



April 19, 2010

Project 1603.046.0

Mr. Paul Cho, PG  
Site Cleanup Unit IV  
California Regional Water Quality Control Board  
Los Angeles Region  
320 West 4<sup>th</sup> Street, Suite 200  
Los Angeles, California 90013

**Re: Work Plan for Step-Out Investigation in the Vicinity of Well GMW-O-18, Southeastern Off-Site Area, Defense Fuel Support Point Norwalk, 15306 Norwalk Boulevard, Norwalk, California (SCP No. 0286B)**

Dear Mr. Cho:

On behalf of SFPP, L.P. (SFPP), an operating partner of Kinder Morgan Energy Partners, L.P. (KMEP), AMEC Geomatrix, Inc. (AMEC), has prepared this Work Plan for Step-Out Investigation in the Vicinity of Well GMW-O-18 (work plan) in response to comments from the California Regional Water Quality Control Board, Los Angeles Region (RWQCB) in its letter dated February 26, 2010. In its letter, the RWQCB noted the recent detections of total petroleum hydrocarbons (TPH) and certain volatile organic compounds (VOCs) in the groundwater sample collected from well GMW-O-18 during the second semiannual 2009 monitoring event and requested that SFPP submit a work plan to conduct an additional step-out investigation near well GMW-O-18 to delineate the impacts in groundwater in this area.

In its February 26, 2010 letter, the RWQCB also requested initiation of additional groundwater extraction from well GMW-O-18 by April 15, 2010 and an increase in the monitoring frequency from quarterly to monthly at six groundwater monitoring wells (including GMW-O-18) in the southeastern area of the site. SFPP has installed a total fluids extraction pump in well GMW-O-18 and initiated groundwater extraction from this well on March 29, 2010. In March 2010, SFPP also began monthly monitoring of the six groundwater monitoring wells (including GMW-O-18) in the southeastern area of the site. SFPP will continue monthly monitoring of groundwater in well GMW-O-18.

The proposed work includes drilling, lithologic logging, and collecting and analyzing discrete-depth soil and groundwater samples within the uppermost water bearing zone. The following sections of this work plan summarize relevant background information, state the proposed objectives, describe the proposed scope of work and methods for step-out investigation, and present a general schedule for implementation of this work plan.

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## **BACKGROUND**

The following sections summarize relevant project background information including site description, site hydrogeologic setting, previous investigations in the vicinity of the off-site 24-inch block valve area which encompasses well GMW-O-18, and historical groundwater monitoring at well GMW-O-18.

## **SITE DESCRIPTION**

The DFSP facility is located at 15306 Norwalk Boulevard in Norwalk, California (Figure 1). SFPP leases two acres along the southern and eastern boundaries of the DFSP facility. Previously, SFPP operated a pump station at the DFSP facility. The pump station has been decommissioned but three pipelines remain in service. One of the pipelines is a 24-inch diameter pipeline that lies along the southern boundary of the DFSP facility and extends off-site to the east. The off-site 24-inch block valve is located along this pipeline east of and near the southeastern corner of the site. Locations of the 24-inch pipeline and the off-site 24-inch block valve are shown on Figure 2.

## **SITE HYDROGEOLOGIC SETTING**

The uppermost groundwater zone in the site vicinity is a semi-perched unit between depths of approximately 25 and 50 feet below ground surface (bgs). Groundwater flow within this uppermost zone, as interpreted during previous assessments and monitoring at DFSP, is generally northwestward under a horizontal gradient of approximately 0.001 foot/foot (ft/ft). The uppermost groundwater zone overlies the Bellflower aquitard of the Lakewood Formation. Based on lithologic logs from previous assessments at and near DFSP, the Bellflower aquitard lies between depths of approximately 50 and 80 feet bgs beneath the site and consists of predominantly clay, silty clay, and sandy clay with some interbedded sand with silt.

The Exposition aquifer underlies the Bellflower aquitard between depths of approximately 80 and 220 feet bgs. The potentiometric surface in the Exposition aquifer is approximately 20 feet lower than that in the semi-perched uppermost groundwater zone. This relatively consistent difference in hydraulic heads between the semi-perched upper groundwater zone and the Exposition aquifer indicates that the Bellflower aquitard inhibits the vertical movement of groundwater in the site area. The horizontal hydraulic gradient in the Exposition aquifer beneath the site area has had a magnitude of approximately 0.001 ft/ft and a generally southeastward direction. The generally southeastward direction of horizontal hydraulic gradient (and interpreted direction of horizontal groundwater flow) in the Exposition aquifer is roughly opposite the general direction of interpreted groundwater flow in 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 comprises a unit that is laterally continuous and has a relatively low bulk vertical hydraulic conductivity.

