KELLEHER & ASSOCIATES
Environmental Mgmt LLC

5655 Silver Creek Valley Road
PMB 281
San Jose, CA 95138
408-677-3307 (P)
408-677-3272 (F)
bkellehr@ix.netcom.com

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Environmental Health

**September 17, 2009**

Steven Plunkett
Alameda Country Health Care Services ("County")
1131 Harbor Bay Parkway, Suite 250
Alameda County, CA 94502-6577

**LUFT Site:** 900 Central Ave, Alameda (Site)
**Re:** Report Submittal –*Corrective Action Plan*, (revised) September 16, 2009.

Dear Mr. Plunkett:

On behalf of the parties contributing to the 900 Central Avenue Corrective Action Account, please find enclosed herewith a copy of the above-referenced Corrective Action Plan (CAP) prepared by RRM, Inc., Santa Cruz, CA (RRM).

On behalf of the parties participating in site-remediation efforts, I declare under penalty of perjury that the information contained in the enclosed document is true and correct to the best of my knowledge.

RRM prepared the CAP pursuant to directives set forth in County correspondence dated December 8, 2008. In the CAP RRM summarizes available information on contaminant distribution in soil and groundwater, identifies and evaluates potential health risks and risk-exposure pathways, establishes appropriate risk-based cleanup goals to mitigate the identified risks, and identifies and evaluates four remedial options for meeting the cleanup goals.

RRM revised the CAP pursuant to recommendations provided by County staff. The revisions includes two additional tables summarizing costs and remediation timelines for the remedial alternatives that were considered, as well as an additional appendix providing detailed cost estimates for these alternatives. In addition, RRM has refined the text of the document as needed to reflect any revisions to their original cost estimates.

According to RRM, there is a 10-feet thick, by 30-feet wide by 60-feet long zone of heavily impacted saturated soils (670 bank cubic yards) between 7 to 17 feet from grade extending southwest from the former tank area through the area of well MW-1. RRM has concluded the TPHg and benzene levels in saturated soils and groundwater within the central portion of this impacted zone, are high enough to represent a secondary source area and present a vapor-intrusion risk.

RRM has concluded that remedial excavation is the optimal remedial approach for meeting site-cleanup goals. Specifically, they are recommending excavating and off-hauling the most heavily impacted saturated soils in the central portion of the impacted area described above and then purging the pit of contaminated groundwater. They considered and rejected sparging-enhanced dual-phase extraction and in-situ chemical oxidation on the basis of various evaluation criteria including the likelihood of agency and community acceptance, short and long term effectiveness in reducing contaminant levels, technical merits, and economics.

The targeted work area is 30-feet long by 25-feet wide by 18-feet deep and involves 500 bank cubic yards of soil that will be excavated and replaced with clean fill. The upper 7 feet of unsaturated soil (190 yards) is assumed to be free of contamination and will be off-hauled to a Class III landfill since there is nowhere to store it within the site boundaries. The 10-foot-thick interval of heavily-impacted saturated soils from 8 to 18 feet from grade (280 bank cubic yards) will be off-hauled to a Class II

landfill. Depending on the groundwater recharge rate, the highly contaminated standing water that enters the pit will either be off-hauled for disposal via vacuum tank trucks or extracted and treated on site under a short-term public works permit with discharge to a sanitary sewer cleanout.

The CAP calls removing and replacing affected areas of street and sidewalk on the corner of Central and Ninth including the underlying storm-water collection system. It also calls for installing interlocking sheet shoring, confirmation sampling, traffic control, and appropriate safety and security measures. The project will require City grading and encroachment permits as well as County approval. It will also require CAL-Trans approval and pre-profiling the soils for disposal to allow for direct loading for Class II and III landfill disposal.

The work is optimally conducted in dry weather and during low-water-table conditions. The project is tentatively scheduled for the late third or early fourth quarter 2009 contingent upon securing all necessary permits and approvals.

We are in the process of making all the associated Geotracker and FTP uploads that are due in connection with this report.

Thank you for your ongoing courtesy and cooperation.

Sincerely:

Brian T. Kelleher

Court consultant/project coordinator

Cc with enclosure: Kim Dincel, Esq., Hines, Smith et al, counsel for Pearce Parties; Gail Ward, Senior Claims Specialist, Safeco, for Thompson Parties; Joe Ryan, Esq., Ryan & Lifter, counsel for Thompson Parties; Laurie Sherwood, Esq., Walsworth & Franklin et al counsel for Peterson Parties; Edward Martins, Esq., counsel for Ann Marie Holland and Estate of John Holland Sr.; Hal Reiland, counsel for Barbara Holland; Jack Holland Jr., c/o Mulholland Bros; cc cover letter only, Matt Kaempf, RRM

# CORRECTIVE ACTION PLAN (REVISED)

Holland Oil/Pearce Property
900 Central Avenue
Alameda, CA

Prepared for:
900 Central Avenue Corrective Action Account
c/o Mr. Brian Kelleher
Kelleher & Associates
5655 Silver Creek Valley Road, PMB 281
San Jose, CA 95138

Prepared by:
RRM, Inc.
2560 Soquel Avenue, Suite 202
Santa Cruz, CA 95062

September 16, 2009

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## 1.0 INTRODUCTION

This report presents a Corrective Action Plan (CAP) for the leaking underground storage tank (UST) case located at 900 Central Avenue, Alameda, CA (Figure 1). As such, this document is intended to comply with requirements set forth in California Code of Regulations Article 11, Chapter 16, Title 23.

In a letter dated December 8, 2008, the Alameda County Environmental Health Services (ACEHS) requested preparation of this CAP to select an appropriate and cost-effective technology for remediation of impacted soil and groundwater at the site. Discussions of the site background, corrective action goals, corrective action alternatives, and the recommended alternative are presented in subsequent sections of this report. This document addresses County recommendations in the December 8, 2008 letter to conduct soil gas sampling and conduct additional investigations for vertical delineation of the contaminated interval in advance of CAP preparation.

## 2.0 SITE BACKGROUND

### 2.1 Physical Site Conditions

**Location.** The site is located on the southeast corner of Central Avenue and Ninth Street in Alameda, CA. In September 1975 the site operated as a Holland Oil Company retail gasoline station that consisted of a garage at the southwest corner, a pump island canopy in the northeast quadrant, three 550-gallon underground storage tanks (USTs) located beneath the sidewalk along Ninth Street, and reportedly, a waste oil tank. According to Alameda Fire Department records, the original permit for the tanks was issued in 1931 to Mohawk Oil Company. A 1973 business directory lists the operator as EZ Pickings Gas and a 1975 directory as Holland Service Station No. 1. The tanks were removed by Holland Oil Company Inc., in September 1975.

In 1976 the property was sold to the Peterson family. In 1978, the Petersons sold the property to Gary Thompson dba Oak Construction. In October 1978 Oak Construction razed the gas station structures and constructed a residential duplex. The current owners, Karen and Gary Pearce, purchased the property in May 1985. The identification of subsurface contamination in 1994 instigated a lawsuit between the past and present owners. Due to the complexity of the lawsuit, William Nagle was appointed as Special Master in 1996 to help resolve the case. In 2003, Brian Kelleher of Kelleher & Associates in San Jose, CA was appointed on behalf of the litigating parties to coordinate remedial response actions and associated cost recovery work.

The property is located in a mixed residential/commercial area. To the west, at the southwest corner of Central Avenue and Ninth Street, was a former church that has since been converted to a movie theater. The property to the northwest (841 Central Avenue) is reportedly the location of a former gas station that operated from approximately 1947 to 1969. Both former gas station properties and the remainder of the surrounding properties are currently residential (Figure 2).

**Local Surface Water.** The nearest surface water is a man-made lagoon system approximately 1,000 feet south of the site; the San Francisco Bay is approximately 2,000 feet southwest, and the Brooklyn Basin is located approximately 1 mile northeast (Figure 1).

**Local Geology.** The site is on gently sloping terrain approximately 25 feet above mean sea level. Based on interpretation of historical boring logs, the site is underlain by sandy fill to a depth of approximately 3.5 feet. Fine sandy silt and poorly graded sand was encountered beneath the fill to approximately 26 feet below ground surface (bgs), the maximum depth explored. (Lowney*, Soil and Groundwater Quality Reconnaissance,* July 20, 1994*;* and Allwest*, Subsurface Investigation Report,* August 5, 1997, and quarterly monitoring reports for 1999 and 2002). Boring logs are presented in Appendix A, and a cross section is shown on Figures 2 and 3.

**Local Groundwater.** First encountered groundwater has been measured between approximately 10 and 14 feet bgs in soil borings advanced at the site; however, from the over four years of quarterly groundwater monitoring, depth to water has ranged from approximately 6 to 13 feet bgs, and appears to be seasonally influenced. Groundwater has generally been determined to flow to the southwest toward the San Francisco Bay. A groundwater elevation contour map prepared from data collected February 9, 2009 is shown on Figure 4 and groundwater monitoring well construction and groundwater elevation data are summarized in Tables 1 and 2, respectively.

**Utility Survey.** In February 2009, RRM conducted a utility survey for the site and vicinity. East Bay Municipal Utility District supplies water to the site, Pacific Gas & Electric (PG&E) supplies natural gas and electricity (electric lines are overhead), and the City of Alameda provides sanitary and storm sewer utilities. Given that the depth to groundwater at the site has been measured at depths as shallow as approximately 6 feet bgs, and the dissolved petroleum hydrocarbon plume appears to extend into Central Avenue; the utilities could serve as preferential pathways for migration. The approximate locations of identified utilities are shown on Figure 2.

**Well Survey.** In December 2002, Allwest Environmental, Inc. (Allwest) of San Francisco, CA reviewed data from the California Department of Water Resources, Alameda County Public Works, and the State Water Resources Control Board Geotracker database to locate drinking water wells located within 1,000 feet of the site. Five wells were identified within 1,000 feet of the site, but none were identified as drinking water wells. The three closest wells (ID#'s 18, 19, and 20) are located approximately 581 feet southwest, 264 feet west, and 264 feet north of the site, respectively; the use of Well #18 is unknown and the well could not be located in the field, Well #19 is listed as an irrigation well, and Well #20 is listed as a monitoring well. The remaining two wells (ID#'s 11 and17) are located upgradient of the site approximately 950 feet southeast and 792 feet east, respectively; both are listed as irrigation wells. Since the dissolved plume does not extend beyond approximately 60 feet downgradient of the site, it is unlikely that any of the identified wells would be affected. The well survey information is included in Appendix B. (Allwest: *2002 Annual Groundwater Monitoring & Risk Assessment Report,* January 31, 2003).

## 2.2 Investigations

The locations of wells, and borings are shown on Figure 2, groundwater analytical data are summarized in Table 2 and shown on Figures 5 and 6, and soil analytical data is summarized in Table 3 and Figures 3 and 7.

**April 1994 Subsurface Investigations.** Lowney Associates (Lowney) of Mountain View, CA conducted a site history review that included historic Sanborn maps and aerial photos and completed a subsurface investigation. During the investigation, three bore holes (EB-1 through EB-3) were completed to approximately 20 feet bgs in the area of the incorrectly presumed location of the former USTs and pump island. Soil samples were collected at 5-foot intervals and grab groundwater samples were collected from each boring; all groundwater and select soil samples (15 to 16-foot interval) were analyzed for motor oil range total petroleum hydrocarbons (TPHmo), diesel range TPH (TPHd), gasoline range TPH (TPHg), benzene, toluene, ethyl benzene, and xylenes (collectively BTEX); and a leachability test was conducted on the soil sample collected from Boring EB-1. Petroleum hydrocarbons were only detected in soil at Boring EB-1; TPHg and benzene were detected at 95 parts per million (ppm) and 0.4 ppm respectively. Petroleum hydrocarbons were detected in all the grab groundwater samples; the highest TPHg and benzene concentrations were detected in Boring EB-1 at 76,000 parts per billion (ppb) and 2,200 ppb respectively. The leachability testing resulted in TPHg and benzene concentrations of 4,300 ppb and 9 ppb, respectively. (Lowney Associates*: Soil and Groundwater Quality Reconnaissance,* July 20, 1994)

**June 1997 Subsurface Investigations and RBCA Analyses.** Allwest conducted a file review to assess potential on- and off-site sources of subsurface contamination. Eight direct push soil borings (P-1 through P-8) were also advanced to approximately 16 feet bgs in the area of the presumed location of the former USTs and pump island. Soil samples were collected at 5-foot intervals and field-tested for total volatile hydrocarbons with an organic vapor analyzer (OVA). Grab groundwater samples from each boring and 11 soil samples were analyzed for TPHg and BTEX. Discolored/odorous soils were reported at 10 to 12 feet bgs in borings P-2 through P-4. Petroleum hydrocarbons were detected in soil from borings P-3 and P-4; and the highest concentrations of 4,600 ppm TPHg and 15 ppm benzene were detected in the soil sample collected at 14.5 feet bgs from Boring P-3. Petroleum hydrocarbons were detected in groundwater at borings P-2 through P-4, P-7, and P-8; the highest concentration of 92,000 ppb was detected at Boring P-3 and the highest concentration of 610 ppb benzene was detected in Boring P-4. Tier 1 and Tier 2 risk-based corrective-action evaluations were conducted using ASTM methodology, and based on the results; Allwest concluded there were no significant human health risks and no need for active remediation. (Allwest: *Subsurface Investigation Report,* August 5, 1997)

**November 1998 Well Installations and Sampling**. Allwest advanced three borings to 18 feet bgs at the northeast quadrant of the site; soil samples were collected at 5-foot intervals and field tested for TVH using an OVA. The borings were converted to 2-inch diameter monitoring wells (MW-1 through MW-3). Groundwater samples collected from each of the wells were analyzed for TPHg, BTEX, and methyl tertiary butanol (MtBE). TPHg and benzene were only detected in the sample from MW-1 at 360 ppb and 5.8 ppb, respectively. Allwest's recommendation to monitor the wells quarterly for one year was

approved by ACEHS (Allwest: *Groundwater Monitoring Well Installation and Sampling,* February 2, 1999)

