

October 30, 2015

Ms. Gail Payne
City of Alameda
Public Works Department
950 West Mall Square, Room 110
Alameda, CA 94501



Subject: Draft Investigation and Risk Assessment Report for the Cross Alameda Trail, Alameda, CA

Dear Ms. Payne:

Enclosed with this letter is the draft *Investigation and Risk Assessment Report for the Cross Alameda Trail* prepared by Tetra Tech on behalf of the City of Alameda, Public Works Department. The Cross Alameda Trail site is adjacent to and south of Ralph Appezzato Memorial Parkway between Webster Street and Main Street, Alameda, CA, and is being investigated under Alameda County Environmental Health (ACEH) Case RO0003168.

Please contact Victor Early at 510-302-6332 with any questions or comments regarding the enclosed report.

Sincerely,

Tetra Tech, Inc.
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Tetra Tech, Inc
1999 Harrison Street, Suite 500
Oakland, CA 94612



Draft

Investigation and Risk Assessment Report for the Cross Alameda Trail

**City of Alameda
Department of Public Works
Alameda, California**

October 2015

Prepared for:

**City of Alameda
Department of Public Works
Alameda, California**



Prepared by:

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DRAFT

Investigation and Risk Assessment Report for the Cross Alameda Trail

Alameda, California

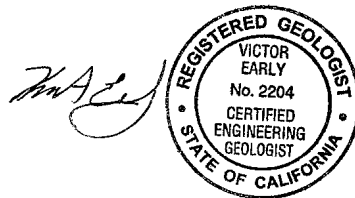
PREPARED FOR:

**City of Alameda
Department of Public Works
Alameda, California**

REVIEW AND APPROVAL

Perjury Statement:

I declare, under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge.



Project Manager: _____
Victor Early, CEG, Tetra Tech

Date: October 2015

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ACRONYMS AND ABBREVIATIONS

µg/dL	Micrograms per deciliter
µg/L	Micrograms per liter
95%UCL	95 percent upper confidence limit
Accutest	Accutest Laboratories
ACEH	Alameda County Department of Environmental Health
ALM	Adult Lead Methodology
APN	Assessor's Parcel Number
bgs	Below ground surface
Cal/EPA	California Environmental Protection Agency
CFR	<i>Code of Federal Regulations</i>
COC	Contaminant of concern
COPC	Chemical of potential concern
CSM	Conceptual site model
DTSC	Department of Toxic Substances Control
EDD	Electronic data deliverable
ELAP	Environmental Laboratory Accreditation Program
EPA	U.S. Environmental Protection Agency
EPC	Exposure point concentration
ESA	Environmental Site Assessment
HERO	Office of Human and Ecological Risk Assessment
HI	Hazard index
HQ	Hazard quotient
IDW	Investigation-derived waste
mg/kg	Milligrams per kilogram
OSWER	Office of Solid Waste and Emergency Response

ACRONYMS AND ABBREVIATIONS (CONTINUED)

PAH	Polycyclic aromatic hydrocarbon
PbB	Blood lead concentration
PEF	Particulate emission factor
PID	Photoionization detector
PVC	Polyvinyl chloride
QA	Quality assurance
QC	Quality control
RBSC	Risk Based Screening Concentration
RBSL	Risk Based Screening Level
RCRA	Resource Conservation and Recovery Act
REC	Recognized environmental condition
RPD	Relative percent difference
RSL	Regional screening level
RWQCB	San Francisco Regional Water Quality Control Board
SLHHRA	Screening Level Human Health Risk Assessment
Tetra Tech	Tetra Tech, Inc.
TPH	Total petroleum hydrocarbons
TEPH	Total extractable petroleum hydrocarbons
TPPH	Total purgeable petroleum hydrocarbons
USA	Underground Service Alert
USGS	U.S. Geological Survey
VDEQ	Virginia Department of Environmental Quality
VF	Volatilization factor
VISL	Vapor Intrusion Screening Level
VOC	Volatile organic compound

1.0 INTRODUCTION

Under contract to the City of Alameda, Department of Public Works (Alameda), Tetra Tech has prepared this surface/subsurface investigation and risk assessment report to evaluate whether unacceptable risk is posed to human health from chemical contamination within the former railroad corridor property between Webster Street and Main Street, along the south side of Ralph Appezato Memorial Parkway (hereinafter referred to as the site), in Alameda, California (Figure 1). The property is owned by the City of Alameda and includes Assessor's Parcel Numbers [APN] 74-905-20-3 and 74-905-20-2. The site occupies approximately 13 acres of former railroad right-of-way, and is approximately 4,200 feet in length (Figure 2) (Blackie 2010).

The environmental investigation and risk assessment described in this report relate to a planned project at the site called "Cross Alameda Trail." Construction of the Cross Alameda Trail, a typical rail-to-trail project, would add to the San Francisco Bay Trail. The proposed path would be approximately 0.8 mile long and would include separate walking and bike paths, bike lockers, trees, and a bioswale for stormwater runoff control. Upon completion, the Cross Alameda Trail would be open for recreational land use.

1.1 PURPOSE, BACKGROUND, AND SCOPE

The purpose of this investigation was to continue assessment of subsurface contamination for chemicals of potential concern (COPC) established by Tetra Tech, Inc., (Tetra Tech) in the *Phase II Environmental Site Assessment Report for the Cross Alameda Trail* (Phase II ESA) dated February 3, 2015 (Tetra Tech 2015a). As a part of the investigation described in this report, Tetra Tech generated soil and groundwater data to further evaluate the extent of contamination previously identified at the site, and performed a screening level human health risk assessment (SLHHRA) based on levels of contamination identified. The work described in this report accorded with Tetra Tech's *Final Investigation and Risk Assessment Work Plan for the Cross Alameda Trail*, dated July 2015 (Tetra Tech 2015b).

1.2.1 Site History and Previous Investigations

Evidence of railroad tracks are visible on a 1939 aerial photograph, but the railroad was likely present as early as the mid-to-late 1910s (Blackie 2010). The railroad tracks were removed from the parcels in the mid-to-late 1950s (Blackie 2010). Based on observations on December 29 and 30, 2014, during Tetra Tech's Phase II ESA field work, the site is primarily undeveloped and covered with low vegetation, mulch, and some pavement. The westernmost portion of the site is partially covered by a parking lot for an adjacent business (Tetra Tech 2015a).

An intent of the Phase II ESA was to address recognized environmental conditions (REC) that had been identified during a Phase I ESA of the Alameda Belt Line Parcels (nine non-contiguous parcels comprising 38.81 acres of land including the site); at the time of the Phase I ESA (March 8, 2010), these parcels were mostly undeveloped (Blackie 2010).

The Phase I ESA had identified the following RECs to the site:

- Historical railroad tracks
- Fill, imported soil

- Marsh crust (Blackie, 2010).

Tetra Tech based initial selection of COPCs for the Phase II ESA on the RECs to the site identified during the Phase I ESA (Blackie 2010). Chlorinated herbicides were selected because products containing these chemicals are known to have been used for weed control along railroad tracks. Arsenic and lead were selected because fill material and imported fill likely are present at the site (similar fill materials in Alameda are known to contain these chemicals), and arsenical pesticides were commonly used for weed control along railroad tracks (Blackie 2010). Petroleum hydrocarbons and polycyclic aromatic hydrocarbons (PAH) were selected because the material referred to as the “marsh crust” is known to contain these chemicals. The site is possibly within the limit of filling where marsh crust material was disposed of, and the original shoreline was approximately within the site or near the southern border of the site, with the upland occurring to the south. Disposal of dredge material on tidal marshland occurred between 1900 and 1940 to extend dry land from the existing shoreline. The marsh crust is the underground layer of fill material that was used to create dry land (City of Alameda 2015).

During the Phase II ESA, 20 soil samples (including duplicate CAT-B collected on December 30, 2014) were collected from boreholes CAT-B-1 through CAT-B-10. The soil samples were collected at depths ranging from 1 to 8 feet below ground surface (bgs). Borehole locations were selected to approximately align with the former railroad tracks, as identified on an U.S. Geological Survey (USGS) topographic map from 1959 (Blackie 2010). Based on results of the Phase II ESA, chlorinated herbicides and PAHs were excluded as COPCs, and it was determined that further investigation of the extent of lead, arsenic, and petroleum hydrocarbons was warranted (Tetra Tech 2015a). Table 1 includes the results of chemical analyses of soil samples collected during the Phase II ESA.

1.1.2 Scope

To meet the project objectives, the following activities were completed for this investigation:

- Perform utility clearance and obtain Alameda County Department of Environmental Health (ACEH) permit (Attachment 1).
- Prepare site-specific Health and Safety Plan.
- Install soil boreholes and temporary groundwater wells at select locations based on soil data generated during the Phase II ESA (Figure 2).
- Measure water levels, collect soil samples from boreholes, and collect groundwater samples from temporary wells.
- Evaluate extent and magnitude of COPCs by reference to soil and groundwater sample data.
- Log and describe soil cores generated during the investigation.
- Decommission soil boreholes and temporary wells with oversight by ACEH, and dispose of investigation-derived waste (IDW).

- Evaluate soil and groundwater data according to a SLHHRA of the site.

1.2 REPORT ORGANIZATION

This report is organized as follows:

- [Section 1.0](#) provides an introduction, specifies the purpose and objectives of the project, presents the report organization, describes the site, and recounts previous investigations.
- [Section 2.0](#) summarizes the field program.
- [Section 3.0](#) presents the soil and groundwater data generated as part of the investigation.
- [Section 4.0](#) presents the SLHHRA for the site.
- [Section 5.0](#) provides an uncertainty analysis.
- [Section 6.0](#) presents conclusions and offers recommendations.
- [Section 7.0](#) lists sources referenced to develop this document.

Figures and tables follow the text of this report.

Tables 1 and 2 summarize results from chemical analyses of soil and groundwater samples collected as part of this investigation, along with Phase II ESA soil data that prompted further investigation. Tables 3 through 11 support the SLHHRA. Figure 1 shows the site location, and Figure 2 shows the step-out investigations conducted at certain Phase II ESA boreholes as a part of this investigation. Figures 3 through 7 show the step-out investigation boreholes, and soil and groundwater data.

2.0 DATA GENERATION AND ACQUISITION

The following sections summarize methods of investigation at the site, sampling design, analytical methods, and data validation.

2.1 INVESTIGATION METHODS

This section describes the methods implemented during field activities.

2.1.2 Utility Clearance

Tetra Tech marked proposed drilling locations at the site in white paint, and notified Underground Service Alert (USA) more than 2 working days (48 hours) before intrusive activities to obtain USA Ticket # 0418286 (Attachment 1). USA alerted utility operators with utilities in the vicinity of the site, and each utility company with possibly present, on-site buried lines at the site cleared the proposed drill locations. Tetra Tech also hired Subtronic Corporation, a private utility clearance subcontractor, to perform an independent survey to clear each drilling location of discernible subsurface utilities using non-intrusive techniques. The location of each identifiable underground utility was marked either by the utility owner or by Subtronic Corporation.

2.1.3 Step-out Boreholes and Soil Sampling

Tetra Tech's subcontracted driller (Vironex) installed step-out boreholes using direct-push drilling technology in the vicinity of Phase II ESA boreholes where COPCs had been detected at levels warranting further investigation. The step-out soil investigation locations are shown on Figure 2. Four step-out boreholes were drilled in the vicinity of each of the following Phase II ESA boreholes: CAT-B-1, CAT-B-2, CAT-B-6, CAT-B-7, and CAT-B-10, as shown on Figures 3 through 7. One step-out borehole was placed within 3 feet of the initial Phase II ESA borehole to confirm presence of COCPs at the borehole, and the remaining three step-out boreholes were installed approximately 10 feet away from the initial Phase II ESA borehole, spaced approximately 120 degrees apart, to surround the borehole.

Purposes of the step-out boreholes were to (1) confirm presence of COPCs identified during the Phase II ESA, and (2) further delineate extents of any laterally continuous COPCs in soil at the site.

Soil cores were collected in acetate liners at approximately 4-foot depth intervals for lithologic description, photoionization detector (PID) screening, and retention for possible laboratory analysis. Each soil borehole was continuously sampled to generate analytical results representing the vertical extent of the borehole. Soil cores were logged for lithology, including preparation of borehole logs under supervision of a professional geologist licensed in the State of California. Copies of the soil boring logs are in Attachment 2.

Discrete soil samples were collected by use of laboratory-provided glass jars; labeled with date, sample identification, and time; documented on a chain-of-custody form; and placed on ice in a cooler for delivery to the laboratory. Samples were delivered via courier to Accutest Laboratories (Accutest) in San Jose, California, under chain of custody. Accutest is a certified State of California, Environmental Laboratory Accreditation Program (ELAP) laboratory.

2.1.4 Temporary Wells and Groundwater Sampling

Two temporary groundwater wells were installed in the vicinity of Phase II ESA boreholes CAT-B-1 and CAT-B-10 to determine whether petroleum hydrocarbons are dissolved in groundwater. Tetra Tech used direct-push drilling technology to collect groundwater samples from each temporary well. Tetra Tech encountered groundwater at approximately 5 feet bgs at the site. The well casing and screen were made of 1.5-inch-diameter, rigid, polyvinyl chloride (PVC) casing. A 5-foot screened interval (0.02-inch slot) was installed from 10 to 15 feet bgs in each temporary well to facilitate groundwater sample collection. Groundwater samples were analyzed for volatile organic compounds (VOC), total purgeable petroleum hydrocarbons (TPPH) as gasoline, and total extractable petroleum hydrocarbons (TEPH) as motor oil and diesel. Copies of the Groundwater Sampling Records are in Attachment 3.

Before groundwater sample collection, static groundwater levels (measurable free-phase petroleum product was not encountered) had been measured to the nearest 0.01 foot by use of an oil-water interface probe and electronic water level sounder. The wells were purged and sampled according to California Department of Toxic Substances Control (DTSC) guidelines in *Representative Sampling of Groundwater for Hazardous Substances, Guidance Manual for Groundwater Investigations* (DTSC 1995, revised 2008). A peristaltic pump was used to purge each well by application of low-flow purging techniques. During purging of the wells, water quality parameters (temperature, pH, electrical conductivity, oxidation-reduction potential, dissolved oxygen, and turbidity) were measured by use of a Horiba U-52 water quality meter until stabilization (see listing below of Stabilization Criteria). If the water quality parameters did not stabilize after purge of 20 liters, or the well was purged dry, groundwater samples were collected nevertheless. Groundwater samples were placed into appropriate sample containers; labeled with a unique identification number, date, and time; and placed into an ice-chilled cooler for transportation to Accutest under chain-of-custody documentation.

Parameter	Stabilization Criteria
Temperature	± 3% of reading (minimum of ± 0.2° C)
pH	± 0.1
Specific electrical conductivity	± 3%
Oxidation-reduction potential	± 10 millivolts
Dissolved oxygen	± 0.3 milligrams per liter
Turbidity	Relatively clear and free of sediment or <100 nephelometric turbidity units

2.1.5 Decommissioning Soil Boreholes and Temporary Groundwater Wells

Tetra Tech decommissioned the soil boreholes and temporary wells via tremie with Type I/II cement-bentonite grout (maximum of 6 gallons of water per 94 pounds of cement, up to 5 percent bentonite) from the bottom of the borehole to the ground surface. Borehole decommissioning accorded with requirements of ACEH. ACEH inspector Steve Miller inspected the grout on October 1 and 2, 2015.

2.1.6 Investigation-Derived Waste (Waste Management Plan)

All solid and liquid IDW (soil and groundwater waste, and decontamination water) generated during this project was drummed on site. The IDW was characterized as Resource Conservation and Recovery Act (RCRA) hazardous waste and will be transported for disposal at an off-site disposal, treatment, or recycling facility accorded with EPA guidance and applicable federal, state, and local regulations. Copies of Hazardous Waste Management documents will be provided in Attachment 4 once the disposal of IDW is complete.

2.2 SAMPLING DESIGN

This section discusses the sampling approach and rationale. Tetra Tech collected soil samples at five step-out investigation locations at the site (20 shallow soil boreholes to maximum depth of 8 feet bgs), as described in Section 2.1.3. Additionally, Tetra Tech collected groundwater samples from two temporary wells, as described in Section 2.1.4. The number of samples per COPC, sample types, and locations in relation to Phase II ESA borehole locations are tabulated as follows:

COPC	Rationale for Further Investigation	Phase II ESA Borehole (Step-out Investigation/Temporary Well)	Number of Boreholes/Samples
TEPH as diesel and motor oil	TEPH results indicate possible petroleum release and extent of contamination is undefined.	CAT-B-1, CAT-B-2, and CAT-B-10 (three step-out soil investigation locations, and two temporary groundwater well locations)	12 step-out boreholes and 24 soil samples
TPPH as gasoline	Possible petroleum release to groundwater based on TEPH data.	CAT-B-1 and CAT-B-10 (two temporary groundwater well locations)	2 groundwater samples
VOCs	Possible petroleum release to groundwater based on TEPH data.	CAT-B-1 and CAT-B-10 (two temporary groundwater well locations)	2 groundwater samples
Lead	Exceeds regulatory screening levels.	CAT-B-6, CAT-B-7, and CAT-B-10 (three step-out soil investigation locations)	12 step-out boreholes and 24 soil samples
Arsenic	Exceeds background level ¹ .	CAT-B-1 and CAT-B-2 (two step-out soil investigation locations)	8 step-out boreholes and 16 soil samples

¹ The regional background level for arsenic is 11 milligrams per kilogram (mg/kg) (Duverge 2011). Step-out soil investigation was proposed at Phase II ESA borehole locations where arsenic concentrations exceeded 11 mg/kg, even though concentrations less than background exceeded applicable regulatory screening levels.

Rationales for soil and groundwater sampling were as follows based on Phase II ESA soil sample data:

1. Analyses for petroleum hydrocarbons in soil and groundwater would lead to better understanding of the nature and extent of petroleum contamination in certain areas of the site (see Table 1).
2. Analyses for petroleum hydrocarbons and VOCs in groundwater would help determine whether groundwater is contaminated with petroleum constituents (Table 2).
3. Analysis for lead in soil would better delineate the extent of lead in soil at concentrations exceeding regulatory screening levels (see Table 1).
4. Analysis for arsenic was deemed necessary in areas of the site where concentrations of arsenic had been found to exceed its regional background level (see Table 1).

Two soil samples were collected from each step-out borehole, and were submitted to Accutest for analyses for COPCs according to the rationales listed above. At each borehole, one soil

sample was collected within 0 to 0.5 feet bgs, and one soil sample was collected within 0.5 to 8.0 feet bgs. The deeper interval soil sample was collected at the approximate depth where contamination had been identified during the Phase II investigation of that area of the site.

2.3 ANALYTICAL METHODS

Analytical methods were selected to obtain the chemical information needed for decision making regarding the site. Soil and groundwater samples were analyzed for COPCs via the following U.S. Environmental Protection Agency (EPA) methods:

- TEPH in soil via EPA Method 8015M
- Lead and arsenic in soil via EPA Method 6020
- VOCs in groundwater via EPA Method 8260B
- TPPH as gasoline in groundwater via EPA Method 8260B.

The subcontracted laboratory provided electronic data deliverables (EDD) of all analytical results.

2.4 DATA VALIDATION

The data have been fully assessed to confirm overall data quality. Accutest's quality assurance (QA) / quality control (QC) procedure included analyses of blanks, spikes of surrogate compounds, laboratory control samples, and matrix spike/matrix spike duplicates. Tetra Tech reviewed the laboratory reports for conformance to the requested analyses, and validated the data. Based on the laboratory QA/QC data, Tetra Tech determined that the sample data were valid for use in the SLHHRA.

Relative percent differences (RPD) between results from respective pairs of duplicate and original groundwater samples (CAT-B-23-GW and CAT-B) were not calculated to evaluate precision of analyses of groundwater samples because results from all analyses were less than the laboratory method detection limits for the duplicate groundwater sample sets.

3.0 INVESTIGATION RESULTS

Four step-out boreholes were drilled in the vicinity of each of the following Phase II ESA boreholes: CAT-B-1, CAT-B-2, CAT-B-6, CAT-B-7, and CAT-B-10, as shown on Figures 3 through 7. The nomenclature for the 20 step-out boreholes is CAT-B-11 through CAT-B-30, and the last numeral of the soil identification nomenclature (e.g., CAT-B-11-0.5) indicates the approximate depth (e.g., 0.5 feet bgs) at which the soil sample was collected. Similarly, the last part of the groundwater sample identification nomenclature (e.g., CAT-B-11-GW) indicates the sample medium. Tables 1 and 2 list soil and groundwater data. Attachment 5 is a copy of the laboratory analytical report.

3.1 SOIL

Forty soil samples were collected on October 1 and 2, 2015, from 20 step-out investigation boreholes in the vicinity of certain Phase II ESA boreholes (two soil samples were collected from each borehole as described in Section 2.1.3). The following is a listing of step-out soil borehole identifications and associated Phase II ESA borehole identifications:

Phase II ESA Borehole/Step-out Investigation Identification	Step-out Borehole Identification
CAT-B-1 Step-out Investigation	Step-out soil boreholes CAT-B-11 through CAT-B-14
CAT-B-2 Step-out Investigation	Step-out soil boreholes CAT-B-15 through CAT-B-18
CAT-B-6 Step-out Investigation	Step-out soil boreholes CAT-B-19 through CAT-B-22
CAT-B-7 Step-out Investigation	Step-out soil boreholes CAT-B-27 through CAT-B-30
CAT-B-10 Step-out Investigation	Step-out soil boreholes CAT-B-23 through CAT-B-26

3.1.1 Lead

Lead was detected in all 32 soil samples analyzed as part of step-out investigations at Phase II ESA boreholes CAT-B-1, CAT-B-6, CAT-B-7, and CAT-B-10. Lead concentrations ranged from 2.6 to 7,670 milligrams per kilogram (mg/kg) (Table 2). Lead data are listed in Table 1, and are shown on Figures 3, 5, 6, and 7. Table 4.2 summarizes subsurface soil statistics, including lead data, for the SLHHRA. Lead was detected in all 53 soil samples collected during both the step-out investigation and the Phase II ESA. Lead results exceeding screening criteria are shaded in the results tables.

3.1.2 Arsenic

Arsenic was detected in all 24 soil samples analyzed as part of step-out investigations at Phase II ESA boreholes CAT-B-1, CAT-B-6, CAT-B-7, and CAT-B-10. Arsenic concentrations ranged from 0.71 to 35.8 mg/kg (Table 1). Arsenic concentrations in soil are shown on Figures 3, 4, and 7. Table 4.2 summarizes subsurface soil statistics, including arsenic data, for the SLHHRA. Arsenic was detected in all 45 soil samples collected during both the step-out investigation and the Phase II ESA.

Regional estimates of background arsenic concentrations in urbanized parts of the San Francisco Bay Area have recently been published with San Francisco Regional Water Quality Control Board (RWQCB) endorsement (Duverge 2011). The study proposes an upper estimate of 11.00 mg/kg for background arsenic (99th percentile) within the undifferentiated flatland soils of the study area. The findings of the study are significant because the estimate for background arsenic is considerably lower than other estimates commonly cited as sources in the literature (Duverge 2011). The upper estimate of 11 mg/kg was proposed in the Sampling and analysis plan and was approved by Alameda County Department of Environmental health. Arsenic results exceeding screening criteria are shaded in the results tables.

3.1.3 Petroleum Hydrocarbons

TEPH as diesel was not detected at concentration above the laboratory method detection limit in any of the 24 soil samples analyzed as part of step-out investigations at Phase II ESA boreholes CAT-B-1, CAT-B-6, CAT-B-7, and CAT-B-10. TEPH as motor oil was detected in all 24 soil samples analyzed at concentrations ranging from 59.9 to 2,210 mg/kg. Petroleum hydrocarbons soil results are listed in Table 1, and shown on Figures 3, 4, and 7. Table 4.2 summarizes subsurface soil statistics, including petroleum hydrocarbon data, for the SLHHRA. TEPH as diesel was detected in 15 of 45 soil samples, and TEPH as motor oil was detected in 42 of 45 soil samples collected during both the step-out investigation and the Phase II ESA. TEPH results exceeding screening criteria are shaded in the results tables.

3.2 GROUNDWATER

Two groundwater samples were collected on October 2, 2015, from temporary groundwater wells installed in step-out boreholes CAT-B-11 and CAT-B-23.

3.1.1 Petroleum Hydrocarbons

In groundwater sample CAT-B-1-GW, TEPH as diesel and TPPH as gasoline were detected at 212 and 301 micrograms per liter ($\mu\text{g/L}$), respectively. The VOC di-isopropyl ether was the only VOC detected at concentration above the laboratory reporting limit in groundwater sample CAT-B-1-GW (acetone was detected at an estimated value [J flag] of 19.5 $\mu\text{g/L}$).

VOCs, TEPH as diesel and motor oil, and TPPH as gasoline were not detected at levels above the laboratory method detection limit in the groundwater sample CAT-B-1-GW/CAT-B duplicate pair. Tables 2 and 4.3 list groundwater data and a statistical summary, respectively.

4.0 RISK ASSESSMENT

The following section presents the SLHHRA of the site.

4.1 SCREENING LEVEL HUMAN HEALTH RISK ASSESSMENT METHODOLOGY

This section describes the methodology applied to complete the SLHHRA. The SLHHRA process involves use of conservative screening levels to estimate cumulative cancer risks and noncancer hazards. If the cumulative risk and hazard index (HI) estimates are acceptable using conservative screening assumptions, site-specific conditions can be expected to result in acceptable risks and hazards.

The methods applied to conduct the SLHHRA are based on the risk assessment framework developed by EPA. The framework is set forth in *Risk Assessment Guidance for Superfund (RAGS), Volume I, Human Health Evaluation Manual (Part A)* (EPA 1989) and “Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities” (DTSC 1992). The SLHHRA consisted of the following seven components, described in the sections below.

- Conceptual Site Model (CSM) ([Section 4.1.1](#))
- Data Evaluation for COPCs ([Section 4.1.2](#))
- Exposure Assessment ([Section 4.1.3](#))
- Toxicity Assessment ([Section 4.1.4](#))
- Risk Characterization and Results ([Section 4.1.5](#))
- Uncertainty Analysis ([Section 4.1.6](#))
- Exit Criteria for the SLHHRA ([Section 4.1.7](#)).

4.1.1 Conceptual Site Model

The CSM summarizes information about sources of chemicals at the site, affected environmental media, chemical release and transport mechanisms that may occur at the site, potential exposed receptors, and potential exposure pathways for each receptor. The CSM for the risk evaluation is shown on Figure 8. The CSM for the site was refined as data from the investigation were evaluated. Components of the CSM included in the SLHHRA are briefly discussed in the following sections.

4.1.1.1 Sources of Site Chemicals

The Phase I and Phase II ESAs of the site served to establish petroleum hydrocarbons, VOCs, and lead and arsenic as COPCs for the site. Chemicals identified at the site during the Phase II

ESA are hypothesized to have originated from historical uses of the site identified in the Phase I ESA report. Those historical uses, summarized in [Section 1.2.1](#), include import fill and marsh crust materials disposal, and operation of railroad tracks.

4.1.1.2 *Affected Environmental Media*

Historical use of the site likely resulted in chemical releases to soil, which may have been followed by leaching of COPCs to groundwater. VOCs in soil gas could migrate into overlying buildings constructed at the site in the future, as well as into ambient (outdoor) air.

4.1.1.3 *Potentially Exposed Human Receptors*

The site is currently vacant, unused land owned by the City of Alameda. Future recreational use of the site as the Cross Alameda Trail is proposed, and is the reason for this SLHHRA.

Site cancer risks and noncancer hazards were quantified for the following receptors: (1) residential users representing an unrestricted use scenario, (2) site-specific recreational users, and (3) construction workers.

Future residential use of the site is not anticipated. This land use scenario, however, represents the most protective and unrestricted future use of the site, and is evaluated to provide risk managers a baseline level of risk and to support implementation of land use restrictions if necessary.

4.1.1.4 *Potentially Complete Exposure Pathways*

According to guidance from EPA (1989), a complete exposure pathway consists of four elements:

- A source and mechanism of chemical release
- A retention or transport medium (or media, in cases involving transfer of chemicals)
- A point of potential human contact with the contaminated medium (referred to as the exposure point)
- An exposure route (such as ingestion) at the exposure point.

The CSM indicates whether exposure pathways are potentially complete or are considered incomplete. Only potentially complete exposure pathways were considered in the SLHHRA. As discussed below in [Section 4.1.5](#), receptor-specific risks and hazards were calculated by comparing medium-specific chemical concentrations to medium-specific risk based screening levels (RBSL). For the purpose of the SLHHRA, residential, recreational user, and construction worker RBSLs were considered.

4.1.1.4.1 Soil

Three potentially complete exposure pathways from surface and subsurface soil were identified for the receptors that were evaluated in the SLHHRA:

- Incidental ingestion of soil
- Dermal contact with soil
- Inhalation of chemicals released from soil to outdoor air from wind erosion and volatilization.

These three soil pathways were evaluated for surface and subsurface soil and incorporated into development of soil RBSLs used in the SLHHRA for residential and recreational users. Volatile compounds were not detected in surface soil; thus, inhalation of volatile chemicals from surface soil pathway was not included in the evaluation. Soil RBSLs for the residential and recreational receptors were based on EPA's soil regional screening levels (RSL) (EPA 2015a); however, if a more conservative (that is, lower) "DTSC-Recommended Screening Levels for Soil" (DTSC 2015) was available, this was used instead of the EPA RSL. For the recreational user, generic RBSLs were not available; thus, site-specific RBSLs were developed using EPA-derived exposure algorithms (EPA 2015a). The DTSC, Office of Human and Ecological Risk (HERO), Note Number 3 was used to incorporate EPA RSLs into the HERO human health risk assessment process. Total petroleum hydrocarbons (TPH) diesel, gasoline, and motor oil data were evaluated by reference to toxicity values for the TPH fractions in the RSL (EPA 2015a) as follows:

- Toxicity criteria for TPH (aliphatic medium) were used for diesel for ingestion and dermal pathways, and toxicity criteria for TPH (aromatic medium) were used for inhalation pathways.
- Toxicity criteria for TPH (aromatic low) were used for gasoline.
- Toxicity criteria for TPH (aromatic high) were used for motor oil.

4.1.1.4.2 Groundwater

Three potentially complete exposure pathways for groundwater used for household domestic uses were evaluated in the SLHHRA:

- Ingestion of groundwater as a source of drinking water
- Dermal contact with groundwater during domestic use
- Inhalation of vapors released from groundwater to indoor air during domestic use.

The three pathways evaluated for groundwater were incorporated into the residential tap water RBSLs used in the SLHHRA, which were based on EPA tap water RSLs (EPA 2015a). The DTSC, HERO, Note Number 3 was used to help incorporate the EPA RSLs into the HERO human health risk assessment process.

In addition, volatile contaminants in groundwater were evaluated by use of EPA's Vapor Intrusion Screening Level calculator (EPA 2015b). Determination of construction worker exposure to vapors in a trench was based on the Virginia Department of Environmental Quality (VDEQ) trench model (VDEQ 2015) and EPA air equations (2015a).

4.1.2 Data Evaluation and Selection of Chemicals of Potential Concern

Only analytical data derived from soil and groundwater samples were included in the SLHHRA. Field screening data (for example, waste characterization data) were not included in the SLHHRA because these data did not meet data quality criteria for risk assessment.

4.1.2.1 Data Evaluation

All analytical data obtained during the investigation underwent cursory validation by use of EPA Contract Laboratory Program National Functional Guidelines for Inorganic and Organic Data Review (EPA 2008b, 2010) and the associated analytical methods. Approximately 20 percent of the data underwent full validation to verify that the data met EPA data quality criteria for use in risk assessment (EPA 1992).

All data without qualifiers and all data qualified as estimated (J) and not detected (U or UJ) were used in the SLHHRA. Any analytes not detected in any medium-specific samples were excluded from consideration for that medium.

Duplicate samples of groundwater were collected to assess laboratory precision. The highest detected concentration of each detected chemical in the normal and duplicate samples was used as the concentration at the location of those two samples.

4.1.2.2 Data Reduction

No data reduction processes additional to those described above in the data evaluation section were implemented during the SLHHRA.

4.1.2.3 Data Grouping

Surface and subsurface soil data were evaluated to determine soil exposure to a future resident or recreational user at the site as described below:

- **Surface soil** was represented by samples collected within 0 to 0.5 feet bgs, where 0.5 feet bgs represented the deepest end-depth interval. This data set was used to evaluate potential current/future exposures associated with the current site configuration, assuming little or no redevelopment and minimal disturbance of deeper (subsurface) soils.
- **Subsurface soil** that could become surface soil in the future was represented by soil samples collected within 0 to 8 feet bgs, where 8 feet bgs represented the deepest end-depth. This data set was used to evaluate potential future exposures associated with possible intrusive development, whereby future regrading or excavation may redistribute subsurface soils to the surface.
- **Groundwater** was evaluated for evaluation of future residential exposure to groundwater through domestic use and vapor intrusion to indoor air, and to future construction workers by vapor intrusion into a trench.

4.1.2.4 Selection of COPCs

COPCs are chemicals carried through the quantitative exposure assessment and risk characterization. COPCs previously identified through Phase I and II ESAs were used in the SLHHRA. COPCs for soil and groundwater were identified separately for each data grouping. All chemicals detected in at least one sample, except essential human nutrients (calcium, magnesium, potassium, and sodium), were initially identified as COPCs. Data for specific TPH fractions or indicator chemicals were used to assess potential human health risk from TPH contamination in groundwater. The following matrix indicates chemicals identified as COPCs for each medium.

Chemical	Surface Soil 0-0.5 foot bgs	Subsurface Soil 0-8 feet bgs	Groundwater
Arsenic	X	X	
Lead	X	X	
TPH Diesel	X	X	X
TPH Gasoline			X
TPH Motor oil	X	X	
Di-Isopropyl ether			X

Notes:

bgs Below ground surface
 TPH Total petroleum hydrocarbons

4.1.3 Exposure Assessment

An exposure assessment identifies potential human receptors who could be exposed to site-related chemicals, as well as the exposure routes, magnitudes, frequencies, and durations of the potential exposures. Potential exposure scenarios and pathways are documented in the CSM (Figure 8 and Table 3).

The exposure point concentration (EPC) is the concentration of a COPC in an exposure medium (for example, surface soil) to which a receptor may be exposed. For each COPC, maximum detected concentrations in soil and groundwater were used as the EPCs in those two media. Maximum detected concentrations of each detected chemical in each medium are listed in Tables 4.1 through 4.3.

COPCs in soil and groundwater may be transferred to outdoor air from wind erosion or volatilization, and to indoor air from volatilization. Samples of outdoor and indoor air were not collected at the site. Transport models were incorporated into the RBSLs to account for transfer mechanisms from these media in the absence of direct measurements of chemical concentrations in air.

4.1.3.1 Outdoor Air – Particulate Chemicals Released from Soil

To derive EPCs for airborne particulates, EPA uses a model that calculates a particulate emission factor (PEF) relative to contaminant concentration in soil and concentration of respirable particulates in the air due to fugitive dust (erosion from wind) emissions from contaminated soils. The soil EPC is multiplied by the reciprocal of the PEF, which is a non-chemical-specific value that relates chemical concentrations in soil to airborne concentrations that may be inhaled. The EPA (2015a) default PEF of 1.36E+09 cubic meters per kilogram was used to develop the RBSLs.

4.1.3.2 Indoor Air – Vapor Intrusion Pathway

Groundwater screening levels for volatile compounds released from groundwater to indoor air were calculated applying the EPA methodology on derivation of Vapor Intrusion Screening Levels (VISL) (EPA 2015b) using default input parameters. VISL results are in Attachment 6.

4.1.3.3 Trench Air Quality Modelling

Groundwater screening levels for volatile compounds released from groundwater to trench air during construction were calculated by application of the VDEQ methodology (VDEQ 2015) using default input parameters and site-specific information. The trench model methodology, inputs and calculated volatilization factors (VF), and resulting groundwater RBSLs are in Attachment 7.

4.1.4 Toxicity Assessment

The medium-specific RBSLs already incorporate the most current, accepted chemical- and medium-specific toxicity factors (EPA 2015a). Available State of California toxicity values (DTSC 2015) that are more protective were used.

As necessary, the SLHHRA incorporated chemical surrogates for COPCs for which toxicity criteria and corresponding generic RBSLs had not been established. The following surrogate toxicity values were used:

- Toxicity criteria for TPH (aliphatic medium) were used for TPH diesel for soil pathways, and toxicity criteria for TPH (aromatic medium) were used for groundwater pathways.
- Toxicity criteria for TPH (aromatic low) were used for TPH gasoline.
- Toxicity criteria for TPH (aromatic high) were used for TPH motor oil.

Risks to child residents and recreational users from lead in soil were characterized by comparing the EPC with the State of California residential screening level of 80 mg/kg (DTSC 2015).

4.1.5 Risk Characterization

Risk characterization involves combining EPCs, daily intakes, and toxicity criteria to calculate potential for health risks associated with exposure to COPCs. Daily intakes are based on exposure assumptions for each receptor. The exposure assumptions used in this SLHHRA are listed in Table 5.

Health risks at the site were estimated by following a “risk-ratiometric” approach. Cancer risks and noncancer health hazards were characterized separately. In this approach, the ratio of EPCs (maximum detected site concentration) to RBSLs is multiplied by the target cancer risk (1×10^{-6}) or target HI (1) to estimate health risks. The resulting risk estimates are numerically equivalent to the estimates obtained using the EPA (1989) “forward calculation methodology.” Both cancer-based and noncancer-based RSLs were considered for COPCs associated with both cancer and noncancer effects. The RBSL equations are presented in EPA (2015a). RBSLs used in this SLHHRA are listed in Table 6.

4.2 SCREENING LEVEL HUMAN HEALTH RISK ASSESSMENT RESULTS

The following sections present results of the SLHHRA by receptor.

4.2.1 Future Resident (Unrestricted Use)

Future residential use of the site is not anticipated. This land use scenario, however, represents the most protective and unrestricted future use of the site, and was evaluated to provide risk managers a baseline level of risk and to support implementation of land use restrictions if necessary. The future resident was evaluated using the most protective of possible scenarios—that is, an age-aggregated adult and child receptor (0-26 years old) was used for estimating cancer risk, and a child receptor (0-6 years old) was used to estimate the non-cancer hazard.

The future resident was evaluated for exposure to surface soil assuming minimal development, exposure to subsurface soil assuming development that includes excavation and potential transfer of subsurface soil to the surface, and exposure to groundwater via both domestic use (ingestion, dermal contact, and inhalation of vapors) and through vapor intrusion into a future residence. The summary of risks and hazards for the future resident is in Table 7.1.

4.2.1.1 Surface Soil

The only COPCs detected in surface soil were arsenic and motor oil. Using the maximum detected concentrations of these two constituents resulted in a cancer risk of 3.3E-04 and a non-cancer HI of 90. Both the cancer risk and the non-cancer hazard are attributable to arsenic.

4.2.1.2 Subsurface Soil

Arsenic, diesel, and motor oil were COPCs detected in subsurface soil samples. Using the maximum detected concentrations of these two constituents resulted in a cancer risk of 3.3E-04 and a non-cancer HI of 92. Both the cancer risk and the non-cancer hazard are primarily attributable to arsenic. The maximum concentration of diesel in subsurface soil resulted in a hazard quotient (HQ) of 2.

4.2.1.3 Groundwater

Di-isopropyl ether, gasoline, and diesel were detected in groundwater. For none of these constituents had a cancer toxicity value been established; thus a cancer risk was not calculated. Using the maximum detected concentrations of these constituents resulted in a non-cancer HI of 51. Most of the non-cancer hazard (48) was from diesel from domestic use of the groundwater, which is an unlikely scenario. The hazard from vapor intrusion to a future resident was estimated at 3.

4.2.2 Future Recreational User

Future recreational use of the site represents the proposed future use of the site. The future recreational user was evaluated for exposure to surface soil assuming minimal development, and exposure to subsurface soil assuming development that includes excavation and potential transfer of subsurface soil to the surface. The summary of risks and hazards for the future recreational user is in Table 7.2.

4.2.2.1 Surface Soil

The only COPCs detected in surface soil were arsenic and motor oil. Using the maximum detected concentrations of these two constituents resulted in a cancer risk of 2.7E-04 and a non-cancer HI of 71. Both the cancer risk and the non-cancer hazard are attributable to arsenic.

4.2.2.2 Subsurface Soil

Arsenic, diesel and motor oil were COPCs detected in subsurface soil samples. Using the maximum detected concentrations of these two constituents resulted in a cancer risk of 2.7E-04 and a non-cancer HI of 72. Both the cancer risk and the non-cancer hazard are primarily attributable to arsenic.

4.2.3 Future Construction Worker

The future construction worker was evaluated for exposure to subsurface soil assuming development that includes excavation, potential transfer of subsurface soil to the surface, and

exposure to groundwater via vapor intrusion into a trench during construction activities. The summary of risks and hazards for the future construction worker is in Table 7.3.

