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June 9, 2014

Mr. Keith Nowell
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Work Plan – Work Plan-Interim Remediation

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 - Interim Remediation

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

June 9, 2014

Prepared for:
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Work Plan

Interim Remediation
76 (Former BP) Station No. 11117

1.0 INTRODUCTION

Antea™Group is pleased to submit this *Work Plan – Interim Remediation*, for the referenced site in Oakland, California (**Figure 1**). The proposed interim remediation will consist of excavating soils in the vicinity of monitoring well MW-4 using large diameter augers (LDAs) as discussed in a conference call with Alameda County Health Care Services Agency (ACHCSA) on May 28, 2014.

1.1 Site Description

The site is currently a closed 76 gas station located at 7210 Bancroft Avenue in Oakland, California (**Figure 1**). The site contains three 12,000-gallon gasoline, underground storage tanks (USTs), one 10,000-gallon diesel UST, and the associated product piping and dispensers (**Figure 2**). See **Appendix A** 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 excavation activities. Drilling permits will be obtained for the well destruction and replacement from the Alameda County Public Works Agency (ACPWA). The following agencies will be notified at least 10 days prior to the start of excavation activities: Alameda County Public Works Agency, City of Oakland Building and Planning Department, City of Oakland Fire Department, and the ACHCSA. 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 well locations and the proposed excavation area for underground utilities.

2.2 Site Set-up

Prior to the start of excavation activities, the following set-up will be implemented at the site:

- Set-up traffic and pedestrian controls per appropriate city and/ or county public agencies approved traffic control plans;
- Set-up temporary fencing or barricades around excavation and work areas;
- Post placards and notifications at site entrance and exits identifying work, physical/chemical/environmental hazards (including Proposition 65 warnings and personal protective equipment required) and emergency contact information;
- Establish and set-up exclusion, contamination reduction, and support zones;
- Establish staging area and truck/equipment entrance and exits;

Set-up real-time air monitoring stations and storm water control measures.

2.3 Excavation Extent and Methods

Based on the historical concentrations of contaminants of concern in soil reported at the site, the anticipated extent of the excavation area is to be 20 feet by 30 feet and 35 feet deep and is depicted on **Figure 3**.

The excavation area is bordered by a planter box to the south east and a dispenser island to the northwest. The excavation area extends to the southwest to envelope the location of CPT-6 and to the northeast to envelope CPT-12. The approximate dimensions of the excavation area are 20-feet long on the southwest-northeast axis and 30-feet long on the southeast-northwest axis. The average depth of the excavation anticipated to remove residual soil impact is approximately 35-feet below ground surface (bgs). Approximately 777 cubic yards of soil will be removed from the excavation area for off-site disposal.

Antea Group proposes excavating soils in the vicinity of monitoring well MW-4 using LDAs. The LDAs will be a minimum of 36 inches in diameter, but will be dependent on subcontractor availability. A conventional excavation is not considered a viable option for this area given the depth of petroleum hydrocarbon impacted soil. The advancement of the LDAs will be conducted in a manner to allow backfill materials time to cure before excavating adjacent to a previously excavated location. Backfill materials will consist of controlled density fill (CDF) instead of compacted fill to eliminate the possibility

of the fill collapsing in adjacent borings. Clean fill cannot be used in conjunction with LDAs because the fill cannot be compacted as necessary for structure(s) to be built at this location. The backfill material specifications are included as **Appendix B**.

2.4 Environmental Control Measures

A basic and site-specific storm water pollution prevention plan (SWPPP) will be prepared using best management practices (BMPs) such as those described in the *Construction Best Management Practice Handbook* prepared by the California Stormwater Quality Association (CASQA) in 2009.

Types of minimum techniques and practices defined in the SWPPP and implemented by the General Engineering Contractor may include the following:

- Berming down-sloping portions of the site with booms/sand/gravel bags;
- Installing stormwater control devices around the site perimeter;
- Protecting existing catch basins with booms/sand/gravel bags.