**2002- Conceptual Model and Risk Assessment.** In December 2002, Allwest prepared a site conceptual model consisting of a 3-dimensional drawing showing known areas of subsurface contamination and potential sensitive receptors. Also a cursory risk assessment using risk-based screening levels (RBSLs) in recently published Regional Water Quality Control Board (RWQCB) lookup tables was conducted. Based on the risk assessment, Allwest concluded that the RBSLs for groundwater were exceeded at MW-1 for the vapor migration to indoor-air-inhalation pathway, and pose a possible risk to off site receptors. (Allwest*: 2002 Annual Groundwater Monitoring & Risk Assessment Report,* January 31, 2003)

**June and August 2007 Well Installations.** On June 20, 2007, RRM installed three 2-inch diameter groundwater monitoring wells (MW-4 through MW-6) to a depth of approximately 18 feet bgs, and on August 13, 2007 installed one 4-inch diameter recovery well (RW-1) to approximately 20 feet bgs. Soil samples were collected at approximate 5-foot intervals and field tested for TVH using an OVA; select soil samples were submitted for laboratory analyses of TPHg and BTEX. No compounds were detected in any of the soil samples analyzed. The wells were added to the quarterly groundwater monitoring program. (RRM: *Subsurface Investigation Results, Second and Third Quarter 2007 Groundwater Monitoring Result,* October 23, 2007)

**August 2007 Direct Push Soil Borings.** On August 9, 2007, RRM advanced six exploratory soil borings (SB-1 through SB-6) using direct-push drilling technology to depths ranging from 8 to 26 feet bgs. The soil borings were continuously sampled for logging purposes and to collect representative samples for laboratory analyses. Groundwater samples were not collected. Groundwater was encountered in borings SB-1 through SB-3 and SB-6 at depths ranging from 12.5 feet to 14.5 feet bgs. Petroleum hydrocarbons were detected in soil samples collected from Boring SB-1 at depths ranging from 7.5 feet to 16 feet bgs and from Boring SB-4 at 8 feet bgs. TPHg was detected in Boring SB-1 at concentrations ranging from 0.79 ppm at 7.5 feet bgs to 2,600 ppm at 12 feet bgs and in Boring SB-4 at a concentration of 5.1 ppm at 8 feet bgs. Fuel oxygenates including MtBE, other volatile organic compounds (VOCs), and other petroleum hydrocarbons were not detected in any of the soil samples submitted for laboratory analyses (RRM: *Subsurface Investigation Results, Second and Third Quarter 2007 Groundwater Monitoring Result,* October 23, 2007).

**Quarterly Groundwater Monitoring.** Quarterly groundwater monitoring was conducted at the site during 1998, 1999, 2002, and has been conducted consistently since 2007. The current monitoring well network consists of wells MW-1 through MW-6 and RW-1. Groundwater samples are analyzed for TPHg and BTEX. Historical analyses have included TPHmo, TPHd, MtBE, 1,2-dibromoethane (EDB) and 1,2-dichloroethane (EDC); however, these compounds have been removed from the monitoring program since they were either not detected, or were not significant constituents of concern. A groundwater elevation contour map is shown on Figure 4 and TPHg and benzene is-concentration maps from the February 9, 2009 monitoring event are presented as Figures 5 and 6, respectively.

## 2.3 Remediation

**UST Removal.** As previously mentioned, the three 550-gallon USTs and reported waste oil tank were removed by Holland Oil Company Inc. in September 1975, and the gas station structures were removed in October 1978. No other information associated with the UST removal was available to RRM as of the date of this report.

## 2.4 Composition, Distribution and Magnitude of Soil and Groundwater Contamination

**Constituents Detected in Soil and Groundwater.** Soil and groundwater samples collected from the site since 1994 have been analyzed for TPHd, TPHmo, TPhss, TPHg, BTEX, MtBE, EDB, EDC, and other VOCs. However, primarily TPHg and BTEX have been detected in soil and groundwater samples collected at the site.

Tables 2 and 3 summarize groundwater and soil analytical results, respectively. Figure 2 shows well and boring locations. Figures 3 and 7 show the distribution of TPHg in soils based on the collective investigation results. Figures 5 and 6 show the current distribution of TPHg and benzene in groundwater from the February 9, 2009 monitoring event.

**Source of Petroleum Hydrocarbons.** Given the detection of petroleum hydrocarbons in soil in the area of the former USTs, it is probable that the USTs were the primary source (removed in 1975). The residual petroleum hydrocarbons trapped in saturated soils beneath and down-gradient of the former USTs serve as an active secondary source area.

**Free Product.** Free product has not been noted at the site.

**Distribution and Magnitude of Petroleum Hydrocarbons in Soil and Saturated Soil.** The analytical data suggests that petroleum hydrocarbons are not present in the vadose zone (unsaturated zone) within or outside the site boundaries; concentrations were generally not reported above laboratory analytical detection limits.

As depicted in Figures 3 and 7, TPHg soil contamination is restricted to the saturated and capillary fringe zones in the northwest corner of the site. Laterally, the impacted area is oriented southwest and covers a footprint roughly 30 feet wide by 60 feet long that extends from the former UST area. Based on groundwater gradient and investigation results, the impacted area is presumed to extend just beyond the north site boundary into Central Avenue and approximately mid-way into Ninth Street. Vertically, the contaminated interval is approximately 10 feet thick and extends from approximately 7 feet to 17 feet from bgs.

Within the contaminated interval, the highest concentrations of petroleum hydrocarbons were generally detected in samples at depths ranging from 12 feet to 14.5 feet bgs from borings drilled within the former UST area and immediately down-gradient of the UST area (borings EB-1, P-3, and SB-1). Residual TPHg concentrations over 100 ppm range from 2,600 ppm at approximately 12 feet bgs in Boring SB-1 to 4,600 ppm at approximately 14.5 feet bgs in Boring P-3. Benzene and MtBE were not detected above the laboratory reporting limits in any of the soil samples analyzed.

The lateral extent of impacted soil is generally delineated to non-detect, or relatively low concentrations to the north by borings SB-4 and SB-5; to the south by borings P-4, SB-6, EB-2, and P-5; to the east by borings SB-2, P-1, and P-2; and to the west by the borings for wells MW-4 through MW-6.

The vertical extent of contamination in the impacted area is defined by boring SB-1 where TPHg was detected at 0.79 ppm at 7.5 feet bgs, 2,600 ppm at 12 feet bgs, 11 ppm at 16 feet bgs and was not detected at 20 feet bgs. This data is adequate for vertical delineation given the central location of boring SB-1 within the contaminated interval, the date of the release (pre MtBE use), the common knowledge that gasoline contamination of the saturated zone is ordinarily restricted to the upper portion of the first water bearing zone because it is lighter than water, the soil types, and the absence of any indications of contamination (petroleum odors) below 17 feet in the logs of the several borings installed within the contaminated interval.

Assuming an area 30 feet wide by 60 feet long by 10 feet thick, the contaminated interval comprises approximately 670 bank cubic yards of saturated soils.

**Distribution and Magnitude of Petroleum Hydrocarbons in Groundwater.** As can be expected, the distribution of TPHg in groundwater mimics the distribution in saturated soils described above. Historic groundwater monitoring analytical data indicates elevated concentrations of petroleum hydrocarbons are present in wells MW-1 and RW-1, which are centrally located within the contaminated soil zone. TPHg concentrations in these two wells have been reported as high as 40,000 ppb at Well RW-1 and 100,000 ppb at Well MW-1. Benzene concentrations have been reported as high as 4,000 ppb at Well MW-1. The dissolved petroleum hydrocarbon plume is defined laterally to the south, east and west by wells MW-2 through MW-6. The up-gradient plume boundary is inferred to be just north into Central Avenue.

## 2.5 Data Gaps

As mentioned above, it is presumed that the impacted saturated zone extends just beyond the north site boundary at the south-most lane of Central Avenue, near the intersection with Ninth Street. The inference of the up-gradient plume boundary is based on groundwater gradients and is considered sufficient for characterization purposes given the difficulty and expense involved with confirmation.

# 3.0 CORRECTIVE ACTION GOALS

Site-specific numeric corrective action goals are necessary to determine the need for and degree of site remediation, and to evaluate corrective action alternatives. The San Francisco Bay Regional Water Quality Control Board (RWQCB) recently published *Screening for Environmental Concerns at Sites with Contaminated Soil and Water* (Interim Final-November 2007, Revised May 2008) to assist responsible parties and oversight agency personnel in establishing appropriate soil and groundwater cleanup goals for contaminated properties including leaking UST (LUST) sites. This document includes a series of lookup tables that provide environmental screening levels (ESLs) for the petroleum hydrocarbon

constituents of concern based on the environmental media involved and land-use considerations. This RWQCB document was used to develop/propose appropriate site cleanup goals for the site.

## 3.1 Groundwater Cleanup Goals

Development of corrective action goals for groundwater begins with identification of the beneficial uses of groundwater near the site. To restore or protect the beneficial use with the most stringent numerical standard will protect or restore all other uses. The San Francisco Bay Basin Water Quality Control Plan specifies that the beneficial uses of groundwater beneath the site include municipal, domestic, industrial and agricultural. The ESLs that the RWQCB has established to meet the highest beneficial use criteria are presented in the table below and represent Federal and State drinking water standards.

**Beneficial Use Corrective Action Goals or Maximum Contaminant Levels (µg/L)**

| Compound | Concentration | Basis |
|---|---|---|
| Benzene | 1.0 | Beneficial use (Table A) |
| Toluene | 40 | Beneficial use (Table A) |
| Ethylbenzene | 30 | Beneficial use (Table A) |
| Xylenes | 20 | Beneficial use (Table A) |
| TPHg | 100 | Beneficial use (Table A) |

According to the well survey conducted by Allwest in April 2002, there are no active drinking water wells within 1,000 feet of the site. Given the site is located along the margin of the San Francisco Bay, it is unlikely that the groundwater in the area would be considered suitable for future potable use. Agricultural and/or industrial use is also not likely, as the surrounding area is primarily residential and commercial.

According to the RWQCB published policies for low risk groundwater cases, at LUST sites where the groundwater is not considered a viable short- or long-term water supply resource, development of short-term groundwater cleanup goals for active remediation that are based on mitigation of human health risks and/or potential environmental impacts to surface water are appropriate. For LUST sites involving gasoline contamination of shallow water tables, the major concern is typically vapor -phase migration into overlying buildings (vapor intrusion) particularly with respect to benzene, a known carcinogen. The beneficial use goals still apply as long-term cleanup goals, but they are generally reached via natural attenuation without the need for long-term monitoring, a formal residual risk management plan, or deed covenant.

In the May 2008 document, the RWQCB has established lookup tables for ESLs for various risks and exposure pathways including mitigation of the vapor intrusion to indoor air pathway, which is addressed in Table E-1. Table E-1 includes ESLs for the gasoline constituents of concern (except for TPHg) at residential areas where groundwater is not a current or potential drinking water resource and the water table is 3 meters bgs. In the absence of an ESL for TPHg in Table E-1, an ESL from Table I-2 based on the odor threshold is used as the proposed corrective action goal for TPHg.

**Risk Based Groundwater Corrective Action Goals (µg/L)**

| Compound | Concentration | Basis |
|---|---|---|
| Benzene | 540 | Vapor intrusion (Table E-1) |
| Toluene | 38,000 | Vapor intrusion (Table E-1) |
| Ethylbenzene | 170,000 | Vapor intrusion (Table E-1) |
| Xylenes | 160,000 | Vapor intrusion (Table E-1) |
| TPHg | 5,000 | Odors (Table I-2) |

Comparison of the data in Table 2 to the proposed groundwater corrective action goals above indicates active remediation is warranted. The TPHg and/or benzene concentrations in groundwater at Well MW-1 and RW-1 are an order of magnitude above the risk-based goal and two orders of magnitude above the beneficial use goal. The benzene concentration in groundwater at Boring P-4 is just above the risk-based goal and one order of magnitude above the beneficial use goal.

In general, the RWQCB recommends using soil gas data to assess the vapor intrusion pathway for gasoline constituents in groundwater and unsaturated soils and includes ESLs for soil gas samples collected at 5 feet bgs in Table E-2. The respective ESLs for benzene and TPHg of 0.084 ug/L and 10 ug/L are both very stringent. For the site, it is neither appropriate nor necessary to test soil gas in the target cleanup area given site-specific conditions including depth to water and contaminant levels. Based on the close proximity of heavily impacted saturated soils to the specified soil gas sampling depth and the sandy conditions, it can be safely assumed that TPHg and benzene in shallow soil gas samples would exceed the RWQCB ESLs by several orders of magnitude.

This is essentially a secondary source area cleanup that is intended to protect and restore groundwater quality as well as a risk-based cleanup.

## 3.2 Soil Cleanup Goals

Since the current investigation data indicates that there is little or no petroleum hydrocarbon contamination in the vadose zone, risk-based cleanup goals for unsaturated soils are not proposed. In the event that petroleum hydrocarbon contamination is encountered in the top 7 feet of soils, the associated gross contamination (odor threshold) ESL for TPHg of 100 ppm, presented in Table B of the RWQCB document, will be used on an interim basis as the soil cleanup goal. As a practical matter, under the proposed remedial excavation alternative, RRM plans to send any suspect unsaturated soils that are encountered within the work zone to a Class II landfill.

As already explained above, in the May 2008 document, the RWQCB includes ESLs for soil-gas samples collected at 5 feet bgs and recommends the use of soil gas data to determine the need for remediation of shallow soils as well as groundwater. For the reasons already stated, RRM does not consider the collection of shallow soil gas samples in the former UST/secondary source area to be necessary at the site given the relatively shallow depth to water and contaminant levels.

The RWQCB has not established ESLs for saturated soils. In general; however, it can be assumed that where ESLs for groundwater are exceeded, the saturated soil in the area requires corrective action.

