.41
GMW-O-16	10/15/12	74.10	---	27.38	---	46.72
GMW-O-17	10/15/12	73.78	---	26.62	---	47.16
GMW-O-18	10/15/12	74.36	---	29.73	---	44.63
GMW-O-19	10/15/12	74.46	---	27.46	---	47.00
GMW-O-20	10/15/12	73.32	32.95	32.97	0.02	NC
GMW-O-21	10/15/12	71.43	---	32.50	---	38.93
GMW-O-23	10/15/12	73.63	---	26.48	---	47.15

TABLE 4-5
Summary of Groundwater Elevations October 2012
DFSP Norwalk Site, Norwalk California

Well	Date	Top of Casing Elevation[1]	Depth to Product (feet)[2]	Depth to Water (feet)[2]	Apparent Product Thickness (feet)	Groundwater Elevation[1]
GMW-O-24	10/15/12	74.39	---	27.90	---	46.49
GMW-SF-7	10/15/12	75.26	---	28.93	---	46.33
GMW-SF-8	10/15/12	76.75	---	30.21	---	46.54
GMW-SF-9	10/15/12	73.05	---	34.21	---	38.84
GMW-SF-10	10/15/12	75.77	---	29.88	---	45.89
GW-1	10/11/12	75.97	---	30.32	---	45.65
GW-2	10/11/12	75.78	---	30.06	---	45.72
GW-3	10/11/12	75.79	---	30.18	---	45.61
GW-5	10/11/12	76.99	---	31.33	---	45.66
GW-6	10/11/12	76.38	---	30.74	---	45.64
GW-7	10/11/12	75.02	---	29.44	---	45.58
GW-8	10/11/12	76.15	---	30.48	---	45.67
GW-13	10/11/12	76.85	---	31.32	---	45.53
GW-14	10/11/12	76.54	---	30.96	---	45.58
GW-15	10/11/12	74.94	---	30.17	---	44.77
GW-16	10/11/12	76.33	---	31.03	---	45.30
GWR-1	10/15/12	77.40	---	29.21	---	48.19
GWR-3	10/15/12	77.60	---	31.21	---	46.39
HL-2	10/15/12	76.94	---	30.22	---	46.72
HL-3	10/15/12	76.86	---	30.64	---	46.22
MW-6	10/15/12	77.20	---	30.91	---	46.29
MW-7	10/15/12	78.13	---	31.81	---	46.32
MW-8	10/15/12	76.06	---	29.48	---	46.58
MW-9	10/15/12	77.11	---	31.30	---	45.81
MW-10	10/11/12	79.12	---	33.42	---	45.70
MW-12	10/15/12	75.76	---	30.31	---	45.45
MW-13	10/11/12	78.25	---	32.56	---	45.69
MW-14	10/11/12	78.60	---	32.93	---	45.67
MW-15	10/15/12	76.99	31.36	32.38	1.02	NC
MW-16	10/11/12	76.87	---	30.87	---	46.00
MW-17	10/11/12	77.86	---	32.05	---	45.81
MW-18 MID	10/15/12	75.67	---	33.41	---	42.26
MW-19 MID	10/15/12	78.14	---	34.29	---	43.85
MW-20 MID	10/15/12	77.19	---	33.05	---	44.14
MW-21 MID	10/15/12	77.55	---	31.23	---	46.32
MW-22 MID	10/11/12	79.57	---	35.12	---	44.45
MW-23 MID	10/11/12	79.59	---	33.89	---	45.70
MW-24	10/11/12	78.51	---	32.90	---	45.61
MW-25	10/11/12	79.15	---	33.48	---	45.67
MW-26	10/11/12	77.40	---	31.71	---	45.69
MW-27	10/11/12	78.46	---	32.62	---	45.84
MW-29	10/11/12	79.13	---	33.29	---	45.84
MW-O-1	10/15/12	75.48	---	28.94	---	46.54
MW-O-2	10/15/12	71.90	---	26.89	---	45.01
MW-SF-1	10/15/12	78.93	---	32.23	---	46.70
MW-SF-2	10/15/12	78.53	---	32.11	---	46.42

TABLE 4-5
Summary of Groundwater Elevations October 2012
DFSP Norwalk Site, Norwalk California

Well	Date	Top of Casing Elevation[1]	Depth to Product (feet)[2]	Depth to Water (feet)[2]	Apparent Product Thickness (feet)	Groundwater Elevation[1]
MW-SF-3	10/15/12	78.12	---	32.47	---	45.65
MW-SF-4	10/15/12	79.38	---	34.04	---	45.34
MW-SF-5	10/15/12	79.74	---	33.28	---	46.46
MW-SF-6	10/15/12	76.80	---	31.44	---	45.36
MW-SF-9	10/15/12	74.10	---	---	---	---
MW-SF-10	10/15/12	76.53	---	29.27	---	47.26
MW-SF-11	10/15/12	78.56	---	33.28	---	45.28
MW-SF-12	10/15/12	78.07	---	32.12	---	45.95
MW-SF-13	10/15/12	73.40	---	27.01	---	46.39
MW-SF-14	10/15/12	78.16	---	30.02	---	48.14
MW-SF-15	10/15/12	78.27	---	33.15	---	45.12
MW-SF-16	10/15/12	78.21	---	32.47	---	45.74
PW-1	10/15/12	75.52	---	27.76	---	47.76
PW-2	10/15/12	74.71	---	---	---	---
PW-3	10/15/12	73.71	---	---	---	---
PZ-2	10/15/12	73.96	---	27.76	---	46.20
PZ-3	10/11/12	76.17	30.14	30.37	0.23	45.99
PZ-5	10/15/12	73.97	---	28.25	---	45.72
PZ-6	10/15/12	73.91	---	---	---	---
PZ-7A	10/15/12	73.87	---	27.24	---	46.63
PZ-7B	10/15/12	73.79	---	27.22	---	46.57
PZ-8A	10/15/12	75.81	---	30.01	---	45.80
PZ-8B	10/15/12	75.69	---	30.71	---	44.98
PZ-9A	10/15/12	76.14	---	30.18	---	45.96
PZ-9B	10/15/12	76.26	---	30.54	---	45.72
PZ-10	10/15/12	74.34	---	29.81	---	44.53
TF-8	10/11/12	74.86	---	29.03	---	45.83
TF-9	10/11/12	74.47	---	28.47	---	46.00
TF-10	10/11/12	73.61	---	27.52	---	46.09
TF-11	10/11/12	74.40	---	28.46	---	45.94
TF-13	10/11/12	75.47	---	---	---	---
TF-14	10/11/12	74.35	---	---	---	---
TF-15	10/11/12	74.78	---	29.73	---	45.05
TF-16	10/11/12	75.89	---	29.87	---	46.02
TF-17	10/11/12	74.88	29.00	29.09	0.09	45.87
TF-18	10/11/12	73.94	27.72	28.03	0.31	46.17
TF-19	10/11/12	75.07	---	28.85	---	46.22
TF-20	10/11/12	75.08	29.94	29.96	0.02	45.14
TF-21	10/11/12	74.96	---	28.92	---	46.04
TF-22	10/11/12	74.76	28.94	28.95	0.01	45.82
TF-23	10/11/12	75.31	29.27	29.36	0.09	46.03
TF-24	10/11/12	76.43	---	30.26	---	46.17
TF-25	10/11/12	74.85	---	29.12	---	45.73
TF-26	10/11/12	75.85	---	29.89	---	45.96
VEW-1	10/15/12	---	---	---	---	---
VEW-2	10/15/12	---	---	---	---	---

TABLE 4-5
Summary of Groundwater Elevations October 2012
DFSP Norwalk Site, Norwalk California

Well	Date	Top of Casing Elevation[1]	Depth to Product (feet)[2]	Depth to Water (feet)[2]	Apparent Product Thickness (feet)	Groundwater Elevation[1]
WCW-1	10/11/12	72.86	---	25.80	---	47.06
WCW-2	10/11/12	75.34	---	28.86	---	46.48
WCW-3	10/15/12	76.16	---	29.98	---	46.18
WCW-4	10/11/12	78.05	---	32.18	---	45.87
WCW-5	10/11/12	73.49	---	26.48	---	47.01
WCW-6	10/11/12	75.52	---	29.22	---	46.30
WCW-7	10/15/12	76.44	---	30.41	---	46.03
WCW-8	10/11/12	77.34	---	31.72	---	45.62
WCW-9	10/11/12	77.74	---	32.10	---	45.64
WCW-10	10/11/12	74.06	---	26.24	---	47.82
WCW-11	10/11/12	75.29	---	28.01	---	47.28
WCW-12	10/11/12	76.27	---	29.72	---	46.55
WCW-13	10/15/12	77.70	---	31.38	---	46.32
WCW-14	10/11/12	78.81	---	32.57	---	46.24

Notes:

1. Feet above mean sea level, based on Los Angeles County Datum, 1980.
2. Below top of casing.
3. --- = product not detected or not applicable or not calculated.
4. NA = Groundwater elevations were not calculated from depth to water measurements due to recent changes in well casing elevations. Resurveyed casing elevations are pending.
5. Groundwater elevations were corrected with respect to product thickness measured in the well by means of the following calculation:

   'Groundwater Elevation = (Top of Casing Elevation - Depth to Water) + Apparent Product Thickness*0.84

6. NC = Groundwater elevations were not calculated due to the presence of measurable product in the well.

TABLE 4-6

Summary of Groundwater Analytical Results April 2013 (µg/L) [1/]

DFSP Norwalk Site, Norwalk California

Sampling Location	TPH [2/] as Gasoline	TPH as Diesel	Benzene	Toluene	Ethyl Benzene	Xylenes (total)	1,2-Dichloro-ethane (1,2-DCA)	Diisopropyl Ether (DIPE)	Ethyl-t-Butyl Ether (ETBE)	Methyl-t-Butyl Ether (MTBE)	Tert-Amyl-Methyl Ether (TAME)	Tert-Butyl Alcohol (TBA)
EXP-1	24 [3/]	42	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.155	0.25	2.5
EXP-2	24	42	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.155	0.25	2.5
EXP-3	24	42	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.155	0.25	2.5
EXP-4	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
EXP-5	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GMW-1	125	**470**	**2.8**	0.65	0.65	0.65	1.25	1.25	1.25	0.65	1.25	12.5
GMW-10	**14000**	**100000**	**210**	**65**	**48**	**310**	5	5	5	2.5	5	50
GMW-12	-- [/4]	**650**	0.07	0.12	0.07	--	0.12	0.165	0.22	0.155	0.11	2.3
GMW-13	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GMW-14	12.5	**110**	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GMW-15	--	**6200**	0.07	0.12	0.07	--	0.12	0.165	0.22	**1.1**	0.11	2.3
GMW-16	--	**190**	0.07	0.12	0.07	--	0.12	0.165	0.22	0.155	0.11	2.3
GMW-17	**1000**	**6700**	**55**	**1.1**	**1.2**	--	0.12	0.165	0.22	0.155	0.11	**31**
GMW-19	--	**1200**	**35**	**0.38**	0.07	--	0.12	0.165	0.22	**58**	0.11	**22**
GMW-27	25	12.5	0.125	0.125	0.125	0.125	0.25	**7.8**	0.25	**0.57**	0.25	**380**
GMW-3	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GMW-31	--	**120**	0.07	0.12	0.07	--	0.12	0.165	0.22	**0.67**	0.11	2.3
GMW-32	--	**1300**	0.07	0.12	0.07	--	0.12	0.165	0.22	0.155	0.11	2.3
GMW-36	**560000**	**19000**	**7400**	**20000**	**8900**	**50000**	100	100	100	**270**	100	1000
GMW-37	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GMW-38	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GMW-39	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	**0.88**	0.25	**54**
GMW-4	**2100**	**8000**	**56**	1	1	1	2	2	2	1	2	20
GMW-41	--	42	0.07	0.12	0.07	--	0.12	0.165	0.22	0.155	0.11	2.3
GMW-43	--	42	0.07	0.12	0.07	--	0.12	0.165	0.22	0.155	0.11	2.3
GMW-44	--	**100**	0.07	0.12	0.07	--	0.12	0.165	0.22	0.155	0.11	2.3
GMW-45	--	**3400**	**24**	0.12	**1.4**	--	0.12	0.165	0.22	0.155	0.11	**13**
GMW-47	--	**1500**	0.07	0.12	0.07	--	0.12	0.165	0.22	**5.4**	0.11	**150**
GMW-57	--	**180**	0.07	0.12	0.07	--	0.12	0.165	0.22	**0.54**	0.11	2.3
GMW-58	--	**1600**	**6.7**	0.12	0.07	--	0.12	0.165	0.22	**0.46**	0.11	**25**
GMW-58	--	**1600**	**6.7**	0.12	0.07	--	0.12	0.165	0.22	**0.46**	0.11	**25**
GMW-59	**2500**	**8200**	**680**	0.6	**2.2**	--	0.6	0.85	1.1	**6.6**	0.55	11.5
GMW-6	--	**110**	0.07	0.12	0.07	--	0.12	0.165	0.22	**0.44**	0.11	2.3
GMW-60	**1000**	**3200**	**61**	0.12	**1.6**	--	0.12	0.165	0.22	0.155	0.11	**460**
GMW-61	24	**340**	**0.43**	0.12	0.07	--	0.12	0.165	0.22	0.155	0.11	**60**
GMW-63	--	42	0.07	0.12	0.07	--	0.12	0.165	0.22	0.155	0.11	2.3
GMW-64	--	42	0.07	0.12	0.07	--	0.12	0.165	0.22	0.155	0.11	2.3
GMW-65	--	42	0.07	0.12	0.07	--	0.12	0.165	0.22	0.155	0.11	2.3
GMW-66	--	**130**	0.07	0.12	0.07	--	0.12	0.165	0.22	0.155	0.11	2.3

TABLE 4-6
Summary of Groundwater Analytical Results April 2013 (µg/L) [1/]
DFSP Norwalk Site, Norwalk California

Sampling Location	TPH [2/] as Gasoline	TPH as Diesel	Benzene	Toluene	Ethyl Benzene	Xylenes (total)	1,2-Dichloro-ethane (1,2-DCA)	Diisopropyl Ether (DIPE)	Ethyl-t-Butyl Ether (ETBE)	Methyl-t-Butyl Ether (MTBE)	Tert-Amyl-Methyl Ether (TAME)	Tert-Butyl Alcohol (TBA)
GMW-8	12.5	12.5	0.125	0.125	0.125	0.125	**1.4**	0.25	0.25	**0.59**	0.25	2.5
GMW-O-1	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GMW-O-10	**110**	12.5	**0.54**	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GMW-O-12	**34000**	**160000**	**13000**	25	25	25	50	50	50	25	50	500
GMW-O-14	**27000**	**3700**	**6900**	**200**	**1800**	**2300**	**61**	**180**	12.5	6.5	12.5	125
GMW-O-15	**460**	**110**	**89**	**2.3**	**4.6**	**5.5**	0.25	0.25	0.25	**36**	0.25	**3600**
GMW-O-16	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GMW-O-17	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	**26**
GMW-O-18	25	**58**	0.125	**0.51**	0.125	**0.53**	0.25	0.25	0.25	0.125	0.25	**4000**
GMW-O-19	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GMW-O-2	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GMW-O-24	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	**4.2**	0.25	2.5
GMW-O-3	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GMW-O-4	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GMW-O-5	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GMW-O-9	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GMW-SF-7	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GMW-SF-8	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
GW-13	24	42	0.07	0.12	0.07	--	**9.1**	**2**	0.22	**1.7**	0.11	**19**
GW-14	**1800**	**4800**	**30**	0.12	**8.2**	--	0.12	0.165	0.22	**13**	**0.82**	**10**
GW-2	24	42	0.07	0.12	0.07	--	**11**	**0.46**	0.22	**1.2**	0.11	2.3
GW-2	24	42	0.07	0.12	0.07	--	**11**	**0.46**	0.22	**1.2**	0.11	2.3
GW-3	--	**120**	0.07	0.12	0.07	--	0.12	0.165	0.22	0.155	0.11	**9.6**
GW-3	--	**120**	0.07	0.12	0.07	--	0.12	0.165	0.22	0.155	0.11	**9.6**
GW-6	--	**130**	0.07	0.12	0.07	--	0.12	0.165	0.22	**0.68**	0.11	2.3
GW-6	--	**130**	0.07	0.12	0.07	--	0.12	0.165	0.22	**0.68**	0.11	2.3
GWR-1	125	**330**	0.65	0.65	0.65	0.65	1.25	**13**	1.25	**9.1**	1.25	**68**
HL-2	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
HL-3	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
MW-12	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
MW-13	--	**140**	0.07	0.12	0.07	--	0.12	0.165	0.22	0.155	0.11	2.3
MW-14	--	**120**	0.07	0.12	0.07	--	**12**	**2.4**	0.22	**1.4**	0.11	2.3
MW-15	**890**	**240000**	0.25	0.25	0.25	0.25	0.5	0.5	0.5	0.25	0.5	5
MW-16	--	42	0.07	0.12	0.07	--	0.12	0.165	0.22	0.155	0.11	2.3
MW-17	--	42	0.07	0.12	0.07	--	0.12	0.165	0.22	0.155	0.11	2.3
MW-19 MID	**55**	12.5	0.125	0.125	0.125	0.125	**9.2**	**31**	0.25	**2**	0.25	**330**
MW-20 MID	12.5	12.5	0.125	0.125	0.125	0.125	**14**	**6.7**	0.25	**9.8**	0.25	2.5
MW-21 MID	50	**61**	0.25	0.25	0.25	0.25	**2.4**	**3.3**	0.5	0.25	0.5	**22**
MW-22 MID	--	**250**	0.07	0.12	0.07	--	**7**	**1.1**	0.22	**11**	0.11	**14**

TABLE 4-6
Summary of Groundwater Analytical Results April 2013 (µg/L) [1/]
DFSP Norwalk Site, Norwalk California

Sampling Location	TPH [2/] as Gasoline	TPH as Diesel	Benzene	Toluene	Ethyl Benzene	Xylenes (total)	1,2-Dichloro-ethane (1,2-DCA)	Diisopropyl Ether (DIPE)	Ethyl-t-Butyl Ether (ETBE)	Methyl-t-Butyl Ether (MTBE)	Tert-Amyl-Methyl Ether (TAME)	Tert-Butyl Alcohol (TBA)
MW-23 MID	--	**4800**	0.07	0.12	0.07	--	0.12	0.165	0.22	**2.9**	0.11	**13**
MW-24	--	**150**	0.07	0.12	0.07	--	0.12	0.165	0.22	**0.87**	0.11	2.3
MW-25	--	42	0.07	0.12	0.07	--	**3.6**	0.165	0.22	**0.49**	0.11	2.3
MW-26	--	**990**	**2**	**0.36**	**1.5**	--	0.12	0.165	0.22	**0.74**	0.11	2.3
MW-27	--	**310**	0.07	0.12	0.07	--	0.12	0.165	0.22	**3.8**	0.11	**23**
MW-29	--	**2200**	0.07	0.12	**0.64**	--	0.12	0.165	0.22	0.155	0.11	2.3
MW-6	12.5	12.5	0.125	0.125	0.125	0.125	**0.7**	0.25	0.25	0.125	0.25	2.5
MW-7	12.5	12.5	0.125	0.125	0.125	0.125	**1.3**	0.25	0.25	0.125	0.25	2.5
MW-8	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
MW-9	**870**	**4400**	**4.8**	0.65	0.65	0.65	1.25	1.25	1.25	**4.5**	1.25	12.5
MW-O-2	**10000**	**7000**	**5400**	10	**91**	**200**	20	20	20	**190**	20	200
MW-SF-9	**2300**	**4500**	**680**	**25**	**52**	**190**	2.5	**40**	2.5	**20**	2.5	25
PW-3	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
PZ-2	**210**	**940**	**9.9**	0.25	**13**	0.25	0.5	0.5	0.5	0.25	0.5	5
PZ-5	**10000**	**2300**	**4100**	**37**	**300**	**140**	10	10	10	**4800**	10	**83000**
TF-16	**1200**	**2500**	**180**	0.12	**1.5**	--	0.12	0.165	0.22	**4.8**	0.11	**6**
TF-21	**590**	**2700**	**130**	0.12	**0.5**	--	0.12	0.165	0.22	**4.1**	0.11	**13**
WCW-12	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
WCW-13	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
WCW-14	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
WCW-2	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
WCW-3	12.5	12.5	0.125	0.125	0.125	0.125	**4.1**	0.25	0.25	0.125	0.25	2.5
WCW-4	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
WCW-5	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
WCW-6	12.5	12.5	0.125	0.125	0.125	0.125	0.125	0.25	0.25	0.125	0.25	2.5
WCW-7	12.5	12.5	0.125	0.125	0.125	0.125	**19**	**1.3**	0.25	**0.61**	0.25	2.5
WCW-8	25	12.5	0.125	0.125	0.125	0.125	0.25	0.25	0.25	0.125	0.25	2.5

Notes:

[1/] all results in micrograms per liter (µg/L)

[2/] TPH = Total Petroleum Hydrocarbons

[3/] All non-detects are reported at one-half of the method detection limit for use in the EVS modeling program.

[4/] -- = Not analyzed

TABLE 5-1
Remediation Objectives, Goals, and Performance Metrics
DFSP Norwalk, Norwalk, California

Obj #	Identify Concerns and Set Remedial Objective		Set Remediation Goals for Each Objective	Set Performance/Remediation Metrics for the Remediation Goal
	Concern	Objective	Goals	Metrics
1	**Reduce LNAPL Saturation.** LNAPL is present in monitoring wells and above residual saturations. Testing of LNAPL in soil cores indicates that LNAPL saturations are sufficiently low so that it is not mobile. LNAPL recovery (bail-down) testing, ref. Section 4.3.4, for wells with LNAPL indicates low transmissivity values (≤ 0.1 ft^2/day) indicates LNAPL is near the range of non-recoverable.	1. Reduce LNAPL saturation until it is no longer above residual saturation or measureable in monitoring wells.	Recover LNAPL mass to the maximum extent practicable using existing wells and to remove volatile fractions of LNAPL using in situ technology and periodic or batch-phase bioslurrping.	Limited or infrequent LNAPL thickness measured in wells. Transmissivity < 0.2 ft^2/d and LNAPL/water ratio is steadily decreasing.
2	**Change LNAPL Phase.** LNAPL is source of the dissolved-phase plume of hydrocarbon constituents (TPH_d, BTEX, and TPH_{jf}) in vadose zone and groundwater that exceed concentrations set by the RWQCB Basin Plan objectives and California Code of Regulations (CCR) Title 22 drinking water standards (Section 4.3.3).	1. Change the phase of LNAPL composition and further reduce LNAPL saturation so that the dissolved-phase plume of hydrocarbon constituents is stable or shrinking and decreasing over time.	Remove volatile fractions of LNAPL using in situ technology (phase-change technology).	Concentrations of dissolved-phase hydrocarbon COCs in groundwater and vapor-phase hydrocarbon constituents in the vadose zone do not pose a threat to human health without the use of active remediation system(s).
3	**Remove Dissolved-Phase Plume.** Dissolved-phase hydrocarbon constituents exceed concentrations set by RWQCB Basin Plan objectives and CCR Title 22 drinking water standards.	1. Remove the plume of dissolved-phase hydrocarbons until Remediation Objectives No. 1 and No. 2 have addressed Concerns No. 1 and No. 2, and then reduce concentrations within the dissolved-phase plume until NSZD can continue to reduce the plume over time.	Remediate dissolved-phase COCs by excavation and in-situ treatment method(s) until the concentrations within the dissolved-phase plume are below dissolved phase cleanup criteria and the plume is shrinking.	Concentrations of dissolved-phase hydrocarbon constituents of concern meet NSZD or cleanup criteria.
4	**Future Site Commercial Use.** In the future, the site will be redeveloped into commercial and light industrial areas and the park to the east of the site will be expanded to cover part of the eastern portion of the site. Thus, future human receptors at the site include construction workers (i.e., to redevelop the site), commercial / industrial workers, and park visitors.	1. Reduce COC concentrations to regulatory levels before future new land use begins.	Remediate dissolved-phase COCs by excavation and in-situ treatment method(s) until the concentrations within the dissolved-phase plume are below dissolved phase cleanup criteria and the plume is shrinking.	Concentrations of dissolved-phase hydrocarbon constituents of concern meet NSZD or cleanup criteria.
		2. Reduce potential for long-term contact with residual COC impacts and allow commercial redevelopment.	Remove presence of COCs to dissolved and gas-phase cleanup levels within shallow vadose zone soils.	Provide a minimum buffer of 10 ft. (via excavation) between land-surface commercial operations and any potentially remaining impacts below ground.
		3. Achieve objectives within 3 to 5 year timeframe for commercial development purposes.	Install tested and proven in-situ technology to actively remove COCs or oxidize existing COCs to non-hazardous byproducts.	Final solution is needed in time to sell and transfer ownership over to a new property owner / developer.

TABLE 5-1
Remediation Objectives, Goals, and Performance Metrics
DFSP Norwalk, Norwalk, California

Obj #	Identify Concerns and Set Remedial Objective		Set Remediation Goals for Each Objective	Set Performance/Remediation Metrics for the Remediation Goal
	Concern	Objective	Goals	Metrics
5	**Vertical VOC Migration in Soils and Resulting Exposure.** VOCs can migrate upwards through the soil column until, eventually, they are released into either outdoor air or into overlying buildings. Human receptors at the site may then breathe in those volatiles.	Minimize or eliminate exposure to human receptors.	Remove or oxidize shallow soil VOCs to below cleanup levels, and if necessary, develop measures or controls to eliminate or bypass pathway for human exposure.	Concentrations of dissolved-phase hydrocarbon constituents of concern meet NSZD or cleanup criteria.
6	**Vertical VOC Migration and Emission.** VOCs in groundwater and soils at the site may be emitted to outdoor air which then may migrate to the park and nearby residences, where the receptors there may be exposed.	Same Objective as Objective for no. 5.	Remove or oxidize shallow soil VOCs to below cleanup levels, and if necessary, develop measures or controls to eliminate or bypass pathway for human exposure.	Concentrations of dissolved-phase hydrocarbon constituents of concern meet NSZD or cleanup criteria.
7	The northeastern groundwater plume at the site has migrated offsite to the east underneath Holifield Park. There, the contaminants may migrate upwards and be released to ambient air in the park where the park users may be exposed via inhalation.	Minimize or eliminate exposure to human receptors.	Excavate, remove, or oxidize shallow soil VOCs to below cleanup levels, and if necessary, develop measures or controls to eliminate or bypass pathway for human exposure.	Concentrations of dissolved-phase hydrocarbon constituents of concern meet NSZD or cleanup criteria.
8	**Upper Zone Groundwater Used as Drinking Water.** If groundwater is used as a drinking water source, human receptors may also be exposed via the potable uses of water; i.e., drinking water ingestion, dermal contact during showering/bathing, and inhalation of volatiles emitted during showering or other domestic uses of water.	Upper groundwater zone has beneficial use; however, not designated as drinking water source zone.	Remove or oxidize shallow soil VOCs to below cleanup levels, and if necessary, develop measures or controls to eliminate or bypass pathway for human exposure.	Reduce, minimize, or eliminate vertical VOC migration pathway.

TABLE 5-2
Soil Cleanup Goals
DFSP Norwalk Site, Norwalk California

	(feet below ground surface)					
Depth Below Ground Surface	**0.5**	**5**	**10**	**15**	**20**	**25**
Depth to Groundwater	**25.5**	**21**	**16**	**11**	**6**	**1**
Constituent	**Soil Cleanup Goal (mg/kg)**					
TPH as Gasoline (C4-C12)	500	500	100	100	100	100
TPH as JP-5 (C8-C17)	500	500	100	100	100	100
TPH as Diesel (C5-C25)	1,000	1,000	100	100	100	100
Benzene	0.015	0.013	0.012	0.013	0.011	0.012
Toluene	0.614	0.440	0.391	0.423	0.356	0.367
Ethylbenzene	2.07	1.44	1.19	1.33	1.07	1.10
Xylenes	5.55	3.77	3.09	3.47	2.76	2.84
1,1,2,2-Tetrachloroethane	0.0023	0.0020	0.0015	0.0012	0.0006	0.0002
1,1,2-Trichloroethane	0.0032	0.0029	0.0023	0.0020	0.0012	0.0008
1,2,3-Trichlorobenzene	0.0740	0.0634	0.0467	0.0356	0.0162	0.0034
1,2,3-Trichloropropane	8.74E-07	7.66E-07	5.87E-07	4.79E-07	2.56E-07	1.23E-07
1,2,4-Trimethylbenzene	2.10	1.80	1.34	1.03	0.478	0.120
1,2-Dibromo-3-chloropropane	2.50E-04	2.19E-04	1.68E-04	1.37E-04	7.31E-05	3.52E-05
1,2-Dibromoethane	3.05E-06	2.78E-06	2.27E-06	2.04E-06	1.30E-06	9.60E-07
1,2-Dichloroethane	1.06E-04	1.04E-04	9.37E-05	9.60E-05	7.29E-05	6.92E-05
1,3,5-Trimethylbenzene	2.06	1.77	1.31	1.01	0.470	0.118
2-Butanone	0.557	0.607	0.617	0.713	0.612	0.661
2-Chlorotoluene	0.558	0.481	0.358	0.278	0.132	0.039
2-Hexanone	0.0073	0.0072	0.0065	0.0066	0.0050	0.0047
4-Chlorotoluene	0.547	0.472	0.351	0.273	0.130	0.038
Acetone	0.994	1.17	1.28	1.57	1.42	1.60
Bromomethane	0.0015	0.0014	0.0013	0.0013	0.0010	0.0010
Carbon disulfide	0.049	0.046	0.039	0.038	0.026	0.023
Chlorobenzene	0.119	0.104	0.079	0.063	0.032	0.013
Chloroethane (Ethyl Chloride)	2.23	2.47	2.55	2.98	2.59	2.83
Chloroform	7.38E-05	6.82E-05	5.67E-05	5.25E-05	3.48E-05	2.75E-05
Dichlorodifluoromethane	0.984	0.868	0.672	0.559	0.309	0.167
Diisopropyl Ether (DIPE)	0.449	0.424	0.364	0.350	0.246	0.212
Isopropylbenzene	5.56	4.78	3.53	2.71	1.26	0.303
Methylene Chloride	7.78E-04	7.99E-04	7.61E-04	8.27E-04	6.69E-04	6.82E-04
Methyl-t-Butyl Ether (MTBE)	9.07E-04	9.10E-04	8.43E-04	8.89E-04	6.97E-04	6.86E-04
Naphthalene	0.270	0.231	0.170	0.130	0.059	0.012
n-Butylbenzene	3.97	3.40	2.50	1.91	0.867	0.179
n-Propylbenzene	2.18	1.87	1.39	1.06	0.489	0.114
p-Isopropyltoluene	2.82	2.42	1.79	1.37	0.636	0.154
sec-Butylbenzene	2.59	2.22	1.64	1.26	0.576	0.129
Styrene	0.463	0.399	0.296	0.229	0.108	0.030
Tert-Butyl Alcohol (TBA)	0.0010	0.0012	0.0013	0.0016	0.0014	0.0016
tert-Butylbenzene	2.07	1.78	1.32	1.01	0.465	0.110
Trichloroethene	0.0070	0.0061	0.0047	0.0038	0.0020	0.0009

Notes:

mg/kg = milligram per kilogram
NA = not applicable

TABLE 5-3
Commercial Worker Soil Gas Screening Levels
DFSP Norwalk Site, Norwalk California

	5 ft bgs				15 ft bgs			
	Carcinogen	Noncarcinogen	Minimum		Carcinogen	Noncarcinogen	Minimum	
Chemical	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/L)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/L)
1,2,4-Trimethylbenzene	-	8.11E+04	8.11E+04	8.11E+01	-	1.78E+05	1.78E+05	1.78E+02
1,2-Dichlorobenzene	-	2.17E+06	2.17E+06	2.17E+03	-	4.60E+06	4.60E+06	4.60E+03
1,2-Dichloroethane	1.20E+03	6.29E+04	1.20E+03	1.20E+00	2.27E+03	1.19E+05	2.27E+03	2.27E+00
1,3,5-Trimethylbenzene	-	8.14E+04	8.14E+04	8.14E+01	-	1.79E+05	1.79E+05	1.79E+02
1,3-Dichlorobenzene	-	3.78E+04	3.78E+04	3.78E+01	-	8.03E+04	8.03E+04	8.03E+01
1,4-Dichlorobenzene	2.76E+03	8.66E+06	2.76E+03	2.76E+00	5.85E+03	1.84E+07	5.85E+03	5.85E+00
2-Butanone (methyl ethyl ketone)	-	5.01E+07	5.01E+07	5.01E+04	-	1.02E+08	1.02E+11	1.02E+08
2-Hexanone	-	3.21E+05	3.21E+05	3.21E+02	-	6.79E+05	6.79E+05	6.79E+02
Acetone	-	2.59E+08	2.59E+08	2.59E+05	-	4.68E+08	4.68E+08	4.68E+05
Benzene	9.31E+02	2.89E+05	9.31E+02	9.31E-01	1.85E+03	5.76E+05	1.85E+03	1.85E+00
Bromodichloromethane	1.37E+03	1.26E+06	1.37E+03	1.37E+00	3.50E+03	3.24E+06	3.50E+03	3.50E+00
c-1,2-Dichloroethene	-	6.29E+05	6.29E+05	6.29E+02	-	1.31E+06	1.31E+06	1.31E+03
Carbon disulfide	-	6.29E+06	6.29E+06	6.29E+03	-	1.19E+07	1.19E+07	1.19E+04
Carbon tetrachloride	6.80E+02	1.02E+06	6.80E+02	6.80E-01	1.40E+03	2.10E+06	1.40E+03	1.40E+00
Chloroform	4.75E+03	8.77E+05	4.75E+03	4.75E+00	9.01E+03	1.67E+06	9.01E+03	9.01E+00
Chloromethane	-	7.51E+05	7.51E+05	7.51E+02	-	1.35E+06	1.35E+06	1.35E+03
Dichlorodifluoromethane (Freon 12)	-	1.10E+06	1.10E+06	1.10E+03	-	2.37E+06	2.37E+06	2.37E+03
Ethylbenzene	1.16E+04	1.04E+07	1.16E+04	1.16E+01	2.42E+04	2.16E+07	2.42E+04	2.42E+01
Methylene chloride	2.55E+04	5.45E+06	2.55E+04	2.55E+01	4.87E+04	1.04E+07	4.87E+04	4.87E+01
o-Xylene	-	9.69E+05	9.69E+05	9.69E+02	-	1.93E+06	1.93E+06	1.93E+03
p/m-Xylene	-	1.03E+06	1.03E+06	1.03E+03	-	2.12E+06	2.12E+06	2.12E+03
Tert-Butyl Alcohol (TBA)	-	2.90E+08	2.90E+08	2.90E+05	-	5.79E+08	5.79E+08	5.79E+05
Tetrachloroethene (PCE)	5.03E+03	2.88E+06	5.03E+03	5.03E+00	1.06E+04	6.04E+06	1.06E+04	1.06E+01
Toluene	-	4.85E+07	4.85E+07	4.85E+04	-	9.67E+07	9.67E+07	9.67E+04
Trichloroethene	1.42E+04	2.03E+04	1.42E+04	1.42E+01	2.91E+04	4.15E+04	2.91E+04	2.91E+01
Vinyl acetate	-	1.96E+06	1.96E+06	1.96E+03	-	3.93E+06	3.93E+06	3.93E+03

Notes:

ft bgs = feet below ground surface

µg/m^3 = micrograms per cubic meter

µg/L = micrograms per liter

TABLE 6-1
Remediation Technology Description and Preliminary Screening
DFSP Norwalk Site, Norwalk California

Remedial Technology[1]		Technology Description	Evaluated for Purpose of Meeting Remedial Objective	Comment
1	Excavation	LNAPL body is physically removed and properly treated or disposed (LNAPL mass recovery).	Yes	To minimize/eliminate human exposure, excavation of top 10-ft bgs in impacted areas where soil cleanup criteria are exceeded.
2	Physical or hydraulic containment (barrier wall, French drain, slurry wall, wells, trenches)	Subsurface barrier is constructed to prevent or impede LNAPL migration (LNAPL mass control).	Yes	Based on the projected timeframe and forecast endpoint of 3 to 5 years, this technology would not assist in reaching site objectives and goals including cleanup goals. However, a treatment barrier and/or horizontal gas collection barrier may serve as a secondary "defense" for site areas where human receptors would have a higher likelyhood of exposure and would be considered.
3	In situ soil mixing	LNAPL body is physically/chemically bound within a stabilized mass to reduce mobility (LNAPL mass control).	Yes	BIOX or similar ISCO material considered for placement at bottom and sides of excavation, which would provide a near-perfect opportunity for this application.
4	Natural source zone depletion (NSZD)	LNAPL constituents are naturally depleted from the LNAPL body over time by volatilization, dissolution, absorption and, degradation (LNAPL phase-change remediation).	Yes	---
5	Air sparging (including biosparging option)/ soil vapor extraction (AS/SVE)	AS injects air into LNAPL body to volatilize LNAPL constituents, and vapors are vacuum extracted. AS or SVE can also be used individually if conditions are appropriate (LNAPL phase-change remediation).	Yes[2]	Although SVE has worked effectively from 1996 through ~2008 to assist with the bulk removal of VOCs and volatile portion of TPH, the existing SVE system has reached an asymptotic removal level and mostly serves to contain the dissolved/gas phase. Because the site does not have an impermeable cap layer or equivalent, SVE has a tendency to short circuit. Additionally, USEPA suggests AS not be used if free product exists (i.e., free product must be removed prior to air sparging), which may increase potential for inducing migration of constituents. Stratified soils may cause air sparging to be ineffective.
6	LNAPL skimming	LNAPL is hydraulically recovered from the top of the groundwater column within a well (LNAPL mass recovery).	No	With reference to Section 4.3, the effective site transmissivity is ≤ 0.2 ft^2/day is essentially deemed as non-recoverable by this technology.
7	Bioslurping/enhanced fluid recovery (EFR)	LNAPL is remediated via a combination of vacuum-enhanced recovery and bioventing processes (LNAPL mass recovery).	Yes	---
8	Dual-pump liquid extraction (DPLE)	LNAPL is hydraulically recovered by using two pumps simultaneously to remove LNAPL and groundwater (LNAPL mass recovery).	No	LNAPL transmissivity (as referenced in comment no. 6) and elevated viscosities of typical diesel (THPd) and JP-5 jet fuel (TPHjf) are generally much greater than 6 centipoise; this generally results in limited recoverability of LNAPL for the site. Additionally, this technology would require a much larger scale pump & treat and ex-situ wastewater treatment system and discharge of treated groundwater. The projected timeframe for this technology would be greater than five years.
9 and 10	Multiphase extraction (MPE) (single or dual pump) with SVE	LNAPL and groundwater are removed through the use of one or two dedicated pumps. Vacuum enhancement is typically added to increase LNAPL hydraulic recovery rates (LNAPL mass recovery).	No	Reference explanation provided in comment no. 8.

