Edward C. Ralston
Program Manager
Remediation Management
Phillips 66 Company
76 Broadway
Sacramento, CA 95818
Phone 916.558.7633
ed.c.ralston@P66.com

RECEIVED
By Alameda County Environmental Health at 10:29 am, Jan 08, 2015

December 31, 2014

Mr. Keith Nowell
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Work Plan for Contamination Delineation

76 (Former BP) Station No. 2611117
7210 Bancroft Avenue
Oakland, California
Fuel Leak Case No. RO0000356

Dear Mr. Nowell:

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.

If you have any questions or need additional information, please contact Mr. Dennis Dettloff at (916) 503-1261.

Sincerely,

Edward C. Ralston
Program Manager
Remediation Management

Work Plan For Contamination Delineation

76 (Former BP) Station No. 11117
7210 Bancroft Avenue
Oakland, CA

Alameda County Health Care Services Agency
Fuel Leak Case No. RO0000356

San Francisco Bay, Regional Water Quality Control Board
Case No. 01-0215

GeoTracker Global ID No.T0600100201

Antea Group Project No. I42611117

December 31, 2014

Prepared for:
Mr. Keith Nowell
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway,
Suite 250
Alameda, CA 94502-6577

Prepared by:
Antea®Group
11050 White Rock Road
Suite 110
Rancho Cordova, CA
95670
+1 800 477 7411

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Site Investigation
76 (Former BP) Station No. 11117

1.0 INTRODUCTION

Antea® Group is pleased to submit this *Work Plan for Contamination Delineation*, for the referenced site in Oakland, California (**Figure 1**). The purpose of the investigation is to delineate the hydrocarbon impact in the vicinity of 3 areas requested in an email dated December 18, 2014 from Mr. Keith Nowell, Alameda County Health Care Services Agency (ACHCSA), in preparation for the proposed excavation using large diameter augers (LDAs) (**Appendix A**).

1.1 Site Description

The site is a former 76 gas station, now a vacant lot, located at 7210 Bancroft Avenue in Oakland, California (**Figure 1**). In July 2014 the station building, fuel dispensers, underground storage tanks (USTs), and the associated product piping, were removed (**Figure 2**). In addition, all of the monitoring and remediation wells associated with the site, with the exception of monitoring well MW-10, were destroyed. See **Appendix B** for additional site information and for a history of environmental investigations and remedial actions.

2.0 PROPOSED ACTIVITIES

2.1 Health and Safety

Before commencing field activities, Antea Group will prepare a Health and Safety Plan in accordance with state and federal requirements for use during drilling activities. Drilling permits will be obtained for the soil borings from the Alameda County Public Works Agency (ACPWA). An access agreement will be obtained from the current property owner of the site. Prior to drilling, Underground Service Alert (USA) will be notified, as required by law, and a private utility locator will be employed to clear the boring locations and the proposed excavation area for underground utilities. In addition, a hand auger will be used to clear each borehole location to a depth of 5 feet below ground surface (bgs) prior to drilling.

2.2 Direct Push Investigation

Antea Group will advance soil borings near historic sample locations C-5, A-2, DPE-2, MW-2, and B (former tank pit) to approximately 35 feet bgs to confirm previously reported concentrations. The historical sample location will be located on the site by measuring the distances from the remaining curbs based on the site plan (**Figure 2**). Additional soil borings will be advanced five to ten feet from the soil boring where hydrocarbons are reported to determine the vertical and lateral extent of the hydrocarbon impact and the boundaries of the excavations in these additional areas. The final locations and number of soil boring will be determined in the field based on field observations, soil samples, Photo Ionization Detector (PID) measurements, odor, discoloration, and other signs of hydrocarbon impact.

2.3 Soil Sampling

Soil samples collected during boring advancement will be collected continuously. Soils will be classified and logged according to the Unified Soil Classification System. PID measurements will be taken and recorded approximately every 1 to 2 feet. At a minimum, soil samples with the highest PID measurements in each boring and the bottom of each boring will be collected and retained for laboratory analysis. Additional soil samples may be collected and retained for laboratory analysis based on field observations, changes in lithology, depth of first water, and historical occurrences of hydrocarbons.

Soil samples retained for laboratory analysis will be given unique sample numbers, placed in an ice-cooled chest and recorded on the chain of custody (COC). The soil samples collected from soil boring advancement activities will be submitted to Pace Analytical (Pace), a California certified analytical laboratory (No. 08263CA), and analyzed for the following constituents:

- TPHg by Environmental Protection Agency (EPA) Method 8260B;
- Benzene, toluene, ethylbenzene, total xylenes (BTEX compounds) by EPA Method 8260B;
- Methyl tertiary-butyl ether (MTBE), ethyl tertiary-butyl ether (ETBE), di-isopropyl ether (DIPE), tertiary-amyl methyl ether (TAME), teriary-butyl alcohol (TBA), ethanol, 1,2 dichloroethane (1,2-DCA) and 1,2 dibromoethane (EDB) by EPA Method 8260B; and
- CAM 17 Metals by EPA Method 6010.

2.4 Excavation Delineation

Boundaries for the additional areas of excavation will be determined based on the results from this investigation. The excavation areas will be flagged and marked with white paint. The boundaries will be measured and recorded from the remaining curbs to within a one foot accuracy. Photographs will be taken showing the delineation for future reference.

2.5 Waste Disposal

Generated waste will be stored in Department of Transportation (DOT) approved 55-gallon drums and in accordance with the corresponding DOT protocols for non-hazardous waste. Antea Group will properly label and inventory all drums. The drums will be temporarily stored on-site, pending analysis and laboratory characterization. Upon receipt of the analytical characterization data, Antea Group will arrange for a licensed disposal contractor to transport and dispose of the waste at an appropriate facility. If the excavation proceeds before the waste soil has been disposed, the waste soil will be added to the excavated waste soil for disposal.

2.6 Reporting

A summary report, describing the investigation activities will be submitted no later than 60 days after the field activities have been completed. Required electronic submittals will be uploaded to the State GeoTracker database.