### 3.3 Primary Remediation Goal

Since there is no shallow soil contamination at the site, the primary goal of remediation is to restore groundwater to the very stringent risk-based corrective action goal for benzene (540 ug/L) proposed in Section 3.1. This goal is protective of the vapor intrusion exposure pathway under a residential land use scenario. Since the benzene cleanup goal for groundwater is so stringent, meeting this single goal using the chosen remedial approach is expected to mitigate all exposure pathways of concern for all petroleum hydrocarbons of concern.

## 4.0 CORRECTIVE ACTION ALTERNATIVES

### 4.1 Elements Common to All Alternatives

Groundwater monitoring is currently part of the existing remediation program, and will be a key aspect of the recommended alternative. Monitoring would be used as a tool to evaluate progress toward corrective action goals and management of the dissolved hydrocarbon plume, and as a means to assess plume stability. Natural processes including biodegradation, dispersion, volatilization, oxidation, and adsorption are expected to occur at the site regardless of the alternative implemented. These natural processes act to reduce soil and groundwater concentrations over time. Research suggests the primary natural attenuation mechanism for petroleum hydrocarbons is biodegradation. Ultimately, no matter what remedial technology is implemented, natural attenuation will be relied upon to complete remediation

### 4.2 Alternative 1 - Natural Attenuation

The EPA suggests that natural attenuation is applicable as a stand-alone technology in situations where total petroleum hydrocarbon concentrations are below 25,000 ppm in soil; where there is no current or projected groundwater use within a 2-year groundwater travel time from the site; and where there are no potential nearby receptors that the impact could affect[1]. Background information provided in this report suggests that only the first two of these criteria are met for this site and that vapor intrusion is a concern to residential receptors.

The benefits of this alternative are that it there would be minimal disturbance to the site. The greatest potential disadvantage is the length of time required to mitigate hydrocarbon impact as compared to active remedial technologies. EPA computer models project that average remediation times could range between 50 to 200 years. The projections are consistent with the fact that contaminant levels in

1 EPA. 1993. An Overview of Underground Storage Tank Remediation Options, EPA 510-F-93-029. October 1993

groundwater at the site are still highly elevated more than three decades after the leaking USTs were removed.

Under this alternative, controls on site use would restrict exposure to the affected media while natural attenuation is progressing. Engineering controls would include a venting system to mitigate the potential for volatilized petroleum hydrocarbons from groundwater to enter the residential building at the site. Institutional controls would include preparation of a residual risk management plan to address containment, management, and monitoring of the groundwater plume. The plan would be consistent with current and projected land and water uses; and would detail contingency plans to address increases in constituent concentrations at down-gradient locations, should increases occur. The residual risk management plan would be a component of a deed covenant and closure plan.

The estimated cost of this alternative, $281,508, includes installation and operation of a venting system for the site building and groundwater monitoring for the assumed ten-year period, preparation and maintenance of a residual risk management plan, and environmental case closure.

### 4.3 Alternative 2 - Remedial Excavation of Saturated Soils

Under this alternative, the contaminated groundwater would be physically removed from the site by digging out the associated saturated soil interval and purging the excavation of standing water. The proposed excavation area is shown on Figure 7. The boundary was determined based on the comparison of existing saturated soil and groundwater data to the proposed corrective action goals in Section 3.0. Under this scenario, the proposed corrective action goals would be achieved or nearly achieved upon completion of the excavation work.

It is expected that approximately 500 cubic yards of overburden and impacted soil would be removed and off-hauled for disposal; the proposed excavation area measures approximately 25 feet by 30 feet and would extend approximately 18 feet bgs. The soil would be pre-profiled for disposal at Allied Waste's Keller Canyon Landfill in Pittsburg, California. The excavation sidewalls would be shored and braced using sheet piles. Confirmation soil samples would be collected from the excavation bottom and sidewalls. Standing groundwater that seeps into the pit would be extracted, filtered, treated with granular activated carbon and discharged directly to the sanitary sewer under a permit from the City of Alameda. Alternatively, if the recharge rate is low, the water will be removed via vacuum tank truck and off-hauled for treatment at permitted facilities by licensed contractors/haulers. The bottom approximately 4 feet of the excavation would be backfilled with crushed rock, followed by clean imported fill to grade. All placed materials would be compacted to 90% relative density under the supervision of an engineer. Additionally, monitoring wells MW-1 and RW-1, located within the excavation boundary, would be properly destroyed and replaced, as necessary.

The advantages of this alternative, particularly when coupled with removal of impacted standing groundwater within the excavation, are that a majority of the residual contaminant mass would be removed from the site quickly and the alternative can be implemented very quickly. The

heavily-impacted groundwater within the targeted area would be physically removed with the saturated soil and the residual impacted groundwater would be extracted from the excavation.

While there will be some lower level contamination left in place peripheral to the excavation boundaries, this residual contamination is expected to decline relatively quickly once the source area has been removed. Another potential benefit of this type of remedial excavation is biodegradation associated with exposure to the atmosphere.

Natural attenuation would be relied upon to completely achieve beneficial use corrective action goals. At least six follow-up quarterly groundwater monitoring events would be completed to establish declining groundwater concentration trends after source removal.

Disadvantages include removal/replacement of the sidewalk and street, difficulties related to underground utilities; site disruption; construction related traffic, noise, odors, and safety concerns; and the relatively large capital cost. It is estimated that the capital cost of this alternative would be $247,624. follow-up groundwater monitoring and reporting would cost approximately $38,100. The total estimated cost for this alternative is $285,724. The capital cost includes groundwater monitoring pre-excavation, pre-profiling of soil, permitting, shoring, excavation, hauling and disposal of excavated soil at a Class II landfill, treatment and disposal of groundwater from the excavation, confirmation sampling, backfill and compaction, resurfacing, destruction and replacement of groundwater monitoring wells MW-1 and RW-1, reporting, and project management and preparation and submittal of a closure summary report.

### 4.4 Alternative 3 - Air Sparging-Enhanced Dual Phase Extraction

Under this alternative, an air sparging and dual phase extraction well network would be designed and installed at the site. Existing well RW-1 would be utilized as a dual phase extraction well, and one or more additional extraction wells would likely be necessary. The remediation well network would be situated within the location of the former UST system in the area of elevated dissolved concentrations. Due to site constraints, and to minimize disturbance to the residential tenants of the property, a mobile remediation unit would be used to inject air and collect soil vapor and entrained groundwater. The recovered air-groundwater mixture would be separated and treated before discharge.

Recovered soil vapor would be treated using thermal/catalytic oxidation and groundwater would be treated using granular activated carbon. Other system components would include an air compressor, a high-vacuum pump, a water separation unit, at least three vessels containing aqueous-phase carbon, an electrical distribution and control panel, and conveyance piping. Discharge permits from the Bay Area Air Quality Management District, and City of Alameda would be necessary to discharge treated soil vapor and groundwater.

The most significant potential advantages of this alternative compared to the remedial excavation approach (Alternative 2) include less construction-related site disruption. The major disadvantage is that there is considerable uncertainty related to the effectiveness of the process under site-specific conditions and the period of system operation required to meet cleanup goals. Other disadvantages include a potentially long period of disruption to site tenants due to noise from remedial equipment.

It is assumed that the mobile air sparging-enhanced dual phase extraction system would initially operate for 45 days, with at least one additional 45 day operational period likely. As with other alternatives, natural attenuation would be relied upon to completely achieve corrective action goals. Quarterly groundwater monitoring would be performed for two years to monitor groundwater concentrations during and after active remediation.

It is estimated that the cost of this alternative, including the cost of operation over the projected lifespan would be $252,527. Groundwater monitoring and reporting and closure activities would cost approximately $56,878. The total estimated cost for this alternative is $309,405.

### 4.5 Alternative 4 - In-Situ Chemical Oxidation

Under this alternative, sodium persulfate, would be injected into the subsurface to directly oxidize and enhance the natural attenuation of petroleum hydrocarbons at the site. Sodium persulfate was chosen over other oxidants because it is stable and does not generate appreciable amounts of heat or gas, and it is a powerful oxidant that is persistent in the subsurface. A dense network of temporary injection points would be installed using direct-push drilling equipment. The chemical oxidant would be injected under high pressure and low flow in an effort to create a dense network of column-like treatment zones that effectively covers the targeted remediation area. Upon completion, the temporary injection point would be removed and the boring would be backfilled with cement grout. Performance results would include typical groundwater monitoring parameters, and sampling and analyses for aquifer parameters, metals, and minerals.

The most significant potential advantages of this alternative compared to the remedial excavation approach include less construction related site disruption and potentially lower costs if the process is successful. The major disadvantages are that it is an emerging remediation technology, there is great uncertainty related to the effectiveness of the alternative under site-specific conditions, the number of injection events required to meet cleanup goals, and determination of the fate and transport of contaminant mass following injection. In general, the major limitation of this type of approach is the inability to achieve a significant degree of mixing in the subsurface. The injected fluids tend to push/displace contaminated groundwater rather than mixing with it and also tend to follow preferential pathways rather than disperse as intended. Damage to subsurface utilities is a major concern when considering the use of in-situ chemical oxidation especially where the contaminated interval is relatively shallow and under public streets and sidewalks (utility corridors). Based on the results of the recent utility survey, this concern is significant at this site (see Figure 2).

It is assumed, that two injection events would be conducted over an approximately one-week period, and one follow-up event will be conducted within three months. As with other alternatives, natural attenuation would be relied upon to completely achieve corrective action goals. Groundwater monitoring would continue for the operation period plus one additional year to monitor groundwater concentrations after the injection is complete.

It is estimated that the cost of implementing this alternative is $255,000 for the chemical injection events and performance monitoring. Groundwater monitoring and reporting would cost approximately $30,462, and closure activities would cost approximately $15,940. The total estimated cost for this alternative is $301,366 assuming reasonable effectiveness.

## 5.0 ALTERNATIVE EVALUATION

Alternatives were ranked according to regulatory and community acceptance; reduction of toxicity, mobility, and volume of contaminates (likelihood of achieving remedial objectives); technical feasibility; and cost.

### 5.1 Regulatory and Community Acceptance

Alternative 1 has the lowest ranking because the regulatory and community acceptance of taking no action and leaving hydrocarbons in place for an extended period without any active remediation is generally low if there are other viable alternatives. Regulatory acceptance would likely be higher for Alternatives 2 and 3 when compared to Alternatives 4, primarily because these alternatives use conventional remedial approaches and do not involve the use of hazardous substances. Alternative 2 is ranked slightly over Alternative 3 despite the fact that is arguably the most disruptive to the community at least on the short term. It is favored over the other alternatives because it would quickly advance site conditions toward meeting corrective action goals and is the most reliable approach.

### 5.2 Reduction of Toxicity, Mobility, and Volume of Contaminates

All the alternatives will eventually allow for a complete reduction in toxicity, mobility, and volume of hydrocarbons. However, Alternatives 2 through 4 would provide much higher rates. Since all the alternatives eventually provide complete reduction, the rate of reliable short-term reduction is used to rank alternatives.

As already stated, Alternative 1 is associated with very slow-paced mass reduction and is ranked lowest. The mass removal rates for the other alternatives are ranked equally above Alternative 1, but the two in-situ alternatives (Alternatives 3 and 4) are ranked below Alternative 2, because these technologies are limited by varied subsurface conditions and the effectiveness is generally less than expected. As such, Alternative 2 is ranked highest because it would reliably reduce mass very quickly. The permanent placement of petroleum-contaminated soils in a secure Class II facility is considered an environmentally viable and acceptable method of reducing toxicity, mobility, and volume. The estimated cleanup time for each of the alternatives is summarized in the table below.

| Alternative | Estimated Time Span for Cleanup |
|---|---|
| Alternative 1 - Natural Attenuation | 10 years |
| Alternative 2 - Remedial Excavation of Saturated Soils | 2 years |
| Alternative 3 - Air Sparging-Enhanced Dual Phase Extraction | 3 years |
| Alternative 4 - In-Situ Chemical Oxidation | 3 years |

## 5.3 Technical Feasibility

The technical feasibility of the alternatives was evaluated by considering effectiveness and implementation. With regard to implementation, Alternative 1 receives the highest rating because it involves very little construction. Alternative 4 is the most difficult to implement, because of the preliminary work that would be needed to demonstrate viability. Between Alternatives 2 and 3 it is likely Alternative 3 would be slightly easier to implement, as it requires fewer resources than Alternative 2.

In regard to short-term effectiveness, Alternative 2 is ranked highest. In the mid- to long-term, all the alternatives approach parity because natural attenuation would be relied upon to reduce residual contaminant levels.

## 5.4 Cost

Under this criterion, alternatives were ranked according to the projected cost presented for each alternative. On this basis, Alternative 1, ranks the highest, followed by Alternatives 3 and 4, with Alternative 2 ranked lowest. The costs for each alternative are summarized below and detailed cost estimates for each alternative are included in Appendix C.

| Alternative | Estimated Cost |
|---|---|
| Alternative 1 - Natural Attenuation | $281,508 |
| Alternative 2 - Remedial Excavation of Saturated Soils | $285,724 |
| Alternative 3 - Air Sparging-Enhanced Dual Phase Extraction | $309,405 |
| Alternative 4 - In-Situ Chemical Oxidation | $301,366 |

# 6.0 RECOMMENDED ALTERNATIVE

Given the evaluation above, Alternative 2 (Remedial Excavation) is considered the best option for remediation of site groundwater to proposed risk-based corrective action goals. While this alternative is not the projected lowest cost option, Alternatives 3 and 4 are not expected to reduce concentrations to meet cleanup goals in a timely manner, and will likely entail extended remediation operation beyond the periods proposed. Also, Alternative 2 is the optimal approach, with respect to short-term effectiveness, as it will completely remove the contamination in the targeted area in a very short period of time and ensure that corrective action goals are met quickly. Though the recommended alternative will cause some disruption to the site tenants and local community, the disruption will only be for a relatively short period. Implementation will occur over approximately two to three months with the actual excavation work at the site spanning approximately two weeks. The alternative will include well replacement and six quarterly follow-up groundwater monitoring events.