TABLE 6-1
Remediation Technology Description and Preliminary Screening
DFSP Norwalk Site, Norwalk California

Remedial Technology[1]		Technology Description	Evaluated for Purpose of Meeting Remedial Objective	Comment
11	Water flooding (including hot water flooding)	Water is injected to enhance the hydraulic LNAPL gradient toward recovery wells. Hot water may be injected to reduce interfacial tension and viscosity of the LNAPL and further enhance LNAPL removal by hydraulic recovery (LNAPL mass recovery).	No	Water-handling equipment to inject, extract, and treat; water-heating equipment, if used, has additional risks. Need to potentially treat water source prior to injection. Water-heating equipment would be needed, which increases energy use; significant scaling of exchangers/heating system would require significant maintenance. Continuous injection and circulation of water, high operation and maintenance costs, heating the water prior to reinjection further increase cost over a relatively short time period.
12	In situ chemical oxidation (ISCO)	LNAPL is depleted by accelerating LNAPL solubilization by the addition of a chemical oxidant into the LNAPL zone (LNAPL phase-change remediation).	Yes	---
13	Surfactant-enhanced subsurface remediation (SESR)	A surfactant is injected that increases LNAPL solubilization and LNAPL mobility. The dissolved phase and LNAPL are then recovered via hydraulic recovery (LNAPL phase-change remediation and LNAPL mass recovery).	No	The success rate is higher for very small areas. Extensive ex-situ treatment required. Implementation experienced at other similar sites indicates a very limited success rate.
14	Co-solvent flushing	A solvent is injected that increases LNAPL solubilization and LNAPL mobility. The dissolved phase and LNAPL are then recovered via hydraulic recovery (LNAPL phase-change remediation and LNAPL mass recovery).	No	The success rate is typically higher for very small areas. LNAPL must be swept by infiltrating or injecting the cosolvent and extracting simultaneously downgradient to maintain hydraulic control, which increases the complexity of the application. TPH and COC extraction from the solvent requires extensive ex-situ treatment and handling. Additionally, the discharge would require a temporary industrial wastewater permit and/or deep well injection registration under the IUC program.
15	Steam/hot-air injection	LNAPL is removed by forcing steam into the aquifer to vaporize, solubilize, and induce LNAPL flow. Vapors, dissolved phase, and LNAPL are recovered via vapor extraction and hydraulic recovery (LNAPL phase-change remediation and LNAPL mass recovery).	No	Preferance is not to induce a phase change. Effective for volatilization and recapture of benzene; however, would potentially cause more dispersion of TPH due to low volatility. Energy, capital, ex-situ process/treatment, on-site team, and process controls are extensive.
16	Radio-frequency heating	Electromagnetic energy is used to heat soil and groundwater to reduce the viscosity and interfacial tension of LNAPL for enhanced hydraulic recovery. Vapors and dissolved phase may also be recovered via vapor extraction and hydraulic recovery (LNAPL phase-change remediation and LNAPL mass recovery).	No	Preferance is not to induce a phase change. Higher-viscosity and/or-lower volatility LNAPL (such as TPH_d and TPH_{jf}) take longer to treat and/or achieve less remedialeffectiveness. Although effective in locations with sand lenses that provide a layer through which fluid flow can occur, it has potentially high operation and maintenance costs to keep the system operational. More difficult to implement on larger sites.
17	Three- and six-phase electrical resistance heating	Electrical energy is used to heat soil and groundwater to vaporize volatile LNAPL constituents and reduce the viscosity and interfacial tension of LNAPL for enhanced hydraulic recovery. Vapors and dissolved phase may also be recovered via vapor extraction and hydraulic recovery (LNAPL phase-change remediation and LNAPL mass recovery).	No	Preferance is not to induce a phase change. Although a very short duration, e.g., 90 to 180 days operation to completion, capital and electrical operation costs are very high.

Notes:

1 From Interstate Technology & Regulatory Council (ITRC). 2009b. Evaluating LNAPL Remedial Technologies for Achieving Project Goals, LNAPL-2. Washington, D.C.: Interstate Technology & Regulatory Council, LNAPLs Team. www.itrcweb.org.

2 It is understood that SFPP will be conducting a pilot study onsite at their areas of impact to determine the effectiveness of AS coupled with SVE and will share the results with DLA Energy. Based on the test results, the effectiveness of this approach will be assessed for use on the DFSP Norwalk site.

--- No Comment

TABLE 6-2
Screened Technologies Assessment Retained and Not-Retained for Further Evaluation
DFSP Norwalk Site, Norwalk California

No.	Technology	Technology Description	Advantages	Disadvantages	Applicable Geology (fine coarse)[1]	Applicable to Unsaturated Zone, Saturated Zone[2]	Applicable Type of LNAPL[3]	Potential Timeframe	Effectiveness	Cost	Implementability	Third-Party Impacts	Retained/ Not Retained
1	Excavation	Targeted areas with shallow impacted soils > cleanup goals is removed from the surface down to 10-ft bgs via excavation.	100% removal time frame; with clean backfill, unquestionably and directly addresses human health exposure.	Cost, 3rd party off-site waste disposal or recycle; depth limited to 10-ft bgs.	F, C	U	LV, LS, HV, HS	Very short	High; treats mobile, diffused, and residual LNAPL	Expensive; need to manage impacted soils off-site for disposal or recycle.	No concerns	Odor/dust control; noise; worker exposure to BTEX emissions; off-site management and transport	Retained
2	Physical or hydraulic containment (barrier wall)	Aerobic vapor migration barrier (beneath future buildings to attenuate vapor migration)	Actively manages / treats any methane or VOC residual gas concentrations below future buildings.	Requires process redundancy and long-term operation & maintenance	F, C	U	LV, LS, HV, HS	Continuous, long or short-term	High; treats methane and/or BTEX residual in subslab air stream	Medium	Only if needed, based on soil-gas testing / monitoring	Vapor intrusion management	Retained
3	In situ soil mixing	Mechanical mixing of soil materials with chemical oxidants or electron acceptors, such as BIOX, at bottom of impacted soil excavation.	Oxidant can be dispersed across the impacted area of the excavation bottom and initiate rapid penetration and oxidation TPH components.	Personal protective safety measures must be utilized during deployment	F, C	U, S	LV, LS, HV, HS	Very short	High; destroys a wide variety of organic contaminants at near neutral pH and at ambient groundwater temperatures.	Medium	Requires WDR and proper PPE for deployment	Little to none	Retained
4	Natural source zone depletion (NSZD)	LNAPL constituents are naturally depleted from the LNAPL body over time by volatilization, dissolution, absorption and, degradation (LNAPL phase-change remediation).	No disruption, implementable, low carbon footprint	Timeframe, long-term monitoring required, containment, perception of no action by public	F, C	U + S	HV, HS	Very long	Low	Low cost; however, long-term monitoring is typically needed	No concerns	None, but public perception of no action	Retained

TABLE 6-2
Screened Technologies Assessment Retained and Not-Retained for Further Evaluation
DFSP Norwalk Site, Norwalk California

No.	Technology	Technology Description	Advantages	Disadvantages	Applicable Geology (fine coarse)[1]	Applicable to Unsaturated Zone, Saturated Zone[2]	Applicable Type of LNAPL[3]	Potential Timeframe	Effectiveness	Cost	Implementability	Third-Party Impacts	Retained/ Not Retained
5	Air sparging (including biosparging option)/ soil vapor extraction (AS/SVE)	AS injects air into LNAPL body to volatilize LNAPL constituents, and vapors are vacuum extracted. AS or SVE can also be used individually if conditions are appropriate (LNAPL phase-change remediation).	Proven implementable, treats residual LNAPL, better suited for more volatile LNAPLs but also enhances biodegradation of heavier-end hydrocarbons, some vapor recovery / treatment already in place	Does not treat effectively in low permeability soils, homogeneity, accessibility for closely spaced vertical wells, off-gas vapor management	C	U + S	HV, HS	Short to medium	High; proven technology, treats residual LNAPL, enhances biodegradation	Expensive; medium to large energy requirements	Access constraints; limited access to target area for drilling and conveyance lines if using vertical wells; access improves using horizontal approach, hydraulic containment and SVE required until remediation goals are met	Noise, vapor intrusion management, site access, temporary utilities	Retained
7	Bioslurping / enhanced fluid recovery (EFR)[4]	LNAPL is remediated via a combination of vacuum-enhanced recovery and bioventing processes (LNAPL mass recovery).	Proven implementable, residual LNAPL recovery, and vapor control	Timeframe, limited to mobile LNAPL, limited ROI, vapor and fluids treatment required	F, C	U + S	LV, LS, HV, HS	Very long	Low; limited to mobile LNAPL	Low cost; treatment and disposal of extracted groundwater at existing GWTS.	No concerns	Waste stream management	Retained
12	In situ chemical oxidation (ISCO)	ISCO involves injecting an oxidant (activated persulfate) to react with and destroy organic compounds. Treatment of LNAPL sites using ISCO focuses on treatment of the dissolved plume, soils, and LNAPL; oxidation reactions occur in the dissolved phase.	Timeframe, source removal, treats residual LNAPL	Rate-limited hydraulic control required, by-products, cost, vapor generation, rebound, accessibility for closely spaced vertical wells, or temporary injection probes	F, C	U + S	HV, HS	Very short to short	High; proven technology, treats residual LNAPL and dissolved phase	Expensive; oxidant costs, temporary injection points and/or installation of closely spaced wells	Access constraints; limited access to target area for drilling and conveyance lines if using vertical wells	Potential vapor intrusion/safety issues	Retained

Notes:
[1] Applicable geology: F = clay to silt, C = sand to gravel
[2] Applicable zone: U = unsaturated zone, S = saturated zone
[3] LNAPL type: LV, LS = low volatility, low solubility, medium or heavy LNAPL (e.g., weathered gasoline, diesel, jet fuel, fuel oil, crude oil); HV, HS = high volatility, high solubility, light LNAPL with significant percentage of volatile or soluble constituents (e.g., gasoline, benzene)
[4] This technology was technically eliminated in approximately 2006, however, this methodology would be essentially continued to remove residual LNAPL on a periodic basis.

FIGURES

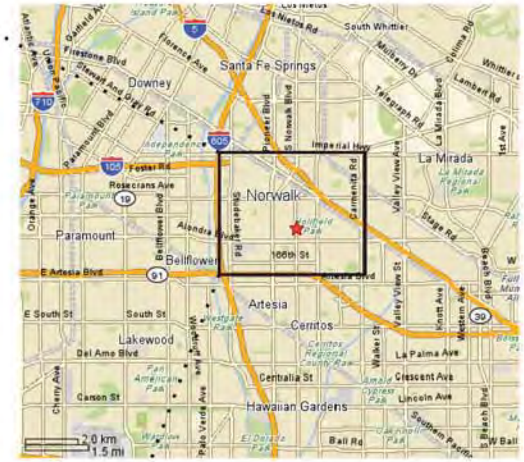


FIGURE 1-1

SITE
LOCATION MAP

Defense Fuel Support Point
Norwalk, California

PARSONS

Pasadena, California

K:\Depts\Dept48\DESC 07-2008 Contract\Norwalk\ACO-0010 Conceptual Site Model\Sept 2013 Complete CSM\Figures\Figure 1-1 Site Location Map.cdr

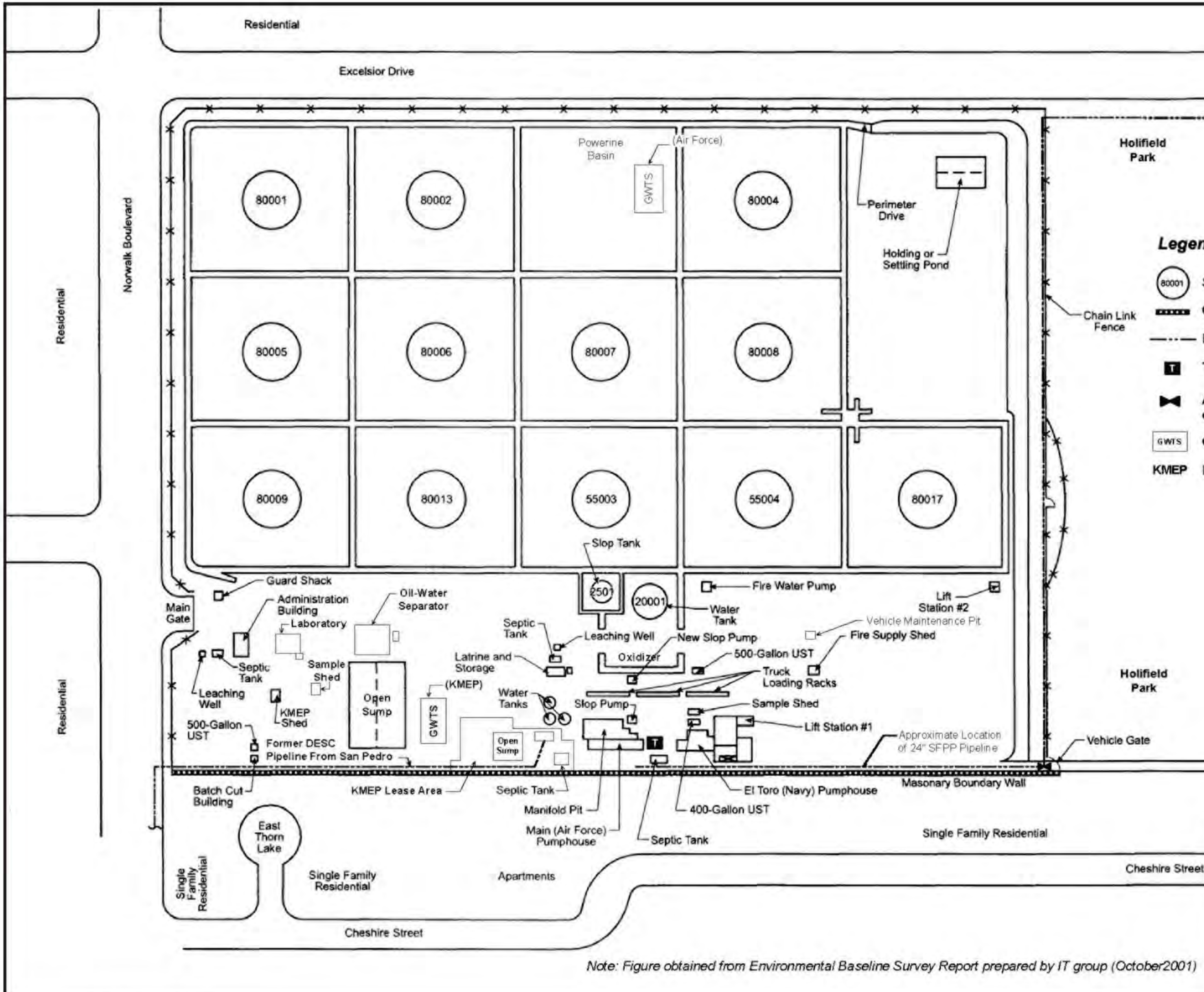


FIGURE 2-1

SITE MAP AND HISTORICAL SITE FACILITIES

Defense Fuel Support Point
Norwalk, California

PARSONS
Pasadena, California

K:\Depts\Dept48\DESC 07-2008 Contract\Norwalk\ACO-0010 Conceptual Site Model\Sept 2013 Complete CSM\Figures\Figure 1-2 Site Map & Historical Site Facilities.cdr

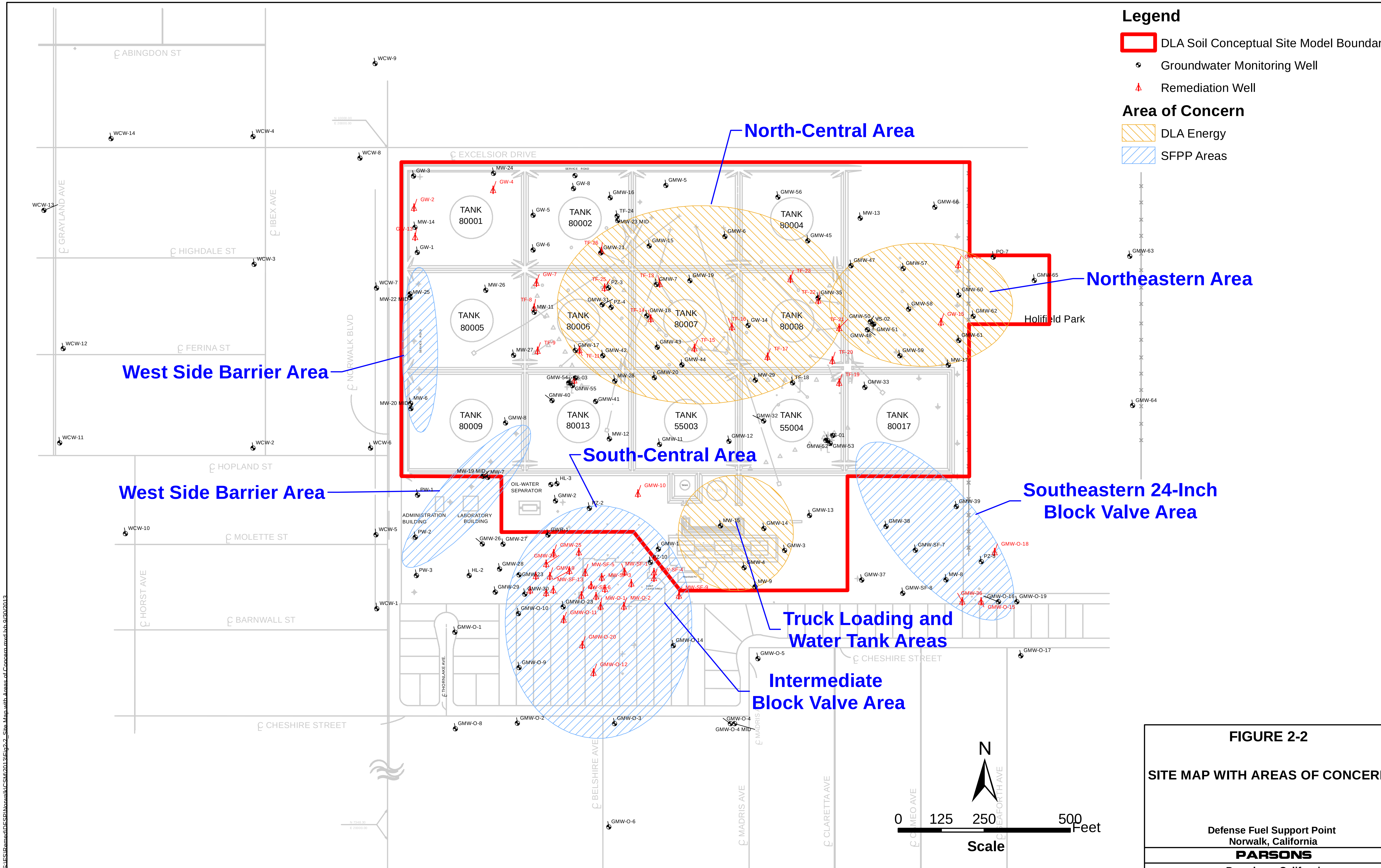


FIGURE 2-2

SITE MAP WITH AREAS OF CONCERN

Defense Fuel Support Point
Norwalk, California

PARSONS

Pasadena, California

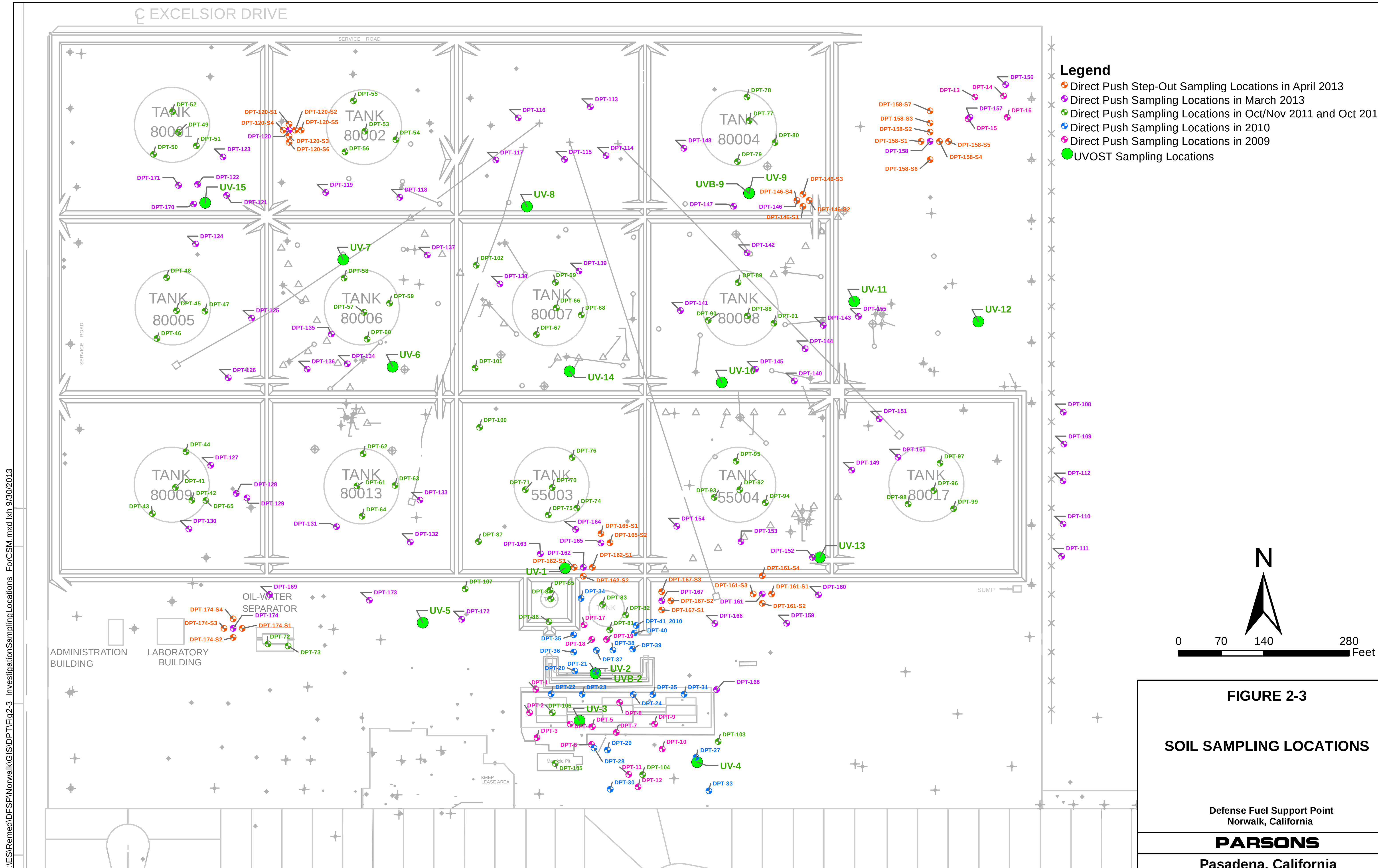


FIGURE 2-3

SOIL SAMPLING LOCATIONS

Defense Fuel Support Point
Norwalk, California

PARSONS

Pasadena, California

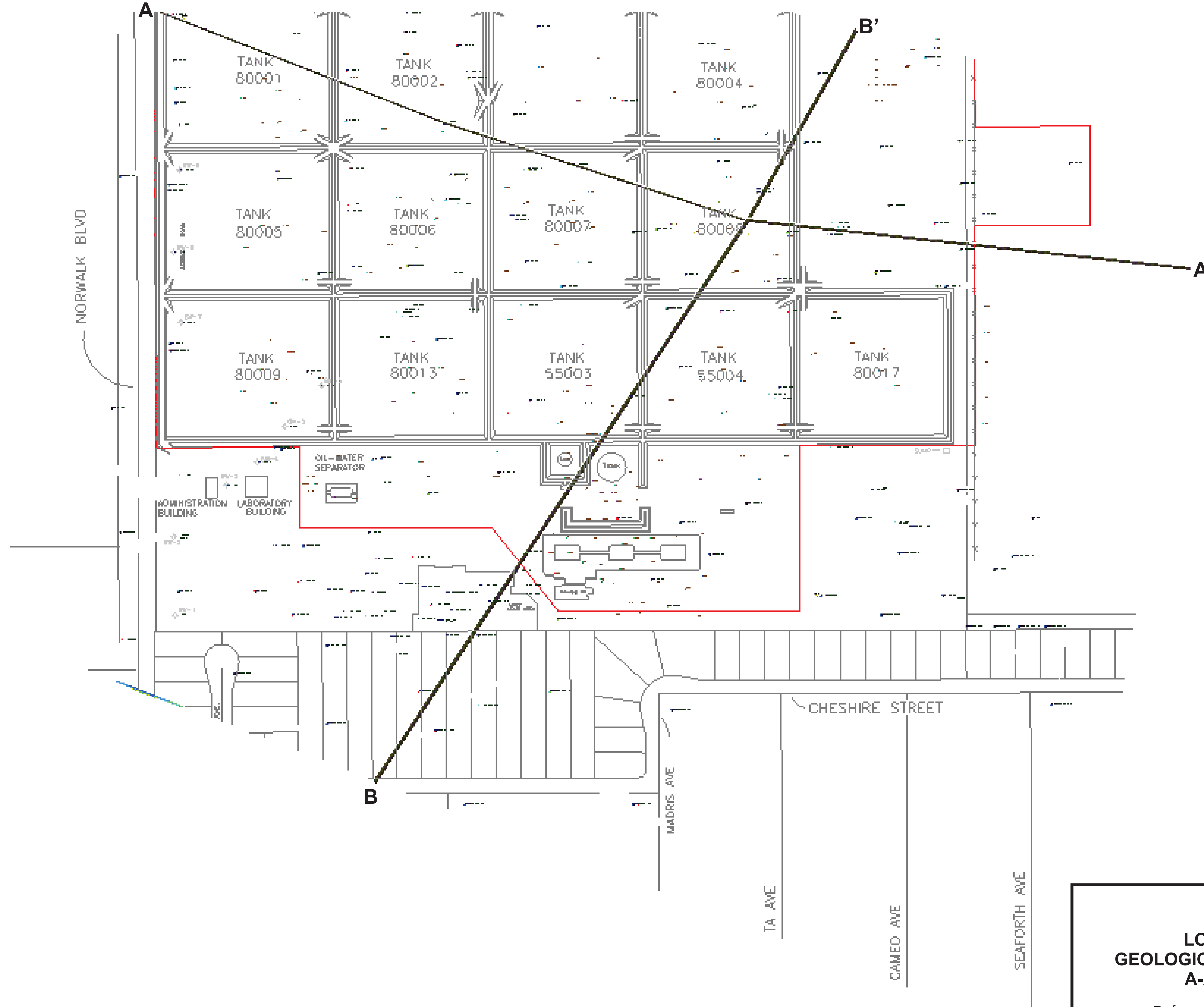


FIGURE 3-1

LOCATION OF GEOLOGIC CROSS-SECTIONS A-A' AND B-B'

Defense Fuel Support Point
Norwalk, California

PARSONS

Pasadena, California

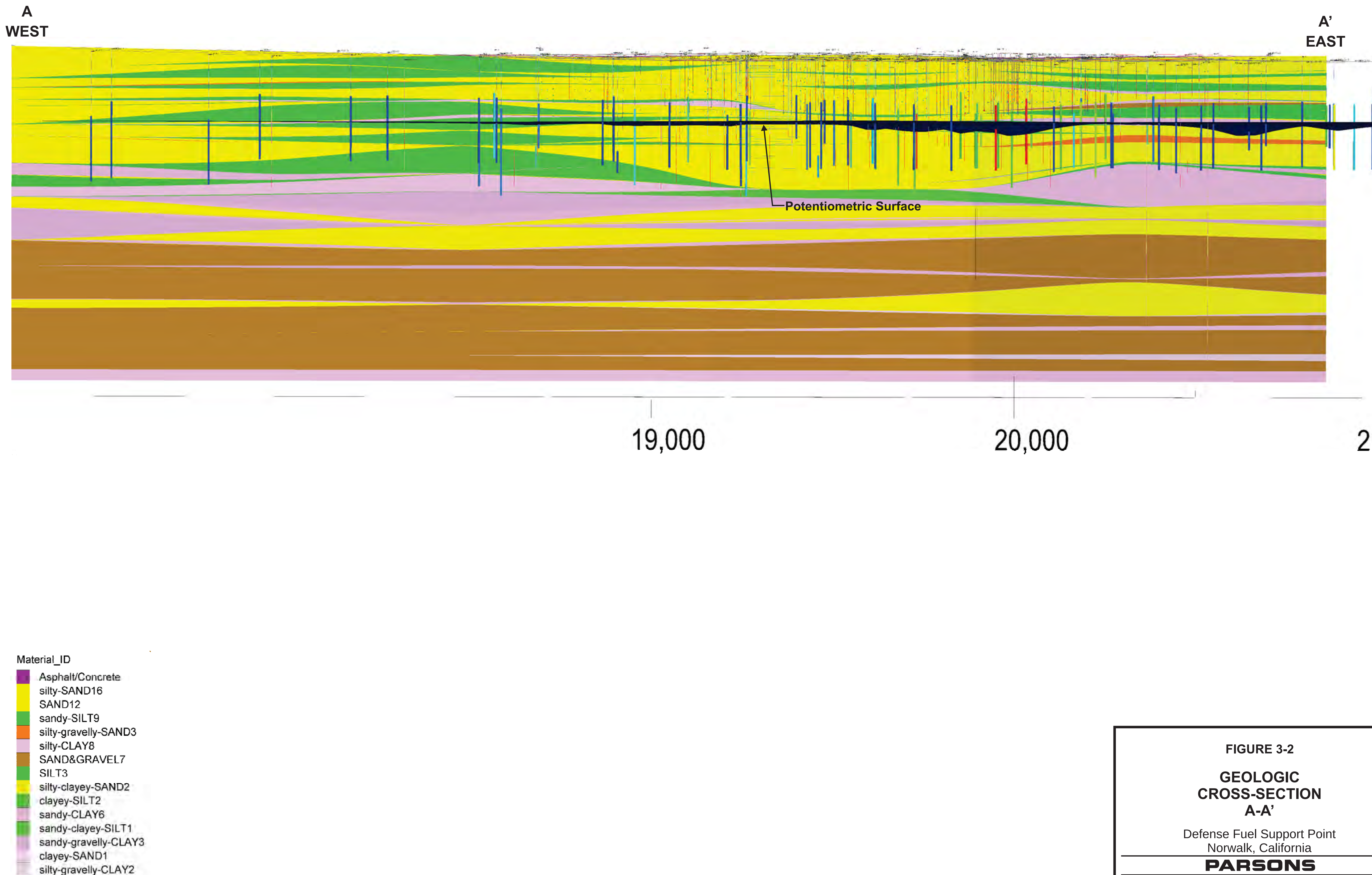


FIGURE 3-2

GEOLOGIC CROSS-SECTION A-A'

Defense Fuel Support Point
Norwalk, California

PARSONS
Pasadena, California

draw\746687 CSM.cdr ma 09/27/13

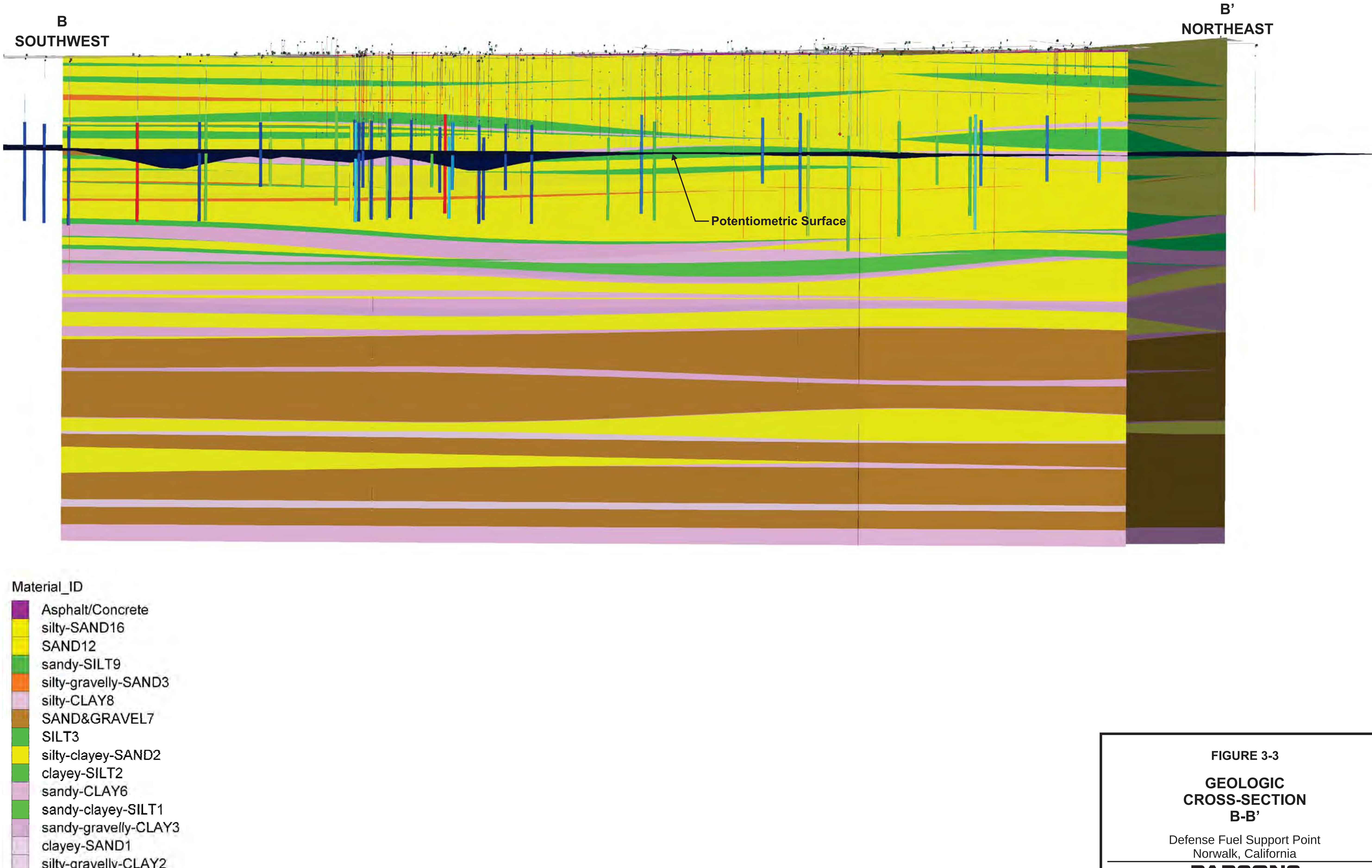


FIGURE 3-3

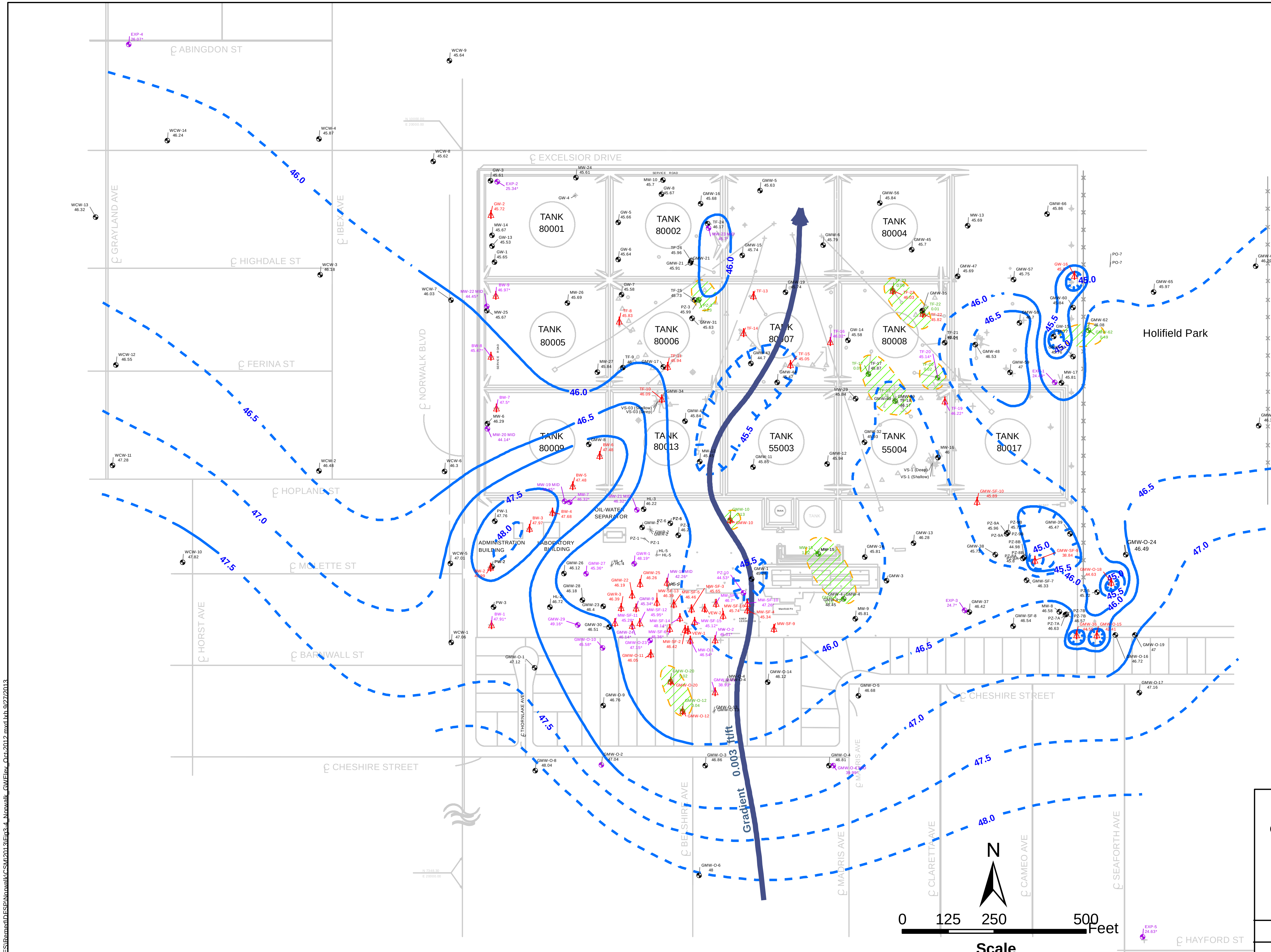
GEOLOGIC CROSS-SECTION B-B'

Defense Fuel Support Point
Norwalk, California

PARSONS

Pasadena, California

draw\746687 CSM.cdr ma 09/27/13



Legend

- GWElev_Oct_2012_GIS_MW_Symbol_GMW-35
- Extraction Well Used for Site Remediation
- Apparent Thickness of Free Product Measured (Feet)
- Groundwater Elevation Not Used in Contouring (See Note 2)
- Groundwater Elevation in Feet Above Mean Sea Level
- Generalized Flow Direction
- 52.5 Lines of Equal Groundwater Elevation Showing groundwater Elevation in Feet Above Mean Sea Level (Dashed where inferred)
- Estimated extent of measurable light nonaqueous phase hydrocarbons (LNAPL, free product) on groundwater; dashed where inferred.