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## PREVIOUS ASSESSMENTS

In April 1994, SFPP detected a leaking seal at the off-site 24-inch block valve. Assessment of impacts of petroleum hydrocarbons to groundwater in the vicinity of the off-site 24-inch block valve release began in 1994 with the installation and sampling of five groundwater monitoring wells (including GMW-O-18). Subsurface assessments conducted in the vicinity of the off-site 24-inch block valve since 1994 have evaluated and defined the extents of liquid-phase, adsorbed-phase, and dissolved phase petroleum hydrocarbons in soil and groundwater in this area.<sup>1,2,3,4</sup>

The results of the subsurface assessments were used in designing an expansion of the groundwater remediation system in this area. The expansion to the remediation system was implemented in April 2003 to address impacts in groundwater downgradient (northwest) of the 24-inch block valve.

In an assessment conducted during July 2008, the presence and depth of the Bellflower aquitard in the off-site area near the 24-inch block valve was evaluated using cone penetrometer test (CPT) profiling at two locations, CPT-1 and CPT-2 (Figure 2). In addition, the vertical extent of dissolved fuel constituents was delineated to the top of the interpreted aquitard at these two locations. Discrete-depth groundwater samples were collected from additional borings drilled at the general locations of CPT-1 and CPT-2 during July 2008. Samples were collected from three discrete intervals between 25 and 47 feet bgs at each location.

CPT-1, located approximately 150 northeast of the block valve (approximately 80 feet southeast of GMW-O-18), was selected to delineate the eastern extent of dissolved fuel constituents in the off-site 24-inch block valve area. Target analytes including TPH quantified using a gasoline standard (TPHg), TPH quantified using a site fuel product (TPHfp), benzene, toluene, ethylbenzene, total xylenes (collectively, BTEX), methyl tert-butyl ether (MTBE), and other fuel oxygenates including tert-butyl alcohol (TBA), diisopropyl ether (DIPE), ethyl tert-butyl ether (ETBE), and tert-amyl methyl ether (TAME) were not detected in any of the three discrete-depth groundwater samples collected at CPT-1. Thus, the eastern extent of dissolved fuel constituents in the off-site 24-inch block valve area was adequately delineated.

CPT-2, located approximately 185 north-northwest (hydraulically downgradient) of the block valve (approximately 80 feet northwest of GMW-O-18) and within an area of known impact to groundwater, was selected to delineate the vertical extent of dissolved fuel constituents by the

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<sup>1</sup> Geomatrix, 1994, Site Assessment of Fuel Hydrocarbons in Soil and Groundwater Associated with a Leak in a 24-Inch Block Valve, Norwalk, California, September 30.

<sup>2</sup> Geomatrix, 2002, Supplemental Groundwater Assessment Northwest of the 24-inch Block Valve Area, DFSP, Norwalk, California, September 19.

<sup>3</sup> Parsons, 2007, Investigation Report for Holifield Park and Dolland Elementary School, Defense Fuel Support Point Norwalk, October 11.

<sup>4</sup> AMEC Geomatrix, Inc., 2008, Additional Off-Site Assessment Report, Off-Site 24-Inch Block Valve Area, Defense Fuel Support Point Norwalk, Norwalk, California, August 28.

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confirmed presence of low or non-detected concentrations of target analytes or the top of the Bellflower aquitard in the immediate vicinity of the off-site 24-inch block valve. Elevated concentrations of TPHg, MTBE, and/or TBA were reported in one or more of the three groundwater samples collected at CPT-2 to a depth of approximately 47 feet near the base of the uppermost groundwater zone. Groundwater monitoring results from Exposition wells, including EXP-3 and EXP-5 located approximately 380 and 840 feet from the 24-inch block valve, however, have indicated no impacts to the Exposition aquifer. In addition, assessment work in the 24-inch block valve area completed in 2009 also indicated no impacts to the Exposition aquifer as described in the subsequent paragraph.