4.2.3.1 Subsurface Soil

Arsenic, diesel, and motor oil were COPCs detected in subsurface soil samples. Using the maximum detected concentrations of these constituents resulted in a cancer risk of 2.0E-05 and a non-cancer HI of 42. Both the cancer risk and the non-cancer hazard are primarily attributable to arsenic.

4.2.3.2 Groundwater

Di-isopropyl ether, gasoline, and diesel were detected in groundwater. For none of these constituents had a cancer toxicity value been established; thus a cancer risk was not calculated. Using the maximum detected concentrations of these constituents resulted in a non-cancer HI of 12, primarily from inhalation of vapors from diesel.

4.3 LEAD RISK EVALUATION

Toxicity values for lead have not been established that would enable evaluation of lead by application of the same methodology applied to the other chemicals. The DTSC screening value for lead represents a concentration in soil that would lead to an incremental increase in blood lead concentration (PbB) of up to 1 microgram per deciliter ($\mu\text{g/dL}$) in people exposed to that soil. Based on a 1 $\mu\text{g/dL}$ increase in PbB, DTSC calculated a risk-based screening value of 80 mg/kg lead in soil for residential land use. The DTSC value of 80 mg/kg was selected as the Risk Based Screening Concentration (RBSC) for both the future resident and future recreational user of the site.

The equation and inputs used in the calculation of the RBSC for the construction worker are in Attachment 8. For the construction worker, State of California (Cal/EPA 2009, DTSC 2014) and EPA (EPA 2009, 2015a) default exposure parameters were used in running the Adult Lead Methodology (ALM) for this receptor including the target PbB of 1 $\mu\text{g/dL}$. A screening level of 39 mg/kg was calculated for a construction worker using the ALM model. This value is considered protective of a pregnant construction worker.

Results of the lead evaluation are in Table 8. Maximum detected concentrations of lead in surface soil (3,170 mg/kg) and in subsurface soil (7,670 mg/kg) both exceeded the screening levels for resident, recreational user, and construction worker receptors. As a further step, the lead sampling results were reviewed to identify outliers (see Attachment 9). Five sample results were identified as statistical outliers: from CAT-B-30-4, CAT-B-19-4, CAT-B-27-0.5, CAT-B-28-4, and CAT-B-28-0.5. Based on this outcome, these locations were identified as “hotspots.”

Assuming remediation of the hotspots would occur, these results were removed from the data set, and a 95 percent upper confidence limit (95% UCL) of the mean was calculated for the remaining lead results for both surface and subsurface soils. Results of this comparison were that average lead concentration in subsurface soil in the remaining samples (77 mg/kg) did not exceed the RBSL for the resident/recreational user (see Table 8). Removal of results from the soil at outlier

locations (CAT-B-30, CAT-B-19, CAT-B-27, and CAT-B-28), as well as from surface soil at CAT-B-20, reduced lead concentration to 80 mg/kg. The pregnant construction worker would still be at potential risk from subsurface soil even after hotspot removal.

4.4 ADDITIONAL EVALUATION OF CONTAMINANTS OF CONCERN

Table 9 summarizes the SLHHRA, and Table 11 identifies the contaminants of concern (COC) for the site. Arsenic and lead were identified as COCs in soil for all receptors, while diesel and gasoline were identified as COCs in groundwater.

As noted in Section 4.3, five sample results for lead were statistical outliers, and locations of their collection were identified as hotspots. If results from these soil sample locations (CAT-B-30, CAT-B-19, CAT-B-27, and CAT-B-28) would be removed, as well as results from surface soil at CAT-B-20, the estimated average concentration of lead would be below a level of concern for a resident (unrestricted land use) or recreational user.

Regional estimates of background arsenic concentrations in urbanized parts of the San Francisco Bay Area have recently been published with RWQCB endorsement (Duverge 2011). The study proposes an upper estimate of 11 mg/kg for background arsenic (99th percentile) within the undifferentiated flatland soils of the study area. Findings of the study are significant because the estimate for background arsenic is considerably lower than other estimates commonly cited as sources in the literature (Duverge 2011). Applying 11 mg/kg as the background value for arsenic narrows the areas of concern for arsenic to the area around sample locations CAT-B-1 (including CAT-B-11, CAT-B-13, and CAT-B-14) and CAT-B-2 (including samples CAT-B-16 and CAT-B-17). If the identified two areas would be remediated (and thus the sample results removed from the data set), remaining arsenic results for the site would yield an estimated arsenic concentration of 10.54 mg/kg for all soil (see Attachment 10). This would result in reduced site cancer risk and noncancer hazard to a level expected for background concentrations of arsenic.

The petroleum hydrocarbons (both diesel and gasoline) identified as COCs were detected in one of two wells, indicating that contamination in groundwater is not widespread. Furthermore, the location of the well in which these COCs were detected (CAT-B-11-GW) is under a parking lot and adjacent to a road; thus the contamination may be due to proximity to the road and automobiles. Finally, the location of the well with petroleum hydrocarbons is within the area with the elevated arsenic proposed for hotspot remediation. Remediation of the soil in this area for arsenic might well also remove the likely source of the petroleum hydrocarbons in the groundwater. However, it is also possible that dissolved petroleum hydrocarbons detected in groundwater sample CAT-B-11-GW migrated across Main Street from nearby petroleum releases at former underground storage tanks at Former Alameda Naval Air Station (RWQCB 2014).

Table 9 is the summary table for the SLHHRA, and Table 10 identifies the COCs for the site. Arsenic and lead are identified as COCs in soil for all receptors, while diesel and gasoline are identified as COCs in groundwater.

5.0 UNCERTAINTY ANALYSIS

Varying degrees of uncertainty are introduced at each stage of the SLHHRA process. These uncertainties arise from assumptions made in the risk assessment and from limitations of the data used to calculate risks and hazards. Table 11 identifies the general and most significant sources of uncertainties, and discusses direction and magnitude of the likely impact of each uncertainty on risks and hazards presented in the SLHHRA. The largest source of uncertainty in this risk evaluation is use of maximum detected concentrations to estimate risk for the entire site. Given the size of the site, exposure time (4 hours per day) for the recreational receptor and exposure duration (1 year) for the construction worker are likely to overestimate risks and hazards to these receptors.

6.0 CONCLUSIONS AND RECOMMENDATIONS

As described in the work plan (TetraTech 2015b), three decision criteria control the outcome of the SLHHRA:

- Chemicals are detected at concentrations exceeding background
- A complete exposure pathway exists from the chemical to the receptor
- Chemical concentrations exceed RBSLs.

If these three criteria are not met, no further action would be recommended regarding the COPCs evaluated in this investigation. If these three criteria are met, further investigation, additional risk characterization, or site remediation may be required. These three criteria are met for lead and arsenic at the Cross Alameda Trail and recommendations are provided for each below.

As noted in Section 4.3, lead results from five soil samples were statistical outliers, and the locations of these samples were identified as hotspots. If the soil from these sample locations (CAT-B-30, CAT-B-19, CAT-B-27, and CAT-B-28), and surface soil at CAT-B-20 would be removed, risk from lead would fall below a level of concern for a resident (unrestricted land use) or recreational user. Tetra Tech therefore recommends the following:

- Soil in the vicinity of sample locations CAT-B-30, CAT-B-19, CAT-B-27, CAT-B-28, and CAT-B-20 (surface only) should be removed by excavation and offsite disposal until confirmation samples representative of post-excavation site conditions contain lead concentrations of 80 mg/kg or less.

If the seven soil samples (CAT-B-1, CAT-B-11, CAT-B-13, CAT-B-14, CAT-B-2, CAT-B-16, and CAT-B-17) with elevated arsenic discussed in Section 4.4 would be remediated, the 95%UCL concentration of arsenic from site samples would be an estimated 10.8 mg/kg, which is comparable to background levels. Based on this result, Tetra Tech recommends that soil in the vicinity of sample locations CAT-B-1, CAT-B-11, CAT-B-13, CAT-B-14, CAT-B-2, CAT-B-

16, and CAT-B-17 be removed until confirmation samples of the excavation contain arsenic concentrations of 11 mg/kg or less.

Because the groundwater contamination is collocated with the arsenic, excavations to remediate the arsenic should also be evaluated for petroleum hydrocarbon contamination, and although not encountered to date, soil with contaminant concentrations exceeding groundwater protection values (570 mg/kg for diesel and 770 mg/kg for gasoline [RWQCB 2013]) should also be remediated.

It should be noted that the lateral and vertical extent of soil that is recommended for remediation has not been fully defined. Prior to remediation, further sampling and analysis should be conducted to define the extent of the planned soil remediation.

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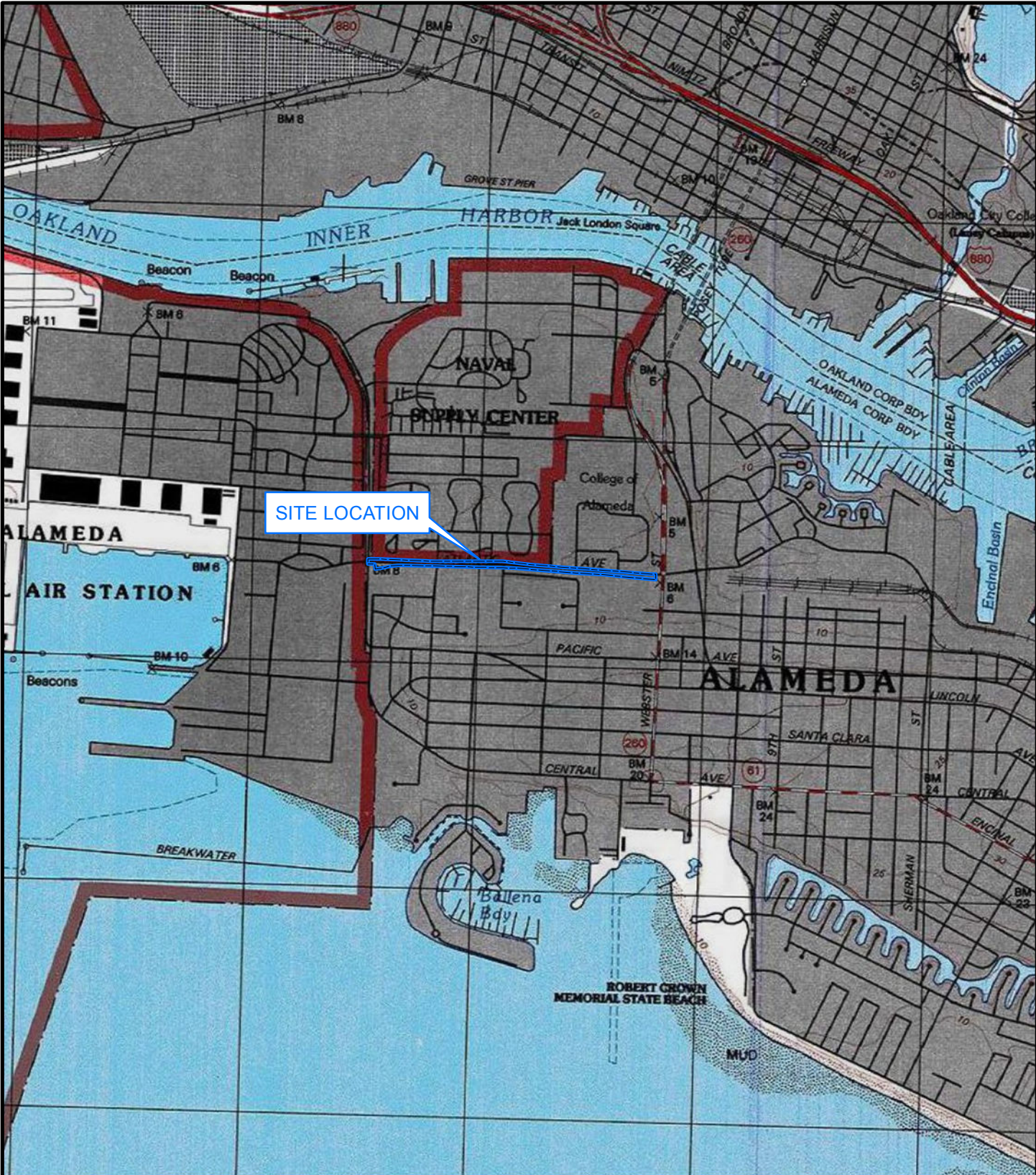
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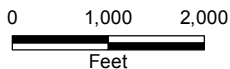
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FIGURES

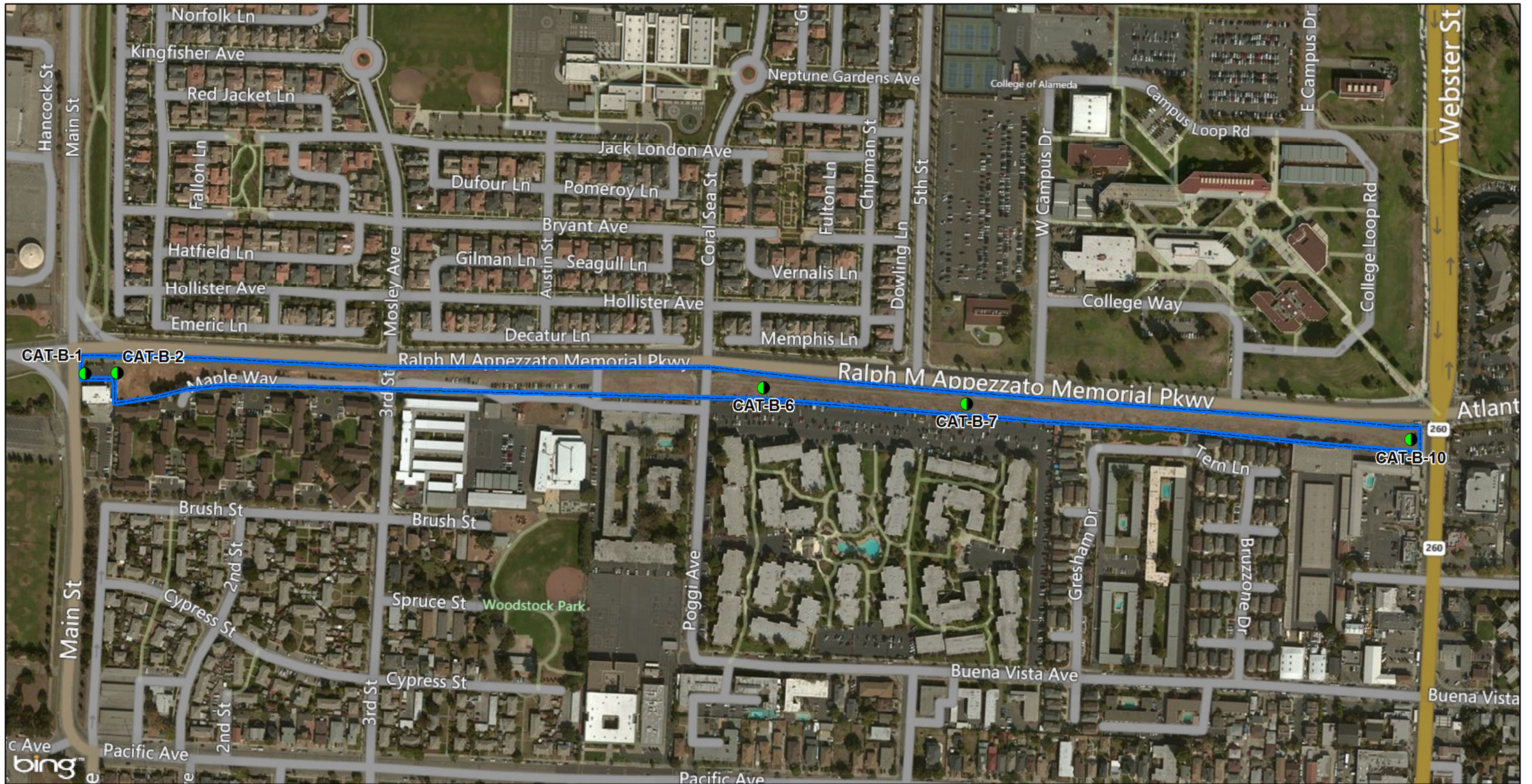


 Property Boundary

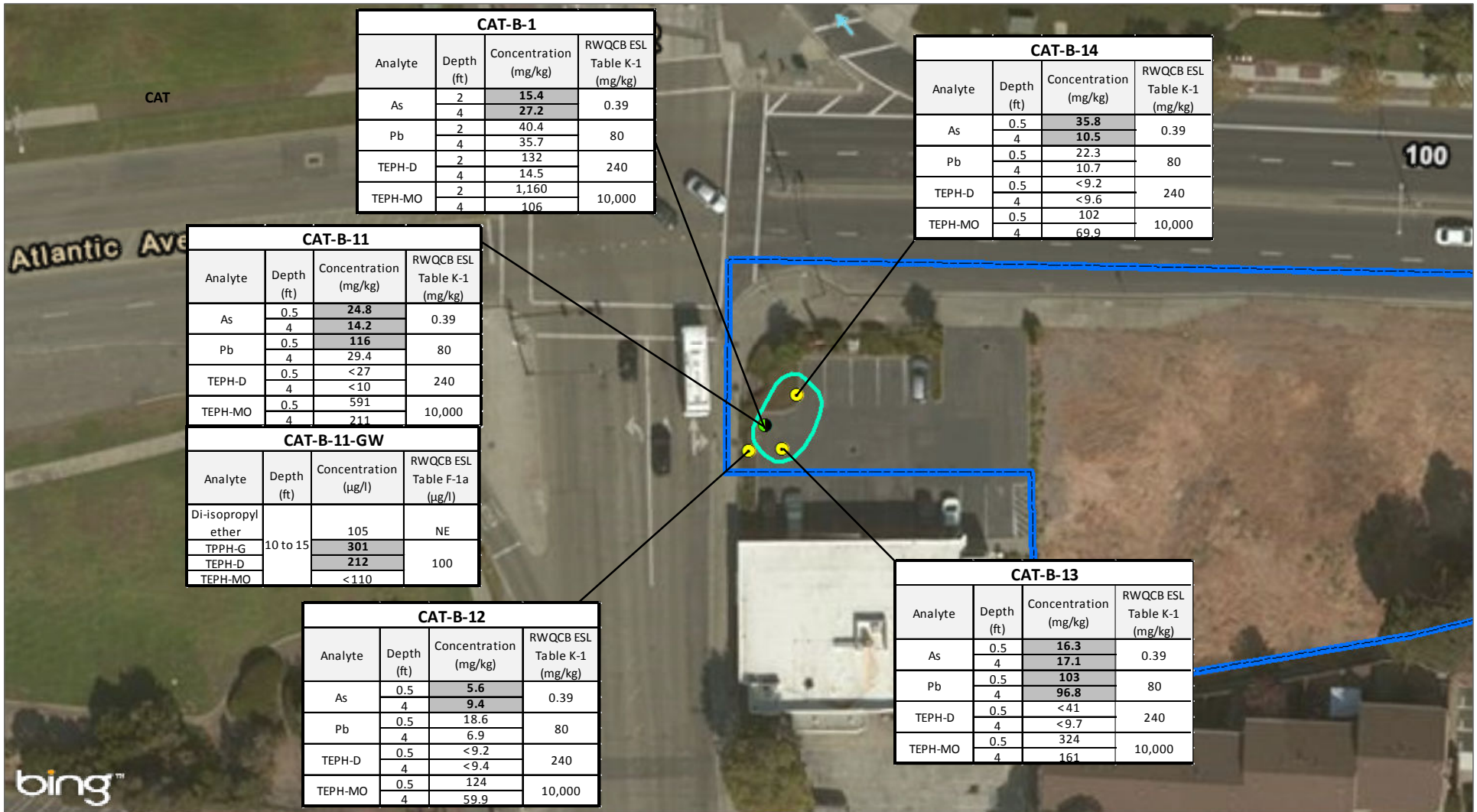


Cross Alameda Trail
Alameda, California

**FIGURE 1
SITE LOCATION**



Property Boundary	TETRA TECH
CAT-B-1 Location and Designation of Step-out Investigation	Cross Alameda Trail Alameda, California
<div data-bbox="1864 1673 2331 1915"> </div> <div data-bbox="2362 1733 3039 1925" style="text-align: center;"> <p>FIGURE 2</p> <p>SITE PLAN SHOWING</p> <p>LOCATION OF STEPOUT</p> <p>INVESTIGATIONS</p> </div>	



● Step-Out Soil Borehole

● Represents Two Co-located Soil Borehole Locations

▭ Property Boundary



Preliminary Area for Soil Remediation

5.6

Shaded concentration indicates a result that exceeds the RWQCB ESL shown.

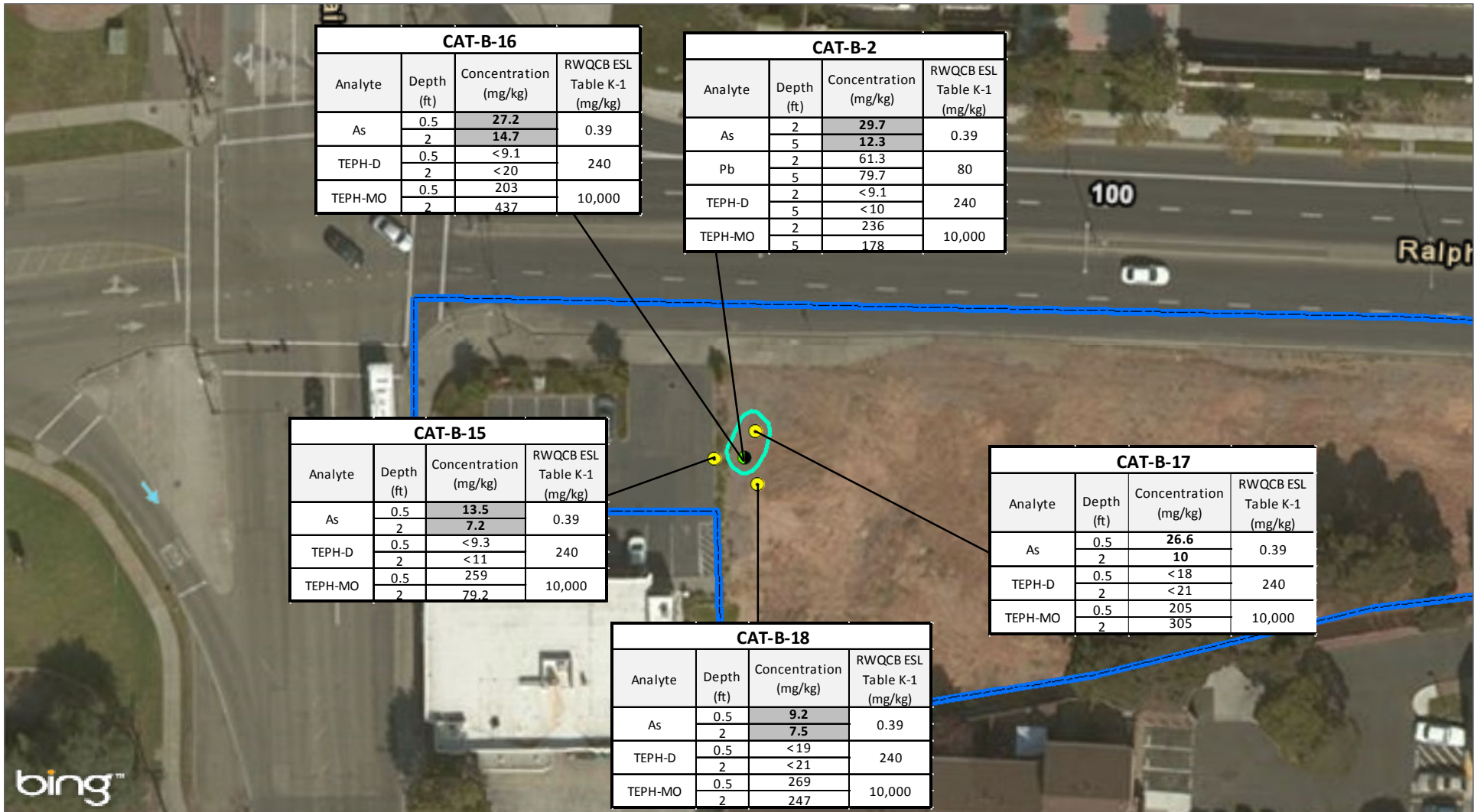


Cross Alameda Trail
Alameda, California

**FIGURE 3
STEP-OUT BOREHOLE LOCATIONS
WITH SOIL AND GROUNDWATER
RESULTS (CAT-B-1)**



As Arsenic
ft Feet
mg/kg Milligram per kilogram
NE Not Established
Pb Lead
RWQCB ESL Regional Water Quality Control Board Environmental Screening Level
TPPH-G Total purgeable petroleum hydrocarbons as gasoline
TEPH-D Total extractable petroleum hydrocarbons as diesel
TEPH-MO Total extractable petroleum hydrocarbons as motor oil



CAT-B-16			
Analyte	Depth (ft)	Concentration (mg/kg)	RWQCB ESL Table K-1 (mg/kg)
As	0.5	27.2	0.39
	2	14.7	
TEPH-D	0.5	<9.1	240
	2	<20	
TEPH-MO	0.5	203	10,000
	2	437	

CAT-B-2			
Analyte	Depth (ft)	Concentration (mg/kg)	RWQCB ESL Table K-1 (mg/kg)
As	2	29.7	0.39
	5	12.3	
Pb	2	61.3	80
	5	79.7	
TEPH-D	2	<9.1	240
	5	<10	
TEPH-MO	2	236	10,000
	5	178	

CAT-B-15			
Analyte	Depth (ft)	Concentration (mg/kg)	RWQCB ESL Table K-1 (mg/kg)
As	0.5	13.5	0.39
	2	7.2	
TEPH-D	0.5	<9.3	240
	2	<11	
TEPH-MO	0.5	259	10,000
	2	79.2	

CAT-B-17			
Analyte	Depth (ft)	Concentration (mg/kg)	RWQCB ESL Table K-1 (mg/kg)
As	0.5	26.6	0.39
	2	10	
TEPH-D	0.5	<18	240
	2	<21	
TEPH-MO	0.5	205	10,000
	2	305	

CAT-B-18			
Analyte	Depth (ft)	Concentration (mg/kg)	RWQCB ESL Table K-1 (mg/kg)
As	0.5	9.2	0.39
	2	7.5	
TEPH-D	0.5	<19	240
	2	<21	
TEPH-MO	0.5	269	10,000
	2	247	

- Step-Out Soil Borehole
- Represents Two Co-located Soil Borehole Locations
- Property Boundary

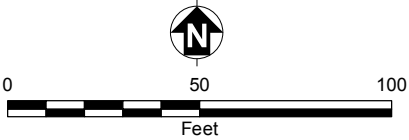
- Preliminary Area for Soil Remediation
- Shaded concentration indicates a result that exceeds the RWQCB ESL shown.

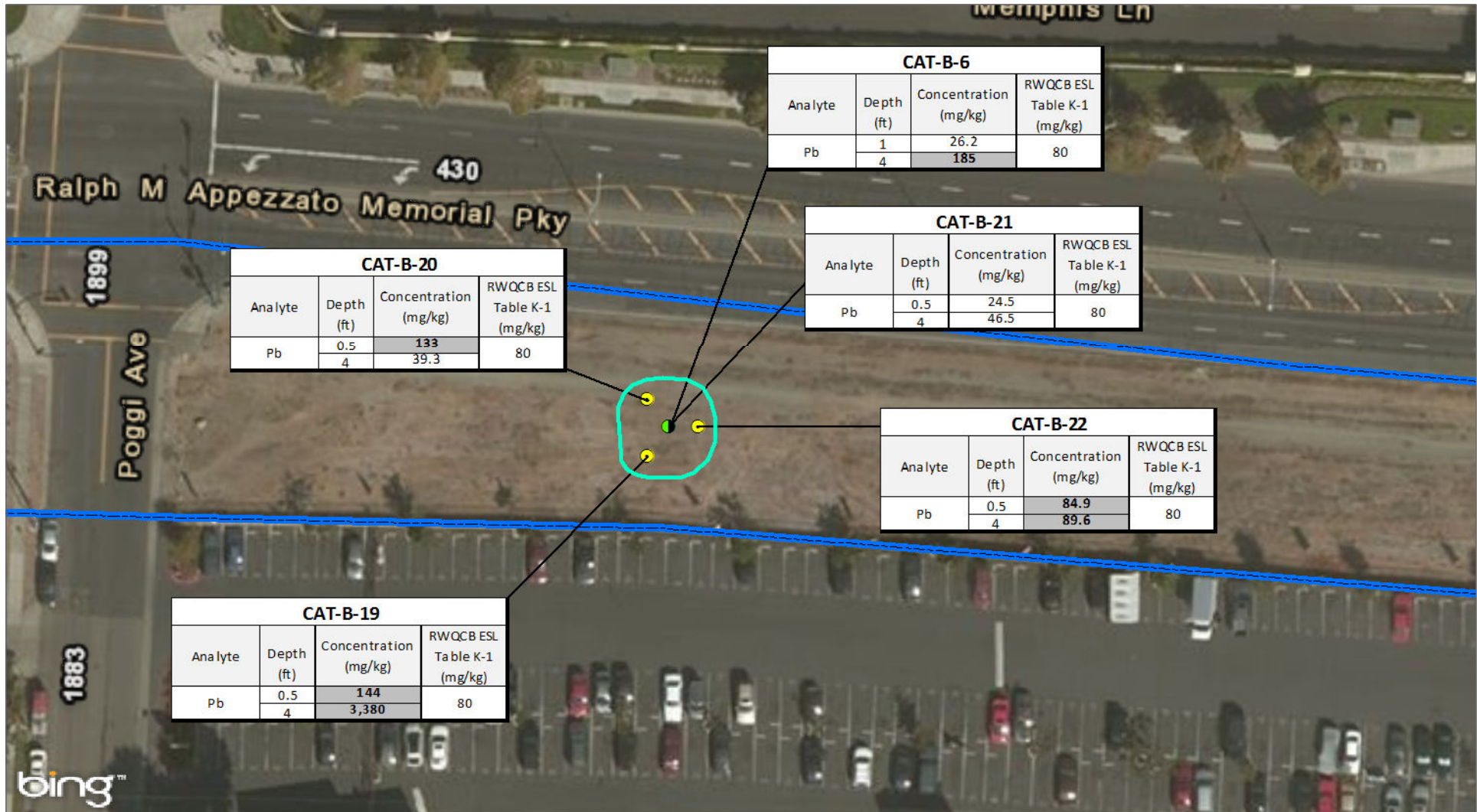


Cross Alameda Trail
Alameda, California

**FIGURE 4
STEP-OUT BOREHOLE LOCATIONS
WITH SOIL AND GROUNDWATER
RESULTS (CAT-B-2)**

As Arsenic
ft Feet
mg/kg Milligram per kilogram
NE Not Established
Pb Lead
RWQCB ESL Regional Water Quality Control Board Environmental Screening Level
TPPH-G Total purgeable petroleum hydrocarbons as gasoline
TEPH-D Total extractable petroleum hydrocarbons as diesel
TEPH-MO Total extractable petroleum hydrocarbons as motor oil





CAT-B-6			
Analyte	Depth (ft)	Concentration (mg/kg)	RWQCB ESL Table K-1 (mg/kg)
Pb	1	26.2	80
	4	185	

CAT-B-21			
Analyte	Depth (ft)	Concentration (mg/kg)	RWQCB ESL Table K-1 (mg/kg)
Pb	0.5	24.5	80
	4	46.5	

CAT-B-22			
Analyte	Depth (ft)	Concentration (mg/kg)	RWQCB ESL Table K-1 (mg/kg)
Pb	0.5	84.9	80
	4	89.6	

CAT-B-20			
Analyte	Depth (ft)	Concentration (mg/kg)	RWQCB ESL Table K-1 (mg/kg)
Pb	0.5	133	80
	4	39.3	

CAT-B-19			
Analyte	Depth (ft)	Concentration (mg/kg)	RWQCB ESL Table K-1 (mg/kg)
Pb	0.5	144	80
	4	3,380	

● Step-Out Soil Borehole

● Represents Two Co-located Soil Borehole Locations

▭ Property Boundary

Notes:

ft Feet
 mg/kg Milligram per kilogram
 Pb Lead
 RWQCB ESL Regional Water Quality Control Board Environmental Screening Level

144

Preliminary Area for Soil Remediation
 Shaded concentration indicates a result that exceeds the RWQCB ESL shown.



Cross Alameda Trail
 Alameda, California

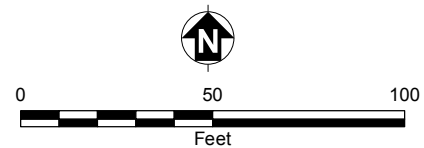
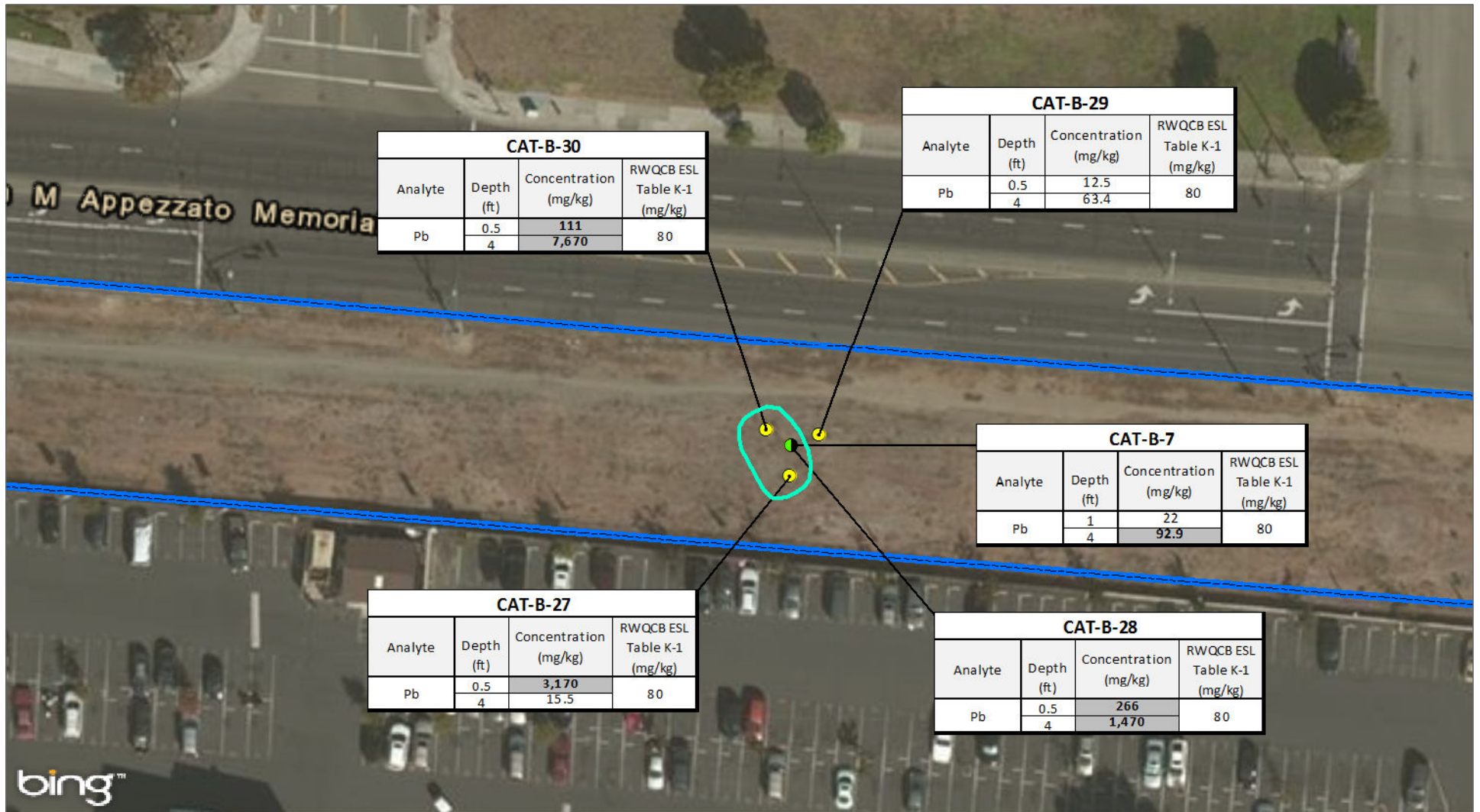


FIGURE 5
STEP-OUT BOREHOLE LOCATIONS
WITH SOIL RESULTS (CAT-B-6)



● Step-Out Soil Borehole

● Represents Two Co-located Soil Borehole Locations

▭ Property Boundary

Notes:

ft Feet
 mg/kg Milligram per kilogram
 Pb Lead
 RWQCB ESL Regional Water Quality Control Board Environmental Screening Level



Preliminary Area for Soil Remediation

92.9

Shaded concentration indicates a result that exceeds the RWQCB ESL shown.



Cross Alameda Trail
 Alameda, California

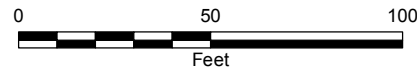
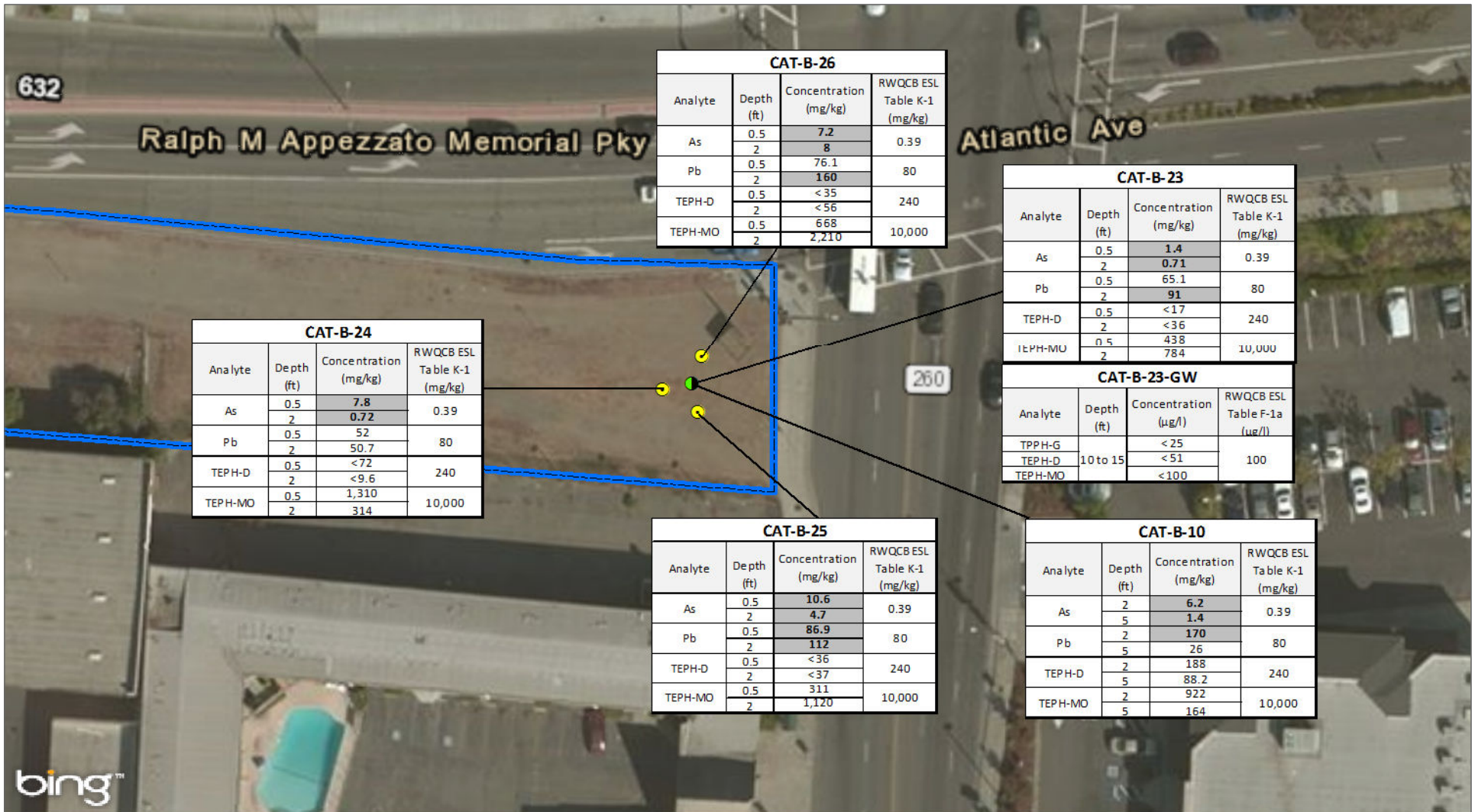


FIGURE 6
STEP-OUT BOREHOLE LOCATIONS
WITH SOIL RESULTS (CAT-B-7)



CAT-B-26			
Analyte	Depth (ft)	Concentration (mg/kg)	RWQCB ESL Table K-1 (mg/kg)
As	0.5	7.2	0.39
	2	8	
Pb	0.5	76.1	80
	2	160	
TEPH-D	0.5	<35	240
	2	<56	
TEPH-MO	0.5	668	10,000
	2	2,210	

CAT-B-23			
Analyte	Depth (ft)	Concentration (mg/kg)	RWQCB ESL Table K-1 (mg/kg)
As	0.5	1.4	0.39
	2	0.71	
Pb	0.5	65.1	80
	2	91	
TEPH-D	0.5	<17	240
	2	<36	
TEPH-MO	0.5	438	10,000
	2	784	

CAT-B-24			
Analyte	Depth (ft)	Concentration (mg/kg)	RWQCB ESL Table K-1 (mg/kg)
As	0.5	7.8	0.39
	2	0.72	
Pb	0.5	52	80
	2	50.7	
TEPH-D	0.5	<72	240
	2	<9.6	
TEPH-MO	0.5	1,310	10,000
	2	314	

CAT-B-23-GW			
Analyte	Depth (ft)	Concentration (µg/l)	RWQCB ESL Table F-1a (µg/l)
TPPH-G		<25	100
TEPH-D	10 to 15	<51	
TEPH-MO		<100	

CAT-B-25			
Analyte	Depth (ft)	Concentration (mg/kg)	RWQCB ESL Table K-1 (mg/kg)
As	0.5	10.6	0.39
	2	4.7	
Pb	0.5	86.9	80
	2	112	
TEPH-D	0.5	<36	240
	2	<37	
TEPH-MO	0.5	311	10,000
	2	1,120	

CAT-B-10			
Analyte	Depth (ft)	Concentration (mg/kg)	RWQCB ESL Table K-1 (mg/kg)
As	2	6.2	0.39
	5	1.4	
Pb	2	170	80
	5	26	
TEPH-D	2	188	240
	5	88.2	
TEPH-MO	2	922	10,000
	5	164	

- Step-Out Soil Borehole
- Represents Two Co-located Soil Borehole Locations
- Property Boundary

7.8

Shaded concentration indicates a result that exceeds the RWQCB ESL shown.