Note:

1 Groundwater elevations shown at wells are based on data collected by Blaine Tech Services, Inc., CH2MHill, and Parsons in October 2012.

2 Wells screened in the Exposition Aquifer or near the bottom of the uppermost aquifer are not used in contouring. These individual local areas of mounding or drawdown are not depicted on the figure only data from wells with screened intervals of similar depth were used for this contour map. Wells not used in contours are marked with a purple asterisk (*).

SURVEY NOTES:

1. Base map prepared from data provided by Fluor Daniel GTI, Dulin & Boynton, and Geomatrix.
2. Except as noted below, well locations surveyed by Dulin & Boynton.
3. Locations of well HL-1, HL-3, and HL-4 based on field measurements by Fluor Daniel GTI and Woodward-Clyde.
4. Locations of wells BW-1 through BW-9 surveyed by Geomatrix based on reference to other wells surveyed by Dulin & Boynton.

FIGURE 3-4

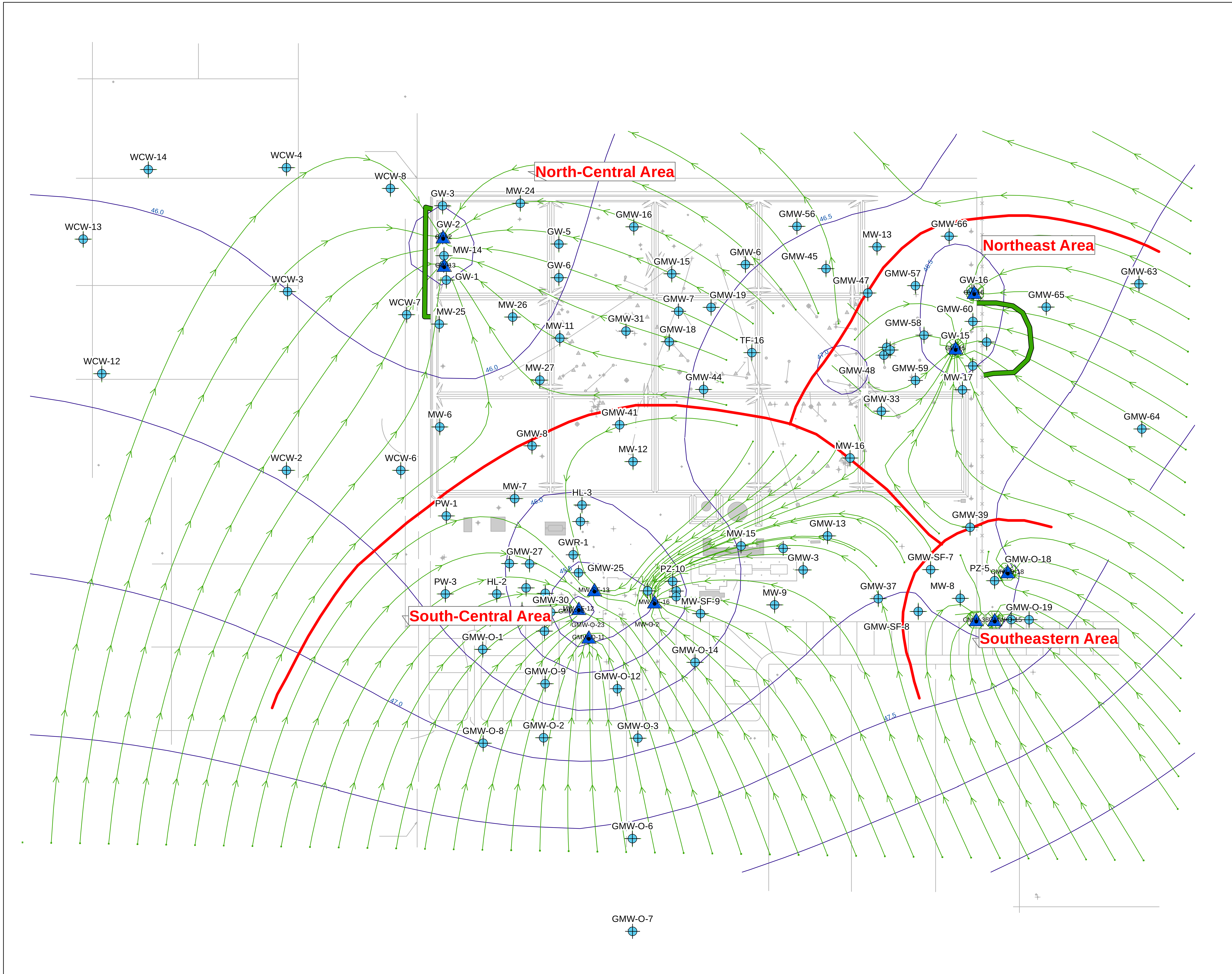
GROUNDWATER EQUIPOTENTIAL MAP AND FREE PRODUCT PLUMES UPPERMOST GROUNDWATER ZONE

OCTOBER 2012

Defense Fuel Support Point Norwalk, California

PARSONS

Pasadena, California



Legend

- PUMPING WELL
- WELL
- Capture Zone Boundaries
- SIMULATED GROUNDWATER FLOW PATH
- SIMULATED GROUNDWATER CONTOUR
- APPROXIMATE EXTENT OF TARGET CAPTURE ZONE RELATIVE TO SITE BOUNDARY

GROUNDWATER EXTRACTION RATES

NORTHWEST AREA
- GW-2 = 3.4 gpm
- GW-13 = 3.4 gpm

NORTHEAST AREA
- GW-15 = 5.5 gpm
- GW-16 = 2.2 gpm

SOUTHEAST AREA
- GMW-36 = 2 gpm
- GMW-O-15 = 3 gpm
- GMW-O-18 = 1.5 gpm

SOUTH-CENTRAL AREA
- MW-SF-12 = 5gpm
- MW-SF-13 = 5 gpm
- MW-SF-16 = 5 gpm
- GMW-O-11 = 5 gpm

FIGURE 3-5

SIMULATED FLOW MODEL RESULTS FOR CURRENT REMEDIATION SYSTEMS

Defense Fuel Support Point
Norwalk, California

PARSONS

Pasadena, California

P:\DFSP Norwalk\tech\Site_gw_capture\feb2010_gw_mod_07-2010-long-term_predict2.mxd