In 2009, pursuant to the RWQCB's request, a supplemental assessment was conducted at a location (GB-18; Figure 2) near the previous sampling location CPT-1 to characterize the physical properties of the Bellflower aquitard and to assess potential that site-related chemicals detected in the uppermost groundwater zone at previous sampling location CPT-2 have impacted groundwater in the Exposition aquifer beneath the Bellflower aquitard in the area. A groundwater sample was collected from the upper portion of the Exposition aquifer at depth intervals between 86 and 90 feet bgs. The analytical results of the discrete-depth groundwater sample show no impacts to groundwater in the Exposition aquifer. Physical and hydraulic property testing was conducted using soil samples collected from a range of sediment types within the Bellflower aquitard. The results of these tests indicate the sediment samples were composed primarily of silt and clay, with vertical hydraulic conductivity values ranging from  $2.83 \times 10^{-7}$  to  $5.52 \times 10^{-6}$  centimeters per second (cm/s). A report summarizing the results of this 2009 assessment is forthcoming.

### **HISTORICAL GROUNDWATER MONITORING AT GMW-O-18**

GMW-O-18 was installed in July 1994 as part of the subsurface assessment in this area. Groundwater monitoring at this well has began in 1996 and included analysis of TPH and VOCs including MTBE. Pursuant to the RWQCB's request, other fuel oxygenates TBA, DIPE, ETBE, and TAME were added to groundwater monitoring and reporting program in the first quarter 2009. Table 1 presents historical analytical results for TPH and VOCs in groundwater samples collected from well GMW-O-18 from November 1996 to March 2010. No sampling was conducted at this well while it was used as a remediation well during mid 2000 through mid 2005. As shown in Table 1, groundwater condition in well GMW-O-18 has significantly improved since November 2005. However, detections of TPH and VOCs in the groundwater sample collected from this well in October 2009 prompted the RWQCB request for a step-out investigation to further delineate the impacts in groundwater in the vicinity of well GMW-O-18. Analytical results for groundwater samples collected from well GMW-O-18 in March 2010 indicated that groundwater quality at this well has already improved compared to TPH and BTEX constituent concentrations reported for the October 2009 sampling event. SFPP will continue monthly monitoring of well GMW-O-18. Pursuant to the RWQCB's request, SFPP has also installed a total fluids extraction pump in well GMW-O-18 and initiated groundwater extraction from this well in March 2010.

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## **OBJECTIVE**

The objective of this step-out investigation is to further assess the potential presence and concentrations of dissolved TPH, BTEX, and fuel oxygenates in groundwater in the vicinity of well GMW-O-18.

## **PROPOSED ASSESSMENT**

The proposed approach to address the objective of this investigation consists of drilling, coring, lithologic logging, and discrete-depth soil and groundwater sampling at five locations using direct-push methods. Figure 2 shows approximate locations of the proposed borings (G19 through G23). Three of the sample locations (GB19, GB20, and GB21) are intended to evaluate the extent of TPH and VOCs in the southeast area; two locations (GB22 and GB23), initially contemplated as potential contingency step-out locations, are included to evaluate the extent of TBA detected in GMW-39 (Figure 2).

The scope and methods of the proposed work are described in the sections below.

### **Pre-Field Activities**

Prior to commencement of drilling and groundwater sampling, the following activities will be conducted:

- obtaining an encroachment permit or access agreement from the City of Norwalk;
- updating the existing site-specific Health and Safety Plan to incorporate the planned field work;
- notifying the RWQCB a minimum of one week in advance of the planned field activities;
- marking the proposed boring locations;
- notifying Underground Service Alert a minimum of three business days in advance of the planned field activities;
- completing an underground utility check using a private utility locating subcontractor;
- retaining and coordinating with drilling and laboratory subcontractors;
- obtaining a permit from the Los Angeles County Department of Public Health – Environmental Health for groundwater assessment; and

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- coordinating with Kinder Morgan personnel to arrange for a Kinder Morgan field inspector to be present during field activities in the vicinity of Kinder Morgan pipelines, if necessary.

The proposed drilling and sampling locations will be finalized in the field based on the results of the geophysical survey.