**PROFESSIONAL CERTIFICATION**

**CORRECTIVE ACTION PLAN**

**900 CENTRAL AVENUE CORRECTIVE ACTION ACCOUNT**

**900 CENTRAL AVENUE**

**ALAMEDA, CALIFORNIA**

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I certify under penalty of law that this document and all attachments have been prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, to the best of my knowledge and belief the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Evaluation of the geological conditions at the site for the purpose of this corrective action plan is inherently limited due to the number of observation points. There may be variations in subsurface conditions in areas away from the sample points. Data from this report reflect the sample conditions at specific locations at a specific point in time. No other interpretations, representations, warranties, guarantees, express or implied, are included.

Sincerely,

for:

Matt Kaempf
Project Manager

Matt Paulus
Senior Geologist
CHG 659

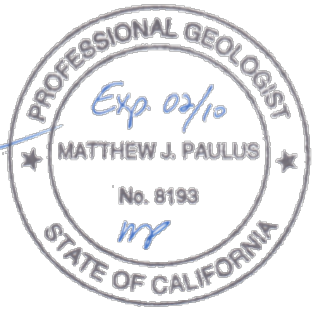


Table 1
**Well Specifications**

900 Central Avenue
Alameda, California

| Well | Total Depth (feet, bgs) | Casing Diameter (inch) | Screened Interval (feet, bgs) | Screen Length (feet) |
|---|---|---|---|---|
| MW-1 | 18 | 2 | 6 - 18 | 12 |
| MW-2 | 19.5 | 2 | 6 - 19.5 | 13.5 |
| MW-3 | 18 | 2 | 6 - 18 | 12 |
| MW-4 | 18 | 2 | 6 - 18 | 12 |
| MW-5 | 18 | 2 | 6 - 18 | 12 |
| MW-6 | 18 | 2 | 6 - 18 | 12 |
| RW-1 | 20 | 4 | 5 - 20 | 15 |

Notes:

bgs = below ground surface

Table 2
**Groundwater Elevation and Analytical Data**

900 Central Avenue
Alameda, California

| Sample ID | Date Gauged & Sampled | Well Elevation (feet, MSL) | Depth to Water (feet, TOC) | Groundwater Elevation (feet, MSL) | TPHg (ppb) | Benzene (ppb) | Toluene (ppb) | Ethyl-benzene (ppb) | Total Xylenes (ppb) | MtBE (ppb) | TPHd (ppb) | TPHmo (ppb) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Monitoring Wells*** | | | | | | | | | | | | | |
| MW-1 | 11/27/98 | 25.17 | 11.77 | 13.40 | 360 | 5.8 | 5.5 | 9.2 | 40 | <5.0 | <50 | <500 | |
| | 03/12/99 | | 6.59 | 18.58 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | <5.0 | <50 | <500 | |
| | 06/01/99 | | 8.71 | 16.46 | 930 | <0.50 | 19 | 52 | 230 | <5.0 | 540 | <500 | |
| | 09/03/99 | | 11.79 | 13.38 | 14,000 | 300 | 1,900 | 890 | 5,600 | <5.0 | 2,100 | <500 | |
| | 03/29/02 | | 8.32 | 16.85 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 61 | <610 | |
| | 07/15/02 | | 11.39 | 13.78 | 39,000 | 1,700 | 2,900 | 1,800 | 7,800 | <10 | 4,200 | <5000 | |
| | 10/03/02 | | 12.88 | 12.29 | 42,000 | 2,600 | 3,300 | 1,800 | 10,000 | <500 | 8,400 | <2500 | |
| | 02/05/07 | | 10.40 | 14.77 | 26,000 | 2,550 | 2,010 | 1,140 | 4,870 | <0.5 | NA | NA | 1 |
| | 05/04/07 | | 9.77 | 15.40 | 28,000 | 2,080 | 1,820 | 739 | 5,500 | NA | NA | NA | 1 |
| | 08/23/07 | 28.27 | 12.23 | 16.04 | 56,700 | 2,570 | 2,370 | 1,120 | 9,560 | <11 | NA | NA | 1,3 |
| | 11/28/07 | | 12.94 | 15.33 | 51,700 | 3,160 | 3,270 | 1,050 | 9,250 | <11.0 | NA | NA | 1,3 |
| | 02/28/08 | | 8.10 | 20.17 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 4 |
| | 06/03/08 | | 11.40 | 16.87 | 11,000 | 1,060 | 2,080 | 784 | 4,370 | NA | NA | NA | 1,5 |
| | 09/04/08 | | 13.23 | 15.04 | 66,000 | 4,000 | 5,410 | 62.0 | 11,700 | NA | NA | NA | 1 |
| | **11/06/08** | | **13.76** | **14.51** | **100,000** | **2,870** | **5,160** | **1,720** | **13,800** | **NA** | **NA** | **NA** | |
| MW-2 | 11/27/98 | 25.12 | 11.76 | 13.41 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | <5.0 | <50 | <500 | |
| | 03/12/99 | | 6.53 | 18.64 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | <5.0 | <50 | <500 | |
| | 06/01/99 | | 8.56 | 16.61 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | <5.0 | <50 | <500 | |
| | 09/03/99 | | 11.60 | 13.57 | <50 | <0.50 | <0.50 | <0.50 | 1.8 | <5.0 | <50 | <500 | |
| | 03/29/02 | | 8.10 | 17.07 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | <5.0 | <50 | <500 | |
| | 07/15/02 | | 10.92 | 14.25 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | <5.0 | <50 | <500 | |
| | 10/03/02 | | DRY | -- | NS | NS | NS | NS | NS | NS | NS | NS | |
| | 02/05/07 | | 10.15 | 15.02 | 89 | <0.5 | <0.5 | <0.5 | <1.50 | <0.5 | NA | NA | 1,2 |
| | 05/04/07 | | 9.43 | 15.74 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 1 |
| | 08/23/07 | 28.31 | 11.94 | 16.37 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | <0.500 | NA | NA | 1 |
| | 11/28/07 | | 12.67 | 15.64 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | <0.500 | NA | NA | 1 |
| | 02/28/08 | | 7.89 | 20.42 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 4 |
| | 06/03/08 | | 11.07 | 17.24 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 1 |
| | 09/04/08 | | 12.95 | 15.36 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 1 |
| | **11/06/08** | | **13.52** | **14.79** | **52** | **<0.500** | **<0.500** | **<0.500** | **<1.50** | **NA** | **NA** | **NA** | **3** |

Table 2
**Groundwater Elevation and Analytical Data**

900 Central Avenue
Alameda, California

| Sample ID | Date Gauged & Sampled | Well Elevation (feet, MSL) | Depth to Water (feet, TOC) | Groundwater Elevation (feet, MSL) | TPHg (ppb) | Benzene (ppb) | Toluene (ppb) | Ethyl-benzene (ppb) | Total Xylenes (ppb) | MtBE (ppb) | TPHd (ppb) | TPHmo (ppb) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-3 | 11/27/98 | 24.58 | 11.41 | 13.76 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | <5.0 | <50 | <500 | |
| | 03/12/99 | | 6.01 | 19.16 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | <5.0 | <50 | <500 | |
| | 06/01/99 | | 8.16 | 17.01 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | <5.0 | <50 | <500 | |
| | 09/03/99 | | 11.27 | 13.90 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | <5.0 | <50 | <500 | |
| | 03/29/02 | | 7.78 | 17.39 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <50 | <500 | |
| | 07/15/02 | | 10.82 | 14.35 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | 110 | <500 | |
| | 10/03/02 | | 12.28 | 12.89 | <50 | <0.50 | <0.50 | <0.50 | <0.50 | <5.0 | <50 | <500 | |
| | 02/05/07 | | 9.85 | 15.32 | <50 | <0.5 | <0.5 | <0.5 | <1.50 | <0.5 | NA | NA | 1 |
| | 05/04/07 | | 9.19 | 15.98 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 1 |
| | 08/23/07 | 27.69 | 11.63 | 16.06 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | <0.500 | NA | NA | 1 |
| | 11/28/07 | | 12.31 | 15.38 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | <0.500 | NA | NA | 1 |
| | 02/28/08 | | 7.46 | 20.23 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 4 |
| | 06/03/08 | | 10.82 | 16.87 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 1 |
| | 09/04/08 | | 12.62 | 15.07 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 1 |
| | **11/06/08** | | **13.20** | **14.49** | **<50** | **<0.500** | **<0.500** | **<0.500** | **<1.50** | **NA** | **NA** | **NA** | |
| MW-4 | 08/23/07 | 27.37 | 11.73 | 15.64 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | <0.500 | NA | NA | 1 |
| | 11/28/07 | | 12.43 | 14.94 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | <0.500 | NA | NA | 1 |
| | 02/28/08 | | 7.81 | 19.56 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 4 |
| | 06/03/08 | | 10.99 | 16.38 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 1 |
| | 09/04/08 | | 12.68 | 14.69 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 1 |
| | **11/06/08** | | **13.25** | **14.12** | **<50** | **<0.500** | **<0.500** | **<0.500** | **<1.50** | **NA** | **NA** | **NA** | |
| MW-5 | 08/23/07 | 27.25 | 11.56 | 15.69 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | <0.500 | NA | NA | 1 |
| | 11/28/07 | | 12.29 | 14.96 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | <0.500 | NA | NA | 1 |
| | 02/28/08 | | 7.55 | 19.70 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 4 |
| | 06/03/08 | | 10.84 | 16.41 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 1 |
| | 09/04/08 | | 12.53 | 14.72 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 1 |
| | **11/06/08** | | **13.12** | **14.13** | **<50** | **<0.500** | **<0.500** | **<0.500** | **<1.50** | **NA** | **NA** | **NA** | |
| MW-6 | 08/23/07 | 27.24 | 11.52 | 15.72 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | <0.500 | NA | NA | 1 |
| | 11/28/07 | | 12.24 | 15.00 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | <0.500 | NA | NA | 1 |
| | 02/28/08 | | 7.43 | 19.81 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 4 |
| | 06/03/08 | | 10.81 | 16.43 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 1 |
| | 09/04/08 | | 12.51 | 14.73 | <50 | <0.500 | <0.500 | <0.500 | <1.50 | NA | NA | NA | 1 |
| | **11/06/08** | | **13.10** | **14.14** | **<50** | **<0.500** | **<0.500** | **<0.500** | **<1.50** | **NA** | **NA** | **NA** | |

Table 2
**Groundwater Elevation and Analytical Data**

900 Central Avenue
Alameda, California

| Sample ID | Date Gauged & Sampled | Well Elevation (feet, MSL) | Depth to Water (feet, TOC) | Groundwater Elevation (feet, MSL) | TPHg (ppb) | Benzene (ppb) | Toluene (ppb) | Ethyl-benzene (ppb) | Total Xylenes (ppb) | MtBE (ppb) | TPHd (ppb) | TPHmo (ppb) | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RW-1 | 08/23/07 | 27.43 | 11.23 | 16.20 | 16,000 | <4.40 | 38.9 | 571 | 2,660 | <4.40 | NA | NA | 1,3 |
| | 11/28/07 | | 11.97 | 15.46 | 24,400 | 4.75 | 110 | 915 | 3,980 | <4.40 | NA | NA | 1,3 |
| | 02/28/08 | | 7.22 | 20.21 | 10,100 | <4.40 | 40.3 | 256 | 1,430 | NA | NA | NA | 1,3 |
| | 06/03/08 | | 10.41 | 17.02 | 40,000 | <4.40 | 120 | 1,100 | 8,810 | NA | NA | NA | 1, 5 |
| | 09/04/08 | | 12.25 | 15.18 | 17,000 | <4.40 | 41.1 | 640 | 3,290 | NA | NA | NA | 1, 5 |
| | **11/06/08** | | **12.75** | **14.68** | **19,000** | **<4.40** | **28.1** | **369** | **2,340** | **NA** | **NA** | **NA** | **6** |
| ***Grab Groundwater Samples*** | | | | | | | | | | | | | |
| EB-1 | 04/20/94 | NA | NA | NA | 76,000 | 2,200 | 8,800 | 2,500 | 1,600 | NA | 16,000 | <1,000 | 7 |
| EB-2 | 04/20/94 | NA | NA | NA | <50 | <0.5 | <0.5 | <0.5 | <0.5 | NA | <50 | 720 | |
| EB-3 | 04/20/94 | NA | NA | NA | <50 | <0.5 | <0.5 | <0.5 | <0.5 | NA | <50 | 820 | |
| P-1-W | 06/30/97 | NA | NA | NA | <50 | <0.5 | <0.5 | <0.5 | <0.5 | NA | NA | NA | |
| P-2-W | 06/30/97 | NA | NA | NA | 290 | 2.4 | 2.1 | 1.4 | 3.1 | NA | <100 | <1,000 | |
| P-3-W | 06/30/97 | NA | NA | NA | 92,000 | 190 | 5,000 | 4,600 | 24,000 | NA | <100 | <1,000 | |
| P-4-W | 06/30/97 | NA | NA | NA | 17,000 | 610 | 720 | 940 | 3,800 | NA | <100 | <1,000 | |
| P-5-W | 06/30/97 | NA | NA | NA | <50 | <0.5 | <0.5 | <0.5 | <0.5 | NA | NA | NA | |
| P-6-W | 06/30/97 | NA | NA | NA | <50 | <0.5 | <0.5 | <0.5 | <0.5 | NA | NA | NA | |
| P-7-W | 06/30/97 | NA | NA | NA | 66 | 2.3 | 6.5 | 0.8 | 4.7 | NA | NA | NA | |
| P-8-W | 06/30/97 | NA | NA | NA | 51 | 1.7 | 5.1 | 0.55 | 2.4 | NA | NA | NA | |

Notes:

MSL = relative to mean sea level
TOC = top of casing
TPHg = gasoline range total petroleum hydrocarbons
TPHd = diesel range total petroleum hydrocarbons
TPHmo = motor oil range total petroleum hydrocarbons
TBA = tert-Butanol
MtBE = Methyl tert-Butyl Ether
ppb = parts per billion (micrograms per liter)
< = none detected at or above reported detection limit
NS = not sampled
NA = not analyzed