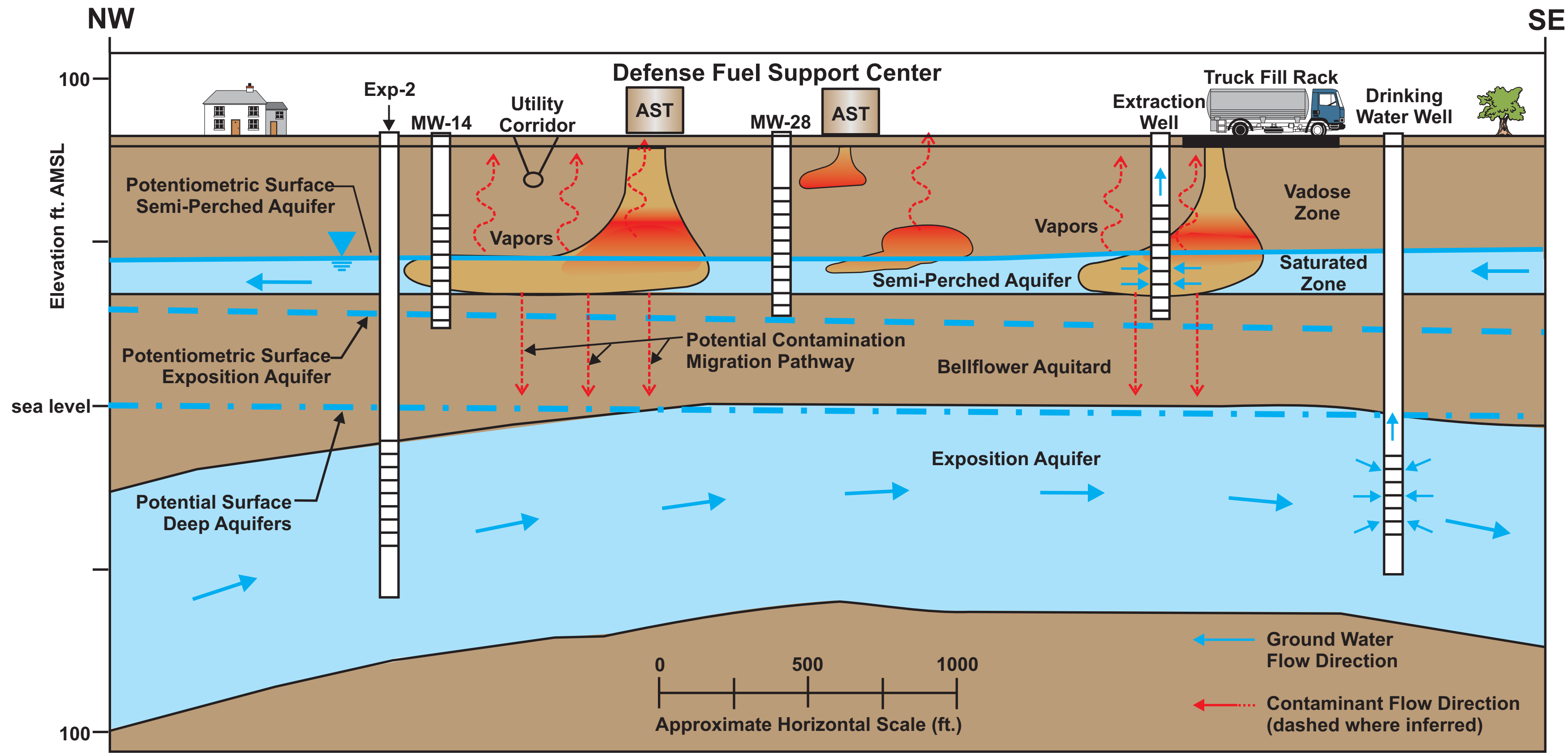


FIGURE 3-6

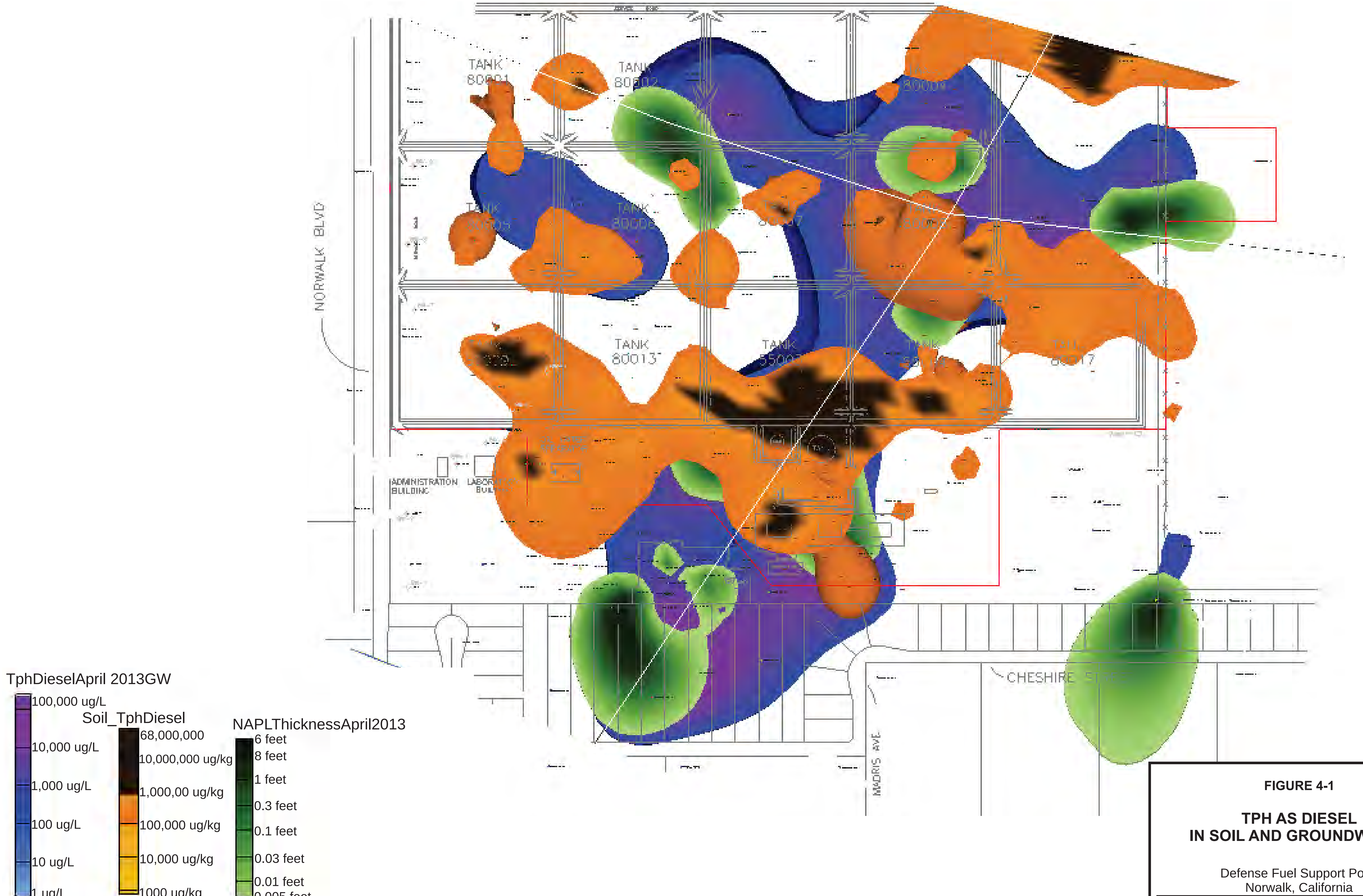
CONCEPTUAL SITE MODEL BLOCK DIAGRAM

Defense Fuel Support Point
Norwalk, California

PARSONS

Pasadena, California

draw\748563 CSM DFSP Norwalk.cdr ma 09/27/2013



Groundwater >=500 ug/L Soil >=1000,000,ug/kg

FIGURE 4-1

TPH AS DIESEL IN SOIL AND GROUNDWATER

Defense Fuel Support Point
Norwalk, California

PARSONS

Pasadena, California

draw\746687 CSM.cdr ma 09/24/13

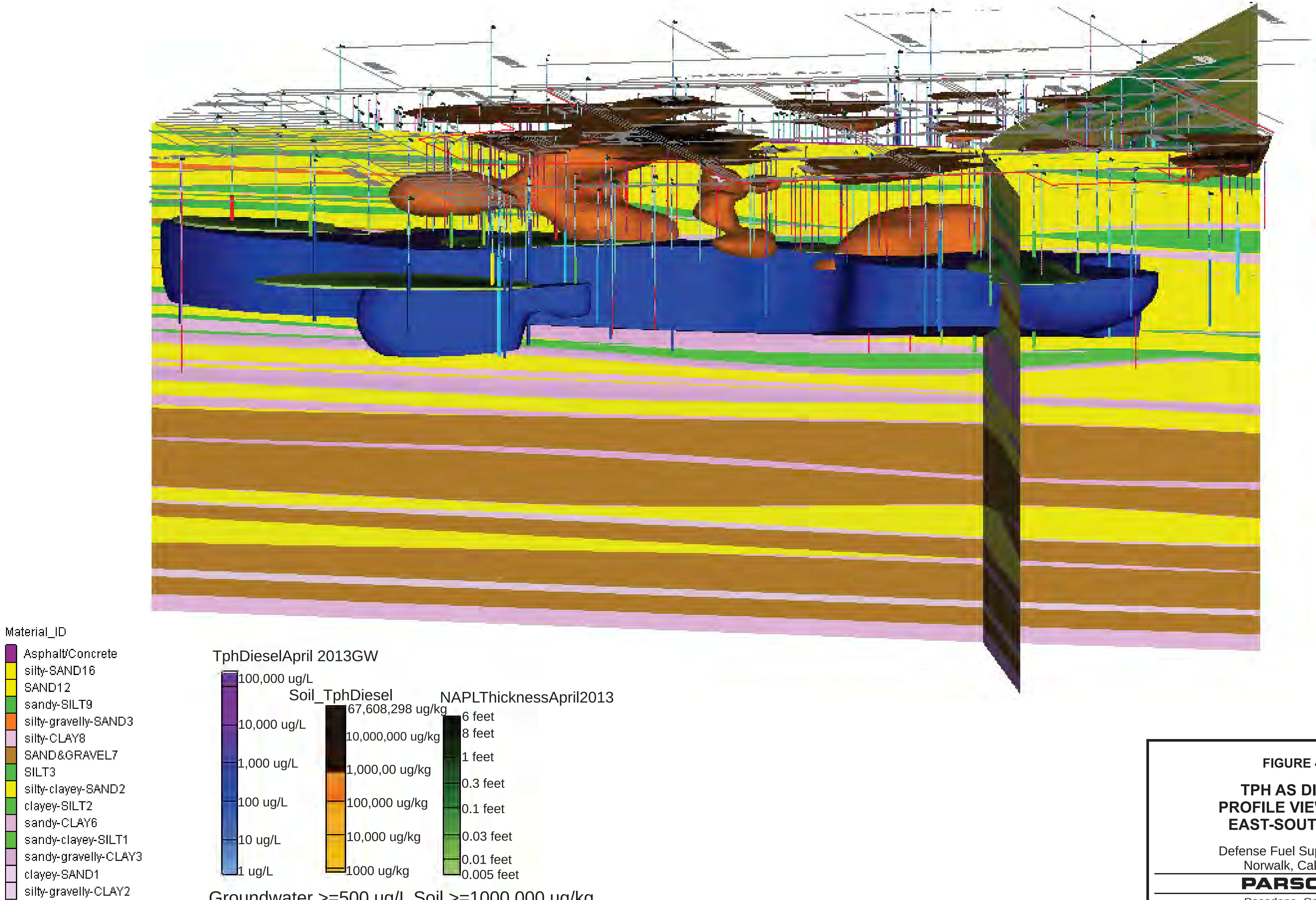


FIGURE 4-2

TPH AS DIESEL PROFILE VIEW FROM EAST-SOUTHEAST

Defense Fuel Support Point
Norwalk, California

PARSONS

Pasadena, California

draw\746687 CSM.cdr ma 09/24/13

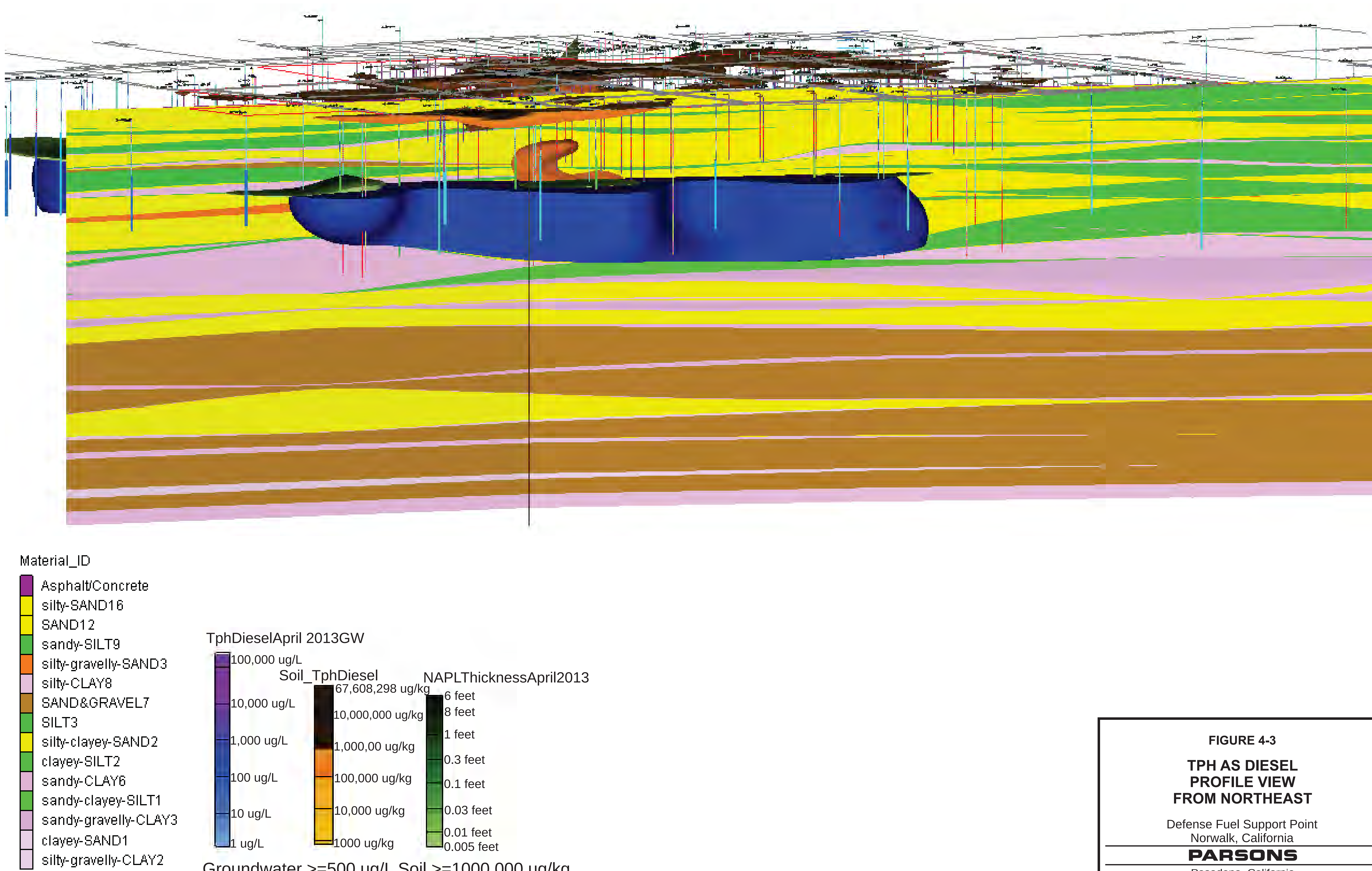


FIGURE 4-3

TPH AS DIESEL PROFILE VIEW FROM NORTHEAST

Defense Fuel Support Point
Norwalk, California

PARSONS
Pasadena, California

draw\746687 CSM.cdr ma 09/24/13

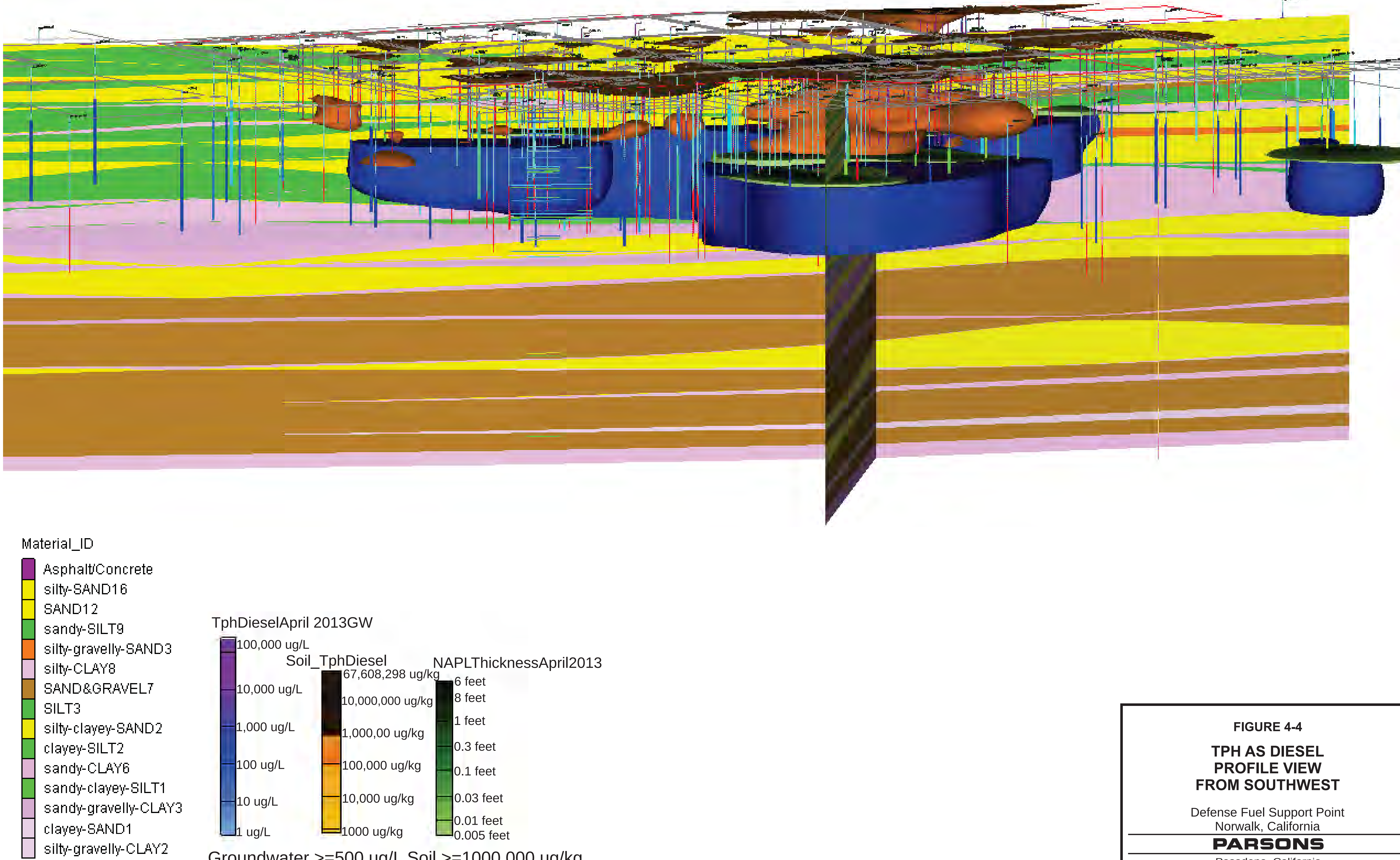


FIGURE 4-4

TPH AS DIESEL PROFILE VIEW FROM SOUTHWEST

Defense Fuel Support Point
Norwalk, California

PARSONS

Pasadena, California

draw\746687 CSM.cdr ma 09/24/13

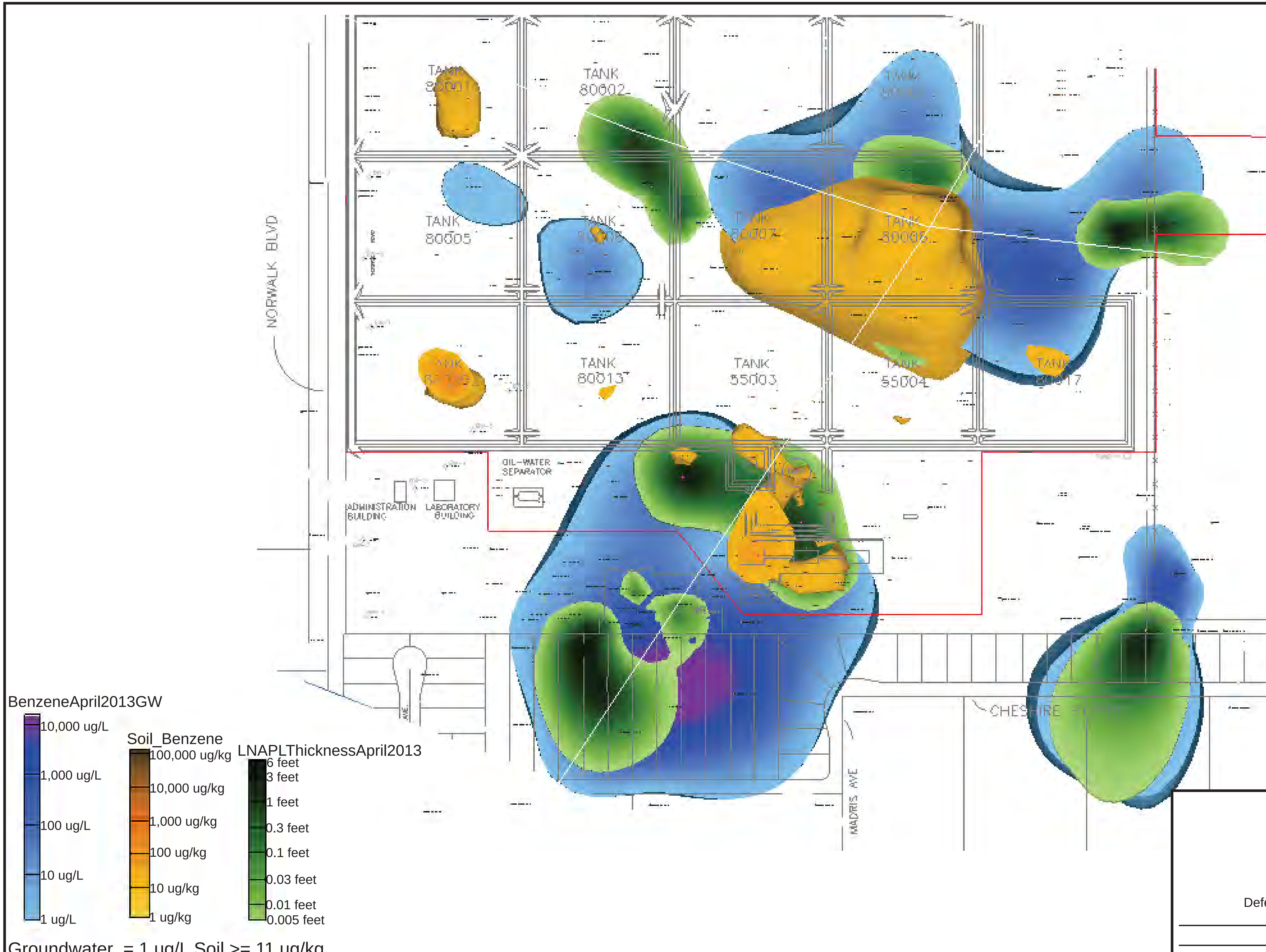


FIGURE 4-5

BENZENE IN SOIL AND GROUNWATER

Defense Fuel Support Point
Norwalk, California

PARSONS

Pasadena, California

draw\746687 CSM.cdr ma 09/24/13

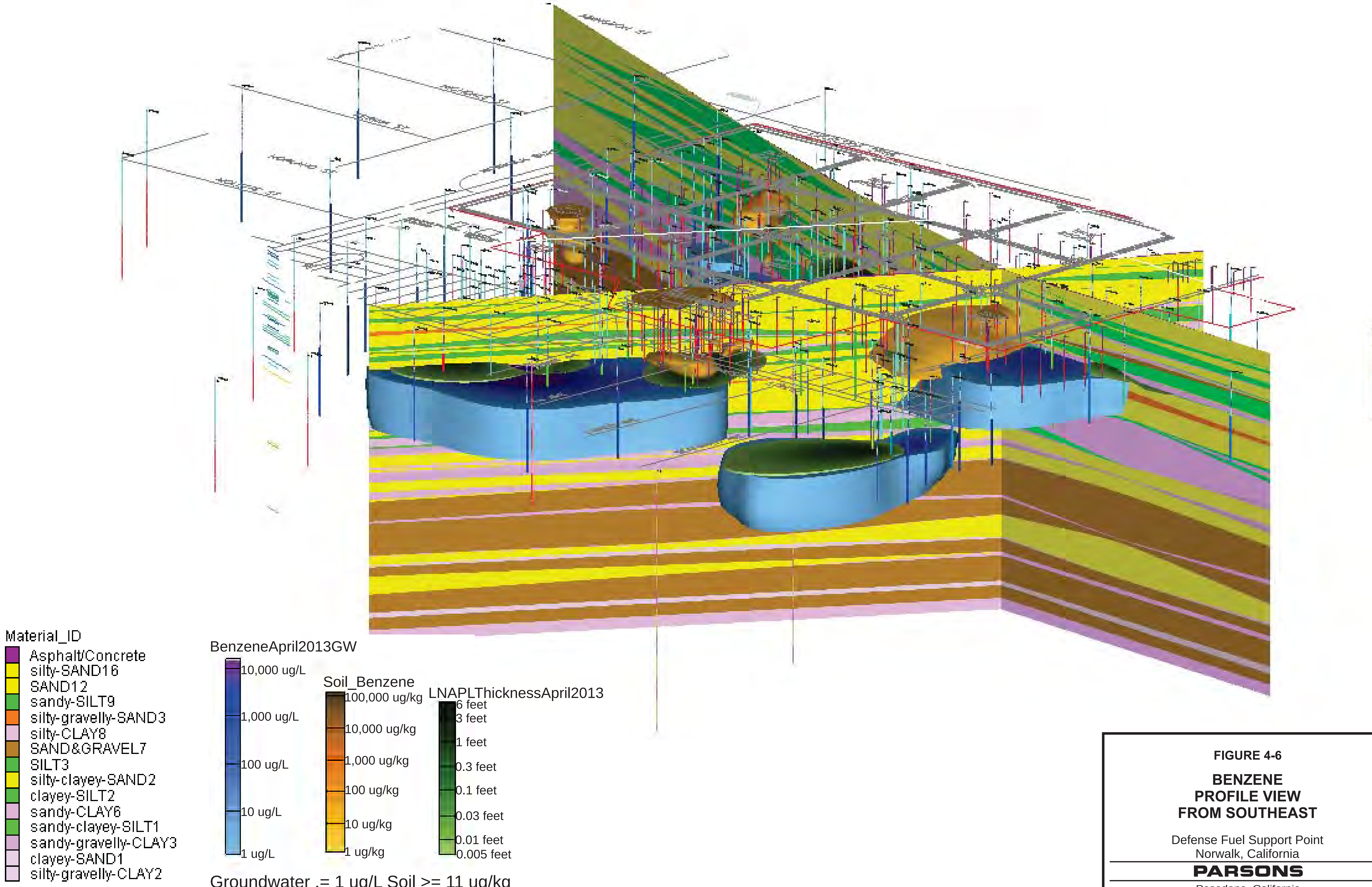


FIGURE 4-6

BENZENE PROFILE VIEW FROM SOUTHEAST

Defense Fuel Support Point
Norwalk, California

PARSONS

Pasadena, California

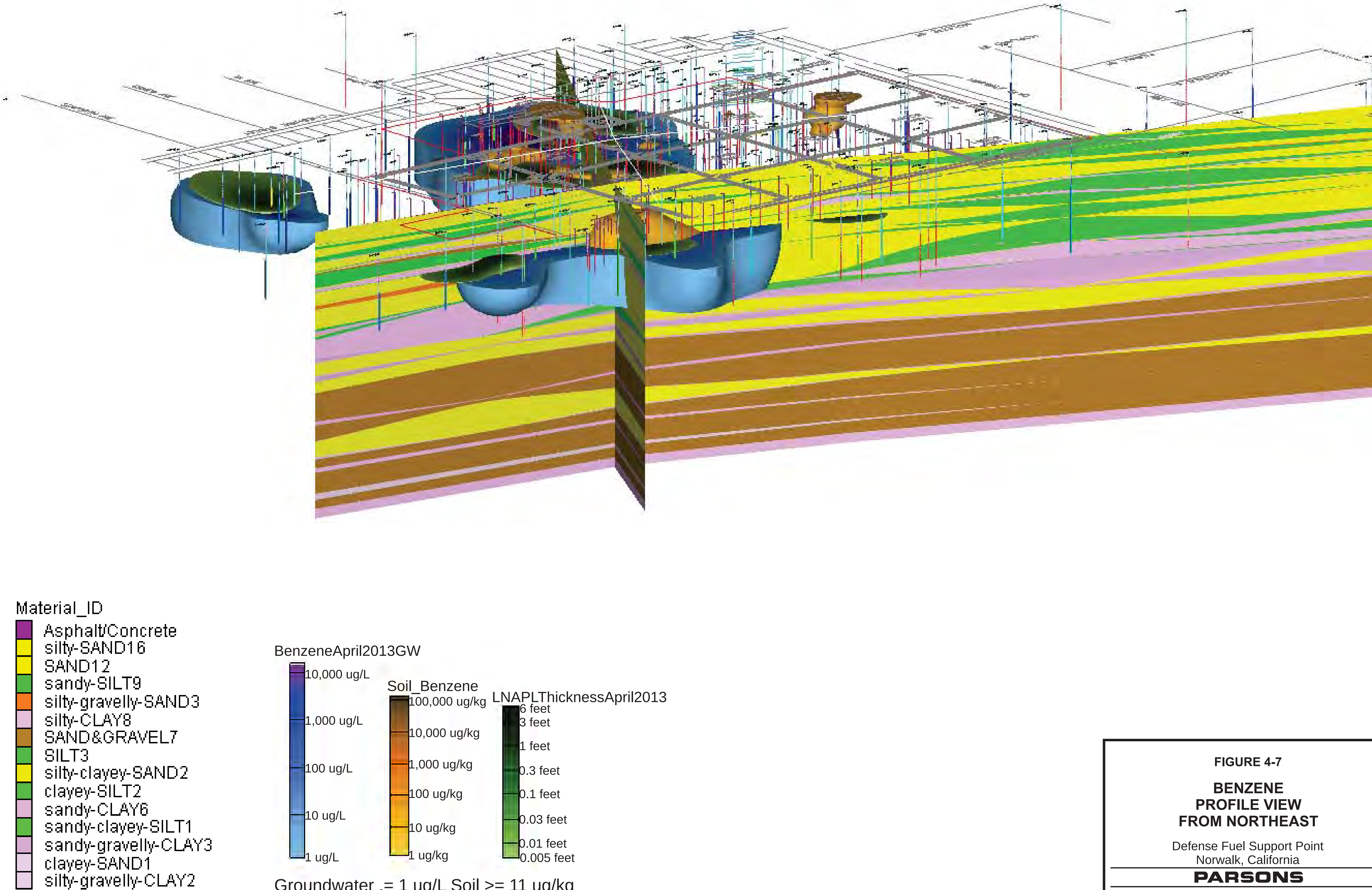


FIGURE 4-7

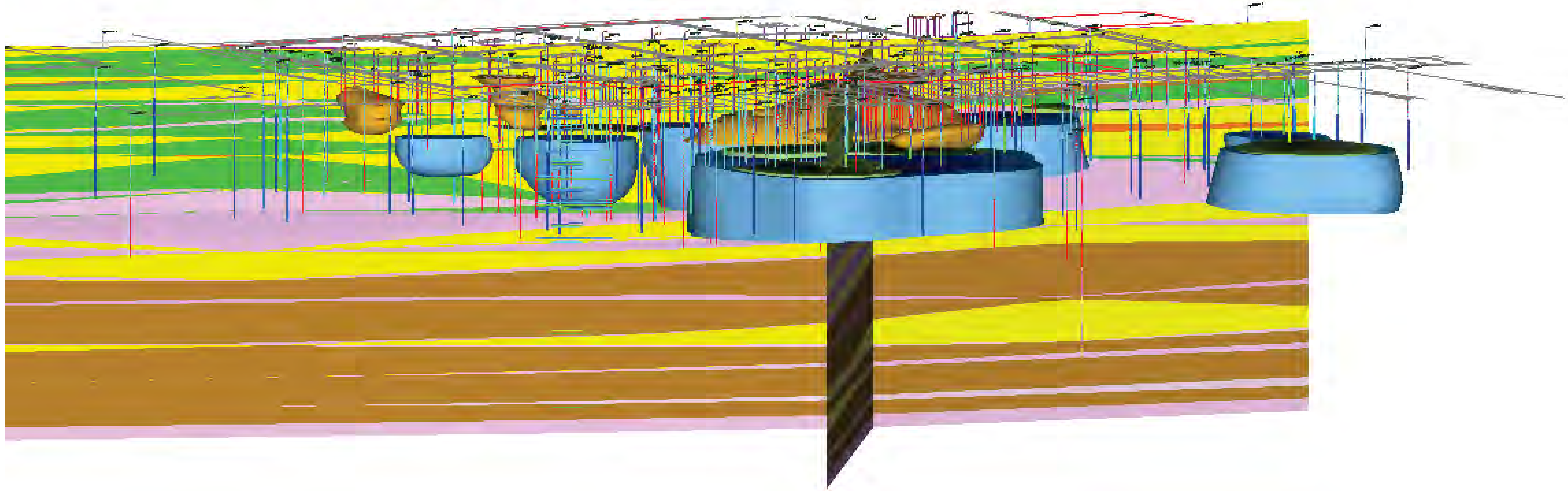
BENZENE PROFILE VIEW FROM NORTHEAST

Defense Fuel Support Point
Norwalk, California

PARSONS

Pasadena, California

draw\746687 CSM.cdr ma 09/24/13



BenzeneApril2013GW

10,000 ug/L
1,000 ug/L
100 ug/L
10 ug/L
1 ug/L

Soil_Benzene

100,000 ug/kg
10,000 ug/kg
1,000 ug/kg
100 ug/kg
10 ug/kg
1 ug/kg

LNAPLThicknessApril2013

6 feet
3 feet
1 feet
0.3 feet
0.1 feet
0.03 feet
0.01 feet
0.005 feet

Groundwater .= 1 ug/L Soil >= 11 ug/kg

FIGURE 4-8

BENZENE PROFILE VIEW FROM SOUTHWEST

Defense Fuel Support Point
Norwalk, California

PARSONS
Pasadena, California

draw\746687 CSM.cdr ma 09/24/13

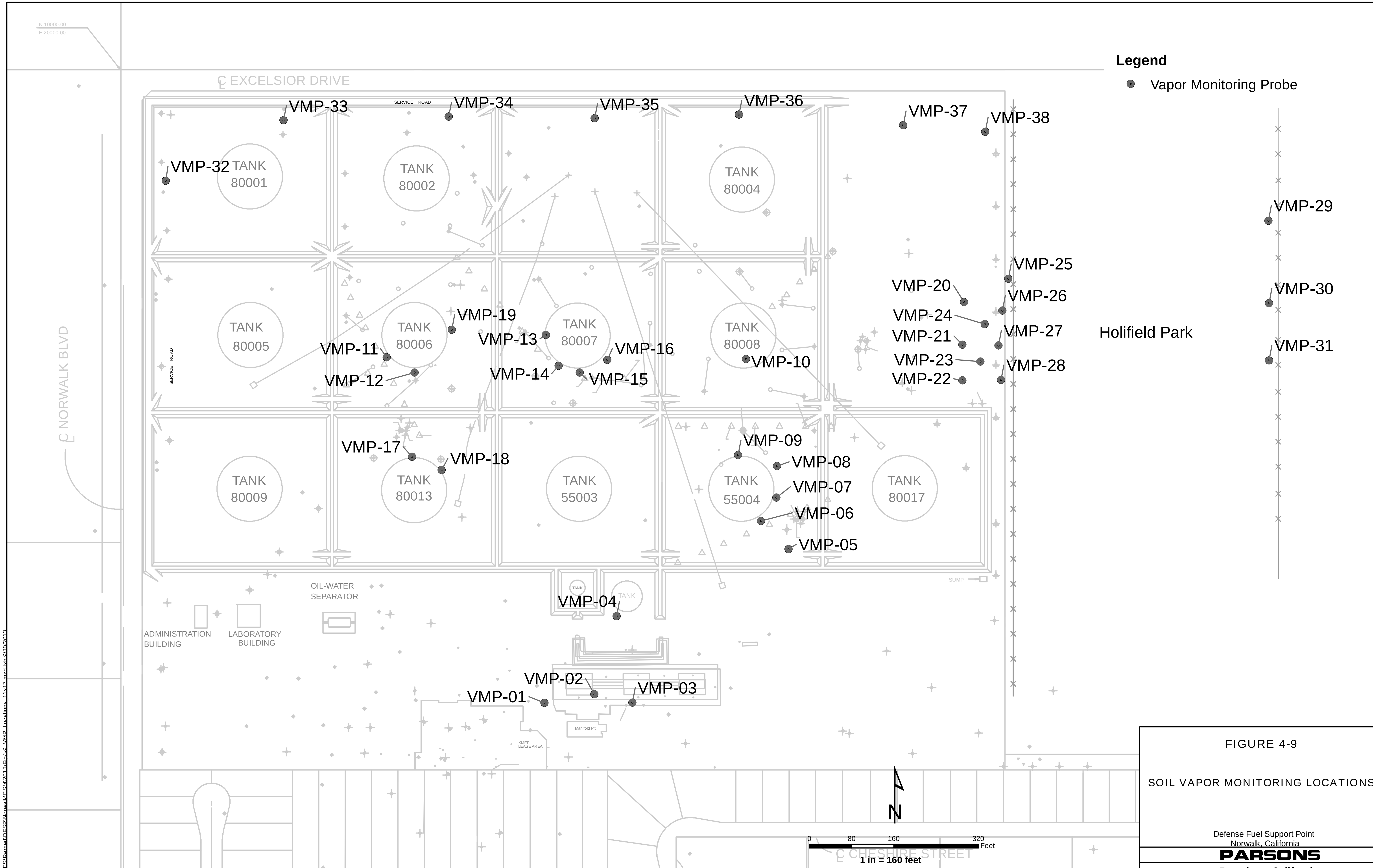


FIGURE 4-9

SOIL VAPOR MONITORING LOCATIONS

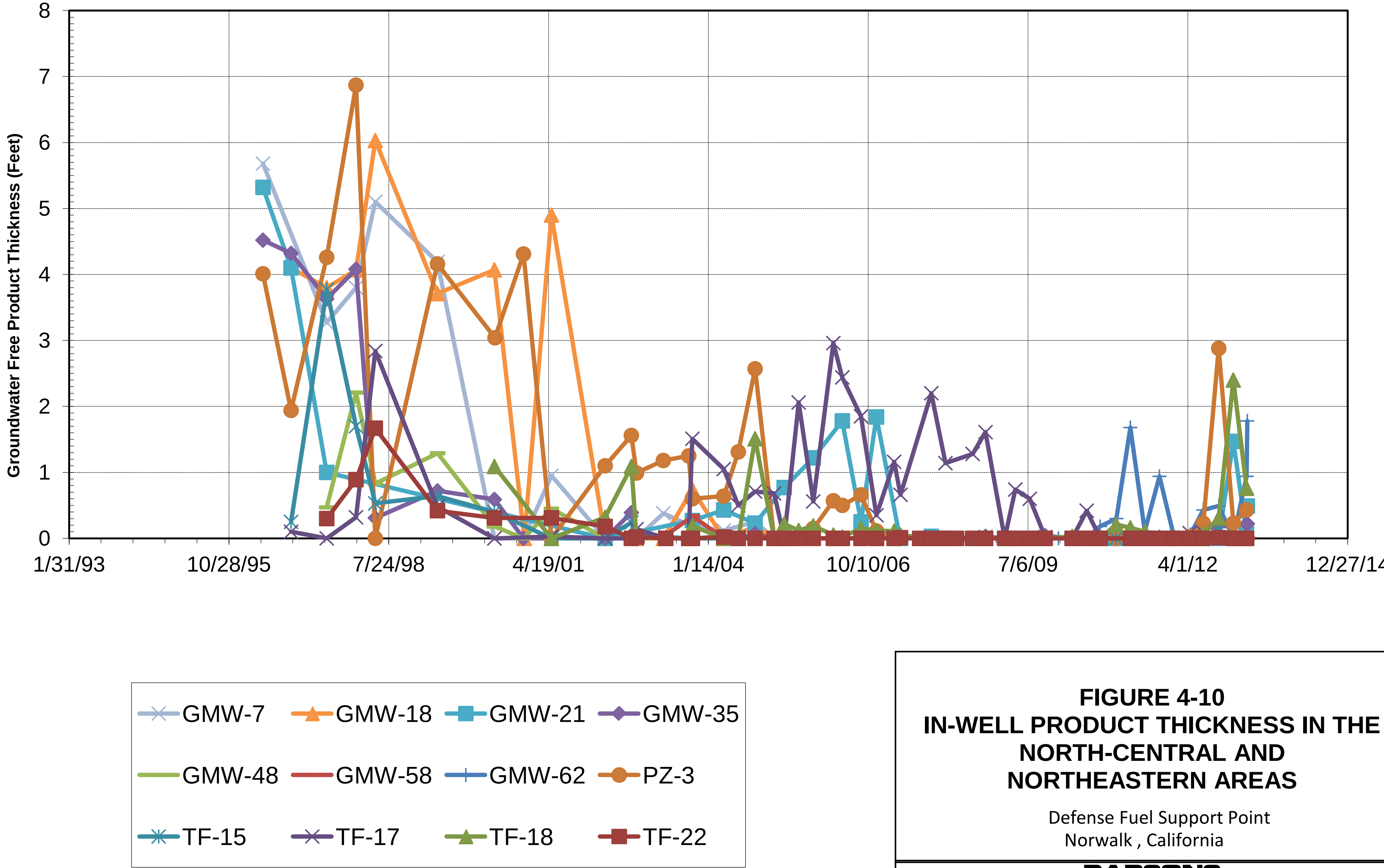


FIGURE 4-10
IN-WELL PRODUCT THICKNESS IN THE NORTH-CENTRAL AND NORTHEASTERN AREAS

Defense Fuel Support Point
Norwalk , California

PARSONS

Pasadena, California

S:\ESOL\DuPontSF\Database\Hydrograph\GMW-7.xls

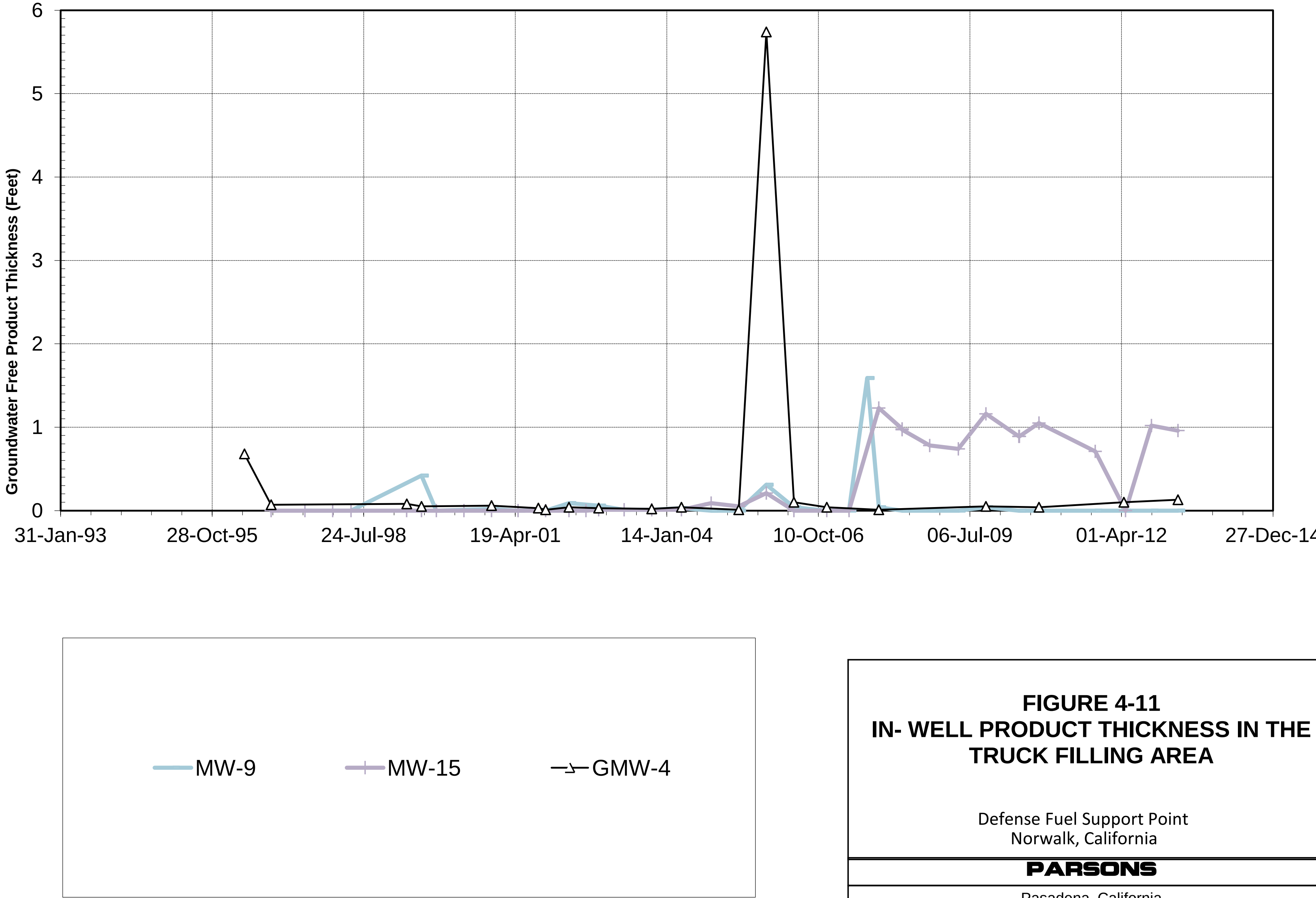


FIGURE 4-11
IN- WELL PRODUCT THICKNESS IN THE TRUCK FILLING AREA

Defense Fuel Support Point
Norwalk, California

PARSONS

Pasadena, California

S:\ESOL\DuPontSF\Database\Hydrograph\GMW-4.xls

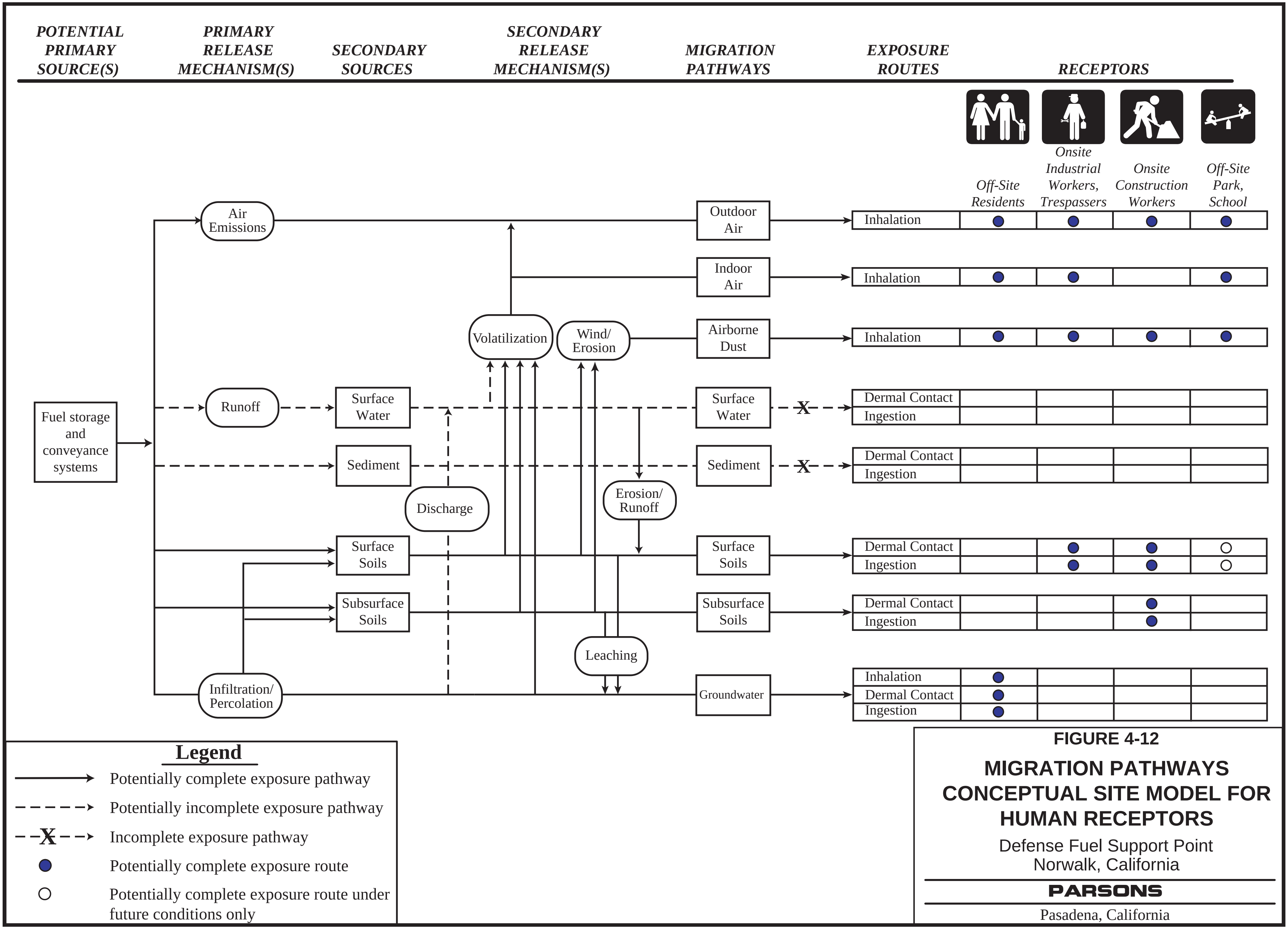


FIGURE 4-12

MIGRATION PATHWAYS CONCEPTUAL SITE MODEL FOR HUMAN RECEPTORS

Defense Fuel Support Point
Norwalk, California

PARSONS

Pasadena, California

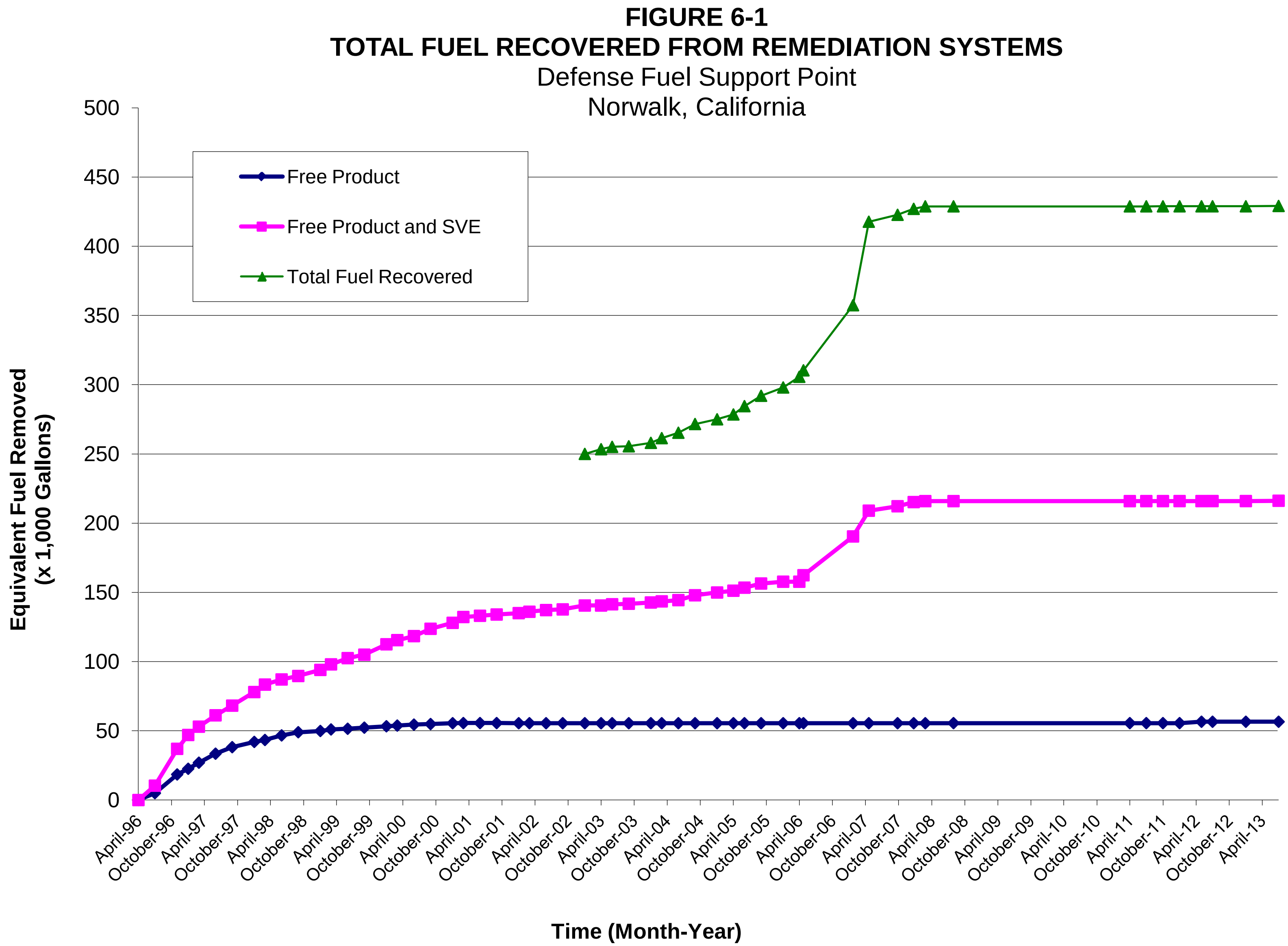
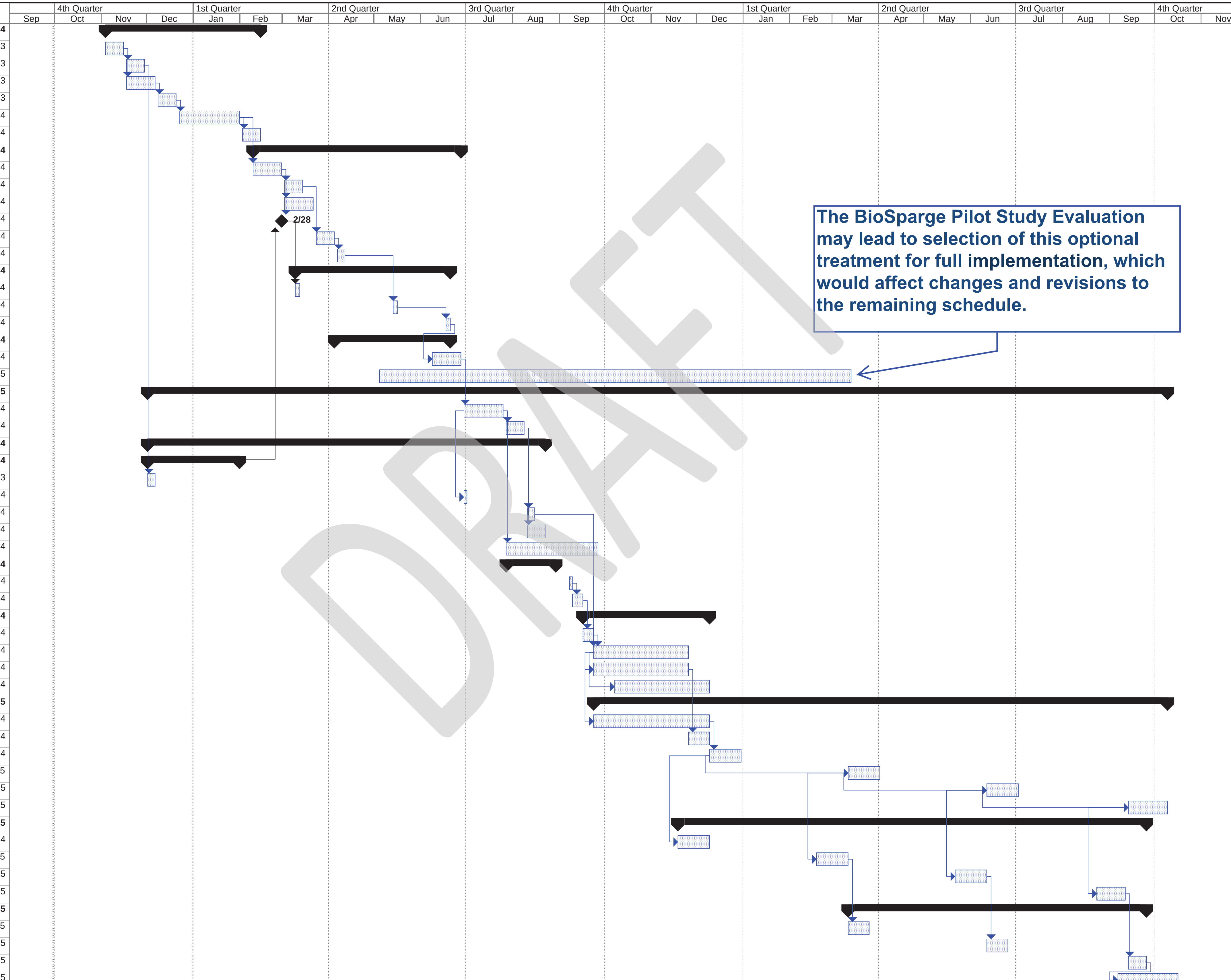


FIGURE 6-1
TOTAL FUEL RECOVERED FROM REMEDIATION SYSTEMS
Defense Fuel Support Point
Norwalk, California
Free Product
Free Product and SVE
Total Fuel Recovered
Equivalent Fuel Removed
(x 1,000 Gallons)
0
50
100
150
200
250
300
350
400
450
500
April-96
October-96
April-97
October-97
April-98
October-98
April-99
October-99
April-00
October-00
April-01
October-01
April-02
October-02
April-03
October-03
April-04
October-04
April-05
October-05
April-06
October-06
April-07
October-07
April-08
October-08
April-09
October-09
April-10
October-10
April-11
October-11
April-12
October-12
April-13
Time (Month-Year)

FIGURE 7-1.
REMEDIAL ACTION IMPLEMENTATION SCHEDULE
Defense Fuel Support Point, Norwalk, California

ID		Task Name	Duration	Start	Finish
1		**TREATABILITY STUDY**	**75 days**	**Mon 11/4/13**	**Fri 2/14/14**
2		Develop SOW and Work Plan	10 days	Mon 11/4/13	Fri 11/15/13
3		RWQCB Review and Approval	10 days	Mon 11/18/13	Fri 11/29/13
4		Procure Driller and Treatability Lab	15 days	Mon 11/18/13	Fri 12/6/13
5		Obtain Samples	10 days	Mon 12/9/13	Fri 12/20/13
6		Conduct In-Lab Treatability Study	30 days	Mon 12/23/13	Fri 1/31/14
7		Results Report and Design Parameters	10 days	Mon 2/3/14	Fri 2/14/14
8		**PILOT STUDY**	**100 days**	**Mon 2/10/14**	**Fri 6/27/14**
9		Develop Pilot Study Design and WP	15 days	Mon 2/10/14	Fri 2/28/14
10		RWQCB Review and Approval	10 days	Mon 3/3/14	Fri 3/14/14
11		Procure Inj Probe, Driller, and ISCO Subcontractors	15 days	Mon 3/3/14	Fri 3/21/14
12		Shutdown Internal SVE & GWE	0 days	Fri 2/28/14	Fri 2/28/14
13		Install Pilot Test System Support Equipment	10 days	Mon 3/24/14	Fri 4/4/14
14		Probe Injection of Activated Persulfate (12)	5 days	Mon 4/7/14	Fri 4/11/14
15		**Monitoring**	**75 days**	**Mon 3/10/14**	**Fri 6/20/14**
16		Conduct Baseline Monitoring	3 days	Mon 3/10/14	Wed 3/12/14
17		Step 1 Monitoring	3 days	Wed 5/14/14	Fri 5/16/14
18		Step 2 Monitoring	3 days	Wed 6/18/14	Fri 6/20/14
19		**PS Field Support & Maintenance Activities**	**55 days**	**Fri 4/4/14**	**Fri 6/20/14**
22		Results Report and Proposed Full-Scale Design Parami	15 days	Mon 6/9/14	Fri 6/27/14
23		**EVALUATION OF KMP BIOSPARGE PILOT STUDY**	225 days	Mon 5/5/14	Fri 3/13/15
24		**EXCAVATION & IN-SITU OXIDATION REMEDY**	**485 days**	**Mon 12/2/13**	**Fri 10/9/15**
25		Develop Design and Execution Plan	20 days	Mon 6/30/14	Fri 7/25/14
26		RWQCB Review and Approval	10 days	Mon 7/28/14	Fri 8/8/14
27		**Permits**	**190 days**	**Mon 12/2/13**	**Fri 8/22/14**
28		**WDR Permit**	**45 days**	**Mon 12/2/13**	**Fri 1/31/14**
31		UIC Registration	5 days	Mon 12/2/13	Fri 12/6/13
32		Extend Stormwater NPDES Permit for Constr	2 days	Mon 6/30/14	Tue 7/1/14
33		SCAQMD 1166 Plan	5 days	Mon 8/11/14	Fri 8/15/14
34		SCAQMD PTO	10 days	Mon 8/11/14	Fri 8/22/14
35		Off-Site Access Agreement(s)	45 days	Mon 7/28/14	Fri 9/26/14
36		**Procurement**	**25 days**	**Mon 7/28/14**	**Fri 8/29/14**
39		Constructability and Excecution Review with Selected C	2 days	Mon 9/8/14	Tue 9/9/14
40		Revise and Finalize Design and Execution Plans	5 days	Wed 9/10/14	Tue 9/16/14
41		**Excavation**	**60 days**	**Wed 9/17/14**	**Tue 12/9/14**
42		Mobilze Equipment and Materials	5 days	Wed 9/17/14	Tue 9/23/14
43		Excavation and Off-site T&D	45 days	Wed 9/24/14	Tue 11/25/14
44		BIOX and Injection Probe Installation	45 days	Wed 9/24/14	Tue 11/25/14
45		Backfill Operations	45 days	Wed 10/8/14	Tue 12/9/14
46		**ISCO System Operation & Maintenance**	**273 days**	**Wed 9/24/14**	**Fri 10/9/15**
47		Remaining Injection Probe Installations	55 days	Wed 9/24/14	Tue 12/9/14
48		Injection System Installation and Startup	10 days	Wed 11/26/14	Tue 12/9/14
49		Injector Probe Dose #1	15 days	Wed 12/10/14	Tue 12/30/14
50		Injector Probe Dose #2	15 days	Thu 3/12/15	Wed 4/1/15
51		Injector Probe Dose #3 (if needed)	15 days	Fri 6/12/15	Thu 7/2/15
52		Equipment Demobilization	20 days	Mon 9/14/15	Fri 10/9/15
53		**Monitoring and Reporting**	**223 days**	**Wed 11/19/14**	**Fri 9/25/15**
54		Conduct Baseline Monitoring	15 days	Wed 11/19/14	Tue 12/9/14
55		Step 1 Monitoring	15 days	Thu 2/19/15	Wed 3/11/15
56		Step 2 Monitoring	15 days	Fri 5/22/15	Thu 6/11/15
57		Step 3 Monitoring	15 days	Mon 8/24/15	Fri 9/11/15
58		**Periodic Reports to Client and RWQCB**	**142 days**	**Thu 3/12/15**	**Fri 9/25/15**
59		Injection & Monitoring Results, Step 1	10 days	Thu 3/12/15	Wed 3/25/15
60		Injection & Monitoring Results, Step 2	10 days	Fri 6/12/15	Thu 6/25/15
61		Injection & Monitoring Results, Step 3	10 days	Mon 9/14/15	Fri 9/25/15
62		**PROJECT COMPLETION REPORT**	30 days	Mon 9/7/15	Fri 10/16/15