### **Drilling and Lithologic Logging**

The proposed borings will be drilled using direct-push methods to collect soil samples for lithologic logging and to assess lithologic conditions for selection of sampling depth intervals for collection of discrete-depth groundwater samples. Prior to drilling, borings will be cleared using an air vacuum extraction system to approximately 5 feet below ground surface (bgs) to check for the potential presence of underground utilities and other obstructions. Each boring will be advanced to a depth of approximately 50 feet bgs where the interpreted top of the Bellflower aquitard is expected to be encountered. Soil will be continuously cored and lithology encountered will be described by an AMEC field geologist under the direction of a State of California Licensed Professional Geologist. Soil characteristics will be described using visual-manual procedures of ASTM D2488 which are based on the Unified Soil Classification System (USCS) for guidance. Color, moisture content, grain size, and other pertinent soil characteristics will be recorded on boring logs. Soil will be screened in the field using a photoionization detector for potential presence of VOCs.

### **Discrete-Depth Soil and Groundwater Sampling and Laboratory Analysis**

At each location (G19 through G23), soil samples will be collected at depth intervals of every 10 feet to the water table. In addition, soil samples will also be collected from within approximately 5 feet above and below the water table. Sampling depth intervals for groundwater samples will be selected based on the lithologic conditions observed in the field. Two to three discrete-depth groundwater samples will be collected from each location. To minimize potential for cross-contamination, discrete-depth groundwater samples will be collected from separate borings drilled within a few feet of one another at each of the general locations shown on Figure 2. Groundwater samples will be collected using a Hydropunch-type sampler or temporary well equipment and methods, as appropriate based on formation and drilling conditions and logistics. For quality assurance and quality control (QA/QC) purposes, one or more field duplicate groundwater samples will be collected (a minimum of one for each 10 groundwater samples), an equipment blank sample will be collected for each piece of non-dedicated sampling equipment each day, and a laboratory-provided trip blank will be maintained with each cooler containing groundwater samples. Samples will be placed in an ice-chilled cooler and submitted under chain-of-custody procedures to an analytical laboratory certified under the California Environmental Laboratory Accreditation Program.

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The soil and groundwater samples (including the field duplicate samples) and the equipment blank sample will be analyzed for:

- TPHg and TPHfp using EPA Method 8015M; and
- BTEX and fuel oxygenates using EPA Method 8260B.

The trip blank will be analyzed for BTEX and fuel oxygenates only.

### **Boring Destruction and Survey**

After groundwater sampling is completed, borings will be destroyed by backfilling with cement-bentonite grout placed through a tremie pipe. Ground surface at each boring location will be repaired to reasonably match surrounding conditions. Following completion of the field investigation, boring locations will be surveyed by a licensed surveyor.

### **Investigation-Derived Waste Management**

Drilling equipment will be steam-cleaned using potable water prior to use. Sampling equipment will be cleaned before each use by washing with Alconox-water solution and double-rinsing with potable water. Waste generated during the investigation including equipment wash and rinse water and soil cuttings will be separately contained in DOT-approved 55-gallon steel drums. The drums will be transported to the site at the end of each day. Equipment rinse and wash water will be transferred to a holding tank at SFPP's onsite groundwater treatment system for treatment and discharge. Soil cuttings will be profiled and disposed of at an appropriate off-site disposal facility.

### **SCHEDULE**

We anticipate initiating implementation of this work plan upon receiving approval from the RWQCB. AMEC will prepare and submit a report summarizing the results of additional assessment within 60 days of receiving final laboratory analytical data.

If you have any questions, please contact either of the undersigned at (949) 642-0245.

Sincerely yours,  
AMEC Geomatrix, Inc.



Thandar Phyu, PG  
Project Hydrogeologist



Shiow-Whei Chou, PE  
Senior Engineer

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Regional Water Quality Control Board, Los Angeles Region  
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Attachments:

Table 1      Historical Analytical Results for Groundwater Samples Collected from Well  
                  GMW-O-18  
Figure 1      Site Location and Assessment Area Map  
Figure 2      Proposed Sampling Locations and Groundwater Analytical Results, Off-Site  
                  24-Inch Block Valve Area

cc:      Mr. Steve Defibaugh – Kinder Morgan Energy Partners, L.P.  
            Ms. Mary Jane McIntosh, Restoration Advisory Board (RAB)  
            Dr. Eugene Garcia, RAB  
            Mr. Bob Hoskins, RAB  
            Ms. Tracy Winkler, RAB  
            Mr. Tim Whyte, URS  
            Ms. Adriana Figueroa, City of Norwalk  
            Mr. Edward Garcia, City of Norwalk  
            Mr. Charles Emig, City of Cerritos  
            Office of Congresswoman Grace F. Napolitano  
            Lt. Col. Jon Ramer, DESC  
            Col. William Keyes, DESC  
            Mr. Kola Olowu, DESC  
            Mr. Redwan Hassan, Parsons  
            Ms. Mary Lucas, Parsons