Cross Alameda Trail
Alameda, California

**FIGURE 7
STEP-OUT BOREHOLE LOCATIONS
WITH SOIL AND GROUNDWATER
RESULTS (CAT-B-10)**

- As Arsenic
- ft Feet
- mg/kg Milligram per kilogram
- NE Not Established
- Pb Lead
- RWQCB ESL Regional Water Quality Control Board Environmental Screening Level
- TPPH-G Total purgeable petroleum hydrocarbons as gasoline
- TEPH-D Total extractable petroleum hydrocarbons as diesel
- TEPH-MO Total extractable petroleum hydrocarbons as motor oil

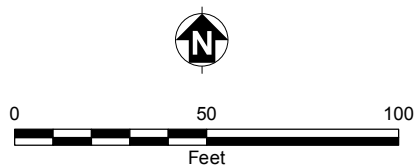
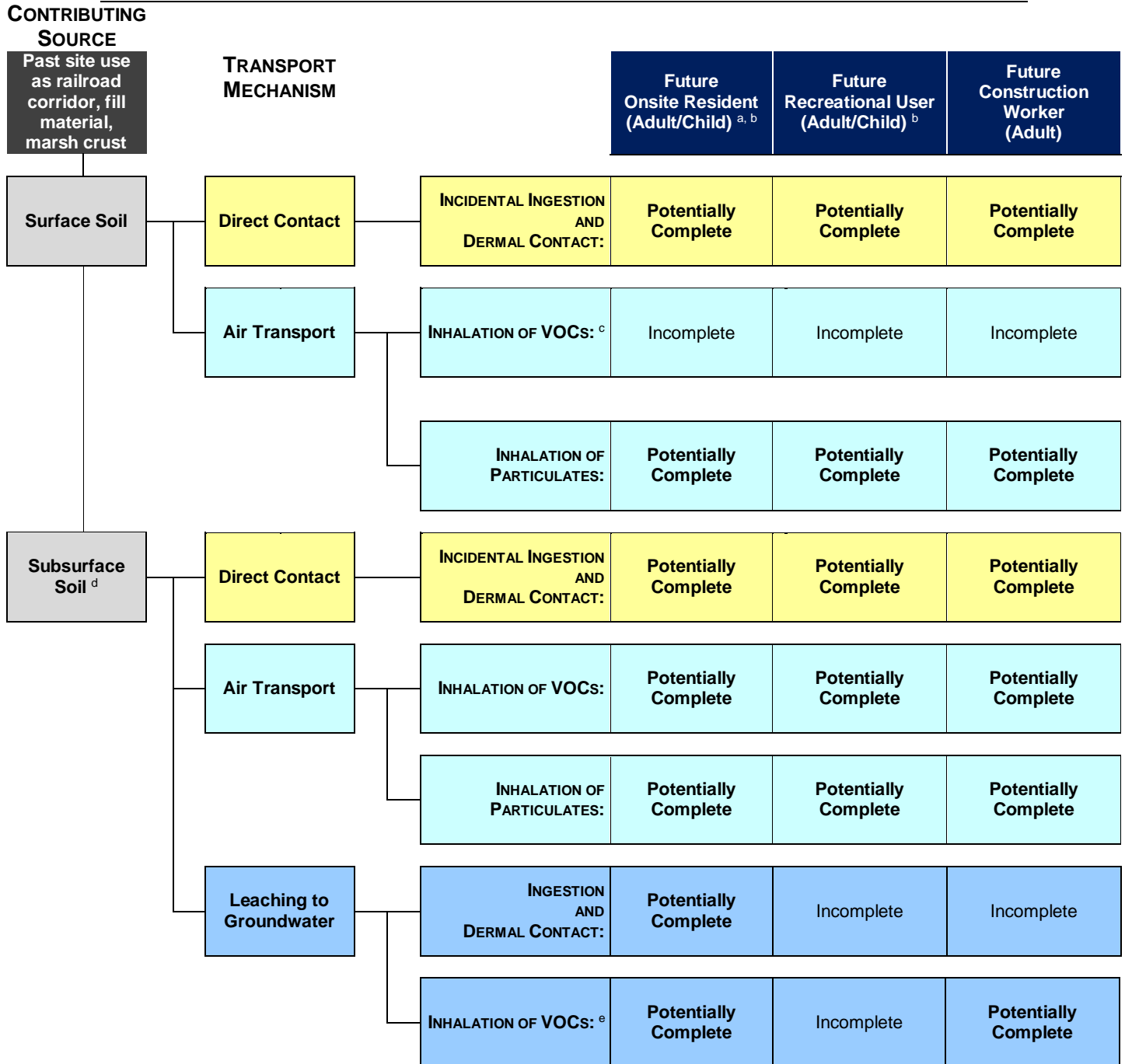


Figure 8
Human Health Exposure Pathway Evaluation
Remedial Investigation Cross Alameda Trail



^a The residential scenario is evaluated to determine whether unrestricted use of the property without land use controls is acceptable.

^b The future resident and future recreational receptors were evaluated using the most protective of the possible scenario; that is, an age-aggregated adult and child receptor (0-26 years old) was used for the estimating the cancer risk and a child (0-6 years old) was used to estimate the non-cancer hazard.

^c Volatile chemicals were not detected in surface soil; thus the pathway is incomplete.

^d Future site uses assume that soil is excavated, mixed and replaced onsite such that any soil to 8 feet below ground surface could become surface soil in the future.

^e Inhalation of volatiles includes both inhalation from domestic uses and from the vapor intrusion pathway.

TABLES

TABLE 1
SUMMARY OF CHEMICAL ANALYSES OF SOIL SAMPLES FOR METALS AND TEPH
City of Alameda, Cross Alameda Trail
Alameda, California

Well/Sample ID	Sample Date	Metals (mg/kg)		TEPH (mg/kg)	
		Arsenic	Lead	Diesel	Motor Oil
CAT-B-1-2	12/29/2014	15.4	40.4	132	1,160
CAT-B-1-4	12/29/2014	27.2	35.7	14.5	106
CAT-B-2-2	12/29/2014	29.7	61.3	< 9.1	236
CAT-B-2-5	12/29/2014	12.3	79.7	< 10	178
CAT-B-3-1	12/29/2014	8.0	24.0	42.7	78.2
CAT-B-3-4	12/29/2014	7.2	2.6	< 4.1	15.3
CAT-B-4-2	12/29/2014	6.8	37	8.76	28.2
CAT-B-4-5	12/29/2014	6.3	36.6	11.7	26.6
CAT-B-5-1	12/29/2014	6.2	68.4	6.17	22.7
CAT-B-5-5	12/29/2014	1.7	3	< 1.8	< 3.6
CAT-B-6-1	12/29/2014	5.3	26.2	8.22	36.5
CAT-B-6-4	12/29/2014	3.9	185	5.74	9.43
CAT-B-7-1	12/30/2014	4.3	22	6.52	16.0
CAT-B-7-4	12/30/2014	5.1	92.9	8.49	19.9
CAT-B-8-2	12/30/2014	6.5	40.5	7.35	31.8
CAT-B-8-8	12/30/2014	2.7	16.9	< 2.2	< 4.3
CAT-B-9-1	12/30/2014	7.8	54.6	6.39	30.3
CAT-B-9-6	12/30/2014	4.9	6.9	< 2.1	< 4.1
CAT-B-10-2	12/30/2014	6.2	126	129	609
CAT-B (Duplicate)	12/30/2014	4.9	170	188	922
CAT-B-10-5	12/30/2014	1.4	26	88.2	164
CAT-B-11-0.5	9/1/2015	24.8	116	< 27	591
CAT-B-11-4	9/1/2015	14.2	29.4	< 10	211
CAT-B-12-0.5	9/1/2015	5.6	18.6	< 9.2	124
CAT-B-12-4	9/1/2015	9.4	6.9	< 9.4	59.9
CAT-B-13-0.5	9/1/2015	16.3	103	< 41	324
CAT-B-13-4	9/1/2015	17.1	96.8	< 9.7	161
CAT-B-14-0.5	9/1/2015	35.8	22.3	< 9.2	102
CAT-B-14-4	9/1/2015	10.5	10.7	< 9.6	69.9
CAT-B-15-0.5	9/1/2015	13.5	NA	< 9.3	259
CAT-B-15-2	9/1/2015	7.2	NA	< 11	79.2
CAT-B-16-0.5	9/1/2015	27.2	NA	< 9.1	203
CAT-B-16-2	9/1/2015	14.7	NA	< 20	437
CAT-B-17-0.5	9/1/2015	26.6	NA	< 18	205
CAT-B-17-2	9/1/2015	10	NA	< 21	305
CAT-B-18-0.5	9/1/2015	9.2	NA	< 19	269
CAT-B-18-2	9/1/2015	7.5	NA	< 21	247
CAT-B-19-0.5	9/1/2015	NA	144	NA	NA
CAT-B-19-4	9/1/2015	NA	3,380	NA	NA
CAT-B-20-0.5	9/1/2015	NA	133	NA	NA
CAT-B-20-4	9/1/2015	NA	39.3	NA	NA

TABLE 1
SUMMARY OF CHEMICAL ANALYSES OF SOIL SAMPLES FOR METALS AND TEPH
 City of Alameda, Cross Alameda Trail
 Alameda, California

Well/Sample ID	Sample Date	Metals (mg/kg)		TEPH (mg/kg)	
		Arsenic	Lead	Diesel	Motor Oil
CAT-B-21-0.5	9/1/2015	NA	24.5	NA	NA
CAT-B-21-4	9/1/2015	NA	46.5	NA	NA
CAT-B-22-0.5	9/1/2015	NA	84.9	NA	NA
CAT-B-22-4	9/1/2015	NA	89.6	NA	NA
CAT-B-23-0.5	9/2/2015	1.4	65.1	< 17	438
CAT-B-23-2	9/2/2015	0.71	91	< 36	784
CAT-B-24-0.5	9/2/2015	7.8	52	< 72	1,310
CAT-B-24-2	9/2/2015	0.72	50.7	< 9.6	314
CAT-B-25-0.5	9/2/2015	10.6	86.9	< 36	311
CAT-B-25-2	9/2/2015	4.7	112	< 37	1,120
CAT-B-26-0.5	9/2/2015	7.2	76.1	< 35	668
CAT-B-26-2	9/2/2015	8	160	< 56	2,210
CAT-B-27-0.5	9/2/2015	NA	3,170	NA	NA
CAT-B-27-4	9/2/2015	NA	15.5	NA	NA
CAT-B-28-0.5	9/2/2015	NA	266	NA	NA
CAT-B-28-4	9/2/2015	NA	1,470	NA	NA
CAT-B-29-0.5	9/2/2015	NA	12.5	NA	NA
CAT-B-29-4	9/2/2015	NA	63.4	NA	NA
CAT-B-30-0.5	9/2/2015	NA	111	NA	NA
CAT-B-30-4	9/2/2015	NA	7,670	NA	NA
<i>RWQCB ESL (Table K-1)¹</i>		<i>0.39</i>	<i>80</i>	<i>240</i>	<i>10,000</i>
<i>RWQCB ESL (Table K-3)²</i>		<i>10</i>	<i>320</i>	<i>900</i>	<i>28,000</i>
<i>Cal/EPA CHHSL (Table 1)³</i>		<i>0.070</i>	<i>80</i>	<i>NE</i>	<i>NE</i>

Notes:

- Light grey shading indicates a detection at or above one or more of the RWQCB ESL values present
- NA Not Analyzed
- NE Not established
- TEPH Total extractable petroleum hydrocarbons
- < detection is less than the laboratory method detection limit
- mg/kg Milligrams per kilogram
- 1 California Regional Water Quality Control Board, Environmental Screening Levels for Soil (RWQCB ESL), residential direct exposure to soil scenario (Table K-1; RWQCB 2013).
- 2 California Regional Water Quality Control Board, Environmental Screening Levels for Soil (RWQCB ESL), construction/trench worker direct exposure to soil scenario (Table K-3; RWQCB 2013).
- 3 California Environmental Protection Agency (Cal/EPA), California Human Health Screening Levels (CHHSL), Soil Screening Numbers for Nonvolatile Chemicals, Residential Scenario (Table 1; Updated 2010)

TABLE 2
SUMMARY OF CHEMICAL ANALYSES OF GROUNDWATER SAMPLES FOR VOCs, TPPH AND TEPH

City of Alameda, Cross Alameda Trail
 Alameda, California

Well/Sample ID	Sample Date	VOCs (µg/l)	TPPH (µg/l)	TEPH (µg/l)	
		Di-Isopropyl ether	Gasoline	Diesel	Motor Oil
CAT-B-11-GW	9/1/2015	105	301	212	< 110
CAT-B-23-GW	9/1/2015	< 0.22	< 25	< 51	< 100
CAT-B	9/1/2015	< 0.22	< 25	< 53	< 110
<i>RWQCB ESL (Table F-1a)¹</i>		<i>NE</i>	<i>100</i>	<i>100</i>	<i>100</i>
<i>RWQCB ESL (Table F-1b)²</i>		<i>NE</i>	<i>500</i>	<i>640</i>	<i>640</i>

Notes:

- Light grey shading indicates a detection at or above one or more of the RWQCB ESL values presented
- NA Not Analyzed
- NE Not established
- TPPH Total purgeable petroleum hydrocarbons
- TEPH Total extractable petroleum hydrocarbons
- VOC Volatile organic compound
- < Detection is less than the laboratory method detection limit (table includes only analytes detected above the laboratory reporting limit)
- mg/kg Milligrams per kilogram
- 1 California Regional Water Quality Control Board, Environmental Screening Levels for Groundwater (RWQCB ESL), groundwater is a current or potential drinking water resource (Table F-1a; RWQCB 2013).
- 2 California Regional Water Quality Control Board, Environmental Screening Levels for Groundwater (RWQCB ESL), groundwater is not a current or potential drinking water resource (Table F-1b; RWQCB 2013).

TABLE 3: EXPOSURE PATHWAYS AND SCENARIOS

Remedial Investigation for Cross Alameda Trail
 City of Alameda, California

Site	Exposure Scenario	Soil				Groundwater			
		Surface (0 to 0.5 foot bgs) and Subsurface (0 to 8 feet bgs)				Domestic Use			Vapor Intrusion
		Incidental Ingestion	Dermal Contact	Inhalation (Outdoor Air - Particulates)	Inhalation (Outdoor Air - Volatile Chemicals) ^a	Ingestion	Dermal Contact	Inhalation (Indoor Air - Domestic Use)	Inhalation (Trench Air - Vapor Intrusion)
Cross Alameda Trail	Future Resident	●	●	●	●	●	●	●	●
	Future Recreational User	●	●	●	●	○	○	○	○
	Future Construction Worker	●	●	●	●	○	○	○	●

Notes:

- Incomplete or negligible exposure pathway (volatile chemicals not detected)
- Potentially complete exposure pathway
- a Volatile compounds were not detected in surface soil.
- bgs Below ground surface

TABLE 4.1: SUMMARY STATISTICS FOR SURFACE SOIL (0 TO 0.5 FOOT BGS)

Remedial Investigation for Cross Alameda Trail
City of Alameda, California

Chemical	Units	Detection Frequency	Minimum Detected Concentration	Maximum Detected Concentration	Location of Maximum Detected Concentration
Arsenic	mg/kg	12 / 12	1.4	35.8	CAT-B-14-0.5
Lead	mg/kg	16 / 16	12.5	3,170	CAT-B-27-0.5
TPH Diesel	mg/kg	0 / 12	--	--	--
TPH Motor oil	mg/kg	12 / 12	102	1,310	CAT-B-24-0.5

Notes:

- Not applicable
- bgs Below ground surface
- J Estimated detected concentration
- mg/kg Milligrams per kilogram

TABLE 4.2: SUMMARY STATISTICS FOR SUBSURFACE SOIL (0 TO 8 FEET BGS)

Remedial Investigation for Cross Alameda Trail
City of Alameda, California

Chemical	Units	Detection Frequency	Minimum Detected Concentration	Maximum Detected Concentration	Location of Maximum Detected Concentration
Arsenic	mg/kg	45 / 45	0.71	35.8	CAT-B-14-0.5
Lead	mg/kg	53 / 53	2.6	7,670	CAT-B-30-4
TPH Diesel	mg/kg	15 / 45	5.74	188	CAT-B-10-2
TPH Motor oil	mg/kg	42 / 45	9.43	2,210	CAT-B-26-2

Notes:

- bgs Below ground surface
- J Estimated detected concentration
- mg/kg Milligrams per kilogram

TABLE 4.3: SUMMARY STATISTICS FOR GROUNDWATER

Remedial Investigation for Cross Alameda Trail

City of Alameda, California

Chemical	Units	Detection Frequency	Minimum Detected Concentration	Maximum Detected Concentration	Location of Maximum Detected Concentration
Di-isopropyl ether	µg/L	1 / 3	105	105	CAT-B-11-GW
TPH Gasoline	µg/L	1 / 3	301	301	CAT-B-11-GW
TPH Diesel	µg/L	1 / 3	212	212	CAT-B-11-GW
TPH Motor Oil	µg/L	0 / 3	--	--	--

Notes:

- Not applicable
- bgs Below ground surface
- J Estimated detected concentration
- µg/L Micrograms per liter

TABLE 5: EXPOSURE ASSUMPTIONS

Remedial Investigation for Cross Alameda Trail
 City of Alameda, California

Parameter	Units	Future Resident (Unrestricted Use)		Future Recreational User		Future Construction Worker
		Adult	Child	Adult	Child	Adult
General Parameters						
Exposure frequency	days/year	350 ^{a,b}	350 ^{a,b}	175 ^c	175 ^c	250 ^{a,b}
Exposure duration	years	20 ^{a,b}	6 ^{a,b}	20 ^c	6 ^c	1 ^{a,b}
Mass conversion factor	kg/mg	1E-06 ⁻⁻	1E-06 ⁻⁻	1E-06 ⁻⁻	1E-06 ⁻⁻	1E-06 ⁻⁻
Body weight	kg	80 ^{a,b}	15 ^{a,b}	80 ^c	15 ^{a,b}	80 ^{a,b}
Averaging time (carcinogens)	days	25,550 ^{a,b}	25,550 ^{a,b}	25,550 ^c	25,550 ^{a,b}	25,550 ^{a,b}
Averaging time (noncarcinogens)	days	7,300 ^{a,b}	2,190 ^{a,b}	7,300 ^c	2,190 ^{a,b}	365 ^{a,b}
Soil Ingestion						
Soil ingestion rate	mg/day	100 ^{a,b}	200 ^{a,b}	100 ^c	200 ^c	330 ^{a,b}
Dermal Contact with Soil						
Body surface area	cm ² /day	6,032 ^{a,b}	2,900 ^b	6,032 ^c	2,900 ^c	6,032 ^b
Soil adherence factor	mg/cm ²	0.07 ^{a,b}	0.2 ^{a,b}	0.07 ^c	0.2 ^c	0.8 ^b
Dermal absorption fraction from soil	unitless	Chemical-specific ^a	Chemical-specific ^a	Chemical-specific ^a	Chemical-specific ^a	Chemical-specific ^a
Inhalation of Chemicals in Soil						
Exposure time	hours/day	24 ^{a,b}	24 ^{a,b}	4 ^c	4 ^c	8 ^{a,b}
Groundwater Ingestion						
Groundwater ingestion rate	L/day	2.5 ^{a,b}	0.78 ^{a,b}	--	--	--
Dermal Contact with Groundwater						
Body surface area	cm ² /day	20,900 ^{a,b}	6,378 ^{a,b}	--	--	--
Exposure Time - dermal	hr/day	0.71 ^{a,b}	0.54 ^{a,b}	--	--	--
Permeability constant	unitless	Chemical-specific ^a	Chemical-specific ^a	--	--	--
Inhalation of Chemicals in Groundwater from Domestic Use						
Exposure time	hours/day	24 ^{a,b}	24 ^{a,b}	--	--	4 ^{c,d}
Groundwater Volatilization Factor	L/m ³	0.5 ^{a,b}	0.5 ^{a,b}	--	--	Chemical-specific ^d

Notes:

a	EPA (2015)	--	Not applicable	L/day	Liters per day
b	DTSC (2014)	cm ² /day	Square centimeter per day	L/m ³	Liter per cubic meter
c	Professional judgment	hr/day	Hour per day	mg/cm ²	milligrams per square centimeter
d	based on VDEQ trench model	kg/mg	Kilogram per milligram	mg/day	milligrams per day

References:

DTSC. 2014. "HERO Note Number 1: Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities." Office of Human and Ecological Risk. September 30. On-line address: http://www.dtsc.ca.gov/AssessingRisk/upload/HHRA_Note1.pdf

EPA. 2015. "Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites. RSL Table Update." June. On-line address: <http://www2.epa.gov/risk/risk-based-screening-table-generic-tables>

Virginia Department of Environmental Quality (VDEQ). 2014. Voluntary Remediation Program - Risk Assessment Guidance. Table 3.8 Groundwater: Construction Worker in a Trench. October 5. On-line Address: <http://www.deq.state.va.us/Programs/LandProtectionRevitalization/RemediationProgram/VoluntaryRemediationProgram/VRPRiskAssessmentGuidance/Guidance.aspx>

TABLE 6: HUMAN HEALTH RISK-BASED SCREENING LEVELS

Remedial Investigation for Cross Alameda Trail
City of Alameda, California

Chemical	Detected in Media:		Residential						Recreational User		Construction Worker			
			Soil (mg/kg)		Groundwater (Domestic Use) (µg/L)		Groundwater (Vapor Intrusion - Indoor Air) (µg/L) ^a		Soil (mg/kg)		Soil (mg/kg)		Groundwater (Vapor Intrusion - Trench Air) (µg/L) ^b	
			SOIL	GW	Cancer	Noncancer	Cancer	Noncancer	Cancer	Noncancer	Cancer	Noncancer	Cancer	Noncancer
Arsenic	X	--	1.1E-01 ^{c,d}	4.0E-01 ^{c,d}	--	--	--	--	1.3E-01 ^e	5.0E-01 ^e	1.8E+00 ^c	8.6E-01 ^c	--	--
Lead	X	--	--	8.0E+01 ^a	--	--	--	--	--	8.0E+01 ^a	--	3.9E+01 ^f	--	--
Total Petroleum Hydrocarbons														
TPH Diesel	X	X	--	9.6E+01 ^g	--	5.5E+00 ^g	--	1.9E+02 ^g	--	7.1E+02 ^g	--	1.4E+03 ^g	--	1.3E+02 ^g
TPH Gasoline	--	X	ND	ND	--	3.3E+01 ^h	--	1.5E+02 ^h	ND	ND	ND	ND	--	2.8E+01 ^h
TPH Motor oil	X	--	--	2.5E+03 ⁱ	ND	ND	ND	ND	--	4.9E+03 ⁱ	--	5.7E+03 ⁱ	ND	ND
Volatile Organic Compounds														
Di-isopropyl ether	--	X	--	--	--	1.5E+03	--	7.0E+03	--	--	--	--	--	7.6E+02

Notes: The future resident and future recreational receptors were evaluated using the most protective of the possible scenario; that is, an age-aggregated adult and child (0-26 years old) was used for the estimating the cancer risk and a child (0-6 years old) was used to estimate the non-cancer hazard.

- a Screening values for vapor intrusion to indoor air pathway were calculated using the EPA Vapor Intrusion Screening Level (VISL) calculator (EPA 2015). Only chemicals identified as volatile on the RSL table (EPA 2015) are included. Consistent with selection of toxicity values for TPH is the RSL tables, naphthalene (noncancer only) was used as a surrogate chemical for TPH diesel and benzene (noncancer) only was used as a surrogate chemical for TPH gasoline. See Attachment 1.
- b Screening values for vapor intrusion from groundwater to trench air pathway were calculated using the Virginia Department of Environmental Quality (VDEQ) calculator (VDEQ 2015) for groundwater less than 15 feet bgs using default input values to obtain the volatility factor. Only chemicals identified as volatile on the RSL table (EPA 2015) are included. Consistent with selection of toxicity values for TPH is the RSL tables, naphthalene (noncancer only) was used as representative of diesel and benzene (noncancer only) was selected as representative of gasoline.
- c The toxicity criteria for arsenic, inorganic was used for arsenic.
- d Residential soil criteria from DTSC (2015).
- e RBSL based on DTSC (2015) toxicity values using exposure parameters as shown on Table 3.
- f RBSL based on Adult Lead Model (EPA 2009) using DTSC input parameters (DTSC 2009) and exposure parameters as shown on Table 3.
- g The toxicity criteria for total petroleum hydrocarbons (aliphatic medium) was used for TPH diesel for soil pathways and total petroleum hydrocarbons (aromatic medium) was used for groundwater pathways.
- h The toxicity criteria for total petroleum hydrocarbons (aromatic low) was used for TPH gasoline.
- i The toxicity criteria for total petroleum hydrocarbons (aromatic high) was used for TPH motor oil.

-- Not available

µg/L Micrograms per liter

DTSC Department of Toxic Substances Control.

EPA U.S. Environmental Protection Agency

mg/kg Milligram per kilogram

ND Not detected

TPH Total petroleum hydrocarbons

References:

DTSC. 2015. "DTSC-modified Screening Levels (DTSC-SLs)." Human and Ecological Risk Office (HERO). HERO HHRA Note Number 3. October.

On-line address: <http://www.dtsc.ca.gov/AssessingRisk/upload/HHRA-Note-3-2015-10.pdf>

EPA. 2015a. "Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites. RSL Table Update." June. Available on-line: <http://www.epa.gov/region9/superfund/prg/index.html>

EPA. 2015b. Vapor Intrusion Screening Level (VISL) Calculator Version 3.4, June 2015 RSLs. Available on-line: <http://www.epa.gov/oswer/vaporintrusion/guidance.html>

SFBRWQCB. 2013. Environmental Screening Levels Workbook. December. Available on-line: http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/esl.shtml

Virginia Department of Environmental Quality (VDEQ). 2015. Voluntary Remediation Program - Risk Assessment Guidance. Table 3.8 Groundwater: Construction Worker in a Trench. Accessed October 19.

On-line Address: <http://www.deq.state.va.us/Programs/LandProtectionRevitalization/RemediationProgram/VoluntaryRemediationProgram/VRPRiskAssessmentGuidance/Guidance.aspx>

TABLE 7.1: CANCER RISKS AND NONCANCER HAZARD INDICES FOR FUTURE RESIDENTS

Remedial Investigation for Cross Alameda Trail

City of Alameda, California

Medium	Chemical	Concentration ^a	Future Resident			
			Cancer RBSL ^b	Noncancer RBSL ^b	Cancer Risk ^c	Hazard Index ^d
Surface Soil (0-0.5 foot bgs) mg/kg	Arsenic	3.6E+01	1.1E-01	4.0E-01	3.3E-04	90
	TPH Motor oil	1.3E+03	--	2.5E+03	--	0.52
	Total (Surface Soil)				3.3E-04	90
Surface and Subsurface Soil (0-8 feet bgs) mg/kg	Arsenic	3.6E+01	1.1E-01	4.0E-01	3.3E-04	90
	TPH Diesel	1.9E+02	--	9.6E+01	--	2.0
	TPH Motor oil	2.2E+03	--	2.5E+03	--	0.88
	Total (Surface and Subsurface Soil)				3.3E-04	92
Groundwater (Ingestion, Dermal, and Vapors from Domestic Use) µg/L	Di-isopropyl ether	1.1E+02	--	1.5E+03	--	0.070
	TPH Gasoline	3.0E+02	--	3.3E+01	--	9.1
	TPH Diesel	2.1E+02	--	5.5E+00	--	39
	Total (Groundwater Domestic Use)				--	48
Groundwater to Indoor Air (Vapor Intrusion) µg/L	Di-isopropyl ether	1.1E+02	--	7.0E+03	--	0.015
	TPH Gasoline	3.0E+02	--	1.5E+02	--	2.0
	TPH Diesel	2.1E+02	--	1.9E+02	--	1.1
	Total (Groundwater Vapor Intrusion)				--	3
Total (Groundwater)				--	51	
Total (Surface Soil + Groundwater)				3E-04	141	
Total (Subsurface Soil + Groundwater)				3E-04	143	

Notes:

a The concentrations of chemicals in each medium are based on the maximum detected concentrations in the medium.

b Cancer and noncancer RBSL values shown are from Table 4.

c The cancer risk is calculated using the following equation: [(Concentration in media / Cancer RBSL) x 1E-06]. Cancer risk is based on an age-aggregated adult and child receptor (0-16 years old).

d The noncancer hazard is calculated using the following equation: [(Concentration in media / Noncancer RBSL) x 1]. Noncancer hazard is based on the more conservative child receptor (0-6 years old).

-- Not applicable

µg/L Micrograms per liter

mg/kg Milligrams per kilogram

RBSL Risk-based screening level

TABLE 7.2: CANCER RISKS AND NONCANCER HAZARD INDICES FOR FUTURE RECREATIONAL USERS

Remedial Investigation for Cross Alameda Trail

City of Alameda, California

Medium	Chemical	Concentration ^a	Future Recreational User			
			Cancer RBSL ^b	Noncancer RBSL ^b	Cancer Risk ^c	Hazard Index ^d
Surface Soil (0-0.5 foot bgs) mg/kg	Arsenic	3.6E+01	1.3E-01	5.0E-01	2.7E-04	71
	TPH Motor oil	1.3E+03	--	4.9E+03	--	0.27
	Total (Surface Soil)				2.7E-04	71
Surface and Subsurface Soil (0-8 feet bgs) mg/kg	Arsenic	3.6E+01	1.3E-01	5.0E-01	2.7E-04	71
	TPH Diesel	1.9E+02	--	7.1E+02	--	0.26
	TPH Motor oil	2.2E+03	--	4.9E+03	--	0.45
Total (Surface and Subsurface Soil)				2.7E-04	72	

Notes:

a The concentrations of chemicals in each medium are based on the maximum detected concentrations in the medium.

b Cancer and noncancer RBSL values shown are from Table 4.

c The cancer risk is calculated using the following equation: $[(\text{Concentration in media} / \text{Cancer RBSL}) \times 1\text{E-}06]$

d The noncancer hazard is calculated using the following equation: $[(\text{Concentration in media} / \text{Noncancer RBSL}) \times 1]$

-- Not applicable

bgs below ground surface

mg/kg Milligrams per kilogram

RBSL Risk-based screening level

TABLE 7.3: CANCER RISKS AND NONCANCER HAZARD INDICES FOR FUTURE CONSTRUCTION WORKERS

Remedial Investigation for Cross Alameda Trail

City of Alameda, California

Medium	Chemical	Concentration ^a	Future Construction Worker			
			Cancer RBSL ^b	Noncancer RBSL ^b	Cancer Risk ^c	Hazard Index ^d
Surface and Subsurface Soil (0-8 feet bgs) mg/kg	Arsenic	3.6E+01	1.8E+00	8.6E-01	2.0E-05	42
	TPH Diesel	1.9E+02	--	1.4E+03	--	0.13
	TPH Motor oil	2.2E+03	--	5.7E+03	--	0.38
	Total (Surface and Subsurface Soil)				2.0E-05	42
Groundwater to Trench Air µg/L	Di-isopropyl ether	1.1E+02	--	7.6E+02	--	0.14
	TPH Gasoline	3.0E+02	--	2.8E+01	--	10.7
	TPH Diesel	2.1E+02	--	1.3E+02	--	2
	Total (Groundwater)				--	12
Total (Subsurface Soil + Groundwater)					2E-05	54

Notes:

- a The concentrations of chemicals in each medium are based on the maximum detected concentrations in the medium.
- b Cancer and noncancer RBSL values shown are from Table 4.
- c The cancer risk is calculated using the following equation: [(Concentration in media / Cancer RBSL) x 1E-06]
- d The noncancer hazard is calculated using the following equation: [(Concentration in media / Noncancer RBSL) x 1]
- Not applicable
- µg/L Micrograms per liter
- mg/kg Milligrams per kilogram
- RBSL Risk-based screening level

TABLE 8: LEAD EVALUATION

Remedial Investigation for Cross Alameda Trail
City of Alameda, California

Medium	Maximum Detected Lead Concentration ^a	95%UCL Lead Concentration ^b	Future Child Resident and Child Recreational User			Future Construction Worker		
			Noncancer RBSL ^c	Site Maximum Detected Concentration Exceeds RBSL?	Site 95%UCL Concentration Exceeds RBSL?	Noncancer RBSL ^d	Detected Concentration Exceeds RBSL?	Site 95%UCL Concentration Exceeds RBSL?
Surface Soil (0-0.5 foot bgs) mg/kg	3.17E+03	8.0E+01	8.0E+01	Yes	No	3.9E+01	Yes	Yes
Subsurface Soil (0-8 feet bgs) mg/kg	7.67E+03	7.7E+01	8.0E+01	Yes	No	3.9E+01	Yes	Yes

Notes:

- a The concentrations of lead are based on the maximum detected concentrations in the medium (see Tables 2.1 and 2.2).
- b The 95%UCL concentrations of lead are based on the 95 percent upper confidence limit of the mean with the "hotspots" removed. (See Section 4.4 and Attachment 4).
- c Noncancer RBSL value from Table 4, and are based on Office of Environmental Health Hazard Assessment (OEHHA) residential screening levels (DTSC 2009, 2015).
- d RBSL for construction worker based on the Adult Lead Model (EPA 2009) with exposure inputs from DTSC (DTSC 2014).
- Not applicable
- mg/kg Milligrams per kilogram
- bgs below ground surface
- RBSL Risk-based screening level

References:

DTSC. 2009. "Revised California Human Health Screening Levels for Lead." Integrated Risk Assessment Branch, Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. September.

DTSC. 2014. "HERO Note Number 1: Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities." Office of Human and Ecological Risk. September 30. On-line address: http://www.dtsc.ca.gov/AssessingRisk/upload/HHRA_Note1.pdf

DTSC. 2015. "DTSC-modified Screening Levels (DTSC-SLs)." Human and Ecological Risk Office (HERO). HERO HHRA Note Number 3. October. On-line address: <http://www.dtsc.ca.gov/AssessingRisk/upload/HHRA-Note-3-2015-10.pdf>

EPA. 2009. Adult Lead Model. June. On-line address: <http://www2.epa.gov/superfund/lead-superfund-sites-software-and-users-manuals>

TABLE 9: HUMAN HEALTH RISK SUMMARY

Remedial Investigation for Cross Alameda Trail
 City of Alameda, California

CANCER RISK					
Site	Medium	Exposure Pathway	Future Resident	Future Recreational User	Future Construction Worker
Cross Alameda Trail	Surface Soil (0 to 0.5 foot bgs)	Direct Contact ^a	3.3E-04	2.7E-04	--
	Surface and Subsurface Soil (0 to 10 feet bgs)	Direct Contact ^b	3.3E-04	2.7E-04	2.0E-05
	Groundwater	Direct Contact ^c	--	NE	NE
		Vapor Intrusion ^d	--	NE	--
NON-CANCER HAZARD					
Site	Medium	Exposure Pathway	Future Resident	Future Recreational User	Future Construction Worker
Cross Alameda Trail	Surface Soil (0 to 0.5 foot bgs)	Direct Contact ^a	90	71	NE
	Surface and Subsurface Soil (0 to 10 feet bgs)	Direct Contact ^b	92	72	42
	Groundwater	Direct Contact ^c	48	NE	NE
		Vapor Intrusion	3	NE	12

Notes:

- a Surface soil exposure pathways evaluated for direct contact are incidental ingestion, dermal contact, and inhalation of particulates from soil to outdoor air.
- b Subsurface soil exposure pathways assumes subsurface soil is excavated and brought to the surface. Subsurface soil exposure pathways evaluated for direct contact are incidental ingestion, dermal contact, and inhalation of particulate and volatile chemicals from soil to outdoor air.
- c Groundwater exposure pathways evaluated for direct contact are ingestion, dermal contact, and inhalation of volatile chemicals.
- d Vapor intrusion was evaluated for indoor air for the future resident and trench air for the future construction worker.
- No risk
- bgs Below ground surface
- NE Not evaluated

TABLE 10: HUMAN HEALTH RISK DRIVERS

Remedial Investigation for Cross Alameda Trail
City of Alameda, California

Site	Medium	Exposure Pathway	Future Resident	Future Recreational User	Future Construction Worker
Cross Alameda Trail	Surface Soil (0 to 0.5 foot bgs)	Direct Contact ^a	Arsenic Lead	Arsenic Lead	NE
	Surface and Subsurface Soil (0 to 10 feet bgs)	Direct Contact ^a	Arsenic Lead	Arsenic Lead	Arsenic Lead
	Groundwater	Domestic Use (Ingestion, dermal, inhalation)	Diesel Gasoline	NE	NE
		Vapor intrusion (inhalation)	Diesel Gasoline	NE	Diesel Gasoline

Notes: Risk drivers are those chemicals for which the chemical-specific cancer risk for a given exposure medium (for example, subsurface soil) exceeds 1E-06 or the chemical-specific noncancer hazard index exceeds 1.

a Soil exposure pathways evaluated for direct contact are incidental ingestion, dermal contact, and inhalation of particulate and volatile chemicals released from soil to outdoor air. For future scenarios it is assumed that subsurface soil would be brought to the surface.