Project: CSM ISCO-Excavation Prelim
Date: Mon 9/30/13

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

APPENDIX A

LNAPL Transmissivity Calculation,

LNAPL Recovery Test Data, and

LNAPL Laboratory Reports

LNAPL Transmissivity Calculation

Well Designation:	GMW-62	
Date:	13-May-13	

Ground Surface Elev (ft msl)	0.0	Enter These Data	**Drawdown Adjustment (ft)**
Top of Casing Elev (ft msl)	0.0		
Well Casing Radius, r_c (ft):	0.167	r_{e1}	0.05
Well Radius, r_w (ft):	0.500		
LNAPL Specific Yield, S_y:	0.175		
LNAPL Density Ratio, ρ_r:	0.780		
Top of Screen (ft bgs):	0.0		
Bottom of Screen (ft bgs):	0.0		
LNAPL Baildown Vol. (gal.):	15.0		
Effective Radius, r_{e3} (ft):	0.258	Calculated Parameters	
Effective Radius, r_{e2} (ft):	0.245		
Initial Casing LNAPL Vol. (gal.):	1.66		
Initial Filter LNAPL Vol. (gal.):	2.33		

Enter Data Here

	Time (min)	DTP (ft btoc)	DTW (ft btoc)	DTP (ft bgs)	DTW (ft bgs)	Water Table Depth (ft)	LNAPL Drawdown s_n (ft)	Average Time (min)	LNAPL Discharge Q_n (ft^3/d)
Initial Fluid Levels:	0	30.15	32.7	30.15	32.7	30.71			
Enter Test Data:	480.6	30.60	31.06	30.60	31.06	30.70	0.40		
	1566.0	30.59	31.46	30.59	31.46	30.78	0.39	1023.3	0.114
	4563.0	30.44	32.03	30.44	32.03	30.79	0.24	3064.5	0.072
	5838.0	30.41	32.21	30.41	32.21	30.81	0.21	5200.5	0.050
	10224.6	30.30	32.62	30.30	32.62	30.81	0.10	8031.3	0.036
	14543.4	30.28	32.77	30.28	32.77	30.83	0.08	12384.0	0.012
	16089.0	30.27	32.78	30.27	32.78	30.82	0.07	15316.2	0.004

APPENDIX A
TRANSMISSIVITY CALCULATION WORKBOOK

DFSP NORWALK

PARSONS

P:\DFSP Norwalk\tech\PTest_capture_report\Figs_v2.ppt

Figure 1

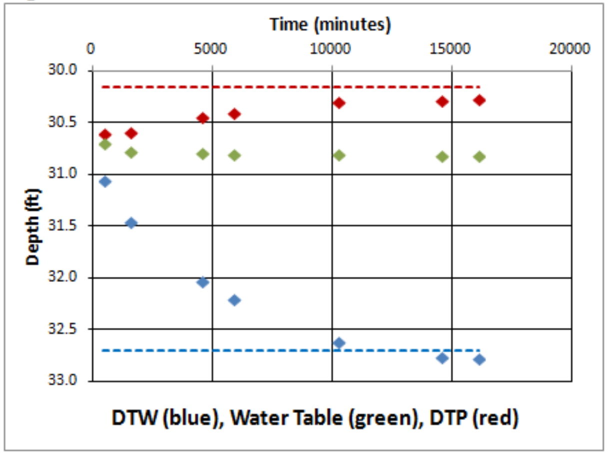
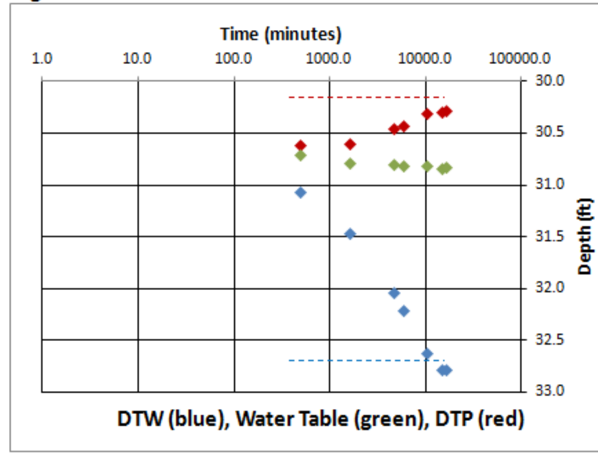


Figure 2



384.5	30.15
16089	30.15
384.5	32.7
16089	32.7

4022.3	#N/A
4022.3	#N/A

Figure 3

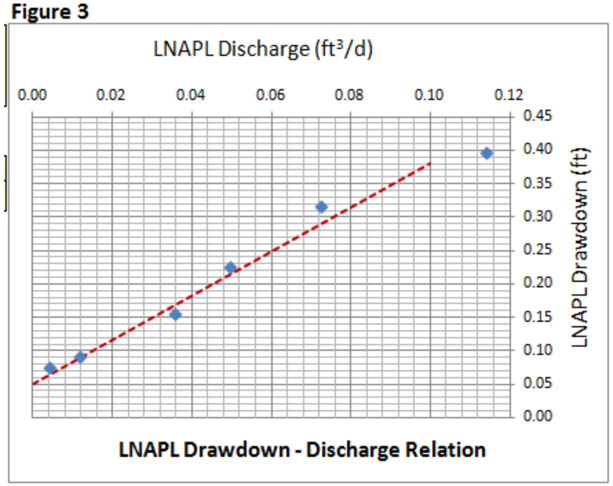
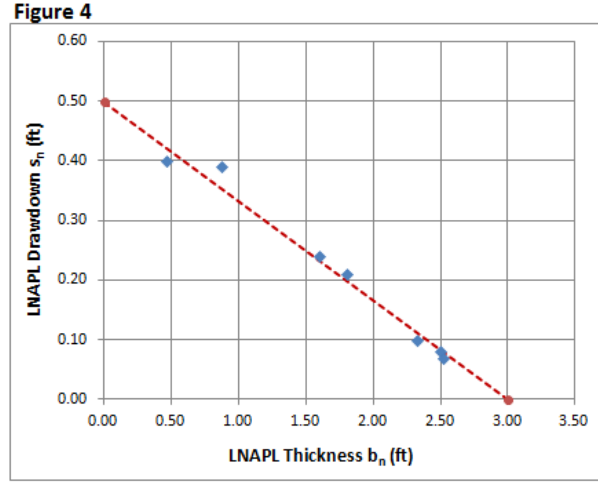


Figure 4



b_n	s_n
3	0
0	0.5

J-ratio	-0.167

APPENDIX A
TRANSMISSIVITY CALCULATION WORKBOOK

DFSP NORWALK

PARSONS

Figure 5

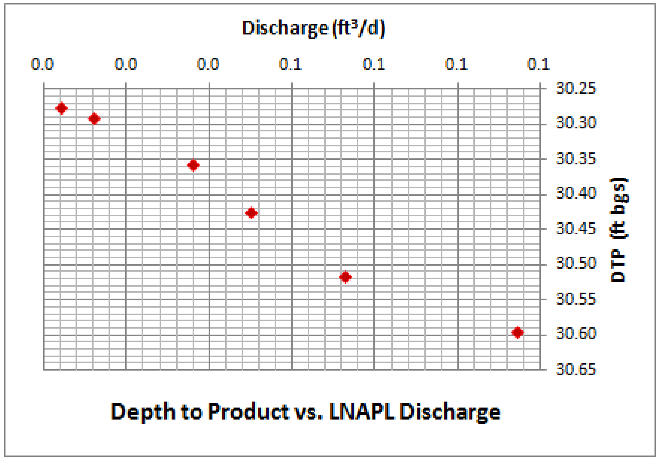


Figure 6

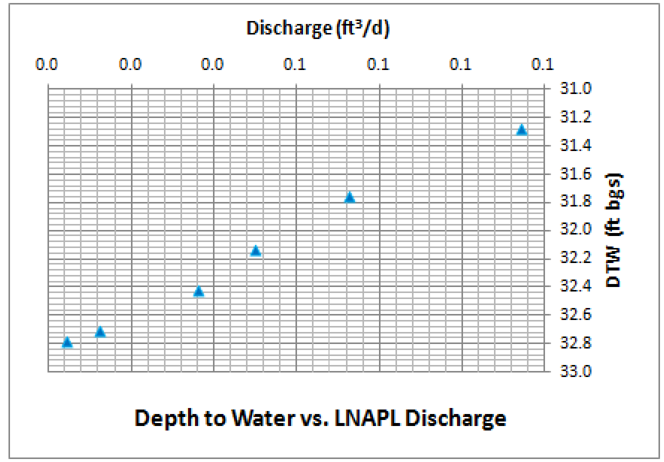


Figure 7

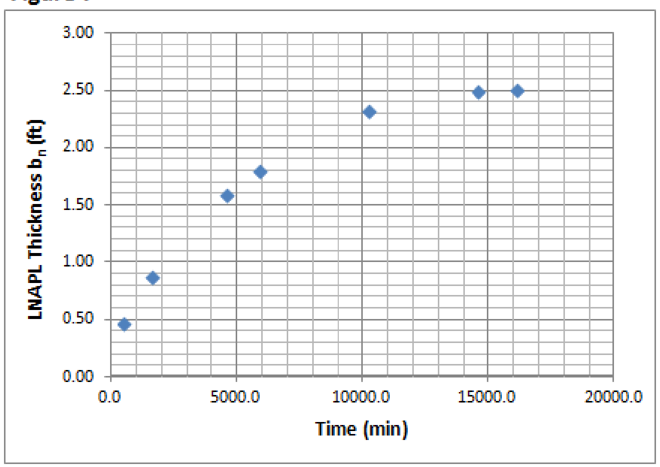
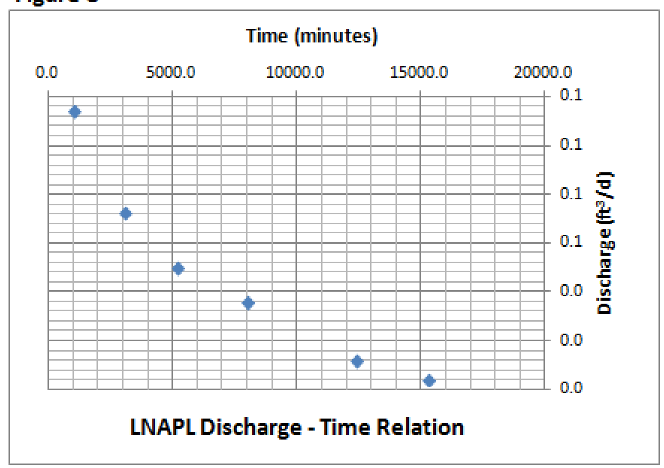


Figure 8



APPENDIX A
TRANSMISSIVITY CALCULATION WORKBOOK

DFSP NORWALK

PARSONS

Figure 9

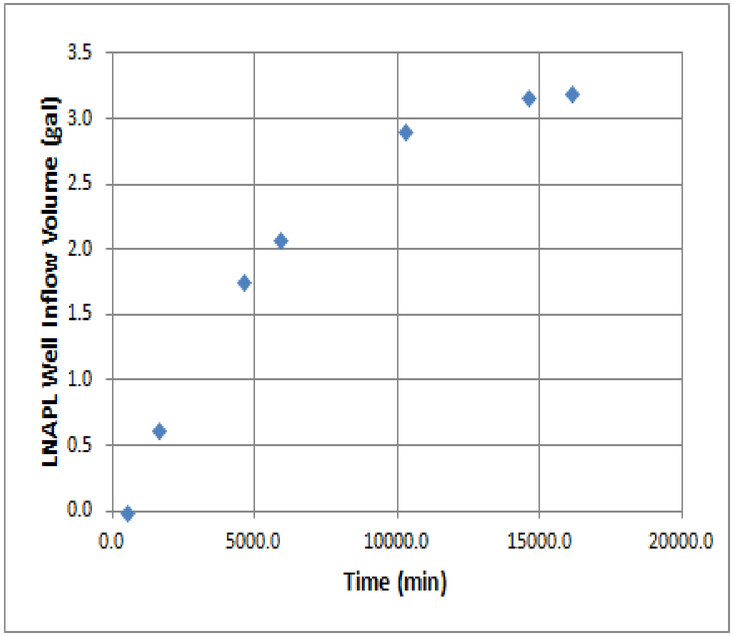
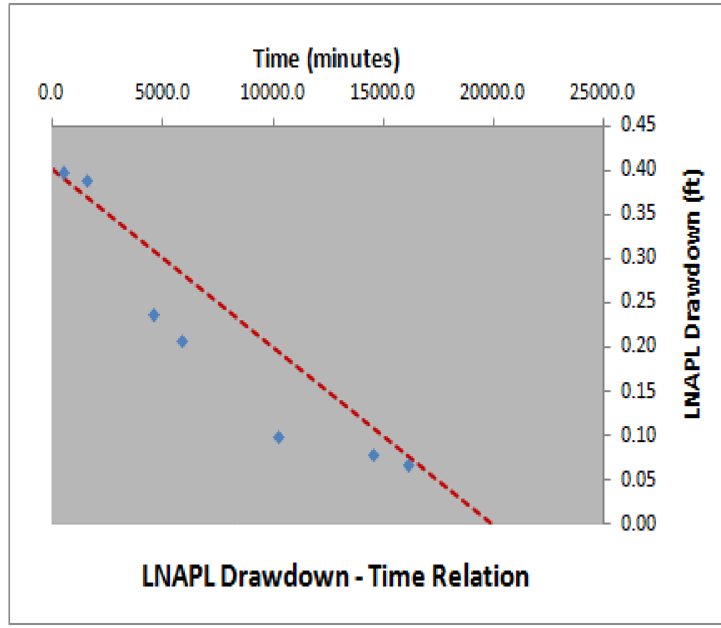


Figure 10



t (min)	s_n (ft)
0	0.4
20000	0

APPENDIX A
TRANSMISSIVITY CALCULATION WORKBOOK

DFSP NORWALK

PARSONS

P:\DFSP Norwalk\tech\PTest_capture_report\Figs_v2.ppt

Generalized Bouwer and Rice (1976)

Well Designation:	GMW-62
Date:	13-May-13

$$T_n = \frac{r_e^2 \ln(R/r_e)\ln(s_n(t_1)/s_n(t))}{2(-J)(t-t_1)}$$

Enter early time cut-off for least-squares model fit

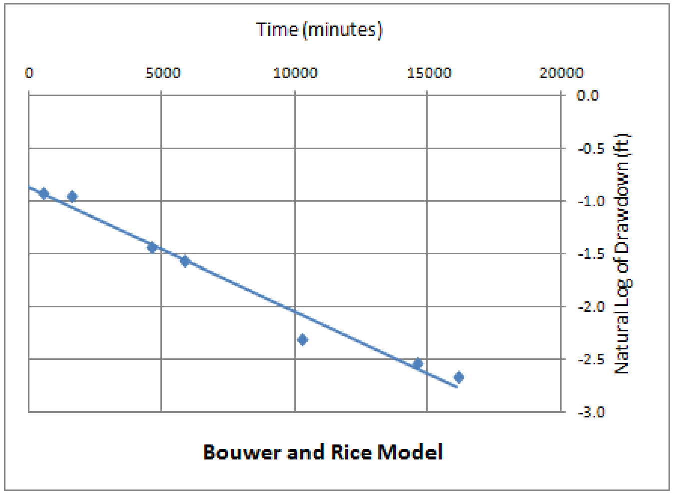
$Time_{cut}$	0	<- Enter or change value here

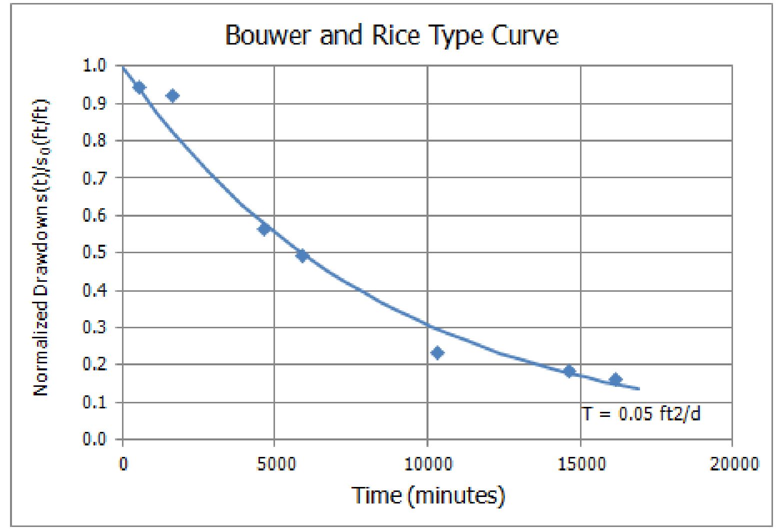
Model Results: T_n (ft^2/d) : 0.05648 +/- 0.004 ft^2/d

L_e/r_e
9.9
C
1.19
R/r_e
5.29

J-Ratio
-0.167

Coef. Of Variation
0.07





C coefficient calculated from Eq. 6.5(c) of Butler, The Design, Performance, and Analysis of Slug Tests, CRC Press, 2000.

APPENDIX A
TRANSMISSIVITY CALCULATION WORKBOOK

DFSP NORWALK

PARSONS

Cooper and Jacob (1946)

Well Designation:	GMW-62
Date:	13-May-13

$$V_n(t_i) = \sum_j^i \frac{4\pi T_n s_j}{\ln\left(\frac{2.25 T_n t_j}{r_e^2 S_n}\right)} \Delta t_j$$

Enter early time cut-off for least-squares model fit

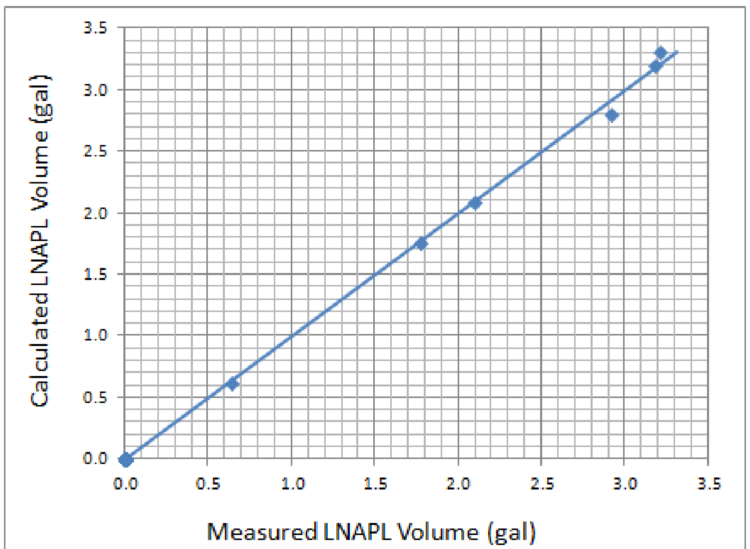
$Time_{cut}$ (min):	5	<- Enter or change values here
Time Adjustment (min):	5	

Trial S_n: d <-- Enter d for default or enter S_n value

Root-Mean-Square Error:	0.152	<-- Minimize this using "Solver"
	0.009	<-- Working S_n
Trial T_n (ft^2/d):	0.129	<-- By changing T_n through "Solver"

Add constraint $T_n > 0.00001$

Model Result: T_n (ft^2/d) = **0.13**



APPENDIX A
TRANSMISSIVITY CALCULATION WORKBOOK

DFSP NORWALK

PARSONS

API LNAPL Transmissivity Workbook

Calculation of LNAPL Transmissivity from Baildown Test Data

STEP 1: RESET OUTPUT SUMMARY

RESET

STEP 2: ENTER DATA & VIEW FIGURES

STEP 3: CHOOSE WELL CONDITIONS

Unconfined

Confined

Perched

STEP 4: LNAPL TRANSMISSIVITY SUMMARY

Output Summary

Mean LNAPL Transmissivity (ft^2/d)
0.10

Standard Deviation (ft^2/d)
0.04

Coefficient of Variation
0.39

APPENDIX A
TRANSMISSIVITY CALCULATION WORKBOOK

DFSP NORWALK

PARSONS

Cooper, Bredehoeft and Papadopulos (1967)

Well Designation:	GMW-62
Date:	13-May-13

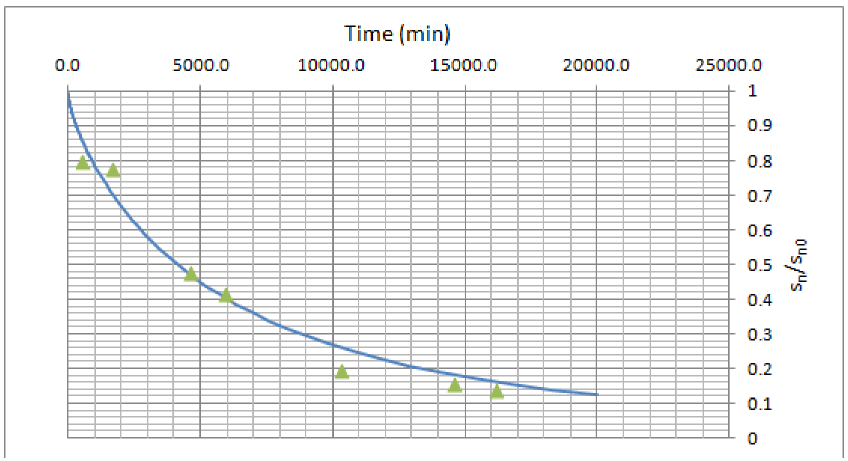
Enter early time cut-off for least-squares model fit

$Time_{cut}$ (min):	0	<- Enter or change values here
Initial Drawdown s_n (ft):	0.5	
Trial S_n:	d	<-- Enter d for default
Root-Mean-Square Error:	0.118	<-- Minimize this using "Solver"
Trial T_n (ft^2/d):	0.123	<-- By changing T_n through "Solver"
	0.009	<-- Working S_n

Add constraint Tn > 0.00001

Model Result: T_n (ft^2/d) = **0.12**

T_{min}	3
T_{max}	20000



J-Ratio
-0.167

APPENDIX A
TRANSMISSIVITY CALCULATION WORKBOOK

DFSP NORWALK

PARSONS

GMW-62 LNAPL Product Baildown Recovery Test Data

DFSP Norwalk
GMW-62 Baildown Test

Date	Time	Depth to Product (ft)	Depth to Water (ft)	Apparent Product Thickness (ft)	Casing Elevation (ft)	Ground water Elevation (ft)	Comments
07/11/10				0.00			3rd Qtr 2010
10/11/10				0.00			4th Qtr 2010
01/08/11	1609	0.00	29.03	0.00	76.34	47.31	
01/10/11		28.78	29.08	0.30	76.34	47.51	
02/18/11	1120	27.27	28.28	1.01	76.34	48.91	
04/07/11	1405	26.89	28.57	1.68	76.34	49.18	
05/18/11	1027	27.77	30.04	2.27	76.34	48.21	
05/25/11	1233	27.91	30.24	2.33	76.34	48.06	
06/29/11	1000	28.48	31.00	2.52	76.34	47.46	Measurements before pumping
06/29/11	1129	29.09	29.10	0.01	76.34	47.25	Measurements after pumping, removed 9 gallons free product, 10 gallons water
06/30/11	900	28.67	28.82	0.15	76.34	47.65	
07/07/11	1026	28.03	28.14	0.11	76.34	48.29	
07/27/11	1210	28.97	29.51	0.54	76.34	47.28	
08/02/11	1400	29.08	29.66	0.58	76.34	47.17	
08/12/11		29.17	29.97	0.80	76.34	47.04	
08/22/11	1330	29.08	29.92	0.84	76.34	47.13	
09/12/11	1330	28.23	29.06	0.83	76.34	47.98	
09/21/11	1345	29.21	30.16	0.95	76.34	46.98	
09/30/11	1230	29.06	29.96	0.90	76.34	47.14	
10/06/11	1002	28.45	29.39	0.94	76.34	47.74	
10/12/11	707	28.18	29.04	0.86	76.34	48.02	Measured by BTS
10/17/11	1045	29.42	30.43	1.01	76.34	46.76	Removed 1 L of product for testing
10/17/11	1100	29.74	30.41	0.67	76.34	46.49	After sample collection.
10/28/11	1405	29.55	30.27	0.72	76.34	46.67	
11/04/11	1340	29.11	29.78	0.67	76.34	47.12	
11/17/11	930	29.34	30.05	0.71	76.34	46.89	
12/02/11	1045	29.47	30.28	0.81	76.34	46.74	
12/14/11	800	29.86	30.78	0.92	76.34	46.33	Before bail down test. Removed 1 gallon of product and 2 gallons of water.
12/14/11	1541	29.97	30.01	0.04	76.34	46.36	6 Hours after product removal.
12/15/11	745	29.79	29.82	0.03	76.34	46.55	
12/19/11	1504	29.33	29.34	0.01	76.34	47.01	
12/23/11	915	30.08	30.20	0.12	76.34	46.24	
12/30/11	1030	29.75	29.80	0.05	76.34	46.58	
01/05/12	1124	29.10	29.13	0.03	76.34	47.24	
02/02/12	1200	30.01	30.16	0.15	76.34	46.31	
02/17/12	1000	30.07	30.22	0.15	76.34	46.25	
02/22/12	810	30.15	30.33	0.18	76.34	46.16	
02/28/12	1223	30.27	30.45	0.18	76.34	46.04	
03/07/12	743	30.25	30.43	0.18	76.34	46.06	
03/27/12	1304	29.50	29.58	0.08	76.34	46.83	
04/05/12	1500	30.25	30.42	0.17	76.34	46.06	

DFSP Norwalk
GMW-62 Baildown Test

Date	Time	Depth to Product (ft)	Depth to Water (ft)	Apparent Product Thickness (ft)	Casing Elevation (ft)	Ground water Elevation (ft)	Comments
04/12/12	808	29.58	29.68	0.10	76.34	46.74	
04/18/12	833	29.40	29.46	0.06	76.34	46.93	Measured by BTS
04/25/12	1150	30.01	30.08	0.07	76.34	46.32	
05/04/12	1117	30.36	30.51	0.15	76.34	45.96	
05/10/12	1005	30.23	30.37	0.14	76.34	46.09	
05/18/12	845	30.25	30.49	0.24	76.34	46.05	
05/23/12	930	30.22	30.52	0.30	76.34	46.07	
06/01/12	1100	30.32	30.63	0.31	76.34	45.97	
06/07/12	840	30.43	30.82	0.39	76.34	45.85	
06/12/12	1207	30.41	30.87	0.46	76.34	45.86	
06/19/12	1041	30.42	30.98	0.56	76.34	45.83	
06/27/12	1245	30.43	31.08	0.65	76.34	45.81	
07/06/12	1025	29.91	30.34	0.43	76.34	46.36	
07/09/12	1520	29.80	30.15	0.35	76.34	46.48	Measured by BTS
07/26/12	1030	30.58	31.31	0.73	76.34	45.64	
08/01/12	1344	30.57	31.40	0.83	76.34	45.64	
08/17/12	1045	30.62	31.74	1.12	76.34	45.54	
08/27/12	1414	30.58	31.80	1.22	76.34	45.56	FPR total removed = 5 gals (~2 gal was LNAPL)
08/27/12	1500	0.00	32.00	0.00	76.34	44.34	Gauged after FPR
09/12/12	1000	30.81	31.49	0.68	76.34	45.42	
09/18/12	1021	30.77	31.67	0.90	76.34	45.43	
09/24/12	1600	30.68	31.74	1.06	76.34	45.49	FPR total removed = 5 gals, (4 gals LNAPL)
10/02/12	1230	30.84	32.23	0.39	76.34	44.44	
10/25/12	1020	30.23	30.81	0.58	76.34	46.02	
11/01/12	1350	30.25	30.82	0.57	76.34	46.00	
11/09/12	905	30.26	30.83	0.57	76.34	45.99	
11/16/12	1430	30.25	30.83	0.58	76.34	46.00	
11/21/12	1150	30.67	31.33	0.66	76.34	45.56	
11/30/12	1445	30.77	31.32	0.55	76.34	45.48	
12/04/12	1000	30.59	31.95	1.36	76.34	45.53	
12/11/12	1200	30.61	32.36	1.75	76.34	45.45	
12/21/12	1300	30.50	32.40	1.90	76.34	45.54	
12/26/12	1450	30.57	32.97	2.40	76.34	45.39	
01/08/13	1430	29.96	32.78	2.82	76.34	45.93	FPR total removed = 9 gals (3 gals LNAPL)
01/11/13	817	30.62	30.62	0.00	76.34	45.72	
01/14/13	?	30.55	30.79	0.24	76.34	45.75	Measured by BTS?
01/17/13	1505	30.78	31.23	0.45	76.34	45.49	
01/25/13	1240	30.64	32.72	2.08	76.34	45.37	
01/29/13	1244	30.60	33.08	2.48	76.34	45.34	
02/04/13	1410	30.44	33.40	2.48	76.34	45.02	FPR total removed=3 gals (2 gals LNAPL)
02/12/13	1138	30.76	32.67	2.48	76.34	45.75	
02/19/13	1448	30.04	31.82	2.48	76.34	46.60	FPR total removed=3 gals (2 gals LNAPL)
02/26/13	958	30.18	31.62	1.44	76.34	45.93	

DFSP Norwalk
GMW-62 Baildown Test

Date	Time	Depth to Product (ft)	Depth to Water (ft)	Apparent Product Thickness (ft)	Casing Elevation (ft)	Ground water Elevation (ft)	Comments
03/04/13	1436	30.11	31.74	2.48	76.34	46.68	FPR total removed=5 gals (4 gals LNAPL)
03/11/13	1210	30.09	31.68	1.59	76.34	46.00	
03/25/13	1145	30.19	31.97	1.78	76.34	45.87	
04/01/13	1420	30.17	32.05	2.48	76.34	46.37	FPR total removed=6 gals (4 gals LNAPL)
04/01/13	1440	32.13	32.15	0.02	76.34	44.21	After purge
04/03/13	803	30.42	31.36	0.94	76.34	45.77	
04/08/13	?	30.35	32.13	1.78	76.34	45.71	Measured by BTS?
04/11/13	1256	30.56	32.42	1.86	76.34	45.48	
04/15/13	1517	30.46	33.48	3.02	76.34	45.40	FPR total removed=11 gals (10 gals LNAPL)
04/15/13	1545	32.75	32.75	0.00	76.34	43.59	After purge
04/19/13	1330	30.92	32.02	1.10	76.34	45.24	
04/24/13	1020	30.83	33.05	2.22	76.34	45.15	
05/02/13	1240	30.01	33.30	3.29	76.34	45.80	
05/07/13	1043	29.96	33.27	3.31	76.34	45.85	
2013 Product Baildown Recovery Test							
05/13/13	**525**	**29.98**	**33.29**	**3.31**	**76.34**	**45.83**	**Started bail down test. FPR total removed=25 gals (15 gals LNAPL)**
05/13/13	545	0.00	34.62	0.00	76.34	41.72	After purge
05/13/13	1346	30.60	31.06	0.46	76.34	45.67	
05/14/13	755	30.59	31.46	0.87	76.34	45.61	
05/15/13	739	30.52	31.48	0.96	76.34	45.67	
05/16/13	950	30.44	32.03	1.59	76.34	45.65	
05/17/13	715	30.41	32.21	1.80	76.34	45.64	
05/20/13	826	30.30	32.62	2.32	76.34	45.67	
05/21/13	1430	30.22	32.64	2.42	76.34	45.73	
05/22/13	810	30.23	32.70	2.47	76.34	45.71	
05/23/13	824	30.28	32.77	2.49	76.34	45.66	
05/24/13	1000	30.27	32.78	2.51	76.34	45.67	
05/28/13	755	30.20	32.71	2.51	76.34	45.74	
05/31/13	800	30.23	32.78	2.55	76.34	45.70	
06/03/13	837	30.24	32.81	2.57	76.34	45.69	
06/05/13	1035	30.24	32.81	2.57	76.34	45.69	
06/07/13	1228	30.17	32.75	2.58	76.34	45.76	

GMW-4

September 7, 2007 LNAPL Sample

Laboratory Report

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Charlene Morrow, M.S.
Yelena Aravkina, M.S.
Bradley T. Benson, B.S.
Kurt Johnson, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
TEL: (206) 285-8282
FAX: (206) 283-5044
e-mail: fbi@isomedia.com

September 10, 2007

Shiow-Whei Chou, Project Manager
Geomatrix Consultants
510 Superior Avenue, Suite 200
Newport Beach, CA 92663

Dear Ms. Chou:

Included are the results from the testing of material submitted on September 10, 2007 from the DFSP Norwalk 1603.044, F&BI 709078 project. The product sample submitted for forensic evaluation arrived in good condition. Upon arrival, the sample GMW-4-090707 was placed in a refrigerator maintained at 4°C until removed for sample processing.

The sample GMW-4-090707 was diluted and analyzed using a gas chromatograph with a flame ionization detector (GC/FID). The data generated yielded information on the boiling range and general chemical composition of the material present. The GC/FID traces are enclosed. A GC/FID trace of a standard consisting of normal alkanes is also provided for reference purposes.

Please contact us if additional consultation is needed by our firm in the interpretation of the analytical results provided. We appreciate this opportunity to be of service to you and hope you will call if you should have any questions. We will hold your samples for 30 days before disposal unless directed otherwise.

Sincerely,

FRIEDMAN & BRUYA, INC.

