ConocoPhillips
76 Broadway
Sacramento, California 95818

RO0000203

June 19, 2008

Ms. Barbara Jakub
Alameda County Health Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

Re: **Work Plan for Source Area Vertical Delineation**
76 Station No. 0746
3943 Broadway
Oakland, California

Dear Ms. Jakub,

I declare under penalty of perjury that to the best of my knowledge the information and/or recommendations contained in the attached report is/are true and correct. In accordance with Section 25297.15(a) of the Health & Safety Code, I also certify that I have notified all responsible landowners of the enclosed proposed action.

If you have any questions or need additional information, please contact me at (916) 558-7612.

Sincerely,

Bill Borgh

Bill Borgh
Site Manager – Risk Management and Remediation

Attachment

June 27, 2008

Ms. Barbara Jakub
Alameda County Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

RE: WORK PLAN FOR SOURCE AREA VERTICAL DELINEATION
76 Service Station No. 0746
3943 Broadway
Oakland, California 94612

DELTA

Dear Ms. Jakub:

On behalf of ConocoPhillips Company (ConocoPhillips), Delta Consultants (Delta) submits this work plan to investigate the vertical extent of petroleum hydrocarbons in the source area of 76 Station No. 0746, located at 3943 Broadway, Oakland, California (Figure 1).

1.0 PROJECT OBJECTIVES

The objective of this assessment is to investigate the vertical extent of petroleum hydrocarbons in soil and groundwater within the onsite source area of impact. Delineation assessment will be conducted using Cone Penetrometer Test (CPT) methodology. Soil samples will be collected continuously to initial groundwater after which soil samples will collected every five feet to total depth. Discrete grab groundwater samples will be collected from up to three depths to evaluate the vertical distribution of petroleum hydrocarbon constituents in the water column.

The soil and groundwater data from this assessment will be used in subsequent discussions regarding potential remedial efforts and path forward to site closure. The scope of work for this investigation is presented below.

2.0 SITE DESCRIPTION

The site is currently an active service station located on the west corner of Broadway and 40th Street in Oakland, California. Station facilities include two 12,000-gallon double-

wall glasteel gasoline underground storage tanks (USTs) in a common pit, one 520-gallon double-wall glasteel waste oil UST, two dispenser islands, one station building, and a car wash building.

2.1 GEOLOGY AND HYDROLOGY

The site vicinity is underlain by Quaternary-age alluvium fan deposits (Temescal Formation), which typically consist of clayey gravel, sandy silty clay, and sand-clay-silt mixtures. The immediate vicinity is underlain by fill material that range from 2 to 4 feet in thickness. The fill is underlain by a clay zone up to 10 feet thick. On the east side of the site and offsite, there is a 2 to 4 foot thick bed of silty sand and sand between the fill and clay zone. Beneath the clay zone is a coarse-grained zone, which extends to approximately 14 feet bgs throughout most of the site. This coarse-grained zone is likely the primary water-bearing and contaminant transport zone. The coarse-grained zone is generally underlain by clay and/or silt that extend to the maximum depths explored (20 to 22.5 feet bgs).

The most recent monitoring and sampling event was conducted at the site on December 13, 2007. The measured depth to groundwater ranged from 7.41 feet (onsite well MW-6) to 15.72 feet (offsite well MW-10) below top of casing (TOC). The groundwater flow direction was south at a gradient of approximately 0.05 feet per foot (ft/ft).

3.0 SITE HISTORY

August 1989 Two 10,000 gallon steel gasoline USTs and one 280-gallon steel waste oil UST were removed and replaced with current USTs. A total of approximately 350 cubic yards of soil was removed from the site during UST removal activities, primarily to enlarge the tank pit for larger tanks. The confirmatory soil sample was reported as non-detect for all constituents. The product piping was also removed. Confirmation soil sampling beneath piping and the waste oil tank contained low concentrations of petroleum hydrocarbons. During the tank removal activities, approximately 6,500 gallons of groundwater was pumped from the UST cavity. Concentrations of total petroleum hydrocarbons as gasoline (TPH-G) and benzene were reported as 1,200 micrograms per liter (µg/l), and 12 µg/l, respectively.