-- No risk drivers were identified for this exposure pathway for this receptor.

bgs Below ground surface

NE Not evaluated

Table 11: Summary of General Uncertainties Associated with the Screening-Level Human Health Risk Assessment

Remedial Investigation for Cross Alameda Trail
 City of Alameda, California

Uncertainty	Effect on Screening-Level Human Health Risk Assessment	Potential Magnitude and Effect on Risk
Data Evaluation		
Systematic or random errors in the chemical analysis may yield erroneous data.	May underestimate risk because data for specific samples or analyses may be viewed as having fewer detected results, or fewer reliable results, as a result of laboratory errors or assumptions in the chemical analysis.	Low Underestimate
Sufficient samples may not have been collected to characterize the media evaluated.	May underestimate or overestimate risk because calculated risks for an exposure area may be based on very few samples, which may or may not be representative of the area at large.	Moderate Underestimate or Overestimate
Selection of Chemicals of Potential Concern		
All metals were included in the estimate of risks, regardless of whether they were found to exceed ambient concentrations.	May overestimate site-related risks, especially for arsenic, because a portion of the measured concentrations of metals are associated with ambient levels that are not site-related.	Moderate to High Overestimate
Polycyclic aromatic hydrocarbons (PAHs) were not included in the estimate of risks, because they were found to not exceed ambient concentrations during previous site investigations.	May underestimate site-related risks because a portion of the measured concentrations of may be associated with site-related risk.	Moderate to High Underestimate
Exposure Assessment		
Maximum detected concentrations were used as the EPCs for soil and groundwater and are assumed present uniformly across the exposure area for the entire duration of exposure.	May overestimate risks because use of maximum concentrations and the assumption of uniformity do not account for reductions to COPC concentrations that may result from biodegradation, chemical oxidation, hydrolysis, or other chemical removal processes.	Moderate to High Overestimate
Sizes of exposure areas are fixed instead of variable.	May underestimate or overestimate risk because exposure may not be confined to the sizes of the areas selected for evaluation. EPCs for COPCs in adjacent exposure areas may be higher or lower.	Moderate Underestimate or Overestimate
The standard assumptions regarding body weight, period exposed, life expectancy, population characteristics, and lifestyle may not be representative of any actual exposure situation.	May overestimate risk associated with exposure to contaminants at the site because other environmental conditions may affect potential receptors, and health-related concerns may not necessarily be attributed to residual contaminants at the site.	Moderate Overestimate

Table 11: Summary of General Uncertainties Associated with the Screening-Level Human Health Risk Assessment

Remedial Investigation for Cross Alameda Trail
 City of Alameda, California

Uncertainty	Effect on Screening-Level Human Health Risk Assessment	Potential Magnitude and Effect on Risk
Exposure Assessment (continued)		
The amount of media intake is assumed constant and representative of the exposed population.	May underestimate or overestimate risk to potential receptors because individual intake could be less or more than the amount assumed in the risk evaluation. Furthermore, it is assumed that a receptor may take in the same amount of media over the entire exposure duration, which is unlikely to happen in actuality.	Moderate Underestimate or Overestimate
Exposure assumptions are based on high estimates of daily, long-term exposure for receptors.	Twenty-six years of exposure is assumed for residential receptors, including the most sensitive time of birth to six years old. These durations may overestimate exposure to these receptors because average intake or exposure could be less than is assumed in the risk evaluation. Likewise, the assumption that residents will reside in the same dwelling for most of their lifetime is very conservative.	Moderate to High Overestimate
Toxicity Assessment		
Statistical methods used to extrapolate from high to low doses rely on experimental animal data.	In animal studies, high doses of a test chemical are administered to laboratory animals, and the reported response is extrapolated to the much lower doses likely for human exposure. Very little experimental data are available on the dose-response relationship at low doses. Because of this uncertainty, EPA has selected a conservative model to estimate the low-dose relationship, and EPA uses an upper-bound estimate (typically a 95 percent upper confidence limit of the SF predicted by the extrapolation model) as the SF. An upper-bound estimate of potential cancer risks is obtained with this SF.	Moderate to High Overestimate
A toxicity value for a surrogate chemical was used to calculate risks when a toxicity value for a given COPC was unavailable.	Surrogate chemicals can introduce uncertainty because of the underlying assumption that the target chemical affects the same target organ or exerts the same method of carcinogenesis at the same effective dose as the surrogate chemical. Surrogate chemicals were used for the petroleum hydrocarbons and likely overestimate the actual risk from the petroleum mixtures.	Moderate Underestimate or Overestimate

Table 11: Summary of General Uncertainties Associated with the Screening-Level Human Health Risk Assessment

Remedial Investigation for Cross Alameda Trail
 City of Alameda, California

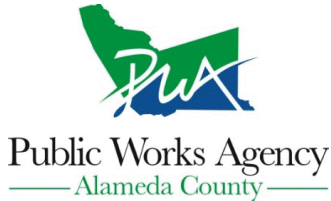
Uncertainty	Effect on Screening-Level Human Health Risk Assessment	Potential Magnitude and Effect on Risk
Risk Characterization		
Risks from carcinogens with different target organs are assumed additive.	This assumption contributes to uncertainty in the risk assessment and may result in underestimated or overestimated risks, depending on whether interactions among the COPCs are synergistic or antagonistic.	Moderate Underestimate or Overestimate
Uncertainty in the risk estimates may be magnified through multiplicative combination of many upper-bound, conservative assumptions for EPCs, chemical intake, and toxicity criteria.	May overestimate risks because upper-bound, conservative assumptions are compounded in the SLHHRA.	High Overestimate

Notes:

- COPC Chemical of potential concern
- EPA U.S. Environmental Protection Agency
- EPC Exposure point concentration
- SF Slope factor
- SLHHRA Screening-level human health risk assessment

ATTACHMENT 1

Alameda County Public Works Agency - Water Resources Well Permit



399 Elmhurst Street
Hayward, CA 94544-1395
Telephone: (510)670-6633 Fax:(510)782-1939

Application Approved on: 08/12/2015 By jamesy

Permit Numbers: W2015-0752
Permits Valid from 09/01/2015 to 09/03/2015

Application Id: 1438971832644
Site Location: APN: 74-905-20-3-South of Ralph Appezato Memorial Pkwy, between Main & Webster St, Alameda, CA
Project Start Date: 09/01/2015
Assigned Inspector: Contact Steve Miller at (510) 670-5517 or stevem@acpwa.org
Applicant: Tetra Tech - Mark Duffy
Property Owner: 1999 Harrison St, #500, Oakland, CA 94612
City of Alameda PWA - Gail Payne
950 Webster Mall Sq, Alameda, CA 94501
Client: ** same as Property Owner **

City of Project Site: Alameda

Completion Date: 09/03/2015

Phone: 510-390-6278

Phone: 510-747-7948

Receipt Number: WR2015-0394
Payer Name : Mark T. Duffy
Total Due: \$265.00
Total Amount Paid: \$265.00
Paid By: VISA
PAID IN FULL

Works Requesting Permits:

Borehole(s) for Investigation-Contamination Study - 22 Boreholes
Driller: vironex - Lic #: 705927 - Method: DP

Work Total: \$265.00

Specifications

Permit Number	Issued Dt	Expire Dt	# Boreholes	Hole Diam	Max Depth
W2015-0752	08/12/2015	11/30/2015	22	2.25 in.	15.00 ft

Specific Work Permit Conditions

1. Backfill bore hole by tremie with cement grout or cement grout/sand mixture. Upper two-three feet replaced in kind or with compacted cuttings. All cuttings remaining or unused shall be containerized and hauled off site. The containers shall be clearly labeled to the ownership of the container and labeled hazardous or non-hazardous.
2. Boreholes shall not be left open for a period of more than 24 hours. All boreholes left open more than 24 hours will need approval from Alameda County Public Works Agency, Water Resources Section. All boreholes shall be backfilled according to permit destruction requirements and all concrete material and asphalt material shall be to Caltrans Spec or County/City Codes. No borehole(s) shall be left in a manner to act as a conduit at any time.
3. Permittee shall assume entire responsibility for all activities and uses under this permit and shall indemnify, defend and save the Alameda County Public Works Agency, its officers, agents, and employees free and harmless from any and all expense, cost, liability in connection with or resulting from the exercise of this Permit including, but not limited to, properly damage, personal injury and wrongful death.
4. Prior to any drilling activities, it shall be the applicant's responsibility to contact and coordinate an Underground Service Alert (USA), obtain encroachment permit(s), excavation permit(s) or any other permits or agreements required for that Federal, State, County or City, and follow all City or County Ordinances. No work shall begin until all the permits and requirements have been approved or obtained. It shall also be the applicants responsibilities to provide to the Cities or to Alameda County an Traffic Safety Plan for any lane closures or detours planned. No work shall begin until all the permits and requirements have been approved or obtained.

Alameda County Public Works Agency - Water Resources Well Permit

5. Applicant shall contact assigned inspector listed on the top of the permit at least five (5) working days prior to starting, once the permit has been approved. Confirm the scheduled date(s) at least 24 hours prior to drilling.
 6. Copy of approved drilling permit must be on site at all times. Failure to present or show proof of the approved permit application on site shall result in a fine of \$500.00.
 7. Electronic Reporting Regulations (Chapter 30, Division 3 of Title 23 & Division 3 of Title 27, CCR) require electronic submission of any report or data required by a regulatory agency from a cleanup site. Submission dates are set by a Regional Water Board or by a regulatory agency. Once a report/data is successfully uploaded, as required, you have met the reporting requirement (i.e. the compliance measure for electronic submittals is the actual upload itself). The upload date should be on or prior to the regulatory due date.
 8. NOTE:
Under California laws, the owner/operator are responsible for reporting the contamination to the governmental regulatory agencies under Section 25295(a). The owner/operator is liable for civil penalties under Section 25299(a)(4) and criminal penalties under Section 25299(d) for failure to report a leak. The owner/operator is liable for civil penalties under Section 25299(b)(4) for knowing failure to ensure compliance with the law by the operator. These penalty provisions do not apply to a potential buyer.
 9. Permit is valid only for the purpose specified herein. No changes in construction procedures, as described on this permit application. Boreholes shall not be converted to monitoring wells, without a permit application process.
-

Duffy, Mark

From: support@usan.org
Sent: Wednesday, August 26, 2015 12:24 PM
To: Duffy, Mark
Subject: USAN 2015/08/26 #00000 0418286-000 NORM RNEW

00000 USAN 08/26/15 12:21:25 0418286 NORMAL NOTICE RENEWAL

Message Number: 0418286 Received by USAN at 12:19 on 08/26/15 by VVL

Work Begins: 08/28/15 at 12:30 Notice: 020 hrs Priority: 2
Night Work: N Weekend Work: N

Expires: 09/23/15 at 23:59 Update By: 09/21/15 at 16:59

Caller: MARK DUFFY
Company: TETRA TECH
Address: 1999 HARRISON ST STE 500
City: OAKLAND State: CA Zip: 94612
Business Tel: 518-480-5947 Fax: 510-433-0830
Email Address: MARK.DUFFY@TETRATECH.COM

Nature of Work: VERTICAL BORING FOR PHASE 2 SITE ASSESSM

Done for: CITY OF ALAMEDA Explosives: N

Foreman: CALLER

Field Tel: Cell Tel: 518-480-5947

Area Premarked: Y Premark Method: CHALK, WHITE PAINT

Permit Type: COUNTY Number: W2014-1180

Vac / Pwr Equip Use In The Approx Location Of Member Facilities Requested: N Excavation Enters Into Street Or Sidewalk Area: N

Location:

S/SI/O RALPH APPEZZATO MEMORIAL PKWY FR WEBSTER ST TO MAIN ST
(EXT APP 100'S FOR ENT DIST-PER CALLER)

Place: ALAMEDA County: ALAMEDA State: CA

Long/Lat Long: -122.291306 Lat: 37.77882 Long: -122.276556 Lat: 37.779995

Excavator Requests Operator(s) To Re-mark Their Facilities: Y

Operator(s) To Re-mark Their Facilities:

CTYALA = CITY ALAMEDA CTYOAK = CITY OAKLAND CONST DEPT
COMHAY = COMCAST-HAYWARD COMOAK = COMCAST-OAKLAND
EBWCMS = EAST BAY WATER MPOWER = MPOWER COMMUNICATIONS
PACBEL = PACIFIC BELL PGEOAK = PGE DISTR OAKLAND

Comments:

RENEWAL OF TICKET RN#533298 ORIG DATE 12/23/2014 RE-MARK YES-VVL

08/26/2015 - ALL MEMBERS

Sent to:

CTYALA = CITY ALAMEDA CTYOAK = CITY OAKLAND CONST DEPT
COMHAY = COMCAST-HAYWARD COMOAK = COMCAST-OAKLAND
EBWCMS = EAST BAY WATER MPOWER = MPOWER COMMUNICATIONS
PACBEL = PACIFIC BELL PGEOAK = PGE DISTR OAKLAND

Member Contact Information

Member Utility	Main Contact #	Vacuum Contact #	Emergency #	After hours #
CITY ALAMEDA	(510)748-3943 (510)715-6111	(510)715-6111	(510)748-3966	
CITY OAKLAND C	(510)238-6348 (510)238-7288		(510)772-8134	
COMCAST-HAYWAR	(510)887-1300		(888)824-8399	
COMCAST-OAKLAN	(510)887-1300	(888)824-8219	(888)824-8399	
EAST BAY WATER	(510)287-0600	(510)287-0600		
MPOWER COMMUNI	(916)903-6028 (877)370-4482			
PACIFIC BELL	(510)645-2929	(510)645-2929	(510)645-2929	(800)332-1321x8
PGE DISTR OAKL	(800)743-5000x00	(800)743-5000	(800)743-5000	(800)743-5000


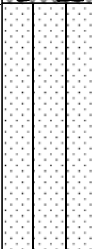
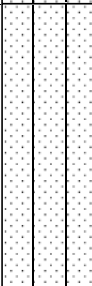
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ATTACHMENT 2



BORING LOG CAT-B-1


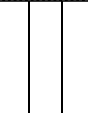

Project: Cross-Alameda Trail Phase II		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S3536		Reviewed By: Victor Early	Page 1 of 1
Logged By: Mark Duffy			Longitude:
Date Boring Started: 12/29/2014		Drilling Contractor: Vironex	Ground Surface Elevation (feet NGVD of 1929):
Date Boring Completed: 12/29/2014		Drilling Method: Direct Push Technology	Depth to groundwater (feet bgs): NA

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	Breathing Zone PID (ppm)
--- 0 ---						Asphalt/fill	
--- 1 ---	48"			SM		Silty sand, light olive brown (2.5Y 5/4), approximately 3 inch black (2.5Y 2.5/1), loose, mostly fine sand, trace gravel, slightly moist.	
--- 2 ---		1115	CAT-B-1-2		0.0		
--- 3 ---							
--- 4 ---		1130	CAT-B-1-4				
--- 5 ---	48"			SM		Silty sand, black (2.5Y 2.5/1), soft, loose to very low plasticity, mostly fine sand, very moist to wet.	
--- 6 ---							
--- 7 ---							
--- 8 ---							
--- 9 ---							
--- 10 ---							
--- 11 ---							
--- 12 ---							
--- 13 ---							
--- 14 ---							
--- 15 ---							
--- 16 ---							
--- 17 ---							
--- 18 ---							
--- 19 ---							
--- 20 ---							



**BORING LOG
CAT-B-2**

Project: Cross-Alameda Trail Phase II		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S3536		Reviewed By: Victor Early	Latitude: Page 1 of 1
Logged By: Mark Duffy			Longitude:
Date Boring Started:	12/29/2014	Drilling Contractor: Vironex	Ground Surface Elevation (feet NGVD of 1929):
Date Boring Completed:	12/29/2014	Drilling Method: Direct Push Technology	Depth to groundwater (feet bgs): NA

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	Breathing Zone PID (ppm)
--- 0 ---	48"					Mulch	
--- 1 ---						Sandy silt, light olive brown (2.5Y 5/4), low plasticity, soft, some fine sand, trace gravel, moist.	
--- 2 ---		1215	CAT-B-2-2	MI			0.0
--- 3 ---							
--- 4 ---	48"					Silty clay, very dark grey (2.5Y 3/1), medium stiffness, medium plasticity, moist.	
--- 5 ---		1230	CAT-B-2-5	CL			
--- 6 ---						No recovery from 5 to 8 feet bgs.	
--- 7 ---					NA	NA	
--- 8 ---							
--- 9 ---							
--- 10 ---							
--- 11 ---							
--- 12 ---							
--- 13 ---							
--- 14 ---							
--- 15 ---							
--- 16 ---							
--- 17 ---							
--- 18 ---							
--- 19 ---							
--- 20 ---							



TETRA TECH

BORING LOG CAT-B-6

Project: Cross-Alameda Trail Phase II		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S3536		Reviewed By: Victor Early	Latitude: Page 1 of 1
Logged By: Mark Duffy			Longitude:
Date Boring Started: 12/29/2014		Drilling Contractor: Vironex	Ground Surface Elevation (feet NGVD of 1929):
Date Boring Completed: 12/29/2014		Drilling Method: Direct Push Technology	Depth to groundwater (feet bgs): NA

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	Breathing Zone PID (ppm)
--- 0 ---						Mulch	
--- 1 ---	48"	1535	CAT-B-6-1	CL		Silty clay, dark grey (2.5Y 4/1), medium stiffness, medium plasticity, moist.	0.0
--- 2 ---							
--- 3 ---							
--- 4 ---	48"	1530	CAT-B-6-4	NA	NA	Marsh crust/unknown material, white (2.5Y 8/1) with yellowish red (5YR 5/6)staining, chalky, very moist	
--- 5 ---							
--- 6 ---							
--- 7 ---	48"			SM		Silty sand, very dark grey (2.5Y 3/1), soft, loose to very low plasticity, very moist.	
--- 8 ---							
--- 9 ---							
--- 10 ---							
--- 11 ---							
--- 12 ---							
--- 13 ---							
--- 14 ---							
--- 15 ---							
--- 16 ---							
--- 17 ---							
--- 18 ---							
--- 19 ---							
--- 20 ---							



TETRA TECH

BORING LOG CAT-B-7

Project: Cross-Alameda Trail Phase II		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S3536		Reviewed By: Victor Early	Latitude: Page 1 of 1
Logged By: Mark Duffy			Longitude:
Date Boring Started: 12/30/2014		Drilling Contractor: Vironex	Ground Surface Elevation (feet NGVD of 1929):
Date Boring Completed: 12/30/2014		Drilling Method: Direct Push Technology	Depth to groundwater (feet bgs): NA

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	Breathing Zone PID (ppm)
--- 0 ---	48"			CL		Silty clay, olive brown (2.5Y 4/4). Medoium stiffness, medium plasticity, moist.	0.0
--- 1 ---		835	CAT-B-7-1				
--- 2 ---							
--- 3 ---				NA	NA	Marsh crust/unknown material, black (2.5Y 2.5/1), olive brown (2.5Y 4/4), white (2.5Y 8/1), loose to slightly stiff, moist.	
--- 4 ---	840	CAT-B-7-4					
--- 5 ---	48"			SM		Silty sand, very dark grey (2.5Y 3/1), soft, loose to very low plasticity, very moist.	
--- 6 ---							
--- 7 ---							
--- 8 ---							
--- 9 ---							
--- 10 ---							
--- 11 ---							
--- 12 ---							
--- 13 ---							
--- 14 ---							
--- 15 ---							
--- 16 ---							
--- 17 ---							
--- 18 ---							
--- 19 ---							
--- 20 ---							



**BORING LOG
CAT-B-10**

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 9 feet		Sampling Method: Macro-Core	
Location: Alameda, CA		Borehole Diameter: 2.25 inches			
Project No.: 103S3536		Reviewed By: Victor Early		Latitude: Page 1 of 1	
Logged By: Mark Duffy				Longitude:	
Date Boring Started:	12/30/2014	Drilling Contractor: Vironex		Ground Surface Elevation (feet NGVD of 1929):	
Date Boring Completed:	12/30/2014	Drilling Method: Direct Push Technology		Depth to groundwater (feet bgs): NA	

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	Breathing Zone PID (ppm)
--- 0 ---	60"			NA		Gravel fill	
--- 1 ---				CL		Silty clay, olive brown (2.5Y 4/4), medium stiffness, medium plasticity, moist.	0.0
--- 2 ---		1310	CAT-B-10-2				
--- 3 ---		1320	CAT-B (duplicate)				
--- 4 ---							
--- 5 ---		1305	CAT-B-10-5	ML		Sandy silt, black (2.5Y 2.5/1), sticky, soft, low plasticity, very moist.	
--- 6 ---	48"			SM		Silty sand, grey (2.5Y 5/1), soft, loose, very moist.	
--- 7 ---							
--- 8 ---							
--- 9 ---							
--- 10 ---							
--- 11 ---							
--- 12 ---							
--- 13 ---							
--- 14 ---							
--- 15 ---							
--- 16 ---							
--- 17 ---							
--- 18 ---							
--- 19 ---							
--- 20 ---							



**BORING LOG
CAT-B-11**

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 15 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S4024		Reviewed By: Victor Early	Latitude: Page 1 of 1
Logged By: Mark Duffy			Longitude:
Date Boring Started: 9/1/2015		Drilling Contractor: Vironex	Ground Surface Elevation (feet NGVD of 1929):
Date Boring Completed: 9/1/2015		Drilling Method: Direct Push Technology	Depth to groundwater (feet bgs): 5.15

Depth (feet bgs)	Recovered Interval	Time	Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)		
--- 0 ---						Asphalt/fill			
--- 1 ---	48"	737	CAT-B-11-0.5 (soil)	SM		Silty sand, dark grey (2.5Y 4/1), soft, loose to very low plasticity, mostly fine sand, trace gravel, poorly graded, moist to wet at 4 feet bgs.			
--- 2 ---								0.0	
--- 3 ---									
--- 4 ---		741	CAT-B-11-4 (soil)						
--- 5 ---	48"								
--- 6 ---									
--- 7 ---									
--- 8 ---	48"								0.0
--- 9 ---									
--- 10 ---									
--- 11 ---	32"								
--- 12 ---			CAT-B-11-GW (water)						
--- 13 ---									
--- 14 ---									
--- 15 ---									
--- 16 ---						* Installed temporary 15 foot PVC well casing with 0.01-inch screen from 10 to 15 feet bgs.			
--- 17 ---									
--- 18 ---									
--- 19 ---									
--- 20 ---									



TETRA TECH

BORING LOG CAT-B-12

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet		Sampling Method: Macro-Core	
Location: Alameda, CA		Borehole Diameter: 2.25 inches			
Project No.: 103S4024		Reviewed By: Victor Early		Latitude: Page 1 of 1	
Logged By: Mark Duffy				Longitude:	
Date Boring Started:	9/1/2015	Drilling Contractor: Vironex		Ground Surface Elevation (feet NGVD of 1929):	
Date Boring Completed:	9/1/2015	Drilling Method: Direct Push Technology		Depth to groundwater (feet bgs): NA	


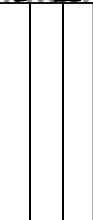
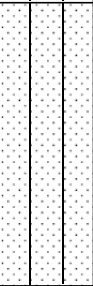
Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)
--- 0 ---	48"		CAT-B-12-0.5	ML		Asphalt/fill	
--- 1 ---		802				Sandy silt, brown (10YR 4/3) from 1 to 2 feet bgs, very dark grey (2.5Y 3/1) from 2 to 4 feet bgs, low plasticity, moist.	0.0
--- 2 ---							
--- 3 ---							
--- 4 ---		805	CAT-B-12-4				
--- 5 ---						SM	
--- 6 ---							
--- 7 ---							
--- 8 ---							
--- 9 ---							
--- 10 ---							
--- 11 ---							
--- 12 ---							
--- 13 ---							
--- 14 ---							
--- 15 ---							
--- 16 ---							
--- 17 ---							
--- 18 ---							
--- 19 ---							
--- 20 ---							



TETRA TECH

BORING LOG CAT-B-13

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S4024		Reviewed By: Victor Early	Latitude: Page 1 of 1
Logged By: Mark Duffy			Longitude:
Date Boring Started: 9/1/2015		Drilling Contractor: Vironex	Ground Surface Elevation (feet NGVD of 1929):
Date Boring Completed: 9/1/2015		Drilling Method: Direct Push Technology	Depth to groundwater (feet bgs): NA


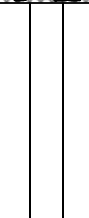
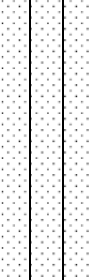
Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)			
--- 0 ---						Asphalt/fill				
--- 1 ---	48"	815	CAT-B-13-0.5	ML		Sandy silt, brown (10YR 4/3) from 1 to 2 feet bgs, very dark grey (2.5Y 3/1) from 2 to 4 feet bgs, low plasticity, moist, glass at 2 feet bgs.	0.0			
--- 2 ---										
--- 3 ---										
--- 4 ---		818	CAT-B-13-4							
--- 5 ---	48"			SM		Silty sand, dark grayish brown (2.5Y 4/2), soft, very low plasticity, mostly fine sand, round to subangular grains, poorly graded, very moist to wet.	0.0			
--- 6 ---										
--- 7 ---										
--- 8 ---										
--- 9 ---										
--- 10 ---										
--- 11 ---										
--- 12 ---										
--- 13 ---										
--- 14 ---										
--- 15 ---										
--- 16 ---										
--- 17 ---										
--- 18 ---										
--- 19 ---										
--- 20 ---										



TETRA TECH

BORING LOG CAT-B-14

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet		Sampling Method: Macro-Core	
Location: Alameda, CA		Borehole Diameter: 2.25 inches			
Project No.: 103S4024		Reviewed By: Victor Early		Latitude: Page 1 of 1	
Logged By: Mark Duffy				Longitude:	
Date Boring Started:	9/1/2015	Drilling Contractor: Vironex		Ground Surface Elevation (feet NGVD of 1929):	
Date Boring Completed:	9/1/2015	Drilling Method: Direct Push Technology		Depth to groundwater (feet bgs): NA	

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)		
--- 0 ---	48"		CAT-B-14-0.5	CL		Asphalt/fill			
--- 1 ---		845					Sandy clay, gray brown (2.5Y 5/2) from 1 to 2 feet bgs, dark grey (2.5Y 4/1) from 2 to 4 feet bgs, low plasticity, moist.	0.0	
--- 2 ---									
--- 3 ---									
--- 4 ---		850			CAT-B-14-4	SM		Silty sand, black (2.5Y 2.5/1), soft, very low plasticity, mostly fine sand, round to subangular grains, poorly graded, very moist to wet.	0.0
--- 5 ---									
--- 6 ---									
--- 7 ---									
--- 8 ---									
--- 9 ---									
--- 10 ---									
--- 11 ---									
--- 12 ---									
--- 13 ---									
--- 14 ---									
--- 15 ---									
--- 16 ---									
--- 17 ---									
--- 18 ---									
--- 19 ---									
--- 20 ---									



BORING LOG CAT-B-15

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S4042		Reviewed By: Victor Early	Page 1 of 1
Logged By: Mark Duffy			Latitude:
Date Boring Started: 9/1/2015		Drilling Contractor: Vironex	Longitude:
Date Boring Completed: 9/1/2015		Drilling Method: Direct Push Technology	Ground Surface Elevation (feet NGVD of 1929):
			Depth to groundwater (feet bgs): NA

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)	
--- 0 ---						Mulch		
--- 1 ---	48"	925	CAT-B-15-0.5	ML		Sandy silt, brown (10YR 4/3), low plasticity, soft, some fine sand, trace gravel, slightly moist.		
--- 2 ---								0.0
--- 3 ---		930	CAT-B-15-2	CL		Silty clay, very dark grey (2.5Y 3/1), medium stiffness, medium plasticity, moist.		
--- 4 ---								
--- 5 ---	48"			SM		Silty sand, black (2.5Y 2.5/1), soft, very low plasticity, mostly fine sand, round to subangular grains, poorly graded, very moist to wet.		
--- 6 ---								
--- 7 ---								
--- 8 ---								
--- 9 ---								
--- 10 ---								
--- 11 ---								
--- 12 ---								
--- 13 ---								
--- 14 ---								
--- 15 ---								
--- 16 ---								
--- 17 ---								
--- 18 ---								
--- 19 ---								
--- 20 ---								



BORING LOG CAT-B-16

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S4042		Reviewed By: Victor Early	Page 1 of 1
Logged By: Mark Duffy			Longitude:
Date Boring Started: 9/1/2015		Drilling Contractor: Vironex	Ground Surface Elevation (feet NGVD of 1929):
Date Boring Completed: 9/1/2015		Drilling Method: Direct Push Technology	Depth to groundwater (feet bgs): NA

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)	
--- 0 ---						Mulch		
--- 1 ---	48"	940	CAT-B-16-0.5	ML		Sandy silt, brown (10YR 4/3), low plasticity, soft, some fine sand, trace gravel, slightly moist.		
--- 2 ---								
--- 3 ---	48"	945	CAT-B-16-2	CL		Silty clay, dark grayish brown (10YR 4/2), medium stiffness, medium plasticity, moist.	0.0	
--- 4 ---								
--- 5 ---								
--- 6 ---								
--- 7 ---	48"			SM		Silty sand, dark grayish brown (2.5Y 5/2), soft, very low plasticity, mostly fine sand, round to subangular grains, poorly graded, very moist to wet.		
--- 8 ---								
--- 9 ---								
--- 10 ---								
--- 11 ---								
--- 12 ---								
--- 13 ---								
--- 14 ---								
--- 15 ---								
--- 16 ---								
--- 17 ---								
--- 18 ---								
--- 19 ---								
--- 20 ---								



BORING LOG CAT-B-17

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S4042		Reviewed By: Victor Early	Page 1 of 1
Logged By: Mark Duffy			Latitude:
Date Boring Started: 9/1/2015		Drilling Contractor: Vironex	Longitude:
Date Boring Completed: 9/1/2015		Drilling Method: Direct Push Technology	Ground Surface Elevation (feet NGVD of 1929):
			Depth to groundwater (feet bgs): NA

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)	
--- 0 ---						Mulch		
--- 1 ---	48"	1035	CAT-B-17-0.5	ML		Sandy silt, brown (10YR 4/3), low plasticity, soft, some fine sand, trace cobbles and gravel, slightly moist.		
--- 2 ---								
--- 3 ---		1037	CAT-B-17-2	CL		Silty clay, black (2.5Y 2.5/1), medium stiffness, medium plasticity, moist.	0.0	
--- 4 ---								
--- 5 ---	48"			SM		Silty sand, dark grayish brown (2.5Y 5/2), soft, very low plasticity, mostly fine sand, round to subangular grains, poorly graded, very moist to wet.		
--- 6 ---								
--- 7 ---								
--- 8 ---								
--- 9 ---								
--- 10 ---								
--- 11 ---								
--- 12 ---								
--- 13 ---								
--- 14 ---								
--- 15 ---								
--- 16 ---								
--- 17 ---								
--- 18 ---								
--- 19 ---								
--- 20 ---								



BORING LOG CAT-B-18

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S4042		Reviewed By: Victor Early	Page 1 of 1
Logged By: Mark Duffy			Longitude:
Date Boring Started: 9/1/2015		Drilling Contractor: Vironex	Ground Surface Elevation (feet NGVD of 1929):
Date Boring Completed: 9/1/2015		Drilling Method: Direct Push Technology	Depth to groundwater (feet bgs): NA

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)
--- 0 ---						Mulch	
--- 1 ---	48"		CAT-B-18-0.5	ML		Sandy silt, olive brown (2.5Y 4/3), low plasticity, soft, some fine sand, trace gravel, slightly moist.	
--- 2 ---		1049					
--- 3 ---			CAT-B-18-2	CL		Silty clay, dark gray (2.5Y 4/1), medium stiffness, medium plasticity, moist.	0.0
--- 4 ---							
--- 5 ---	48"			SM		Silty sand, dark grayish brown (2.5Y 5/2), soft, very low plasticity, mostly fine sand, round to subangular grains, poorly graded, very moist to wet.	
--- 6 ---							
--- 7 ---							
--- 8 ---							
--- 9 ---							
--- 10 ---							
--- 11 ---							
--- 12 ---							
--- 13 ---							
--- 14 ---							
--- 15 ---							
--- 16 ---							
--- 17 ---							
--- 18 ---							
--- 19 ---							
--- 20 ---							



TETRA TECH

BORING LOG CAT-B-19

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 7 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S4024		Reviewed By: Victor Early	Latitude: Page 1 of 1
Logged By: Mark Duffy			Longitude:
Date Boring Started: 9/1/2015		Drilling Contractor: Vironex	Ground Surface Elevation (feet NGVD of 1929):
Date Boring Completed: 9/1/2015		Drilling Method: Direct Push Technology	Depth to groundwater (feet bgs): NA

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)
--- 0 ---						Mulch	
--- 1 ---	48"	1307	CAT-B-19-0.5	CL		Sandy clay, very dark gray brown (2.5Y 3/2), medium stiffness, low plasticity, moist.	0.0
--- 2 ---							
--- 3 ---							
--- 4 ---		1304	CAT-B-19-4				NA
--- 5 ---	32"			SM		Silty sand, very dark grey (10YR 3/3), soft, loose to very low plasticity, very moist to wet, drilling refusal at 7 feet bgs.	
--- 6 ---							
--- 7 ---							
--- 8 ---							
--- 9 ---							
--- 10 ---							
--- 11 ---							
--- 12 ---							
--- 13 ---							
--- 14 ---							
--- 15 ---							
--- 16 ---							
--- 17 ---							
--- 18 ---							
--- 19 ---							
--- 20 ---							



TETRA TECH

BORING LOG CAT-B-20

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S4024		Reviewed By: Victor Early	Latitude: Page 1 of 1
Logged By: Mark Duffy			Longitude:
Date Boring Started: 9/1/2015		Drilling Contractor: Vironex	Ground Surface Elevation (feet NGVD of 1929):
Date Boring Completed: 9/1/2015		Drilling Method: Direct Push Technology	Depth to groundwater (feet bgs): NA

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)
--- 0 ---						Mulch	
--- 1 ---	48"	1307	CAT-B-20-0.5	CL		Sandy clay, very dark gray brown (2.5Y 3/2), low stiffness, low plasticity, moist.	0.0
--- 2 ---							
--- 3 ---							
--- 4 ---	48"	1304	CAT-B-20-4	NA	NA	Marsh crust/unknown material, white (2.5Y 8/1) with yellowish red (5YR 5/6)staining, chalky, very moist	
--- 5 ---							
--- 6 ---							
--- 7 ---	48"			SM		Silty sand, black (2.5Y 2.5Y/1), soft, loose to very low plasticity, very moist to wet.	
--- 8 ---							
--- 9 ---							
--- 10 ---							
--- 11 ---							
--- 12 ---							
--- 13 ---							
--- 14 ---							
--- 15 ---							
--- 16 ---							
--- 17 ---							
--- 18 ---							
--- 19 ---							
--- 20 ---							



**BORING LOG
CAT-B-21**

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet		Sampling Method: Macro-Core	
Location: Alameda, CA		Borehole Diameter: 2.25 inches			
Project No.: 103S4024		Reviewed By: Victor Early		Latitude: Page 1 of 1	
Logged By: Mark Duffy				Longitude:	
Date Boring Started:	9/1/2015	Drilling Contractor: Vironex		Ground Surface Elevation (feet NGVD of 1929):	
Date Boring Completed:	9/1/2015	Drilling Method: Direct Push Technology		Depth to groundwater (feet bgs): NA	

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)
--- 0 ---						Mulch	
--- 1 ---	48"	1348	CAT-B-21-0.5	CL		Sandy clay, very dark gray brown (2.5Y 3/2), low stiffness, low plasticity, moist.	0.0
--- 2 ---							
--- 3 ---							
--- 4 ---	48"	1351	CAT-B-21-4	NA	NA	Marsh crust/unknown material, white (2.5Y 8/1) with yellowish red (5YR 5/6)staining, chalky, very moist	
--- 5 ---							
--- 6 ---							
--- 7 ---	48"			SM		Silty sand, black (2.5Y 2.5Y/1), soft, loose to very low plasticity, very moist to wet.	
--- 8 ---							
--- 9 ---							
--- 10 ---							
--- 11 ---							
--- 12 ---							
--- 13 ---							
--- 14 ---							
--- 15 ---							
--- 16 ---							
--- 17 ---							
--- 18 ---							
--- 19 ---							
--- 20 ---							



BORING LOG CAT-B-22

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S4024		Reviewed By: Victor Early	Page 1 of 1
Logged By: Mark Duffy			Longitude:
Date Boring Started: 9/1/2015		Drilling Contractor: Vironex	Ground Surface Elevation (feet NGVD of 1929):
Date Boring Completed: 9/1/2015		Drilling Method: Direct Push Technology	Depth to groundwater (feet bgs): NA

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)		
--- 0 ---						Mulch			
--- 1 ---	48"	1400	CAT-B-22-0.5	CL		Sandy clay, very dark gray brown (2.5Y 3/2), low stiffness, low plasticity, moist.	0.0		
--- 2 ---									
--- 3 ---									
--- 4 ---		1358	CAT-B-22-4				NA	NA	Marsh crust/unknown material, white (2.5Y 8/1) with yellowish red (5YR 5/6) staining, chalky, very moist
--- 5 ---	48"			SM		Silty sand, black (2.5Y 2.5Y/1), soft, loose to very low plasticity, very moist to wet.			
--- 6 ---									
--- 7 ---									
--- 8 ---									
--- 9 ---									
--- 10 ---									
--- 11 ---									
--- 12 ---									
--- 13 ---									
--- 14 ---									
--- 15 ---									
--- 16 ---									
--- 17 ---									
--- 18 ---									
--- 19 ---									
--- 20 ---									



BORING LOG CAT-B-23

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 15 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S4024		Reviewed By: Victor Early	Page 1 of 1
Logged By: Mark Duffy			Longitude:
Date Boring Started: 9/2/2015		Drilling Contractor: Vironex	Ground Surface Elevation (feet NGVD of 1929):
Date Boring Completed: 9/2/2015		Drilling Method: Direct Push Technology	Depth to groundwater (feet bgs): 5.21

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)
--- 0 ---						Gravel fill	
--- 1 ---	48"	1205	CAT-B-23-0.5	CL		Silty clay, brown (10YR 5/3), medium stiffness, low plasticity, moist.	0.0
--- 2 ---							
--- 3 ---							
--- 4 ---							
--- 5 ---	48"	1210	CAT-B-23-2	ML		Sandy silt, brown (10YR 5/3), reddish brown mottling (5YR 4/4) at 3 feet bgs, sticky, soft, low plasticity, very moist.	
--- 6 ---							
--- 7 ---							
--- 8 ---							
--- 9 ---							
--- 10 ---	48"			SM		Silty sand, dark grey (5Y 4/1), color change to brown (10YR 4/3) at 10 feet bgs, soft, loose, wet.	
--- 11 ---							
--- 12 ---		1400	CAT-B-23-GW				0.0
--- 13 ---	36"						
--- 14 ---				ML		Sandy silt, brown (10YR 4/3), sticky, soft, very moist.	
--- 15 ---							
--- 16 ---						* Installed temporary 15 foot PVC well casing with 0.01-inch screen from 10 to 15 feet bgs.	
--- 17 ---							
--- 18 ---							
--- 19 ---							
--- 20 ---							



BORING LOG CAT-B-24




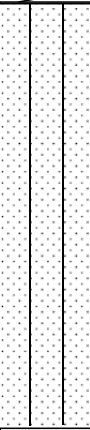
Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S4024		Reviewed By: Victor Early	Page 1 of 1
Logged By: Mark Duffy			Latitude:
Date Boring Started: 9/2/2015		Drilling Contractor: Vironex	Longitude:
Date Boring Completed: 9/2/2015		Drilling Method: Direct Push Technology	Ground Surface Elevation (feet NGVD of 1929):
			Depth to groundwater (feet bgs): NA

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)			
--- 0 ---	48"			NA		Gravel fill				
--- 1 ---		1230	CAT-B-24-0.5	SM		Silty sand, brown (2.5Y 4/4), loose, slightly moist.				
--- 2 ---	48"			CL		Silty clay, olive brown (2.5Y 4/4), medium stiffness, medium plasticity, moist.				
--- 3 ---		1240	CAT-B-24-2				0.0			
--- 4 ---	48"			SM		Silty sand, dark grayish brown (10YR 4/2), soft, loose, very moist to wet at 5 feet bgs.				
--- 5 ---										
--- 6 ---										0.0
--- 7 ---										
--- 8 ---										
--- 9 ---										
--- 10 ---										
--- 11 ---										
--- 12 ---										
--- 13 ---										
--- 14 ---										
--- 15 ---										
--- 16 ---										
--- 17 ---										
--- 18 ---										
--- 19 ---										
--- 20 ---										



BORING LOG CAT-B-25

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S4024		Reviewed By: Victor Early	Page 1 of 1
Logged By: Mark Duffy			Latitude:
Date Boring Started: 9/2/2015		Drilling Contractor: Vironex	Longitude:
Date Boring Completed: 9/2/2015		Drilling Method: Direct Push Technology	Ground Surface Elevation (feet NGVD of 1929):
			Depth to groundwater (feet bgs): NA

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)		
--- 0 ---	48"			NA		Gravel fill			
--- 1 ---		1300	CAT-B-25-0.5	SM		Silty sand, brown (2.5Y 4/4), loose, slightly moist.			
--- 2 ---			1255	CAT-B-25-2	CL		Silty clay, olive brown (2.5Y 4/4), medium stiffness, medium plasticity, moist.		
--- 3 ---				SM		Silty sand, dark grayish brown (10YR 4/2), soft, loose, very moist to wet at 5 feet bgs.	0.0		
--- 4 ---									
--- 5 ---									
--- 6 ---	48"								0.0
--- 7 ---									
--- 8 ---									
--- 9 ---									
--- 10 ---									
--- 11 ---									
--- 12 ---									
--- 13 ---									
--- 14 ---									
--- 15 ---									
--- 16 ---									
--- 17 ---									
--- 18 ---									
--- 19 ---									
--- 20 ---									



BORING LOG CAT-B-26

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S4024		Reviewed By: Victor Early	Latitude: Page 1 of 1
Logged By: Mark Duffy			Longitude:
Date Boring Started: 9/2/2015		Drilling Contractor: Vironex	Ground Surface Elevation (feet NGVD of 1929):
Date Boring Completed: 9/2/2015		Drilling Method: Direct Push Technology	Depth to groundwater (feet bgs): NA

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)		
--- 0 ---	48"			NA		Gravel fill			
--- 1 ---		1350	CAT-B-26-0.5	SM		Silty sand, brown (2.5Y 4/4), loose, slightly moist.			
--- 2 ---		1345	CAT-B-26-2	CL		Silty clay, olive brown (2.5Y 4/4), medium stiffness, medium plasticity, moist.			
--- 3 ---	48"			SM		Silty sand, dark grayish brown (10YR 4/2), soft, loose, very moist to wet at 5 feet bgs.	0.0		
--- 4 ---									
--- 5 ---									
--- 6 ---									
--- 7 ---									
--- 8 ---									
--- 9 ---									
--- 10 ---									
--- 11 ---									
--- 12 ---									
--- 13 ---									
--- 14 ---									
--- 15 ---									
--- 16 ---									
--- 17 ---									
--- 18 ---									
--- 19 ---									
--- 20 ---									