1 = also sampled for the fuel oxygenates ethyl tert-butyl ether (ETBE), isopropyl ether (DIPE), t-butyl alcohol (t-butanol) (TBA), and tert-amyl methyl ether (TAME); none of these compounds detected above the laboratory limit.
2 = the laboratory reported value due to discrete peaks present within the TPH as gasoline quantitation range (heavy end); not typical gasoline.
3 = the laboratory reported results are elevated due to non-target compounds within the gasoline range
4 = also sampled for the fuel oxygenates ethyl tert-butyl ether (ETBE), t-butyl alcohol (t-butanol) (TBA), and tert-amyl methyl ether (TAME); none of these compounds detected above the laboratory limit.
5 = laboratory noted that although TPH as gasoline constituents are present, TPH value includes a significant portion of non-target hydrocarbons present within gasoline range.
6 = Although TPH as Gasoline compounds are present, result includes heavy end hydrocarbons within the C5 - C12 quantitation range (possibly aged gasoline).
7 = TPHd result characterized by laboratory as non-diesel mix ($C_5$-$C_{20}$)

Table 3
**Soil Analytical Data**

900 Central Avenue
Alameda, California

| Sample ID | Date | Depth (feet, bgs) | TPHg (mg/kg) | Benzene (mg/kg) | Toluene (mg/kg) | Ethyl-benzene (mg/kg) | Total Xylenes (mg/kg) | MtBE (mg/kg) | TPHd (mg/kg) | TPHmo (mg/kg) | TPHss (mg/kg) | TPHk (mg/kg) | VOCs (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SB-1-7.5 | 08/09/07 | 7.5 | 0.79 | <0.010 | <0.010 | <0.010 | 0.034 | NA | NA | NA | NA | NA | NA |
| SB-1-12 | 08/09/07 | 12 | 2,600 | <3.3 | <3.3 | 31 | 200 | NA | NA | NA | NA | NA | NA |
| SB-1-16 | 08/09/07 | 16 | 11 | <0.010 | <0.010 | 0.31 | 1.7 | NA | NA | NA | NA | NA | NA |
| SB-1-20 | 08/09/07 | 20 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| SB-1-24 | 08/09/07 | 24 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| SB-2-8 | 08/09/07 | 8 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| SB-2-11.5 | 08/09/07 | 11.5 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | <5.0 | <10 | <5.0 | <5.0 | NA |
| SB-2-16 | 08/09/07 | 16 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| SB-2-20 | 08/09/07 | 20 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| SB-2-24 | 08/09/07 | 24 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| SB-3-8 | 08/09/07 | 8 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| SB-3-12 | 08/09/07 | 12 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| SB-3-16 | 08/09/07 | 16 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| SB-4-8 | 08/09/07 | 8 | 5.1 | <0.050 | <0.050 | <0.050 | <0.100 | <0.050 | <5.0 | <10 | <5.0 | <5.0 | ND |
| SB-5-8 | 08/09/07 | 8 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | | | |
| SB-5-10.5 | 08/09/07 | 10.5 | <0.10 | <0.005 | <0.005 | <0.005 | <0.010 | <0.0050 | <5.0 | <10 | <5.0 | <5.0 | ND |
| SB-6-8 | 08/09/07 | 8 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| SB-6-12 | 08/09/07 | 12 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| SB-6-16 | 08/09/07 | 16 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| MW-4-6 | 06/22/07 | 6 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| MW-4-10.5 | 06/22/07 | 10.5 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| MW-4-16.5 | 06/22/07 | 16.5 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| MW-5-7.5 | 06/22/07 | 8 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| MW-5-10.5 | 06/22/07 | 10.5 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| MW-5-15 | 06/22/07 | 15.0 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |

Table 3
**Soil Analytical Data**

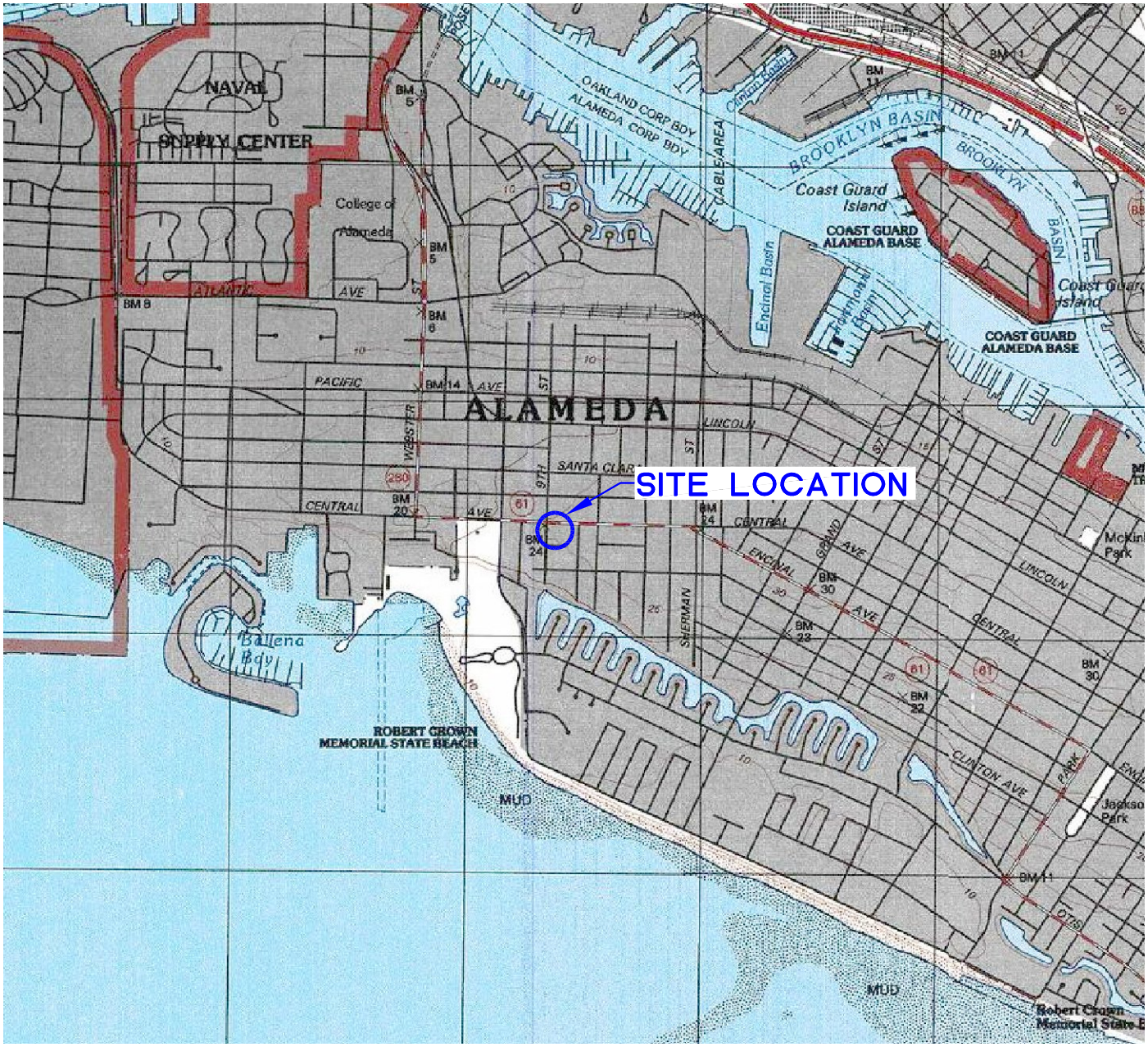
900 Central Avenue
Alameda, California

| Sample ID | Date | Depth (feet, bgs) | TPHg (mg/kg) | Benzene (mg/kg) | Toluene (mg/kg) | Ethyl-benzene (mg/kg) | Total Xylenes (mg/kg) | MtBE (mg/kg) | TPHd (mg/kg) | TPHmo (mg/kg) | TPHss (mg/kg) | TPHk (mg/kg) | VOCs (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-6-5 | 06/22/07 | 5 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| MW-6-10.5 | 06/22/07 | 10.5 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| MW-6-17 | 06/22/07 | 17 | <0.50 | <0.010 | <0.010 | <0.010 | <0.010 | NA | NA | NA | NA | NA | NA |
| EB-1[a] | 04/20/94 | 14.5 | 95 | 0.4 | 0.5 | 0.9 | 5.2 | NA | 39 | <10 | NA | NA | NA |
| EB-2[a] | 04/20/94 | 16.5 | <1.0 | <0.005 | <0.005 | <0.005 | <0.005 | NA | <5 | <10 | NA | NA | NA |
| EB-3[a] | 04/20/94 | 14.5 | <1.0 | <0.005 | <0.005 | <0.005 | <0.005 | NA | <5 | <10 | NA | NA | ND |
| P-1-11[b] | 06/97 | 11 | ND | ND | ND | ND | ND | NA | NA | NA | NA | NA | NA |
| P-2-10.5[b] | 06/97 | 10.5 | ND | ND | ND | ND | ND | NA | NA | NA | NA | NA | NA |
| P-2-12.5[b] | 06/97 | 12.5 | ND | ND | ND | ND | ND | NA | NA | NA | NA | NA | NA |
| P-3-11[b] | 06/97 | 11 | ND | ND | ND | ND | ND | NA | NA | NA | NA | NA | NA |
| P-3-14.5[b] | 06/97 | 14.5 | 4,600 | ND | 15 | 110 | 590 | NA | NA | NA | NA | NA | NA |
| P-4-13[b] | 06/97 | 13 | ND | ND | ND | ND | ND | NA | NA | NA | NA | NA | NA |
| P-4-15.5[b] | 06/97 | 15.5 | 1.1 | 0.011 | 0.0092 | 0.03 | 0.066 | NA | NA | NA | NA | NA | NA |
| P-5-11.5[b] | 06/97 | 11.5 | ND | ND | ND | ND | ND | NA | NA | NA | NA | NA | NA |
| P-6-10.5[b] | 06/97 | 10.5 | ND | ND | ND | ND | ND | NA | NA | NA | NA | NA | NA |
| P-7-9.5[b] | 06/97 | 9.5 | ND | ND | ND | ND | ND | NA | NA | NA | NA | NA | NA |
| P-8-9.5[b] | 06/97 | 9.5 | ND | ND | ND | ND | ND | NA | NA | NA | NA | NA | NA |

Notes:

TPHg = gasoline range total petroleum hydrocarbons
TPHd = diesel range total petroleum hydrocarbons
TPHmo = motor oil range total petroleum hydrocarbons
TPHss = Stoddard range total petroleum hydrocarbons
TPHk = kerosene total petroleum hydrocarbons
MtBE = Methyl tert-Butyl Ether
a = Work performed by Lowney Associates on April 4, 1994.
b = Work performed by Allwest in 1997.

mg/kg = milligrams per kilogram
bgs = below ground surface
< = none detected at or above reported detection limit
ND = not detected
NA = not analyzed





QUADRANGLE LOCATION

N

SCALE IN FEET

0 2,000

*Ref. KCE514/KCE514-SLM.DWG*
*Base Map from TOPO!© NGH*

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RRM ENVIRONMENTAL ENGINEERING GEOLOGY

# SITE LOCATION MAP

900Central Avenue
Alameda, California

FIGURE:
1

PROJECT:
KCE514

COMMERCIAL/RESIDENTIAL

COMMERCIAL/RESIDENTIAL

8"ø PLASTIC

3"ø PLASTIC

6"ø

4"ø

M.H.

6"ø

56'

CENTRAL AVENUE

8"ø

M.H.

4"ø PLASTIC

2"ø PLASTIC (4"ø CAST ENCASED)

A'

SB-5

SB-4

RW-1

SB-1

SB-3

SUSPECT FORMER UST

SIDEWALK

MW-4

8"ø

MW-2

P-3

P-2

P-1

EB-1

SB-2

MW-1

FENCE/PROPERTY BOUNDARY

P-4

FORMER CANOPY

MW-5

NINTH STREET

SB-6

EB-2

SIDEWALK

RESIDENTIAL

MW-3

APARTMENT BUILDING

P-5

MOVIE THEATER (FORMER CHURCH)

A

MW-6

EB-3

FORMER STATION/GARAGE

36'

P-6

P-7

P-8

RESIDENTIAL

1 1/4"ø PLASTIC

EXPLANATION

MW-1 GROUNDWATER MONITORING WELL LOCATION

P-1 EXPLORATORY SOIL BORING/GRAB GROUNDWATER SAMPLE LOCATION, (1997)

EB-1 EXPLORATORY SOIL BORING/GRAB GROUNDWATER SAMPLE LOCATION, (1994)

SB-1 EXPLORATORY SOIL BORING LOCATION, (2007)

RW-1 RECOVERY WELL LOCATION

UTILITY – PG&E (GAS)