October 1989 Three monitoring wells (MW-1, MW-2, and MW-3) were drilled at the site to depths ranging from 20 to 25 feet below ground surface (bgs).

January 1990 Two additional monitoring wells (MW-4 and MW-5) were drilled at the site to a depths of 20 feet bgs.

October 1990 Four additional monitoring wells (MW-6 through MW-9) were drilled at and in the vicinity of the site to depths ranging from 20 to 22 feet bgs. Groundwater recovery tests were conducted on four wells to determine potential locations for placement of recovery wells.

January 1992 Two offsite monitoring wells (MW-10 and MW-11) were drilled in the vicinity of the site to depths ranging from 19 to 22 feet bgs.

June 1992 One recovery well (RW-1) was drilled onsite to 17.0 feet bgs, and one additional offsite monitoring well (MW-12) was drilled to 17.5 feet bgs.

February 1998 The product piping and associated dispenser islands were replaced at the site. Four soil samples were collected from beneath the dispenser islands. Petroleum hydrocarbons were reported present in the soil samples. A total of 30.2 tons of stockpiled soil was transported form the site to the Forward Inc. Landfill in Stockton, California.

October 2003 Site environmental consulting responsibilities transferred to TRC.

October 2007 Delta became the lead consultant for the site.

Groundwater has been monitored at the site since November 1989. Sampling of the eight onsite and five offsite monitoring wells is currently conducted semi-annually during the second and fourth quarters. During the Fourth Quarter 2007 monitoring and sampling event TPH-G, benzene and MTBE were detected at maximum concentrations of 9,100 µg/l, 190 µg/l, and 30 µg/l, respectively, each in the sample from recovery well RW-1.

3.1 SENSITIVE RECEPTORS

The subject site is located cross gradient, and approximately 1,630 feet northwest of Glen Echo Creek, and is within one-half mile of three potential sensitive receptors: two irrigation wells, and one domestic well. The three wells are located upgradient or crossgradient to the site.

3.2 REMEDIATION STATUS

1989 Approximately 350 cubic yards of soil was removed from the site during UST removal activities, primarily to make room in the tank pit for larger tanks. During the tank removal activities, a total of approximately 6,500 gallons of groundwater were pumped from the UST cavity.

1990 Groundwater tests were conducted on four wells to determine potential locations for placement of recovery wells.

1993 A soil vapor extraction (SVE) pilot test was conducted at the site on well RW-1. A maximum concentration of 8.6 µg/l TPH-G was reported in the influent vapor stream. The calculated maximum hydrocarbon extraction rate during the test was 0.00049 lbs/hour. Based on the low extraction rate, high groundwater levels, and fine-grained soil beneath the site, vapor extraction was determined to not be a feasible remedial option. Well RW-1 was initially installed to conduct a groundwater

recovery test; however, due to lack of groundwater recharge the test was not conducted.

March 1998 Product piping and associated dispenser islands were replaced at the site. Denbeste Transportation, Inc. of Windsor, California transported a total of 30.2 tons of stockpiled soil from the site to the Forward Inc. Landfill in Stockton, California for disposal.

April 2005 A 68-hour dual phase extraction (DPE) test was conducted. During this event a mobile treatment system was used to remove vapors and liquids from wells RW-1, MW-3, and MW-5. During the event 39.03 pounds of hydrocarbons were recovered with 6,500 gallons of water.

4.0 SITE ASSESSMENT ACTIVITIES

Delta will conduct a CPT drilling assessment on the property to investigate the vertical extent of petroleum hydrocarbons in the onsite areas adjacent to monitoring wells MW-3, MW-4, and MW-5, and extraction well RW-1.