**TABLE 1**  
**HISTORICAL ANALYTICAL RESULTS FOR GROUNDWATER SAMPLES COLLECTED FROM WELL GMW-O-18**  
**NOVEMBER 1996 THROUGH March 2010**  
 Defense Fuel Support Point, Norwalk  
 Norwalk, California

Results reported in micrograms per liter (µg/L)

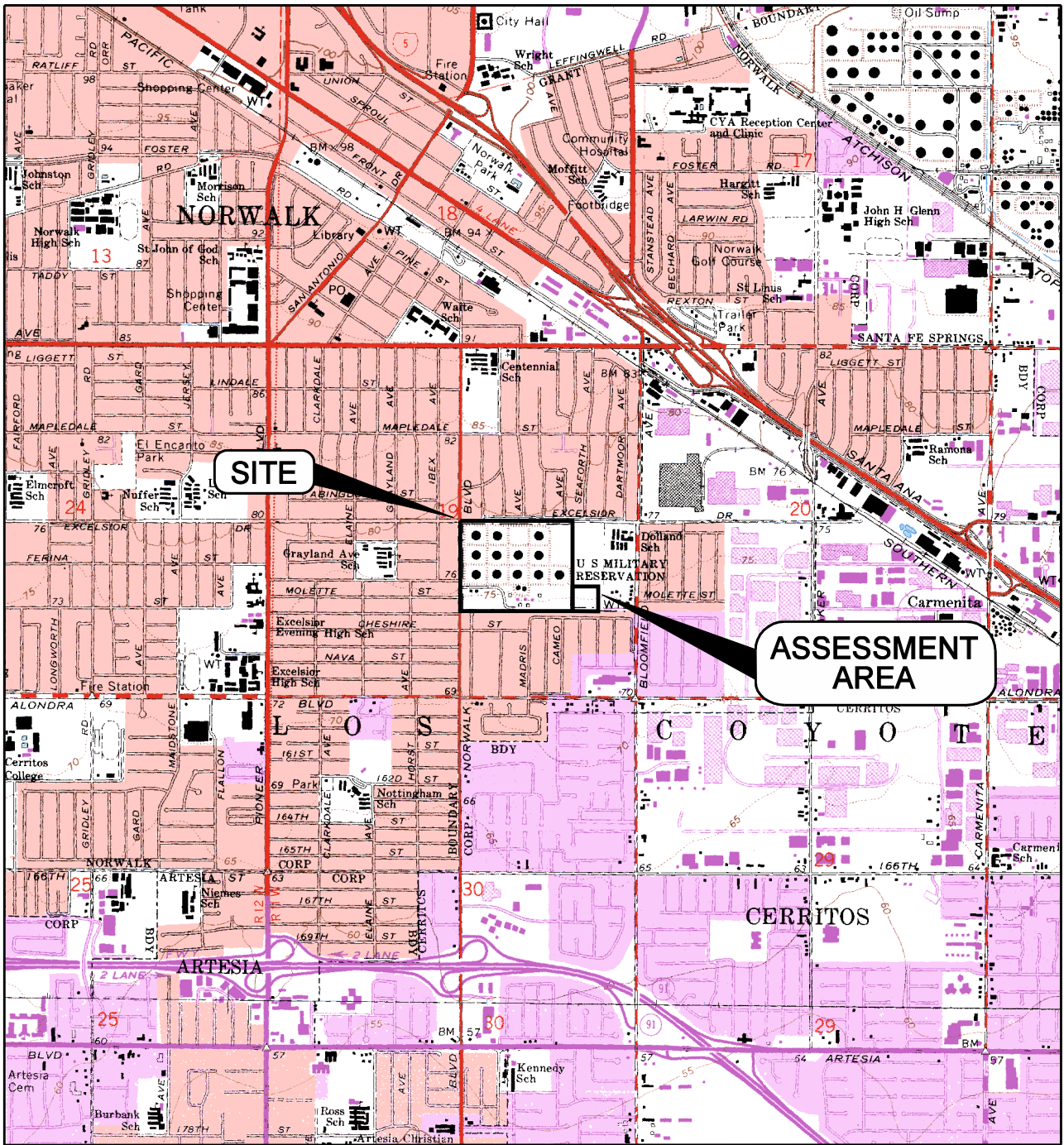
Well	Date Sampled	TPH as Gasoline	TPH as Diesel	TPH as FP	Benzene	Toluene	Ethylbenzene	Total Xylenes	1,2-DCA	MTBE	TBA	DIPE
GMW-O-18	11/26/96	---	---	---	<10	<10	<10	<30	<10	10000	---	---
	11/27/96 (DUP)	---	---	---	<10	66	<10	<30	<5	120	---	---
	07/11/97	<100	<500	---	<3	<3	<3	<3	<3	3000	---	---
	01/07/98	<100	<500	---	<5	<5	<5	<15	<5	3200	---	---
	05/21/98	2000	---	---	<100	<100	<100	<200	<100	5600	---	---
	11/17/98	543	---	<100	<0.5	1	<0.5	2.6	<0.5	1420	---	---
	05/06/99	2700	<500	---	<5	<5	<5	<5	<13	15000	---	---
	11/18/99	2900	---	<100	<13	<12.5	<12.5	<12.5	<13	6700	---	---