3.0 REMARKS

The recommendations contained in this report represent Antea USA, Inc.'s professional opinions based upon the currently available information and are arrived at in accordance with currently accepted professional standards. This report is based upon a specific scope of work requested by the client. The contract between Antea USA, Inc. and its client outlines the scope of work, and only those tasks specifically authorized by that contract or outlined in this report were performed. This report is intended only for the use of Antea USA, Inc.'s client and anyone else specifically identified in writing by Antea USA, Inc. as a user of this report. Antea USA, Inc. will not and cannot be liable for unauthorized reliance by any other third party. Other than as contained in this paragraph, Antea USA, Inc. makes no express or implied warranty as to the contents of this report.

Jonathan Fillingame Date: 12/31/14

Jonathan Fillingame
Staff Geologist

Reviewed by:

PROFESSIONAL GEOLOGIST
DENNIS SHANNON DETTLOFF
No. 7480
STATE OF CALIFORNIA

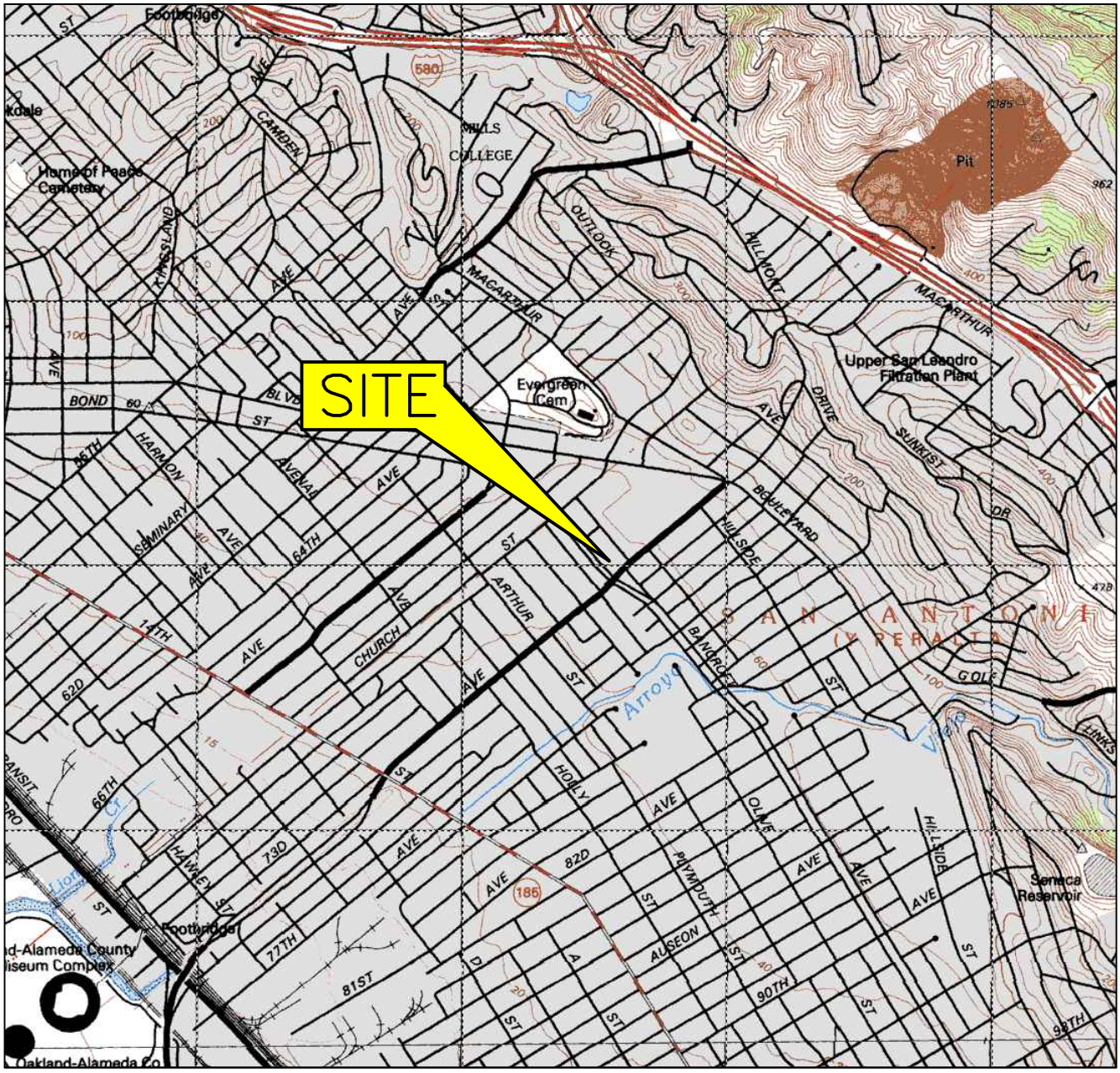
Dennis S Dettloff Date: 12/31/14

Dennis S. Dettloff, P.G.
Senior Project Manager
California Registered Geologist No. 7480

cc: Ms. Tiffany McClendon, One Eastmont Town Center, 7200 Bancroft Avenue, Oakland, CA 94605
GeoTracker (upload)

Figures

Figure 1 Site Location Map
Figure 2 Site Plan
Figure 3 Site Plan with Proposed Investigation Areas



QUADRANGLE LOCATION

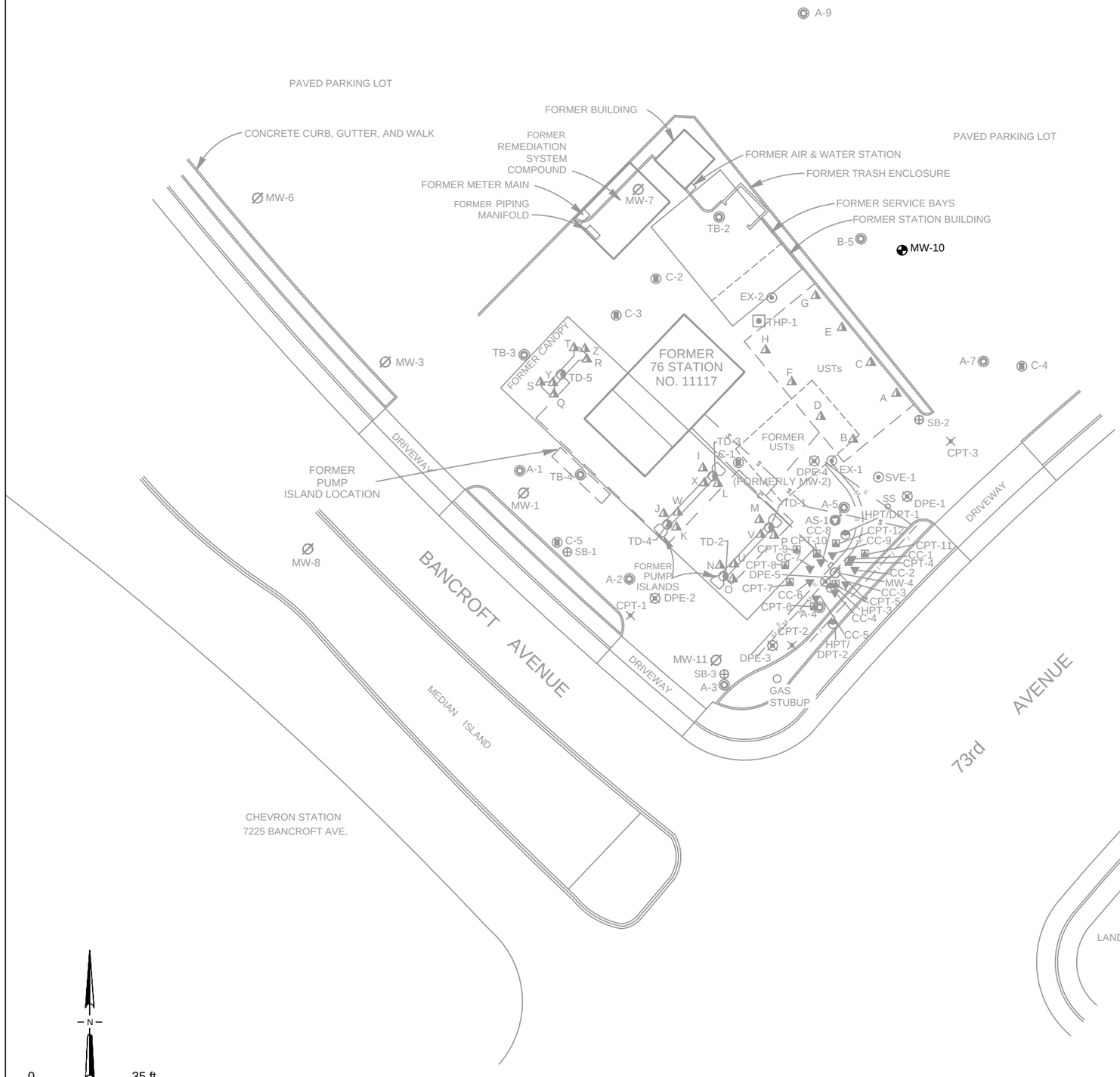
GENERAL NOTES:
BASE MAP FROM USGS, 7.5 MINUTE
TOPOGRAPHIC OAKLAND, CA. PHOTO REVISED 1980

FIGURE 1
SITE LOCATION MAP

76 (FORMER BP) STATION NO 11117
7210 BANCROFT AVENUE
OAKLAND, CALIFORNIA

PROJECT NO.	PREPARED BY	DRAWN BY	
I42611117	DD	JH	
DATE	REVIEWED BY	FILE NAME	
3/14/14	DU	11117-TOPO	

antea group



EXPLANATION

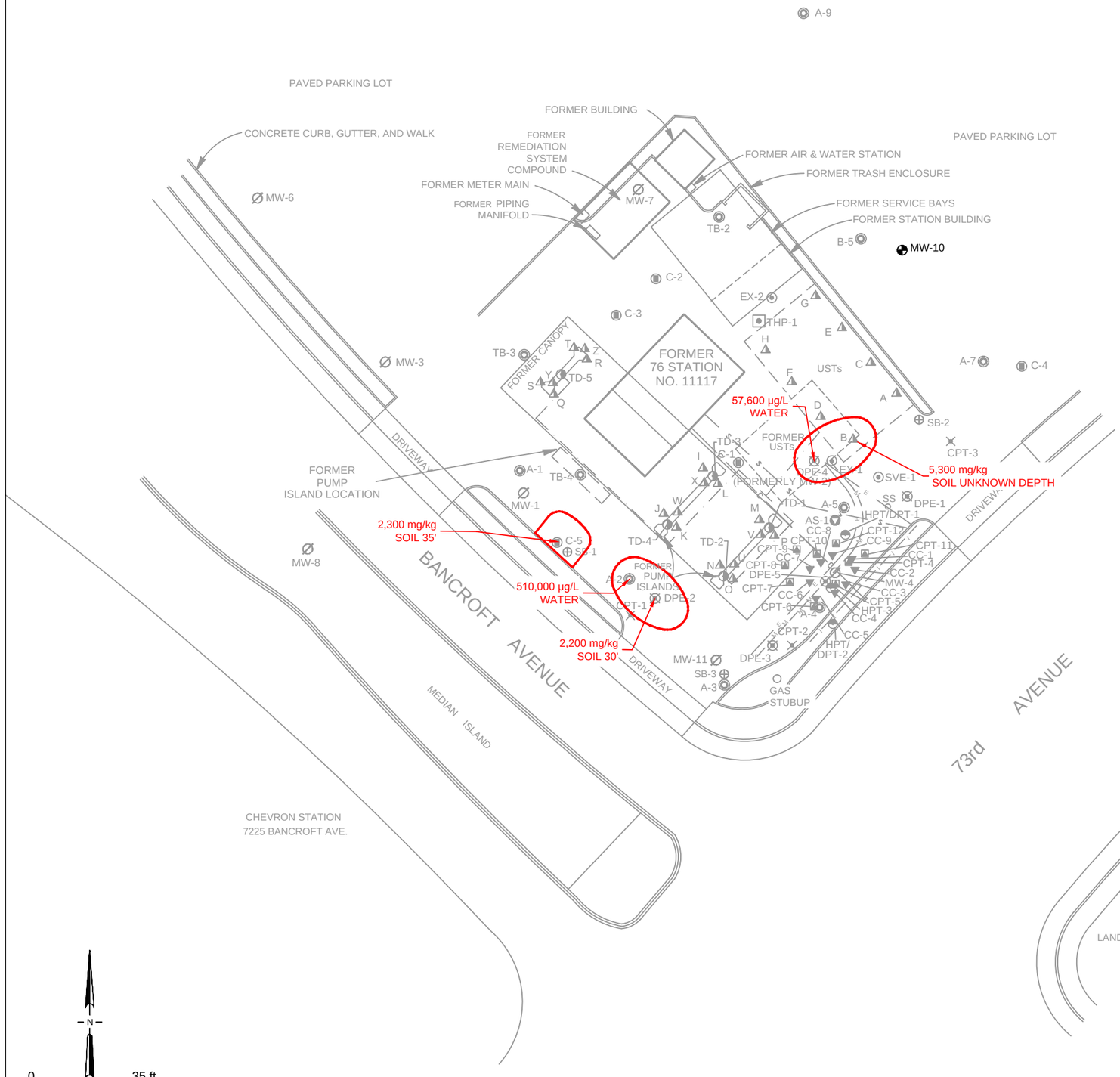
MW-10	GROUNDWATER MONITORING WELL LOCATION
MW-7	DESTROYED GROUNDWATER MONITORING WELL LOCATION
DPE-2	DESTROYED GROUNDWATER EXTRACTION WELL LOCATION
EX-1	DESTROYED SOIL VAPOR EXTRACTION WELL LOCATION
AS-1	DESTROYED AIR SPARGE WELL LOCATION
HPT-3	HPT BORING LOCATION
CC-1	INJECTION LOCATION
SS	SEWER CLEANOUT LOCATION
SB-2	FUTURE USE STUB-OUT LOCATION
CPT-12	CPT / UVOST BORING (ANTEA GROUP 2013)
C-1	SOIL BORING LOCATION (ANTEA GROUP, 2011)
CPT-1	CONE PENETROMETER TEST BORINGS BROADBENT & ASSOCIATES, INC. (JUNE, 2007)
A-1/TB-2	SOIL BORING LOCATION A BORINGS (URS, NOVEMBER 2005) B BORING (HEDI, 1992) T BORINGS (EMCON, 1994)
TD-1	DISPENSER GRAB SAMPLE LOCATION (EMCON, SEPTEMBER 1994)
THP-1	HYDROPUNCH BORING LOCATION (EMCON, SEPTEMBER 1994)
A	SOIL SAMPLES COLLECTED DURING ERI UST, PRODUCT LINE, AND DISPENSER REMOVAL (NOVEMBER, 1998)
	PRODUCT LINES
C	UNDERGROUND COMMUNICATIONS LINE
E	UNDERGROUND ELECTRIC LINE
I	UNDERGROUND IRRIGATION LINE
M	UNDERGROUND METAL PIPE LINE
S	UNDERGROUND SEWER LINE

FIGURE 2
SITE PLAN

76 (FORMER BP) STATION NO 11117
7210 BANCROFT AVENUE
OAKLAND, CALIFORNIA

PROJECT NO.	PREPARED BY	DRAWN BY
142611117	JF	JH
DATE	REVIEWED BY	FILE NAME
12/31/14	DD	11117-SMS

antea group



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I	UNDERGROUND IRRIGATION LINE
M	UNDERGROUND METAL PIPE LINE
S	UNDERGROUND SEWER LINE
	PROPOSED INVESTIGATION AREA

FIGURE 3
SITE PLAN WITH PROPOSED INVESTIGATION AREAS

76 (FORMER BP) STATION NO 11117
7210 BANCROFT AVENUE
OAKLAND, CALIFORNIA

PROJECT NO.	PREPARED BY	DRAWN BY
142611117	JF	JH
DATE	REVIEWED BY	FILE NAME
12/31/14	DD	11117-SMS

antea group

Appendix A

ACHCSA E-mail

Jonathan Fillingame

From: Nowell, Keith, Env. Health <Keith.Nowell@acgov.org>
Sent: Thursday, December 18, 2014 10:37 AM
To: Ed.C.Ralston@p66.com
Cc: Dennis Dettloff; Roe, Dilan, Env. Health; 'jpaul@skbcos.com'
Subject: Fuel Leak Case RO356 - BP #11117, 7210 Bancroft, Oakland, CA

Dear Mr. Ralston,

Alameda County Environmental Health (ACEH) has reviewed the case file including the document entitled draft Corrective Action Plan (CAP) dated July 29, 2014 prepared by Antea Group (Antea) for the subject site. The CAP proposes to over excavate an area of residual contamination through the use of large diameter augers (LDAs). As ACEH previously noted in its Directive letter dated July 14, 2014, other areas at the site appear to contain significantly elevated residual petroleum hydrocarbon contamination at depth and requested LDA be used to remediate these areas. This includes bore location C-5, with a total petroleum hydrocarbons as gasoline (TPHg) concentration of 2,300 milligrams per kilogram (mg/kg) at 35 feet below the ground surface (bgs), bore DPE-2 with TPHg concentration of 2,200 mg/kg at 30 feet bgs, bore B having 5,300 mg/kg TPHg at 15 feet bgs, and free product historically reported in well MW-2 and the grab groundwater sample from bore A-2 with 510,000 micrograms per liter (ug/L) TPHg.

ACEH is in agreement with Anteas proposal that a work plan addressing the characterization of these areas be prepared and submitted to ACEH prior to the initiation of over excavation using large diameter augers at the site.

Please prepare a work plan to delineate residual contamination locations C-5, DPE-2, A-2, B, and MW-2 for the purpose of using LDA over excavation. Please upload technical reports to the ACEH ftp site (Attention: Keith Nowell), and to the State Water Resources Control Board's Geotracker and ACEHs FTP websites, in accordance with the following specified file naming convention and schedule:

- **February 14, 2015– Work Plan for Contamination Delineation** (file name: RO0000356_WP_R_yyyy-mm-dd)

Thank you for your cooperation. ACEH looks forward to working with you and your consultants to advance the case toward closure. Should you have any questions regarding this correspondence or your case, please call me at (510) 567-6764 or send an electronic mail message at keith.nowell@acgov.org.

Respectfully,
Keith Nowell

Keith Nowell PG, CHG
Hazardous Materials Specialist
Alameda County Environmental Health
1131 Harbor Bay Parkway
Alameda , CA 94502-6540
phone: 510 / 567 - 6764
fax: 510 / 337 - 9335
email: keith.nowell@acgov.org

PDF copies of case files can be reviewed/downloaded at:

http://www.acgov.org/aceh/lop/ust.htm

Appendix B

Previous Investigation and Site History Summary

SITE LOCATION AND BACKGROUND

The Site is an active 76-brand gasoline retail outlet located on the northern corner of Bancroft Avenue and 73rd Avenue at 7210 Bancroft Avenue in Oakland, Alameda County, California (**Figure 1**). The site consists of a service station building, three 12,000-gallon gasoline underground storage tanks (USTs), and one 10,000-gallon diesel UST with associated piping and dispensers. The site is covered with asphalt or concrete surfacing except for planters along the southeastern and southwestern property boundaries and at the north corner of the property.

Land use in the immediate vicinity of the site is mixed commercial and residential. BP acquired the facility from Mobil Oil Corporation in 1989. In January 1994, BP transferred the property to TOSCO Marketing Company (TOSCO) and has not operated the facility since that time.

SUMMARY OF PREVIOUS ENVIRONMENTAL INVESTIGATIONS

1984 UST Replacement: In 1984, the pre-existing USTs at the site were removed and three single-walled fiberglass gasoline USTs (6,000-gallon, 10,000-gallon, and 12,000-gallon) and one 6,000-gallon diesel UST were installed in a cavity immediately to the northeast of the former USTs. A UST removal/installation report is not on file, and it is unknown if one was ever prepared. No documentation was reportedly found referencing the conditions of the removed USTs or reporting evidence of the hydrocarbon impacts in the soil and groundwater, if any, at the time of the UST removal.

1989 Phase II Environmental Audit: In December 1989, Hunter Environmental Services, Inc. (Hunter) performed a Phase II Environmental Audit on the adjacent Eastmont Town Center site located to the north and northwest of the former BP Site. Part of the Phase II study included the installation monitoring well MW-3 near the western boundary of the former BP Site. Soil samples collected from 10 and 20 feet below ground surface (bgs) from MW-3 were analyzed for total petroleum hydrocarbons (TPH), benzene, toluene, ethyl benzene, and total xylenes (BTEX), and oil and grease. No analytes were reported above their respective laboratory reporting limits (LRLs). A groundwater sample collected from MW-3 was reported to contain TPH and benzene at concentrations of 2,700 micrograms per liter (µg/L) and 530 µg/L, respectively (Hunter, 1989).

1991 Phase I Subsurface Investigation: In December 1991, Hydro Environmental Technologies, Inc. (Hydro) drilled two on-site soil borings (MW-1 and MW-2) to total depths of 40 feet bgs, and soil samples were collected at 10-foot intervals between 5 and 25 feet bgs. First groundwater was encountered at approximately 30 feet bgs. The analytical results of the soil samples from MW-1 and MW-2 reported total petroleum hydrocarbons as gasoline (TPHg) and BTEX at concentrations below their respective LRLs (Hydro, 1991).

1992 Phase I Subsurface Investigation: In July 1992, Hydro advanced boring MW-4 and MW-6 to total depths of 40 feet bgs, and boring B-5 was advanced to 50 feet bgs, First groundwater was encountered at approximately 30 feet bgs in borings MW-4 and MW-6, and no free water was encountered in boring B-5. The analytical results of soil samples collected at 30 feet bgs from B-5 and MW-6 reported TPHg and BTEX at concentrations below their respective LRLs. The maximum TPHg and BTEX concentrations in soil reported in MW-4 were 6,000 milligrams per kilogram (mg/kg) and 34 mg/kg, respectively, from a depth of 20 feet bgs. Borings MW-4 and MW-6 were subsequently converted into monitoring wells (Hydro, 1992).

1994 Baseline Assessment Report: In September 1994, EMCON performed a Supplemental Site Assessment at the site. Four exploratory soil borings (THP-1, TB-2, TB-3, TB-4) were advanced to a maximum depth of 45 feet bgs north of the

former and existing UST complexes (THP-1), at the former service bays (TB-2), north of the northern pump island (TB-3), and at a former pump island (TB-4). Additionally, one soil sample was collected from beneath each of the five dispensers (TD-1 through TD-5). Groundwater was encountered in TB-2 and TB-3 at approximately 33 to 36 feet bgs and groundwater samples were collected from TB-2 and TB-3 via temporarily well points. Maximum concentrations of 16 mg/kg TPHg (TD-3), TPH as diesel (TPHd) at concentrations ranging from 110 mg/kg to 5,000 mg/kg (TD-1 through TD-5), and benzene at concentrations below LRLs were reported in soil samples. TPHg was not reported above the LRLs and a maximum concentration of 0.7 µg/L benzene (TB-3) was reported in groundwater samples (EMCON, 1994).

1994 Well Installation: In October 1994, Hydro advanced boring MW-7 to a total depth of 45 feet bgs, and borings MW-8 and MW-9 were advanced to total depths of 40 feet bgs. First encountered groundwater was at approximately 27 feet bgs to 32 feet bgs. TPHg and BTEX were not reported above their respective LRLs in soil samples collected from 25 feet bgs in each boring. The three borings were subsequently converted into monitoring wells MW-7 through MW-9 (Hydro, 1995).

1997 Offsite Well Installation: In July 1997, Pacific Environmental Group (PEG) drilled one boring (MW-10) offsite to a depth of approximately 37.5 feet bgs. Soil samples were collected and the boring was subsequently converted into a monitoring well. First groundwater was encountered at approximately 26 feet bgs. No TPHg, BTEX or methyl tertiary butyl ether (MTBE) was reported in soil samples at concentrations above their respective LRLs in MW-10. TPHg and BTEX were not reported in the groundwater sample collected from MW-10 at concentrations above their respective LRLs. However, MTBE was reported at concentration of 13 µg/L using EPA Method 8020 (PEG, 1997).

1998 UST and Associated Piping and Dispenser Removal: In August 1998, Environmental Resolutions, Inc. (ERI) removed the three gasoline USTs (6,000-gallon, 10,000-gallon, and 12,000-gallon), one 6,000-gallon diesel UST, and associated dispensers and piping from the site. There was no visible evidence of leakage from the USTs removed. A total of eight native soil samples were collected from beneath each end of the removed USTs (denoted as A through H on **Figure 2**) at depths of 14 to 16 feet bgs, and a total of 18 soil samples (denoted as I through Z on **Figure 2**) were collected from the former dispenser locations and from beneath the associated product lines at three feet bgs (ERI, 1998).

TPHg was reported in five of the eight UST excavation samples at concentrations ranging from 3.7 mg/kg (S-15-T2S) to 5,300 mg/kg (S-15-T1S). TPHd was reported at 630 mg/kg (S-15-T1N) and 800mg/kg (S-15 T1S) into two samples, benzene concentrations ranged between 0.40 mg/kg (S-15-T1N) to 0.95 mg/kg (S-16-T3N) in three samples, MTBE concentrations ranged between 0.028 mg/kg (S-14-T4S) to 5.3 mg/kg (S-16-T3N) in seven samples, and lead was not reported in the sample analyzed for lead. TPHg was reported in nine of the eighteen dispenser and product line samples with concentrations ranging between 1.4 mg/kg (S-3-PL12) to 7,200 mg/kg (S-3-D4). TPHd was reported between 4.8 mg/kg (S-3-PL12) to 190 mg/kg (S-3-PL11) in five samples, benzene was reported between 0.0089 mg/kg (S-3-PL12) to 22 mg/kg (S-3-D4) in three samples and MTBE was reported between 0.048 mg/kg (S-3-PL12) to 15 mg/kg (S-3-PL1) in ten samples (ERI, 1998).

During the 1998 UST replacement activities, approximately 389 tons of soil and backfill were transported off-site disposal. The existing 10,000-gallon diesel and three 12,000-gallon gasoline USTs were installed as replacements (ERI, 1998).

1999 Groundwater Recovery Test: In April 1999, Alisto Engineering Group (Alisto) conducted groundwater recovery tests on wells MW-1 through MW-4, MW-6, MW-7 and MW-10 to assess the spatial variation in hydraulic conductivity in the

shallow water-bearing zone across the Site. Testing by the Bouwer-Rice method yielded hydraulic conductivities of 2.46 x 10^{-2} ft/min for MW-1, 2.42 x 10^{-4} ft/min for MW-2, 3.82 x 10^{-4} ft/min for MW-3, 5.75 x 10-4 ft/min for MW-4, 1.99 x 10^{-2} ft/min for MW-6 1.09 x 10^{-4} ft/min for MW-7 and 8.78 x 10^{-5} ft/min for MW-10. The geometric mean of the hydraulic conductivity and flow velocity values were calculated to be 1.37 x 10-5 feet per second and 73.85 feet per year, respectively (Alisto, 1999).

1999 Extraction Well Installation: In November 1999, Cambria Environmental Technology, Inc. (Cambria) installed two 4-inch diameter wells (EX-1 and EX-2) on-site to facilitate potential remedial activities at the site. Well EX-1 was drilled to 39.5 feet bgs and EX-2 was drilled to 36.5 feet bgs. Groundwater was first encountered at 26 feet bgs. No TPHg or BTEX, and relatively low MTBE concentrations (below 0.012 mg/kg) were reported in soil samples collected from EX-1 and EX-2 (Cambria, 2000).

2000 Interim Remedial Action and Recovery Testing: Between March 16 and April 30, 2000, Cambria conducted interim remedial activities at the site to evaluate the effectiveness of hydrocarbon and MTBE reduction using short-term groundwater extraction. During eight extraction events, approximately 10,900 gallons of groundwater was extracted from wells EX-1, EX-2 and MW-2. During the extraction events, stable to slightly decreasing hydrocarbon and MTBE concentration trends were reported in samples collected from wells MW-2 and EX-1, located immediately southwest of the existing USTs. Samples from well EX-2, located north of the existing USTs, exhibited lower hydrocarbon and MTBE concentrations than MW-2 and EX-1. In April 2000, during the batch extraction events, recovery tests were conducted on wells EX-1, EX-2 and MW-2. Based on the recovery test measurements, the calculated hydraulic conductivity values ranged from 1.85 x 10^{-4} ft/min to 8.33 x 10^{-4} ft/min with resulting flow velocities of 16 ft/year to 73 ft/year at well MW-2 (Cambria, 2000).

The calculated hydraulic conductivity values ranged from 2.02 x 10^{-5} ft/min to 3.85 x 10^{-5} ft/min for well EX-1 with resulting flow velocities of 1.8 to 3.4 Ft/yr. And a well EX-2, the calculated hydraulic conductivity values ranged from 3.04 x 10^{-4} ft/min to 2.13 x 10^{-3} ft/min for resulting flow velocities of 27 ft/year to 187 ft/year. The geometric mean of these values is a hydraulic conductivity of 3.0 x 10^{-4} ft/min and resulting flow velocity of 26 ft/year (Cambria, 2000).

2001 Dual-Phase Extraction Pilot Test: From October 29, through November 2, 2001, Cambia performed a dual phase soil vapor and groundwater extraction (DPE) pilot test on the monitoring wells with the highest historical hydrocarbon concentrations (i.e., MW-2 and MW-4) and the extraction wells (EX-1 and EX-2) at the site. The DPE test results indicated that the vacuum influence was limited to within 18 to 28 feet of the extraction well. Water levels typically decreased several feet in the extraction wells and had a varied response in the observation wells. Estimated vapor-phase removal rates were approximately 200-pounds of hydrocarbon per day in wells MW-4 and EX-1, and less than 5-pounds of hydrocarbon per day in wells MW-2 and EX-2 (Cambria 2002).

Soil vapor concentrations showed a decreasing trend in wells MW-4 and EX-1 during the short-term pilot tests. Grab water samples collected before and after the pilot tests remained the same order of magnitude. A total of 6,500 gallons of water were extracted during the DPE pilot test and appropriately disposed off-site. Overall, the test results indicated that DPE is a feasible remedial alternative for the site (Cambria, 2002). Alameda County Environmental Health (ACEH) approved Cambria's August 8, 2002, *Dual Phase Extraction Pilot Test Report* as a Corrective Action Plan (CAP).

2005 Soil and Water Investigation: In fall 2005, URS completed nine Geoprobe soil borings with co-located Hydropunch borings. The first phase of work was on-site source area characterization: five boring locations (A-1 through A-5) were advanced in the vicinity of the possible hydrocarbons source areas such as locations of former and current USTs, products dispensers, and in the vicinity of MW-4 to adequately characterize the lateral and vertical extent of petroleum hydrocarbons in soils in the identified source areas. An off-site assessment was completed during the second phase of work (borings A-7 through A-10) to further define the downgradient, cross-gradient, and up-gradient extent of the groundwater plume (soil boring A-6 was unable to be advanced due to close proximity to electric lines and product piping). Maximum concentrations of TPHg, benzene, and MTBE were reported in soil at concentrations of 490 mg/kg [A-4 (23.5-24')], 0.11 mg/kg [A-5 (35-35.5')], and 0.84 mg/kg [A-1 (46-46.5')], respectively. Maximum concentrations of GRO, benzene, and MTBE were reported in ground water at concentrations of 510,000 µg/L [A-2 (21.3')], 11,000 µg/L [A-4 (34-36')], and 39,000 ug/L [A-4 (34-36')], respectively (URS, 2005).

The cross-gradient and downgradient lateral extents of the dissolved hydrocarbon plume were characterized during the last investigation. However, the vertical extent of the dissolved-phase hydrocarbons on the southern portion of the site was not defined. Specifically, significantly elevated concentrations were reported in Hydropunch groundwater samples collected from the bottom depths of soil borings A-2, A-3 and A-4. The bottom Hydropunch sample collected from boring A-2 (40-42 ft bgs) contained concentrations of GRO, benzene, and MTBE at 36,000 µg/L. 1,800 µg/L, and 110 µg/L, respectively. The bottom Hydropunch sample collected from boring A-3 (34-36 ft bgs) contained concentrations of GRO, benzene, and MTBE at 12,000µg/L, 21µg/L, and 8.3µg/L respectively. The bottom Hydropunch sample collected from boring A-4 (34-36 ft bgs) contained GRO, benzene, and MTBE concentrations of 120,000µg/L, 11,000µg/L and 39,000 µg/L respectively (URS, 2005).

Therefore, the vertical extent of dissolved phase petroleum hydrocarbon contamination remains unknown in this southern area of the site (URS, 2005). A work plan for soil and water investigation to delineate the vertical extent of contamination in the southern portion of the site was submitted to ACEH in October 2006.

2007 Soil and Groundwater Investigation: In April 2007, Stratus Environmental, Inc. (Stratus) advanced cone penetrometer test (CPT) borings in three locations onsite (CPT-1 through CPT-3) to maximum depths of 60 feet bgs. CPT-1 was advanced southwest of the dispenser islands and southeast of monitoring well MW-1; CPT-2 was advanced south of the dispenser islands and southwest of monitoring well MW-4; CPT-3 was advanced in the eastern corner of the side as requested by the ACEH. An Ultraviolet Induced Fluorescence (UVIF) module was used at each CPT boring location, analyzing the vertical extent of petroleum hydrocarbons in additional to providing soil profiling data. Groundwater samples were collected from multiple depths at each boring locations; physical soil samples were not collected during this investigation.

- TPHg was reported above laboratory reporting limits in five of the seven groundwater samples, ranging from 170 µg/L (CPT-3-28-32') to 170,000 µg/L (CPT-1-37-41').
- Benzene was reported above laboratory reporting limits in four of the seven groundwater samples, ranging from 0.51 µg/L (CPT-3-23-27') to 7,700 µg/L (CPT-2-37-41').
- Toluene was reported above laboratory reporting limits in three of the seven groundwater samples, ranging from 57 µg/L (CPT-1-30-34') to 670 µg/L (CPT-2-28-32').

- Ethylbenzene was reported above laboratory reporting limits in four of the seven groundwater samples, ranging from 530 µg/L (CPT-2-37-41') to 2,600 µg/L (CPT-1-37-41').
- Total xylenes were reported above laboratory reporting limits in four of the seven groundwater samples, ranging from 290 µg/L (CPT-2-37-41') to 9,600 µg/L (CPT-1-37-41').
- MTBE was reported above laboratory reporting limits in five of the seven groundwater samples, ranging from 4.4 µg/L (CPT-3-56-60') to 6,500 µg/L (CPT-2-37-41').
- TBA was reported above laboratory reporting limits in groundwater sample CPT-2-37-41' at 2,400 µg/L.

2007-2008 DPE System Installation: Construction of the DPE system was started by Broadbent & Associates, Inc (BAI) and Stratus in late 2007. The system consists of a thermal/catalytic oxidizer with a 25 horsepower liquid ring blower designed to extract water and vapor from six on-site extraction wells. Extracted vapor were to be treated by thermal/catalytic oxidation and discharged to the atmosphere under the oversight of the Bay Area Air Quality Management District. Extracted groundwater was to be treated by a sediment filter and three 1,000 pounds carbon vessels before being discharged into the City of Oakland sanitary sewer system. DPE wells DPE-1 through DPE-5 were installed at the site to total depths ranging from 35 feet to 40 feet bgs. Well MW-2 was overdrilled and destroyed to allow DPE-4 to be installed in the same borehole.

As of the end of the fourth quarter 2008 the system had not been started. BAI and Stratus were still coordinating with Pacific Gas & Electric (PG&E) to install electrical service to the system. Natural gas was completed to the site and system in third quarter 2008 (BAI, 2008a).

During DPE construction activities, on-site groundwater monitoring well MW-11 was installed to a total depth of 40 feet bgs on the southern corner of the site. Soil samples collected at 20 feet and 30 feet bgs reported maximum concentrations of 1.9 mg/kg TPHg and 0.0089 mg/kg benzene. MTBE was not reported above the LRL in either of the soil samples (BAI, 2008a).

2009-2011 DPE System Startup Efforts: In 2009, Antea Group (formerly Delta Consultants) began coordinating with nearby businesses (Eastmont Mall and Burger King) for the 3-phase power source. Due to financial consideration, Antea Group also explored another alternative for the startup of the DPE system, which included reconfiguring the current system for single phase power.

2011-2012 Remedial Action Site Investigation: Antea Group submitted the *Remedial Action Investigation Work Plan*, dated August 03, 2011 to the ACEH. The ACEH approved the proposed scope of work in an agency letter to Antea Group dated September 1, 2011. In October 2011, Antea Group and subcontractors advanced borings C-1 through C-5, and advanced and installed remedial wells SVE-1 and AS-1 per the August 2011 work plan. Antea Group submitted a *Remedial Investigation Work Plan Addendum*, dated December 13, 2011 which proposes a postponement of the AS/SVE pilot test described in the August 3, 2011 *Remedial Action Investigation Work Plan* to utilize a new remedial strategy called Plume Stop, a product created by Regenesis. Between March 26 and 30, 2012, Antea Group and Regenesis oversaw subcontractor Vironex inject Plume Stop at nine soil boring locations using direct push technology.

2013 Site Investigation: Antea Group conducted a site investigation on October 14 through 18, 2013 including the advancement of nine CPT borings (CPT-4 through CPT-12). The borings were advanced in the vicinity of monitoring well

MW-4 in an attempt to evaluate soil contamination in the area in preparation for a feasibility study/corrective action plan. Results of the investigation were reported in the *Site Investigation Report*, dated January 24, 2014.

2014 Well Destruction: On July 7 through 10, 2014, Cascade Drilling (Cascade), under supervision of an Antea Group field geologist, destroyed fifteen (15) on-site wells (MW-1, MW-3, MW-4, MW-6, MW-7, MW-11, EX-1, EX-2, DPE-1 through DPE-5, SVE-1, and AS-1) and two (2) off-site wells (MW-8 and MW-9). The well destruction was conducted in preparation for site razing, fuel dispenser piping and UST removal activities.

FREE PRODUCT RECOVERY DURING GROUNDWATER MONITORING EVENTS

Free product was observed in groundwater monitoring well MW-2 between 1993 and 1998, at thicknesses ranging from 2.60 feet (3/30/1994) to less than 0.01 feet (10/2/1997 to 7/21/1998). When free product was observed in the well, it was removed by bailer. Between 1993 and 1998, a cumulative total of 24.90 gallons of free product had been removed from the well (Alisto, 1998).

Free product was also observed in monitoring well MW-4 during the third quarter 2001 (0.03 inches), fourth quarter 2006 (0.11 inches), first quarter 2008 (0.01 inches), and third quarter 2008 (0.05 inches); and in EX-2 during the second quarter 2007 (0.01 inch). With the exception of 1.5 gallons of a free product/water mixture recovered from monitoring well MW-4 during the third quarter 2008 (BAI, 2008b), free product was not recovered from these wells when observed.

SENSTIVE RECEPTORS

2000 Potential Receptor Survey, Expanded Site Plan and Well Search: In October 2000, Alisto completed a potential receptor survey, prepared an expanded site plan with neighboring property parcel information and underground utilities mapped, and identified wells in the vicinity of the site. A review of the files of the California Department of Water Resources (DWR) was performed to identify all known wells within one-half mile radius of the site. The results of the well search revealed that there were 17 wells other than the on-site monitoring sells. Of these, 11 were offsite monitoring wells; four were cathodic protection wells, one an industrial well, and one irrigation well for a nearby cemetery. No domestic/municipal water supply wells were identified from review of the DWR files (Alisto, 2000).

2010 Sensitive Receptor Survey: Delta Consultants (Delta) submitted a *Sensitive Receptor Survey* in October 2010. As part of that receptor survey, Delta conducted a records review (environmental database search), a well radius search, and a search for other sensitive receptors which have the potential to be affected by the petroleum hydrocarbon release at the site. Delta's review of the historical aerial photographs indicated that the site in 1939 was primarily used for agricultural purposes with small family residences. In general, the site was developed to the current conditions with the station building in 1974. The historical topographic maps support the indication of residential houses and agriculture in the site region as early as 1915 to 1948. The well search indicated that 10 wells were within a one-mile radius of the site. DWR indicated the presence of 7 wells within a one-mile radius of the site. However, no records were found for the status of these wells as being active or abandoned. The main surface water bodies were Lake Merritt located northwest of the site and San Leandro Bay located west of the site. Several churches, schools and day care centers were located within a one-mile radius of the site. Based on the above identified receptors' distances form the site, directions from the site, and extent of hydrocarbon impact at the site, they were not anticipated to be affected by the petroleum hydrocarbon release at the site.