Dust control techniques will be implemented by the General Engineering Contractor at all times during the excavation, loading, and backfilling activities to prevent the formation and migration of visible dust. These techniques may include the following:

- Misting or spraying water at least twice daily to prevent formation of dust while excavating, loading, or backfilling;
- Controlling and monitoring excavation activities to minimize the generation of dust;
- Minimizing drop heights while loading transportation vehicles;
- Covering all trucks hauling soils or backfill materials, and requiring all trucks to maintain at least 2-feet of freeboard.
- Covering any stockpiles of clean fill material or top soils with weighted plastic;
- Sweep site daily if visible soil is on paved areas and being carried on public right-of-way.

Air monitoring will be performed to establish background air quality using a photoionization detector (PID) to measure ambient volatile organic compound (VOCs) concentrations, and a multi-gas lower explosive limit (LEL) detector to measure. Antea Group will prepare an Air Monitoring Plan for use during excavation activities.

2.5 Soil Transportation and Disposal Plan & Waste Characterization

Waste hauling will be performed by a hauling contractor arranged by the General Engineering Contractor that is licensed and permitted as required by the United Stated Environmental Protection Agency (EPA), Department of Transportation, and the State of California. Trucks will use only pre-planned and authorized routes established in a site-specific Traffic Control and Waste Transportation Plan. Trucks used for the off-site transportation of impacted soil and debris will remain in clean, regularly swept areas, to the extent possible, to minimize the need to decontaminate the truck tires. Each loaded truck will be equipped to fully cover all soil and debris during transportation and leave the site with a completed manifest or bill of lading for transport of the soil to the assigned disposal facility.

Soil samples collected and analyzed during the October 2013 site investigation will be used to initially characterize the soil for waste disposal and select an appropriate class, State of California-permitted disposal facility. Antea Group may collect and submit additional waste samples for waste characterization analysis as requested by the selected disposal facility.
Following the approval of this work plan, Antea Group will prepare a site-specific Traffic Control and Waste Transportation Plan for implementation during soil removal activities. The Traffic Control and Waste Transportation Plan will be prepared in accordance with the Department of Toxic Substances Control (DTSC) *Transportation Plan, Preparation Guidance for Site Remediation* dated December 2001.

2.6 Record Keeping

At minimum, Antea Group will measure and record the limits of excavation, daily air monitoring data, PID results and import fill material types and quantities. Antea Group will also maintain a daily log of site personnel arriving and leaving, complete a daily checklist for site set-up and control measures and retain copies of bills of lading and manifests.

A detailed log of the soil hauled off-site will be maintained. The log will include, at minimum, the date and time trucks are loaded, the destination, size (estimated volume and weight) of the load, description of contents, name and signature of the hauler, truck license plate number, name and signature of Antea Group personnel or the General Engineering Contractor personnel.

2.7 Post-Excavation Monitoring Plan

Antea Group will discuss the replacement of on-site monitoring wells with ACHCSA after the completion of the soil excavation activities.

2.8 Reporting

A summary report, describing the excavation activities will be submitted no later than 60 days after the field work has 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.

Date: 6-9-14

Edward T. Weyrens, G.I.T.
Project Professional

Reviewed by:

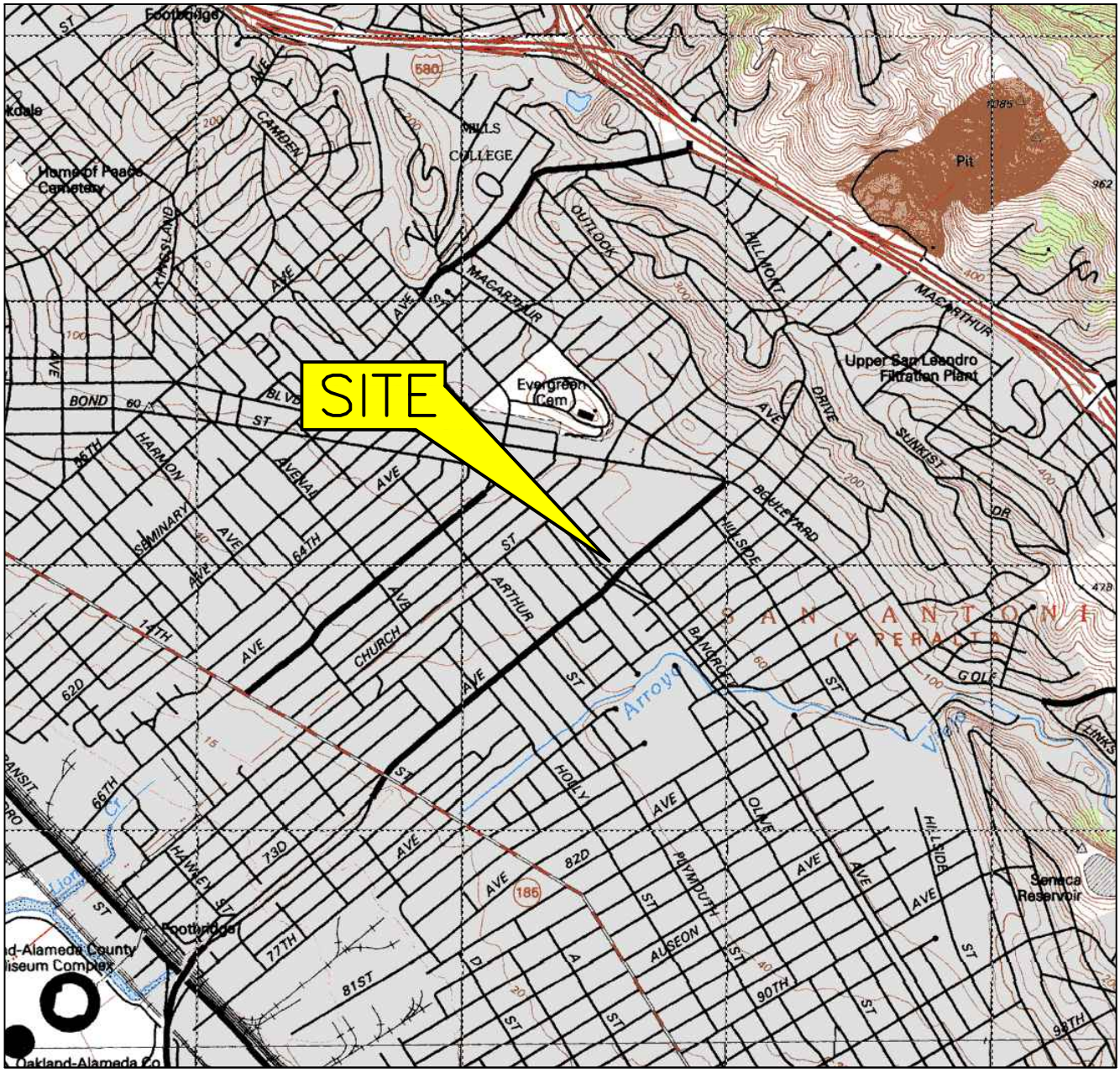
PROFESSIONAL GEOLOGIST
DENNIS SHANNON DETTLOFF
No. 7480
STATE OF CALIFORNIA

Date: 6/9/14

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



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

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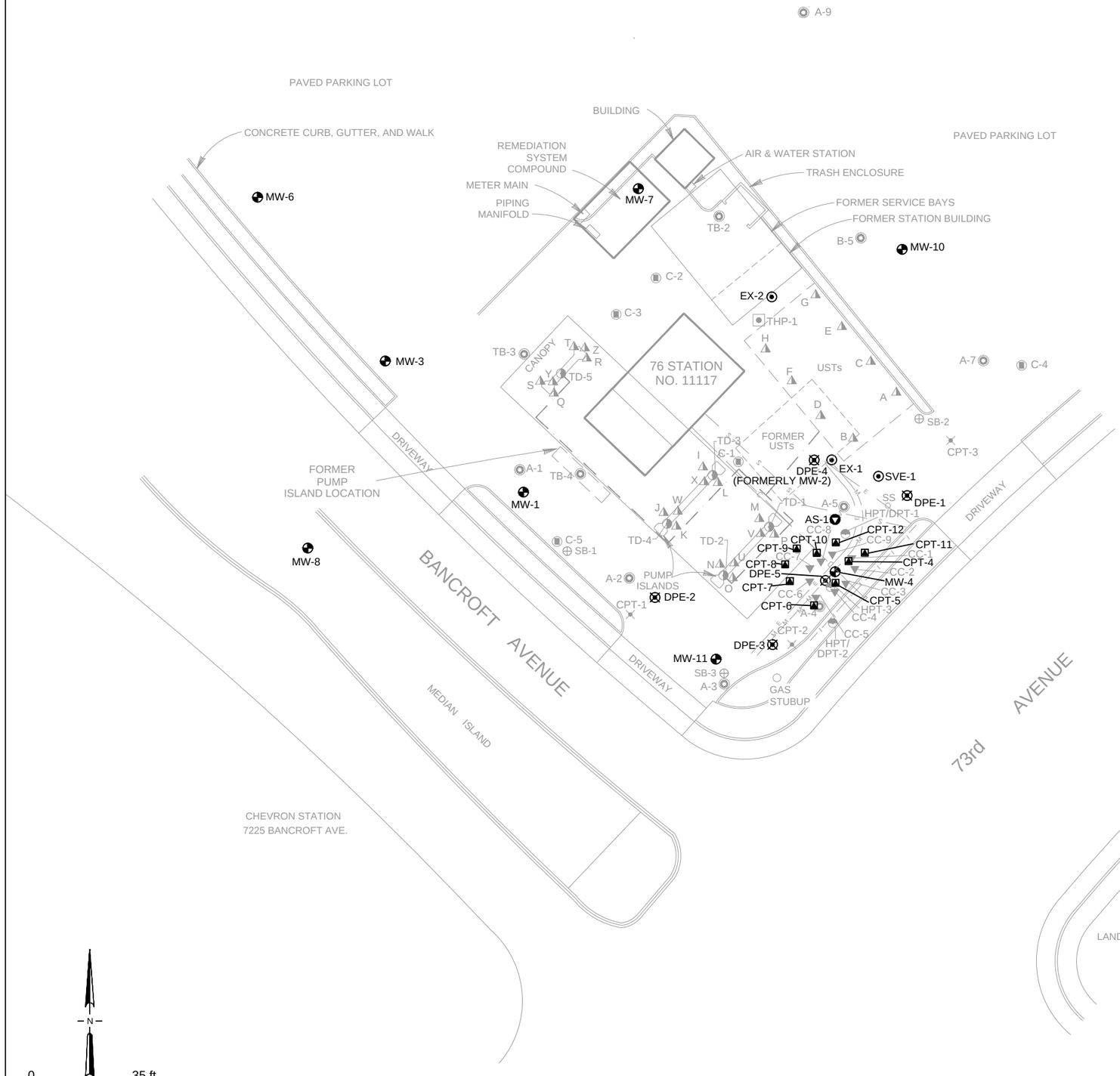

EXPLANATION

- MW-7 — GROUNDWATER MONITORING WELL LOCATION
- EX-1 — SOIL VAPOR EXTRACTION WELL LOCATION
- DPE-2 — GROUNDWATER EXTRACTION WELL LOCATION
- AS-1 — 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	DD	JH	
DATE	REVIEWED BY	FILE NAME	
3/14/14	DU	11117-SMS	antea group

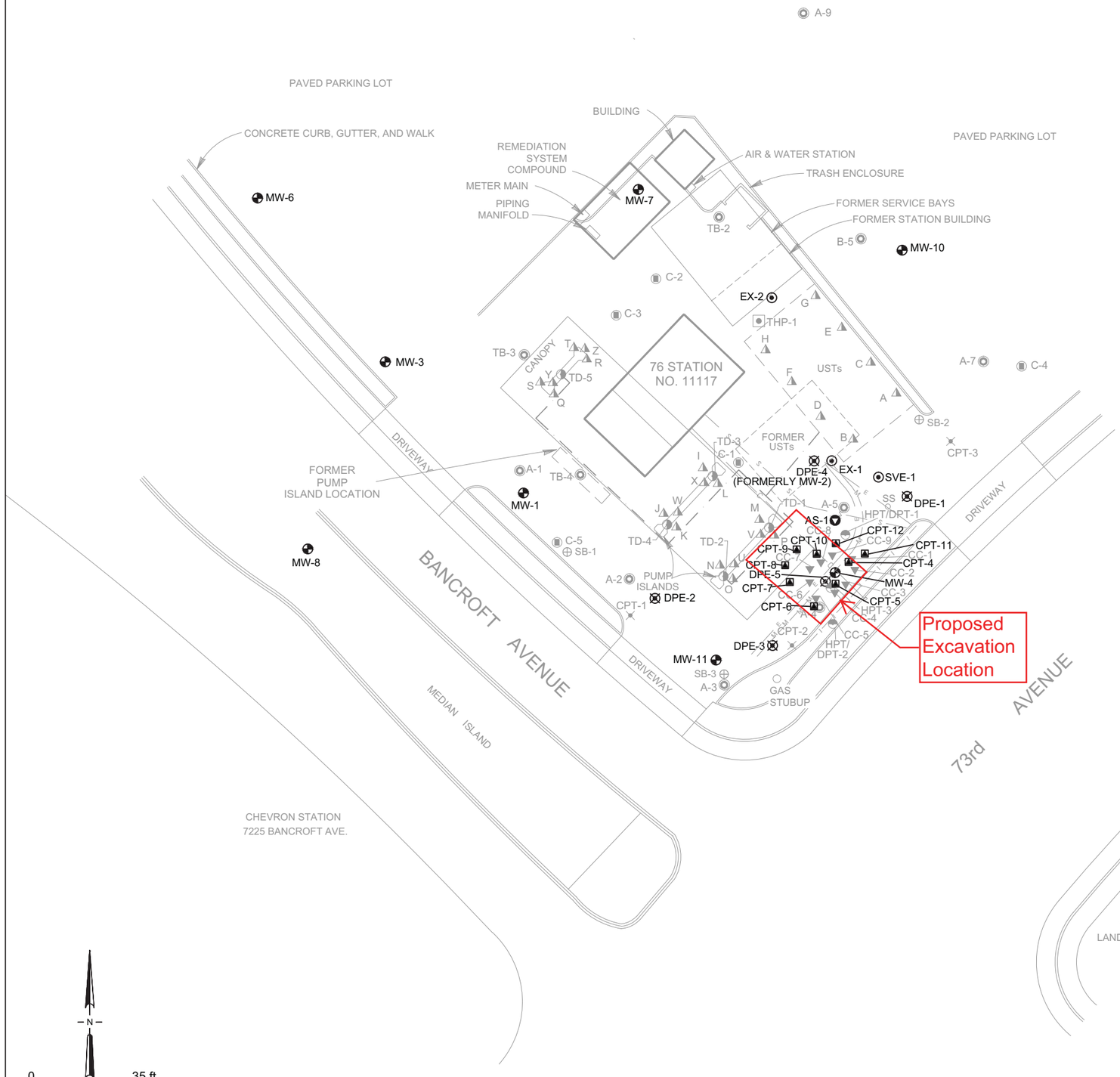

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FIGURE 3
SITE PLAN WITH PROPOSED EXCAVATION

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

PROJECT NO.	PREPARED BY	DRAWN BY
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Appendix A

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 underground storage tanks (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 (TPH-g) 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 TPH-g and BTEX at concentrations below their respective LRLs. The maximum TPH-g 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 TPH-g (TD-3), TPH as diesel (TPH-d) 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. TPH-g and BTEX were not detected 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 TPH-g, BTEX or methyl tertiary butyl ether (MTBE) was detected in soil samples at concentrations above their respective LRLs in MW-10. TPH-g and BTEX were not detected in the groundwater sample from MW-10 at concentrations above their respective LRLs. However, MTBE was detected 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).

TPH-g 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). TPH-d was detected 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. TPH-g 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). TPH-d was detected between 4.8 mg/kg (S-3-PL12) to 190 mg/kg (S-3-PL11) in five samples, benzene was detected between 0.0089 mg/kg (S-3-PL12) to 22 mg/kg (S-3-D4) in three samples and MTBE was detected 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 TPH-G 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 was 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 gasoline range organics (GRO), benzene, and MTBE were detected 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 detected 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 detected in Hydropunch groundwater samples collected from the bottom depths of soil borings A-2, A-3 and A-4. The bottom Hydropunch sample 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 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 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.

- GRO was detected 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 detected 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 detected 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 detected 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 detected 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 detected 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 detected 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. The system is currently connected to six wells (DPE-1 through DPE-5 and EX-1) (BAI, 2008a).

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 GRO 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. Antea Group is currently conducting post injection groundwater monitoring events as outlined in the December 2011 Work Plan Addendum.

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.

FREE PRODUCT RECOVERY DURING GROUNDWATER MONITORING EVENTS

Free product was observed in groundwater monitoring well MW-2 between the 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 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 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 an 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.

Appendix B

Controlled Density Fill Specifications

SECTION A10

CONTROLLED DENSITY FILL

GENERAL

The Contractor shall furnish Controlled Density Fill to be used as backfill material for all locations shown on the plans, specified herein or ordered by the Engineer. The Contractor shall not encapsulate gas pipes, including gas services, with controlled density fill.

MATERIALS

Controlled Density Fill (CDF) shall be excavatable after setting and be designated as either CDF-VFE (very flowable, excavatable) or CDF-FE (flowable, excavatable).

CDF-FE and CDF-VFE are backfill materials, which are delivered by ready mixed concrete mixers (R/M). CDF-FE and CDF-VFE are a flowable, excavatable, self-compacting and self-leveling material, which after solidifying will have the structural characteristics of a well-compacted load bearing soil. CDF-FE is used primarily for backfilling trenches, foundations, utilities, etc. in an efficient and complete manner with the minimum use of labor and equipment. CDF-VFE's are used for those purposes plus the areas where long flowable horizontal movements are required such as filling pipes, annular rings in jacked pipes, hard to access areas requiring long lateral movements.

The mixes for CDF-VFE and CDF-FE will have the following ingredients and appropriate quantities:

1. Portland Cement- ASTM C150- the range of cement content will be between 40 lbs. to 100 lbs. per cubic yard. Trial batches by the R/M operator should be done as soon as possible, if the R/M intends to be a bona fide supplier of CDF-FE or CDF-VFE.

2. Flyash - Type F - Fly Ash shall be used in CDF-VFE mixes. The flyash content may vary, subject to a minimum content of 250 lbs. per cubic yard, which can be increased for more flowability and/or pumpability. Type C flyash or high lime Flyash is not to be used, since it tends to increase the long term strength and may render the mix unexcavatable in the future.

3. Water - shall be potable and shall be used as needed to achieve the proper flowability (slump).

4. Air-Entraining Admixture - the air content shall be in the 12-18% range.

5. No admixtures that tend to increase strength with time may be used without the written consent of the Engineer and an appropriate change of the mix where required.

6. Aggregate-ASTM 33 for the excavatable mixes - well-graded concrete sand shall make up the remaining volume of the mix to achieve the full one cubic yard.

ACCEPTANCE OF MIX AND SUPPLIER

The acceptance of the mix and the supplier will be based on the range and length of experience of the supplier and the mix backup data. The primary properties are the maximum and minimum strengths, air content, setting times, flowability and yield. The supplier shall submit to the Contractor and then to the Engineer, documentation of his experience with his mixes and his personnel's ability to deliver them. If these are sufficient to start the placement, the Engineer can waive pre-job testing and the testing can be done on the initial placements.

The Engineer requires a testing program that should begin as soon as possible after the contract award. The Contractor shall submit the materials to be used to the designated approved laboratory along with the suppliers proposed mix. The lab will perform all the tests required by the specification at the suppliers cost, to include setting times, 3,7,28 and 90-day strength tests, air contents, and the ASTM tests on the Cement and Aggregate. In lieu of trial mixes, the materials Engineer may allow the use of the following mix until there is sufficient test feedback. NOTE: The mix is a guideline only and should be adjusted for proper yield, SP.GR and other properties specified.