BORING LOG CAT-B-27

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S4024		Reviewed By: Victor Early	Page 1 of 1
Logged By: Mark Duffy			Longitude:
Date Boring Started: 9/2/2015		Drilling Contractor: Vironex	Ground Surface Elevation (feet NGVD of 1929):
Date Boring Completed: 9/2/2015		Drilling Method: Direct Push Technology	Depth to groundwater (feet bgs): NA

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)
--- 0 ---						Mulch	
--- 1 ---	36/48"	1550	CAT-B-27-0.5	NA	NA	No recovery, hand auger to collect soil sample	
--- 2 ---				CL		Sandy clay, very dark gray brown (2.5Y 3/2), low stiffness, low plasticity, moist.	0.0
--- 3 ---							
--- 4 ---	48"	1510	CAT-B-27-4	NA	NA	Marsh crust/unknown material, white (2.5Y 8/1) with yellowish red (5YR 5/6)staining, chalky, very moist	
--- 5 ---						Silty sand, black (2.5Y 2.5Y/1), soft, loose to very low plasticity, very moist to wet.	
--- 6 ---					SM		
--- 7 ---							
--- 8 ---							
--- 9 ---							
--- 10 ---							
--- 11 ---							
--- 12 ---							
--- 13 ---							
--- 14 ---							
--- 15 ---							
--- 16 ---							
--- 17 ---							
--- 18 ---							
--- 19 ---							
--- 20 ---							



TETRA TECH

BORING LOG CAT-B-28

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet		Sampling Method: Macro-Core	
Location: Alameda, CA		Borehole Diameter: 2.25 inches			
Project No.: 103S4024		Reviewed By: Victor Early		Latitude: Page 1 of 1	
Logged By: Mark Duffy				Longitude:	
Date Boring Started:	9/2/2015	Drilling Contractor: Vironex		Ground Surface Elevation (feet NGVD of 1929):	
Date Boring Completed:	9/2/2015	Drilling Method: Direct Push Technology		Depth to groundwater (feet bgs): NA	



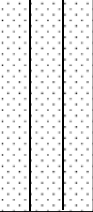
Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)
--- 0 ---						Mulch	
--- 1 ---	36/48"	1555	CAT-B-28-0.5	NA	NA	No recovery, hand auger to collect soil sample	
--- 2 ---				CL		Sandy clay, very dark gray brown (2.5Y 3/2), low stiffness, low plasticity, moist.	0.0
--- 3 ---							
--- 4 ---	48"	1535	CAT-B-28-4	NA	NA	Marsh crust/unknown material, white (2.5Y 8/1) with yellowish red (5YR 5/6)staining, chalky, very moist	
--- 5 ---							
--- 6 ---					SM		Silty sand, black (2.5Y 2.5Y/1), soft, loose to very low plasticity, very moist to wet.
--- 7 ---							
--- 8 ---							
--- 9 ---							
--- 10 ---							
--- 11 ---							
--- 12 ---							
--- 13 ---							
--- 14 ---							
--- 15 ---							
--- 16 ---							
--- 17 ---							
--- 18 ---							
--- 19 ---							
--- 20 ---							



TETRA TECH

BORING LOG CAT-B-29

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S4024		Reviewed By: Victor Early	Latitude: Page 1 of 1
Logged By: Mark Duffy			Longitude:
Date Boring Started: 9/2/2015		Drilling Contractor: Vironex	Ground Surface Elevation (feet NGVD of 1929):
Date Boring Completed: 9/2/2015		Drilling Method: Direct Push Technology	Depth to groundwater (feet bgs): NA

Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)		
--- 0 ---						Mulch			
--- 1 ---	48"	1545	CAT-B-29-0.5	CL		Sandy clay, very dark gray brown (2.5Y 3/2), low stiffness, low plasticity, moist.	0.0		
--- 2 ---									
--- 3 ---									
--- 4 ---		1550	CAT-B-29-4				NA	NA	Marsh crust/unknown material, white (2.5Y 8/1) with yellowish red (5YR 5/6) staining, chalky, very moist
--- 5 ---	48"			SM		Silty sand, black (2.5Y 2.5Y/1), soft, loose to very low plasticity, very moist to wet.			
--- 6 ---									
--- 7 ---									
--- 8 ---									
--- 9 ---									
--- 10 ---									
--- 11 ---									
--- 12 ---									
--- 13 ---									
--- 14 ---									
--- 15 ---									
--- 16 ---									
--- 17 ---									
--- 18 ---									
--- 19 ---									
--- 20 ---									



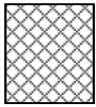
BORING LOG CAT-B-30

Project: Cross-Alameda Trail Risk Assessment		Borehole Depth: 8 feet	Sampling Method: Macro-Core
Location: Alameda, CA		Borehole Diameter: 2.25 inches	
Project No.: 103S4024		Reviewed By: Victor Early	Page 1 of 1
Logged By: Mark Duffy			Longitude:
Date Boring Started: 9/2/2015		Drilling Contractor: Vironex	Ground Surface Elevation (feet NGVD of 1929):
Date Boring Completed: 9/2/2015		Drilling Method: Direct Push Technology	Depth to groundwater (feet bgs): NA

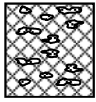
Depth (feet bgs)	Recovered Interval	Time	Soil Sample ID	USCS	Graphic Log	Interval and Lithologic Description	PID (ppm)
--- 0 ---						Mulch	
--- 1 ---	36/48"	1600	CAT-B-30-0.5	NA	NA	No recovery, hand auger to collect soil sample	
--- 2 ---				CL		Sandy clay, very dark gray brown (2.5Y 3/2), low stiffness, low plasticity, moist.	0.0
--- 3 ---							
--- 4 ---		1605	CAT-B-30-4	NA	NA	Marsh crust/unknown material, white (2.5Y 8/1) with yellowish red (5YR 5/6)staining, chalky, very moist	
--- 5 ---	48"					Silty sand, black (2.5Y 2.5Y/1), soft, loose to very low plasticity, very moist to wet.	
--- 6 ---				SM			
--- 7 ---							
--- 8 ---							
--- 9 ---							
--- 10 ---							
--- 11 ---							
--- 12 ---							
--- 13 ---							
--- 14 ---							
--- 15 ---							
--- 16 ---							
--- 17 ---							
--- 18 ---							
--- 19 ---							
--- 20 ---							

Geologic Borehole Log Legend

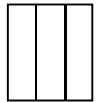
bgs	below ground surface
ppm	parts per million
PID	photoionization detector
USCS	Unified Soil Classification System
NGVD	National Geodetic Vertical Datum
NA	not applicable



Asphalt



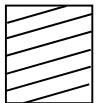
Gravel Fill



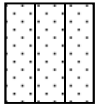
Sandy Silt
(ML)



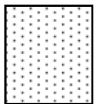
Clayey
Silt (ML)



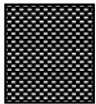
Silty Clay
(CL)



Silty Sand
(SM)



Sand
(SP)



Mulch



approximate depth to groundwater

ATTACHMENT 3

GROUNDWATER SAMPLING RECORD

Well / Sample ID: CAT-B-11-GW Page 1 of 1

Project Number: 10354024 Project Name: CAT, Alameda, CA Date: 9-2-14

Sampling Location (well ID, etc.): CAT-B-11-GW Starting Water Level (ft. BMP): 5.15

Sampled by: Matthew Hanson / Mark Aubrey Total Depth (ft. BGL): 15 Water Column Ht. (ft.):

Measuring Point (MP) of Well: 10' Ground surface Casing Diameter (in ID): 4.5 Mult. Factor:

Screened Interval (ft. BGL): 10-15 Casing Volume (gal.): 1x 2x 3x 4x

Filter Pack Interval (ft. BGL): None Water Level (ft. BMP) at End of Purge:

Casing Stick-up/down(ft): None Total Depth (ft. BGL) at End of Purge: 8

QUALITY ASSURANCE

METHODS (describe):

Cleaning Equipment: Decon w/ water and Ligumex soap (triple rinse)

Purging: Perristaloc pump / tubing Sampling: Perristaloc pump

Disposal of Discharged Water: 55-gal Drum

INSTRUMENTS (Indicate make, model, ID)

Water Level: Solinst 101 Thermometer: Haneda

pH Meter: Haneda Field Calibration: 7

Conductivity Meter: ↓ Field Calibration: X

Filter / Filter Size: none none Other:

SAMPLING MEASUREMENTS

Time	Cum. Vol. (gal. or L)	Purge Rate (gpm or L/m)	Temp. (°C)	pH	Specific Conductance (µmhos/cm)		ORP	Turbidity / Color	Dissolved Oxygen %	Dissolved Oxygen mg/L	Remarks
					@ Field Temp	@ 25 °C					
<u>900</u>	<u>0.0</u>	<u>0.3</u>	<u>23.61</u>	<u>6.87</u>	<u>11,400</u>		<u>-139</u>	<u>1000</u>		<u>2.97</u>	
<u>905</u>	<u>0.5</u>	<u>↓</u>	<u>23.30</u>	<u>6.97</u>	<u>11,300</u>		<u>-138</u>	<u>386</u>		<u>3.47</u>	
<u>910</u>	<u>3.0</u>	<u>↓</u>	<u>23.68</u>	<u>7.09</u>	<u>11,300</u>		<u>-134</u>	<u>100</u>		<u>4.33</u>	
	<u>Purged Dry</u>										
<u>917</u>	<u>4.0</u>	<u>0.3</u>	<u>23.60</u>	<u>7.11</u>	<u>11,288</u>		<u>-131</u>	<u>61</u>		<u>3.89</u>	
<u>920</u>	<u>5.0</u>	<u>↓</u>	<u>23.58</u>	<u>7.08</u>	<u>11,279</u>		<u>-129</u>	<u>46</u>		<u>3.96</u>	
<u>925</u>	<u>6.0</u>	<u>↓</u>	<u>23.62</u>	<u>7.09</u>	<u>11,278</u>		<u>-127</u>	<u>44</u>		<u>3.91</u>	
<u>930</u>	<u>collect sample</u>										

Water Level (ft. BMP) at End of Purge: Recovery %: Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY (Bottles collected)

Date/Time	Sample ID	Container (G, P)	Quantity / Vol.	Filtration (Y/N)	Preservation (type)	Analysis	Remarks (quality control sample, other)
<u>9-2-14</u>	<u>CAT-B-11-GW</u>	<u>G</u>	<u>5</u>				

Chain-of-Custody Record No. 6898

Comments:



7.35

GROUNDWATER SAMPLING RECORD

Well / Sample ID: CAT-B-23-GW Page 1 of 1

Project Number: 10384024 Project Name: CAT, Alameda, CA Date: 9-2-15

Sampling Location (well ID, etc.): CAT-B-23-GW Starting Water Level (ft. BMP): 5.21

Sampled by: M. Duffy Total Depth (ft. BGL): 15 Water Column Ht. (ft):

Measuring Point (MP) of Well: TOC North Casing Diameter (in ID): 1.5 Mult. Factor:

Screened Interval (ft. BGL): 10-15' Casing Volume (gal.): 1x 2x 3x 4x

Filter Pack Interval (ft. BGL): None Water Level (ft. BMP) at End of Purge:

Casing Stick-up/down(ft): Total Depth (ft. BGL) at End of Purge:

QUALITY ASSURANCE

METHODS (describe): Devcon w/ water and soap (Liquinox)

Cleaning Equipment:

Purging: peristaltic pump/tubing Sampling: peristaltic pump/tubing

Disposal of Discharged Water: 55-gal Drum

INSTRUMENTS (Indicate make, model, ID)

Water Level: Solinst 101 Thermometer: Horiba

pH Meter: Horiba Flow Theory Field Calibration: Y

Conductivity Meter: N Field Calibration: Y

Filter / Filter Size: none None Other:

SAMPLING MEASUREMENTS

Time	Cum. Vol. (gal. or L)	Purge Rate (gpm or L/m)	Temp. (°C)	pH	Specific Conductance (µmhos/cm)		ORP	Turbidity / Color	Dissolved Oxygen %	Dissolved Oxygen mg/L	Remarks
					@ Field Temp	@ 25 °C					
1335	0.0	0.3	25.93	7.82	1,490		-168	318	2.4	2.43	
1340	1.5		26.27	7.33	1,430		-455	200		1.65	
1345	3.0		25.56	7.15	1,310		-447	355		1.55	
1350	4.5		25.06	7.15	1,290		-428	348		1.53	
1355	6.0		24.90	7.15	1,290		-414	210		1.50	
1358	7.5		24.83	7.15	1,290		-469	209		1.49	
1400	Collect		542.26								

Water Level (ft. BMP) at End of Purge: Recovery %: Sample Intake Depth (ft. BMP):

SAMPLE INVENTORY (Bottles collected)

Date/Time	Sample ID	Container (G, P)	Quantity / Vol.	Filtration (Y/N)	Preservation (type)	Analysis	Remarks (quality control sample, other)
9-2-15	CAT-B-23-GW	G	9	N	HCl/NG	8015/8260	

Chain-of-Custody Record No. 6898

Comments: Collected Duplicate Sample CAT-B



ATTACHMENT 4

ATTACHMENT 5

Technical Report for

Tetra Tech EMI

CAT Alameda

CAT ALAMEDA

Accutest Job Number: C41598

Sampling Dates: 09/01/15 - 09/02/15

Report to:

**Tetra Tech
1999 Harrison St. Suite 500
Oakland, CA 94612
mark.duffy@tetrattech.com**

ATTN: Mark Duffy

Total number of pages in report: 176



Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.



**James J. Rhudy
Lab Director**

Client Service contact: Nutan Kabir 408-588-0200

Certifications: CA (ELAP 2910) AK (UST-092) AZ (AZ0762) NV (CA00150) OR (CA300006) WA (C925)
DoD ELAP (L-A-B L2242)

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Test results relate only to samples analyzed.

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Sample Summary

Tetra Tech EMI

Job No: C41598

CAT Alameda
Project No: CAT ALAMEDA

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
C41598-1	09/01/15	07:37	09/03/15	SO	Soil	CAT-B-11-0.5
C41598-2	09/01/15	07:41	09/03/15	SO	Soil	CAT-B-11-4
C41598-3	09/01/15	08:02	09/03/15	SO	Soil	CAT-B-12-0.5
C41598-4	09/01/15	08:05	09/03/15	SO	Soil	CAT-B-12-4
C41598-5	09/01/15	08:15	09/03/15	SO	Soil	CAT-B-13-0.5
C41598-6	09/01/15	08:18	09/03/15	SO	Soil	CAT-B-13-4
C41598-7	09/01/15	08:45	09/03/15	SO	Soil	CAT-B-14-0.5
C41598-8	09/01/15	08:50	09/03/15	SO	Soil	CAT-B-14-4
C41598-9	09/01/15	09:25	09/03/15	SO	Soil	CAT-B-15-0.5
C41598-10	09/01/15	09:30	09/03/15	SO	Soil	CAT-B-15-2
C41598-11	09/01/15	09:40	09/03/15	SO	Soil	CAT-B-16-0.5
C41598-12	09/01/15	09:45	09/03/15	SO	Soil	CAT-B-16-2
C41598-13	09/01/15	10:35	09/03/15	SO	Soil	CAT-B-17-0.5

Soil samples reported on a dry weight basis unless otherwise indicated on result page.



Sample Summary

(continued)

Tetra Tech EMI

Job No: C41598

CAT Alameda
Project No: CAT ALAMEDA

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
C41598-14	09/01/15	10:37	09/03/15	SO	Soil	CAT-B-17-2
C41598-15	09/01/15	10:49	09/03/15	SO	Soil	CAT-B-18-0.5
C41598-16	09/01/15	10:51	09/03/15	SO	Soil	CAT-B-18-2
C41598-17	09/01/15	13:07	09/03/15	SO	Soil	CAT-B-19-0.5
C41598-18	09/01/15	13:04	09/03/15	SO	Soil	CAT-B-19-4
C41598-19	09/01/15	13:27	09/03/15	SO	Soil	CAT-B-20-0.5
C41598-20	09/01/15	13:25	09/03/15	SO	Soil	CAT-B-20-4
C41598-21	09/01/15	13:48	09/03/15	SO	Soil	CAT-B-21-0.5
C41598-22	09/01/15	13:51	09/03/15	SO	Soil	CAT-B-21-4
C41598-23	09/01/15	14:00	09/03/15	SO	Soil	CAT-B-22-0.5
C41598-24	09/01/15	13:58	09/03/15	SO	Soil	CAT-B-22-4
C41598-25	09/02/15	12:05	09/03/15	SO	Soil	CAT-B-23-0.5
C41598-26	09/02/15	12:10	09/03/15	SO	Soil	CAT-B-23-2

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

Sample Summary

(continued)

Tetra Tech EMI

Job No: C41598

CAT Alameda

Project No: CAT ALAMEDA

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
C41598-27	09/02/15	12:30	09/03/15	SO	Soil	CAT-B-24-0.5
C41598-28	09/02/15	12:40	09/03/15	SO	Soil	CAT-B-24-2
C41598-29	09/02/15	13:00	09/03/15	SO	Soil	CAT-B-25-0.5
C41598-30	09/02/15	12:55	09/03/15	SO	Soil	CAT-B-25-2
C41598-31	09/02/15	13:50	09/03/15	SO	Soil	CAT-B-26-0.5
C41598-32	09/02/15	13:45	09/03/15	SO	Soil	CAT-B-26-2
C41598-33	09/02/15	15:50	09/03/15	SO	Soil	CAT-B-27-0.5
C41598-34	09/02/15	15:10	09/03/15	SO	Soil	CAT-B-27-4
C41598-35	09/02/15	15:55	09/03/15	SO	Soil	CAT-B-28-0.5
C41598-36	09/02/15	15:35	09/03/15	SO	Soil	CAT-B-28-4
C41598-36D	09/02/15	15:35	09/03/15	SO	Soil Dup/MSD	CAT-B-28-4 SDS
C41598-36S	09/02/15	15:35	09/03/15	SO	Soil Matrix Spike	CAT-B-28-4 SMS
C41598-37	09/02/15	15:45	09/03/15	SO	Soil	CAT-B-29-0.5

Soil samples reported on a dry weight basis unless otherwise indicated on result page.



Sample Summary

(continued)

Tetra Tech EMI

Job No: C41598

CAT Alameda

Project No: CAT ALAMEDA

Sample Number	Collected		Received	Matrix		Client Sample ID
	Date	Time By		Code	Type	
C41598-38	09/02/15	15:50	09/03/15	SO	Soil	CAT-B-29-4
C41598-39	09/02/15	16:00	09/03/15	SO	Soil	CAT-B-30-0.5
C41598-40	09/02/15	16:05	09/03/15	SO	Soil	CAT-B-30-4
C41598-41	09/02/15	09:30	09/03/15	AQ	Ground Water	CAT-B-11-GW
C41598-42	09/02/15	14:05	09/03/15	AQ	Ground Water	CAT-B
C41598-43	09/02/15	14:00	09/03/15	AQ	Ground Water	CAT-B-23-GW
C41598-44	09/02/15	09:00	09/03/15	AQ	Ground Water	CAT-A

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

Summary of Hits

Job Number: C41598
Account: Tetra Tech EMI
Project: CAT Alameda
Collected: 09/01/15 thru 09/02/15

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
C41598-1	CAT-B-11-0.5					
TPH (Motor Oil)		591	110	54	mg/kg	SW846 8015B M
Arsenic		24.8	0.27		mg/kg	SW846 6020
Lead		116	0.27		mg/kg	SW846 6020
C41598-2	CAT-B-11-4					
TPH (Motor Oil)		211	40	20	mg/kg	SW846 8015B M
Arsenic		14.2	0.25		mg/kg	SW846 6020
Lead		29.4	0.25		mg/kg	SW846 6020
C41598-3	CAT-B-12-0.5					
TPH (Motor Oil)		124	37	18	mg/kg	SW846 8015B M
Arsenic		5.6	0.24		mg/kg	SW846 6020
Lead		18.6	0.24		mg/kg	SW846 6020
C41598-4	CAT-B-12-4					
TPH (Motor Oil)		59.9	38	19	mg/kg	SW846 8015B M
Arsenic		9.4	0.24		mg/kg	SW846 6020
Lead		6.9	0.24		mg/kg	SW846 6020
C41598-5	CAT-B-13-0.5					
TPH (Motor Oil)		324	160	82	mg/kg	SW846 8015B M
Arsenic		16.3	0.28		mg/kg	SW846 6020
Lead		103	0.28		mg/kg	SW846 6020
C41598-6	CAT-B-13-4					
TPH (Motor Oil)		161	39	19	mg/kg	SW846 8015B M
Arsenic		17.1	0.24		mg/kg	SW846 6020
Lead		96.8	0.24		mg/kg	SW846 6020
C41598-7	CAT-B-14-0.5					
TPH (Motor Oil)		102	37	18	mg/kg	SW846 8015B M
Arsenic		35.8	0.23		mg/kg	SW846 6020
Lead		22.3	0.23		mg/kg	SW846 6020
C41598-8	CAT-B-14-4					
TPH (Motor Oil)		69.9	39	19	mg/kg	SW846 8015B M

Summary of Hits

Job Number: C41598
Account: Tetra Tech EMI
Project: CAT Alameda
Collected: 09/01/15 thru 09/02/15

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Arsenic		10.5	0.26		mg/kg	SW846 6020
Lead		10.7	0.26		mg/kg	SW846 6020
C41598-9		CAT-B-15-0.5				
TPH (Motor Oil)		259	37	19	mg/kg	SW846 8015B M
Arsenic		13.5	0.23		mg/kg	SW846 6020
C41598-10		CAT-B-15-2				
TPH (Motor Oil)		79.2	43	21	mg/kg	SW846 8015B M
Arsenic		7.2	0.30		mg/kg	SW846 6020
C41598-11		CAT-B-16-0.5				
TPH (Motor Oil)		203	36	18	mg/kg	SW846 8015B M
Arsenic		27.2	0.24		mg/kg	SW846 6020
C41598-12		CAT-B-16-2				
TPH (Motor Oil)		437	80	40	mg/kg	SW846 8015B M
Arsenic		14.7	0.28		mg/kg	SW846 6020
C41598-13		CAT-B-17-0.5				
TPH (Motor Oil)		205	73	37	mg/kg	SW846 8015B M
Arsenic		26.6	0.23		mg/kg	SW846 6020
C41598-14		CAT-B-17-2				
TPH (Motor Oil)		305	85	43	mg/kg	SW846 8015B M
Arsenic		10	0.27		mg/kg	SW846 6020
C41598-15		CAT-B-18-0.5				
TPH (Motor Oil)		269	75	38	mg/kg	SW846 8015B M
Arsenic		9.2	0.24		mg/kg	SW846 6020
C41598-16		CAT-B-18-2				
TPH (Motor Oil)		247	84	42	mg/kg	SW846 8015B M
Arsenic		7.5	0.27		mg/kg	SW846 6020

Summary of Hits

Job Number: C41598
Account: Tetra Tech EMI
Project: CAT Alameda
Collected: 09/01/15 thru 09/02/15

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
C41598-17	CAT-B-19-0.5					
Lead		144	0.27		mg/kg	SW846 6020
C41598-18	CAT-B-19-4					
Lead ^a		3380	5.6		mg/kg	SW846 6020
C41598-19	CAT-B-20-0.5					
Lead		133	0.28		mg/kg	SW846 6020
C41598-20	CAT-B-20-4					
Lead		39.3	0.69		mg/kg	SW846 6020
C41598-21	CAT-B-21-0.5					
Lead		24.5	0.29		mg/kg	SW846 6020
C41598-22	CAT-B-21-4					
Lead		46.5	0.62		mg/kg	SW846 6020
C41598-23	CAT-B-22-0.5					
Lead		84.9	0.29		mg/kg	SW846 6020
C41598-24	CAT-B-22-4					
Lead		89.6	0.33		mg/kg	SW846 6020
C41598-25	CAT-B-23-0.5					
TPH (Motor Oil)		438	69	34	mg/kg	SW846 8015B M
Arsenic		1.4	0.25		mg/kg	SW846 6020
Lead		65.1	0.25		mg/kg	SW846 6020
C41598-26	CAT-B-23-2					
TPH (Motor Oil)		784	140	72	mg/kg	SW846 8015B M
Arsenic		0.71	0.22		mg/kg	SW846 6020
Lead		91.0	0.22		mg/kg	SW846 6020

Summary of Hits

Job Number: C41598
Account: Tetra Tech EMI
Project: CAT Alameda
Collected: 09/01/15 thru 09/02/15

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
C41598-27		CAT-B-24-0.5				
TPH (Motor Oil)		1310	290	140	mg/kg	SW846 8015B M
Arsenic		7.8	0.25		mg/kg	SW846 6020
Lead		52.0	0.25		mg/kg	SW846 6020
C41598-28		CAT-B-24-2				
TPH (Motor Oil)		314	38	19	mg/kg	SW846 8015B M
Arsenic		0.72	0.24		mg/kg	SW846 6020
Lead		50.7	0.24		mg/kg	SW846 6020
C41598-29		CAT-B-25-0.5				
TPH (Motor Oil)		311	150	73	mg/kg	SW846 8015B M
Arsenic		10.6	0.24		mg/kg	SW846 6020
Lead		86.9	0.24		mg/kg	SW846 6020
C41598-30		CAT-B-25-2				
TPH (Motor Oil)		1120	150	74	mg/kg	SW846 8015B M
Arsenic		4.7	0.25		mg/kg	SW846 6020
Lead		112	0.25		mg/kg	SW846 6020
C41598-31		CAT-B-26-0.5				
TPH (Motor Oil)		668	140	70	mg/kg	SW846 8015B M
Arsenic		7.2	0.22		mg/kg	SW846 6020
Lead		76.1	0.44		mg/kg	SW846 6020
C41598-32		CAT-B-26-2				
TPH (Motor Oil)		2110	220	110	mg/kg	SW846 8015B M
Arsenic		8.0	0.24		mg/kg	SW846 6020
Lead		160	0.47		mg/kg	SW846 6020
C41598-33		CAT-B-27-0.5				
Lead		3170	5.7		mg/kg	SW846 6020
C41598-34		CAT-B-27-4				
Lead		15.5	0.36		mg/kg	SW846 6020

Summary of Hits

Job Number: C41598
Account: Tetra Tech EMI
Project: CAT Alameda
Collected: 09/01/15 thru 09/02/15

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
---------------	------------------	-----------------	----	-----	-------	--------

C41598-35 CAT-B-28-0.5

Lead 266 0.32 mg/kg SW846 6020

C41598-36 CAT-B-28-4

Lead 1470 2.9 mg/kg SW846 6020

C41598-37 CAT-B-29-0.5

Lead 12.5 0.23 mg/kg SW846 6020

C41598-38 CAT-B-29-4

Lead 63.4 0.29 mg/kg SW846 6020

C41598-39 CAT-B-30-0.5

Lead 111 0.23 mg/kg SW846 6020

C41598-40 CAT-B-30-4

Lead 7670 11 mg/kg SW846 6020

C41598-41 CAT-B-11-GW

Acetone ^b 19.5 J 40 8.0 ug/l SW846 8260B
 Di-Isopropyl ether 105 4.0 0.44 ug/l SW846 8260B
 TPH-GRO (C6-C10) 301 50 25 ug/l SW846 8260B
 TPH (Diesel) ^c 0.212 0.11 0.054 mg/l SW846 8015B M

C41598-42 CAT-B

No hits reported in this sample.

C41598-43 CAT-B-23-GW

No hits reported in this sample.

C41598-44 CAT-A

No hits reported in this sample.

(a) Elevated reporting limit(s) due to matrix interference and/or dilution required for high interfering element.
 (b) CCV outside of control limits; associated results may be biased high.

Summary of Hits

Job Number: C41598
Account: Tetra Tech EMI
Project: CAT Alameda
Collected: 09/01/15 thru 09/02/15

Lab Sample ID	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Analyte						

(c) Atypical pattern; value due to multiple discrete peaks in Diesel range.

Sample Results

Report of Analysis

Report of Analysis

3.1
3

Client Sample ID: CAT-B-11-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-1	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 92.1
Method: SW846 8015B M SW846 3550B	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326252.D	10	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.0 g	1.5 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	54	27	mg/kg	
	TPH (Motor Oil)	591	110	54	mg/kg	
	TPH (Mineral Spirits)	ND	54	27	mg/kg	
	TPH (Kerosene)	ND	54	27	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	79%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-11-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-1	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 92.1
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	24.8	0.27	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²
Lead	116	0.27	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-11-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-1	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 92.1
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	7.9		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

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Client Sample ID: CAT-B-11-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-2	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 82.8
Method: SW846 8015B M SW846 3550B	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326253.D	5	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	20	10	mg/kg	
	TPH (Motor Oil)	211	40	20	mg/kg	
	TPH (Mineral Spirits)	ND	20	10	mg/kg	
	TPH (Kerosene)	ND	20	10	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	79%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

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3

Client Sample ID: CAT-B-11-4 Lab Sample ID: C41598-2 Matrix: SO - Soil Project: CAT Alameda	Date Sampled: 09/01/15 Date Received: 09/03/15 Percent Solids: 82.8
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Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	14.2	0.25	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²
Lead	29.4	0.25	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

- (1) Instrument QC Batch: MA5193
- (2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-11-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-2	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 82.8
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	17.2		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-12-0.5		Date Sampled: 09/01/15
Lab Sample ID: C41598-3		Date Received: 09/03/15
Matrix: SO - Soil		Percent Solids: 90.2
Method: SW846 8015B M SW846 3550B		
Project: CAT Alameda		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326255.D	5	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	18	9.2	mg/kg	
	TPH (Motor Oil)	124	37	18	mg/kg	
	TPH (Mineral Spirits)	ND	18	9.2	mg/kg	
	TPH (Kerosene)	ND	18	9.2	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	78%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-12-0.5 Lab Sample ID: C41598-3 Matrix: SO - Soil Project: CAT Alameda	Date Sampled: 09/01/15 Date Received: 09/03/15 Percent Solids: 90.2
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Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	5.6	0.24	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²
Lead	18.6	0.24	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-12-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-3	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 90.2
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	9.8		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-12-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-4	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 87.9
Method: SW846 8015B M SW846 3550B	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326256.D	5	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	19	9.4	mg/kg	
	TPH (Motor Oil)	59.9	38	19	mg/kg	
	TPH (Mineral Spirits)	ND	19	9.4	mg/kg	
	TPH (Kerosene)	ND	19	9.4	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	79%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-12-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-4	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 87.9
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	9.4	0.24	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²
Lead	6.9	0.24	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-12-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-4	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 87.9
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	12.1		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-13-0.5		Date Sampled: 09/01/15
Lab Sample ID: C41598-5		Date Received: 09/03/15
Matrix: SO - Soil		Percent Solids: 80.9
Method: SW846 8015B M SW846 3550B		
Project: CAT Alameda		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326257.D	10	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	15.1 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	82	41	mg/kg	
	TPH (Motor Oil)	324	160	82	mg/kg	
	TPH (Mineral Spirits)	ND	82	41	mg/kg	
	TPH (Kerosene)	ND	82	41	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	76%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-13-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-5	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 80.9
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	16.3	0.28	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²
Lead	103	0.28	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-13-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-5	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 80.9
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	19.1		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-13-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-6	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 85.2
Method: SW846 8015B M SW846 3550B	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326258.D	5	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	19	9.7	mg/kg	
	TPH (Motor Oil)	161	39	19	mg/kg	
	TPH (Mineral Spirits)	ND	19	9.7	mg/kg	
	TPH (Kerosene)	ND	19	9.7	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	79%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-13-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-6	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 85.2
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	17.1	0.24	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²
Lead	96.8	0.24	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-13-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-6	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 85.2
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	14.8		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-14-0.5		Date Sampled: 09/01/15
Lab Sample ID: C41598-7		Date Received: 09/03/15
Matrix: SO - Soil		Percent Solids: 90.0
Method: SW846 8015B M SW846 3550B		
Project: CAT Alameda		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326259.D	5	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	18	9.2	mg/kg	
	TPH (Motor Oil)	102	37	18	mg/kg	
	TPH (Mineral Spirits)	ND	18	9.2	mg/kg	
	TPH (Kerosene)	ND	18	9.2	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	74%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-14-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-7	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 90.0
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	35.8	0.23	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²
Lead	22.3	0.23	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-14-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-7	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 90.0
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	10		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-14-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-8	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 86.5
Method: SW846 8015B M SW846 3550B	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326260.D	5	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	19	9.6	mg/kg	
	TPH (Motor Oil)	69.9	39	19	mg/kg	
	TPH (Mineral Spirits)	ND	19	9.6	mg/kg	
	TPH (Kerosene)	ND	19	9.6	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	78%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis



Client Sample ID: CAT-B-14-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-8	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 86.5
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	10.5	0.26	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²
Lead	10.7	0.26	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-14-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-8	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 86.5
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	13.5		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-15-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-9	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 89.0
Method: SW846 8015B M SW846 3550B	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326261.D	5	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	19	9.3	mg/kg	
	TPH (Motor Oil)	259	37	19	mg/kg	
	TPH (Mineral Spirits)	ND	19	9.3	mg/kg	
	TPH (Kerosene)	ND	19	9.3	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	80%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-15-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-9	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 89.0
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	13.5	0.23	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-15-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-9	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 89.0
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	11		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-15-2	Date Sampled: 09/01/15
Lab Sample ID: C41598-10	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 77.9
Method: SW846 8015B M SW846 3550B	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326262.D	5	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	21	11	mg/kg	
	TPH (Motor Oil)	79.2	43	21	mg/kg	
	TPH (Mineral Spirits)	ND	21	11	mg/kg	
	TPH (Kerosene)	ND	21	11	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	78%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-15-2	Date Sampled: 09/01/15
Lab Sample ID: C41598-10	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 77.9
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	7.2	0.30	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-15-2	Date Sampled: 09/01/15
Lab Sample ID: C41598-10	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 77.9
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	22.1		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-16-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-11	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 91.4
Method: SW846 8015B M SW846 3550B	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326263.D	5	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	18	9.1	mg/kg	
	TPH (Motor Oil)	203	36	18	mg/kg	
	TPH (Mineral Spirits)	ND	18	9.1	mg/kg	
	TPH (Kerosene)	ND	18	9.1	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	81%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-16-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-11	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 91.4
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	27.2	0.24	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-16-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-11	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 91.4
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	8.6		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-16-2	Date Sampled: 09/01/15
Lab Sample ID: C41598-12	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 82.8
Method: SW846 8015B M SW846 3550B	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326264.D	10	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.4 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	40	20	mg/kg	
	TPH (Motor Oil)	437	80	40	mg/kg	
	TPH (Mineral Spirits)	ND	40	20	mg/kg	
	TPH (Kerosene)	ND	40	20	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	80%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-16-2	Date Sampled: 09/01/15
Lab Sample ID: C41598-12	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 82.8
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	14.7	0.28	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-16-2	Date Sampled: 09/01/15
Lab Sample ID: C41598-12	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 82.8
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	17.2		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-17-0.5	
Lab Sample ID: C41598-13	Date Sampled: 09/01/15
Matrix: SO - Soil	Date Received: 09/03/15
Method: SW846 8015B M SW846 3550B	Percent Solids: 89.8
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326266.D	10	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.4 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	37	18	mg/kg	
	TPH (Motor Oil)	205	73	37	mg/kg	
	TPH (Mineral Spirits)	ND	37	18	mg/kg	
	TPH (Kerosene)	ND	37	18	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	78%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-17-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-13	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 89.8
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	26.6	0.23	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-17-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-13	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 89.8
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	10.2		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-17-2	Date Sampled: 09/01/15
Lab Sample ID: C41598-14	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 78.0
Method: SW846 8015B M SW846 3550B	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326267.D	10	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	43	21	mg/kg	
	TPH (Motor Oil)	305	85	43	mg/kg	
	TPH (Mineral Spirits)	ND	43	21	mg/kg	
	TPH (Kerosene)	ND	43	21	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	83%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-17-2	Date Sampled: 09/01/15
Lab Sample ID: C41598-14	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 78.0
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	10	0.27	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-17-2	Date Sampled: 09/01/15
Lab Sample ID: C41598-14	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 78.0
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	22		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-18-0.5		Date Sampled: 09/01/15
Lab Sample ID: C41598-15		Date Received: 09/03/15
Matrix: SO - Soil		Percent Solids: 88.0
Method: SW846 8015B M SW846 3550B		
Project: CAT Alameda		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326268.D	10	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	38	19	mg/kg	
	TPH (Motor Oil)	269	75	38	mg/kg	
	TPH (Mineral Spirits)	ND	38	19	mg/kg	
	TPH (Kerosene)	ND	38	19	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	78%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-18-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-15	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 88.0
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	9.2	0.24	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-18-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-15	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 88.0
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	12		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-18-2	Date Sampled: 09/01/15
Lab Sample ID: C41598-16	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 78.4
Method: SW846 8015B M SW846 3550B	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326269.D	10	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.3 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	42	21	mg/kg	
	TPH (Motor Oil)	247	84	42	mg/kg	
	TPH (Mineral Spirits)	ND	42	21	mg/kg	
	TPH (Kerosene)	ND	42	21	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	79%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-18-2	Date Sampled: 09/01/15
Lab Sample ID: C41598-16	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 78.4
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	7.5	0.27	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-18-2	Date Sampled: 09/01/15
Lab Sample ID: C41598-16	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 78.4
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	21.6		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-19-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-17	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 83.0
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	144	0.27	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-19-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-17	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 83.0
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	17		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-19-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-18	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 78.8
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead ^a	3380	5.6	mg/kg	100	09/08/15	09/14/15 RS	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5205

(2) Prep QC Batch: MP10109

(a) Elevated reporting limit(s) due to matrix interference and/or dilution required for high interfering element.