	05/19/00	3500	---	<100	<25	<25	<25	<25	<25	10000	---	---
	11/02/05	<50	---	<100	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	---	---
	05/09/06	<50	---	<100	<0.5	<0.5	<0.5	<0.5	<0.5	2.1	---	---
	12/07/06	<100	---	<100	<0.5	<0.5	<0.5	<0.5	<1	0.65	---	---
	05/04/07	<50	---	<100	<0.5	<0.5	<0.5	<0.5	<0.5	0.62	---	---
	11/15/07	<50	---	<100	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	---	---
	04/15/08	<50	---	<100	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	---	---
	10/15/08	<200	---	<100	<1	<1	<1	<1	<2	<1	---	---
	04/23/09	<50	---	<100	<0.5	<0.5	<0.5	<0.5	<0.5	1	140	<1
	4/23/09 (DUP)	<50	---	<100	<0.5	<0.5	<0.5	<0.5	<0.5	0.99	170	<1
10/21/09	2400	---	680	170	440	17	410	<5	490	480	<5	
03/16/10	<50	---	<100	0.60	1.3	<0.50	1.77	<0.50	4.5	550	<1.0	
3/16/10 (DUP)	<50	---	<100	0.50	1.1	<0.50	1.48	<0.50	3.6	450	<1.0	