UTILITY – WATER

UTILITY – STORM DRAIN

UTILITY – SANITARY SEWER

M.H. MANHOLE

A A' LINE OF GEOLOGIC CROSS SECTION

N

SCALE IN FEET

0 20

Ref. KCE514/KCE514-EXTENDED.DWG
Basemap from All West

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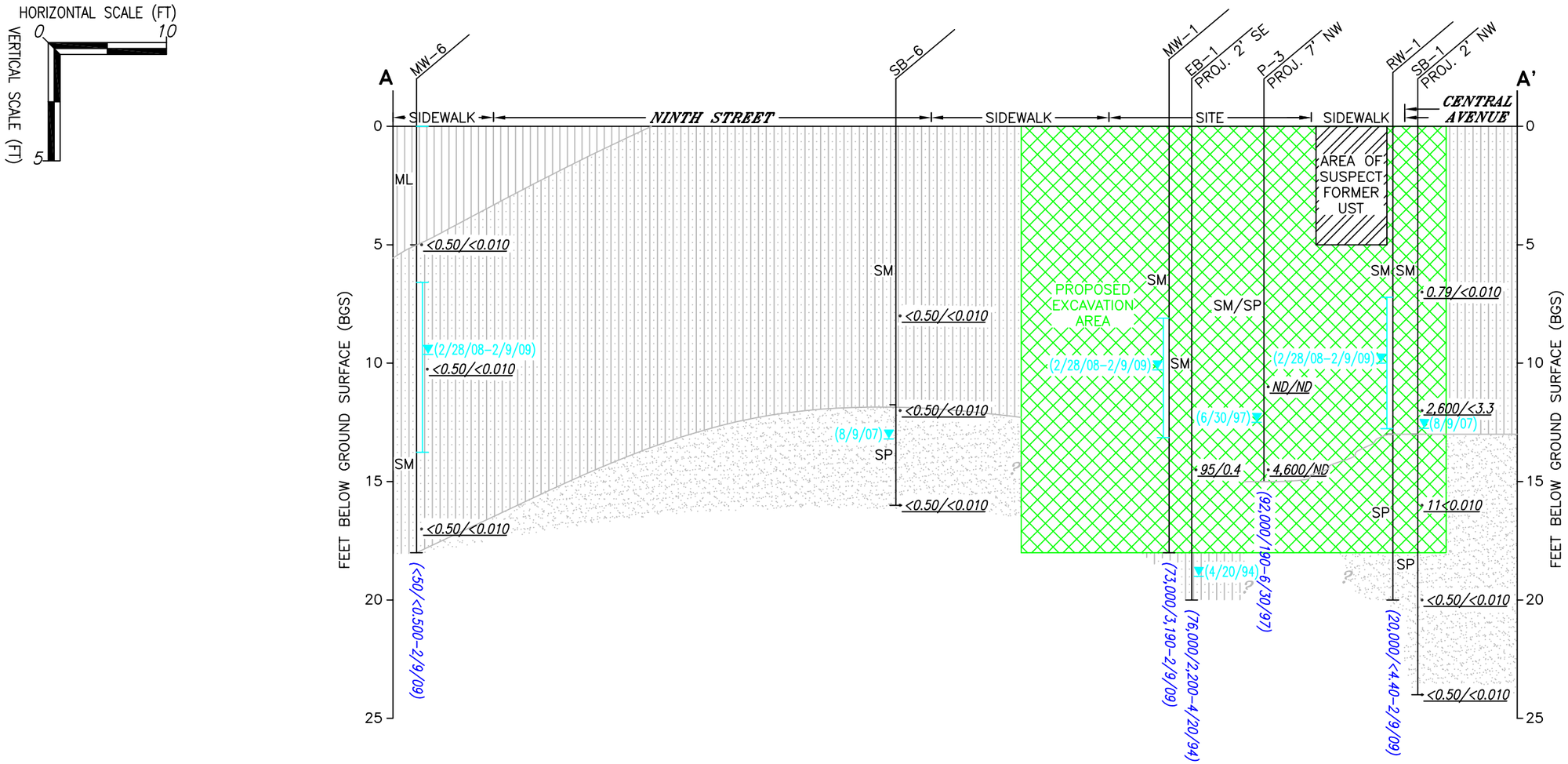
**EXTENDED SITE MAP**

900 Central Avenue
Alameda, California

FIGURE:
2
PROJECT:
KCE514




EXPLANATION

*520/6.8* TPHg/BENZENE CONCENTRATIONS IN SOIL IN MILLIGRAMS PER KILOGRAM (mg/kg)

*ND* NOT DETECTED AT OR ABOVE LABORATORY REPORTING LIMITS

*(<50/<0.500)* TPHg/BENZENE CONCENTRATIONS IN GROUNDWATER IN MICROGRAMS PER LITER (ug/L)

*2/9/09* GROUNDWATER SAMPLE DATE

GROUNDWATER DEPTH

GROUNDWATER DEPTH RANGE

(2/9/09) GROUNDWATER DEPTH MEASUREMENT DATE/RANGE

ML: SILT

SM: SILTY SAND

SP: SAND

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**GEOLOGIC CROSS SECTION A-A'**

900 Central Avenue
Alameda, California

FIGURE:
3
PROJECT:
KCE514

Ref. KCE514/KCE514_X-SEC_A-A.DWG

COMMERCIAL/RESIDENTIAL

COMMERCIAL/RESIDENTIAL

8"ø PLASTIC

3"ø PLASTIC

6"ø

4"ø

M.H.

6"ø

CENTRAL AVENUE

56'

8"ø

M.H.

4"ø PLASTIC

2"ø PLASTIC (4"ø CAST ENCASED)

SB-5

SB-4

(14.66)

RW-1

SB-1

SB-3

SUSPECT FORMER UST

SIDEWALK

MW-4 (14.07)

8"ø

NINTH STREET

MW-2 (14.81)

FENCE/PROPERTY BOUNDARY

P-3

P-2

P-1

EB-1

SB-2

MW-1 (14.51)

0.01

P-4

FORMER CANOPY

14.75

MW-5 (14.09)

SB-6

EB-2

(14.48)

MW-3

SIDEWALK

APARTMENT BUILDING

RESIDENTIAL

P-5

14.50

EB-3

FORMER STATION/GARAGE

MW-6 (14.10)

14.25

36'

P-6

P-7

P-8

RESIDENTIAL

1 1/4"ø PLASTIC

MOVIE THEATER (FORMER CHURCH)

EXPLANATION

MW-1 GROUNDWATER MONITORING WELL LOCATION

P-1 EXPLORATORY SOIL BORING/GRAB GROUNDWATER SAMPLE LOCATION, (1997)

EB-1 EXPLORATORY SOIL BORING/GRAB GROUNDWATER SAMPLE LOCATION, (1994)

SB-1 EXPLORATORY SOIL BORING LOCATION, (2007)

RW-1 RECOVERY WELL LOCATION

UTILITY – PG&E (GAS)

UTILITY – WATER

UTILITY – STORM DRAIN

UTILITY – SANITARY SEWER

M.H. MANHOLE

(14.66) GROUNDWATER ELEVATION, FT/MSL

14.25 GROUNDWATER ELEVATION CONTOUR, FT/MSL

0.01 APPROXIMATE GROUNDWATER FLOW DIRECTION; APPROXIMATE GRADIENT = 0.01 FT/FT

N

SCALE IN FEET

0 20

Ref. KCE514/KCE514-EXTENDED.DWG
Basemap from All West

PREPARED BY

RRM ENVIRONMENTAL ENGINEERING & GEOLOGY

# GROUNDWATER ELEVATION CONTOUR MAP, FEBRUARY 9, 2009

900 Central Avenue
Alameda, California

FIGURE: 4

PROJECT: KCE514

COMMERCIAL/RESIDENTIAL

COMMERCIAL/RESIDENTIAL

8"ø PLASTIC
3"ø PLASTIC

6"ø
4"ø

M.H.

6"ø

CENTRAL AVENUE

56'

M.H.

8"ø

4"ø PLASTIC

2"ø PLASTIC (4"ø CAST ENCASED)

20,000

SB-5
SB-4
RW-1
EB-1
SB-1
SB-3

SUSPECT FORMER UST

SIDEWALK

MW-4 <50

8"ø

MW-2 <50

P-1

P-3

EB-1

P-2

SB-2

MW-1

10,000
1,000
100

73,000

FENCE/PROPERTY BOUNDARY

P-4

FORMER CANOPY

MW-5 <50

SB-6

EB-2

NINTH STREET

SIDEWALK

MW-3 <50

P-5

APARTMENT BUILDING

RESIDENTIAL

MW-6 <50

EB-3

FORMER STATION/GARAGE

36'

P-6

P-7

P-8

RESIDENTIAL

1 1/4"ø PLASTIC

MOVIE THEATER (FORMER CHURCH)

EXPLANATION

| | |
|---|---|
| MW-1 | GROUNDWATER MONITORING WELL LOCATION |
| P-1 | EXPLORATORY SOIL BORING/GRAB GROUNDWATER SAMPLE LOCATION, (1997) |
| EB-1 | EXPLORATORY SOIL BORING/GRAB GROUNDWATER SAMPLE LOCATION, (1994) |
| SB-1 | EXPLORATORY SOIL BORING LOCATION, (2007) |
| RW-1 | RECOVERY WELL LOCATION |
| | UTILITY – PG&E (GAS) |
| | UTILITY – WATER |
| | UTILITY – STORM DRAIN |
| | UTILITY – SANITARY SEWER |
| M.H. | MANHOLE |
| 20,000 | TPHg CONCENTRATIONS IN GROUNDWATER IN MICROGRAMS PER LITER (ug/L) |
| 10,000 | TPHg ISOCONCENTRATION CONTOUR (DASHED WHERE INFERRED) |
| < | NOT DETECTED AT OR ABOVE VALUE SHOWN |
| TPHg | GASOLINE RANGE TOTAL PETROLEUM HYDROCARBONS |

N

SCALE IN FEET

0 20

Ref. KCE514/KCE514-EXTENDED.DWG
Basemap from All West

PREPARED BY RRM

**TPHg GROUNDWATER ISOCONCENTRATION MAP, FEBRUARY 9, 2009**

900 Central Avenue
Alameda, California

FIGURE: **5**

PROJECT: KCE514

COMMERCIAL/RESIDENTIAL

COMMERCIAL/RESIDENTIAL

8"ø PLASTIC
3"ø PLASTIC

6"ø
4"ø
M.H.
6"ø

*CENTRAL AVENUE*

56'

M.H.
8"ø
2"ø PLASTIC (4"ø CAST ENCASED)

4"ø PLASTIC

SB-5
SB-4
<4.40
RW-1
SB-1
SB-3
SUSPECT FORMER UST
SIDEWALK

500
1,000
P-3
EB-1
MW-1
3,190
P-2
SB-2
P-1
MW-2
<0.500
FENCE/PROPERTY BOUNDARY

P-4
FORMER CANOPY
SB-6
EB-2
SIDEWALK
MW-3
<0.500
P-5
APARTMENT BUILDING
RESIDENTIAL

EB-3
FORMER STATION/GARAGE
P-6
P-7
P-8

MW-4
<0.500
8"ø
*NINTH STREET*
MW-5
<0.500
MW-6
<0.500
36'

RESIDENTIAL

1 1/4"ø PLASTIC

MOVIE THEATER (FORMER CHURCH)

EXPLANATION

| | |
|---|---|
| MW-1 | GROUNDWATER MONITORING WELL LOCATION |
| P-1 | EXPLORATORY SOIL BORING/GRAB GROUNDWATER SAMPLE LOCATION, (1997) |
| EB-1 | EXPLORATORY SOIL BORING/GRAB GROUNDWATER SAMPLE LOCATION, (1994) |
| SB-1 | EXPLORATORY SOIL BORING LOCATION, (2007) |
| RW-1 | RECOVERY WELL LOCATION |
| | UTILITY – PG&E (GAS) |
| | UTILITY – WATER |
| | UTILITY – STORM DRAIN |
| | UTILITY – SANITARY SEWER |
| M.H. | MANHOLE |
| *<4.40* | BENZENE CONCENTRATIONS IN GROUNDWATER IN MICROGRAMS PER LITER (ug/L) |
| *500* | BENZENE ISOCONCENTRATION CONTOUR (DASHED WHERE INFERRED) |
| < | NOT DETECTED AT OR ABOVE VALUE SHOWN |

N

SCALE IN FEET
0 20

Ref. KCE514/KCE514-EXTENDED.DWG
Basemap from All West

PREPARED BY RRM

**BENZENE GROUNDWATER ISOCONCENTRATION MAP, FEBRUARY 9, 2009**

900 Central Avenue
Alameda, California

FIGURE:
**6**
PROJECT:
KCE514

CENTRAL AVENUE

NINTH STREET

SIDEWALK

SIDEWALK

FENCE

SUSPECT FORMER UST

FORMER CANOPY

FORMER STATION/GARAGE

APARTMENT BUILDING

8"ø

36'

1 1/4"ø PLASTIC

| SB-4 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 8' | 5.1 | ND |

| SB-5 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 8' | ND | ND |
| | 10.5' | ND | ND |

| RW-1 / SB-1 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 7.5' | 0.79 | ND |
| | 12' | 2,600 | ND |
| | 16' | 11 | ND |
| | 20' | ND | ND |
| | 24' | ND | ND |

| SB-3 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 8' | ND | ND |
| | 12' | ND | ND |
| | 16' | ND | ND |

| P-2 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 10.5' | ND | ND |
| | 12.5' | ND | ND |

| MW-2 / P-1 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 11' | ND | ND |

| MW-4 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 6' | ND | ND |
| | 10.5' | ND | ND |
| | 16.5' | ND | ND |

| EB-1 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 14.5-15' | 95 | 0.4 |

| P-3 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 11' | ND | ND |
| | 14.5' | 4,600 | ND |

| SB-2 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 8' | ND | ND |
| | 11.5' | ND | ND |
| | 16' | ND | ND |
| | 20' | ND | ND |
| | 24' | ND | ND |

| MW-1 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 13' | ND | ND |
| | 15.5' | 1.1 | 0.011 |

| P-4 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 16.5-17' | ND | ND |

| EB-2 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 8' | ND | ND |
| | 12' | ND | ND |
| | 16' | ND | ND |

| SB-6 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 8' | ND | ND |
| | 10.5' | ND | ND |
| | 15.0' | ND | ND |

| MW-5 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 8' | ND | ND |
| | 10.5' | ND | ND |
| | 15.0' | ND | ND |

| MW-3 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 11.5' | ND | ND |

| P-5 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 11.5' | ND | ND |

| MW-6 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 5' | ND | ND |
| | 10.5' | ND | ND |
| | 17' | ND | ND |

| EB-3 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 14.5-15' | ND | ND |

| P-6 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 10.5' | ND | ND |

| P-7 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 9.5' | ND | ND |

| P-8 | DEPTH | TPHg | BENZ |
|---|---|---|---|
| | 9.5' | ND | ND |

EXPLANATION

- MW-1 — GROUNDWATER MONITORING WELL LOCATION
- P-1 — EXPLORATORY SOIL BORING/GRAB GROUNDWATER SAMPLE LOCATION, (1997)
- EB-1 — EXPLORATORY SOIL BORING/GRAB GROUNDWATER SAMPLE LOCATION, (1994)
- SB-1 — EXPLORATORY SOIL BORING LOCATION, (2007)
- RW-1 — RECOVERY WELL LOCATION
- PROPOSED EXCAVATION AREA
- UTILITY – PG&E (GAS)
- UTILITY – WATER
- UTILITY – STORM DRAIN
- UTILITY – SANITARY SEWER
- M.H. — MANHOLE
- 8' — SAMPLE DEPTH IN FEET BELOW GROUND SURFACE (bgs)
- <5.0 — TPHg/TPHd CONCENTRATIONS IN SOIL IN MILLIGRAMS PER KILOGRAM (mg/K)
- TPHg/BENZ — TOTAL PETROLEUM HYDROCARBONS AS GASOLINE/BENZENE
- ND — NOT DETECTED AT OR ABOVE LABORATORY VALUE SHOWN