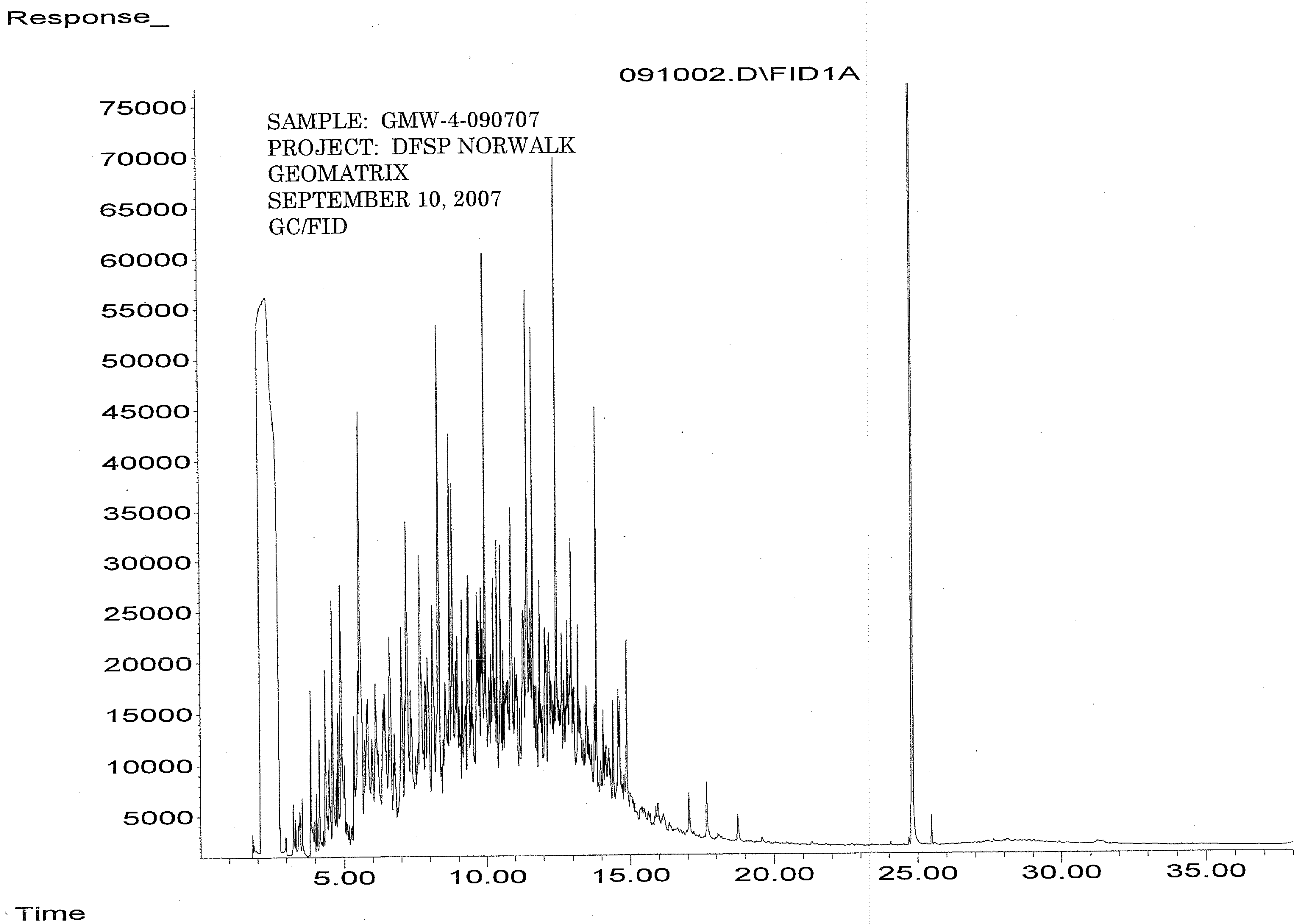
Kurt Johnson
Chemist

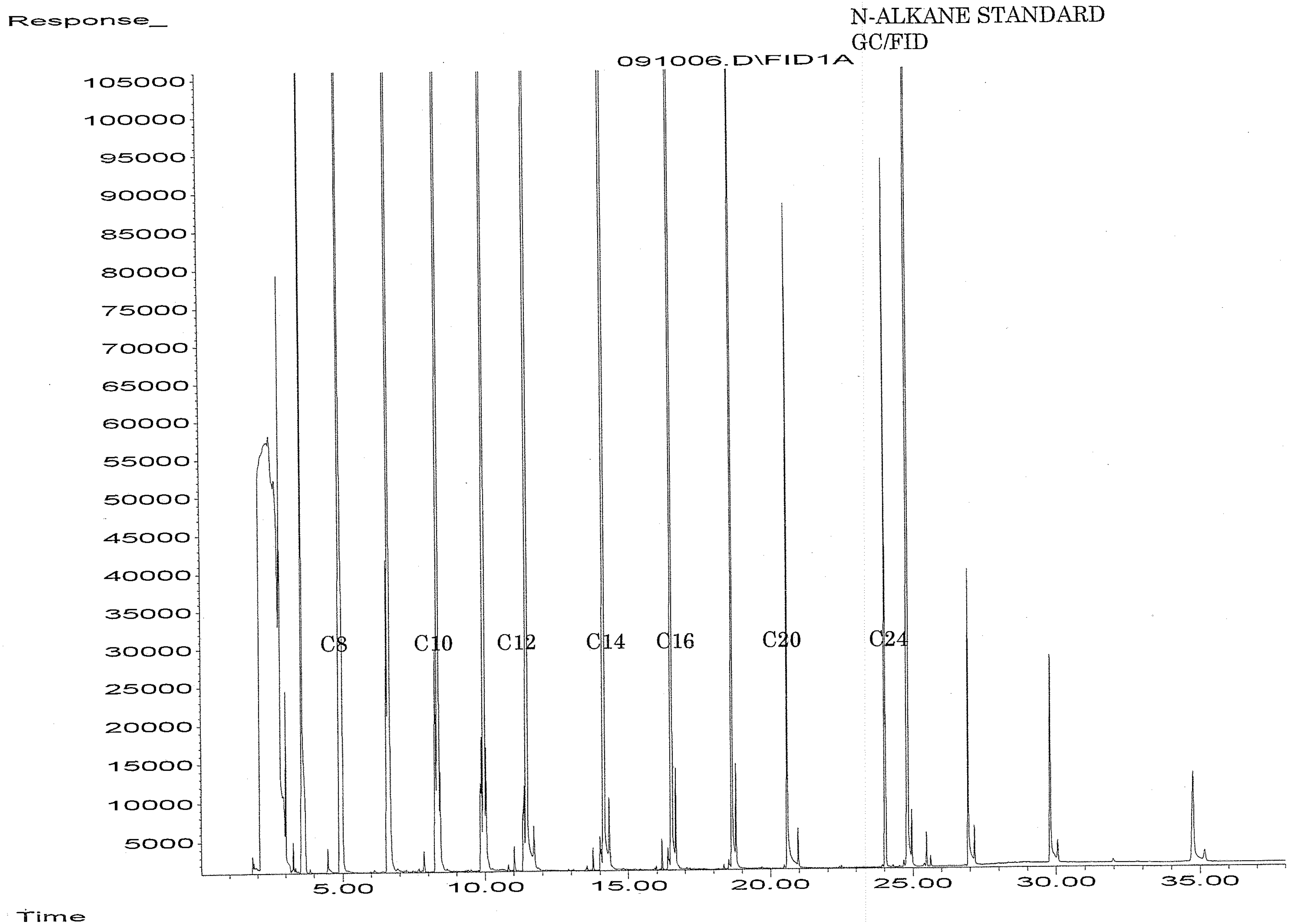
Enclosures
NAA0910R.DOC

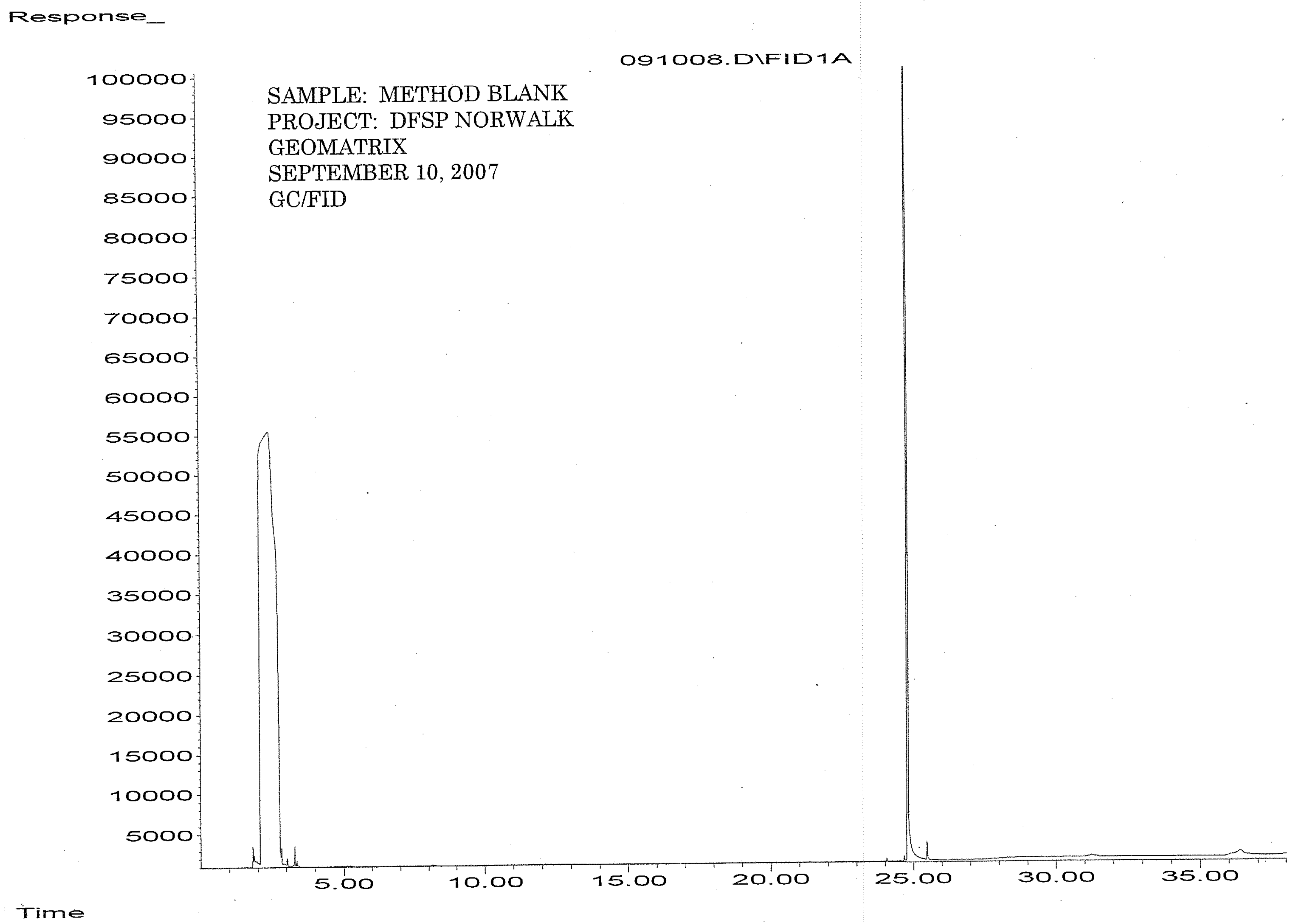
Date of Report: 09/10/07
Date Received: 09/10/07
Project: DFSP Norwalk 1603.044, F&BI 709078
Date Extracted: 09/10/07
Date Analyzed: 09/10/07

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR FORENSIC EVALUATION BY CAPILLARY GAS CHROMATOGRAPHY USING A FLAME IONIZATION DETECTOR (FID)

Sample ID	GC Characterization
GMW-4-090707	The GC trace using the flame ionization detector (FID) showed the presence of low and medium boiling compounds. The patterns displayed by these peaks are indicative of a low boiling petroleum distillate such as JP-4, or a mixture of gasoline, condensate, or JP-4 and a middle distillate such as kerosene, Jet A or JP-5. The low boiling compounds appear as a ragged pattern of peaks eluting from n-C_7 to n-C_{17} showing a maximum near n-C_{10}. This correlates with a temperature range of approximately 100°C to 240 °C with a maximum near 170 °C. Peaks indicative of the most abundant aromatic compounds usually seen in gasoline are not present. The medium boiling compounds appear as a regular pattern of peaks on top of a hump or unresolved complex mixture (UCM). This material elutes from n-C_8 to n-C_{18} showing a maximum near n-C_{13}. This correlates with a temperature range of approximately 130°C to 320 °C with a maximum near 240 °C. Within this range, the dominant peaks present are indicative of both normal alkanes and isoprenoids. The relative abundance of the normal alkanes and isoprenoids indicates that substantial biological degradation has not occurred to at least a portion of the fuel. The large peak seen near 25 minutes on the GC/FID trace is pentacosane, added as a quality assurance check for this GC analysis.


Response_
091002.D\FID1A
SAMPLE: GMW-4-090707
PROJECT: DFSP NORWALK
GEOMATRIX
SEPTEMBER 10, 2007
GC/FID
75000
70000
65000
60000
55000
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
5.00
10.00
15.00
20.00
25.00
30.00
35.00
Time


N-ALKANE STANDARD
GC/FID
091006.D\FID1A
Response_
105000
100000
95000
90000
85000
80000
75000
70000
65000
60000
55000
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
C8
C10
C12
C14
C16
C20
C24
5.00
10.00
15.00
20.00
25.00
30.00
35.00
Time



Response_
091008.D\FID1A
SAMPLE: METHOD BLANK
PROJECT: DFSP NORWALK
GEOMATRIX
SEPTEMBER 10, 2007
GC/FID
100000
95000
90000
85000
80000
75000
70000
65000
60000
55000
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
5.00
10.00
15.00
20.00
25.00
30.00
35.00
Time

CHAIN-OF-CUSTODY RECORD 709078 MP 09/10/07 NEW 11767 A02

PROJECT NAME: DFSP Norwalk			DATE: 9-7-07	PAGE 1 OF 1
PROJECT NUMBER: 1603.044	LABORATORY NAME:	CLIENT INFORMATION:	REPORTING REQUIREMENTS:	
RESULTS TO: Shiow-Whei Chou	LABORATORY ADDRESS:			
TURNAROUND TIME: 24 Hr				
SAMPLE SHIPMENT METHOD: Fedex	LABORATORY CONTACT:		GEOTRACKER REQUIRED YES NO	
	LABORATORY PHONE NUMBER:		SITE SPECIFIC GLOBAL ID NO.	

SAMPLERS (SIGNATURE): [signature]

Lab ID	DATE	TIME	SAMPLE NUMBER	GC/FID		PIANO	CONTAINER TYPE AND SIZE	Soil (S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No. of Containers	ADDITIONAL COMMENTS
01 A-C	9-7-07	14:40	GMW-4-090707	X		X	40 mL VOA	O	–	–	–		3	

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
SIGNATURE: [signature] PRINTED NAME: R. DOVE COMPANY: Geomatrix	9/7/07	1652	SIGNATURE: [signature] PRINTED NAME: Nhan Phan COMPANY: FeBI	9/10/07	09:30
SIGNATURE: PRINTED NAME: COMPANY:			SIGNATURE: PRINTED NAME: COMPANY:		
SIGNATURE: PRINTED NAME: COMPANY:			SIGNATURE: PRINTED NAME: COMPANY:		

TOTAL NUMBER OF CONTAINERS: 3

SAMPLING COMMENTS:

Sampl received at 21 °C

510 Superior Avenue, Suite 200
Newport Beach, California 92663-3627
Tel 949.642.0245 Fax 949.642.4474

Geomatrix

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Charlene Morrow, M.S.
Yelena Aravkina, M.S.
Bradley T. Benson, B.S.
Kurt Johnson, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
TEL: (206) 285-8282
FAX: (206) 283-5044
e-mail: fbi@isomedia.com

September 19, 2007

Shiow-Whei Chou, Project Manager
Geomatrix
510 Superior Avenue, Suite 200
Newport Beach, CA 92663

Dear Ms. Chou:

Included are the results from the testing of material submitted on September 10, 2007 from the DFSP Norwalk 1603.044, F&BI 709078 project. There are 6 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Kurt Johnson
Chemist

Enclosures
NAA0919R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 09/19/07
Date Received: 09/10/07
Project: DFSP Norwalk 1603.044, F&BI 709078
Date Analyzed: 9/10/07

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS

Results Reported as % by Weight

Laboratory ID 709078-01
Client ID GMW-4-090707

Compound	Weight Percent
Propane	<0.01
Methanol	<0.01
Isobutane	<0.01
2-Methyl-1-propene	<0.01
Ethanol	<0.01
n-Butane	<0.01
t-2-Butene	<0.01
c-2-Butene	<0.01
Isopropanol	<0.01
3-Methyl-1-butene	<0.01
Isopentane	<0.01
tert-Butanol	<0.01
1-Pentene	<0.01
2-Methyl-1-butene	<0.01
n-Propanol	<0.01
n-Pentane	<0.01
t-2-Pentene	<0.01
c-2-Pentene	<0.01
2-Methyl-2-butene	<0.01
MTBE	<0.01
sec-Butanol	<0.01
4-Methyl-1-pentene	<0.01
Isobutanol	<0.01
2,3-Dimethylbutane	<0.01
Cyclopentane	<0.01
2-Methylpentane	<0.01
DIPE	<0.01
3-Methylpentane	<0.01
1-Hexene	<0.01
ETBE	<0.01
n-Hexane	<0.01

Date of Report: 09/19/07
Date Received: 09/10/07
Project: DFSP Norwalk 1603.044, F&BI 709078
Date Analyzed: 9/10/07

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 709078-01
Client ID GMW-4-090707

Compound	Weight Percent
t-2-Hexene	<0.01
2-Methyl-1-pentene	<0.01
2-Methyl-2-pentene	<0.01
c-2-Hexene	<0.01
2,2-Dimethylpentane	<0.01
2,4-Dimethylpentane	<0.01
Methylcyclopentane	0.02
2,2,3-Trimethylbutane	<0.01
Benzene	<0.01
1-Methylcyclopentene	<0.01
TAME	<0.01
3,3-Dimethylpentane	<0.01
Cyclohexane	0.02
2-Methylhexane	0.02
2,3-Dimethylpentane	0.02
1,1-Dimethylcyclopentane	0.01
3-Methylhexane	0.04
c-1,3-Dimethylcyclopentane	0.03
3-Ethylpentane	0.01
Isooctane	0.02
t-1,2-Dimethylcyclopentane	0.06
1-Heptene	<0.01
n-Heptane	0.07
t-3-Heptene	<0.01
c-3-Heptene	<0.01
t-2-Heptene	<0.01
c-2-Heptene	<0.01
2,2-Dimethylhexane	<0.01
2,5-Dimethylhexane	0.02
Methylcyclohexane	0.24
2,4-Dimethylhexane	0.24
Ethylcyclopentane	0.04

Date of Report: 09/19/07
Date Received: 09/10/07
Project: DFSP Norwalk 1603.044, F&BI 709078
Date Analyzed: 9/10/07

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 709078-01
Client ID GMW-4-090707

Compound	Weight Percent
t-1,c-2,4-Trimethylcyclopentane	0.10
t-1,c-2,3-Trimethylcyclopentane	0.18
2,3,4-Trimethylpentane	0.02
Toluene	<0.01
2,3-Dimethylhexane	0.04
2-Methylheptane	0.25
3-Methylheptane	0.15
4-Methylheptane	0.07
3-Ethylhexane	0.03
1-Octene	<0.01
1,2,3-Trimethylcyclopentane	0.11
t-1,2-Dimethylcyclohexane	0.47
n-Octane	0.34
1-Ethyl-1-methylcyclopentane	0.09
c-2-Octene	<0.01
c-1,2-Dimethylcyclohexane	0.30
Isopropylcyclopentane	0.02
2,5-Dimethylheptane	0.10
3,5-Dimethylheptane	0.03
n-Propylcyclopentane	0.11
Ethylbenzene	0.12
2,3-Dimethylheptane	0.32
3,4-Dimethylheptane	0.03
2-Methyloctane	0.18
m-Xylene	0.03
p-Xylene	0.09
3-Methyloctane	0.32
1-Nonene	<0.01
3,3-Diethylpentane	<0.01
t-3-Nonene	<0.01
c3-Nonene	<0.01
o-Xylene	0.02

Date of Report: 09/19/07
Date Received: 09/10/07
Project: DFSP Norwalk 1603.044, F&BI 709078
Date Analyzed: 9/10/07

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 709078-01
Client ID GMW-4-090707

Compound	Weight Percent
n-Nonane	0.66
Isobutylcyclopentane	0.08
t-2-Nonene	<0.01
c-2-Nonene	<0.01
Isopropylbenzene	0.02
3,3-Dimethyloctane	0.03
n-Butylcyclopentane	0.14
n-Propylbenzene	0.14
2,3-Dimethyloctane	0.10
1-Methyl-3-ethylbenzene	0.02
1-Methyl-4-ethylbenzene	0.19
2-Methylnonane	0.18
3-Ethyloctane	0.19
3-Methylnonane	0.19
1,3,5-Trimethylbenzene	0.14
1-Methyl-2-ethylbenzene	0.28
1,2,4-Trimethylbenzene	0.37
tert-Butylbenzene	<0.01
n-Decane	0.67
Isobutylbenzene	0.11
Isopropylcyclohexane	<0.01
sec-Butylbenzene	0.18
1-Methyl-3-isopropylbenzene	0.16
Isobutylcyclohexane	<0.01
1-Methyl-4-isopropylbenzene	0.25
1,2,3-Trimethylbenzene	0.61
Indan	0.05
1-Methyl-3-n-propylbenzene	0.09
1-Methyl-4-n-propylbenzene	0.21
n-Butylbenzene	0.50
1,3-Dimethyl-5-ethylbenzene	0.32
1,2-Diethylbenzene	0.08

Date of Report: 09/19/07
Date Received: 09/10/07
Project: DFSP Norwalk 1603.044, F&BI 709078
Date Analyzed: 9/10/07

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 709078-01
Client ID GMW-4-090707

Compound	Weight Percent
1-Methyl-2-n-propylbenzene	0.26
1,4-Dimethyl-2-ethylbenzene	0.28
1,2-Dimethyl-4-ethylbenzene	0.41
1,3-Dimethyl-2-ethylbenzene	0.26
1,2-Dimethyl-3-ethylbenzene	0.28
n-Undecane	1.30
1,2,4,5-Tetramethylbenzene	0.24
2-Methylbutylbenzene	0.11
n-Pentylbenzene	0.10
Methylindan	0.19
1-tert-Butyl-3,5-dimethylbenzene	<0.01
1-tert-Butyl-4-ethylbenzene	<0.01
n-Dodecane	1.00
1,3,5-Triethylbenzene	<0.01
1,2,4-Triethylbenzene	<0.01
Naphthalene	0.39
n-Hexylbenzene	<0.01
2-Methylnaphthalene	0.99
n-Tridecane	0.63
1-Methylnaphthalene	0.67
n-Tetradecane	0.25
n-Pentadecane	0.11

Date of Report: 09/19/07
Date Received: 09/10/07
Project: DFSP Norwalk 1603.044, F&BI 709078
Date Analyzed: 9/10/07

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 709078-01
Client ID GMW-4-090707

PIANO SUMMARY	Weight Percent
Total Identified Compounds	17.84
Oxygenated Compounds	0.00
Hydrocarbon Compounds	17.84
Unidentified Compounds	82.16
Total	100

	Paraffins	Isoparaffins	Aromatics	Naphthenes	Olefins	Total
C3	<0.01					<0.01
C4	<0.01	<0.01			<0.01	<0.01
C5	<0.01	<0.01		<0.01	<0.01	<0.01
C6	<0.01	<0.01	<0.01	0.04	<0.01	0.04
C7	0.07	0.09	<0.01	0.38	<0.01	0.54
C8	0.34	0.83	0.25	1.39	<0.01	2.81
C9	0.66	0.98	1.83	0.22	<0.01	3.69
C10	0.67	0.69	4.23	<0.01		5.59
C11	1.30		1.87			3.17
C12	1.00		<0.01			1.00
C13	0.63					0.63
C14	0.25					0.25
C15	0.11					0.11
Total	5.05	2.60	8.17	2.02	<0.01	17.84

709078 MP 09/10/07 NEW 11767 A02

CHAIN-OF-CUSTODY RECORD

PROJECT NAME: DFSP Norwalk
DATE: 9-7-07 PAGE 1 OF 1

PROJECT NUMBER: 1603.044
RESULTS TO: Shiow-Whei Chou
TURNAROUND TIME: 24 Hr
SAMPLE SHIPMENT METHOD: Fedex

LABORATORY NAME:
LABORATORY ADDRESS:
LABORATORY CONTACT:
LABORATORY PHONE NUMBER:

CLIENT INFORMATION:

REPORTING REQUIREMENTS:
GEOTRACKER REQUIRED YES NO
SITE SPECIFIC GLOBAL ID NO.

SAMPLERS (SIGNATURE): [signature]

ANALYSES

Lab ID	DATE	TIME	SAMPLE NUMBER	GC/FID		PIANO	CONTAINER TYPE AND SIZE	Soil (S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No. of Containers	ADDITIONAL COMMENTS
01 A-C	9-7-07	14:40	GMW-4-090707	X		X	40 mL VOA	O	–	–	–		3	

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
SIGNATURE: [signature] PRINTED NAME: R. DOVE COMPANY: Geomatrix	9/7/07	1652	SIGNATURE: [signature] PRINTED NAME: Nhan Phan COMPANY: FeBI	9/10/07	09:30
SIGNATURE: PRINTED NAME: COMPANY:			SIGNATURE: PRINTED NAME: COMPANY:		
SIGNATURE: PRINTED NAME: COMPANY:			SIGNATURE: PRINTED NAME: COMPANY:		

TOTAL NUMBER OF CONTAINERS: 3

SAMPLING COMMENTS:

Sampl received at 21 °C

510 Superior Avenue, Suite 200
Newport Beach, California 92663-3627
Tel 949.642.0245 Fax 949.642.4474

Geomatrix

MW-9

September 11, 2007 LNAPL Sample

Laboratory Report

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Charlene Morrow, M.S.
Yelena Aravkina, M.S.
Bradley T. Benson, B.S.
Kurt Johnson, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
TEL: (206) 285-8282
FAX: (206) 283-5044
e-mail: fbi@isomedia.com

September 13, 2007

Shiow-Whei Chou, Project Manager
Geomatrix Consultants
510 Superior Avenue, Suite 200
Newport Beach, CA 92663

Dear Ms. Chou:

Included are the results from the testing of material submitted on September 12, 2007 from the DFSP Norwalk 1603.044.0, F&BI 709117 project. The product sample submitted for forensic evaluation arrived in good condition. Upon arrival, the sample MW-9-091107 was placed in a refrigerator maintained at 4°C until removed for sample processing.

The sample MW-9-091107 was diluted and analyzed using a gas chromatograph with a flame ionization detector (GC/FID). The data generated yielded information on the boiling range and general chemical composition of the material present. The GC/FID traces are enclosed. A GC/FID trace of a standard consisting of normal alkanes is also provided for reference purposes.

Please contact us if additional consultation is needed by our firm in the interpretation of the analytical results provided. We appreciate this opportunity to be of service to you and hope you will call if you should have any questions. We will hold your samples for 30 days before disposal unless directed otherwise.

Sincerely,

FRIEDMAN & BRUYA, INC.

Kurt Johnson
Chemist

Enclosures
NAA0913R.DOC

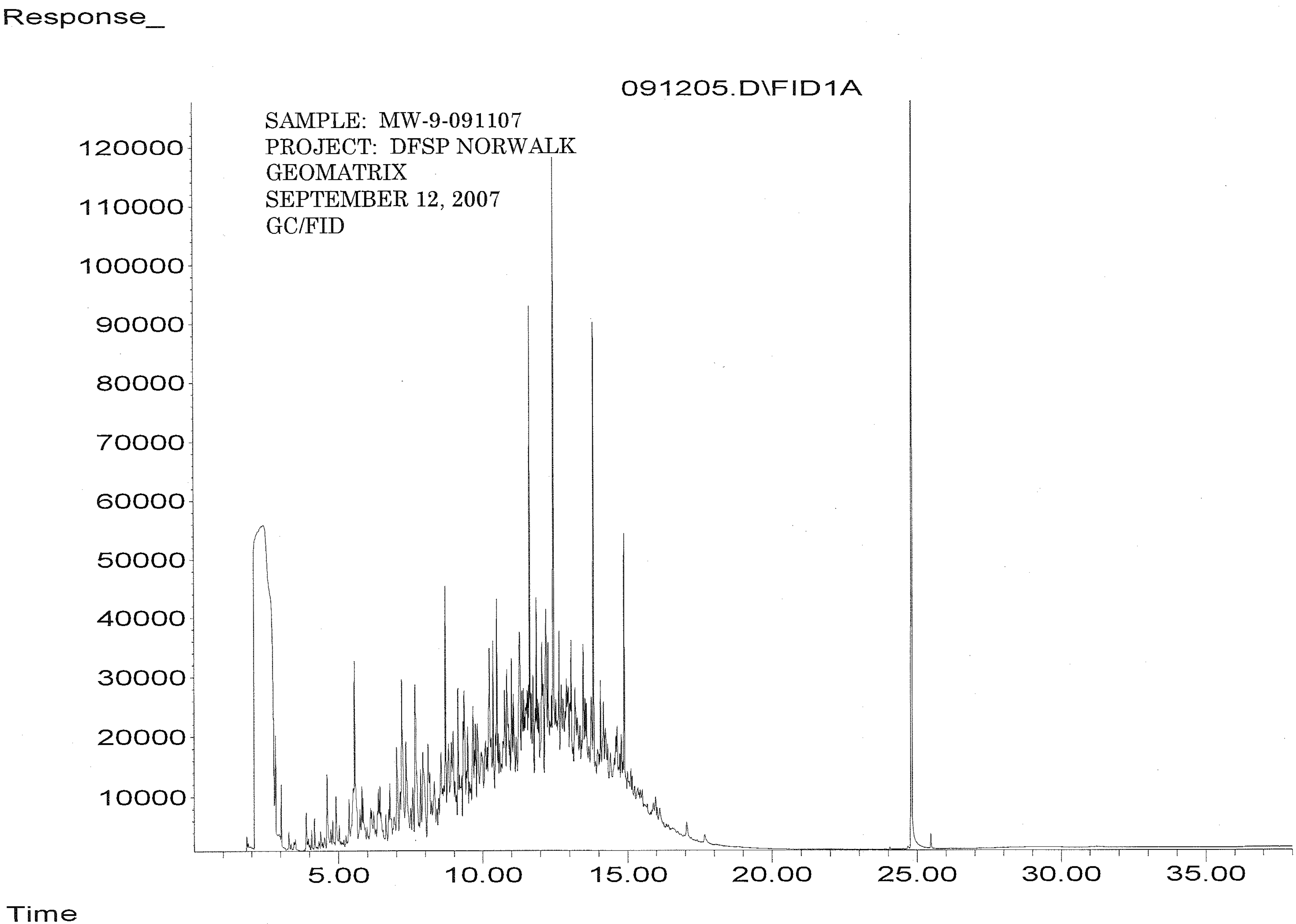
FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

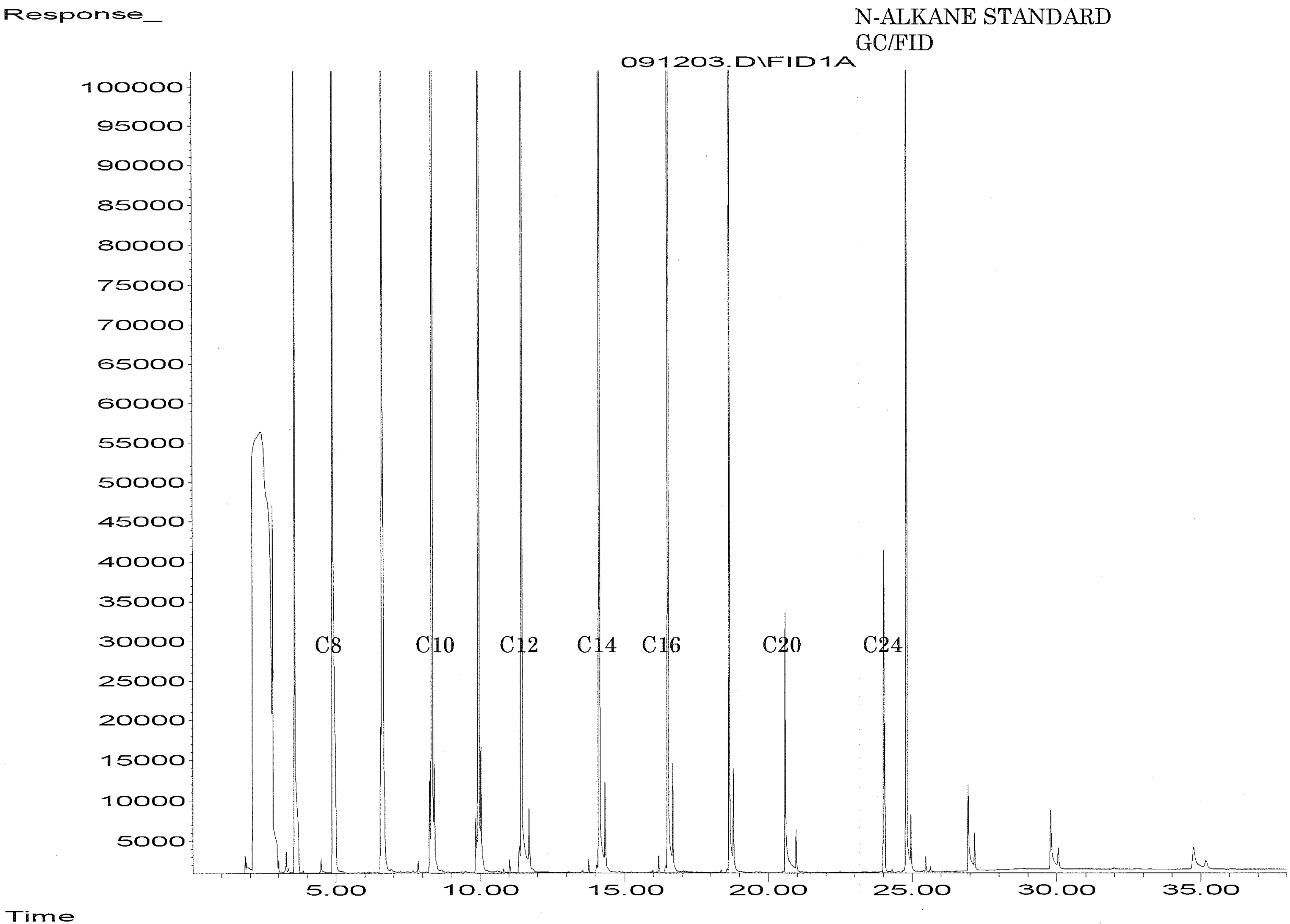
Date of Report: 09/13/07
Date Received: 09/12/07
Project: DFSP Norwalk 1603.044.0, F&BI 709117
Date Extracted: 09/12/07
Date Analyzed: 09/12/07

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR FORENSIC EVALUATION BY CAPILLARY GAS CHROMATOGRAPHY USING A FLAME IONIZATION DETECTOR (FID)

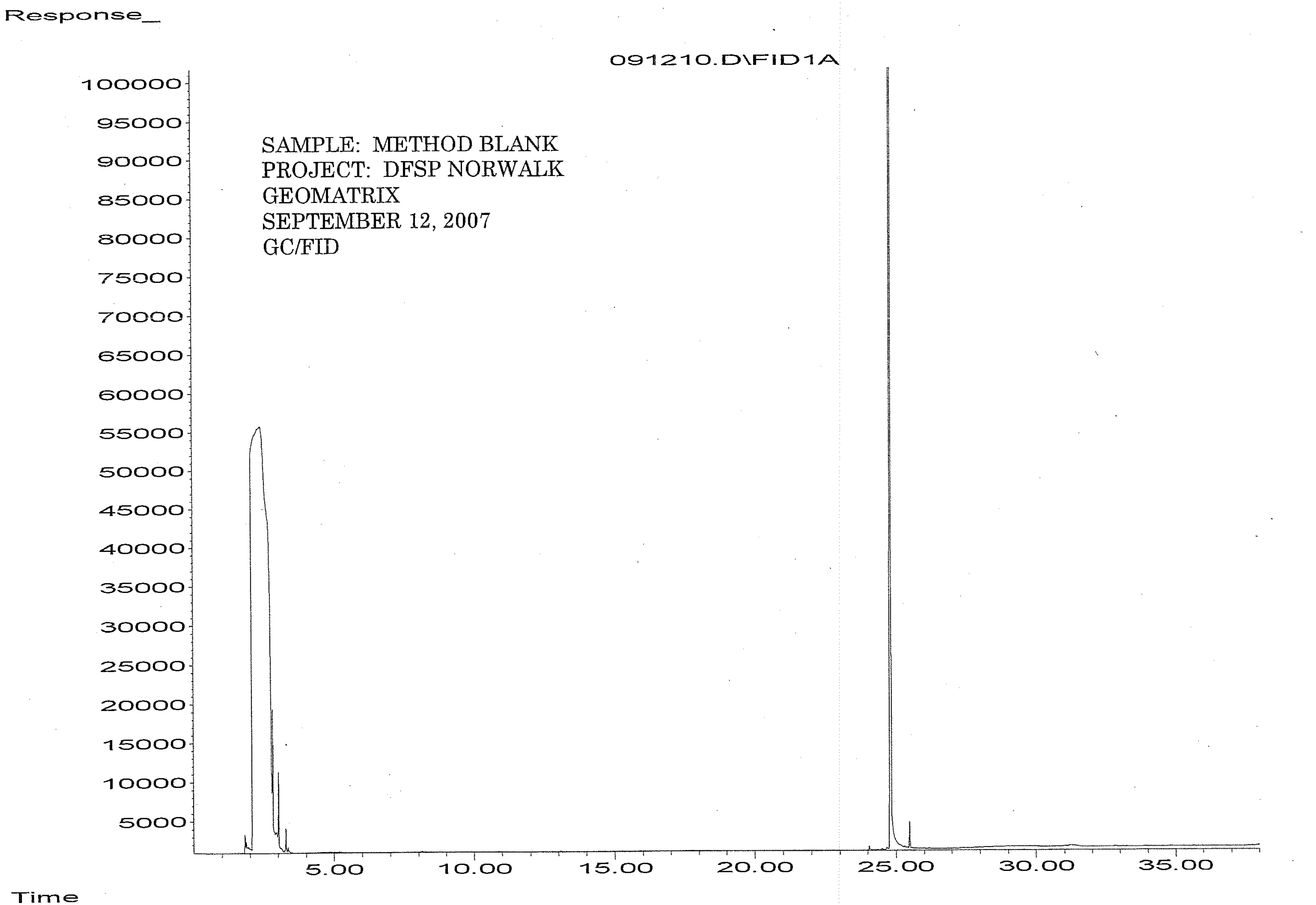
Sample ID	GC Characterization
MW-9-091107	The GC trace using the flame ionization detector (FID) showed the presence of low and medium boiling compounds. The patterns displayed by these peaks are indicative of a low boiling petroleum distillate such as JP-4, or a mixture of gasoline, condensate, or JP-4 and a middle distillate such as kerosene, Jet A or JP-5. The low boiling compounds appear as a ragged pattern of peaks eluting from n-C_7 to n-C_{14} showing a maximum near n-C_{10}. This correlates with a temperature range of approximately 100°C to 250 °C with a maximum near 170 °C. Peaks indicative of the most abundant aromatic compounds usually seen in gasoline are not present. The medium boiling compounds appear as a regular pattern of peaks on top of a hump or unresolved complex mixture (UCM). This material elutes from n-C_8 to n-C_{17} showing a maximum near n-C_{13}. This correlates with a temperature range of approximately 130°C to 300 °C with a maximum near 240 °C. Within this range, the dominant peaks present are indicative of isoprenoids. A discernible pattern of peaks characteristic of the normal alkanes was not present. The abundance of isoprenoids in conjunctions with the apparent absence of normal alkanes indicates that the fuel present has undergone substantial biological degradation. The large peak seen near 25 minutes on the GC/FID trace is pentacosane, added as a quality assurance check for this GC analysis.



Response_
091205.D\FID1A
SAMPLE: MW-9-091107
PROJECT: DFSP NORWALK
GEOMATRIX
SEPTEMBER 12, 2007
GC/FID
120000
110000
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
5.00
10.00
15.00
20.00
25.00
30.00
35.00
Time



Response_
N-ALKANE STANDARD
GC/FID
091203.D\FID1A
100000
95000
90000
85000
80000
75000
70000
65000
60000
55000
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
C8
C10
C12
C14
C16
C20
C24
5.00
10.00
15.00
20.00
25.00
30.00
35.00
Time


Response_
091210.D\FID1A
SAMPLE: METHOD BLANK
PROJECT: DFSP NORWALK
GEOMATRIX
SEPTEMBER 12, 2007
GC/FID
100000
95000
90000
85000
80000
75000
70000
65000
60000
55000
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
5.00
10.00
15.00
20.00
25.00
30.00
35.00
Time

CHAIN-OF-CUSTODY RECORD 709117 MP 09-12-07 NEW 12029 A02

PROJECT NAME: DFSP NORWALK		DATE: 9.11.07	PAGE 1 OF 1
PROJECT NUMBER: 1603.044.0	LABORATORY NAME:	CLIENT INFORMATION:	REPORTING REQUIREMENTS:
RESULTS TO: Shiow-Whei Chou	LABORATORY ADDRESS:		
TURNAROUND TIME: 24 hr (GC/FID)			
SAMPLE SHIPMENT METHOD: Fedex	LABORATORY CONTACT:		GEOTRACKER REQUIRED YES NO
	LABORATORY PHONE NUMBER:		SITE SPECIFIC GLOBAL ID NO.