4.1 PRE-FIELD ACTIVITIES

Prior to commencing drilling activities, the necessary drilling permits will be obtained. Underground Service Alert (USA) will be notified at least 72 hours prior to field activities to mark underground utilities at the site. In addition, a private utility locator will be used to confirm the absence of buried utilities at each proposed boring location. Prior to drilling each boring, a pilot hole will be cleared with an air knife to approximately five feet bgs to verify the absence of buried utilities.

Delta will prepare a health and safety plan (HASP) specific to the site and to the work being conducted at the site. Prior to beginning the field activities, a safety meeting will be conducted with onsite workers to discuss applicable health and safety issues and concerns related to the specific work.

4.2 PROPOSED ACTIVITIES

Assessment of the site has generally been conducted concurrent with drilling and construction of groundwater monitoring wells at the site. Soil samples were collected from the boreholes during drilling of the monitoring wells and analyzed for petroleum hydrocarbon constituents, i.e., total petroleum hydrocarbons as gasoline (TPH-G), benzene, toluene, xylenes, and ethylbenzene (BTEX). The results of these analyses show where residual hydrocarbons are present in the soil, either adsorbed to the soil or within the soil interstices. Soil samples were not collected for analysis from depths greater than 12.5 feet below ground surface (bgs) in onsite well borings. The results of the analyses show that the highest petroleum hydrocarbon concentrations are in soil samples collected from well borings MW-3, MW-4, and MW-5. The following table shows the analytical results of soil samples collected

from well borings MW-3, MW-4, and MW-5; no soil samples were collected from boring RW-1.

Sample	Depth (feet)	DTW[1]	TPH-G	Benzene	Toluene	Xylenes	Ethylbenzene
MW3(5)	5	11.75	3.1	0.068	ND	ND	ND
MW3(10)	10	11.75	69	0.89	2.6	7.9	2.0
MW3(11)	11	11.75	1,100	16	85	150	35
MW4(5)	5	11.50	22	0.059	ND	ND	ND
MW4(7)	7	11.50	2.5	ND	ND	ND	ND
MW4(10)	10	11.50	250	1.2	0.66	20	1.4
MW4(11)	11	11.50	280	1.0	4.0	36	7.6
MW5(5)	5	12.25	25	0.21	ND	ND	ND
MW5(7.5)	7.5	12.25	46	0.25	0.28	0.20	0.46
MW5(10)	10	12.25	140	1.5	1.7	10	4.0
MW5(11.5)	11.5	12.25	370	1.8	14	51	11

[1]DTW – depth to water during drilling as depicted on boring logs

Initial depth to groundwater in the borings was 11.50-12.25 feet bgs during drilling. The highest petroleum hydrocarbon concentrations in soil samples from each boring were from the depth just above the groundwater surface, i.e., the capillary fringe. It may be that these highest petroleum hydrocarbon concentrations were derived from the groundwater during fluctuations in the groundwater surface elevation and therefore represent a "smear" zone, or are due to capillary effects.

It is proposed that two CPT borings be drilled in the vicinity of the site adjacent to monitoring wells MW-3, MW-4, and MW-5 to investigate the vertical extent of petroleum hydrocarbons in soil and groundwater (Figure 2). Each CPT boring will drilled to approximately 35 feet bgs. The soil will be logged using the Unified Soil Classification System (ASTM D2487-00).

Soil samples will be collected continuously to five feet past the depth of initial groundwater, anticipated to be approximately 12 feet bgs. Logging of the continuous sample will provide the data necessary to characterize the depth interval of the capillary fringe. This is important in evaluating whether the highest concentrations of petroleum hydrocarbons present in soil samples from well borings MW-3, MW-4, and MW-5 are due, entirely or in part, to (1) fluctuations in the groundwater elevation, and/or (2) capillary effects. Analysis of soil samples collected from the capillary fringe, and from the areas immediately above and below the capillary fringe, will likely show where the highest petroleum hydrocarbon concentrations are present in each boring and may reveal the effect that interaction with the groundwater has on the concentrations of petroleum hydrocarbons in the soil.

Soil samples will also be collected from depths below the groundwater, generally at five-foot intervals, to the total proposed depth of 35 feet bgs. A soil unit consisting of clayey sand, clayey gravel, or well graded gravel with sand and clay was

recognized in well borings MW-3, MW-4, and MW-5 at approximate depths of 12.5 feet to 15.5 feet bgs. This unit extends downgradient and was also recognized in well boring MW-9. It is likely that this unit is the primary path of shallow downgradient groundwater flow at the site. Soil samples from this unit will be collected for analysis if the unit is recognized during drilling.

Three discrete groundwater samples will be collected from each boring, one at the initial groundwater depth encountered, one at the depth of the anticipated coarse-grained unit if recognized during drilling and if different than the initial groundwater depth, and one at the final depth of 35 feet bgs.

Each soil and groundwater sample will be analyzed for TPH-G by EPA Method 8015M, and BTEX, MTBE, tertiary butyl alcohol (TBA), ethyl tertiary butyl ether (ETBE), tertiary amyl methyl ether (TAME), di-isopropyl ether (DIPE), 1,2-dichloroethane (1,2-DCA), ethylene dibromide (EDB), and ethanol by EPA Method 8260B.

4.3 WASTE DISPOSAL

Waste generated during assessment activities will be temporarily stored onsite in Department of Transportation (DOT)-approved 55-gallon drums pending disposal to an approved disposal/recycling facility. Waste manifests will be prepared for proper transport and disposal of waste.

4.4 ASSESSMENT REPORT

Following completion of field work and receipt of laboratory reports, a report will be prepared which presents analytical results of soil and groundwater sample analyses, boring logs, a discussion regarding the results of the assessment, conclusions and recommendations for addressing the need for future investigations at the site.

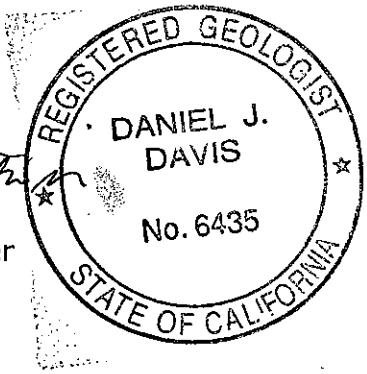
4.5 WORK SCHEDULE

Planned activities will be completed according to the following estimated schedule.

- Schedule drilling following acceptance of the work plan scope of work;
- Complete CPT drilling activities in a maximum three days;
- Prepare and submit a final report six weeks after completion of drilling.

If you have questions regarding this work plan, please call Daniel Davis at (916) 503-1260.

Sincerely,
Delta Consultants



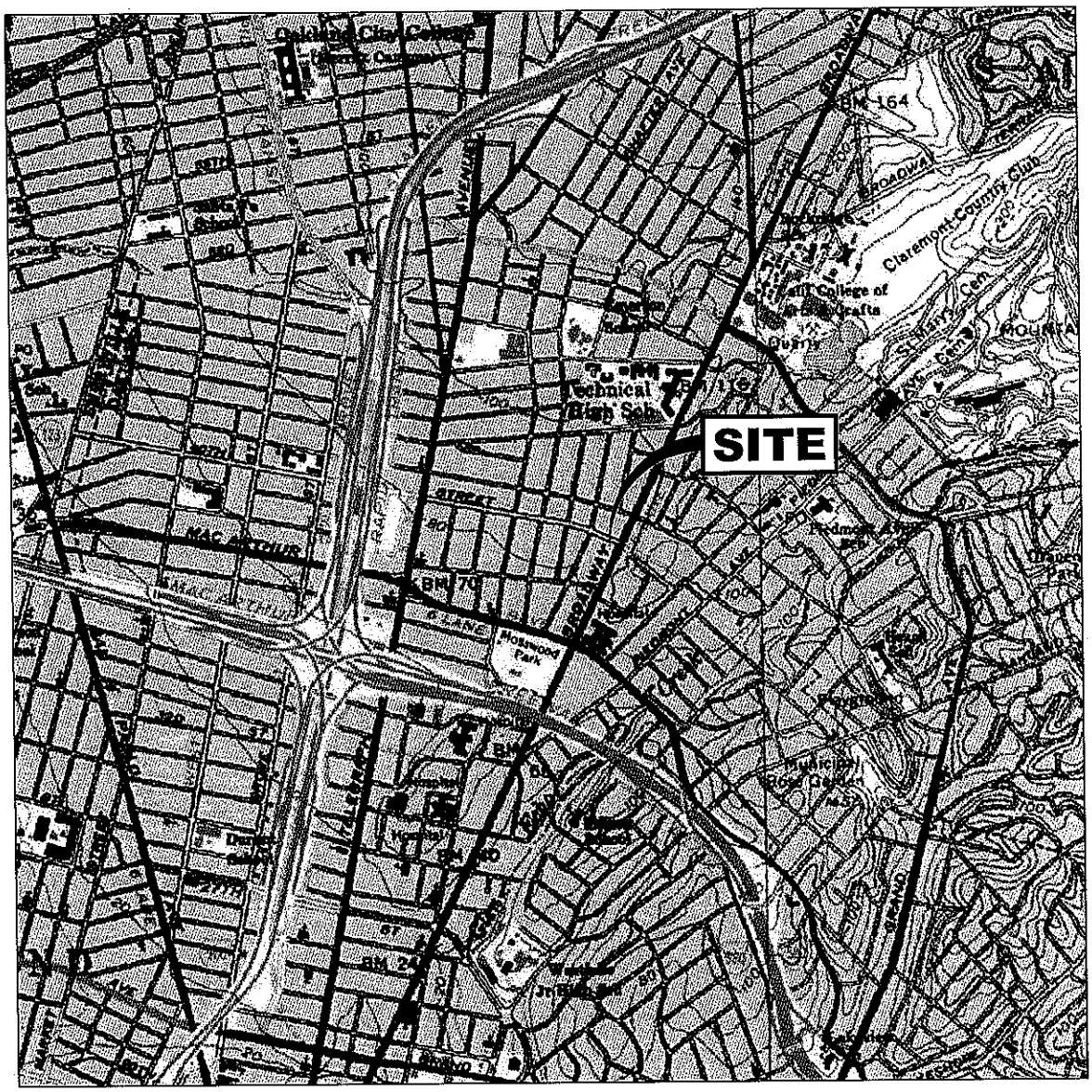
Daniel J. Davis, R.G.
Senior Project Manager

Attachments

Figure 1: Site Vicinity Map
Figure 2: Site Plan with Proposed CPT Drilling Locations

cc: Mr. Bill Borgh, ConocoPhillips (electronic upload)
Alameda County Environmental Health Services (electronic upload)

LATITUDE:	N 37° 49' 47.7"			TOWNSHIP	1S
LONGITUDE:	W 122° 15' 32.9"			RANGE	4W
UTM COORDINATES:	ZONE 10	565197 E	4187203 N	SECTION	24



OAKLAND WEST QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)

QUADRANGLE LOCATION

North

0 2000

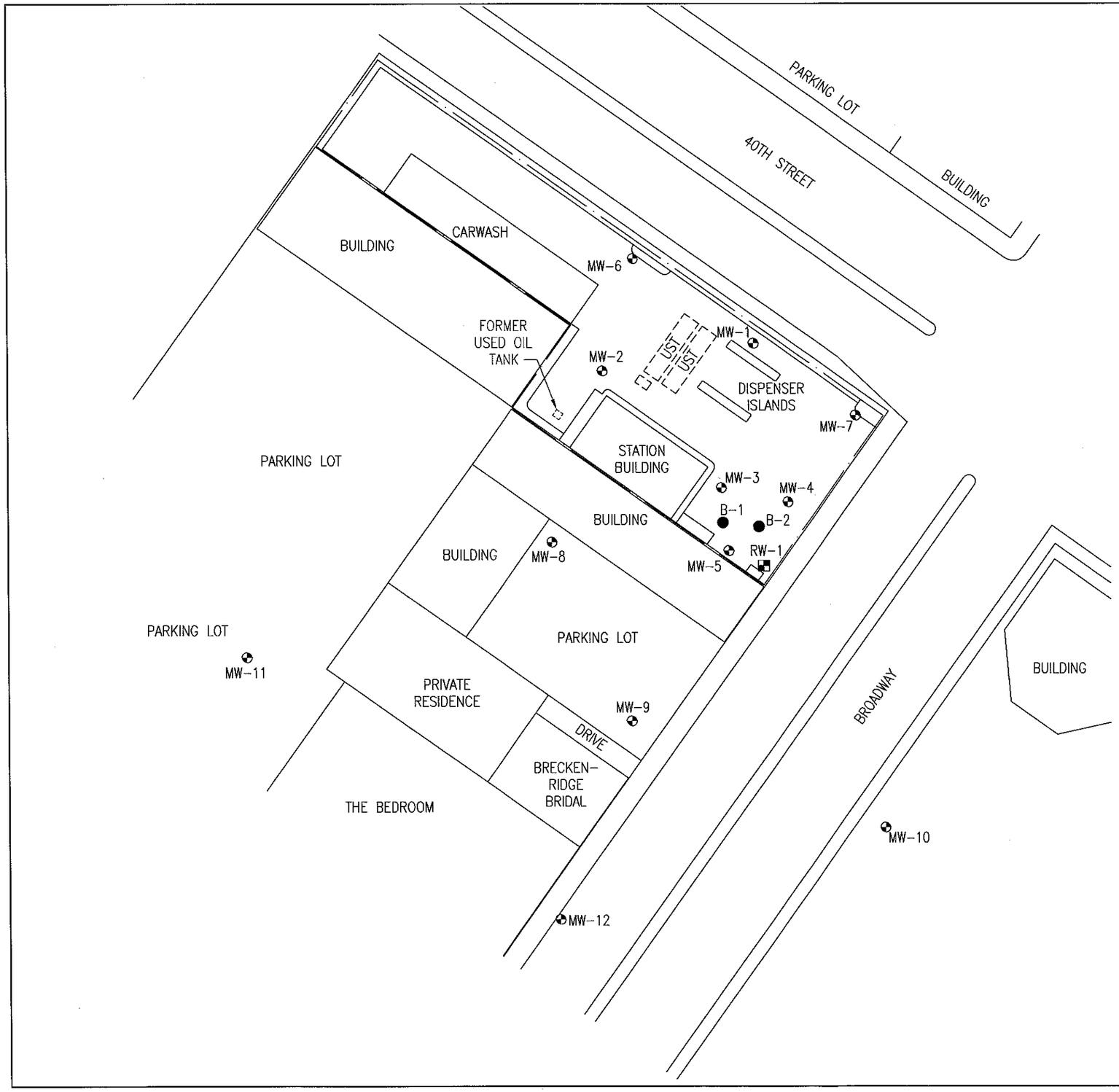
SCALE IN FEET

FIGURE 1
SITE VICINITY MAP

76 STATION NO. 0746
3943 BROADWAY
OAKLAND, CALIFORNIA

PROJECT NO.	PREPARED BY	DRAWN BY
C1007-4600-3	CM	DR
DATE	REVIEWED BY	FILE NAME
6/25/08		C100746003sm

DELTA



LEGEND

PROPOERTY BOUNDARY

MW- MONITORING WELL

RW- RECOVERY WELL

B- PROPOSED CPT BORING

North

0 50

SCALE IN FEET

FIGURE 2
SITE MAP WITH
PROPOSED CPT BORINGS
76 STATION NO. 0746
3943 BROADWAY
OAKLAND, CALIFORNIA

PROJECT NO.	PREPARED BY	DRAWN BY	
C1007-4600-3	CM	DR	
DATE	REVIEWED BY	FILE NAME	
6/25/08		C100746003sm	DELTA