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-19-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-18	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 78.8
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	21.2		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-20-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-19	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 78.7
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	133	0.28	mg/kg	5	09/08/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5193

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-20-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-19	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 78.7
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	21.3		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-20-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-20	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 65.0
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	39.3	0.69	mg/kg	10	09/08/15	09/13/15 RS	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5203

(2) Prep QC Batch: MP10109

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-20-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-20	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 65.0
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	35		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-21-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-21	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 75.2
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	24.5	0.29	mg/kg	5	09/09/15	09/14/15 RS	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5205

(2) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-21-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-21	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 75.2
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	24.8		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-21-4		Date Sampled: 09/01/15
Lab Sample ID: C41598-22		Date Received: 09/03/15
Matrix: SO - Soil		Percent Solids: 72.5
Project: CAT Alameda		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	46.5	0.62	mg/kg	10	09/09/15	09/13/15 RS	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5203

(2) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-21-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-22	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 72.5
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	27.5		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-22-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-23	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 76.4
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	84.9	0.29	mg/kg	5	09/09/15	09/13/15 RS	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5203

(2) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-22-0.5	Date Sampled: 09/01/15
Lab Sample ID: C41598-23	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 76.4
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	23.6		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-22-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-24	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 68.5
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	89.6	0.33	mg/kg	5	09/09/15	09/13/15 RS	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5203

(2) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-22-4	Date Sampled: 09/01/15
Lab Sample ID: C41598-24	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 68.5
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	31.5		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-23-0.5		Date Sampled: 09/02/15
Lab Sample ID: C41598-25		Date Received: 09/03/15
Matrix: SO - Soil		Percent Solids: 95.4
Method: SW846 8015B M SW846 3550B		
Project: CAT Alameda		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326270.D	10	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.5 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	34	17	mg/kg	
	TPH (Motor Oil)	438	69	34	mg/kg	
	TPH (Mineral Spirits)	ND	34	17	mg/kg	
	TPH (Kerosene)	ND	34	17	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	81%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-23-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-25	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 95.4
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	1.4	0.25	mg/kg	5	09/09/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ³
Lead	65.1	0.25	mg/kg	5	09/09/15	09/13/15 RS	SW846 6020 ²	SW846 3050B ³

(1) Instrument QC Batch: MA5193

(2) Instrument QC Batch: MA5203

(3) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-23-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-25	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 95.4
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	4.6		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-23-2		
Lab Sample ID: C41598-26		Date Sampled: 09/02/15
Matrix: SO - Soil		Date Received: 09/03/15
Method: SW846 8015B M SW846 3550B		Percent Solids: 92.7
Project: CAT Alameda		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326289.D	20	09/08/15	NN	09/04/15	OP13013	GHH1622
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	72	36	mg/kg	
	TPH (Motor Oil)	784	140	72	mg/kg	
	TPH (Mineral Spirits)	ND	72	36	mg/kg	
	TPH (Kerosene)	ND	72	36	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	80%		43-144%

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-23-2	Date Sampled: 09/02/15
Lab Sample ID: C41598-26	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 92.7
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	0.71	0.22	mg/kg	5	09/09/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ³
Lead	91.0	0.22	mg/kg	5	09/09/15	09/13/15 RS	SW846 6020 ²	SW846 3050B ³

(1) Instrument QC Batch: MA5193

(2) Instrument QC Batch: MA5203

(3) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-23-2	Date Sampled: 09/02/15
Lab Sample ID: C41598-26	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 92.7
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	7.3		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-24-0.5	
Lab Sample ID: C41598-27	Date Sampled: 09/02/15
Matrix: SO - Soil	Date Received: 09/03/15
Method: SW846 8015B M SW846 3550B	Percent Solids: 90.7
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326290.D	40	09/08/15	NN	09/04/15	OP13013	GHH1622
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.5 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	140	72	mg/kg	
	TPH (Motor Oil)	1310	290	140	mg/kg	
	TPH (Mineral Spirits)	ND	140	72	mg/kg	
	TPH (Kerosene)	ND	140	72	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	80%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-24-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-27	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 90.7
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	7.8	0.25	mg/kg	5	09/09/15	09/10/15 RS	SW846 6020 ¹	SW846 3050B ³
Lead	52.0	0.25	mg/kg	5	09/09/15	09/13/15 RS	SW846 6020 ²	SW846 3050B ³

(1) Instrument QC Batch: MA5197

(2) Instrument QC Batch: MA5203

(3) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-24-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-27	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 90.7
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	9.3		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-24-2	Date Sampled: 09/02/15
Lab Sample ID: C41598-28	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 87.1
Method: SW846 8015B M SW846 3550B	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326273.D	5	09/06/15	NN	09/04/15	OP13013	GHH1621
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	19	9.6	mg/kg	
	TPH (Motor Oil)	314	38	19	mg/kg	
	TPH (Mineral Spirits)	ND	19	9.6	mg/kg	
	TPH (Kerosene)	ND	19	9.6	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	81%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-24-2	Date Sampled: 09/02/15
Lab Sample ID: C41598-28	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 87.1
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	0.72	0.24	mg/kg	5	09/09/15	09/10/15 JR	SW846 6020 ¹	SW846 3050B ³
Lead	50.7	0.24	mg/kg	5	09/09/15	09/13/15 RS	SW846 6020 ²	SW846 3050B ³

(1) Instrument QC Batch: MA5193

(2) Instrument QC Batch: MA5203

(3) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-24-2	Date Sampled: 09/02/15
Lab Sample ID: C41598-28	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 87.1
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	12.9		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-25-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-29	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 90.0
Method: SW846 8015B M SW846 3550B	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326340.D	20	09/10/15	NN	09/08/15	OP13029	GHH1623
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.5 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	73	36	mg/kg	
	TPH (Motor Oil)	311	150	73	mg/kg	
	TPH (Mineral Spirits)	ND	73	36	mg/kg	
	TPH (Kerosene)	ND	73	36	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	86%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-25-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-29	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 90.0
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	10.6	0.24	mg/kg	5	09/09/15	09/10/15 RS	SW846 6020 ¹	SW846 3050B ³
Lead	86.9	0.24	mg/kg	5	09/09/15	09/13/15 RS	SW846 6020 ²	SW846 3050B ³

(1) Instrument QC Batch: MA5197

(2) Instrument QC Batch: MA5203

(3) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-25-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-29	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 90.0
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	10		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-25-2	Date Sampled: 09/02/15
Lab Sample ID: C41598-30	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 89.5
Method: SW846 8015B M SW846 3550B	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326341.D	20	09/10/15	NN	09/08/15	OP13029	GHH1623
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	74	37	mg/kg	
	TPH (Motor Oil)	1120	150	74	mg/kg	
	TPH (Mineral Spirits)	ND	74	37	mg/kg	
	TPH (Kerosene)	ND	74	37	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	87%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-25-2	Date Sampled: 09/02/15
Lab Sample ID: C41598-30	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 89.5
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	4.7	0.25	mg/kg	5	09/09/15	09/10/15 RS	SW846 6020 ¹	SW846 3050B ³
Lead	112	0.25	mg/kg	5	09/09/15	09/13/15 RS	SW846 6020 ²	SW846 3050B ³

- (1) Instrument QC Batch: MA5197
- (2) Instrument QC Batch: MA5203
- (3) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-25-2	Date Sampled: 09/02/15
Lab Sample ID: C41598-30	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 89.5
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	10.5		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-26-0.5		
Lab Sample ID: C41598-31		Date Sampled: 09/02/15
Matrix: SO - Soil		Date Received: 09/03/15
Method: SW846 8015B M SW846 3550B		Percent Solids: 95.0
Project: CAT Alameda		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326342.D	20	09/10/15	NN	09/08/15	OP13029	GHH1623
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	70	35	mg/kg	
	TPH (Motor Oil)	668	140	70	mg/kg	
	TPH (Mineral Spirits)	ND	70	35	mg/kg	
	TPH (Kerosene)	ND	70	35	mg/kg	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
630-01-3	Hexacosane	89%		43-144%		

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-26-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-31	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 95.0
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	7.2	0.22	mg/kg	5	09/09/15	09/10/15 RS	SW846 6020 ¹	SW846 3050B ³
Lead	76.1	0.44	mg/kg	10	09/09/15	09/13/15 RS	SW846 6020 ²	SW846 3050B ³

(1) Instrument QC Batch: MA5197

(2) Instrument QC Batch: MA5203

(3) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-26-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-31	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 95.0
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	5		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-26-2	Date Sampled: 09/02/15
Lab Sample ID: C41598-32	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 89.4
Method: SW846 8015B M SW846 3550B	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326343.D	20	09/10/15	NN	09/08/15	OP13029	GHH1623
Run #2							

Run #	Initial Weight	Final Volume
Run #1	30.1 g	1.5 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	110	56	mg/kg	
	TPH (Motor Oil)	2110	220	110	mg/kg	
	TPH (Mineral Spirits)	ND	110	56	mg/kg	
	TPH (Kerosene)	ND	110	56	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	79%		43-144%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-26-2	Date Sampled: 09/02/15
Lab Sample ID: C41598-32	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 89.4
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Arsenic	8.0	0.24	mg/kg	5	09/09/15	09/10/15 RS	SW846 6020 ¹	SW846 3050B ³
Lead	160	0.47	mg/kg	10	09/09/15	09/13/15 RS	SW846 6020 ²	SW846 3050B ³

(1) Instrument QC Batch: MA5197

(2) Instrument QC Batch: MA5203

(3) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-26-2	Date Sampled: 09/02/15
Lab Sample ID: C41598-32	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 89.4
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	10.6		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-27-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-33	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 76.7
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	3170	5.7	mg/kg	100	09/09/15	09/11/15 RS	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5200

(2) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-27-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-33	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 76.7
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	23.3		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-27-4		Date Sampled: 09/02/15
Lab Sample ID: C41598-34		Date Received: 09/03/15
Matrix: SO - Soil		Percent Solids: 64.6
Project: CAT Alameda		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	15.5	0.36	mg/kg	5	09/09/15	09/10/15 RS	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5197

(2) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-27-4	Date Sampled: 09/02/15
Lab Sample ID: C41598-34	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 64.6
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	35.4		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-28-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-35	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 71.1
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	266	0.32	mg/kg	5	09/09/15	09/10/15 RS	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5197

(2) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-28-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-35	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 71.1
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	28.9		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-28-4	Date Sampled: 09/02/15
Lab Sample ID: C41598-36	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 78.6
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	1470	2.9	mg/kg	50	09/09/15	09/11/15 RS	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5200

(2) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-28-4	Date Sampled: 09/02/15
Lab Sample ID: C41598-36	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 78.6
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	21.4		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-29-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-37	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 89.0
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	12.5	0.23	mg/kg	5	09/09/15	09/10/15 RS	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5197

(2) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-29-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-37	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 89.0
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	11		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-29-4		Date Sampled: 09/02/15
Lab Sample ID: C41598-38		Date Received: 09/03/15
Matrix: SO - Soil		Percent Solids: 75.0
Project: CAT Alameda		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	63.4	0.29	mg/kg	5	09/09/15	09/10/15 RS	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5197

(2) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-29-4	Date Sampled: 09/02/15
Lab Sample ID: C41598-38	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 75.0
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	25		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-30-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-39	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 89.2
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	111	0.23	mg/kg	5	09/09/15	09/11/15 RS	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5197

(2) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-30-0.5	Date Sampled: 09/02/15
Lab Sample ID: C41598-39	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 89.2
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	10.8		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-30-4	Date Sampled: 09/02/15
Lab Sample ID: C41598-40	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 81.6
Project: CAT Alameda	

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	7670	11	mg/kg	200	09/09/15	09/11/15 RS	SW846 6020 ¹	SW846 3050B ²

(1) Instrument QC Batch: MA5200

(2) Prep QC Batch: MP10110

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-30-4	Date Sampled: 09/02/15
Lab Sample ID: C41598-40	Date Received: 09/03/15
Matrix: SO - Soil	Percent Solids: 81.6
Project: CAT Alameda	

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Moisture, Percent	18.4		%	1	09/10/15 10:54	EA	SM2540MOD G-97

RL = Reporting Limit

Report of Analysis

Client Sample ID: CAT-B-11-GW	Date Sampled: 09/02/15
Lab Sample ID: C41598-41	Date Received: 09/03/15
Matrix: AQ - Ground Water	Percent Solids: n/a
Method: SW846 8260B	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W56477.D	1	09/11/15	CV	n/a	n/a	VW2096
Run #2	W56612.D	2	09/15/15	CV	n/a	n/a	VW2103

Run #	Purge Volume
Run #1	10.0 ml
Run #2	10.0 ml

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone ^a	19.5 ^b	40	8.0	ug/l	J
71-43-2	Benzene	ND	1.0	0.20	ug/l	
108-86-1	Bromobenzene	ND	1.0	0.20	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.22	ug/l	
104-51-8	n-Butylbenzene	ND	2.0	0.20	ug/l	
135-98-8	sec-Butylbenzene	ND	2.0	0.20	ug/l	
98-06-6	tert-Butylbenzene	ND	2.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	1.0	0.20	ug/l	
67-66-3	Chloroform	ND	1.0	0.20	ug/l	
95-49-8	o-Chlorotoluene	ND	2.0	0.20	ug/l	
106-43-4	p-Chlorotoluene	ND	2.0	0.26	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.20	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.20	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
563-58-6	1,1-Dichloropropene	ND	1.0	0.20	ug/l	
96-12-8	1,2-Dibromo-3-chloropropan ^c	ND	2.0	0.40	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.20	ug/l	
142-28-9	1,3-Dichloropropane	ND	1.0	0.20	ug/l	
108-20-3	Di-Isopropyl ether	105 ^b	4.0	0.44	ug/l	
594-20-7	2,2-Dichloropropane	ND	1.0	0.20	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
75-71-8	Dichlorodifluoromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.20	ug/l	
541-73-1	m-Dichlorobenzene	ND	1.0	0.20	ug/l	
95-50-1	o-Dichlorobenzene	ND	1.0	0.20	ug/l	
106-46-7	p-Dichlorobenzene	ND	1.0	0.20	ug/l	

ND = Not detected MDL = Method Detection Limit

J = Indicates an estimated value

RL = Reporting Limit

B = Indicates analyte found in associated method blank

E = Indicates value exceeds calibration range

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	CAT-B-11-GW	Date Sampled:	09/02/15
Lab Sample ID:	C41598-41	Date Received:	09/03/15
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	SW846 8260B		
Project:	CAT Alameda		

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
637-92-3	Ethyl Tert Butyl Ether	ND	2.0	0.22	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	2.0	0.20	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.20	ug/l	
99-87-6	p-Isopropyltoluene	ND	2.0	0.20	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	1.0	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.20	ug/l	
74-87-3	Methyl chloride	ND	1.0	0.30	ug/l	
74-95-3	Methylene bromide	ND	1.0	0.20	ug/l	
75-09-2	Methylene chloride	ND	10	2.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	2.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.20	ug/l	
91-20-3	Naphthalene ^c	ND	5.0	0.50	ug/l	
103-65-1	n-Propylbenzene	ND	2.0	0.20	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
994-05-8	Tert-Amyl Methyl Ether	ND	2.0	0.40	ug/l	
75-65-0	Tert-Butyl Alcohol ^c	ND	10	2.4	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	ND	1.0	0.30	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.20	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.20	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.22	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	2.0	0.20	ug/l	
96-18-4	1,2,3-Trichloropropane	ND	2.0	0.20	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	0.20	ug/l	
95-63-6	1,2,4-Trimethylbenzene	ND	2.0	0.20	ug/l	
108-67-8	1,3,5-Trimethylbenzene	ND	2.0	0.20	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.30	ug/l	
108-88-3	Toluene	ND	1.0	0.20	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.20	ug/l	
75-69-4	Trichlorofluoromethane	ND	1.0	0.20	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.20	ug/l	
1330-20-7	Xylene (total)	ND	2.0	0.46	ug/l	
	TPH-GRO (C6-C10)	301	50	25	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%	102%	78-125%

ND = Not detected MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-11-GW	
Lab Sample ID: C41598-41	Date Sampled: 09/02/15
Matrix: AQ - Ground Water	Date Received: 09/03/15
Method: SW846 8260B	Percent Solids: n/a
Project: CAT Alameda	

VOA 8260 List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	102%	102%	86-114%
460-00-4	4-Bromofluorobenzene	102%	98%	80-113%

- (a) CCV outside of control limits; associated results may be biased high.
- (b) Result is from Run# 2
- (c) CCV outside of control limits (biased high); not detected in sample.

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-11-GW	Date Sampled: 09/02/15
Lab Sample ID: C41598-41	Date Received: 09/03/15
Matrix: AQ - Ground Water	Percent Solids: n/a
Method: SW846 8015B M SW846 3510C	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326228.D	1	09/05/15	NN	09/04/15	OP13015	GHH1621
Run #2							

Run #	Initial Volume	Final Volume
Run #1	920 ml	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel) ^a	0.212	0.11	0.054	mg/l	
	TPH (Motor Oil)	ND	0.22	0.11	mg/l	
	TPH (Mineral Spirits)	ND	0.11	0.054	mg/l	
	TPH (Kerosene)	ND	0.11	0.054	mg/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	79%		38-139%

(a) Atypical pattern; value due to multiple discrete peaks in Diesel range.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B		Date Sampled: 09/02/15
Lab Sample ID: C41598-42		Date Received: 09/03/15
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: SW846 8260B		
Project: CAT Alameda		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W56478.D	1	09/11/15	CV	n/a	n/a	VW2096
Run #2							

Run #	Purge Volume
Run #1	10.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone ^a	ND	20	4.0	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
108-86-1	Bromobenzene	ND	1.0	0.20	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.22	ug/l	
104-51-8	n-Butylbenzene	ND	2.0	0.20	ug/l	
135-98-8	sec-Butylbenzene	ND	2.0	0.20	ug/l	
98-06-6	tert-Butylbenzene	ND	2.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	1.0	0.20	ug/l	
67-66-3	Chloroform	ND	1.0	0.20	ug/l	
95-49-8	o-Chlorotoluene	ND	2.0	0.20	ug/l	
106-43-4	p-Chlorotoluene	ND	2.0	0.26	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.20	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.20	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
563-58-6	1,1-Dichloropropene	ND	1.0	0.20	ug/l	
96-12-8	1,2-Dibromo-3-chloropropan ^b	ND	2.0	0.40	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.20	ug/l	
142-28-9	1,3-Dichloropropane	ND	1.0	0.20	ug/l	
108-20-3	Di-Isopropyl ether	ND	2.0	0.22	ug/l	
594-20-7	2,2-Dichloropropane	ND	1.0	0.20	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
75-71-8	Dichlorodifluoromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.20	ug/l	
541-73-1	m-Dichlorobenzene	ND	1.0	0.20	ug/l	
95-50-1	o-Dichlorobenzene	ND	1.0	0.20	ug/l	
106-46-7	p-Dichlorobenzene	ND	1.0	0.20	ug/l	

ND = Not detected MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B		Date Sampled: 09/02/15
Lab Sample ID: C41598-42		Date Received: 09/03/15
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: SW846 8260B		
Project: CAT Alameda		

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
637-92-3	Ethyl Tert Butyl Ether	ND	2.0	0.22	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	2.0	0.20	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.20	ug/l	
99-87-6	p-Isopropyltoluene	ND	2.0	0.20	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	1.0	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.20	ug/l	
74-87-3	Methyl chloride	ND	1.0	0.30	ug/l	
74-95-3	Methylene bromide	ND	1.0	0.20	ug/l	
75-09-2	Methylene chloride	ND	10	2.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	2.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.20	ug/l	
91-20-3	Naphthalene ^b	ND	5.0	0.50	ug/l	
103-65-1	n-Propylbenzene	ND	2.0	0.20	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
994-05-8	Tert-Amyl Methyl Ether	ND	2.0	0.40	ug/l	
75-65-0	Tert-Butyl Alcohol ^b	ND	10	2.4	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	ND	1.0	0.30	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.20	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.20	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.22	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	2.0	0.20	ug/l	
96-18-4	1,2,3-Trichloropropane	ND	2.0	0.20	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	0.20	ug/l	
95-63-6	1,2,4-Trimethylbenzene	ND	2.0	0.20	ug/l	
108-67-8	1,3,5-Trimethylbenzene	ND	2.0	0.20	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.30	ug/l	
108-88-3	Toluene	ND	1.0	0.20	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.20	ug/l	
75-69-4	Trichlorofluoromethane	ND	1.0	0.20	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.20	ug/l	
1330-20-7	Xylene (total)	ND	2.0	0.46	ug/l	
	TPH-GRO (C6-C10)	ND	50	25	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	104%		78-125%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B		Date Sampled: 09/02/15
Lab Sample ID: C41598-42		Date Received: 09/03/15
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: SW846 8260B		
Project: CAT Alameda		

VOA 8260 List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	103%		86-114%
460-00-4	4-Bromofluorobenzene	100%		80-113%

- (a) CCV/BS outside of control limits (biased high); not detected in sample.
- (b) CCV outside of control limits (biased high); not detected in sample.

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B	Date Sampled: 09/02/15
Lab Sample ID: C41598-42	Date Received: 09/03/15
Matrix: AQ - Ground Water	Percent Solids: n/a
Method: SW846 8015B M SW846 3510C	
Project: CAT Alameda	

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326229.D	1	09/05/15	NN	09/04/15	OP13015	GHH1621
Run #2							

Run #	Initial Volume	Final Volume
Run #1	950 ml	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	0.11	0.053	mg/l	
	TPH (Motor Oil)	ND	0.21	0.11	mg/l	
	TPH (Mineral Spirits)	ND	0.11	0.053	mg/l	
	TPH (Kerosene)	ND	0.11	0.053	mg/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	76%		38-139%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-23-GW		Date Sampled: 09/02/15
Lab Sample ID: C41598-43		Date Received: 09/03/15
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: SW846 8260B		
Project: CAT Alameda		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W56479.D	1	09/11/15	CV	n/a	n/a	VW2096
Run #2							

Run #	Purge Volume
Run #1	10.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone ^a	ND	20	4.0	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
108-86-1	Bromobenzene	ND	1.0	0.20	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.22	ug/l	
104-51-8	n-Butylbenzene	ND	2.0	0.20	ug/l	
135-98-8	sec-Butylbenzene	ND	2.0	0.20	ug/l	
98-06-6	tert-Butylbenzene	ND	2.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	1.0	0.20	ug/l	
67-66-3	Chloroform	ND	1.0	0.20	ug/l	
95-49-8	o-Chlorotoluene	ND	2.0	0.20	ug/l	
106-43-4	p-Chlorotoluene	ND	2.0	0.26	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.20	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.20	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
563-58-6	1,1-Dichloropropene	ND	1.0	0.20	ug/l	
96-12-8	1,2-Dibromo-3-chloropropan ^b	ND	2.0	0.40	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.20	ug/l	
142-28-9	1,3-Dichloropropane	ND	1.0	0.20	ug/l	
108-20-3	Di-Isopropyl ether	ND	2.0	0.22	ug/l	
594-20-7	2,2-Dichloropropane	ND	1.0	0.20	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
75-71-8	Dichlorodifluoromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.20	ug/l	
541-73-1	m-Dichlorobenzene	ND	1.0	0.20	ug/l	
95-50-1	o-Dichlorobenzene	ND	1.0	0.20	ug/l	
106-46-7	p-Dichlorobenzene	ND	1.0	0.20	ug/l	

ND = Not detected MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-23-GW Lab Sample ID: C41598-43 Matrix: AQ - Ground Water Method: SW846 8260B Project: CAT Alameda	Date Sampled: 09/02/15 Date Received: 09/03/15 Percent Solids: n/a
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VOA 8260 List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	102%		86-114%
460-00-4	4-Bromofluorobenzene	100%		80-113%

- (a) CCV/BS outside of control limits (biased high); not detected in sample.
- (b) CCV outside of control limits (biased high); not detected in sample.

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-B-23-GW		
Lab Sample ID: C41598-43		Date Sampled: 09/02/15
Matrix: AQ - Ground Water		Date Received: 09/03/15
Method: SW846 8015B M SW846 3510C		Percent Solids: n/a
Project: CAT Alameda		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH326230.D	1	09/06/15	NN	09/04/15	OP13015	GHH1621
Run #2							

	Initial Volume	Final Volume
Run #1	980 ml	1.0 ml
Run #2		

TPH Extractable w/ Silica Gel Cleanup

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	0.10	0.051	mg/l	
	TPH (Motor Oil)	ND	0.20	0.10	mg/l	
	TPH (Mineral Spirits)	ND	0.10	0.051	mg/l	
	TPH (Kerosene)	ND	0.10	0.051	mg/l	
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
630-01-3	Hexacosane	76%		38-139%		

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-A		Date Sampled: 09/02/15
Lab Sample ID: C41598-44		Date Received: 09/03/15
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: SW846 8260B		
Project: CAT Alameda		

Run #1	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	W56476.D	1	09/11/15	CV	n/a	n/a	VW2096
Run #2							

Run #1	Purge Volume
Run #1	10.0 ml
Run #2	

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone ^a	ND	20	4.0	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
108-86-1	Bromobenzene	ND	1.0	0.20	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.22	ug/l	
104-51-8	n-Butylbenzene	ND	2.0	0.20	ug/l	
135-98-8	sec-Butylbenzene	ND	2.0	0.20	ug/l	
98-06-6	tert-Butylbenzene	ND	2.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	1.0	0.20	ug/l	
67-66-3	Chloroform	ND	1.0	0.20	ug/l	
95-49-8	o-Chlorotoluene	ND	2.0	0.20	ug/l	
106-43-4	p-Chlorotoluene	ND	2.0	0.26	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.20	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.20	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
563-58-6	1,1-Dichloropropene	ND	1.0	0.20	ug/l	
96-12-8	1,2-Dibromo-3-chloropropan ^b	ND	2.0	0.40	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.20	ug/l	
142-28-9	1,3-Dichloropropane	ND	1.0	0.20	ug/l	
108-20-3	Di-Isopropyl ether	ND	2.0	0.22	ug/l	
594-20-7	2,2-Dichloropropane	ND	1.0	0.20	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
75-71-8	Dichlorodifluoromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.20	ug/l	
541-73-1	m-Dichlorobenzene	ND	1.0	0.20	ug/l	
95-50-1	o-Dichlorobenzene	ND	1.0	0.20	ug/l	
106-46-7	p-Dichlorobenzene	ND	1.0	0.20	ug/l	

ND = Not detected MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-A		Date Sampled: 09/02/15
Lab Sample ID: C41598-44		Date Received: 09/03/15
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: SW846 8260B		
Project: CAT Alameda		

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
637-92-3	Ethyl Tert Butyl Ether	ND	2.0	0.22	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	2.0	0.20	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.20	ug/l	
99-87-6	p-Isopropyltoluene	ND	2.0	0.20	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	1.0	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.20	ug/l	
74-87-3	Methyl chloride	ND	1.0	0.30	ug/l	
74-95-3	Methylene bromide	ND	1.0	0.20	ug/l	
75-09-2	Methylene chloride	ND	10	2.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	2.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.20	ug/l	
91-20-3	Naphthalene ^b	ND	5.0	0.50	ug/l	
103-65-1	n-Propylbenzene	ND	2.0	0.20	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
994-05-8	Tert-Amyl Methyl Ether	ND	2.0	0.40	ug/l	
75-65-0	Tert-Butyl Alcohol ^b	ND	10	2.4	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	ND	1.0	0.30	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.20	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.20	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.22	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	2.0	0.20	ug/l	
96-18-4	1,2,3-Trichloropropane	ND	2.0	0.20	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	0.20	ug/l	
95-63-6	1,2,4-Trimethylbenzene	ND	2.0	0.20	ug/l	
108-67-8	1,3,5-Trimethylbenzene	ND	2.0	0.20	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.30	ug/l	
108-88-3	Toluene	ND	1.0	0.20	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.20	ug/l	
75-69-4	Trichlorofluoromethane	ND	1.0	0.20	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.20	ug/l	
1330-20-7	Xylene (total)	ND	2.0	0.46	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	103%		78-125%
2037-26-5	Toluene-D8	103%		86-114%

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
 RL = Reporting Limit B = Indicates analyte found in associated method blank
 E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: CAT-A	
Lab Sample ID: C41598-44	Date Sampled: 09/02/15
Matrix: AQ - Ground Water	Date Received: 09/03/15
Method: SW846 8260B	Percent Solids: n/a
Project: CAT Alameda	

VOA 8260 List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
460-00-4	4-Bromofluorobenzene	99%		80-113%

- (a) CCV/BS outside of control limits (biased high); not detected in sample.
- (b) CCV outside of control limits (biased high); not detected in sample.

ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

135 Main St. Suite 1800
San Francisco, CA 94105
415-543-4880
Fax 415-543-5480

Project name:		TIEMI technical contact:	Field samplers:	No./Container Types				Analysis Required									
Project (CTO) number:		TIEMI project manager:	Field samplers' signatures:	MS/MSD	40 ml VOA	1 liter Amber	500 ml Poly	Sieve	Glass Jar	VOA	SVOA	Pest/PCBs	Metals	TPH Purgeables	TPH Extractables	Other	Preservative Added
Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix													
CAT-Alameda		Mark Duffy	Mark Duffy														
103S 4024		Victo Early	Victo Early														
CAT-B-11-0.5		9-1-15	07:37	Soil					1					X	X	X	
CAT-B-11-4		9-1-15	07:41	Soil					1					X	X	X	
CAT-B-12-0.5		9-1-15	08:02	Soil					1					X	X	X	
CAT-B-12-4		9-1-15	08:05	Soil					1					X	X	X	
CAT-B-13-0.5		9-1-15	08:15	Soil					1					X	X	X	
CAT-B-13-4		9-1-15	08:18	Soil					1					X	X	X	
CAT-B-14-0.5		9-1-15	08:45	Soil					1					X	X	X	
CAT-B-14-4		9-1-15	08:50	Soil					1					X	X	X	
CAT-B-15-0.5		9-1-15	09:25	Soil					1					X	X	X	
CAT-B-15-2		9-1-15	09:30	Soil					1					X	X	X	
CAT-B-16-0.5		9-1-15	9:40	Soil					1					X	X	X	
CAT-B-16-2		9-1-15	9:45	Soil					1					X	X	X	

Relinquished by:	Name (print)	Company Name	Date	Time
Mark Duffy	Mark Duffy	Tetra Tech	9-3-15	12:00
Mike Moorhead	Mike Moorhead	Accutest	9/3/15	12:00
Lee Bautista	LEE BAUTISTA	ACCUTEST	9/3/15	13:40

Turnaround time/remarks: **std TAT**
silica gel on all TEPH
Temp = 4.7/4.7

135 Main St. Suite 1800
San Francisco, CA 94105
415-543-4880
Fax 415-543-5480

Chain of Custody Record No. 6897

C41598

Project name:	TtEMI technical contact:	Field samplers:	No./Container Types				Analysis Required															
			MS / MSD	40 ml VOA	1 liter Amber	500 ml Poly	Sieve	Glass Jar	VOA	SVOA	Pest/PCBs	Metals	TPH	Purgeables	TPH Extractables	S.I.C.	Lead	As-Sem	As-Sem			
CUA Alameda	Mark Duffy	Mark Duffy																				
Project (CTO) number:	TtEMI project manager:	Field samplers' signatures:																				
10354024	Vicki Early	Mark Duffy																				
Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	MS / MSD	40 ml VOA	1 liter Amber	500 ml Poly	Sieve	Glass Jar	VOA	SVOA	Pest/PCBs	Metals	TPH	Purgeables	TPH Extractables	S.I.C.	Lead	As-Sem	As-Sem	
CAT-B-23-0.5		9-2-15	12:5	Soil						1						X	X					25
CAT-B-23-2			12:10													X	X					26
CAT-B-24-0.5			12:30													X	X					27
CAT-B-24-2			12:40													X	X					28
CAT-B-25-0.5			1:30													X	X					29
CAT-B-25-2			1:55													X	X					30
CAT-B-26-0.5			1:50													X	X					31
CAT-B-26-2			1:45													X	X					32
CAT-B-27-0.5			1:50													X	X					33
CAT-B-27-4			1:10													X	X					34
CAT-B-28-0.5			1:55													X	X					35
CAT-B-28-4			1:55													X	X					36

Relinquished by:	Name (print)	Company Name	Date	Time
Mark Duffy	Mark Duffy	Tetra Tech	9-3-15	
Vicki Early	Vicki Early	Accutest	9/3/15	12:00
				13:40
Relinquished by:				
Received by:				

Turnaround time/remarks:

Fed Ex #:

WHITE-Laboratory Copy YELLOW-Sample Tracker PINK-File Copy

135 Main St. Suite 1800
San Francisco, CA 94105
415-543-4880
Fax 415-543-5480

Project name:	Lab PO#: BOA	Lab: Acutest	No./Container Types				Preservative Added				Analysis Required								
			40 ml VOA	1 liter Amber	500 ml Poly	Shieve	Glass Jar - 8.0 L	VOA	SVOA	Pest/PCBs	Metals	TPH Purgeables 8260	TPH Extractables 5160	TPH	TPH				
Project (CTO) number: CAT Alameda	TEMI technical contact: Mark Dufky	Field samplers: Mark Dufky	Project (CTO) number: 10354024				TEMI project manager: Victor Early				Field samplers' signatures: [Signature]								
Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	MS /MSD	40 ml VOA	1 liter Amber	500 ml Poly	Shieve	Glass Jar - 8.0 L	VOA	SVOA	Pest/PCBs	Metals	TPH Purgeables 8260	TPH Extractables 5160	TPH	TPH	
CAT-B-28-0.5		9-2-15	1555	Soil						X									
CAT-B-28-4		9-2-15	1535		X														
CAT-B-29-0.5		9-2-15	1545																
CAT-B-29-4			1550																
CAT-B-30-0.5			1600																
CAT-B-30-4			1605																
CAT-B-11-GW			930	Water		3	2				X		X	X	X	X	X	X	X
CAT-B			1405			3	2				X		X	X	X	X	X	X	X
CAT-B-23-GW			1400		X	0	3				X		X	X	X	X	X	X	X
CAT-A			900			2					X								

Relinquished by:	Name (print)	Company Name	Date	Time
[Signature]	Mark Dufky	Tetra Tech	9-3-15	12:00
[Signature]	Mike Harshbarger	Acutest	9/3/15	12:00
[Signature]				13:40
Relinquished by:				
Received by:				

Turnaround time/remarks: Std TAT * TEPH by 8015

Fed Ex #:

135 Main St. Suite 1800
San Francisco, CA 94105
415-543-4880
Fax 415-543-5480

Lab PO#: B01A Lab: Accutest
 Project name: CIAT Alameda TtEMI technical contact: Mark Duffy Field samplers: Mark Duffy
 Project (CTO) number: 10354024 TtEMI project manager: Victor Early Field samplers' signatures: [Signature]

No./Container Types

Preservative Added

Analysis Required

Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	No./Container Types				Analysis Required											
					MS / MSD	40 ml VOA	1 liter Amber	500 ml Poly	Sleeve	Class Jar	VOA	Pest/PCBs	Metals	TPH						
CIAT-B-28-0.5		9-2-15	1555	Soil																
CIAT-B-28-4		9-2-15	1535		X															
CIAT-B-29-0.5		9-2-15	1545																	
CIAT-B-29-4		9-2-15	1550																	
CIAT-B-30-0.5			1600																	
CIAT-B-30-4			1605																	
CIAT-B-11-GW			930	Water		3	2				X		X	X						
CIAT-B			1405			3	2				X		X	X						
CIAT-B-23-GW			1400		X	6	3				X		X	X						
CIAT-A			900			2					X									

Relinquished by:	Name (print)	Company Name	Date	Time
<u>[Signature]</u>	<u>Mark Duffy</u>	<u>Tetra Tech</u>	<u>9-3-15</u>	<u>1200</u>
<u>[Signature]</u>	<u>Mike Markelid</u>	<u>Accutest</u>	<u>9/3/15</u>	<u>12:00</u>
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks: Std TAT * TEPM by 8015

Fed Ex #:



Accutest Laboratories Sample Receipt Summary

Accutest Job Number: C41598 Client: TETRA TECH Project: CAT ALAMEDA
 Date / Time Received: 9/3/2015 1:40:00 PM Delivery Method: Accutest Courier Airbill #s: _____

Cooler Temps (Initial/Adjusted): #1: (4.7/4.7);

<u>Cooler Security</u>	<u>Y</u>	<u>or</u>	<u>N</u>		<u>Y</u>	<u>or</u>	<u>N</u>
1. Custody Seals Present:	<input type="checkbox"/>		<input checked="" type="checkbox"/>	3. COC Present:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Custody Seals Intact:	<input type="checkbox"/>		<input type="checkbox"/>	4. Smpl Dates/Time OK	<input checked="" type="checkbox"/>		<input type="checkbox"/>

<u>Cooler Temperature</u>	<u>Y</u>	<u>or</u>	<u>N</u>
1. Temp criteria achieved:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Therm ID:	<u>IR1;</u>		
3. Cooler media:	<u>Ice (Bag)</u>		
4. No. Coolers:	<u>1</u>		

<u>Quality Control Preservation</u>	<u>Y</u>	<u>or</u>	<u>N</u>	<u>N/A</u>
1. Trip Blank present / cooler:	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Trip Blank listed on COC:	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Samples preserved properly:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
4. VOCs headspace free:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

<u>Sample Integrity - Documentation</u>	<u>Y</u>	<u>or</u>	<u>N</u>
1. Sample labels present on bottles:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Container labeling complete:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
3. Sample container label / COC agree:	<input checked="" type="checkbox"/>		<input type="checkbox"/>

<u>Sample Integrity - Condition</u>	<u>Y</u>	<u>or</u>	<u>N</u>
1. Sample recvd within HT:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. All containers accounted for:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
3. Condition of sample:	<u>Intact</u>		

<u>Sample Integrity - Instructions</u>	<u>Y</u>	<u>or</u>	<u>N</u>	<u>N/A</u>
1. Analysis requested is clear:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
2. Bottles received for unspecified tests	<input type="checkbox"/>		<input checked="" type="checkbox"/>	
3. Sufficient volume recvd for analysis:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
4. Compositing instructions clear:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Filtering instructions clear:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments

Accutest Laboratories
V:408.588.0200

2105 Lundy Avenue
F: 408.588.0201

San Jose, CA 95131
www.accutest.com

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Accutest Laboratories Sample Receipt Summary

Accutest Job Number: C41598 Client: TETRA TECH Project: CAT ALAMEDA
 Date / Time Received: 9/3/2015 1:40:00 PM Delivery Method: Accutest Courier Airbill #s: _____
 Cooler Temps (Initial/Adjusted): #1: (4.7/4.7):

<u>Cooler Security</u>	<u>Y</u>	<u>or</u>	<u>N</u>		<u>Y</u>	<u>or</u>	<u>N</u>
1. Custody Seals Present:	<input type="checkbox"/>		<input checked="" type="checkbox"/>	3. COC Present:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Custody Seals Intact:	<input type="checkbox"/>		<input type="checkbox"/>	4. SmpI Dates/Time OK	<input checked="" type="checkbox"/>		<input type="checkbox"/>

<u>Cooler Temperature</u>	<u>Y</u>	<u>or</u>	<u>N</u>
1. Temp criteria achieved:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Therm ID:	<u>IR1;</u>		
3. Cooler media:	<u>Ice (Bag)</u>		
4. No. Coolers:	<u>1</u>		

<u>Quality Control Preservation</u>	<u>Y</u>	<u>or</u>	<u>N</u>	<u>N/A</u>
1. Trip Blank present / cooler:	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Trip Blank listed on COC:	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Samples preserved properly:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
4. VOCs headspace free:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

<u>Sample Integrity - Documentation</u>	<u>Y</u>	<u>or</u>	<u>N</u>
1. Sample labels present on bottles:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Container labeling complete:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
3. Sample container label / COC agree:	<input checked="" type="checkbox"/>		<input type="checkbox"/>

<u>Sample Integrity - Condition</u>	<u>Y</u>	<u>or</u>	<u>N</u>
1. Sample recvd within HT:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. All containers accounted for:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
3. Condition of sample:	<u>Intact</u>		

<u>Sample Integrity - Instructions</u>	<u>Y</u>	<u>or</u>	<u>N</u>	<u>N/A</u>
1. Analysis requested is clear:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
2. Bottles received for unspecified tests	<input type="checkbox"/>		<input checked="" type="checkbox"/>	
3. Sufficient volume recvd for analysis:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
4. Compositing instructions clear:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Filtering instructions clear:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments

Accutest Laboratories
V:408.588.0200

2105 Lundy Avenue
F: 408.588.0201

San Jose, CA 95131
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GC/MS Volatiles

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QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: C41598
Account: TETRAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VW2096-MB	W56473.D	1	09/11/15	CV	n/a	n/a	VW2096

The QC reported here applies to the following samples:

Method: SW846 8260B

C41598-41, C41598-42, C41598-43, C41598-44

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	20	4.0	ug/l	
71-43-2	Benzene	ND	1.0	0.20	ug/l	
108-86-1	Bromobenzene	ND	1.0	0.20	ug/l	
74-97-5	Bromochloromethane	ND	1.0	0.20	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.22	ug/l	
104-51-8	n-Butylbenzene	ND	2.0	0.20	ug/l	
135-98-8	sec-Butylbenzene	ND	2.0	0.20	ug/l	
98-06-6	tert-Butylbenzene	ND	2.0	0.28	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	1.0	0.20	ug/l	
67-66-3	Chloroform	ND	1.0	0.20	ug/l	
95-49-8	o-Chlorotoluene	ND	2.0	0.20	ug/l	
106-43-4	p-Chlorotoluene	ND	2.0	0.26	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.20	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.20	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
563-58-6	1,1-Dichloropropene	ND	1.0	0.20	ug/l	
96-12-8	1,2-Dibromo-3-chloropropane	ND	2.0	0.40	ug/l	
106-93-4	1,2-Dibromoethane	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.20	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.20	ug/l	
142-28-9	1,3-Dichloropropane	ND	1.0	0.20	ug/l	
108-20-3	Di-Isopropyl ether	ND	2.0	0.22	ug/l	
594-20-7	2,2-Dichloropropane	ND	1.0	0.20	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
75-71-8	Dichlorodifluoromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.20	ug/l	
541-73-1	m-Dichlorobenzene	ND	1.0	0.20	ug/l	
95-50-1	o-Dichlorobenzene	ND	1.0	0.20	ug/l	
106-46-7	p-Dichlorobenzene	ND	1.0	0.20	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.20	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.30	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.20	ug/l	
637-92-3	Ethyl Tert Butyl Ether	ND	2.0	0.22	ug/l	

Method Blank Summary

Job Number: C41598
Account: TETRAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VW2096-MB	W56473.D	1	09/11/15	CV	n/a	n/a	VW2096

The QC reported here applies to the following samples:

Method: SW846 8260B

C41598-41, C41598-42, C41598-43, C41598-44

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
87-68-3	Hexachlorobutadiene	ND	2.0	0.20	ug/l	
98-82-8	Isopropylbenzene	ND	1.0	0.20	ug/l	
99-87-6	p-Isopropyltoluene	ND	2.0	0.20	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	10	1.0	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.20	ug/l	
74-87-3	Methyl chloride	ND	1.0	0.30	ug/l	
74-95-3	Methylene bromide	ND	1.0	0.20	ug/l	
75-09-2	Methylene chloride	ND	10	2.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	10	2.0	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.20	ug/l	
91-20-3	Naphthalene	ND	5.0	0.50	ug/l	
103-65-1	n-Propylbenzene	ND	2.0	0.20	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
994-05-8	Tert-Amyl Methyl Ether	ND	2.0	0.40	ug/l	
75-65-0	Tert-Butyl Alcohol	ND	10	2.4	ug/l	
630-20-6	1,1,1,2-Tetrachloroethane	ND	1.0	0.30	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.20	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.20	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.22	ug/l	
87-61-6	1,2,3-Trichlorobenzene	ND	2.0	0.20	ug/l	
96-18-4	1,2,3-Trichloropropane	ND	2.0	0.20	ug/l	
120-82-1	1,2,4-Trichlorobenzene	ND	2.0	0.20	ug/l	
95-63-6	1,2,4-Trimethylbenzene	ND	2.0	0.20	ug/l	
108-67-8	1,3,5-Trimethylbenzene	ND	2.0	0.20	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.30	ug/l	
108-88-3	Toluene ^a	0.32	1.0	0.20	ug/l	J
79-01-6	Trichloroethylene	ND	1.0	0.20	ug/l	
75-69-4	Trichlorofluoromethane	ND	1.0	0.20	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.20	ug/l	
1330-20-7	Xylene (total)	ND	2.0	0.46	ug/l	
	TPH-GRO (C6-C10)	ND	50	25	ug/l	

5.1.1
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Method Blank Summary

Job Number: C41598
Account: TETRCAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VW2096-MB	W56473.D	1	09/11/15	CV	n/a	n/a	VW2096

The QC reported here applies to the following samples:

Method: SW846 8260B

C41598-41, C41598-42, C41598-43, C41598-44

CAS No.	Surrogate Recoveries	Limits
1868-53-7	Dibromofluoromethane	99% 78-125%
2037-26-5	Toluene-D8	101% 86-114%
460-00-4	4-Bromofluorobenzene	97% 80-113%

(a) Associated sample(s) with "B" qualifiers indicate analyte is found at concentrations less than 10 times of method blank. Concentration present in blank is less than 1/2 RL; meeting method criteria.

Method Blank Summary

Job Number: C41598
Account: TETRCAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VW2103-MB	W56611.D	1	09/15/15	CV	n/a	n/a	VW2103

The QC reported here applies to the following samples:

Method: SW846 8260B

C41598-41

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	20	4.0	ug/l	
108-20-3	Di-Isopropyl ether	ND	2.0	0.22	ug/l	

CAS No.	Surrogate Recoveries	Limits
1868-53-7	Dibromofluoromethane	100% 78-125%
2037-26-5	Toluene-D8	101% 86-114%
460-00-4	4-Bromofluorobenzene	97% 80-113%

Blank Spike/Blank Spike Duplicate Summary

Job Number: C41598
Account: TETRAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VW2096-BS	W56467.D	1	09/11/15	CV	n/a	n/a	VW2096
VW2096-BSD	W56471.D	1	09/11/15	CV	n/a	n/a	VW2096

The QC reported here applies to the following samples:

Method: SW846 8260B

C41598-41, C41598-42, C41598-43, C41598-44

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	BSD ug/l	BSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	80	119	149* a	130	163* a	9	58-137/12
71-43-2	Benzene	20	17.6	88	21.4	107	19* b	77-118/10
108-86-1	Bromobenzene	20	18.1	91	22.5	113	22* b	78-122/10
74-97-5	Bromochloromethane	20	18.3	92	22.7	114	21* b	76-124/10
75-27-4	Bromodichloromethane	20	17.7	89	21.9	110	21* b	74-121/10
75-25-2	Bromoform	20	16.5	83	20.3	102	21* b	58-133/10
104-51-8	n-Butylbenzene	20	17.2	86	23.3	117	30* b	75-125/10
135-98-8	sec-Butylbenzene	20	17.3	87	23.3	117	30* b	76-127/10
98-06-6	tert-Butylbenzene	20	17.3	87	23.0	115	28* b	76-124/10
108-90-7	Chlorobenzene	20	17.3	87	21.5	108	22* b	77-120/10
75-00-3	Chloroethane	20	16.7	84	16.8	84	1	63-117/10
67-66-3	Chloroform	20	17.2	86	21.5	108	22* b	74-123/10
95-49-8	o-Chlorotoluene	20	18.3	92	23.2	116	24* b	76-125/10
106-43-4	p-Chlorotoluene	20	17.9	90	22.7	114	24* b	76-123/10
56-23-5	Carbon tetrachloride	20	17.1	86	22.1	111	26* b	72-128/11
75-34-3	1,1-Dichloroethane	20	17.0	85	21.1	106	22* b	70-120/10
75-35-4	1,1-Dichloroethylene	20	16.2	81	20.7	104	24* b	65-120/11
563-58-6	1,1-Dichloropropene	20	15.3	77	19.6	98	25* b	69-125/10
96-12-8	1,2-Dibromo-3-chloropropane	20	19.6	98	24.1	121	21* b	63-128/10
106-93-4	1,2-Dibromoethane	20	18.7	94	22.8	114	20* b	78-123/10
107-06-2	1,2-Dichloroethane	20	18.4	92	21.9	110	17* b	72-123/10
78-87-5	1,2-Dichloropropane	20	18.3	92	22.3	112	20* b	76-119/10
142-28-9	1,3-Dichloropropane	20	18.9	95	23.2	116	20* b	78-122/10
108-20-3	Di-Isopropyl ether	20	18.3	92	21.6	108	17* b	69-124/10
594-20-7	2,2-Dichloropropane	20	17.1	86	21.8	109	24* b	68-129/10
124-48-1	Dibromochloromethane	20	18.0	90	22.8	114	24* b	75-124/10
75-71-8	Dichlorodifluoromethane	20	21.3	107	19.5	98	9	37-149/21
156-59-2	cis-1,2-Dichloroethylene	20	18.5	93	22.7	114	20* b	74-121/10
10061-01-5	cis-1,3-Dichloropropene	20	19.1	96	23.6	118	21* b	76-125/10
541-73-1	m-Dichlorobenzene	20	17.3	87	21.9	110	23* b	77-121/10
95-50-1	o-Dichlorobenzene	20	17.6	88	22.0	110	22* b	77-120/10
106-46-7	p-Dichlorobenzene	20	16.9	85	21.7	109	25* b	78-118/10
156-60-5	trans-1,2-Dichloroethylene	20	15.7	79	19.8	99	23* b	71-118/10
10061-02-6	trans-1,3-Dichloropropene	20	18.1	91	22.5	113	22* b	73-122/10
100-41-4	Ethylbenzene	20	17.2	86	22.0	110	24* b	78-121/10
637-92-3	Ethyl Tert Butyl Ether	20	18.2	91	21.2	106	15* b	76-130/10

* = Outside of Control Limits.

5.2.1
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Blank Spike/Blank Spike Duplicate Summary

Job Number: C41598
Account: TETRAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VW2096-BS	W56467.D	1	09/11/15	CV	n/a	n/a	VW2096
VW2096-BSD	W56471.D	1	09/11/15	CV	n/a	n/a	VW2096

The QC reported here applies to the following samples:

Method: SW846 8260B

C41598-41, C41598-42, C41598-43, C41598-44

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	BSD ug/l	BSD %	RPD	Limits Rec/RPD
591-78-6	2-Hexanone	80	90.8	114	106	133	15* b	71-139/10
87-68-3	Hexachlorobutadiene	20	17.6	88	22.5	113	24* b	69-127/11
98-82-8	Isopropylbenzene	20	17.0	85	22.2	111	27* b	77-125/10
99-87-6	p-Isopropyltoluene	20	17.2	86	22.9	115	28* b	76-125/10
108-10-1	4-Methyl-2-pentanone	80	88.8	111	103	129	15* b	71-132/10
74-83-9	Methyl bromide	20	18.1	91	17.7	89	2	66-123/10
74-87-3	Methyl chloride	20	18.3	92	17.9	90	2	50-138/19
74-95-3	Methylene bromide	20	19.2	96	23.0	115	18* b	77-125/10
75-09-2	Methylene chloride	20	18.2	91	22.0	110	19* b	65-124/14
78-93-3	Methyl ethyl ketone	80	97.0	121	107	134	10	67-139/11
1634-04-4	Methyl Tert Butyl Ether	20	17.9	90	20.4	102	13* b	73-124/10
91-20-3	Naphthalene	20	18.3	92	22.0	110	18* b	68-122/12
103-65-1	n-Propylbenzene	20	17.0	85	22.4	112	27* b	76-123/10
100-42-5	Styrene	20	18.1	91	22.7	114	23* b	74-126/10
994-05-8	Tert-Amyl Methyl Ether	20	18.9	95	22.0	110	15* b	76-127/10
75-65-0	Tert-Butyl Alcohol	100	119	119	133	133	11	47-161/18
630-20-6	1,1,1,2-Tetrachloroethane	20	17.9	90	22.6	113	23* b	79-123/10
71-55-6	1,1,1-Trichloroethane	20	17.1	86	22.1	111	26* b	73-124/10
79-34-5	1,1,2,2-Tetrachloroethane	20	18.9	95	23.9	120	23* b	77-123/10
79-00-5	1,1,2-Trichloroethane	20	17.9	90	22.2	111	21* b	77-120/10
87-61-6	1,2,3-Trichlorobenzene	20	19.0	95	23.7	119	22* b	70-126/11
96-18-4	1,2,3-Trichloropropane	20	19.0	95	23.4	117	21* b	65-125/10
120-82-1	1,2,4-Trichlorobenzene	20	17.9	90	22.7	114	24* b	72-123/10
95-63-6	1,2,4-Trimethylbenzene	20	17.4	87	22.4	112	25* b	77-122/10
108-67-8	1,3,5-Trimethylbenzene	20	18.2	91	23.7	119	26* b	79-127/10
127-18-4	Tetrachloroethylene	20	16.4	82	21.2	106	26* b	71-124/10
108-88-3	Toluene	20	17.5	88	21.6	108	21* b	78-120/10
79-01-6	Trichloroethylene	20	16.9	85	21.3	107	23* b	75-119/10
75-69-4	Trichlorofluoromethane	20	21.5	108	20.4	102	5	67-129/14
75-01-4	Vinyl chloride	20	18.9	95	17.5	88	8	60-133/15
1330-20-7	Xylene (total)	60	51.4	86	65.2	109	24* b	78-122/10

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
1868-53-7	Dibromofluoromethane	104%	103%	78-125%

* = Outside of Control Limits.

5.2.1
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Blank Spike/Blank Spike Duplicate Summary

Job Number: C41598
Account: TETRCAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VW2096-BS	W56467.D	1	09/11/15	CV	n/a	n/a	VW2096
VW2096-BSD	W56471.D	1	09/11/15	CV	n/a	n/a	VW2096

The QC reported here applies to the following samples:

Method: SW846 8260B

C41598-41, C41598-42, C41598-43, C41598-44

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
2037-26-5	Toluene-D8	101%	100%	86-114%
460-00-4	4-Bromofluorobenzene	101%	100%	80-113%

- (a) Outside laboratory control limits.
- (b) RPD exceeded laboratory acceptance limit; BS/BSD recoveries met acceptance criteria.

* = Outside of Control Limits.

Blank Spike/Blank Spike Duplicate Summary

Job Number: C41598
Account: TETRCAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VW2103-BS	W56608.D	1	09/15/15	CV	n/a	n/a	VW2103
VW2103-BSD	W56609.D	1	09/15/15	CV	n/a	n/a	VW2103

The QC reported here applies to the following samples:

Method: SW846 8260B

C41598-41

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	BSD ug/l	BSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	80	115	144* a	113	141* a	2	58-137/12
108-20-3	Di-Isopropyl ether	20	20.6	103	20.7	104	0	69-124/10

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
1868-53-7	Dibromofluoromethane	104%	105%	78-125%
2037-26-5	Toluene-D8	102%	101%	86-114%
460-00-4	4-Bromofluorobenzene	101%	100%	80-113%

(a) Outside laboratory control limits.

* = Outside of Control Limits.

5.2.2
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Laboratory Control Sample Summary

Job Number: C41598
Account: TETRCAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VW2096-LCS	W56470.D	1	09/11/15	CV	n/a	n/a	VW2096

The QC reported here applies to the following samples:

Method: SW846 8260B

C41598-41, C41598-42, C41598-43, C41598-44

CAS No.	Compound	Spike ug/l	LCS ug/l	LCS %	Limits
	TPH-GRO (C6-C10)	125	93.5	75	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	99%	78-125%
2037-26-5	Toluene-D8	102%	86-114%
460-00-4	4-Bromofluorobenzene	98%	80-113%

* = Outside of Control Limits.

Laboratory Control Sample Summary

Job Number: C41598
Account: TETRCAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VW2103-LCS	W56610.D	1	09/15/15	CV	n/a	n/a	VW2103

The QC reported here applies to the following samples:

Method: SW846 8260B

C41598-41

CAS No.	Compound	Spike ug/l	LCS ug/l	LCS %	Limits
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CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	98%	78-125%
2037-26-5	Toluene-D8	102%	86-114%
460-00-4	4-Bromofluorobenzene	98%	80-113%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: C41598
Account: TETRAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
C41519-2MS	W56486.D	5	09/11/15	CV	n/a	n/a	VW2096
C41519-2MSD	W56487.D	5	09/11/15	CV	n/a	n/a	VW2096
C41519-2	W56483.D	5	09/11/15	CV	n/a	n/a	VW2096

The QC reported here applies to the following samples:

Method: SW846 8260B

C41598-41, C41598-42, C41598-43, C41598-44

CAS No.	Compound	C41519-2 ug/l	Spike Q ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD	
67-64-1	Acetone	ND		400	607	152* a	400	606	152* a	0	58-137/12
71-43-2	Benzene	1.3	J	100	110	109	100	109	108	1	77-118/10
108-86-1	Bromobenzene	ND		100	113	113	100	113	113	0	78-122/10
74-97-5	Bromochloromethane	ND		100	111	111	100	113	113	2	76-124/10
75-27-4	Bromodichloromethane	ND		100	112	112	100	111	111	1	74-121/10
75-25-2	Bromoform	ND		100	102	102	100	103	103	1	58-133/10
104-51-8	n-Butylbenzene	21.1		100	137	116	100	139	118	1	75-125/10
135-98-8	sec-Butylbenzene	12.2		100	130	118	100	132	120	2	76-127/10
98-06-6	tert-Butylbenzene	9.9	J	100	125	115	100	126	116	1	76-124/10
108-90-7	Chlorobenzene	ND		100	109	109	100	110	110	1	77-120/10
75-00-3	Chloroethane	ND		100	85.3	85	100	81.6	82	4	63-117/10
67-66-3	Chloroform	ND		100	109	109	100	107	107	2	74-123/10
95-49-8	o-Chlorotoluene	ND		100	110	110	100	117	117	6	76-125/10
106-43-4	p-Chlorotoluene	ND		100	115	115	100	115	115	0	76-123/10
56-23-5	Carbon tetrachloride	ND		100	115	115	100	114	114	1	72-128/11
75-34-3	1,1-Dichloroethane	ND		100	107	107	100	105	105	2	70-120/10
75-35-4	1,1-Dichloroethylene	ND		100	108	108	100	107	107	1	65-120/11
563-58-6	1,1-Dichloropropene	ND		100	101	101	100	100	100	1	69-125/10
96-12-8	1,2-Dibromo-3-chloropropane	ND		100	127	127	100	126	126	1	63-128/10
106-93-4	1,2-Dibromoethane	ND		100	114	114	100	116	116	2	78-123/10
107-06-2	1,2-Dichloroethane	ND		100	112	112	100	109	109	3	72-123/10
78-87-5	1,2-Dichloropropane	ND		100	114	114	100	114	114	0	76-119/10
142-28-9	1,3-Dichloropropane	ND		100	115	115	100	116	116	1	78-122/10
108-20-3	Di-Isopropyl ether	ND		100	107	107	100	107	107	0	69-124/10
594-20-7	2,2-Dichloropropane	ND		100	96.9	97	100	96.0	96	1	68-129/10
124-48-1	Dibromochloromethane	ND		100	114	114	100	115	115	1	75-124/10
75-71-8	Dichlorodifluoromethane	ND		100	107	107	100	99.0	99	8	37-149/21
156-59-2	cis-1,2-Dichloroethylene	ND		100	113	113	100	113	113	0	74-121/10
10061-01-5	cis-1,3-Dichloropropene	ND		100	116	116	100	115	115	1	76-125/10
541-73-1	m-Dichlorobenzene	ND		100	111	111	100	110	110	1	77-121/10
95-50-1	o-Dichlorobenzene	ND		100	112	112	100	113	113	1	77-120/10
106-46-7	p-Dichlorobenzene	ND		100	111	111	100	110	110	1	78-118/10
156-60-5	trans-1,2-Dichloroethylene	ND		100	99.3	99	100	99.2	99	0	71-118/10
10061-02-6	trans-1,3-Dichloropropene	ND		100	110	110	100	109	109	1	73-122/10
100-41-4	Ethylbenzene	1.0	J	100	113	112	100	114	113	1	78-121/10
637-92-3	Ethyl Tert Butyl Ether	ND		100	105	105	100	105	105	0	76-130/10

* = Outside of Control Limits.

5.4.1
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Matrix Spike/Matrix Spike Duplicate Summary

Job Number: C41598
Account: TETRAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
C41519-2MS	W56486.D	5	09/11/15	CV	n/a	n/a	VW2096
C41519-2MSD	W56487.D	5	09/11/15	CV	n/a	n/a	VW2096
C41519-2	W56483.D	5	09/11/15	CV	n/a	n/a	VW2096

The QC reported here applies to the following samples:

Method: SW846 8260B

C41598-41, C41598-42, C41598-43, C41598-44

CAS No.	Compound	C41519-2 ug/l	Spike Q ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
591-78-6	2-Hexanone	ND	400	532	133	400	541	135	2	71-139/10
87-68-3	Hexachlorobutadiene	ND	100	113	113	100	118	118	4	69-127/11
98-82-8	Isopropylbenzene	12.7	100	126	113	100	128	115	2	77-125/10
99-87-6	p-Isopropyltoluene	ND	100	117	117	100	119	119	2	76-125/10
108-10-1	4-Methyl-2-pentanone	ND	400	514	129	400	523	131	2	71-132/10
74-83-9	Methyl bromide	ND	100	87.4	87	100	84.6	85	3	66-123/10
74-87-3	Methyl chloride	ND	100	90.9	91	100	84.7	85	7	50-138/19
74-95-3	Methylene bromide	ND	100	115	115	100	115	115	0	77-125/10
75-09-2	Methylene chloride	ND	100	109	109	100	109	109	0	65-124/14
78-93-3	Methyl ethyl ketone	ND	400	520	130	400	524	131	1	67-139/11
1634-04-4	Methyl Tert Butyl Ether	ND	100	101	101	100	101	101	0	73-124/10
91-20-3	Naphthalene	ND	100	114	114	100	115	115	1	68-122/12
103-65-1	n-Propylbenzene	30.6	100	142	111	100	142	111	0	76-123/10
100-42-5	Styrene	ND	100	117	117	100	116	116	1	74-126/10
994-05-8	Tert-Amyl Methyl Ether	ND	100	108	108	100	109	109	1	76-127/10
75-65-0	Tert-Butyl Alcohol	ND	500	712	142	500	726	145	2	47-161/18
630-20-6	1,1,1,2-Tetrachloroethane	ND	100	116	116	100	115	115	1	79-123/10
71-55-6	1,1,1-Trichloroethane	ND	100	113	113	100	112	112	1	73-124/10
79-34-5	1,1,2,2-Tetrachloroethane	ND	100	120	120	100	121	121	1	77-123/10
79-00-5	1,1,2-Trichloroethane	ND	100	115	115	100	116	116	1	77-120/10
87-61-6	1,2,3-Trichlorobenzene	ND	100	120	120	100	123	123	2	70-126/11
96-18-4	1,2,3-Trichloropropane	ND	100	117	117	100	118	118	1	65-125/10
120-82-1	1,2,4-Trichlorobenzene	ND	100	115	115	100	117	117	2	72-123/10
95-63-6	1,2,4-Trimethylbenzene	ND	100	115	115	100	114	114	1	77-122/10
108-67-8	1,3,5-Trimethylbenzene	ND	100	123	123	100	122	122	1	79-127/10
127-18-4	Tetrachloroethylene	ND	100	107	107	100	108	108	1	71-124/10
108-88-3	Toluene	ND	100	111	111	100	112	112	1	78-120/10
79-01-6	Trichloroethylene	ND	100	109	109	100	108	108	1	75-119/10
75-69-4	Trichlorofluoromethane	ND	100	105	105	100	99.0	99	6	67-129/14
75-01-4	Vinyl chloride	ND	100	90.6	91	100	86.2	86	5	60-133/15
1330-20-7	Xylene (total)	ND	300	336	112	300	340	113	1	78-122/10

CAS No.	Surrogate Recoveries	MS	MSD	C41519-2	Limits
1868-53-7	Dibromofluoromethane	104%	101%	104%	78-125%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: C41598
Account: TETRCAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
C41519-2MS	W56486.D	5	09/11/15	CV	n/a	n/a	VW2096
C41519-2MSD	W56487.D	5	09/11/15	CV	n/a	n/a	VW2096
C41519-2	W56483.D	5	09/11/15	CV	n/a	n/a	VW2096

The QC reported here applies to the following samples:

Method: SW846 8260B

C41598-41, C41598-42, C41598-43, C41598-44

CAS No.	Surrogate Recoveries	MS	MSD	C41519-2	Limits
2037-26-5	Toluene-D8	101%	102%	104%	86-114%
460-00-4	4-Bromofluorobenzene	102%	101%	105%	80-113%

(a) Outside laboratory control limits.

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: C41598
Account: TETRAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
C41584-9MS	W56628.D	25	09/15/15	CV	n/a	n/a	VW2103
C41584-9MSD	W56629.D	25	09/15/15	CV	n/a	n/a	VW2103
C41584-9 ^a	W56624.D	25	09/15/15	CV	n/a	n/a	VW2103

The QC reported here applies to the following samples:

Method: SW846 8260B

C41598-41

CAS No.	Compound	C41584-9 ug/l	Spike Q ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	ND	2000	2740	137	2000	2790	140* ^b	2	58-137/12
108-20-3	Di-Isopropyl ether	ND	500	512	102	500	505	101	1	69-124/10

CAS No.	Surrogate Recoveries	MS	MSD	C41584-9	Limits
1868-53-7	Dibromofluoromethane	108%	105%		78-125%
2037-26-5	Toluene-D8	102%	102%		86-114%
460-00-4	4-Bromofluorobenzene	103%	103%		80-113%

(a) Sample vial contained more than 0.5cm of sediment. Sample used for QC purposes only. Sample reanalyzed at lower dilution.

(b) Outside laboratory control limits.

* = Outside of Control Limits.

5.4.2
5

GC Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: C41598
Account: TETRCAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13015-MB	HH326224.D	1	09/05/15	NN	09/04/15	OP13015	GHH1621

The QC reported here applies to the following samples:

Method: SW846 8015B M

C41598-41, C41598-42, C41598-43

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	0.10	0.050	mg/l	
	TPH (Motor Oil)	ND	0.20	0.10	mg/l	
	TPH (Mineral Spirits)	ND	0.10	0.050	mg/l	
	TPH (Kerosene)	ND	0.10	0.050	mg/l	

CAS No.	Surrogate Recoveries	Limits
630-01-3	Hexacosane	77% 38-139%

Method Blank Summary

Job Number: C41598
Account: TETRCAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13013-MB	HH326245.D	1	09/06/15	NN	09/04/15	OP13013	GHH1621

The QC reported here applies to the following samples:

Method: SW846 8015B M

C41598-1, C41598-2, C41598-3, C41598-4, C41598-5, C41598-6, C41598-7, C41598-8, C41598-9, C41598-10, C41598-11, C41598-12, C41598-13, C41598-14, C41598-15, C41598-16, C41598-25, C41598-26, C41598-27, C41598-28

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	3.3	1.7	mg/kg	
	TPH (Motor Oil)	ND	6.7	3.3	mg/kg	
	TPH (Mineral Spirits)	ND	3.3	1.7	mg/kg	
	TPH (Kerosene)	ND	3.3	1.7	mg/kg	

CAS No.	Surrogate Recoveries	Limits
630-01-3	Hexacosane	75% 43-144%

Method Blank Summary

Job Number: C41598
Account: TETRCAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13029-MB	HH326302.D	1	09/09/15	NN	09/08/15	OP13029	GHH1623

The QC reported here applies to the following samples:

Method: SW846 8015B M

C41598-29, C41598-30, C41598-31, C41598-32

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (Diesel)	ND	3.3	1.7	mg/kg	
	TPH (Motor Oil)	ND	6.7	3.3	mg/kg	
	TPH (Mineral Spirits)	ND	3.3	1.7	mg/kg	
	TPH (Kerosene)	ND	3.3	1.7	mg/kg	

CAS No.	Surrogate Recoveries	Limits
630-01-3	Hexacosane	78% 43-144%

Blank Spike/Blank Spike Duplicate Summary

Job Number: C41598
Account: TETRCAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13015-BS	HH326222.D	1	09/05/15	NN	09/04/15	OP13015	GHH1621
OP13015-BSD	HH326223.D	1	09/05/15	NN	09/04/15	OP13015	GHH1621

The QC reported here applies to the following samples:

Method: SW846 8015B M

C41598-41, C41598-42, C41598-43

CAS No.	Compound	Spike mg/l	BSP mg/l	BSP %	BSD mg/l	BSD %	RPD	Limits Rec/RPD
	TPH (Diesel)	1	0.650	65	0.691	69	6	45-110/18
	TPH (Motor Oil)	1	0.768	77	0.801	80	4	53-119/16

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
630-01-3	Hexacosane	77%	79%	38-139%

* = Outside of Control Limits.

Blank Spike/Blank Spike Duplicate Summary

Job Number: C41598
Account: TETRCAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13013-BS	HH326246.D	1	09/06/15	NN	09/04/15	OP13013	GHH1621
OP13013-BSD	HH326247.D	1	09/06/15	NN	09/04/15	OP13013	GHH1621

The QC reported here applies to the following samples:

Method: SW846 8015B M

C41598-1, C41598-2, C41598-3, C41598-4, C41598-5, C41598-6, C41598-7, C41598-8, C41598-9, C41598-10, C41598-11, C41598-12, C41598-13, C41598-14, C41598-15, C41598-16, C41598-25, C41598-26, C41598-27, C41598-28

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	BSD mg/kg	BSD %	RPD	Limits Rec/RPD
	TPH (Diesel)	33.3	22.3	67	22.8	68	2	50-112/13
	TPH (Motor Oil)	33.3	24.4	73	25.4	76	4	59-122/16

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
630-01-3	Hexacosane	78%	79%	43-144%

* = Outside of Control Limits.

Blank Spike/Blank Spike Duplicate Summary

Job Number: C41598
Account: TETRCAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13029-BS	HH326300.D	1	09/09/15	NN	09/08/15	OP13029	GHH1623
OP13029-BSD	HH326301.D	1	09/09/15	NN	09/08/15	OP13029	GHH1623

The QC reported here applies to the following samples:

Method: SW846 8015B M

C41598-29, C41598-30, C41598-31, C41598-32

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	BSD mg/kg	BSD %	RPD	Limits Rec/RPD
	TPH (Diesel)	33.3	22.9	69	23.1	69	1	50-112/13
	TPH (Motor Oil)	33.3	27.4	82	27.7	83	1	59-122/16

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
630-01-3	Hexacosane	77%	81%	43-144%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: C41598
Account: TETRCAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13013-MS	HH326291.D	2	09/08/15	NN	09/04/15	OP13013	GHH1622
OP13013-MSD	HH326292.D	2	09/08/15	NN	09/04/15	OP13013	GHH1622
C41598-4	HH326256.D	5	09/06/15	NN	09/04/15	OP13013	GHH1621

The QC reported here applies to the following samples:

Method: SW846 8015B M

C41598-1, C41598-2, C41598-3, C41598-4, C41598-5, C41598-6, C41598-7, C41598-8, C41598-9, C41598-10, C41598-11, C41598-12, C41598-13, C41598-14, C41598-15, C41598-16, C41598-25, C41598-26, C41598-27, C41598-28

CAS No.	Compound	C41598-4 mg/kg	Spike Q	MS mg/kg	MS %	Spike mg/kg	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH (Diesel)	ND	37.6	36.7	98	37.6	39.5	105	7	50-112/13
	TPH (Motor Oil)	59.9	37.6	58.6	-3* a	37.6	70.8	29* a	19* b	59-122/16

CAS No.	Surrogate Recoveries	MS	MSD	C41598-4	Limits
630-01-3	Hexacosane	87%	90%	79%	43-144%

(a) Outside control limits due to high level in sample relative to spike amount.

(b) Outside laboratory control limits.

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: C41598
Account: TETRAO Tetra Tech EMI
Project: CAT Alameda

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP13029-MS	HH326344.D	20	09/10/15	NN	09/08/15	OP13029	GHH1623
OP13029-MSD	HH326345.D	20	09/10/15	NN	09/08/15	OP13029	GHH1623
C41598-29	HH326340.D	20	09/10/15	NN	09/08/15	OP13029	GHH1623

The QC reported here applies to the following samples:

Method: SW846 8015B M

C41598-29, C41598-30, C41598-31, C41598-32

CAS No.	Compound	C41598-29 mg/kg	Spike Q	MS mg/kg	MS %	Spike mg/kg	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH (Diesel)	ND	36.8	49.4	134* a	36.7	50.8	138* a	3	50-112/13
	TPH (Motor Oil)	311	36.8	309	-5* a	36.7	240	-193* a	25* b	59-122/16

CAS No.	Surrogate Recoveries	MS	MSD	C41598-29	Limits
630-01-3	Hexacosane	82%	81%	86%	43-144%

(a) Outside control limits due to high level in sample relative to spike amount.

(b) Outside laboratory control limits.

* = Outside of Control Limits.

Metals Analysis

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: C41598
Account: TETRCOA - Tetra Tech EMI
Project: CAT Alameda

QC Batch ID: MP10109
Matrix Type: SOLID

Methods: SW846 6020
Units: mg/kg

Prep Date: 09/08/15

Metal	RL	IDL	MDL	MB raw	final
Aluminum	25	2.3	2.5		
Antimony	0.25	.14	.008		
Arsenic	0.25	.3	.017	0.55	* (a)
Barium	0.50	.011	.036		
Beryllium	0.25		.027		
Boron	2.5	.09	.066		
Cadmium	0.25	.0028	.011		
Calcium	250	40	38		
Chromium	1.0	.025	.053		
Cobalt	0.25	.018	.0085		
Copper	1.0	.018	.11		
Iron	25	3.1	1.6		
Lead	0.25	.0056	.038	0.015	<0.25
Magnesium	250	.54	2.1		
Manganese	0.50	.012	.18		
Molybdenum	0.50	.11	.026		
Nickel	1.0	.18	.043		
Potassium	250	2.3	1.5		
Selenium	0.25	.17	.012		
Silver	0.25	.0048	.006		
Sodium	250	2.2	2.6		
Strontium	2.5	.021	.018		
Thallium	0.25	.04	.015		
Tin	2.5	.055	.036		
Titanium	0.50	.083	.038		
Uranium	0.25	.06	.006		
Vanadium	1.0	.36	.051		
Zinc	2.0	.22	.11		

Associated samples MP10109: C41598-1, C41598-2, C41598-3, C41598-4, C41598-5, C41598-6, C41598-7, C41598-8, C41598-9, C41598-10, C41598-11, C41598-12, C41598-13, C41598-14, C41598-15, C41598-16, C41598-17, C41598-18, C41598-19, C41598-20

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested
(a) All sample results < RL or > 10x method blank concentration.

7.1.1
7

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: C41598
 Account: TETRAO - Tetra Tech EMI
 Project: CAT Alameda

QC Batch ID: MP10109
 Matrix Type: SOLID

Methods: SW846 6020
 Units: mg/kg

Prep Date: 09/08/15

Metal	C41598-4 Original MS		SpikeLot MPIR5	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic	9.4	50.6	47.8	86.2	75-125
Barium					
Beryllium					
Boron					
Cadmium					
Calcium					
Chromium					
Cobalt					
Copper					
Iron					
Lead	6.9	48.6	47.8	87.2	75-125
Magnesium					
Manganese					
Molybdenum					
Nickel					
Potassium					
Selenium					
Silver					
Sodium					
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP10109: C41598-1, C41598-2, C41598-3, C41598-4, C41598-5, C41598-6, C41598-7, C41598-8, C41598-9, C41598-10, C41598-11, C41598-12, C41598-13, C41598-14, C41598-15, C41598-16, C41598-17, C41598-18, C41598-19, C41598-20

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

7.1.2
 7

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: C41598
 Account: TETRCAO - Tetra Tech EMI
 Project: CAT Alameda

QC Batch ID: MP10109
 Matrix Type: SOLID

Methods: SW846 6020
 Units: mg/kg

Prep Date: 09/08/15

Metal	C41598-4 Original	MSD	Spike/lot MPIR5	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	9.4	55.8	49	94.6	9.8	20
Barium						
Beryllium						
Boron						
Cadmium						
Calcium						
Chromium						
Cobalt						
Copper						
Iron						
Lead	6.9	53.3	49	94.6	9.2	20
Magnesium						
Manganese						
Molybdenum						
Nickel						
Potassium						
Selenium						
Silver						
Sodium						
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP10109: C41598-1, C41598-2, C41598-3, C41598-4, C41598-5, C41598-6, C41598-7, C41598-8, C41598-9, C41598-10, C41598-11, C41598-12, C41598-13, C41598-14, C41598-15, C41598-16, C41598-17, C41598-18, C41598-19, C41598-20

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

7.1.2
 7

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: C41598
 Account: TETRAO - Tetra Tech EMI
 Project: CAT Alameda

QC Batch ID: MP10109
 Matrix Type: SOLID

Methods: SW846 6020
 Units: mg/kg

Prep Date: 09/08/15

Metal	BSP Result	Spikelot MPIR5	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	47.8	50	95.6	80-120
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium				
Cobalt				
Copper				
Iron				
Lead	47.9	50	95.8	80-120
Magnesium				
Manganese				
Molybdenum				
Nickel				
Potassium				
Selenium				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP10109: C41598-1, C41598-2, C41598-3, C41598-4, C41598-5, C41598-6, C41598-7, C41598-8, C41598-9, C41598-10, C41598-11, C41598-12, C41598-13, C41598-14, C41598-15, C41598-16, C41598-17, C41598-18, C41598-19, C41598-20

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (anr) Analyte not requested

7.1.3
7

SERIAL DILUTION RESULTS SUMMARY

Login Number: C41598
 Account: TETRAO - Tetra Tech EMI
 Project: CAT Alameda

QC Batch ID: MP10109
 Matrix Type: SOLID

Methods: SW846 6020
 Units: ug/l

Prep Date: 09/08/15

Metal	C41598-4			QC
	Original	SDL 5:25	%DIF	Limits

Aluminum				
Antimony				
Arsenic	96.2	85.5	11.1 (a)	0-10
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium				
Cobalt				
Copper				
Iron				
Lead	70.9	70.7	0.3	0-10
Magnesium				
Manganese				
Molybdenum				
Nickel				
Potassium				
Selenium				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP10109: C41598-1, C41598-2, C41598-3, C41598-4, C41598-5, C41598-6, C41598-7, C41598-8, C41598-9, C41598-10, C41598-11, C41598-12, C41598-13, C41598-14, C41598-15, C41598-16, C41598-17, C41598-18, C41598-19, C41598-20

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(anr) Analyte not requested

(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

7.1.4
 7

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: C41598
Account: TETRCOA - Tetra Tech EMI
Project: CAT Alameda

QC Batch ID: MP10110
Matrix Type: SOLID

Methods: SW846 6020
Units: mg/kg

Prep Date: 09/09/15

Metal	RL	IDL	MDL	MB raw	final
Aluminum	25	2.3	2.5		
Antimony	0.25	.14	.008		
Arsenic	0.25	.3	.017	0.044	<0.25
Barium	0.50	.011	.036		
Beryllium	0.25		.027		
Boron	2.5	.09	.066		
Cadmium	0.25	.0028	.011		
Calcium	250	40	38		
Chromium	1.0	.025	.053		
Cobalt	0.25	.018	.0085		
Copper	1.0	.018	.11		
Iron	25	3.1	1.6		
Lead	0.25	.0056	.038	0.026	<0.25
Magnesium	250	.54	2.1		
Manganese	0.50	.012	.18		
Molybdenum	0.50	.11	.026		
Nickel	1.0	.18	.043		
Potassium	250	2.3	1.5		
Selenium	0.25	.17	.012		
Silver	0.25	.0048	.006		
Sodium	250	2.2	2.6		
Strontium	2.5	.021	.018		
Thallium	0.25	.04	.015		
Tin	2.5	.055	.036		
Titanium	0.50	.083	.038		
Uranium	0.25	.06	.006		
Vanadium	1.0	.36	.051		
Zinc	2.0	.22	.11		

Associated samples MP10110: C41598-21, C41598-22, C41598-23, C41598-24, C41598-25, C41598-26, C41598-27, C41598-28, C41598-29, C41598-30, C41598-31, C41598-32, C41598-33, C41598-34, C41598-35, C41598-36, C41598-37, C41598-38, C41598-39, C41598-40

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: C41598
 Account: TETRCOA - Tetra Tech EMI
 Project: CAT Alameda

QC Batch ID: MP10110
 Matrix Type: SOLID

Methods: SW846 6020
 Units: mg/kg

Prep Date: 09/09/15

Metal	C41598-36		Spike/lot		QC
	Original	MS	MPIR5	% Rec	Limits
Aluminum					
Antimony					
Arsenic	0.85	51.7	54.4	87.0	75-125
Barium					
Beryllium					
Boron					
Cadmium					
Calcium					
Chromium					
Cobalt					
Copper					
Iron					
Lead	1470	1490	54.4	36.8 (a)	75-125
Magnesium					
Manganese					
Molybdenum					
Nickel					
Potassium					
Selenium					
Silver					
Sodium					
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP10110: C41598-21, C41598-22, C41598-23, C41598-24, C41598-25, C41598-26, C41598-27, C41598-28, C41598-29, C41598-30, C41598-31, C41598-32, C41598-33, C41598-34, C41598-35, C41598-36, C41598-37, C41598-38, C41598-39, C41598-40

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

(anr) Analyte not requested

(a) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

7.2.2
 7

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: C41598
 Account: TETRCAO - Tetra Tech EMI
 Project: CAT Alameda

QC Batch ID: MP10110
 Matrix Type: SOLID

Methods: SW846 6020
 Units: mg/kg

Prep Date: 09/09/15

Metal	C41598-36 Original MSD		Spike/lot MPIR5	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic						
Barium						
Beryllium						
Boron						
Cadmium						
Calcium						
Chromium						
Cobalt						
Copper						
Iron						
Lead	1470	1580	54.8	200.6(a)	5.9	20
Magnesium						
Manganese						
Molybdenum						
Nickel						
Potassium						
Selenium						
Silver						
Sodium						
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP10110: C41598-21, C41598-22, C41598-23, C41598-24, C41598-25, C41598-26, C41598-27, C41598-28, C41598-29, C41598-30, C41598-31, C41598-32, C41598-33, C41598-34, C41598-35, C41598-36, C41598-37, C41598-38, C41598-39, C41598-40

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

(anr) Analyte not requested

(a) Spike amount low relative to the sample amount. Refer to lab control or spike blank for recovery information.

7.2.2
 7

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: C41598
 Account: TETRAO - Tetra Tech EMI
 Project: CAT Alameda

QC Batch ID: MP10110
 Matrix Type: SOLID

Methods: SW846 6020
 Units: mg/kg

Prep Date: 09/09/15

Metal	BSP Result	Spikelot MPIR5	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	46.2	50	92.4	80-120
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium				
Cobalt				
Copper				
Iron				
Lead	49.3	50	98.6	80-120
Magnesium				
Manganese				
Molybdenum				
Nickel				
Potassium				
Selenium				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP10110: C41598-21, C41598-22, C41598-23, C41598-24, C41598-25, C41598-26, C41598-27, C41598-28, C41598-29, C41598-30, C41598-31, C41598-32, C41598-33, C41598-34, C41598-35, C41598-36, C41598-37, C41598-38, C41598-39, C41598-40

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (anr) Analyte not requested

7.2.3
7

SERIAL DILUTION RESULTS SUMMARY

Login Number: C41598
 Account: TETRAO - Tetra Tech EMI
 Project: CAT Alameda

QC Batch ID: MP10110
 Matrix Type: SOLID

Methods: SW846 6020
 Units: ug/l

Prep Date: 09/09/15

Metal	C41598-36		QC	
	Original	SDL 5:25	%DIF	Limits

Aluminum				
Antimony				
Arsenic	7.39	1.14	100.0 (a)	0-10
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium				
Cobalt				
Copper				
Iron				
Lead	2460	12900	1.0	0-10
Magnesium				
Manganese				
Molybdenum				
Nickel				
Potassium				
Selenium				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP10110: C41598-21, C41598-22, C41598-23, C41598-24, C41598-25, C41598-26, C41598-27, C41598-28, C41598-29, C41598-30, C41598-31, C41598-32, C41598-33, C41598-34, C41598-35, C41598-36, C41598-37, C41598-38, C41598-39, C41598-40

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(anr) Analyte not requested

(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

7.2.4
 7

ATTACHMENT 6

ATTACHMENT 6
 OSWER VAPOR INTRUSION ASSESSMENT
 Vapor Intrusion Screening Level (VISL) Calculator Version 3.4, June 2015 RSLs

The primary objective of risk-based screening is to identify sites or buildings unlikely to pose a health concern through the vapor intrusion pathway. Generally, at properties where subsurface concentrations of vapor-forming chemicals (e.g., groundwater or "near source" soil gas concentrations) fall below screening levels (i.e., VISLs), no further action or study is warranted, so long as the exposure assumptions match those taken into account by the calculations and the site fulfills the conditions and assumptions of the generic conceptual model underlying the screening levels. In a similar fashion, the results of risk-based

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Residential	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR	1.00E-06	Enter target risk for carcinogens
Target Hazard Quotient for Non-Carcinogens	THQ	1	Enter target hazard quotient for non-carcinogens
Average Groundwater Temperature (°C)	Tgw	23.62	Enter average of the stabilized groundwater temperature to correct Henry's Law Constant for groundwater target concentrations

CAS	Chemical Name	Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1)	Does chemical have inhalation toxicity data? (IUR and/or RfC)	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source?	Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source?	Target Indoor Air Conc. @ TCR = 1E-06 or THQ = 1	Toxicity Basis	Target Sub-Slab and Exterior Soil Gas Conc. @ TCR = 1E-06 or THQ = 1	Target Ground Water Conc. @ TCR = 1E-06 or THQ = 1	Is Target Ground Water Conc. < MCL?	Pure Phase Vapor Conc. @ 25°C	Groundwater Vapor Conc.	Temperature for Groundwater Vapor Conc.	Lower Explosive Limit**	LEL Source
		Yes/No	Yes/No	Cvp > Cia,target?	Chc > Cia,target?	MIN(Cia,c;Cia,nc)		Csg	Cgw	Cgw<MCL?	Cvp	Chc	Tgw or 25	LEL	
				Yes/No	Yes/No	(ug/m ³)	C/NC	(ug/m ³)	(ug/L)	Yes/No (MCL ug/L)	(ug/m ³)	(ug/m ³)	C	(% by vol)	
71-43-2	TPH Gasoline (Benzene)	Yes	Yes	Yes	Yes	3.1E+01	NC	1.0E+03	1.5E+02	No (5)	3.98E+08	3.81E+08	23.62	1.2	N
108-20-3	Di-isopropyl Ether	Yes	Yes	Yes	Yes	7.3E+02	NC	2.4E+04	7.0E+03	--	8.19E+08	9.21E+08	25		
91-20-3	TPH Diesel (Naphthalene)	Yes	Yes	Yes	Yes	3.1E+00	NC	1.0E+02	1.9E+02	--	5.86E+05	5.04E+05	23.62	N	N

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

Exposure Scenario

	Units
Averaging time for carcinogens	(yrs)
Averaging time for non-carcinogens	(yrs)
Exposure duration	(yrs)
Exposure frequency	(days/yr)
Exposure time	(hr/day)

Residential		Commercial			
Symbol	Value	Symbol	Value	Symbol	Value
ATc_R	70	ATc_C	70	ATc	70
ATnc_R	26	ATnc_C	25	ATnc	26
ED_R	26	ED_C	25	ED	26
EF_R	350	EF_C	250	EF	350
ET_R	24	ET_C	8	ET	24

(2) **Generic Attenuation Factors:**

Source Medium of Vapors

	Units
Groundwater	(-)
Sub-Slab and Exterior Soil Gas	(-)

Residential		Commercial			
Symbol	Value	Symbol	Value	Symbol	Value
AFgw_R	0.001	AFgw_C	0.001	AFgw	0.001
AFss_R	0.03	AFss_C	0.03	AFss	0.03

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
 Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
 Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

Trichloroethylene

Residential		Commercial			
Symbol	Value	Symbol	Value	Symbol	Value
mIURTCE_R	1.00E-06	mIURTCE_C	0.00E+00	mIURTCE	1.00E-06
IURTCE_R	3.10E-06	IURTCE_C	4.10E-06	IURTCE	3.10E-06

Mutagenic Chemicals

The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration (years)	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 26 years	10	1

Mutagenic-mode-of-action (MMOA) adjustment factor 72 This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride

See the Navigation Guide equation for Cia,c for vinyl chloride.

ATTACHMENT 6
 OSWER VAPOR INTRUSION ASSESSMENT
 Vapor Intrusion Screening Level (VISL) Calculator Version 3.4, June 2015 RSLs

Inhalation Unit Risk	IUR Source*	Reference Concentration	RfC Source*	Mutagenic Indicator	Target Indoor Air Conc. for Carcinogens @ TCR = 1E-06	Target Indoor Air Conc. for Non-Carcinogens @ THQ = 1
IUR		RfC		i	Cia,c	Cia,nc
(ug/m ³) ⁻¹		(mg/m ³)			(ug/m ³)	(ug/m ³)
7.80E-06	I	3.00E-02	I		3.6E-01	3.1E+01
		7.00E-01	P			7.3E+02
3.40E-05	CA	3.00E-03	I		8.3E-02	3.1E+00

Notation:

NVT = Not sufficiently volatile and/or toxic to pose inhalation risk in selected exposure scenario for the indicated medium

C = Carcinogenic

NC = Non-carcinogenic

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at:

P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at:

A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at:

CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at:

H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at:

S = See RSL User Guide, Section 5

X = PPRTV Appendix

E = The Engineering ToolBox. Available online at http://www.engineeringtoolbox.com/explosive-concentration-limits-d_423.html

N = Centers for Disease Control and Prevention (CDC) National Institute for Occupational Safety and Health (NIOSH). Pocket Guide to Chemical Hazards. Available online at:

M = Chemical-specific MSDS

Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).

VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).

TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).

Yellow highlighting indicates site-specific parameters that may be edited by the user.

Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be changed.

**Lower explosive limit is the minimum concentration of the compound in air (% by volume) that is needed for the gas to ignite and explode.

ATTACHMENT 7

ATTACHMENT 7
CONSTRUCTION TRENCH MODELING

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ACRONYMS AND ABBREVIATIONS

$\mu\text{g}/\text{m}^3$	Microgram per cubic meter
$\mu\text{g}/\text{L}$	Microgram per liter
$\text{atm}\cdot\text{m}^3/\text{mol}$	Atmosphere – cubic meter per mole
$\text{atm}\cdot\text{m}^3/\text{mole}\cdot^\circ\text{K}$	Atmosphere – cubic meter per mole – degrees Kelvin
cm	Centimeter
cm^2/s	Square centimeter per second
cm^2/m^2	Square centimeter per square meter
cm^3/m^3	Cubic centimeter per cubic centimeter
COPC	Chemical of potential concern
g/mol	Gram per mole
hr^{-1}	Event per hour
$^\circ\text{K}$	Degrees Kelvin
L/cm^3	Liter per cubic centimeter
L/m^3	Liter per cubic meter
m^2	Square meter
m^3	Cubic meter
s/hr	Second per hour
VDEQ	Virginia Department of Environmental Quality
VF	Volatilization factor

1 TRENCH MODEL METHODOLOGY

Chemical-specific volatilization factors (VF) were used to calculate risk-based screening levels for volatile chemicals of potential concern (COPC) in groundwater for the human health risk assessment. Chemical-specific VFs were used to relate concentrations of volatile chemicals in groundwater that accumulate in a construction trench to airborne concentrations that may be inhaled by construction workers. The VF for this scenario was calculated based on Virginia Department of Environmental Quality (VDEQ) guidance (VDEQ 2015) for sites with groundwater shallower than 15 feet below ground surface, which provides a combination of a vadose zone model to estimate volatilization of gaseous COPCs from groundwater into a trench, and a box model to estimate dispersion of the COPCs from the air inside the trench into aboveground air. These models, which can be described by three equations, are detailed below.

Equation 1

$$C_{trench} = C_{GW} \times VF$$

where:

C_{trench} = Concentration of contaminant in the trench (microgram per cubic meter [$\mu\text{g}/\text{m}^3$])

C_{GW} = Concentration of contaminant in groundwater (microgram per liter [$\mu\text{g}/\text{L}$])

VF = Volatilization factor (see Equation 2) (liter per cubic meter [L/m^3])

Equation 2

$$VF = (K_i \times A \times F \times 10^{-3} \times 10^4 \times 3,600) / (ACH \times V)$$

where:

K_i = Mass transfer coefficient of contaminant i (see Equation I3-3) (centimeter per second [cm/s])

A = Area of the trench (square meter [m^2])

- F = Fraction of floor through which contaminant can enter (unitless)
- ACH = Air changes per hour (hr^{-1})
- V = Volume of trench (m^3)
- 10^{-3} = Conversion factor (liter per cubic centimeter [L/cm^3])
- 10^4 = Conversion factor (square centimeter per square meter [cm^2/m^2])
- 3,600 = Conversion factor (second per hour)

If the ratio of trench width to depth is less than or equal to 1, [VDEQ \(2015\)](#) recommends a value of 2 air changes per hour (ACH). If the ratio of trench width to depth is greater than one, [VDEQ \(2015\)](#) recommends using a value of 360 ACH. The width, length, and depth of the trench were assumed to be 3, 8 and 8 feet, based on a typical construction trench (and the default values for the VDEQ model). The volume of the trench and the ratio of the trench's width to depth can be found in [Table 7-1](#).

Equation 3

$$K_i = 1 / \{ (1/k_{iL}) + [(R T) / (H_i k_{iG})] \}$$

where:

- k_{iL} = Liquid-phase mass transfer coefficient of contaminant i (see Equation I3-4) (cm/s)
- R = Ideal gas constant (atmosphere – cubic meter per mole degrees Kelvin [$\text{atm}\cdot\text{m}^3/\text{mole}\cdot^\circ\text{K}$])
- T = Average system temperature ($^\circ\text{K}$)
- H_i = Henry's Law constant of contaminant i ($\text{atm}\cdot\text{m}^3/\text{mol}$)
- K_{iG} = Gas-phase mass transfer coefficient of contaminant i (see Equation I3-5) (cm/s)

The value for R is 8.2×10^{-5} atm-m³/mole-°K. A site-specific groundwater temperature of 297°K (23.62 °Celsius) was used for T in Equation 3.

Equation 4

$$k_{iL} = (MW_{O_2}/MW_i)^{0.5} \times (T/298) \times k_{L,O_2}$$

where:

k_{iL} = Liquid-phase mass transfer coefficient of contaminant *i* (cm/s)

MW_{O_2} = Molecular weight of oxygen (gram per mole [g/mol])

MW_i = Molecular weight of contaminant *i* (g/mol)

T = Average system absolute temperature (°K)

k_{L,O_2} = Liquid-phase mass transfer coefficient of oxygen at 25 °C (cm/s)

The value of k_{L,O_2} in Equation 4 is 0.002 cm/s.

Equation 5

$$k_{iG} = (MW_{H_2O}/MW_i)^{0.335} \times (T/298)^{1.005} \times k_{G,H_2O}$$

where:

k_{iG} = Gas-phase mass transfer coefficient of contaminant *i* (cm/s)

MW_{H_2O} = Molecular weight of water (g/mol)

T = Average system absolute temperature (°K)

k_{G,H_2O} = Gas-phase mass transfer coefficient of water vapor at 25°C (cm/s)

The value of k_{G,H_2O} in Equation 5 is 0.833 cm/s.

Chemical-specific modeling parameters are summarized and the resulting VFs and trench air concentrations generated from the trench modeling are presented in [Table 7-2](#).

2 REFERENCES

Virginia Department of Environmental Quality (VDEQ). 2015. "Voluntary Remediation Program Risk Assessment Guidance." Accessed on-line October 19. On-line address:
<http://www.deq.state.va.us/Programs/LandProtectionRevitalization/RemediationProgram/VoluntaryRemediationProgram/VRPRiskAssessmentGuidance/Guidance.aspx>

TABLES

TABLE 7-1: TRENCH MODEL INPUT PARAMETERS

For Mass-Transfer Coefficients			
Variable	Value	Units	Source
Gas-phase mass transfer coefficient of water vapor at 25°C (K_{G,H_2O})	0.833	cm/s	Not applicable
Molecular weight of water (MW_{H_2O})	18	unitless	Not applicable
Liquid-phase mass transfer coefficient of oxygen at 25°C (k_{L,O_2})	0.002	cm/s	Not applicable
Molecular weight of oxygen (MW_{O_2})	32	unitless	Not applicable
Average system temperature (T)	297	K	Site-specific (a)
Ideal gas constant (R)	0.000082	atm-m ³ /mol-°K	Not applicable

For Emission Flux and Concentration in Trench			
Variable	Value	Units	Source
Volume conversion factor (CF1)	0.001	L/cm ³	Not applicable
Area conversion factor (CF2)	10,000	cm ² /m ²	Not applicable
Time conversion factor (CF3)	3,600	s/hr	Not applicable
Fraction of floor through which contaminant can enter (F)	1	unitless	Default
Air changes per hour (ACH)	2	hr ⁻¹	Default (b)

Trench dimensions			
Variable	Value	Units	Source
Length of trench	8	feet	Default (b)
Width of trench	3	feet	Default (b)
Depth of trench	8	feet	Default (b)
Ratio of width/depth	0.38	unitless	Default (b)

Notes:

- a Site-specific temperature (T) of 23.62 °Celsius was used.
- b See Section 1.0.
- atm-m³/mol-°K Atmosphere - cubic meter per mole - degrees Kelvin
- cm Centimeter
- cm/s Centimeter per second
- cm²/m² Square centimeter per square meter
- cm³/cm³ Cubic centimeter per cubic centimeter
- hr⁻¹ Event per hour
- K Kelvin
- L/cm³ Liter per cubic centimeter
- s/hr Second per hour

References:

Virginia Department of Environmental Quality (VDEQ). 2015. Voluntary Remediation Program - Risk Assessment Guidance. Table 3.8 Groundwater: Construction Worker in a Trench. Accessed October 19. On-line Address: <http://www.deq.state.va.us/Programs/LandProtectionRevitalization/RemediationProgram/VoluntaryRemediationProgram/VRPRiskAssessmentGuidance/Guidance>.

TABLE 7-2: TRENCH MODEL CHEMICAL-SPECIFIC VALUES AND MODELED

Chemical	CAS No.	Molecular Weight (MW) g/mol	Henry's Law Constant (H) atm-m³/mol	Volatilization Factor (VF) L/m³	Target Air Concentration µg/m³	Target Groundwater Concentration µg/L
TPH Gasoline (Benzene)	71-43-2	78.11	5.55E-03	9.35E+00	2.63E+02	2.82E+01
Di-Isopropyl ether	108-20-3	102.18	2.56E-03	8.08E+00	6.13E+03	7.62E+02
TPH Diesel (Naphthalene)	91-20-3	128.17	4.83E-04	6.60E+00	2.63E+01	1.33E+02

µg/L micrograms per liter
µg/m³ micrograms per cubic meter
atm-m³/mol Atmosphere - cubic meter per mole
CAS Chemical Abstract Service
g/mol Gram per mole
L/m³ Liter per cubic meter

Chemical-specific constants from VDEQ (2015).

References:

Virginia Department of Environmental Quality (VDEQ). 2015. Voluntary Remediation Program - Risk Assessment Guidance. Table 3.8 Groundwater: Construction Worker in a Trench. Accessed October 19. On-line Address: <http://www.deq.state.va.us/Programs/LandProtectionRevitalization/RemediationProgram/VoluntaryRemediationProgram/VRPRiskAssessmentGuidance/Guidance.aspx>

ATTACHMENT 8

ATTACHMENT 4: DERIVATION OF CONSTRUCTION WORKER RISK-BASED SCREENING LEVEL FOR LEAD

Potential exposure of receptors to lead in surface soil and subsurface soil through incidental ingestion, dermal contact, and inhalation of particulates in ambient air is difficult to assess. However, lead does not have toxicity values that would enable the chemical to be evaluated by the same methodology as the other chemicals. As a result, lead was evaluated using the Adult Lead Methodology (ALM) Model (EPA 2009) for construction workers. The ALM is used to assess lead risks from soil at non-residential Superfund sites. The baseline blood lead concentration (PbB) input parameter of the ALM represents the geometric mean blood lead concentration in women of child-bearing age and the geometric standard deviation (GSD) input parameter is a measure of the inter-individual variability in these concentrations. The revised GSD of 1.8 was used in EPA’s calculator (EPA 2009) to derive a PbB in soil for women 17 to 45 (child-bearing) years of age in a working environment and has been accepted by the State of California (Cal/EPA 2009).

The basis for the calculation of the blood lead concentration of women of child-bearing age is the following equation:

$$RBSL = \frac{\left(\left[\frac{PbB_{fetal,95}}{(R_{fetal/maternal} \times GSD_i)} \right] - PbB_0 \right) \times AT_{S,D}}{BKSF \times IR_S \times AF_{S,D} \times EF_{S,D}}$$

The description of the input parameters are presented in the table below.

Variable	Description of Variable	Units	Model Inputs	Source of input values
PbB _{fetal, 0.95}	95 th percentile PbB in fetus	µg/dL	1	Cal/EPA 2009
R _{fetal/maternal}	Fetal/maternal PbB ratio	--	0.9	Cal/EPA 2009 EPA 2009
BKSF	Biokinetic Slope Factor	µg/dL per µg/day	0.4	Cal/EPA 2009 EPA 2009
GSD _i	Geometric standard deviation PbB	--	1.8	Cal/EPA 2009
PbB ₀	Baseline PbB	µg/dL	0	Cal/EPA 2009
IR _S	Soil ingestion rate	g/day	0.330	DTSC 2014 EPA 2015
AF _{S,D}	Absorption fraction (same for soil and dust)	--	0.12	Cal/EPA 2009 EPA 2009
EF _{S,D}	Exposure frequency (same for soil and dust)	days/year	250	DTSC 2014 EPA 2015
AT _{S,D}	Averaging time (same for soil and dust)	days/year	365	DTSC 2014 EPA 2015

Notes:

µg/day microgram per day

µg/dL	microgram per deciliter
g/day	grams per day
mg/kg	milligrams per kilogram
RBSL	Risk-based screening level

For the construction worker, State of California (Cal/EPA 2009, DTSC 2014) and EPA (EPA 2009, 2015) default exposure parameters were used in running the ALM for this receptor including the target blood lead level (PbB) of 1 microgram per deciliter (µg/dL). A screening level of 39 mg/kg was calculated for a construction worker using the ALM model.

REFERENCES

- California Environmental Protection Agency (Cal/EPA). 2009. Revised California Human Health Screening Levels for Lead. Office of Environmental Health Hazard Assessment. September.
- California Department of Toxic Substances Control (DTSC). 2014. Human Health Risk Assessment Note Number 1: Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities. September 30. Accessed on-line: http://www.dtsc.ca.gov/AssessingRisk/upload/HHRA_Note1-2.pdf
- EPA. 2009. Adult Lead Model. Technical Review Workgroup for Lead, Adult Lead Committee. June 21. Accessed on-line: <http://www.epa.gov/superfund/lead/products.htm>
- EPA. 2015. Regional Screening Levels (RSL) for Chemical Contaminants. June. Accessed on-line: <http://www.epa.gov/region9/superfund/prg/>

ATTACHMENT 9

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation 10/16/2015 9:59:02 AM
From File WorkSheet.xls
Full Precision OFF

Rosner's Outlier Test for Lead

Mean 358
Standard Deviation 1209
Number of data 53
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	358	1198	7670	1	6.105	3.151	3.504

For 5% Significance Level, there is 1 Potential Outlier
Potential outliers is: 7670

For 1% Significance Level, there is 1 Potential Outlier
Potential outliers is: 7670

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation 10/16/2015 9:59:53 AM
From File WorkSheet.xls
Full Precision OFF

Rosner's Outlier Test for Lead

Mean 217.4
Standard Deviation 649.9
Number of data 52
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	217.4	643.6	3380	1	4.914	3.144	3.496

For 5% Significance Level, there is 1 Potential Outlier
Potential outliers is: 3380

For 1% Significance Level, there is 1 Potential Outlier
Potential outliers is: 3380

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation 10/16/2015 10:00:38 AM
From File WorkSheet.xls
Full Precision OFF

Rosner's Outlier Test for Lead

Mean 155.4
Standard Deviation 476.3
Number of data 51
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	155.4	471.6	3170	1	6.392	3.137	3.488

For 5% Significance Level, there is 1 Potential Outlier
Potential outliers is: 3170

For 1% Significance Level, there is 1 Potential Outlier
Potential outliers is: 3170

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation 10/16/2015 10:01:12 AM
From File WorkSheet.xls
Full Precision OFF

Rosner's Outlier Test for Lead

Mean 95.07
Standard Deviation 205.8
Number of data 50
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	95.07	203.7	1470	1	6.75	3.13	3.48

For 5% Significance Level, there is 1 Potential Outlier
Potential outliers is: 1470

For 1% Significance Level, there is 1 Potential Outlier
Potential outliers is: 1470

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation 10/16/2015 10:01:48 AM
From File WorkSheet.xls
Full Precision OFF

Rosner's Outlier Test for Lead

Mean 67.01
Standard Deviation 55.05
Number of data 49
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	67.01	54.48	266	1	3.652	3.12	3.47

For 5% Significance Level, there is 1 Potential Outlier
Potential outliers is: 266

For 1% Significance Level, there is 1 Potential Outlier
Potential outliers is: 266

Outlier Tests for Selected Uncensored Variables

User Selected Options

Date/Time of Computation 10/16/2015 10:02:31 AM
From File WorkSheet.xls
Full Precision OFF

Rosner's Outlier Test for Lead

Mean 62.86
Standard Deviation 47.27
Number of data 48
Number of suspected outliers 1

#	Mean	sd	Potential outlier	Obs. Number	Test value	Critical value (5%)	Critical value (1%)
1	62.86	46.78	185	1	2.611	3.11	3.46

For 5% Significance Level, there is no Potential Outlier

For 1% Significance Level, there is no Potential Outlier

All Lead ResultsRemedial Investigation for Cross Alameda Trail
City of Alameda, California

Well/Sample ID	Lead Concentration mg/kg
CAT-B-10-2	170
CAT-B-10-5	26
CAT-B-11-0.5	116
CAT-B-11-4	29.4
CAT-B-1-2	40.4
CAT-B-12-0.5	18.6
CAT-B-12-4	6.9
CAT-B-13-0.5	103
CAT-B-13-4	96.8
CAT-B-1-4	35.7
CAT-B-14-0.5	22.3
CAT-B-14-4	10.7
CAT-B-19-0.5	144
CAT-B-19-4	3,380
CAT-B-20-0.5	133
CAT-B-20-4	39.3
CAT-B-21-0.5	24.5
CAT-B-21-4	46.5
CAT-B-2-2	61.3
CAT-B-22-0.5	84.9
CAT-B-22-4	89.6
CAT-B-23-0.5	65.1
CAT-B-23-2	91
CAT-B-24-0.5	52
CAT-B-24-2	50.7
CAT-B-2-5	79.7
CAT-B-25-0.5	86.9
CAT-B-25-2	112
CAT-B-26-0.5	76.1
CAT-B-26-2	160
CAT-B-27-0.5	3,170
CAT-B-27-4	15.5
CAT-B-28-0.5	266
CAT-B-28-4	1,470
CAT-B-29-0.5	12.5
CAT-B-29-4	63.4
CAT-B-30-0.5	111
CAT-B-30-4	7,670
CAT-B-3-1	24.0
CAT-B-3-4	2.6
CAT-B-4-2	37
CAT-B-4-5	36.6
CAT-B-5-1	68.4
CAT-B-5-5	3
CAT-B-6-1	26.2
CAT-B-6-4	185
CAT-B-7-1	22
CAT-B-7-4	92.9
CAT-B-8-2	40.5
CAT-B-8-8	16.9
CAT-B-9-1	54.6
CAT-B-9-6	6.9

Highlighted samples removed as hotspots

All Lead Results with Outliers Removed
 Remedial Investigation for Cross Alameda Trail
 City of Alameda, California

Well/Sample ID	Lead Concentration mg/kg
CAT-B-6-4	185
CAT-B-10-2	170
CAT-B-26-2	160
CAT-B-20-0.5	133
CAT-B-11-0.5	116
CAT-B-25-2	112
CAT-B-13-0.5	103
CAT-B-13-4	96.8
CAT-B-7-4	92.9
CAT-B-23-2	91
CAT-B-22-4	89.6
CAT-B-25-0.5	86.9
CAT-B-22-0.5	84.9
CAT-B-2-5	79.7
CAT-B-26-0.5	76.1
CAT-B-5-1	68.4
CAT-B-23-0.5	65.1
CAT-B-29-4	63.4
CAT-B-2-2	61.3
CAT-B-9-1	54.6
CAT-B-24-0.5	52
CAT-B-24-2	50.7
CAT-B-21-4	46.5
CAT-B-8-2	40.5
CAT-B-1-2	40.4
CAT-B-20-4	39.3
CAT-B-4-2	37
CAT-B-4-5	36.6
CAT-B-1-4	35.7
CAT-B-11-4	29.4
CAT-B-6-1	26.2
CAT-B-10-5	26
CAT-B-21-0.5	24.5
CAT-B-3-1	24.0
CAT-B-14-0.5	22.3
CAT-B-7-1	22
CAT-B-12-0.5	18.6
CAT-B-8-8	16.9
CAT-B-27-4	15.5
CAT-B-29-0.5	12.5
CAT-B-14-4	10.7
CAT-B-12-4	6.9
CAT-B-9-6	6.9
CAT-B-5-5	3
CAT-B-3-4	2.6

UCL Statistics for Uncensored Full Data Sets

User Selected Options

Date/Time of Computation 10/19/2015 1:49:04 PM
 From File WorkSheet_b.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lead

General Statistics

Total Number of Observations	47	Number of Distinct Observations	46
		Number of Missing Observations	0
Minimum	2.6	Mean	61.52
Maximum	185	Median	50.7
SD	46.85	Std. Error of Mean	6.834
Coefficient of Variation	0.762	Skewness	0.885

Normal GOF Test

Shapiro Wilk Test Statistic	0.912	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.946	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.141	Lilliefors GOF Test
5% Lilliefors Critical Value	0.129	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	72.99	95% Adjusted-CLT UCL (Chen-1995)	73.7
		95% Modified-t UCL (Johnson-1978)	73.14

Gamma GOF Test

A-D Test Statistic	0.198	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.768	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.072	Kolmogrov-Smirnoff Gamma GOF Test
5% K-S Critical Value	0.132	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.468	k star (bias corrected MLE)	1.389
Theta hat (MLE)	41.9	Theta star (bias corrected MLE)	44.3
nu hat (MLE)	138	nu star (bias corrected)	130.5
MLE Mean (bias corrected)	61.52	MLE Sd (bias corrected)	52.21
		Approximate Chi Square Value (0.05)	105.1
Adjusted Level of Significance	0.0449	Adjusted Chi Square Value	104.4

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	76.38	95% Adjusted Gamma UCL (use when n<50)	76.9
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.933	Shapiro Wilk Lognormal GOF Test
5% Shapiro Wilk Critical Value	0.946	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0941	Lilliefors Lognormal GOF Test
5% Lilliefors Critical Value	0.129	Data appear Lognormal at 5% Significance Level

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.956	Mean of logged Data	3.742
Maximum of Logged Data	5.22	SD of logged Data	1.009

Assuming Lognormal Distribution

95% H-UCL	99.4	90% Chebyshev (MVUE) UCL	104.9
95% Chebyshev (MVUE) UCL	121.2	97.5% Chebyshev (MVUE) UCL	143.7
99% Chebyshev (MVUE) UCL	188		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	72.76	95% Jackknife UCL	72.99
95% Standard Bootstrap UCL	72.54	95% Bootstrap-t UCL	73.61
95% Hall's Bootstrap UCL	73.04	95% Percentile Bootstrap UCL	73.26
95% BCA Bootstrap UCL	73.08		
90% Chebyshev(Mean, Sd) UCL	82.02	95% Chebyshev(Mean, Sd) UCL	91.31
97.5% Chebyshev(Mean, Sd) UCL	104.2	99% Chebyshev(Mean, Sd) UCL	129.5

Suggested UCL to Use

95% Adjusted Gamma UCL 76.9

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets. For additional insight the user may want to consult a statistician.

Surface soil Lead Results

Remedial Investigation for Cross Alameda Trail
City of Alameda, California

Well/Sample ID	Lead Concentration mg/kg
CAT-B-11-0.5	116
CAT-B-12-0.5	18.6
CAT-B-13-0.5	103
CAT-B-14-0.5	22.3
CAT-B-19-0.5	144
CAT-B-20-0.5	133
CAT-B-21-0.5	24.5
CAT-B-22-0.5	84.9
CAT-B-23-0.5	65.1
CAT-B-24-0.5	52
CAT-B-25-0.5	86.9
CAT-B-26-0.5	76.1
CAT-B-27-0.5	3,170
CAT-B-28-0.5	266
CAT-B-29-0.5	12.5
CAT-B-30-0.5	111

Highlighted samples removed as hotspots

All Lead Results with Outliers Removed
Remedial Investigation for Cross Alameda Trail
City of Alameda, California

Well/Sample ID	Lead Concentration mg/kg
CAT-B-11-0.5	116
CAT-B-12-0.5	18.6
CAT-B-13-0.5	103
CAT-B-14-0.5	22.3
CAT-B-21-0.5	24.5
CAT-B-22-0.5	84.9
CAT-B-23-0.5	65.1
CAT-B-24-0.5	52
CAT-B-25-0.5	86.9
CAT-B-26-0.5	76.1
CAT-B-29-0.5	12.5

UCL Statistics for Uncensored Full Data Sets

User Selected Options
 Date/Time of Computation 10/21/2015 11:54:10 AM
 From File WorkSheet.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Lead

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	12.5	Mean	60.17
Maximum	116	Median	65.1
SD	36.51	Std. Error of Mean	11.01
Coefficient of Variation	0.60	Skewness	0.0263

Normal GOF Test

Shapiro Wilk Test Statistic	0.92	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.85	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.19	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.26	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	80.12	95% Adjusted-CLT UCL (Chen-1995)	78.37
		95% Modified-t UCL (Johnson-1978)	80.14

Gamma GOF Test

A-D Test Statistic	0.53	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.73	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.19	Kolmogrov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.25	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.29	k star (bias corrected MLE)	1.732
Theta hat (MLE)	26.18	Theta star (bias corrected MLE)	34.74
nu hat (MLE)	50.56	nu star (bias corrected)	38.11
MLE Mean (bias corrected)	60.17	MLE Sd (bias corrected)	45.72
		Approximate Chi Square Value (0.05)	24.97
Adjusted Level of Significance	0.027	Adjusted Chi Square Value	23.25

Assuming Gamma Distribution

Approximate Gamma UCL (use when n>=50)	91.83	5% Adjusted Gamma UCL (use when n<50)	98.63
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.88	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.85	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.20	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.26	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.52	Mean of logged Data	3.864
Maximum of Logged Data	4.75	SD of logged Data	0.781

Assuming Lognormal Distribution

95% H-UCL	122.9	90% Chebyshev (MVUE) UCL	108.6
95% Chebyshev (MVUE) UCL	129.5	97.5% Chebyshev (MVUE) UCL	158.4
99% Chebyshev (MVUE) UCL	215.3		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	78.28	95% Jackknife UCL	80.12
95% Standard Bootstrap UCL	77.65	95% Bootstrap-t UCL	80.19
95% Hall's Bootstrap UCL	76.82	95% Percentile Bootstrap UCL	77.41
95% BCA Bootstrap UCL	77.21		
90% Chebyshev(Mean, Sd) UCL	93.2	95% Chebyshev(Mean, Sd) UCL	108.2
97.5% Chebyshev(Mean, Sd) UCL	128.9	99% Chebyshev(Mean, Sd) UCL	169.7

Suggested UCL to Use

95% Student's-t UCL 80.12

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets. For additional insight the user may want to consult a statistician.

ATTACHMENT 10

ATTACHMENT 10**All Arsenic Results**Remedial Investigation for Cross Alameda Trail
City of Alameda, California

Well/Sample ID	Arsenic (mg/kg)
CAT-B-10-2	6.2
CAT-B-10-5	1.4
CAT-B-11-0.5	24.8
CAT-B-11-4	14.2
CAT-B-1-2	15.4
CAT-B-12-0.5	5.6
CAT-B-12-4	9.4
CAT-B-13-0.5	16.3
CAT-B-13-4	17.1
CAT-B-1-4	27.2
CAT-B-14-0.5	35.8
CAT-B-14-4	10.5
CAT-B-15-0.5	13.5
CAT-B-15-2	7.2
CAT-B-16-0.5	27.2
CAT-B-16-2	14.7
CAT-B-17-0.5	26.6
CAT-B-17-2	10
CAT-B-18-0.5	9.2
CAT-B-18-2	7.5
CAT-B-2-2	29.7
CAT-B-23-0.5	1.4
CAT-B-23-2	0.71
CAT-B-24-0.5	7.8
CAT-B-24-2	0.72
CAT-B-2-5	12.3
CAT-B-25-0.5	10.6
CAT-B-25-2	4.7
CAT-B-26-0.5	7.2
CAT-B-26-2	8
CAT-B-3-1	8.0
CAT-B-3-4	7.2
CAT-B-4-2	6.8
CAT-B-4-5	6.3
CAT-B-5-1	6.2
CAT-B-5-5	1.7
CAT-B-6-1	5.3
CAT-B-6-4	3.9
CAT-B-7-1	4.3
CAT-B-7-4	5.1
CAT-B-8-2	6.5
CAT-B-8-8	2.7
CAT-B-9-1	7.8
CAT-B-9-6	4.9

Highlighted samples removed as hotspots

ATTACHMENT 10**All Arsenic Results Minus Hotspots**

Remedial Investigation for Cross Alameda Trail
City of Alameda, California

Well/Sample ID	Arsenic (mg/kg)
CAT-B-10-2	6.2
CAT-B-10-5	1.4
CAT-B-12-0.5	5.6
CAT-B-12-4	9.4
CAT-B-15-0.5	13.5
CAT-B-15-2	7.2
CAT-B-18-0.5	9.2
CAT-B-18-2	7.5
CAT-B-23-0.5	1.4
CAT-B-23-2	0.71
CAT-B-24-0.5	7.8
CAT-B-24-2	0.72
CAT-B-25-0.5	10.6
CAT-B-25-2	4.7
CAT-B-26-0.5	7.2
CAT-B-26-2	8
CAT-B-3-1	8.0
CAT-B-3-4	7.2
CAT-B-4-2	6.8
CAT-B-4-5	6.3
CAT-B-5-1	6.2
CAT-B-5-5	1.7
CAT-B-6-1	5.3
CAT-B-6-4	3.9
CAT-B-7-1	4.3
CAT-B-7-4	5.1
CAT-B-8-2	6.5
CAT-B-8-8	2.7
CAT-B-9-1	7.8
CAT-B-9-6	4.9

ATTACHMENT 10

UCL Statistics for Uncensored Full Data Sets

User Selected Options
 Date/Time of Computation 10/22/2015 4:34:56 PM
 From File WorkSheet.xls
 Full Precision OFF
 Confidence Coefficient 95%
 mber of Bootstrap Operations 2000

Arsenic

General Statistics

Total Number of Observations	30	Number of Distinct Observations	24
		Number of Missing Observations	0
Minimum	0.71	Mean	5.928
Maximum	13.5	Median	6.25
SD	2.996	Std. Error of Mean	0.547
Coefficient of Variation	0.506	Skewness	0.0831

Normal GOF Test

Shapiro Wilk Test Statistic	0.962	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.927	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.111	Lilliefors GOF Test
5% Lilliefors Critical Value	0.162	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	6.857	95% Adjusted-CLT UCL (Chen-1995)	6.836
		95% Modified-t UCL (Johnson-1978)	6.859

Gamma GOF Test

A-D Test Statistic	1.372	Anderson-Darling Gamma GOF Test
5% A-D Critical Value	0.754	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.177	Kolmogrov-Smirnoff Gamma GOF Test
5% K-S Critical Value	0.161	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.663	k star (bias corrected MLE)	2.419
Theta hat (MLE)	2.226	Theta star (bias corrected MLE)	2.451
nu hat (MLE)	159.8	nu star (bias corrected)	145.1
MLE Mean (bias corrected)	5.928	MLE Sd (bias corrected)	3.811
		Approximate Chi Square Value (0.05)	118.3
Adjusted Level of Significance	0.041	Adjusted Chi Square Value	116.9

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	7.273	95% Adjusted Gamma UCL (use when n<50)	7.36
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Lognormal GOF Test

Shapiro Wilk Test Statistic	0.827	Shapiro Wilk Lognormal GOF Test
5% Shapiro Wilk Critical Value	0.927	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.216	Lilliefors Lognormal GOF Test
5% Lilliefors Critical Value	0.162	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.342	Mean of logged Data	1.58
Maximum of Logged Data	2.603	SD of logged Data	0.753

Assuming Lognormal Distribution

95% H-UCL	8.763	90% Chebyshev (MVUE) UCL	9.249
95% Chebyshev (MVUE) UCL	10.55	97.5% Chebyshev (MVUE) UCL	12.36
99% Chebyshev (MVUE) UCL	15.91		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	6.828	95% Jackknife UCL	6.857
95% Standard Bootstrap UCL	6.809	95% Bootstrap-t UCL	6.88
95% Hall's Bootstrap UCL	6.919	95% Percentile Bootstrap UCL	6.777
95% BCA Bootstrap UCL	6.794		
90% Chebyshev(Mean, Sd) UCL	7.569	95% Chebyshev(Mean, Sd) UCL	8.312
97.5% Chebyshev(Mean, Sd) UCL	9.344	99% Chebyshev(Mean, Sd) UCL	11.37

Suggested UCL to Use

95% Student's-t UCL 6.857

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.

For additional insight the user may want to consult a statistician.

ATTACHMENT 10

Surface Soil Arsenic Results

Remedial Investigation for Cross Alameda Trail
City of Alameda, California

Well/Sample ID	Arsenic (mg/kg)
CAT-B-11-0.5	24.8
CAT-B-12-0.5	5.6
CAT-B-13-0.5	16.3
CAT-B-14-0.5	35.8
CAT-B-15-0.5	13.5
CAT-B-16-0.5	27.2
CAT-B-17-0.5	26.6
CAT-B-18-0.5	9.2
CAT-B-23-0.5	1.4
CAT-B-24-0.5	7.8
CAT-B-25-0.5	10.6
CAT-B-26-0.5	7.2

Highlighted samples removed as hotspots

ATTACHMENT 10

Surface Soil Arsenic Results Minus Hotspots

Remedial Investigation for Cross Alameda Trail

City of Alameda, California

Well/Sample ID	Arsenic (mg/kg)
CAT-B-12-0.5	5.6
CAT-B-15-0.5	13.5
CAT-B-18-0.5	9.2
CAT-B-23-0.5	1.4
CAT-B-24-0.5	7.8
CAT-B-25-0.5	10.6
CAT-B-26-0.5	7.2

ATTACHMENT 10

UCL Statistics for Uncensored Full Data Sets

User Selected Options
 Date/Time of Computation 10/21/2015 12:35:32 PM
 From File | Worksheet_a.xls
 Full Precision OFF
 Confidence Coefficient 95%
 Number of Bootstrap Operations 2000

Arsenic

General Statistics			
Total Number of Observations	7	Number of Distinct Observations	7
		Number of Missing Observations	0
Minimum	1.4	Mean	7.9
Maximum	13.5	Median	7.8
SD	3.838	Std. Error of Mean	1.451
Coefficient of Variation	0.486	Skewness	-0.37

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test			
Shapiro Wilk Test Statistic	0.987	Shapiro Wilk GOF Test	
5% Shapiro Wilk Critical Value	0.803	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.142	Lilliefors GOF Test	
5% Lilliefors Critical Value	0.335	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution			
95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	10.72	95% Adjusted-CLT UCL (Chen-1995)	10.07
		95% Modified-t UCL (Johnson-1978)	10.68

Gamma GOF Test			
A-D Test Statistic	0.445	Anderson-Darling Gamma GOF Test	
5% A-D Critical Value	0.712	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.227	Kolmogrov-Smirnov Gamma GOF Test	
5% K-S Critical Value	0.314	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics			
k hat (MLE)	3.079	k star (bias corrected MLE)	1.854
Theta hat (MLE)	2.566	Theta star (bias corrected MLE)	4.26
nu hat (MLE)	43.1	nu star (bias corrected)	25.96
MLE Mean (bias corrected)	7.9	MLE Sd (bias corrected)	5.801
		Approximate Chi Square Value (0.05)	15.35
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	12.95

Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50)	13.36	95% Adjusted Gamma UCL (use when n<50)	15.83

Lognormal GOF Test			
Shapiro Wilk Test Statistic	0.812	Shapiro Wilk Lognormal GOF Test	
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.265	Lilliefors Lognormal GOF Test	
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics			
Minimum of Logged Data	0.336	Mean of logged Data	1.896
Maximum of Logged Data	2.603	SD of logged Data	0.743

Assuming Lognormal Distribution			
95% H-UCL	21.87	90% Chebyshev (MVUE) UCL	15.49
95% Chebyshev (MVUE) UCL	18.71	97.5% Chebyshev (MVUE) UCL	23.18
99% Chebyshev (MVUE) UCL	31.96		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs			
95% CLT UCL	10.29	95% Jackknife UCL	10.72
95% Standard Bootstrap UCL	10.06	95% Bootstrap-t UCL	10.61
95% Hall's Bootstrap UCL	10.41	95% Percentile Bootstrap UCL	10.13
95% BCA Bootstrap UCL	9.943		
90% Chebyshev(Mean, Sd) UCL	12.25	95% Chebyshev(Mean, Sd) UCL	14.22
97.5% Chebyshev(Mean, Sd) UCL	16.96	99% Chebyshev(Mean, Sd) UCL	22.33

Suggested UCL to Use
 95% Student's-t UCL 10.72

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). However, simulation results will not cover all Real World data sets. For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.