SAMPLERS (SIGNATURE): [signature]

ANALYSES

Lab ID	DATE	TIME	SAMPLE NUMBER	GC/FID	PIANO	CONTAINER TYPE AND SIZE	Soil (S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No. of Containers	ADDITIONAL COMMENTS
01 A-C	9.11.07	0940	MW-9-091107	✓	✓	40 mL VOAS	O		–			3	

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME	
SIGNATURE: [signature] PRINTED NAME: R. DOVE COMPANY: GMX	9/11/07		SIGNATURE: [signature] PRINTED NAME: Nhan Phan COMPANY: FeBI	9/12/07	15:00pm	TOTAL NUMBER OF CONTAINERS: 3
SIGNATURE: PRINTED NAME: COMPANY:			SIGNATURE: PRINTED NAME: COMPANY:			SAMPLING COMMENTS: Samples received at 23 °C
SIGNATURE: PRINTED NAME: COMPANY:			SIGNATURE: PRINTED NAME: COMPANY:			

510 Superior Avenue, Suite 200
Newport Beach, California 92663-3627
Tel 949.642.0245 Fax 949.642.4474
Geomatrix

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Charlene Morrow, M.S.
Yelena Aravkina, M.S.
Bradley T. Benson, B.S.
Kurt Johnson, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
TEL: (206) 285-8282
FAX: (206) 283-5044
e-mail: fbi@isomedia.com

September 28, 2007

Shiow-Whei Chou, Project Manager
Geomatrix
510 Superior Avenue, Suite 200
Newport Beach, CA 92663

Dear Ms. Chou:

Included are the results from the testing of material submitted on September 12, 2007 from the DFSP Norwalk 1603.044.0, F&BI 709117 project. There are 6 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Kurt Johnson
Chemist

Enclosures
NAA0928R.DOC

Date of Report: 09/28/07
Date Received: 09/12/07
Project: DFSP Norwalk 1603.044.0, F&BI 709117
Date Analyzed: 9/17/07

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 709117-01
Client ID MW-9-091107

Compound	Weight Percent
Propane	<0.01
Methanol	<0.01
Isobutane	<0.01
2-Methyl-1-propene	<0.01
Ethanol	<0.01
n-Butane	<0.01
t-2-Butene	<0.01
c-2-Butene	<0.01
Isopropanol	<0.01
3-Methyl-1-butene	<0.01
Isopentane	<0.01
tert-Butanol	<0.01
1-Pentene	<0.01
2-Methyl-1-butene	<0.01
n-Propanol	<0.01
n-Pentane	<0.01
t-2-Pentene	<0.01
c-2-Pentene	<0.01
2-Methyl-2-butene	<0.01
MTBE	<0.01
sec-Butanol	<0.01
4-Methyl-1-pentene	<0.01
Isobutanol	<0.01
2,3-Dimethylbutane	<0.01
Cyclopentane	<0.01
2-Methylpentane	<0.01
DIPE	<0.01
3-Methylpentane	<0.01
1-Hexene	<0.01
ETBE	<0.01
n-Hexane	<0.01

Date of Report: 09/28/07
Date Received: 09/12/07
Project: DFSP Norwalk 1603.044.0, F&BI 709117
Date Analyzed: 9/17/07

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 709117-01
Client ID MW-9-091107

Compound	Weight Percent
t-2-Hexene	<0.01
2-Methyl-1-pentene	<0.01
2-Methyl-2-pentene	<0.01
c-2-Hexene	<0.01
2,2-Dimethylpentane	<0.01
2,4-Dimethylpentane	<0.01
Methylcyclopentane	<0.01
2,2,3-Trimethylbutane	<0.01
Benzene	<0.01
1-Methylcyclopentene	<0.01
TAME	<0.01
3,3-Dimethylpentane	<0.01
Cyclohexane	<0.01
2-Methylhexane	<0.01
2,3-Dimethylpentane	0.01
1,1-Dimethylcyclopentane	<0.01
3-Methylhexane	0.01
c-1,3-Dimethylcyclopentane	0.01
3-Ethylpentane	<0.01
Isooctane	<0.01
t-1,2-Dimethylcyclopentane	0.02
1-Heptene	<0.01
n-Heptane	<0.01
t-3-Heptene	<0.01
c-3-Heptene	<0.01
t-2-Heptene	<0.01
c-2-Heptene	<0.01
2,2-Dimethylhexane	<0.01
2,5-Dimethylhexane	0.01
Methylcyclohexane	0.08
2,4-Dimethylhexane	0.02
Ethylcyclopentane	0.01

Date of Report: 09/28/07
Date Received: 09/12/07
Project: DFSP Norwalk 1603.044.0, F&BI 709117
Date Analyzed: 9/17/07

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 709117-01
Client ID MW-9-091107

Compound	Weight Percent
t-1,c-2,4-Trimethylcyclopentane	0.05
t-1,c-2,3-Trimethylcyclopentane	0.07
2,3,4-Trimethylpentane	0.01
Toluene	<0.01
2,3-Dimethylhexane	0.03
2-Methylheptane	0.04
3-Methylheptane	0.02
4-Methylheptane	0.01
3-Ethylhexane	0.02
1-Octene	<0.01
1,2,3-Trimethylcyclopentane	0.04
t-1,2-Dimethylcyclohexane	0.24
n-Octane	<0.01
1-Ethyl-1-methylcyclopentane	0.02
c-2-Octene	<0.01
c-1,2-Dimethylcyclohexane	0.15
Isopropylcyclopentane	0.01
2,5-Dimethylheptane	0.07
3,5-Dimethylheptane	0.02
n-Propylcyclopentane	0.02
Ethylbenzene	<0.01
2,3-Dimethylheptane	0.11
3,4-Dimethylheptane	<0.01
2-Methyloctane	0.05
m-Xylene	<0.01
p-Xylene	0.02
3-Methyloctane	0.11
1-Nonene	<0.01
3,3-Diethylpentane	<0.01
t-3-Nonene	<0.01
c3-Nonene	<0.01
o-Xylene	<0.01

Date of Report: 09/28/07
Date Received: 09/12/07
Project: DFSP Norwalk 1603.044.0, F&BI 709117
Date Analyzed: 9/17/07

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 709117-01
Client ID MW-9-091107

Compound	Weight Percent
n-Nonane	<0.01
Isobutylcyclopentane	0.03
t-2-Nonene	<0.01
c-2-Nonene	<0.01
Isopropylbenzene	<0.01
3,3-Dimethyloctane	0.04
n-Butylcyclopentane	0.03
n-Propylbenzene	<0.01
2,3-Dimethyloctane	0.07
1-Methyl-3-ethylbenzene	<0.01
1-Methyl-4-ethylbenzene	<0.01
2-Methylnonane	0.06
3-Ethyloctane	0.12
3-Methylnonane	0.12
1,3,5-Trimethylbenzene	<0.01
1-Methyl-2-ethylbenzene	<0.01
1,2,4-Trimethylbenzene	0.03
tert-Butylbenzene	<0.01
n-Decane	<0.01
Isobutylbenzene	<0.01
Isopropylcyclohexane	<0.01
sec-Butylbenzene	<0.01
1-Methyl-3-isopropylbenzene	<0.01
Isobutylcyclohexane	<0.01
1-Methyl-4-isopropylbenzene	<0.01
1,2,3-Trimethylbenzene	<0.01
Indan	<0.01
1-Methyl-3-n-propylbenzene	0.02
1-Methyl-4-n-propylbenzene	0.02
n-Butylbenzene	<0.01
1,3-Dimethyl-5-ethylbenzene	<0.01
1,2-Diethylbenzene	<0.01

Date of Report: 09/28/07
Date Received: 09/12/07
Project: DFSP Norwalk 1603.044.0, F&BI 709117
Date Analyzed: 9/17/07

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 709117-01
Client ID MW-9-091107

Compound	Weight Percent
1-Methyl-2-n-propylbenzene	<0.01
1,4-Dimethyl-2-ethylbenzene	0.10
1,2-Dimethyl-4-ethylbenzene	0.14
1,3-Dimethyl-2-ethylbenzene	<0.01
1,2-Dimethyl-3-ethylbenzene	0.05
n-Undecane	<0.01
1,2,4,5-Tetramethylbenzene	0.14
2-Methylbutylbenzene	0.06
n-Pentylbenzene	<0.01
Methylindan	<0.01
1-tert-Butyl-3,5-dimethylbenzene	<0.01
1-tert-Butyl-4-ethylbenzene	<0.01
n-Dodecane	<0.01
1,3,5-Triethylbenzene	<0.01
1,2,4-Triethylbenzene	<0.01
Naphthalene	<0.01
n-Hexylbenzene	<0.01
2-Methylnaphthalene	0.10
n-Tridecane	<0.01
1-Methylnaphthalene	0.07
n-Tetradecane	<0.01
n-Pentadecane	<0.01

Date of Report: 09/28/07
Date Received: 09/12/07
Project: DFSP Norwalk 1603.044.0, F&BI 709117
Date Analyzed: 9/17/07

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 709117-01
Client ID MW-9-091107

PIANO SUMMARY	Weight Percent
Total Identified Compounds	2.52
Oxygenated Compounds	0.00
Hydrocarbon Compounds	2.52
Unidentified Compounds	97.48
Total	100

	Paraffins	Isoparaffins	Aromatics	Naphthenes	Olefins	Total
C3	<0.01					<0.01
C4	<0.01	<0.01			<0.01	<0.01
C5	<0.01	<0.01		<0.01	<0.01	<0.01
C6	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
C7	<0.01	0.02	<0.01	0.12	<0.01	0.14
C8	<0.01	0.16	0.02	0.60	<0.01	0.77
C9	<0.01	0.37	0.03	0.06	<0.01	0.47
C10	<0.01	0.42	0.48	<0.01		0.90
C11	<0.01		0.24			0.24
C12	<0.01		<0.01			<0.01
C13	<0.01					<0.01
C14	<0.01					<0.01
C15	<0.01					<0.01
Total	<0.01	0.97	0.77	0.78	<0.01	2.52

CHAIN-OF-CUSTODY RECORD 709117 MP 09-12-07 NEW 12029 AOZ

PROJECT NAME: DFSP NORWALK		DATE: 9.11.07	PAGE 1 OF 1
PROJECT NUMBER: 1603.044.0	LABORATORY NAME:	CLIENT INFORMATION:	REPORTING REQUIREMENTS:
RESULTS TO: Shiow-Whei Chou	LABORATORY ADDRESS:		
TURNAROUND TIME: 24 hr (GC/FID)			
SAMPLE SHIPMENT METHOD: Fedex	LABORATORY CONTACT:		GEOTRACKER REQUIRED YES NO
	LABORATORY PHONE NUMBER:		SITE SPECIFIC GLOBAL ID NO.

SAMPLERS (SIGNATURE): [signature]

ANALYSES

Lab ID	DATE	TIME	SAMPLE NUMBER	GC/FID	PIANO	CONTAINER TYPE AND SIZE	Soil (S), Water (W), Vapor (V), or Other (O)	Filtered	Preservative Type	Cooled	MS/MSD	No. of Containers	ADDITIONAL COMMENTS
01 A-C	9.11.07	0940	MW-9-091107	✓	✓	40 mL VOAs	O		—			3	

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE	TIME
SIGNATURE: [signature]	9/11/07		SIGNATURE: [signature]	9/12/07	15:00pm
PRINTED NAME: R. DOVE			PRINTED NAME: Nhan Phan		
COMPANY: Gmx			COMPANY: FeBI		
SIGNATURE:			SIGNATURE:		
PRINTED NAME:			PRINTED NAME:		
COMPANY:			COMPANY:		
SIGNATURE:			SIGNATURE:		
PRINTED NAME:			PRINTED NAME:		
			COMPANY:		

TOTAL NUMBER OF CONTAINERS: 3

SAMPLING COMMENTS:

Samples received at 23 °C

510 Superior Avenue, Suite 200
Newport Beach, California 92663-3627
Tel 949.642.0245 Fax 949.642.4474

Geomatrix

GMW-62

February 28, 2011; October 17, 2011; June 21, 2013 LNAPL Samples

Laboratory Reports

REPORT OF ANALYTICAL RESULTS

ZymaX FORENSICS

Client:	Mary Lucas Parsons 100 W Walnut Street Pasadena, CA. 91124	Lab Number:	42148-1
		Collected:	2/28/2011
		Received:	3/2/2011
		Matrix:	Product

Project:	GMW-62FP	Sample Description: GMW-62FP	
Project Number:	747577	Analyzed:	3/21/2011
Collected by:	C. Zicker	Method:	EPA 1624 GC/MS SIM

CONSTITUENT	PQL* mg/Kg	RESULT** mg/Kg
t-Amyl Methyl Ether (TAME)	100	ND
t-Butyl Alcohol (TBA)	10	ND
Diisopropyl Ether (DIPE)	100	ND
Ethanol	10	ND
Ethyl-t-Butyl Ether (ETBE)	50	ND
Methyl-t-Butyl Ether (MTBE)	50	ND
Percent Surrogate Recovery (MTBE-d3)		107

*PQL - Practical Quantitation Limit
**Results listed as ND would have been reported if present at or above the listed PQL.
J:Below PQL

Submitted by,
Zymax Forensics, a DPRA Company

Shan-Tan Lu, Ph.D.
Director, Forensic Geochemistry

MSD #9
42148-1.OXY.xls
STL

REPORT OF ANALYTICAL RESULTS

ZymaX FORENSICS

Client:	Mary Lucas Parsons 100 W Walnut Street Pasadena, CA. 91124
Lab Number:	42148
Collected:	2/28/2011
Received:	3/2/2011
Matrix:	Product
Project:	GMW-62FP
Project Number:	747577
Collected by:	C. Zicker
Sample Description:	See Below
Analyzed:	3/22/2011
Method:	GC/ECD

EDB and ORGANIC LEAD SPECIATION

LAB NUMBER	SAMPLE DESCRIPTION	EDB mg/L	TML mg/L	TMEL mg/L	DMDEL mg/L	MTEL mg/L	TEL mg/L	MMT mg/L
42148-1	GMW-62FP	<0.5	<5	<5	<5	<5	<5	<5
Detection Limit:		0.5	5.0	5.0	5.0	5.0	5.0	5.0
Method Blank:		<0.5	<5	<5	<5	<5	<5	<5

EDB: Ethylene Dibromide
TML: Tetramethyl Lead
TMEL: Trimethylethyl Lead
DMDEL: Dimethyldiethyl Lead
MTEL: Methyltriethyl Lead
TEL: Tetraethyl Lead
MMT: Methylcyclopentadienyl Manganese Tricarbonyl

Submitted by,
Zymax Forensics, A DPRA Company

Shan-Tan Lu, Ph.D.
Director of Forensic Geochemistry

42148e.xls
STL

ZymaX FORENSICS

QUALITY ASSURANCE REPORT

Client:	
	Parsons 100 W Walnut Street Pasadena, CA. 91124

Lab Number:	42148
Analyzed:	3/22/2011
Method:	GC/ECD

QA DATA FOR EDB and TEL

ANALYTES	RF	RF_D	%D	ACCEPTANCE LIMIT %
EDB	0.684	0.68	0.50	± 15
TEL	0.038	0.033	13.50	± 15

EDB: Ethylene Dibromide
TEL: Tetraethyl Lead
RF = Mean response factor from 3 point calibration
RF_D= Daily calibration standard response factor
% D = % Difference
Calibration file: ORG07168.M / MMT07168.M

42148e.xls
STL

Submitted by,
Zymax Forensics, a DPRA Company

Shan-Tan Lu, Ph.D.
Director of Forensic Geochemistry

Calscience Environmental Laboratories, Inc.

☐ SoCal Laboratory
7440 Lincoln Way
Garden Grove, CA 92841-1427
(714) 895-5494

☐ NorCal Service Center
5063 Commercial Circle, Suite H
Concord, CA 94520-8577
(925) 689-9022

CHAIN OF CUSTODY RECORD

Date 2/28/2011

Page 1 of 1

LABORATORY CLIENT: Parsons

ADDRESS: 100 W. Walnut St.

CITY: Pasadena STATE: CA ZIP: 91124

TEL: 626-440-6032 E-MAIL: mary.lucas@parsons.com

TURNAROUND TIME: ☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☑ STANDARD

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY): ☐ RWQCB REPORTING FORMS ☐ COELT EDF ☐

SPECIAL INSTRUCTIONS: ✓ 3/17 AJ

CLIENT PROJECT NAME / NUMBER: DFSP Norwalk

P.O. NO.: 747577

PROJECT CONTACT: 747577

LAB USE ONLY: ☐☐-☐☐☐☐

SAMPLER(S): (PRINT) C. Zicker

COELT LOG CODE: ☐☐☐☐

COOLER RECEIPT TEMP= °C

LAB USE ONLY	SAMPLE ID	FIELD POINT NAME (FOR COELT EDF)	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH (g)	TPH (d) or (C6-C36) or (C6-C44)	TPH (___)	BTEX / MTBE (8260B) or (___)	VOCs (8260B)	Oxygenates (8260B)	Encore Prep (5035)	SVOCs (8270C)	Pesticides (8081A)	PCBs (8082)	PNAs (8310) or (8270C)	T22 Metals (6010B/747X)	Cr(VI) [7196A or 7199 or 218.6]	VOCs (TO-14A) or (TO-15)	TPH (g) [TO-3]+	C3-C44 GC/FID	6 Fuel Oxys	EDB MMT Pb
42148-1	GMW-62 FP		2/28/2011	13:34	OT	2																X	✓	✓

Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
[signature]	Ryan Woon 3/3/11 11:30 am	3/2/2011	10:15
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies respectively.

05/01/07 Revision

Q&Q Graphic 714-898-9702

ZymaX FORENSICS

3/7/2011

ZymaX ID	42148-1
Sample ID	GMW-62FP
Evaporation	
n-Pentane / n-Heptane	0.12
2-Methylpentane / 2-Methylheptane	0.46
Waterwashing	
Benzene / Cyclohexane	0.00
Toluene / Methylcyclohexane	0.01
Aromatics / Total Paraffins (n+iso+cyc)	0.37
Aromatics / Naphthenes	1.33
Biodegradation	
(C4 - C8 Para + Isopara) / C4 - C8 Olefins	199.47
3-Methylhexane / n-Heptane	0.51
Methylcyclohexane / n-Heptane	1.77
Isoparaffins + Naphthenes / Paraffins	2.16
Octane rating	
2,2,4,-Trimethylpentane / Methylcyclohexane	0.02
Relative percentages - Bulk hydrocarbon composition as PIANO	
% Paraffinic	22.95
% Isoparaffinic	29.21
% Aromatic	26.89
% Naphthenic	20.28
% Olefinic	0.66

Submitted by,
Zymax Forensics, a DPRA Company

Shan-Tan Lu, Ph.D.
Director of Forensic Geochemistry

ZymaX FORENSICS

3/7/2011

ZymaX ID		42148-1
Sample ID		GMW-62FP
		Relative Area %
1	Propane	0.00
2	Isobutane	0.03
3	Isobutene	0.00
4	Butane/Methanol	0.10
5	trans-2-Butene	0.00
6	cis-2-Butene	0.00
7	3-Methyl-1-butene	0.00
8	Isopentane	0.62
9	1-Pentene	0.00
10	2-Methyl-1-butene	0.00
11	Pentane	0.47
12	trans-2-Pentene	0.00
13	cis-2-Pentene/t-Butanol	0.00
14	2-Methyl-2-butene	0.00
15	2,2-Dimethylbutane	0.10
16	Cyclopentane	0.00
17	2,3-Dimethylbutane/MTBE	0.30
18	2-Methylpentane	1.39
19	3-Methylpentane	1.14
20	Hexane	1.52
21	trans-2-Hexene	0.00
22	3-Methylcyclopentene	0.00
23	3-Methyl-2-pentene	0.00
24	cis-2-Hexene	0.00
25	3-Methyl-trans-2-pentene	0.11
26	Methylcyclopentane	1.56
27	2,4-Dimethylpentane	0.24
28	Benzene	0.00
29	5-Methyl-1-hexene	0.09
30	Cyclohexane	1.21
31	2-Methylhexane/TAME	1.37
32	2,3-Dimethylpentane	0.77
33	3-Methylhexane	1.90
34A	1-trans-3-Dimethylcyclopentane	1.03
34B	1-cis-3-Dimethylcyclopentane	1.58
35	2,2,4-Trimethylpentane	0.11
I.S. #1	à,à,à-Trifluorotoluene	0.00

ZymaX FORENSICS

3/7/2011

ZymaX ID		42148-1
Sample ID		GMW-62FP
		Relative Area %
36	n-Heptane	3.74
37	Methylcyclohexane	6.65
38	2,5-Dimethylhexane	0.34
39	2,4-Dimethylhexane	0.48
40	2,3,4-Trimethylpentane	0.15
41	Toluene/2,3,3-Trimethylpentane	0.08
42	2,3-Dimethylhexane	0.93
43	2-Methylheptane	3.03
44	4-Methylheptane	0.88
45	3,4-Dimethylhexane	0.24
46A	3-Ethyl-3-methylpentane	1.70
46B	1,4-Dimethylcyclohexane	3.76
47	3-Methylheptane	0.05
48	2,2,5-Trimethylhexane	1.08
49	n-Octane	5.93
50	2,2-Dimethylheptane	0.07
51	2,4-Dimethylheptane	0.59
52	Ethylcyclohexane	4.49
53	2,6-Dimethylheptane	2.90
54	Ethylbenzene	1.87
55	m+p Xylenes	3.38
56	4-Methyloctane	1.09
57	2-Methyloctane	1.21
58	3-Ethylheptane	0.30
59	3-Methyloctane	2.08
60	o-Xylene	1.32
61	1-Nonene	0.46
62	n-Nonane	5.97
I.S.#2	p-Bromofluorobenzene	0.00
63	Isopropylbenzene	0.37
64	3,3,5-Trimethylheptane	0.46
65	2,4,5-Trimethylheptane	1.69
66	n-Propylbenzene	1.00
67	1-Methyl-3-ethylbenzene	1.09
68	1-Methyl-4-ethylbenzene	1.02
69	1,3,5-Trimethylbenzene	2.32
70	3,3,4-Trimethylheptane	1.83

ZymaX FORENSICS

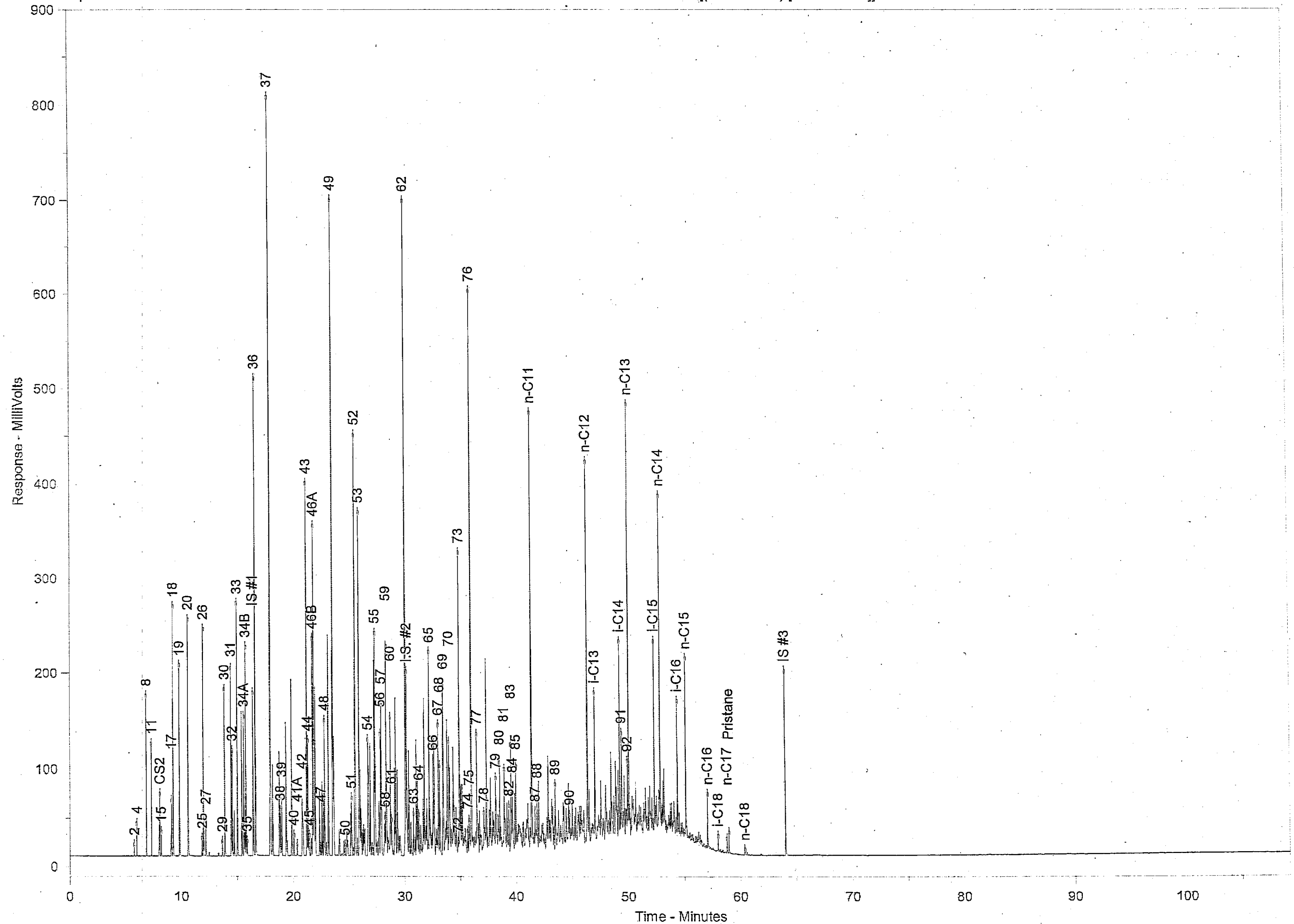
3/7/2011

ZymaX ID		42148-1
Sample ID		GMW-62FP
		Relative Area %
71	1-Methyl-2-ethylbenzene	0.00
72	3-Methylnonane	0.14
73	1,2,4-Trimethylbenzene	2.64
74	Isobutylbenzene	0.24
75	sec-Butylbenzene	0.52
76	n-Decane	5.21
77	1,2,3-Trimethylbenzene	1.38
78	Indan	0.36
79	1,3-Diethylbenzene	1.03
80	1,4-Diethylbenzene	0.58
81	n-Butylbenzene	0.91
82	1,3-Dimethyl-5-ethylbenzene	0.44
83	1,4-Dimethyl-2-ethylbenzene	1.16
84	1,3-Dimethyl-4-ethylbenzene	0.77
85	1,2-Dimethyl-4-ethylbenzene	0.63
86	Undecene	0.00
87	1,2,4,5-Tetramethylbenzene	0.35
88	1,2,3,5-Tetramethylbenzene	0.53
89	1,2,3,4-Tetramethylbenzene	0.79
90	Naphthalene	0.36
91	2-Methyl-naphthalene	1.10
92	1-Methyl-naphthalene	0.68

Chrom Perfect Chromatogram Report

— C:\CPSpirit\2011\Mar11\030711\030711.0011.RAW

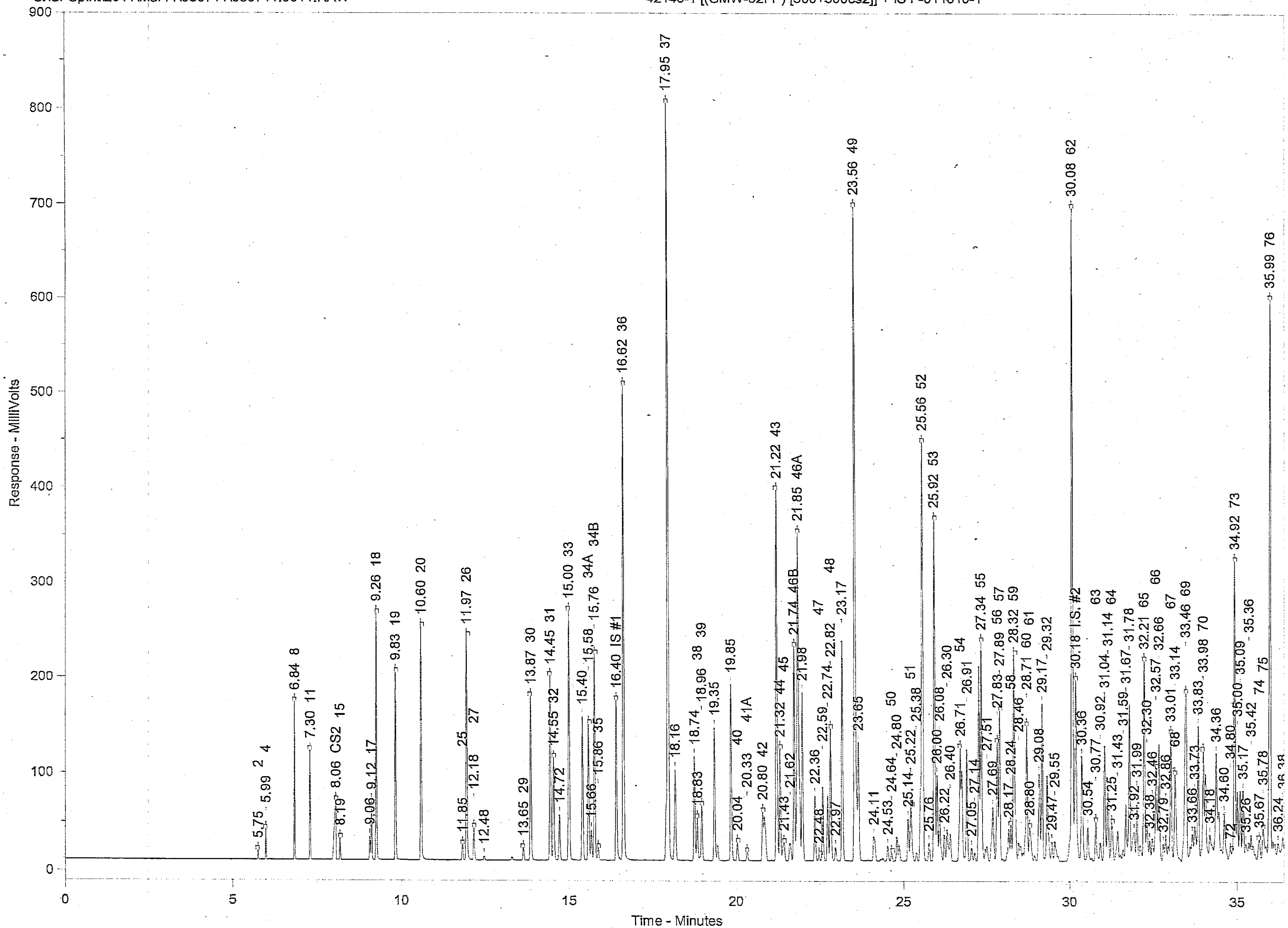
42148-1 [(GMW-62FP) [500+500cs2]] + IS F-011810-1



Chrom Perfect Chromatogram Report

— C:\CPSpirit\2011\Mar11\030711\030711.0011.RAW

42148-1 [(GMW-62FP) [500+500cs2]] + IS F-011810-1



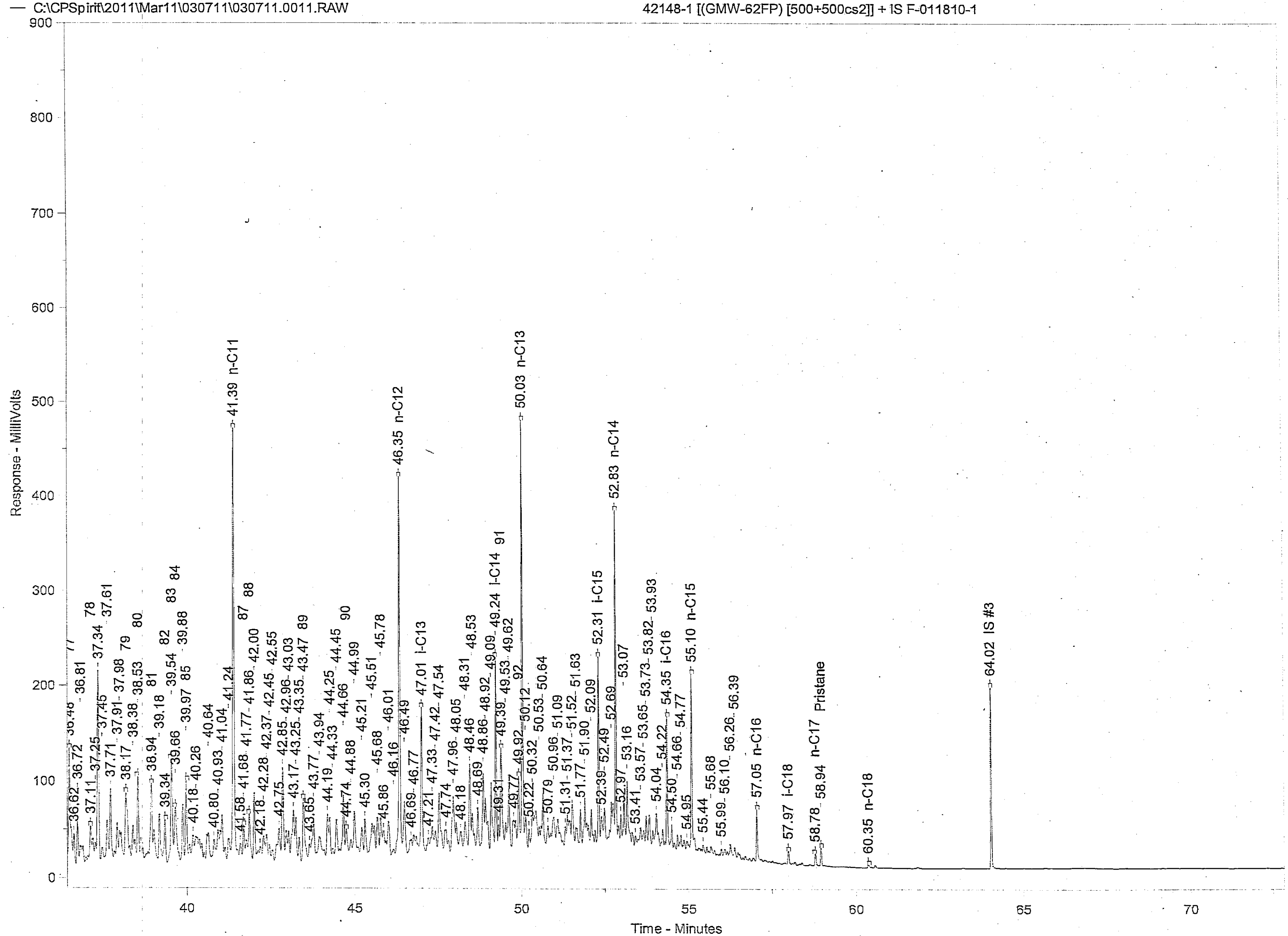
Printed on 3/16/2011 5:22:47 PM

ZymaX FORENSICS

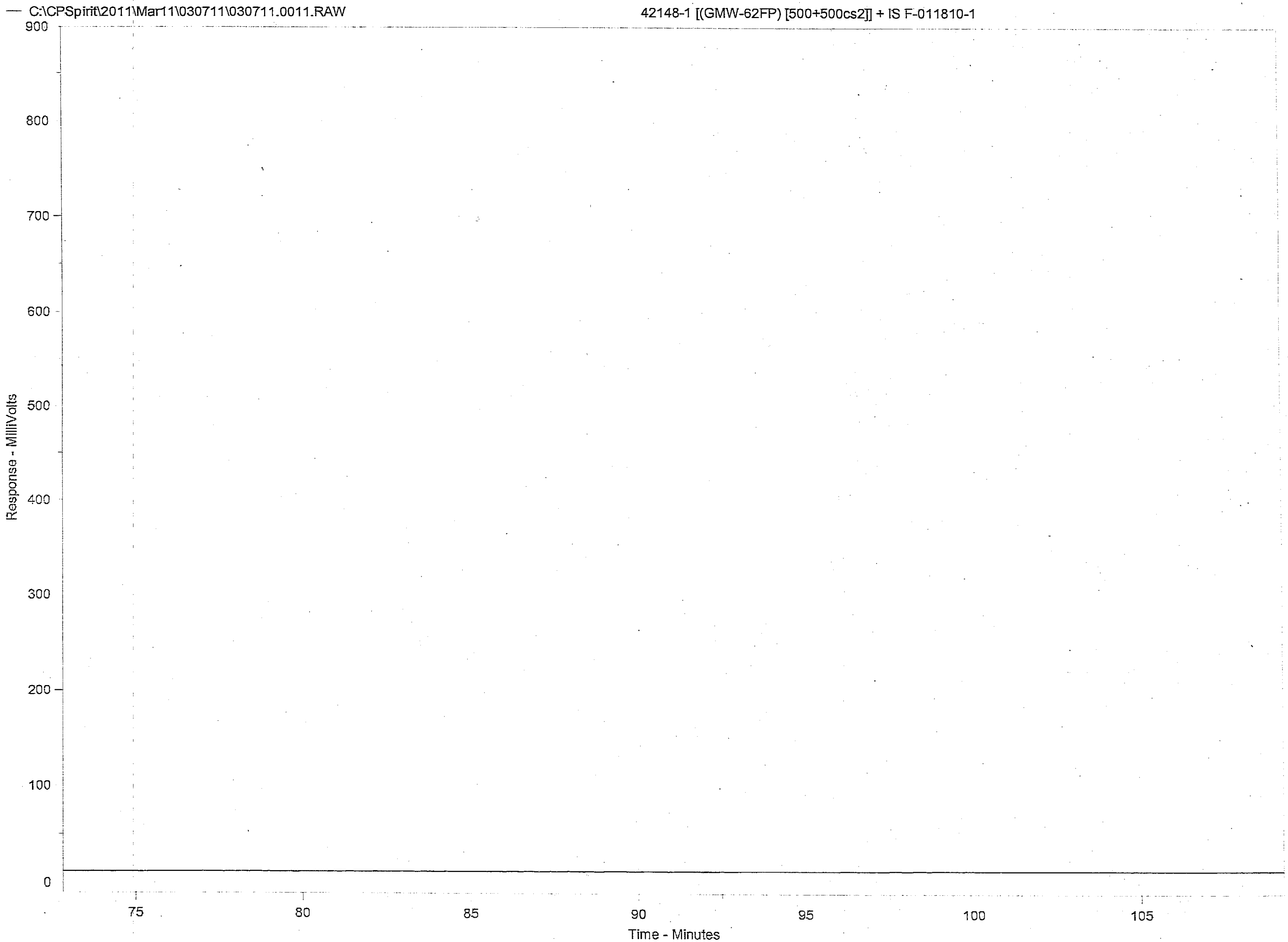
Chrom Perfect Chromatogram Report

— C:\CPSpirit\2011\Mar11\030711\030711.0011.RAW

42148-1 [(GMW-62FP) [500+500cs2]] + IS F-011810-1



Chrom Perfect Chromatogram Report



Sample Name = **42148-1 [(GMW-62FP) [500+500cs2]] + IS F-011810-1**

Instrument = Instrument 1
Heading 1 =
Heading 2 =

Acquisition Port = DP#

Raw File Name = **C:\CPSpirit\2011\Mar11\030711\030711.0011.RAW**
Method File Name = C:\CPSpirit\C344.met
Calibration File Name = C:\CPSpirit\041610.cal