TYPE		CDF-FE		CDF-VFE		
PROD	WGT	SP GR	VOL	WGT	SP GR	VOL
cement	60	3.15	.29	60		.29
fly ash		2.3	0.00	250		1.74
sand	2800	2.62	17.00	2650		16.21
air		12%	3.24		12%	3.24
water	406	1.0	6.52	347	1.0	5.57
			27.05			27.05

LAB MIX TARGETS

SLUMP	11"
AIR	14%
STRENGTH	25 PSI @ 7 DAYS MIN
	80 PSI @ 28 DAYS MAX
	100 PSI @ 90 DAYS MAX

NOTE: The use of slump, on the job, lower than the design slump can push the strength beyond its excavatable property. It should not be allowed. If a lower slump is desired, the mix should be designed for that lower slump. Test cylinders should not be rodded but simply overfilled and struck off. Use waxed cardboard cylinders that can be torn apart with little damage to the cylinder to be tested. Low early strengths (3 day) may require a soil bearing plate test in lieu of cylinders.

SPECIFICATIONS: The following is the specification format:

CEMENT- Range of cement content 40-100 LBS/C.Y.
FLYASH - 250 lbs. MIN when used
SLUMP - 8"-11" or, an alternative method is to achieve an 8"-15" diameter spread from a 6" long 3" diameter tube filled vertically and lifted off vertically

Unconfined Compressive Strength Targets:

@ 3 days	@ 7 days	@ 28 days	@ 90 days
MIN 10 PSI	25 PSI	30 PSI	
MAX		80 PSI	100 PSI

NOTE: If strength targets are not reached, the Engineer may direct the Contractor to increase the testing pace until he is satisfied with the results.

CONSTRUCTION METHODS

In general, Control Density Fill shall be placed in two layers. The first layer shall be placed from the bottom of the trench to a point 6 inches above the crown of the pipe. The CDF material shall be poured from one side of the pipe at the lowest slump (approximately 4") necessary to allow the CDF to flow under the pipe. The Contractor shall allow sufficient setting time for the embedment layer prior to pouring the full height CDF backfill in order to prevent uplift of the pipe. The setting time will vary, but typically shall be under one hour.

Bedding for sanitary or drain pipes shall consist of setting the pipe to the grade as shown on the plans and bedding the pipe in new bank run gravel at all bells, wyes or as ordered by the Engineer. The Contractor shall then follow the above procedures for backfilling with CDF materials.
Bedding for water pipes shall consist of supporting the water pipe at all bell connections, tees, gates or as ordered by the

Engineer with new bank run gravel. The bank run gravel acts as a support for the pipe and is not to be used to backfill the entire trench width. The Contractor shall use extreme care when backfilling with CDF around gate valves, air valves or any other device needing direct access.

The Contractor shall carefully seal the riser pipes around gate valves to ensure that no CDF material interferes with the operation of the gate valves. If required, the Contractor will be required to re-excavate around the gate valve, verify the operation of the gate valve and backfill again at no cost to the Commission. The Contractor will not use CDF material for his backfill operations around fire hydrants, which will be backfilled with bank run gravel.

MEASUREMENT AND PAYMENT

ITEM A10-1	Controlled Density Fill-Flowable & Excavatable	CY
ITEM A10-2	Controlled Density Fill-Very Flowable & Excavatable	CY

The quantity of control density fill to be paid for shall be that quantity delivered to the site and used for backfill of excavation. Such quantity shall be measured in place by the cubic yard. Such measurements shall be made by the Commission's Inspector.

Such measurements will be based upon the depth of normal trench excavation (or ordered below grade excavation); the length of the trench and the width of the trench minus the area of the pipe measured using the outside diameter. Such trench width shall not exceed the limits set forth in Section A1.

No payment shall be made for furnishing of controlled density fill to backfill any excavation performed for the Contractor's convenience or excavation beyond the limits set forth in Section A1, Excavation and Backfill.

No payment shall be made for re-excavating around a gate valve, service shut off, or any other device for which the Commission needs direct access that has been interfered with by CDF material entering the access tube. The Contractor will be required to excavate, remove and clean out the access tube, clean around the operating nut and backfill at no additional cost to the Commission.

This unit price shall also include all laboratory and test costs as specified herein and as ordered by the Engineer.