N

SCALE IN FEET

0 10

Ref. KCE514/KCE514-SITE-EXCAVATION.DWG
Basemap from All West

PREPARED BY RRM

**MAP SHOWING PROPOSED AREA OF EXCAVATION**

900 Central Avenue
Alameda, California

FIGURE: **7**

PROJECT: KCE514

# A

# BORING LOGS

DRILL RIG: DA-1 SURFACE ELEVATION: -- LOGGED BY: BB

DEPTH TO GROUND WATER: 18.5 feet BORING DIAMETER: 4 inches DATE DRILLED: 4/20/94

| DESCRIPTION AND REMARKS | SYMBOL | LEGEND | CONSISTENCY | SOIL TYPE | DEPTH (FEET) | SAMPLER | WATER CONTENT (%) | PENETRATION RESISTANCE (BLOWS/FT.) | SHEAR STRENGTH BY TORVANE (KSF) | ORGANIC VAPOR METER (ppm) |
|---|---|---|---|---|---|---|---|---|---|---|
| SILTY SAND, Brown, moist, fine to medium sand (fill) | Af | | Loose | SM | | | | | | |
| FILL | | | | | | | | | | |
| SANDY SILT, yellow-brown, moist, fine to medium grained sand | B | | Loose | SM | 5 | | | | | |
| Color change to green-gray, and petroleum odor between 10 and 20 feet | | | | | 10 | | | | | |
| Final | | | | | | | | | | |
| Petroleum odor increases at 18 to 18.5 feet | | | | | 15 | | | | | |
| Saturated at approximately at 19 feet | | | | | | | | | | |
| Initial | | | | | 20 | | | | | |
| Bottom of Boring = 20.0 feet. | | | | | | | | | | |
| NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual. | | | | | 25 | | | | | |
| | | | | | 30 | | | | | |

1027-1, 5/12 BB*EB

**EXPLORATORY BORING LOG - EB-1**

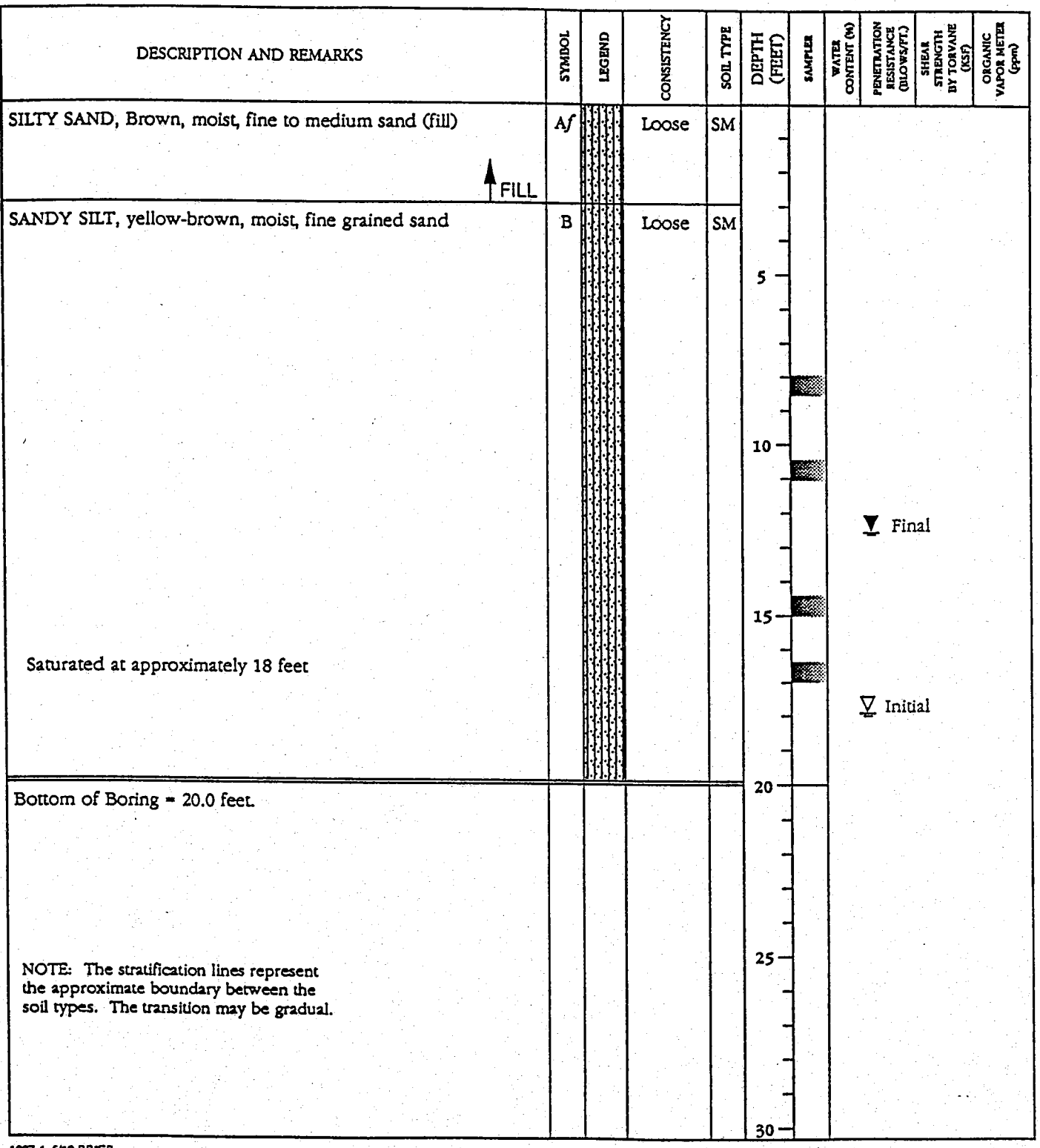
CENTRAL & 9TH STREET
Alameda, California

LOWNEY ASSOCIATES
Environmental/Geotechnical/Engineering Services

DRILL RIG: DA-1 SURFACE ELEVATION: -- LOGGED BY: BB

DEPTH TO GROUND WATER: 18 feet BORING DIAMETER: 4 inches DATE DRILLED: 4/20/94

| DESCRIPTION AND REMARKS | SYMBOL | LEGEND | CONSISTENCY | SOIL TYPE |
|---|---|---|---|---|
| SILTY SAND, Brown, moist, fine to medium sand (fill) ↑FILL | Af | | Loose | SM |
| SANDY SILT, yellow-brown, moist, fine grained sand | B | | Loose | SM |
| Saturated at approximately 18 feet | | | | |
| Bottom of Boring = 20.0 feet. | | | | |
| NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual. | | | | |




1027-1, 5/12 BB*EB

**EXPLORATORY BORING LOG - EB-2**

CENTRAL & 9TH STREET
Alameda, California

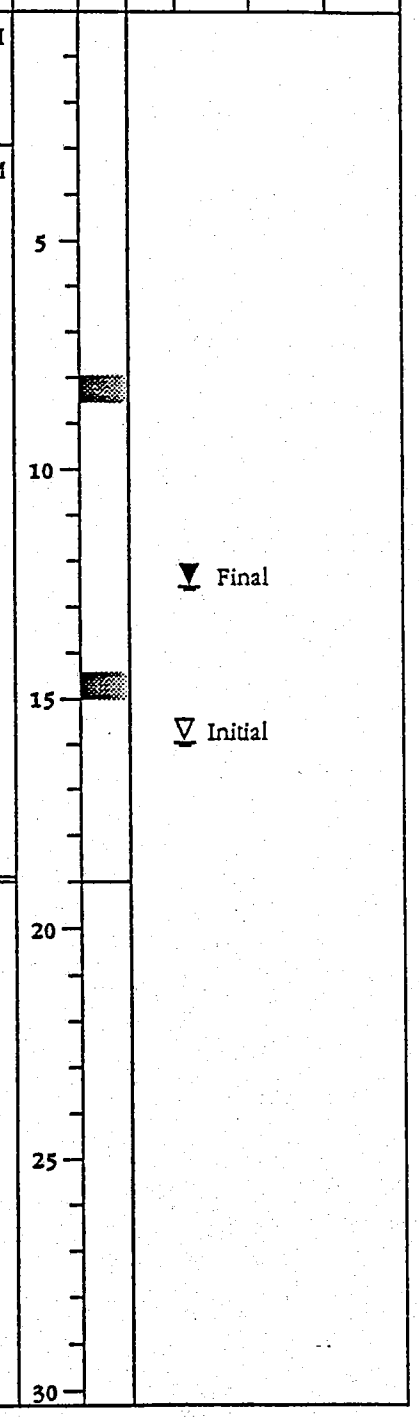
LOWNEY ASSOCIATES
Environmental/Geotechnical/Engineering Services

DRILL RIG: DA-1 SURFACE ELEVATION: -- LOGGED BY: BB

DEPTH TO GROUND WATER: 16 feet BORING DIAMETER: 4 inches DATE DRILLED: 4/20/94

| DESCRIPTION AND REMARKS | SYMBOL | LEGEND | CONSISTENCY | SOIL TYPE |
|---|---|---|---|---|
| SILTY SAND, Brown, moist, fine to medium sand (fill) FILL | Af | | Loose | SM |
| SANDY SILT, yellow-brown, moist, fine grained sand | B | | Loose | SM |
| Saturated at approximately 16 feet | | | | |
| Bottom of Boring = 19.0 feet. | | | | |

NOTE: The stratification lines represent the approximate boundary between the soil types. The transition may be gradual.



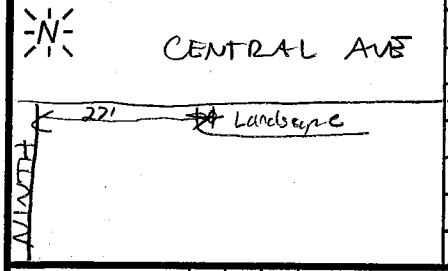

1027-1, 5/12 BB*EB

**EXPLORATORY BORING LOG - EB-3**

CENTRAL & 9TH STREET
Alameda, California

LOWNEY ASSOCIATES
Environmental/Geotechnical/Engineering Services

WELL/BORING LOCATION MAP

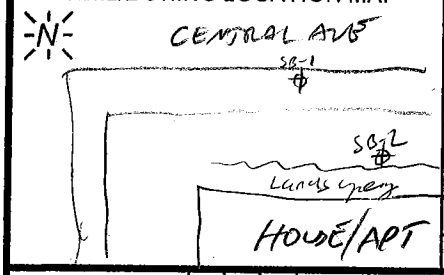



| Remediation Risk Management, Inc. | WELL/BORING: SB-1 |
|---|---|
| DATE: 8-9-07 | DRILLING METHOD: Geoprobe |
| PROJECT: SCE514 | SAMPLING METHOD: Hydraulic |
| CLIENT: Kelleher | BORING DIAMETER: 2" |
| LOCATION: 900 Central Ave | BORING DEPTH: 24' |
| CITY: Alameda | WELL CASING: N/A |
| CO./STATE: Alameda/CA | WELL SCREEN: N/A |
| DRILLER: Vironex | SAND PACK: N/A |

| WATER LEVEL: | | | |
|---|---|---|---|
| TIME: | | | |
| DATE: | | | |
| DESCRIPTION/LOGGED BY: | Cate Townsend | | |

| WELL/BORING COMPLETION | FIRST ▽ | STABILIZED ▼ | MOISTURE | DENSITY BLOWS / FT | FIELD TEST PID (ppm) | SAMPLE NUMBER | DEPTH (FEET) | RECOVERY | SAMPLE INTERVAL | GRAPHIC | USCS SYMBOL | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CEMENT GROUT | | | | | | | 1 | | | | | ≈6" topsoil |
| | | | | | | | 2 | | | | SM | Silty Sand: Dark Brn; 7.5YR-4/4; 15% silt; 85% fine sand; loose; dry; roots; NPO |
| | | | | | | | 3 | | | | | |
| | | | | | | | 4 | | | | | |
| | | | | | | | 5 | | | | SM | Silty Sand; Dark Brn - 7.5YR-4/4 10-15% silt; 85-90% fine sand; Color change @ 7.5' to Olive Gray 5Y-4/2 - NPO until ≈ 7.5' - SPO - appears to be stained |
| | | | | | | | 6 | | | | | |
| | | | | | 1.1 | SB-1 7.5 0850 | 7 | | | | | color change |
| | | | | | | | 8 | | | | | |
| | | | | | | | 9 | | | | | |
| | | | | | | | 10 | | | | SM | Silty Sand; Dark Greenish Gray; 5G-4/1 15% silt; 85% fine sand; very moist; SPO |
| | | | | | 52.8 | SB-1-12' 0900 | 11 | | | | | |
| | ▽ | | | | | | 12 | | | | | |
| | | | | | | | 13 | | | | SP | Poorly Graded Sand; varies (mottled) from Dark Greenish Gray 5G-4/1 to Dark Brn - 7.5YR-4/4; 5% fine sand/silt; 95% medium sand; wet; SPO |
| | | | | | | | 14 | | | | | |
| | | | | | | | 15 | | | | | |
| | | | | | 0.9 | SB-1-16' 0924 | 16 | | | | | |
| | | | | | | | 17 | | | | | |
| | | | | | | | 18 | | | | SP | - Same as above; Color not varied) Dark Greenish Gray; 5G-4/1; wet |
| | | | | | | | 19 | | | | | |
| | | | | | 0 | SB-1-20' 0931 | 20 | | | | | |
| | | | | | | | 21 | | | | SP | Poorly Graded Sand; Dark Brn 7.5YR-4/4 5% silt/fine sand; 95% medium to coarse Sand; loose; wet; SPO - shoe of drill shavings NPO |
| | | | | | | | 22 | | | | | |
| | | | | | 11.0 | SB-1-24' 0940 | 24 | | | | | BOTTOM OF BORING 24' |