Date Taken (end) = 3/11/2011 12:21:11 AM
Method Version = 44
Calibration Version = 12

Peak Name	Ret. Time	Area %	Area
2	5.75	0.0143	9871.49
4	5.99	0.0502	34725.88
8	6.84	0.3053	211187.40
11	7.30	0.2287	158196.10
CS2	8.06	0.3200	221381.10
15	8.19	0.0496	34331.45
	9.06	0.0599	41464.37
17	9.12	0.1452	100460.80
18	9.26	0.6798	470302.00
19	9.83	0.5585	386427.90
20	10.60	0.7420	513330.00
25	11.85	0.0541	37418.82
26	11.97	0.7640	528599.10
27	12.18	0.1162	80398.93
	12.48	0.0147	10201.64
29	13.65	0.0463	32066.72
30	13.87	0.5909	408811.00
31	14.45	0.6691	462884.80
32	14.55	0.3785	261898.10
	14.72	0.1684	116476.50
33	15.00	0.9265	641002.30
	15.40	0.5287	365810.50
34A	15.58	0.5020	347326.90
	15.66	0.1122	77638.10
34B	15.76	0.7744	535750.20
35	15.86	0.0532	36812.54
IS #1	16.40	0.6255	432719.10
36	16.62	1.8309	1266678.00
37	17.95	3.2491	2247888.00
	18.16	0.3944	272879.20
	18.74	0.4044	279810.60
38	18.83	0.1679	116126.50
39	18.96	0.2325	160851.20
	19.35	0.5028	347857.80
	19.85	0.6924	479039.80
40	20.04	0.0739	51159.79
41A	20.33	0.0392	27089.61
42	20.80	0.4541	314158.50
43	21.22	1.4830	1026010.00
44	21.32	0.4300	297496.70
45	21.43	0.1179	81578.56
	21.62	0.1080	74745.36
46B	21.74	0.8333	576513.60
46A	21.85	1.8390	1272281.00
	21.98	0.6311	436620.30
	22.36	0.2597	179687.00
47	22.48	0.0237	16421.60
	22.59	0.2892	200114.40
	22.74	0.2568	177641.50
48	22.82	0.5267	364366.90
	22.97	0.0557	38526.20
	23.17	0.8864	613277.90
49	23.56	2.9006	2006755.00
	23.65	0.5111	353589.00
	24.11	0.1513	104690.60

Peak Name	Ret. Time	Area %	Area
	24.53	0.0595	41145.51
50	24.64	0.0342	23643.17
	24.80	0.0695	48100.03
	25.14	0.1710	118309.10
51	25.22	0.2899	200585.80
	25.38	0.0332	22948.51
52	25.56	2.1967	1519808.00
	25.76	0.0774	53515.10
53	25.92	1.4163	979865.20
	26.00	0.3520	243501.40
	26.08	0.2323	160732.00
	26.22	0.1058	73172.32
	26.30	0.1717	118762.50
	26.40	0.1167	80761.15
54	26.71	0.9123	631182.10
	26.91	0.4621	319668.70
	27.05	0.0650	44976.11
	27.14	0.0326	22521.31
55	27.34	1.6517	1142748.00
	27.51	0.0830	57422.07
	27.69	0.3342	231193.00
56	27.83	0.5348	370012.00
57	27.89	0.5898	408058.80
	28.17	0.1745	120748.60
58	28.24	0.1449	100260.30
59	28.32	1.0145	701857.90
	28.46	0.1537	106314.90
60	28.71	0.6450	446260.80
61	28.80	0.2242	155124.30
	29.08	0.4332	299717.50
	29.17	0.6597	456388.90
	29.32	0.4472	309419.80
	29.47	0.0856	59237.76
	29.55	0.1414	97832.09
62	30.08	2.9185	2019174.00
I.S. #2	30.18	0.9529	659232.70
	30.36	0.5280	365268.60
	30.54	0.1574	108925.50
63	30.77	0.1817	125706.20
	30.92	0.0881	60922.37
	31.04	0.5152	356451.20
	31.14	0.3345	231435.40
64	31.25	0.2256	156092.70
	31.43	0.2029	140358.40
	31.59	0.0579	40056.39
	31.67	0.2430	168124.20
	31.78	0.6740	466281.80
	31.92	0.2287	158202.70
	31.99	0.2450	169515.40
65	32.21	0.8282	572962.60
	32.30	0.1935	133877.20
	32.38	0.0882	60990.66
	32.46	0.1108	76644.84
66	32.57	0.4896	338709.60
	32.66	0.5753	398019.20
	32.79	0.0736	50888.14
	32.86	0.1190	82300.66
67	33.01	0.5338	369279.40
68	33.14	0.5007	346386.80
69	33.46	1.1334	784148.50
	33.66	0.2106	145681.40
	33.73	0.2001	138435.30
	33.83	0.5648	390724.60
70	33.98	0.8964	620167.40
	34.18	0.2293	158662.40
	34.36	0.8386	580165.20
	34.60	0.2678	185298.20

Peak Name	Ret. Time	Area %	Area
72	34.80	0.0680	47069.56
73	34.92	1.2883	891294.50
	35.00	0.2798	193569.60
	35.09	0.3169	219262.00
	35.17	0.3141	217291.70
	35.26	0.0893	61763.57
	35.36	0.0886	61270.69
	35.42	0.1914	132413.90
74	35.67	0.1168	80811.06
75	35.78	0.2543	175902.50
76	35.99	2.5496	1763923.00
	36.24	0.1180	81635.68
	36.38	0.1430	98943.30
77	36.48	0.6728	465455.90
	36.62	0.1284	88803.17
	36.72	0.1771	122552.10
	36.81	0.1816	125634.90
78	37.11	0.1746	120795.40
	37.25	0.0796	55098.56
	37.34	0.8538	590684.10
	37.45	0.0693	47935.06
	37.61	0.2133	147604.70
	37.71	0.3172	219475.50
	37.91	0.1526	105606.50
	37.98	0.2204	152486.00
79	38.17	0.5029	347945.30
	38.38	0.1792	124003.00
80	38.53	0.2844	196729.10
81	38.94	0.4431	306567.50
	39.18	0.2365	163592.40
82	39.34	0.2146	148465.10
83	39.54	0.5653	391099.50
84	39.66	0.3780	261549.00
	39.88	0.2189	151475.70
85	39.97	0.3065	212079.60
	40.18	0.0702	48541.53
	40.26	0.0666	46044.04
	40.64	0.2088	144448.00
	40.80	0.1274	88156.44
	40.93	0.1675	115897.20
	41.04	0.2109	145921.80
	41.24	0.1384	95776.03
n-C11	41.39	2.0345	1407568.00
	41.58	0.0901	62332.68
87	41.68	0.1688	116808.60
	41.77	0.1064	73588.70
88	41.86	0.2567	177631.50
	42.00	0.3003	207727.40
	42.18	0.0807	55841.32
	42.28	0.1610	111369.20
	42.37	0.1218	84290.90
	42.45	0.0755	52201.85
	42.55	0.0505	34967.48
	42.75	0.2809	194348.60
	42.85	0.4760	329298.10
	42.96	0.1549	107201.30
	43.03	0.1360	94108.63
	43.17	0.3825	264623.90
	43.25	0.1941	134312.60
	43.35	0.1051	72707.80
89	43.47	0.3886	268834.90
	43.65	0.0866	59944.33
	43.77	0.2963	204984.00
	43.94	0.3124	216109.20
	44.19	0.2342	162043.80
	44.25	0.1805	124855.60
	44.33	0.0532	36787.27

Peak Name	Ret. Time	Area %	Area
	44.45	0.2324	160766.90
	44.66	0.3515	243157.90
90	44.74	0.1759	121673.40
	44.88	0.1165	80575.97
	44.99	0.3533	244452.30
	45.21	0.1903	131630.20
	45.30	0.2021	139826.30
	45.51	0.2588	179049.70
	45.68	0.2217	153390.60
	45.78	0.2186	151229.30
	45.86	0.2009	139021.50
	46.01	0.2125	146983.50
	46.16	0.0354	24491.40
n-C12	46.35	1.6855	1166098.00
	46.49	0.3004	207842.80
	46.69	0.0527	36442.09
	46.77	0.0355	24536.62
i-C13	47.01	0.6076	420398.50
	47.21	0.0698	48323.38
	47.33	0.1418	98137.59
	47.42	0.0949	65673.34
	47.54	0.3375	233496.70
	47.74	0.1072	74195.03
	47.96	0.4071	281654.00
	48.05	0.1269	87762.02
	48.18	0.1516	104911.90
	48.31	0.1986	137417.90
	48.46	0.4211	291320.30
	48.53	0.2179	150744.90
	48.69	0.2004	138665.50
	48.86	0.4048	280079.60
	48.92	0.3382	233979.00
	49.09	0.3563	246526.60
i-C14	49.24	0.6893	476862.90
	49.31	0.0943	65265.00
91	49.39	0.5386	372628.80
	49.53	0.1749	120990.90
	49.62	0.2617	181058.10
	49.77	0.2862	197977.10
92	49.92	0.3303	228544.60
n-C13	50.03	1.4801	1024013.00
	50.12	0.1518	105048.80
	50.22	0.0489	33832.88
	50.32	0.0619	42843.77
	50.53	0.0304	21047.44
	50.64	0.1695	117244.20
	50.79	0.1005	69530.37
	50.96	0.1874	129655.00
	51.09	0.1831	126681.10
	51.31	0.0749	51801.85
	51.37	0.2597	179648.70
	51.52	0.2312	159965.20
	51.63	0.1159	80169.40
	51.77	0.1336	92414.60
	51.90	0.3929	271806.70
	52.09	0.1768	122295.40
i-C15	52.31	0.6158	426035.30
	52.39	0.1696	117339.40
	52.49	0.1828	126447.40
	52.69	0.4643	321213.70
n-C14	52.83	1.0357	716545.00
	52.97	0.1242	85926.50
	53.07	0.2493	172455.40
	53.16	0.3442	238140.80
	53.41	0.0506	35014.39
	53.57	0.1247	86244.59
	53.65	0.0866	59917.19

Peak Name	Ret. Time	Area %	Area
	53.73	0.1225	84753.62
	53.82	0.1548	107124.90
	53.93	0.0691	47805.71
	54.04	0.2249	155584.00
	54.22	0.0940	65031.77
i-C16	54.35	0.4467	309048.40
	54.50	0.0871	60281.70
	54.66	0.0582	40271.01
	54.77	0.0328	22707.27
	54.95	0.0355	24589.71
n-C15	55.10	0.4811	332867.50
	55.44	0.0255	17664.23
	55.68	0.0277	19161.99
	55.99	0.0224	15501.02
	56.10	0.0328	22709.17
	56.26	0.0601	41595.72
	56.39	0.0407	28148.57
n-C16	57.05	0.1806	124948.60
i-C18	57.97	0.0467	32276.44
n-C17	58.78	0.0506	34984.67
Pristane	58.94	0.0706	48861.33
n-C18	60.35	0.0172	11929.58
IS #3	64.02	0.5196	359471.20

Total Area = 6.918469E+07 Total Height = 2.252049E+07 Total Amount = 1

Calscience Environmental Laboratories, Inc.

☐ SoCal Laboratory
7440 Lincoln Way
Garden Grove, CA 92841-1427
(714) 895-5494

☐ NorCal Service Center
5063 Commercial Circle, Suite H
Concord, CA 94520-8577
(925) 689-9022

CHAIN OF CUSTODY RECORD

Date 2/28/2011

Page 1 of 1

LABORATORY CLIENT: Parsons

ADDRESS: 100 W. Walnut St.

CITY Pasadena STATE CA ZIP 91124

TEL: 626-440-6032 E-MAIL: mary.lucas@parsons.com

TURNAROUND TIME: ☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☑ STANDARD

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
☐ RWQCB REPORTING FORMS ☐ COELT EDF ☐ ____

SPECIAL INSTRUCTIONS:

CLIENT PROJECT NAME / NUMBER: DFSP Norwalk

P.O. NO.: 747577

PROJECT CONTACT: 747577

LAB USE ONLY ☐☐-☐☐☐☐

SAMPLER(S): (PRINT) C. Zicker

COELT LOG CODE ☐☐☐☐

COOLER RECEIPT TEMP= ____ °C

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	FIELD POINT NAME (FOR COELT EDF)	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH (g)	TPH (d) or (C6-C36) or (C6-C44)	TPH (____)	BTEX / MTBE (8260B) or (____)	VOCs (8260B)	Oxygenates (8260B)	Encore Prep (5035)	SVOCs (8270C)	Pesticides (8081A)	PCBs (8082)	PNAs (8310) or (8270C)	T22 Metals (6010B/747X)	Cr(VI) [7196A or 7199 or 218.6]	VOCs (TO-14A) or (TO-15)	TPH (g) [TO-3]+ ____	C3-C44 GC/FID		
42148-1	GMW-62 FP		2/28/2011	13:34	OT	2																X		

Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
[signature]	Ryan Woon 3/3/11 11:30 am	3/2/2011	10:15
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies respectively.

05/01/07 Revision

Q&Q Graphic 714-898-9702

Calscience Environmental Laboratories, Inc.

CALSCIENCE

WORK ORDER NUMBER: 11-10-1170

The difference is service

AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Parsons, Inc.

Client Project Name: DFSP - Norwalk

Attention: Mary Lucas
100 West Walnut Street
Pasadena, CA 91124-0002

Approved for release on 11/1/2011 by:
Ranjit Clarke
Project Manager

ResultLink ▸

Email your PM ▸

ACCREDITED IN ACCORDANCE WITH nelac

Calscience Environmental Laboratories certifies that the test results provided in this report meet all NELAC requirements for parameters for which accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The original report of subcontracted analyses, if any, is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety. Note that the Chain-of-Custody Record and Sample Receipt Form are integral parts of this report.

Calscience Environmental Laboratories, Inc.

Contents

Client Project Name: DFSP - Norwalk
Work Order Number: 11-10-1170

Calscience Environmental Laboratories, Inc.

Subcontractor Analysis Report

Work Order # 11-10-1170

One or more samples in this Work Order have tests that were subcontracted. The subcontract report(s) follows.

For subcontracted tests, please reference the laboratory information noted below.

1 Core Laboratories - Bakersfield,CA ISO 9001:2000, CERT-0014993, ELAP CA # 1247

Geotechnical Testing

Return to Contents

Petroleum Services Division
3437 Landco Dr.
Bakersfield, California 93308
Tel: 661-325-5657
Fax: 661-325-5808
www.corelab.com

November 1, 2011

Ranjit Clarke
Calscience Environmental Laboratories, Inc.
7440 Lincoln Way
Garden Grove, CA 92641-1432

Re: Physical Properties Analyses
Project: 11-09-1342
CL File No: 411068EN

Dear Ms. Gonsman:

Results of the viscosity and density determinations performed upon samples submitted from your Project # 11-10-1170 accompany this cover. This electronic version of the report will constitute the final report unless otherwise instructed.

Appropriate ASTM, EPA or API methodologies were used for this project and SOP's are available on request. The samples for this project are currently in storage and will be retained for thirty days past completion of testing at no charge. At the end of thirty days the sample will be disposed. You may contact me regarding continued storage, disposal or return of the sample.

We appreciate the opportunity to be of service to Calscience Environmental Laboratories, Inc. and trust these data will prove beneficial in the development of this project. Please do not hesitate to contact us (661-325-5657) if you have any questions regarding these results, or if we can be of any additional service.

Sincerely,
Core Laboratories

Jeffry L. Smith
ARP Supervisor

Return to Contents

Core Lab
RESERVOIR OPTIMIZATION

VISCOSITY and DENSITY DATA

(METHODOLOGY: ASTM D445, ASTM D1481, API RP40)

PETROLEUM SERVICES

Calscience Environmental Laboratories, Inc

Core Lab File No: 411072EN

Lab Sample No.	Well or Sample ID	Matrix	Sample Source	Sample Date	Analysis Date	Temperature °F	Density g/cc	Viscosity centistokes	Viscosity centipoise
411072-1	11-10-1170	NAPL	N/A	10/17/11	10/26/11	80	0.7783	1.1240	0.8755
						100	0.7705	1.0546	0.8125
						120	0.7627	0.9294	0.7088

Return to Contents

Calscience Environmental Laboratories, Inc.

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1427
TEL: (714) 895-5494 . FAX: (714) 894-7501

TO: Core Labs

CHAIN OF CUSTODY RECORD

DATE: 10/17/11
PAGE: 1 OF 1

LABORATORY CLIENT: Calscience Environmental Laboratories, Inc.	CLIENT PROJECT NAME / NUMBER: 11-10-1170
ADDRESS: 7440 Lincoln Way	P.O. NO.:
CITY: Garden Grove, CA 92841-1427	PROJECT CONTACT: Ranjit Clarke
TEL: (714) 895-5494	QUOTE NO.:
E-MAIL: rclarke@calscience.com	SAMPLER(S): (PRINT)
	LAB USE ONLY: 411072

TURNAROUND TIME: ☐ SAME DAY ☐ 24 HR ☐ 48HR ☐ 72 HR ☐ 5 DAYS ☒ Normal

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY): ☐ RWQCB REPORTING ☐ ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS:

Viscosity: mulit-point analysis (3 temperatures).

80, 100 & 120 per R. Clarke 10/18/11 JZ

REQUESTED ANALYSIS

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	Matrix	#Cont	Density (ASTM D1481)	Viscosity (ASTM D445)
	GMW-62	10/17/11	10:45	L	2	X	X

Relinquished by: (Signature)	Received by / Affiliation: (Signature)	Date:	Time:
[signature] (CALSCIENCE)	GSO # 517633334	10/17/11	1500
Relinquished by: (Signature)	Received by / Affiliation: (Signature) Jeff Smith / Core Lab / [signature]	Date: 10/18/11	Time: 11:00
Relinquished by: (Signature)	Received by / Affiliation: (Signature)	Date:	Time:

Return to Contents

Calscience Environmental Laboratories, Inc.

CHAIN OF CUSTODY RECORD

☐ SoCal Laboratory
7440 Lincoln Way
Garden Grove, CA 92841-1427
(714) 895-5494

☐ NorCal Service Center
5063 Commercial Circle, Suite H
Concord, CA 94520-8577
(925) 689-9022

WO # / LAB USE ONLY: 11-10-1170

Date 10-17-11

Page 1 of 1

LABORATORY CLIENT: Parsons	CLIENT PROJECT NAME / NUMBER: DFSP-Norwalk
ADDRESS: 100 W. Walnut St	P.O. NO.: 747577
CITY: Pasadena STATE: CA ZIP:	PROJECT CONTACT: Mary Lucas
TEL: 626-440-6032 E-MAIL: mary.lucas@parsons.com	SAMPLER(S): (PRINT) Glenn Androsko

TURNAROUND TIME: ☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☒ STANDARD

☐ COELT EDF | GLOBAL ID | LOG CODE

SPECIAL INSTRUCTIONS:

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	TPH (g) or GRO	TPH (d) or DRO or (C6-C36) or (C6-C44)	TPH ( )	BTEX / MTBE (8260) or ( )	VOCs (8260)	Oxygenates (8260)	En Core / Terra Core Prep (5035)	SVOCs (8270)	Pesticides (8081)	PCBs (8082)	PNAs (8310) or (8270)	T22 Metals (6010/747X)	Cr(VI) [7196 or 7199 or 218.6]	Air - VOCs (TO-14A) or (TO-15)	Air - TPH (g) [TO-3]	Density ASTM D1481	Viscosity ASTM D445	
1	GMW-62	10-17-11	1045	oil	2	X																		X	X	

Relinquished by: (Signature) Glenn Androsko	Received by: (Signature/Affiliation) [signature]	Date: 10-17-11	Time: 11:16
Relinquished by: (Signature) [signature]	Received by: (Signature/Affiliation) [signature]	Date: 10/17/11	Time: 1217
Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies respectively.

06/01/10 Revision

Return to Contents

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 11-10-1170

SAMPLE RECEIPT FORM

Cooler 1 **of** 1

CLIENT: PARSON **DATE:** 10/17/11

TEMPERATURE: Thermometer ID: SC1 (Criteria: 0.0 °C – 6.0 °C, not frozen)

Temperature 1.6 °C + 0.5 °C (CF) = 2.1 °C ☑ **Blank** ☐ **Sample**

☐ Sample(s) outside temperature criteria (PM/APM contacted by: ________).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

Ambient Temperature: ☐ Air ☐ Filter **Initial:** VB

CUSTODY SEALS INTACT:

☐ Cooler ☐ ________ ☐ No (Not Intact) ☑ Not Present ☐ N/A **Initial:** VB

☐ Sample ☐ ________ ☐ No (Not Intact) ☑ Not Present **Initial:** PS

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels.			
☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished.			
Sampler's name indicated on COC	☑	☐	☐
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and good condition	☑	☐	☐
Proper containers and sufficient volume for analyses requested	☑	☐	☐
Analyses received within holding time	☑	☐	☐
pH / Res. Chlorine / Diss. Sulfide / Diss. Oxygen received within 24 hours	☐	☐	☑
Proper preservation noted on COC or sample container	☐	☐	☑
☐ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace	☐	☐	☑
Tedlar bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve (____) ☐EnCores® ☐TerraCores® ☐________

Water: ☐VOA ☐**VOAh** ☐VOA**na₂** ☐125AGB ☐125AGB**h** ☐125AGB**p** ☐1AGB ☐1AGB**na₂** ☐1AGB**s** ☐500AGB ☐500AGJ ☐500AGJ**s** ☐250AGB ☐250CGB ☐250CGB**s** ☐1PB ☐1PB**na** ☐500PB ☐250PB ☐250PB**n** ☐125PB ☐125PB**znna** ☐100PJ ☐100PJ**na₂** ☐______ ☐______ ☐______

Air: ☐Tedlar® ☐Summa® **Other:** ☑ (2) SOIL BAG **Trip Blank Lot#:** ________ **Labeled/Checked by:** PS

Container: C: Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** JbL

Preservative: h: HCL **n:** HNO_3 **na₂:**$Na_2S_2O_3$ **na:** NaOH **p:** H_3PO_4 **s:** H_2SO_4 **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:** VL

Calscience Environmental Laboratories, Inc.

CALSCIENCE

WORK ORDER NUMBER: 13-06-1485

The difference is service

AIR | SOIL | WATER | MARINE CHEMISTRY

Analytical Report For

Client: Parsons Government Services, Inc.

Client Project Name: DFSP - Norwalk

Attention: Mary Lucas
100 West Walnut Street
Pasadena, CA 91124-0002

Approved for release on 07/26/2013 by:
Ranjit Clarke
Project Manager

ResultLink ▸

Email your PM ▸

ACCREDITED IN ACCORDANCE WITH nelac

Calscience Environmental Laboratories, Inc.

Contents

Client Project Name: DFSP - Norwalk
Work Order Number: 13-06-1485

Calscience Environmental Laboratories, Inc.

Work Order Narrative

Condition Upon Receipt:

Samples were received under Chain of Custody (COC) on 06/21/13. They were assigned to Work Order 13-06-1485.

Unless otherwise noted on the Sample Receiving forms all samples were received in good condition and within the recommended EPA temperature criteria for the methods noted on the COC. The COC and Sample Receiving Documents are integral elements of the analytical report and are presented at the back of the report.

Holding Times:

All samples were analyzed within prescribed holding times (HT) and/or in accordance with the Calscience Sample Acceptance Policy unless otherwise noted in the analytical report and/or comprehensive case narrative, if required.

Any parameter identified in 40CFR Part 136.3 Table II that is designated as "analyze immediately" with a holding time of <= 15 minutes (40CFR-136.3 Table II, footnote 4), is considered a "field" test and the reported results will be qualified as being received outside of the stated holding time unless received at the laboratory within 15 minutes of the collection time.

Quality Control:

All quality control parameters (QC) were within established control limits except where noted in the QC summary forms or described further within this report.

Additional Comments:

Solid - Unless otherwise indicated, solid sample data is reported on a wet weight basis, not corrected for % moisture. All QC results are always reported on a wet weight basis.

Subcontractor Information:

Unless otherwise noted below (or on the subcontract form), no samples were subcontracted.

Return to Contents

Calscience Environmental Laboratories, Inc.

☒ SoCal Laboratory
7440 Lincoln Way
Garden Grove, CA 92841-1427
(714) 895-5494

☐ NorCal Service Center
5063 Commercial Circle, Suite H
Concord, CA 94520-8577
(925) 689-9022

CHAIN OF CUSTODY RECORD

WO # / LAB USE ONLY: 13-06-1485

Date: 6-21-13

Page 1 of 1

LABORATORY CLIENT: Parsons

ADDRESS: 100 W. Walnut St

CITY: Pasadena STATE: CA ZIP: 91124

TEL: 626-440-6032 E-MAIL: Mary.Lucas@Parsons.com

TURNAROUND TIME: ☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☒ STANDARD

☐ COELT EDF GLOBAL ID LOG CODE

SPECIAL INSTRUCTIONS:

CLIENT PROJECT NAME / NUMBER: DFSP-Norwalk

P.O. NO.: 6687 ~~742576~~ 747 -05000

PROJECT CONTACT: Mary Lucas / Cindy Zicker

SAMPLER(S): (PRINT) Glenn Androsko

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	Unpreserved	Preserved	Field Filtered	TPH (g) or GRO	TPH (d) or DRO or (C6-C36) or (C6-C44)	TPH ( )	BTEX / MTBE (8260) or ( )	VOCs (8260)	Oxygenates (8260)	En Core / Terra Core Prep (5035)	SVOCs (8270)	Pesticides (8081)	PCBs (8082)	PNAs (8310) or (8270)	T22 Metals (6010/747X)	Cr(VI) [7196 or 7199 or 218.6]	Air - VOCs (TO-14A) or (TO-15)	Air - TPH (g) [TO-3]	Density	Viscosity	Interfacial Tension
1	GMW-62-LNAPL	6-21-13	1040	(liq)	2	2																		X	X	X

Relinquished by: (Signature)	Received by: (Signature/Affiliation)	Date:	Time:
Glenn Androsko	[signature] - CEL	6-21-13	1515 ~~1545~~
[signature] - CEL	Danny [signature] CEL	6/21/13	1545

DISTRIBUTION: White with final report, Green and Yellow to Client.
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies respectively.

06/01/10 Revision

Return to Contents

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 13-06-1485

SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: Parsons

DATE: 06 / 21 / 13

TEMPERATURE: Thermometer ID: SC1 (Criteria: 0.0 °C – 6.0 °C, not frozen except sediment/tissue)

Temperature 1.4 °C - 0.2°C (CF) = 1.2 °C ☐ Blank ☑ Sample

☐ Sample(s) outside temperature criteria (PM/APM contacted by: ________).

☐ Sample(s) outside temperature criteria but received on ice/chilled on same day of sampling.

☐ **Received at ambient temperature, placed on ice for transport by Courier.**

Ambient Temperature: ☐ Air ☐ Filter   Initial: [initials]

CUSTODY SEALS INTACT:

☐ Cooler	☐ ________	☐ No (Not Intact)	☑ Not Present	☐ N/A	Initial: [initials]
☐ Sample	☐ ________	☐ No (Not Intact)	☑ Not Present		Initial: JD

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
☐ Collection date/time, matrix, and/or # of containers logged in based on sample labels.			
☐ No analysis requested. ☐ Not relinquished. ☐ No date/time relinquished.			
Sampler's name indicated on COC	☑	☐	☐
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and good condition	☑	☐	☐
Proper containers and sufficient volume for analyses requested	☑	☐	☐
Analyses received within holding time	☑	☐	☐
pH / Res. Chlorine / Diss. Sulfide / Diss. Oxygen received within 24 hours	☐	☐	☑
Proper preservation noted on COC or sample container	~~☑~~ 6/21/13	☐	☑
☐ Unpreserved vials received for Volatiles analysis			
Volatile analysis container(s) free of headspace	☐	☐	☑
Tedlar bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☐8ozCGJ ☐16ozCGJ ☐Sleeve (____) ☐EnCores® ☐TerraCores® ☐________

Water: ☐VOA ☐VOAh ☐VOAna$_2$ ☐125AGB ☐125AGBh ☐125AGBp ☐1AGB ☐1AGBna$_2$ ☐1AGBs ☐500AGB ~~☑500AGJ~~ 6/21/13 JD ☐500AGJs ☐250AGB ☐250CGB ☐250CGBs ☐1PB ☐1PBna ☐500PB ☐250PB ☐250PBn ☐125PB ☐125PBznna ☐100PJ ☐100PJna$_2$ ☐________ ☐________ ☐________

Air: ☐Tedlar® ☐Canister **Other:** ☑ 500AGJ **Trip Blank Lot#:**________ **Labeled/Checked by:** JD

Container: **C:** Clear **A:** Amber **P:** Plastic **G:** Glass **J:** Jar **B:** Bottle **Z:** Ziploc/Resealable Bag **E:** Envelope **Reviewed by:** [initials]

Preservative: **h:** HCL **n:** HNO_3 **na$_2$:**$Na_2S_2O_3$ **na:** NaOH **p:** H_3PO_4 **s:** H_2SO_4 **u:** Ultra-pure **znna:** $ZnAc_2$+NaOH **f:** Filtered **Scanned by:** [initials]

Calscience Environmental Laboratories, Inc.

Subcontractor Analysis Report

Work Order: 13-06-1485 Page 1 of 1

One or more samples in this work order have tests that were subcontracted. The subcontract report(s) follows.

For subcontracted tests, please reference the laboratory information noted below.

1. Core Laboratories - Bakersfield,CA ISO 9001:2000, CERT-0014993, ELAP CA # 1247
   Geotechnical Testing

Return to Contents

Core Lab
RESERVOIR OPTIMIZATION

Petroleum Services Division
3437 Landco Dr.
Bakersfield, California 93308
Tel: 661-325-5657
Fax: 661-325-5808
www.corelab.com

July 26, 2013

Ranjit Clarke
Calscience Env. Laboratories, Inc.
7440 Lincoln Way
Garden Grove, CA 92841-1427

Subject: Fluid Properties Analyses
Project:13-06-1485
CL File No: 413045EN

Dear : Mr. Clarke:

The attached file presents the final viscosity,density and interfacial tension results for a LNAPL and water sample submitted from your Project #13-06-1485.

Appropriate ASTM, EPA or API methodologies were used for this project and SOP's are available on request.

Thank you for this opportunity to be of service to Calscience Env. Laboratories, Inc.. Please do not hesitate to contact us at (661-325-5657) if you have any questions regarding these results or if we can be of any additional service.

Sincerely,
Core Laboratories

Stephen Carter
Senior Core Analyst

Return to Contents

VISCOSITY and DENSITY DATA

(METHODOLOGY: ASTM D445, ASTM D1481, API RP40)

PETROLEUM SERVICES

Calscience Env. Laboratories, Inc.

Core Lab File No: 413045EN

Project Number: 13-06-1485

Lab Sample No.	Sample ID	Matrix	Sample Source	Sample Date	Temperature °F	Density g/cc	Viscosity	
							centistokes	centipoise
413045-1	GMW-62-LNAPL-1-A	LNAPL	N/A	6/21/13	80	0.7708	0.788	0.607
					120	0.7531	0.626	0.472
					140	0.7442	0.565	0.420

Return to Contents

INTERFACIAL / SURFACE TENSION DATA

(METHODOLOGY: DuNuoy Method - ASTM D971)

PETROLEUM SERVICES

Calscience Env. Laboratories, Inc.

Core Lab File No: 413045EN

Project Number: 13-06-1485

Sample Date: 6/26/13

Phase Pair		Temperature,	Interfacial Tension,
Sample ID / Phase	Sample ID / Phase	°F	Dynes/centimeter
GMW-62_Water	Air	60	73.2
GMW-62_LNAPL	Air	60	23.7
GMW-62_Water	GMW-62_LNAPL	60	24.3

Return to Contents

Return to Contents

Calscience Environmental Laboratories, Inc.
7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1427
TEL: (714) 895-5494 . FAX: (714) 894-7501

TO: Core Labs

CHAIN OF CUSTODY RECORD

DATE: 06/24/13
PAGE: 1 OF 1

LABORATORY CLIENT: Calscience Environmental Laboratories, Inc.	CLIENT PROJECT NAME / NUMBER: 13-06-1485
ADDRESS: 7440 Lincoln Way	P.O. NO.:
CITY: Garden Grove, CA 92841-1427	PROJECT CONTACT: Ranjit Clarke
TEL: (714) 895-5494	E-MAIL: rclarke@calscience.com
SAMPLER(S): (PRINT)	QUOTE NO.:
	LAB USE ONLY

TURNAROUND TIME: ☐ SAME DAY ☐ 24 HR ☐ 48HR 72 HR ☐ 5 DAYS ☒ Normal

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY): ☐ RWQCB REPORTING ☐ ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS:

4130445EN

REQUESTED ANALYSIS

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	Matrix	#Cont	LNAPL Physical Properties (Density, Viscosity, Interfacial Tension)
✓	GMW-62-LNAPL	06/21/13	10:40	L	2	X

Relinquished by: (Signature)	Received by / Affiliation: (Signature)	Date:	Time:
[signature] (CALSCIENCE)	GSO# 522119461	6/24/13	1600
Relinquished by: (Signature)	Received by / Affiliation: (Signature) Tracey Bishop	Date: 6/25/13	Time: 4:30PM
Relinquished by: (Signature)	Received by / Affiliation: (Signature)	Date:	Time:

Return to Contents

Calscience Environmental Laboratories, Inc.
7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1427
TEL: (714) 895-5494 . FAX: (714) 894-7501

TO: Core Labs

CHAIN OF CUSTODY RECORD

DATE: 06/27/13

PAGE: 1 OF 1

LABORATORY CLIENT: Calscience Environmental Laboratories, Inc.	CLIENT PROJECT NAME / NUMBER: 13-06-1766
ADDRESS: 7440 Lincoln Way	P.O. NO.:
CITY: Garden Grove, CA 92841-1427	PROJECT CONTACT: Ranjit Clarke
TEL: (714) 895-5494	E-MAIL: rclarke@calscience.com
SAMPLER(S): (PRINT)	QUOTE NO.:
LAB USE ONLY	

TURNAROUND TIME: ☐ SAME DAY ☐ 24 HR ☐ 48HR 72 HR ☐ 5 DAYS ☒ Normal

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY): ☐ RWQCB REPORTING ☐ ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS:

Additional sample for WO# 13-06-1485.
Please call Ranjit Clarke with any questions.

4130045EN

REQUESTED ANALYSIS

LAB USE ONLY	SAMPLE ID	SAMPLING DATE	SAMPLING TIME	Matrix	#Cont	Interfacial Tension
	GMW-62-LNAPL	06/26/13	12:30	L	1	X

Relinquished by: (Signature)	Received by / Affiliation: (Signature)	Date:	Time:
[signature] (CALSCIENCE)	GSO # 522194494	6/27/13	1610
Relinquished by: (Signature)	Received by / Affiliation: (Signature) Tracey Bishop	Date: 6-28-13	Time: 1:40 PM
Relinquished by: (Signature)	Received by / Affiliation: (Signature)	Date:	Time: