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By Alameda County Environmental Health 2:10 pm, Oct 20, 2015

October 14, 2015

Subject: Work Plan for Supplemental Investigation
585 22nd Street LLC
Oakland, California
Alameda County Department of Environmental Health
Case RO0003187

We declare, under penalty of perjury, that the information and/or recommendations contained in the attached Work Plan for Supplemental Investigation is true and correct to the best of our knowledge.

Charles A. Long
Principal

Matt Ticknor
Principal

# Work Plan for Supplemental Investigation

585 22nd Street
Oakland, California
Alameda County Department of Environmental Health
Case RO0003187

AEC Project No. 15-120A-SD
October 13, 2015

*Presented to:*

Alameda County Department of Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 94502-6540

*On Behalf Of:*

585 22nd Street, LLC
2030 Manzanita Drive
Oakland, CA 94611

*Prepared By*:

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ADVANTAGE
ENVIRONMENTAL
CONSULTANTS, LLC.

**Work Plan for Supplemental Investigation**

**585 22nd Street**
**Oakland, California**
**Alameda County Department of Environmental Health**
**Case RO0003187**

On behalf of 585 22nd Street, LLC, Advantage Environmental Consultants, LLC has prepared a Work Plan for Supplemental Investigation (Work Plan) for the above referenced property which is being submitted to the Alameda County Department of Environmental Health for review, comment and approval. This Work Plan was completed in accordance with the standards of care exercised by environmental professionals in the industry.

**PROJECT MANAGER CERTIFICATION**

I certify that the information contained in or included with this submittal is accurate and complete. This submittal and all attachments were prepared at my direction and in accordance with protocols designed to assure that qualified personnel gathered and evaluated the information submitted in accordance with the standards of care exercised by environmental professionals in the industry.

Daniel Weis, R.E.H.S.
Branch Manager

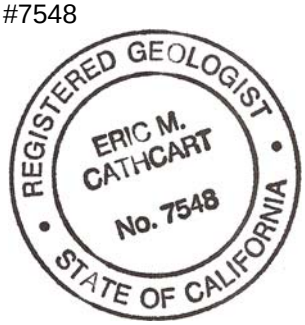
10-13-2015
Date

**WORK PROGRAM CERTIFICATION**

This Work Plan presents the technical approach AEC will take to further investigate soil and soil gas conditions at 585 22nd Street in Oakland, California. The proposed Work Plan and field procedures to implement the plan are in accordance with the standards of care exercised by environmental professionals in the industry.

Eric Cathcart, MS, PG
California Professional Geologist #7548
Senior Geologist

10-13-2015
Date

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## 1.0 INTRODUCTION

On behalf of 585 22nd Street, LLC, Advantage Environmental Consultants, LLC (AEC) has prepared this Work Plan for Supplemental Investigation (Work Plan) for the property located at 585 22nd Street in Oakland, California (Site). This document presents a plan to further investigate the presence and spatial distribution of volatile organic compounds (VOCs) in soil gas at the Site, and utilizing the data obtained, conduct an evaluation of the human health risks associated with potential soil gas exposures and vapor intrusion for the planned development project. In addition, the plan includes an evaluation of soil at the Site relative to hexavalent chromium.

### 1.1 Site Location and Description

The Site is comprised of an approximately 16,000 square foot lot located at the physical address of 585 22nd Street, Oakland, California. The Site is further identified as Alameda County Assessor's Parcel Number 005-8-0647-028-04. The Site is an asphalt paved lot used for the parking of postal service vehicles. The majority of the Site is comprised of an asphalt paved parking lot. There is some minor landscaping at the Site. A Vicinity Map depicting the general location of the Site is included as Figure 1. Site Plans depicting the boundaries of the Site are included as Figures 2 and 3. Figure 2 also depicts the locations of prior soil borings drilled by AEC at the Site in 2012 and Figure 3 also depicts proposed soil boring locations as detailed in this Work Plan.

### 1.2 Previous Site Assessment Work and Regulatory Status

AEC completed Phase I and II Environmental Site Assessments (ESAs) of the Site in August 2015. Such documents were provided to the Alameda County Department of Environmental Health (ACDEH) as part of the execution of a Voluntary Remedial Action Agreement between ACDEH and 585 22nd Street, LLC. During the course of the completion of the Phase I ESA of the Site, it was revealed that portions of the Site were occupied by an engraving/plating facility business. In addition, AEC corresponded with ACDEH regarding a former leaking underground storage tank (LUST) case that was associated with the Site and previously closed under a commercial land use. AEC was informed by ACDEH that if a change in land use of a property from commercial to residential is proposed, that ACDEH would expect the Site owner, development proponent or other party to voluntarily work with the Department to have them review and approve the proposed change in land use relative to subsurface environmental conditions, and in particular related to potential vapor intrusion/human health risk based concerns that were not commonly evaluated during the closure of older LUST cases.

AEC subsequently conducted a Phase II ESA at the Site to evaluate for the presence of contaminants of potential concern in soil, soil gas and groundwater and to evaluate such data relative to a proposed change in land use from commercial to residential. On July 17, 2015, a total of six soil borings (identified as B1 through B6) were drilled at the Site using direct-push drilling technology. One soil boring, B5, was drilled to a total depth of 10 feet below ground surface (bgs). This boring was situated in the northeastern corner of the Site. The remaining soil borings, B1 though B4 and B6, were drilled to a total depth of 15 feet bgs. Soil samples were collected at depths of one foot, three feet, five-feet, ten feet and fifteen feet bgs in soil borings B1 through B4 and B6. Soil samples were collected at depths of one foot, three feet, five feet and 10 feet bgs in soil boring B5. A total of 28 soil samples were collected during drilling activities. Soil gas samples were collected at depths of five feet and ten feet bgs in soil borings B1, B3 and B4. Groundwater samples were collected from three of the soil borings (B1 through B3) at a depth of 15 feet bgs.

Six of the 28 soil samples were analyzed for VOCs. VOCs were not detected in any of the samples analyzed for this constituent. In addition, twelve soil samples were analyzed for asbestos. Asbestos was not detected in any of the samples analyzed for this constituent. Six of the twenty-eight soil samples collected during the drilling of the soil borings were analyzed for Title 22 Metals. Detected metals in the soil samples included total barium, chromium, copper, lead, nickel, vanadium and zinc. None of the metals concentrations exceeded the San Francisco Bay Area Regional Water Quality

Control Board (RWQCB) Environmental Screening Levels (ESLs) for residential soil and California Total Threshold Limit Concentrations. The three groundwater samples collected during the drilling of the soil borings were analyzed for were VOCs. VOCs were not detected at or above the laboratory reporting limits in any of the samples. Other potential organic and inorganic contaminants in soil and groundwater were not evaluated as AEC had no reason to believe that other potential contaminants are present at the Site based on the current and historical land uses.

Six soil gas samples were analyzed during the assessment for VOCs. A summary of the VOCs detected in soil gas at the Site is presented in the table below.

**VOC Detection Summary**

| VOC Compound | Number of Detected Data | Number of Non-Detected Data | Minimum Concentration (µg/m$^3$) | Location of Minimum Concentration | Maximum Concentration (µg/m$^3$) | Location of Maximum Concentration |
|---|---|---|---|---|---|---|
| Chloromethane | 6 | 0 | 2.7 | SV2-5 | 4.3 | SV3-10 |
| Acetone | 6 | 0 | 160 | SV1-10 | 470 | SV1-5 |
| Carbon disulfide | 6 | 0 | 17 | SV3-10 | 98 | SV1-5 |
| 2-Butanone (MEK) | 6 | 0 | 56 | SV3-5 | 150 | SV1-5 |
| Chloroform | 3 | 3 | 20 | SV3-5 | 400 | SV2-5 |
| Benzene | 6 | 0 | 14 | SV2-5 & SV2-10 | 40 | SV1-5 |
| 4-Methyl-2-pentanone (MIBK) | 4 | 2 | 14 | SV1-10 | 17 | SV3-5 |
| Toluene | 6 | 0 | 22 | SV2-10 | 46 | SV1-5 |
| Ethylbenzene | 5 | 1 | 4.4 | SV3-5 | 7.8 | SV1-5 |
| m,p-Xylene | 6 | 0 | 8.8 | SV2-10 | 14 | SV1-5 & SV1-10 |
| Styrene | 4 | 2 | 4.7 | SV3-5 | 6.5 | SV1-5 |
| o-Xylene | 3 | 3 | 5.2 | SV3-10 | 6.4 | SV1-5 |
| 1,2,4-Trimethylbenzene | 5 | 1 | 5.0 | SV3-10 | 7.8 | SV1-5 |
| Tetrachloroethene | 2 | 0 | 28 | SV3-5 | 36 | SV3-10 |

A narrative pertaining to maximum concentrations and the general distribution of various VOCs detected at the Site is listed below:

- Maximum concentrations of ten of the fourteen detected VOCs were collected in soil gas from boring SV1 at five feet bgs. Such VOC compounds included, acetone, carbon disulfide, 2-Butanone (MEK), benzene, toluene, ethylbenzene, m,p-xylenes, styrene, o-xylenes and 1,2,4-trimethylbenzene.

- The maximum concentration of chloromethane was detected in soil gas from boring SV3 at ten feet bgs.

- The maximum concentration of chloroform was detected in soil gas from boring SV2 at five feet bgs.

- The maximum concentration of 4-Methyl-2-pentanone (MIBK) was detected in soil gas from boring SV3 at five feet bgs.

- The maximum concentration of tetrachloroethene was detected in soil gas from boring SV3 at ten feet bgs.

With the exception of the maximum detected concentration of chloroform (400 µg/$m^3$), none of the detected VOC concentrations exceeded their respective ESLs. The ESL for chloroform is 230 µg/$m^3$.

Conclusions of the Phase II ESA were follows:

- VOCs, asbestos and metals were not considered to be contaminants of concern at the Site.

- With the exception of the maximum detected concentration of chloroform (400 µg/$m^3$), none of the detected VOC concentrations exceeded their respective ESLs.

- AEC recommended that as part of obligations under the prior no further action letter from ACDEH pertaining to the former LUST case associated with the Site, the Phase I and II ESA reports should be submitted to ACDEH for review as part of the entitlement and project approval process for the proposed residential development at the Site. After engaging ACDEH under a voluntary cleanup agreement, ACDEH would review the reports and provide written directives regarding any additional assessment and/or mitigation they feel may be warranted at the Site relative to the proposed change in land use from commercial to residential.

- All data obtained during the subsurface investigation was considered to be valid and useful for decision making purposes. In addition, no upset conditions occurred during the sampling events or completion of the laboratory analysis that may have adversely influenced the results of the investigation.

- Based on the current land use of the Site (parking lot), the findings of this assessment did not represent conditions that are considered to be an imminent threat to human health or the environment, or ones that require immediate notification to an environmental regulatory agency.

### 1.3 Proposed Redevelopment

The Site is currently a paved parking lot that is slated for development for residential purposes. Site development will require conventional grading (removal and recompaction of soil) to depths that are yet to be determined, but are expected to be less than five feet from existing grades. No significant export of soil from the Site is proposed at this time. However, it is possible that some export of soil may be required as part of construction of lifts associated with an automated automobile parking system. The design of the automated parking system is yet to be determined. ACDEH will be notified in the future when the system design is in place so that it may comment on soil management protocols that will be in place prior to any export of soil that may occur. Site development plans will include a residential development constructed on a concrete slab-on-grade foundation system. At this time, it is anticipated that no residential units will be constructed on the ground-level of the future Site building. However, the construction of residential units on the ground-level cannot be ruled out until the design of the proposed building is complete.

### 1.4 Project Objective

The primary objective of this Work Plan is to develop a program to further investigate the presence and spatial distribution of VOCs in vadose zone soil gas at the Site, and utilizing the data obtained, conduct an evaluation of the human health risks associated with potential soil gas exposures and vapor intrusion for the planned development. Soil sampling and analysis is also proposed to rule out hexavalent chromium as a contaminant of potential concern at the Site.

Upon implementation of the work proposed herein and assuming favorable results, the data generated during the assessment will be used to request ACDEH administrative concurrence that the Site is suitable for its intended use as a residential development. If warranted, the data can also be utilized for the purposes of finalizing a Soil Management Plan for the project and/or evaluating the potential need for institutional or engineering controls to be incorporated in to the proposed Site development.

## 2.0 PHYSICAL SETTING

### 2.1 Topography

According to the United States Geologic Survey topographic map for the Oakland West, California 7.5 minute quadrangle (1997), the Site is shown as being relatively level and located at an elevation of approximately 25 feet above mean sea level. Regional topography is shown as sloping to the south and southeast. No structures are depicted on the Site. However, the Site and its adjacent properties are situated in an area that is shaded grey, indicating dense development. Streets/roadways bordering the Site are shown in their current configuration. Figure 1 (Vicinity Map) is a reproduction of the USGS topographic map.

### 2.2 Geology

The Site is situated in the Coast Ranges Geomorphic Province; one of 11 physiographic provinces in California recognized by defining features based on geology, faults, topography, and climate. The Coast Ranges are comprised of a series of long, northwest-trending mountain ranges separated by valleys, generally subparallel to faults of the San Andreas Fault system, which were created by extensive folding and faulting during a mountain-building episode beginning in the late Pliocene and culminating in the mid-Pleistocene. Summit elevations average between 2,000 to 4,000 feet above mean sea level (msl), with the highest elevation located in the northern part of the province (Solomon Peak) at approximately 8,000 feet above msl. The Coast Ranges province is also composed of thick Mesozoic and Cenozoic sedimentary strata. The Coast Ranges province is bound on the north by the Oregon state line, on the east by the South Fork Mountain and Coast Range thrusts bordering the Klamath Mountains and Great Valley provinces, on the south by the Santa Ynez fault and Transverse Ranges province, and on the west by the continental borderland. The area is seismically active, including the San Andreas fault which extends 600 miles from the north at Point Arena beyond the Coast Ranges to the south to the Gulf of California. More specifically, the Site is located in the central portion of the Coast Ranges province east of the San Francisco Bay. According to geologic map sources, the Site appears to be underlain by Quaternary older alluvium deposits. These deposits are characterized by partially consolidated sand, gravel, and clay. Artificial fill material is also present beneath the Site in the area of the former UST.

### 2.3 Hydrology

According to the California Water Quality Control Plan for the San Francisco Bay Region (SF-RWQCB, 1995), the Site is situated within the East Bay Plain groundwater sub-basin of the Santa Clara Valley groundwater basin. Groundwater within the East Bay Plain sub-basin is listed with existing beneficial use designations for municipal, industrial, process supply, and agricultural purposes. Static groundwater beneath the Site is anticipated to be present at approximately 15 feet bgs with an anticipated flow direct in a south to southeasterly direction.

# 3.0 FIELD INVESTIGATION

## 3.1 Technical Approach

### 3.1.1 Soil and Soil Gas Sampling Depths

A total of 10 soil borings will be drilled at the property utilizing a direct-push drill rig (truck-mounted). The soil borings will be drilled by TEG Northern California of Rancho Cordova, California under the oversight of AEC. The soil borings will be drilled to target depths of five feet below existing grades. Soil samples will be collected from all proposed soil borings at depths of one-half a foot (0.5 feet), one, three and five feet below the ground surface. Soil gas probes will be installed at the five foot depths of the soil borings. The proposed five foot soil gas sampling depths represent locations situated approximately five vertical feet below the future concrete slab of the proposed ground-level of the residential building at the Site. Planned soil and soil gas sampling activities are discussed in greater detail in the following sections. Figure 3 is a Site Plan as currently configured with the proposed sampling locations.

### 3.1.2 Geotechnical Sampling

This Work Plan is being proposed, in part, to collect information that will be needed for the completion of a human health risk assessment for the Site relative to a residential development over a subterranean parking garage. For this reason, geotechnical analysis of select soil samples may be performed in accordance with various American Society of Testing and Materials (ASTM) and other methods. A minimum of two soil samples obtained from the five foot depths will be collected and archived for potential geotechnical analysis should the initial human health risk screening require such analyses. If warranted, geotechnical testing will include the following parameters:

- Grain-size distribution (ASTM D422)
- Moisture content (ASTM D2216)
- Bulk density (ASTM D2937)
- Total porosity (API RP40)
- Total/Fractional organic carbon (Walkley-Black)
- Volumetric air and moisture

## 3.2 Preliminary Field Activities

The following tasks will be performed before the commencement of field sampling activities:

- AEC representatives will complete Site visits to reconfirm/mark-out the locations of proposed sampling locations and to confirm the feasibility of drill rig access (where applicable). Some locations may require concrete coring to access the underlying soil. These locations will be cored prior to mobilization of drill rigs.
- A permit for the drilling of the proposed soil borings was procured with the Alameda County Public Works Agency.
- All equipment to be used during the sampling events will be inspected, pre-cleaned and decontaminated.

- Field meters to be used during sampling (i.e., photoionization detector (PID) and other equipment) will be checked to ensure proper calibration.

- All forms to be used in the field (i.e., logbook, chain-of-custody forms, etc.) will be assembled.

- Sampling personnel will review the sampling protocols. In addition, health and safety protocols will be reviewed.

- The location of underground utilities in the vicinity of the sampling locations will be evaluated for underground conflict. In accordance with State law, at least 48 hours prior to the commencement of field sampling, we will notify Underground Service Alert (USA) utility marking service.

- Notification to the ACDEH of the commencement of fieldwork activities will be made a minimum of 48 hours in advance of the work.

## 3.3 Sampling Methodology

### 3.3.1 Soil Sampling Methodology

As stated previously, 10 soil borings will be drilled at the property using a truck-mounted, direct-push sampling rig. A total of 30 soil samples are proposed for collection during the drilling activities. During drilling activities, an organic vapor monitor (OVM) will be used to monitor the presence and level of undifferentiated organic vapors in the borings and to screen soil samples which are collected. The instrument will also be used to screen for organic vapor in ambient air and the breathing zone of field personnel. A MiniRAE 2000 PID or equivalent will be used at the Site during the investigation activities. Upon completion of drilling and soil sampling, the soil gas probes will be installed as previously described. Precautions will be taken to limit the contamination of samples from outside sources. Hands will be washed with distilled water and soap, and rubber surgical gloves will be used, especially if petroleum products have been handled. Soils encountered at each boring location will be described and logged by a qualified field representative working under the supervision of a licensed California Professional Geologist. A log of each boring will be prepared in accordance with the Unified Soil Classification System (USCS). The locations of the soil borings will be noted by measuring/scaling the areas from known points at the Site.

***Direct-Push Sampling Technology***

The direct-push sampling system uses a hydraulic hammer to advance a two-inch diameter rod equipped with a soil sampling tool. Soil samples at targeted sampling depths are collected into acetate sleeves by unlocking the drive tip and pushing through the soil. The acetate sleeves containing soil are then retrieved, cut (in approximate six-inch sections), capped, sealed with Parafilm™ and the respective soil samples retained from the cores are labeled. Soil sampling equipment will be decontaminated between uses by washing with a non-phosphate detergent solution followed by a triple distilled water rinse. Soil from the soil borings will be described and logged by a qualified field representative working under the direct supervision of a registered California Professional Geologist.

### 3.3.2 Soil Gas Sampling Methodology

Soil gas probe installation, sampling and analysis will also be conducted by TEG. Boreholes will be drilled using a truck-mounted direct-push drill rig. Soil gas sampling and analysis will not be conducted during or immediately following a significant rain event (more than ½-inch). Soil gas sampling procedures will be conducted in general compliance with the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) Soil Gas Advisory (2015). Analytical protocols are in general compliance with method United States EPA test Method

8260B which has been improved to include surrogate and second source analysis. Sample injection for 8260B analysis will use glass syringes as per the DTSC Soil Gas Advisory (2015).

***Probe Installation***

The manually driven direct-push probe rods will be used to set the soil gas implants. With a hardened one-inch steel tip on the end of the rod, the probe is driven to the desired depth. The rod is then removed and 1/8-inch (or 1/4-inch if requested) nylon tubing with a small plastic airstone filter attached to the end is inserted into the open borehole. The probe is gently lifted up approximately six inches and sand is poured down the borehole to encase the filter with one foot of sandpack. Approximately one foot of granular bentonite is then poured down the borehole and hydrated to seal the probe. The soil gas well can then be completed to the surface with hydrated bentonite. The probe is allowed to set for two hours prior to sampling to allow the bentonite time to properly seal.

***Sampling***

After a minimum of a two hour equilibration time and the purging of three volumes from the sampling system, soil gas is withdrawn from the end of the inert Teflon tubing that runs from the sampling tip to the surface using a 50 cubic centimeter (cc) gas tight, glass syringe connected via an on-off valve. The probe tip and sampling tubing is purged based upon the pre-determined purge volume established by the purge volume test described above. A sample of in-situ soil gas is then withdrawn and immediately transferred to the mobile lab for analysis within minutes of collection. The use of small calibrated syringes allows for careful monitoring of purge and sample volumes. This procedure ensures adequate sample flow is obtained without excessive pumping of air or introduction of surface air into the sample.

***Leak Control and Testing***

Tests for leakage will be conducted at each sampling location utilizing a shroud of sufficient size required to cover the newly installed soil gas probes. The leak tests will be conducted to evaluate if ambient air has penetrated and diluted the soil gas samples. The tracer compound (1,1-Difluoroethane) will be introduced under the shroud and will be quantified and reported as a target analyte by the analytical laboratory. It is not anticipated that breakthrough will be observed as this type of leakage has rarely been observed with the present day sampling scheme referenced above.

***Probe Removal***

Upon completion of soil and soil gas sampling, the probes will be removed from the ground and the probe holes will be backfilled with bentonite chips (which will be subsequently hydrated) and capped with concrete or asphalt to match existing grades. The used tubing along with other non-hazardous wastes generated during the field activities will be bagged and handled as miscellaneous solid waste.

## 3.4 Sampling Strategy

### 3.4.1 Rationale for Soil and Soil Gas Sampling and Sample Analysis

Five of the proposed soil borings are proposed to further investigate the elevated chloroform soil gas concentration identified in soil boring B3 during the completion of the Phase II ESA. One of the borings will be drilled immediately adjacent (i.e. within two feet) from former boring location B3. The additional four referenced borings will be considered step-out borings and will be drilled ten feet to the north, south, east and west of former soil boring B3. The remaining five proposed soil borings are considered to unbiased sampling locations situated in the northern portion of the Site. Figure 3 presents the proposed boring locations.

### 3.4.2 Constituents of Potential Concern and Laboratory Analyses

VOCs in soil gas are considered to be the primary constituents of concern at this time and will be evaluated during the proposed Site investigation. During the additional assessment work, soil gas samples will be analyzed by a mobile laboratory for VOCs by United States EPA Test Method 8260B. A list of the VOCs and corresponding analytical laboratory reporting limits is provided in Appendix A of this Work Plan.

It is AEC's opinion that there are no contaminants of concern present in Site soils. However, during a conference call with ACDEH, AEC was asked if the Site had been evaluated for hexavalent chromium. Given the concentrations of total chromium present in Site soils, AEC does not believe that hexavalent chromium would be present at the Site. However, to rule of this potential contaminant at the Site, AEC is proposing soil analysis for hexavalent chromium.

As stated previously, a total of 30 soil samples will be collected during the drilling of the soil borings. A total of 20 of the soil samples will be selected for hexavalent chromium analysis by United States EPA test Method 7196. The ten soil samples collected from 0.5 foot depths will be analyzed for hexavalent chromium. The remaining ten samples to be analyzed for this element will be from varying depths within the borings. Choice of soil samples to be analyzed for this element will also be based on field observations and professional judgment. Soil gas samples will be analyzed for VOCs by United States EPA test Method 8260B.

### 3.4.3 Reporting Limits

Laboratory method reporting limits for the proposed soil gas analysis method (EPA Test Method 8260B) are included in Appendix A.

## 3.5 Sample Collection Procedures

### 3.5.1 Equipment Calibration and Maintenance

As stated previously, an OVM (MiniRAE 2000 PID or equivalent) to be used for health and safety monitoring and field screening of soil samples will be utilized during the sampling activities. The instrument will be calibrated once per day in accordance with manufacturer's guidelines which includes the use of an Isobutylene standard. An AEC representative is responsible for ensuring adherence to the calibration schedule including an understanding of the proper usage, maintenance, and storage of each instrument. Calibration information will be recorded in the field logbook and will include the date of calibration, the operator's initials, the calibration measurements and observations about the instrument or calibration procedures.

### 3.5.2 Sample Containers, Labels and Preservation

As stated previously, soil samples to be obtained during the field sampling will be collected in acetate sleeves provided by the drilling contractor. Sample containers required for soil gas samples will be provided by the analytical laboratory. The sample containers will be filled as described in this document, and the container lids will be tightly closed. Container lids will not be removed at any time prior to sample collection. The sample labels will be firmly attached to the containers, and the following information will be printed on the label:

- Project name and number
- Sample location and analytical parameters
- Boring number
- Sample identification number
- Sample collector's initials
- Date and time of collection

Preservatives will not be required for the soil gas and soil samples. However, soil samples will be properly prepared for transportation to the analytical laboratory by placing the samples in coolers containing ice to maintain a shipping temperature of 4°C +/- 2°C.

### 3.5.3 Sample Packaging and Shipment

#### 3.5.3.1 Soil Matrix Sample Packaging

Once soil samples are obtained, they will be placed immediately in the cooler on ice to maintain the samples at 4°C +/- 2°C. The field sampler will indicate the sample designation/location number and date and time of collection in the space provided on the chain-of-custody for each sample. After the samples are sealed and labeled, they will be packaged for transport to the analytical laboratory with chain-of-custody forms placed on the inside of the lids of the coolers. The samples will be packaged so that they will not leak or spill from the containers. It is AEC's intent to have the samples transported to the analytical laboratory at the end of each sampling day. If samples are held overnight due to scheduling conflicts or logistical issues with respect to delivering samples prior to the lab closing, the samples will be stored in a secure location under chain-of-custody procedures and delivered the following day to the analytical laboratory.

#### 3.5.3.2 Soil Gas Sample Packaging

Chain-of-custody protocol similar to the soil samples will also be implemented during the on-Site field analysis of soil gas for VOCs.

#### 3.5.3.3 Chain-of-Custody Protocol

After the samples have been collected, chain-of-custody procedures will be followed to establish a written record of sample handling and movement between the Site and the analytical laboratories. Each shipping container will have a chain-of-custody form completed in triplicate by the sampling personnel. One copy of this form will be kept by the sampling team and the other two copies will be sent to the laboratories. One of the laboratory copies will become a part of the permanent record for the sample and will be returned with the sample analytical results. The chain-of-custody will contain the following information:

- Sample identification number;
- Sample collector's printed name and signature;
- Date and time of collection;
- Place and address of collection;
- Sample matrix;
- Analyses requested;
- Signatures of individuals involved in the chain of possession; and
- Inclusive dates of possession

As stated previously, the chain-of-custody documentation will be placed inside the shipping container so that it will be immediately apparent to the laboratory personnel receiving the container, and will not be damaged or lost during transport.

### 3.5.4 Sampling Documentation

#### 3.5.4.1 Field Reports

In order to provide complete documentation of the sampling activities, detailed records will be maintained by field personnel. At a minimum, these records will include the following information:

- Site name and address
- Name of field log recorder
- Team members present on-Site and associated duties
- Other persons on-Site (i.e. subcontractors, regulatory personnel, etc.)
- A brief summary of meetings held at the Site
- Levels of safety protection utilized
- Weather conditions
- Calibration readings for field monitoring equipment
- Time of soil gas probe placement and sample collection time
- Any other relevant information.

#### 3.5.4.2 Boring Logs

Soils encountered at each boring location will be described and logged by a qualified field representative working under the supervision of a licensed California Professional Geologist. A log of each boring will be prepared in accordance with the USCS. Boring logs will be included in the investigation report and will include additional information such as the boring identification, boring location, sample identification numbers, date and time of drilling, sample depths retained during drilling and PID readings.

### 3.5.5 Equipment Decontamination

All drilling and field equipment that comes into contact with soil at the Site will be decontaminated between uses. Disposable field equipment will not be decontaminated but will be placed in to plastic trash bags for proper disposal. Drilling and field equipment will be decontaminated between uses by washing with a non-phosphate detergent/tap water solution followed by a triple rinse of distilled/deionized water. The decontamination area will be designated by AEC field representatives and may be modified during field activities.

In addition to the procedures for decontamination outlined above, all persons collecting samples will wear clean nitrile gloves and will limit contact with the samples. Gloves will be changed between samples. Sample containers provided by the laboratory will be certified clean and sealed to ensure cleanliness. To the extent that is economically feasible and technically acceptable, disposable personal protective equipment will be utilized. Where tasks or conditions restrict the use of disposable equipment (not expected), decontamination facilities will be provided.

### 3.5.6 Investigative Waste Management

A significant quantity of investigative derived waste will not be generated during the course of the project. Excess soil derived during the field investigation will be appropriately disposed of by TEG on behalf of AEC. As stated previously, the used components of the soil gas probes along with other non-hazardous wastes generated during the field activities will be bagged and handled as general solid waste.

## 4.0 QUALITY ASSURANCE/QUALITY CONTROL AND DATA VALIDATION

When laboratory reports are provided by the analytical laboratories to AEC during the proposed assessment activities, the QA/QC summaries provided in the standard laboratory reports will be reviewed for content and any qualifiers that may have lead AEC to believe that the data was not acceptable. Such review will be conducted to ensure that the data obtained during the proposed investigation is within acceptable standards and considered useable for decision making purposes. For the soil gas analysis, laboratory method blanks, field duplicate samples (one per each day of analysis), continuing calibration (daily mid-point calibration check) and other laboratory check samples will be evaluated. For the soil analysis, reagent blanks, laboratory control samples, matrix spikes and matrix spike duplicates and surrogate spikes will be evaluated. QC Summary Forms (sample included as Appendix B) will be completed by AEC QA Managers during the course of the proposed investigation and submitted as part of the final report.

Data audits will be performed on results received from the laboratories if the data is suspected as being questionable. Such audits are not anticipated but would be performed in a manner outside of the proposed limited data validation procedures discussed previously in this Work Plan. Such an evaluation would require submission of raw analytical data files from the laboratory to AEC and a more intensive data validation process including verification of data calculations for calibration and QC samples to assess if data are consistent with method requirements. Examples of information to be requested from the laboratories and subsequently evaluated in such a scenario include:

- Instrument specifications and analysis logs for all instruments used on days of calibration and analysis;
- Reconstructed ion chromatograms for all samples, standards, blanks, calibrations, spikes, replicates, and reference materials;
- Spectra of detected compounds with associated best-match spectra for each sample;
- Printouts and quantitation reports for each instrument used, including reports for all samples, standards, blanks, calibrations, spikes, replicates, and reference materials;
- Raw data quantification reports for each sample; and
- Raw data for blanks and samples not reported.

The laboratories will make available all supporting documentation referenced above (if requested) in a timely manner.

## 5.0 REPORTING

A technical report will be prepared that describes the site investigation, and will present an evaluation of investigation results. The site investigation report will include at a minimum the following:

- A summary of prior and the current/proposed investigation results (including tables that summarize analytical results).

- A complete description of the investigation, including all data necessary to understand the project in its entirety and all investigative methods and procedures.

- A discussion of key decision points encountered and resolved during the course of the investigation.

- Graphical displays that describe report results. Key data such as geologic features that may affect contaminant transport will also be discussed.

- A human health risk assessment evaluating the potential vapor intrusion pathway with a description of potential or known impacts on human and environmental receptors for a residential development. San Francisco Bay Regional Water Quality Control Board ESLs will be utilized by AEC during the vapor risk evaluation. In addition, the California DTSC modified J&E screening-level model for soil gas contamination (last modified in December 2014) will be utilized during the risk evaluation if deemed appropriate.

- A discussion of additional soil analytical data obtained during the investigation. Comparative criteria to be utilized during the soil evaluation will include ESLs and also waste profiling relative thresholds as defined in California Code of Regulations, Title 22, Chapter 11, Article 3.

- A discussion of any upset conditions that occurred during the sampling events or laboratory analysis that may have influence the results. The discussion will include any problems with chain of custody procedures, sample holding times, sample preservation, handling and transport procedures, field equipment calibration and handling, field blank results that show potential sample contamination and any field duplicate results that indicate a potential concern. Summary tables will be provided that show the upset condition and the samples that could be impacted (if applicable).

## 6.0 REFERENCES

Alameda County Department of Environmental Health, Online Local Oversight Program (LOP) Records, http://www.acgov.org/aceh/lop/ust.htm

California Code of Regulations (CCR), Title 22 Social Security, Division 4.5 Environmental Health Standards for the Management of Hazardous Waste, Chapter 11 Identification and Listing of Hazardous Waste, filed on 5-24-91; effective on 7-1-91.

California Environmental Protection Agency, Department of Toxic Substances Control (DTSC)/ California Regional Water Quality Control Board, Los Angeles and San Francisco Regions (LA-RWQCB and SF-RWQCB), July 2015, Advisory—*Active Soil Gas Investigations,* jointly issued by the DTSC, LA-RWQCB and SF-RWQCB.

California Geological Survey, D.L. Wagner, E. J.Bortugno, and R.D. McJunkin, 1991, Geologic Map of San Francisco – San Jose Quadrangle.

California Geological Survey (CGS), 2002, California Geomorphic Provinces Note 36, Electronic Copy, Revised December.

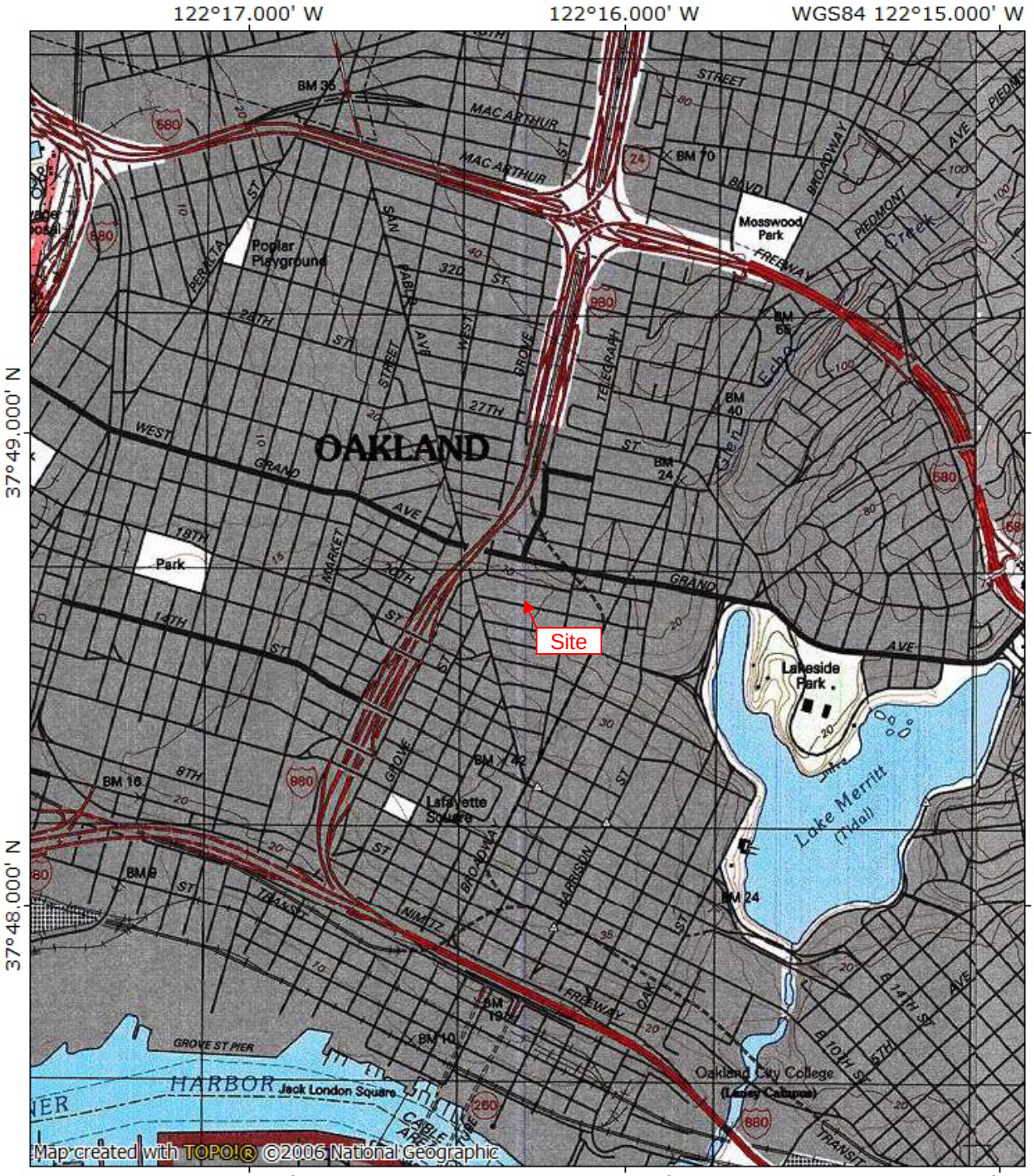
California Regional Water Quality Control Board – San Francisco Bay Region (SF-RWQCB), 1995, "San Francisco Bay Basin (Region 2), Water Quality Control Plan (Basin Plan)", revised 2012 (including amendments adopted through 2011).

California Regional Water Quality Control Board – San Francisco Bay Region (SF-RWQCB), 2013, "User's Guide: Derivation and Application of Environmental Screening Levels", Interim Final 2013.

State of California Water Resources Control Board (SWRCB) GeoTracker database: http://geotracker.swrcb.ca.gov/;

United States Geologic Survey (USGS), 1997, Oakland West, CA, Quadrangle 7.5 Minute Topographic Map.

# FIGURES




USGS Topographic Quadrangle Map
Oakland West, CA (1997)


Advantage Environmental Consultants, LLC

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San Marcos, CA 92069
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Vicinity Map
585 22nd Street
Oakland, California

| Work Order No.: | Report Date: | Drawn By: |
|---|---|---|
| 15-120A-SD | October 2015 | TJ |


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San Marcos, CA 92069
Phone: 760-744-3363 Fax: 760-744-3383

Site Plan With Prior Sampling Locations
585 22nd Street
Oakland, California

| Work Order No.: | Report Date: | Drawn By: |
|---|---|---|
| 15-120A-SD | October 2015 | TJ |


Advantage Environmental Consultants, LLC

145 Vallecitos De Oro, Suite 201
San Marcos, CA 92069
Phone: 760-744-3363 Fax: 760-744-3383

Site Plan With Prior and Proposed Sampling Locations
585 22nd Street
Oakland, California

| Work Order No.: | Report Date: | Drawn By: |
|---|---|---|
| 15-120A-SD | October 2015 | TJ |

# APPENDIX A

## *SOIL GAS LABORATORY REPORTING LIMITS*

teg

# Soil Vapor - VOC compounds

## Low Level Reporting Limits by EPA 8260B

| | Reporting Limit in $\mu g/m^3$ of vapor |
|---|---|
| Dichlorodifluoromethane | 100 |
| Vinyl Chloride | 13 |
| Chloroethane | 100 |
| Trichlorofluoromethane | 100 |
| 1,1-Dichloroethene | 100 |
| 1,1,2-Trichloro-trifluoroethane | 100 |
| Methylene Chloride | 100 |
| trans-1,2-Dichloroethene | 100 |
| 1,1-Dichloroethane | 100 |
| cis-1,2-Dichloroethene | 100 |
| Chloroform | 100 |
| 1,1,1-Trichloroethane | 100 |
| Carbon Tetrachloride | 25 |
| 1,2-Dichloroethane | 45 |
| Benzene | 35 |
| Trichloroethene | 100 |
| Toluene | 200 |
| 1,1,2-Trichloroethane | 100 |
| Tetrachloroethene | 100 |
| Ethylbenzene | 100 |
| 1,1,1,2-Tetrachloroethane | 100 |
| m,p-Xylene | 200 |
| o-Xylene | 100 |
| 1,1,2,2-Tetrachloroethane | 100 |
| | |
| Leak check compound: | |
| 1,1 Difluoroethane (1,1 DFA) | 10,000 |

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# APPENDIX B

## *SAMPLE QC SUMMARY FORM*

# QA/QC CHECKLIST FOR LABORATORY DATA REVIEW

| | | | |
|---|---|---|---|
| **Project:** | | **Method(s):** | |
| **Laboratory:** | | | |
| **Sampling Dates:** | | **Samples:** | |
| **Analysis Dates:** | | | |
| **Lab Report Date:** | | | |
| **Lab Report Number:** | | | |

| | Item | Y/N | Initials | Comment |
|---|---|---|---|---|
| 1. | Chain-of-Custody Complete and Correct? | | | |
| 2. | Samples ID's on Lab Report Match those on COC? | | | |
| 3. | Required Analyses Reported? | | | |
| 4. | Holding Times Met? | | | |
| 5. | Lab Report Complete, signed Dated, on Time? | | | |
| 6. | Travel and Equip Blanks Okay? | | | |
| 7. | Field Duplicates Okay | | | |
| 8. | Lab Method Blanks Okay? | | | |
| 9. | Surrogate Recovery Okay? | | | |
| 10. | Matrix Spike Recovery Okay? | | | |
| 11. | BS Recovery Okay? | | | |
| 12. | BSD & or MSD Dupes Okay? | | | |
| 13. | Reporting Limits Met? | | | |
| 14. | Units match Matrix? | | | |
| 15. | Data Make Sense? | | | |
| 16. | Any Unusual Data? | | | |
| 17. | Corrective Action Needed? | | | |
| 18. | Correction Action Reported? | | | |
| | | | Follow-up with Lab Required? | |

| | | | |
|---|---|---|---|
| Signature of Reviewer | | Date: | |