**Notes:**

Groundwater samples were analyzed for TPH using EPA Method 8015M and volatile organic compounds using EPA Method 8260B.

**Abbreviations:**

- TPH = total petroleum hydrocarbon
- 3. FP = fuel product (standard collected from north-central plume).
- 4. 1,2-DCA = 1,2-dichloroethane.
- 5. MTBE = methyl tert-butyl ether.
- 6. TBA = tert-butyl alcohol.
- 7. DIPE = diisopropyl ether.
- 8. < = not detected above the indicated laboratory reporting limit.
- 9. --- = not analyzed.
- 10. DUP = duplicate sample.



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Base map modified from U.S.G.S. 7.5 minute quadrangle maps Los Alamitos 1964, California; photo-revised 1981; and Whittier 1965, California; photorevised 1981.

**SITE LOCATION AND ASSESSMENT AREA MAP  
OFF-SITE 24-INCH BLOCK VALVE AREA  
DFSP NORWALK  
Norwalk, California**

By: BRP      Date: 04/19/10      Project No: 1603.046

**AMEC Geomatrix**

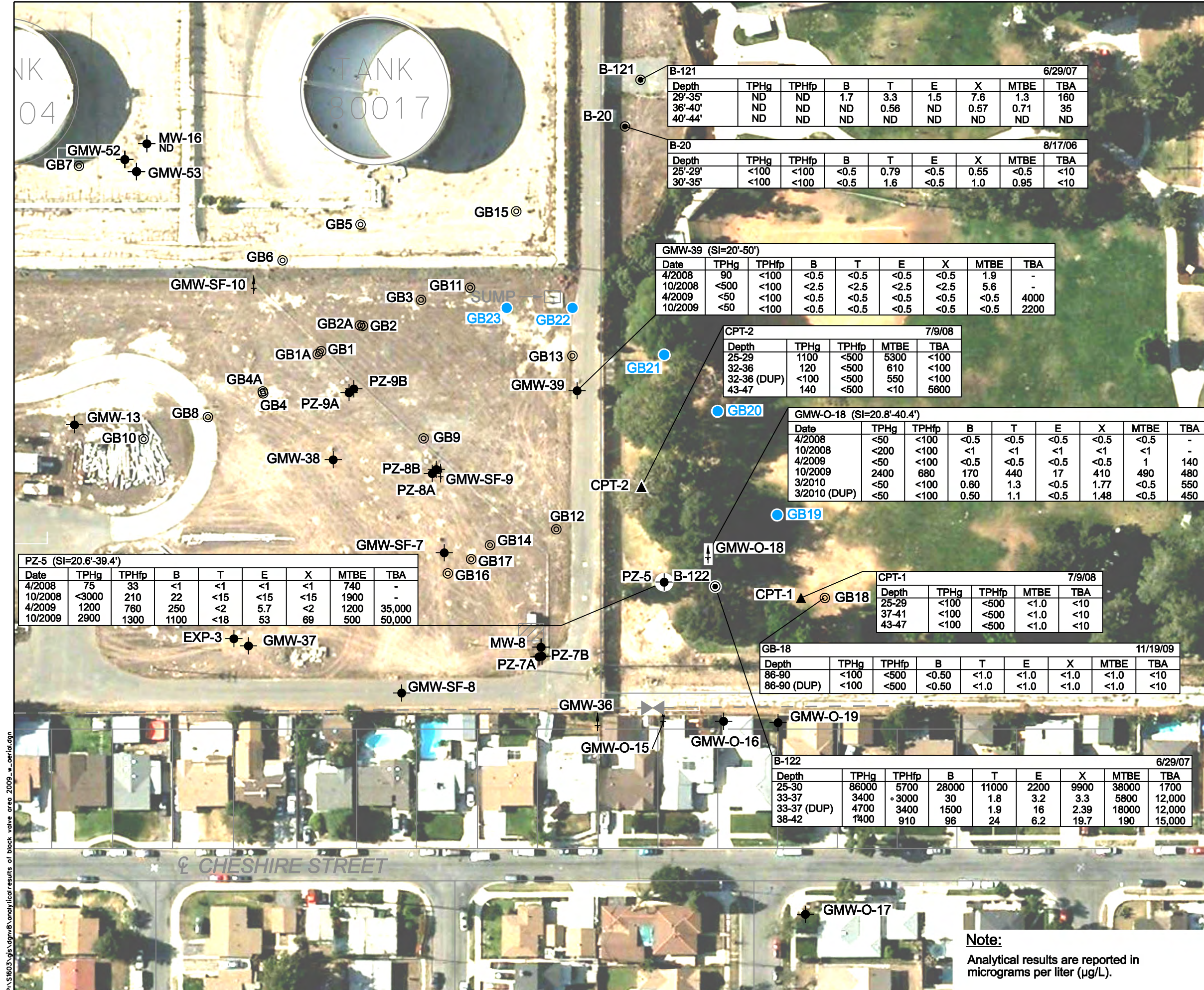
Figure 1

Approximate Scale in Feet



Approximate Scale in Meters





**Explanation**

- GB23 ● Proposed groundwater sampling location
- GB18 ⊙ Exposition aquifer groundwater sampling location (AMEC Geomatrix, 2009)
- CPT-2 ▲ CPT and groundwater sampling location (AMEC Geomatrix, 2008)
- B-122 ⊙ Groundwater sampling location (Parsons, 2007)
- GB17 ⊙ Groundwater screening sample location (Geomatrix, 2002)
- GMW-39 ● Existing groundwater monitoring well
- GMX-O-15 † Existing remediation well
- ⊠ Approximate location of 24" block valve
- Approximate location of 24" SFPP pipeline
- Depth Sample depth or well screen interval in feet below ground surface
- TPHg Total petroleum hydrocarbons quantified using a gasoline standard
- TPHfp Total petroleum hydrocarbons quantified using a site fuel product standard
- B Benzene
- T Toluene
- E Ethylbenzene
- X Total xylenes
- MTBE Methyl tert-butyl ether
- TBA Tert-butyl alcohol
- <100 Not detected at or above laboratory reporting limit (RL) shown
- DUP Duplicate sample
- ND Not detected
- SI Screen interval in feet below ground surface

Basemap modified from Google Earth Pro, aerial photograph dated July 31, 2007

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**Note:**  
Analytical results are reported in micrograms per liter (µg/L).