WELL/BORING LOCATION MAP




**Remediation Risk Management, Inc.** | WELL/BORING: SB-2

| | |
|---|---|
| DATE: 8-9-07 | DRILLING METHOD: Geoprobe |
| PROJECT: CCE514 | SAMPLING METHOD: Hydraulic |
| CLIENT: Cellular | BORING DIAMETER: 2" |
| LOCATION: 900 Central Ave | BORING DEPTH: 26' |
| CITY: Alameda | WELL CASING: N/A |
| CO./STATE: Alameda / CA | WELL SCREEN: N/A |
| DRILLER: Nironex | SAND PACK: N/A |

| | | | |
|---|---|---|---|
| WATER LEVEL: | | | |
| TIME: | | | |
| DATE: | | | |
| DESCRIPTION/LOGGED BY: Cate Townsend | | | |

WELL/BORING COMPLETION: CEMENT GROUT

| DEPTH (FEET) | FIRST | STABILIZED | MOISTURE | DENSITY BLOWS / FT | FIELD TEST PID (ppm) | SAMPLE NUMBER | RECOVERY | SAMPLE INTERVAL | GRAPHIC | USCS SYMBOL | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | 0 | | | | | SM | Silty Sand; Yellowish Red 5YR 4/6 10% silt, 90% sand; damp; NPO |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | 0 | SB-2-8' 1113 | | | | | |
| 9 | | | | | | | | | | SM | Silty Sand; Olive Brn; 2.5Y 4/3; 15% silt/fine sand; 85% Sand; Color change @ ≈ 10.5~11' to Dark Grenish Gray 5Y 4/1; damp; SPO @ 11'. |
| 10 | | | | | | | | | | | |
| 11 | | | | | 0 | SB-2 11.5' 1130 | | | | | |
| 12 | | | | | | | | | | | |
| 13 | | | | | | | | | | | |
| 14 | | | | | | | | | | SP | Poorly Graded Sand; Dark Grenish Gray; 5Y 4/1 5% silt/fine sand; 95% medium sand; moist; SPO |
| 15 | | | | | | | | | | | |
| 16 | | | | | 0 | SB-2 16' 1140 | | | | | |
| 17 | | | | | | | | | | SP | As above |
| 18 | | | | | | | | | | | Color change - to Olive Brn 2.5Y 4/3; SPO to ≈ 18.5'; NPO @ ≈ 19 to 20' |
| 19 | | | | | | | | | | | |
| 20 | | | | | 0 | SB-2 20' 1150 | | | | | |
| 21 | | | | | | | | | | SM | Silty Sand; Olive Brn 2.5Y 4/3 10% fines; 90% medium Sand damp; NPO |
| 22 | | | | | | | | | | | |
| 23 | | | | | | | | | | | |
| 24 | | | | | 0 | SB-2 24' 1205 | | | | | |

WELL/BORING LOCATION MAP

N

**Remediation Risk Management, Inc.** | WELL/BORING: SB-2

| | |
|---|---|
| DATE: | DRILLING METHOD: |
| PROJECT: | SAMPLING METHOD: |
| CLIENT: | BORING DIAMETER: |
| LOCATION: | BORING DEPTH: |
| CITY: | WELL CASING: |
| CO./STATE: | WELL SCREEN: |
| DRILLER: | SAND PACK: |

| WELL/BORING COMPLETION | FIRST ▽ | STABILIZED ▼ | MOISTURE | DENSITY BLOWS / FT | FIELD TEST PID (ppm) | SAMPLE NUMBER | DEPTH (FEET) | RECOVERY | SAMPLE INTERVAL | GRAPHIC | USCS SYMBOL | WATER LEVEL: | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | TIME: | | | |
| | | | | | | | | | | | | DATE: | | | |
| | | | | | | | | | | | | DESCRIPTION/LOGGED BY: | | | |
| | | | | | | | 25 | | | | SP | Well Graded Sand, same color & above | | | |
| | | | | | | | 26 | | | | | wet; NPO | | | |
| | ▽ | | | | | | | | | | | | | | |
| | ▽ BOTTOM OF BORING | | | | | | | | | | | | | | |
| | | | | | | 26' | | | | | | | | | |

WELL/BORING LOCATION MAP

N

SEE SITE MAP

**Remediation Risk Management, Inc.** | WELL/BORING: SB-3

| | |
|---|---|
| DATE: 8-9-07 | DRILLING METHOD: Geoprobe |
| PROJECT: KCB514 | SAMPLING METHOD: Hydraulic |
| CLIENT: Kulchar | BORING DIAMETER: 2" |
| LOCATION: 900 Central Ave | BORING DEPTH: 16' |
| CITY: Alameda | WELL CASING: N/A |
| CO./STATE: Alameda / CA | WELL SCREEN: N/A |
| DRILLER: Vironex | SAND PACK: N/A |

| | | | |
|---|---|---|---|
| WATER LEVEL: | | | |
| TIME: | | | |
| DATE: | | | |
| DESCRIPTION/LOGGED BY: | CA Townsend | | |

| WELL/BORING COMPLETION | FIRST ▽ | STABILIZED ▼ | MOISTURE | DENSITY BLOWS / FT | FIELD TEST PID (ppm) | SAMPLE NUMBER | DEPTH (FEET) | RECOVERY | SAMPLE INTERVAL | GRAPHIC | USCS SYMBOL | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cement Grout | | | | | | | 1 | | | | | Sod/topsoil |
| | | | | | | | 2 | | | | | NA - |
| | | | | | | | 3 | | | | SC | Clayey Sand; Dark Brn 7.5YR-4/4; 25-30% mpf; 75-70% fine sand; NPD |
| | | | | | | SB-3 4.5' 1300 | 4 | | | | | |
| | | | | | 0 | | 5 | | | | SM | Silty Sand; Dark Brn 7.5YR-4/4; 10-15% silt; 90% fine sand; loose; damp NPD |
| | | | | | | | 6 | | | | | |
| | | | | | | | 7 | | | | | |
| | | | | | 0 | SB-3 8' 1310 | 8 | | | | | |
| | | | | | | | 9 | | | | SP | Poorly Graded Sand; Dark Yellowish Brn 10YR-3/4; 5% fines; 95% fine to medium sand; damp; loose NPD |
| | | | | | | | 10 | | | | | |
| | | | | | | | 11 | | | | | |
| | | | | | 0 | SB-3 12' 1315 | 12 | | | | | |
| | ▽ | | | | | | 13 | | | | SM | Silty Sand; Dark Yellowish Brn 10YR-4/4 10-15% fines/silt; 85-90% sand; wet; loose NPD |
| | | | | | | | 14 | | | | | |
| | | | | | | | 15 | | | | | |
| | | | | | 0 | SB-3 16' 1330 | 16 | | | | | Bottom of Borg 16' |

WELL/BORING LOCATION MAP

N

SEE SITE MAP

**Remediation Risk Management, Inc.** | WELL/BORING: SB-4

| | |
|---|---|
| DATE: 8-9-07 | DRILLING METHOD: Geoprobe |
| PROJECT: KCG514 | SAMPLING METHOD: Hydraulic |
| CLIENT: Kellehe | BORING DIAMETER: 2" |
| LOCATION: 900 Central Ave | BORING DEPTH: 8' |
| CITY: Alameda | WELL CASING: N/A |
| CO./STATE: Alameda / CA | WELL SCREEN: N/A |
| DRILLER: Vironex | SAND PACK: N/A |

| | | | |
|---|---|---|---|
| WATER LEVEL: | | | |
| TIME: | | | |
| DATE: | | | |
| DESCRIPTION/LOGGED BY: | Cate Townsend | | |

| WELL/BORING COMPLETION | FIRST ☑ | STABILIZED ▼ | MOISTURE | DENSITY BLOWS / FT | FIELD TEST PID (ppm) | SAMPLE NUMBER | DEPTH (FEET) | RECOVERY | SAMPLE INTERVAL | GRAPHIC | USCS SYMBOL | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ← CEMENT GROUT → | | | | | | | 1 | | | | | |
| | | | | | | | 2 | | | | SM | Silty Sand; Dark Yellowish Brn 10YR-3/4 |
| | | | | | | | 3 | | | | | 15% silt / fines; 85% sand; loose; damp; NPD |
| | | | | | 0 | SB-4 4' 1134S | 4 | | | | | |
| | | | | | | | 5 | | | | SM | - Same as above; |
| | | | | | | | 6 | | | | | |
| | | | | | | | 7 | | | | SM | - color change to Dark Greenish Gray 5/6 4/1 NPD until ≈ 7.5, SPD @ 7.5~8' |
| | | | | | 4.4 | SB-4 1400 8' | 8 | | | | | |
| ↳ BOTTOM OF BORING | | | | | | | | | | | | |
| | | | | | 8' | | | | | | | |

WELL/BORING LOCATION MAP

SEE SITE MAP

**Remediation Risk Management, Inc.** | WELL/BORING: SB-5

| | |
|---|---|
| DATE: 8-9-07 | DRILLING METHOD: Geoprobe |
| PROJECT: KC6514 | SAMPLING METHOD: |
| CLIENT: Kaiser | BORING DIAMETER: 2" |
| LOCATION: 900 Central Ave | BORING DEPTH: 12' |
| CITY: Alameda | WELL CASING: N/A |
| CO./STATE: Alameda / CA | WELL SCREEN: N/A |
| DRILLER: Vironex | SAND PACK: N/A |

| | | | |
|---|---|---|---|
| WATER LEVEL: | | | |
| TIME: | | | |
| DATE: | | | |

DESCRIPTION/LOGGED BY: C Townsend

| WELL/BORING COMPLETION | FIRST ▽ | STABILIZED ▼ | MOISTURE | DENSITY BLOWS / FT | FIELD TEST PID (ppm) | SAMPLE NUMBER | DEPTH (FEET) | RECOVERY | SAMPLE INTERVAL | GRAPHIC | USCS SYMBOL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1 | | | | | 6" asphalt |
| | | | | | | | 2 | | | | | |
| | | | | | | | 3 | | | | SM | Silty Sand; Dark Yellowish Brn; 10YR-3/4 10-15% silt fines; 85-90% fine sand; loose; dry; NPO |
| | | | | | | SB-5-4' | | | | | | |
| | | | | | 0 | 1500 | 4 | | | | | |
| | | | | | | | 5 | | | | | |
| | | | | | | | 6 | | | | SM | Same as above; iron-oxide staining clumps; NPO |
| | | | | | | | 7 | | | | | |
| | | | | | 0 | SB-5-8' | 8 | | | | | |
| | | | | | | 1510 | 9 | | | | | |
| | | | | | | | 10 | | | | SM | As above; Sharp color change @ 9.5' from Dark Yellowish Brn 10YR-3/4 to Dark Greenish Gray; 5BG-4/1 SPO @ ≈ 9.5-10 |
| | | | | | | SB-5 | | | | | | |
| | | | | | 0 | 10.5 | 11 | | | | | |
| | | | | | | 1520 | | | | | | |
| | | | | | | | 12 | | | | | |
| Cement Grout | | | | | | | | | | | | |
| Bottom of Boring @ 12' | | | | | | | | | | | | |

WELL/BORING LOCATION MAP

N

SEE SITE MAP

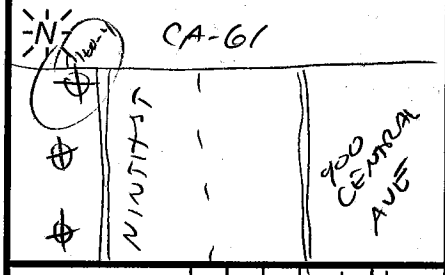
**Remediation Risk Management, Inc.** | WELL/BORING: SB-6

| | |
|---|---|
| DATE: 8-9-07 | DRILLING METHOD: Geoprobe |
| PROJECT: KCE514 | SAMPLING METHOD: |
| CLIENT: Kelleher | BORING DIAMETER: 2" |
| LOCATION: 900 Central Ave | BORING DEPTH: 16' |
| CITY: Alameda | WELL CASING: N/A |
| CO./STATE: Alameda / CA | WELL SCREEN: N/A |
| DRILLER: Vironex | SAND PACK: N/A |

| | | | |
|---|---|---|---|
| WATER LEVEL: | | | |
| TIME: | | | |
| DATE: | | | |
| DESCRIPTION/LOGGED BY: Cade Townsend | | | |

| WELL/BORING COMPLETION | FIRST ▽ | STABILIZED ▼ | MOISTURE | DENSITY BLOWS / FT | FIELD TEST PID (ppm) | SAMPLE NUMBER | DEPTH (FEET) | RECOVERY | SAMPLE INTERVAL | GRAPHIC | USCS SYMBOL | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CEMENT GROUT | | | | | | | 1 | | | | | ≈ 6" asphalt |
| | | | | | | | 2 | | | | SM | Silty Sand; Dark Yellowish Brn - 10YR-4/4 15% silt/fines; 85% fine sand; loose; iron oxide staining; NPO |
| | | | | | | | 3 | | | | | |
| | | | | | 0 | SB-6 41 1540 | 4 | | | | | |
| | | | | | | | 5 | | | | | |
| | | | | | | | 6 | | | | SM | Silty Sand - Dark Yellowish Brn - 10YR-4/6 Sand as above; NPO |
| | | | | | | | 7 | | | | | |
| | | | | | 0 | SB-6 8' 1548 | 8 | | | | | |
| | | | | | | | 9 | | | | | Same as above |
| | | | | | | | 10 | | | | SM | |
| | | | | | | | 11 | | | | | |
| | | | | | 0 | SB-6 12' 1600 | 12 | | | | | |
| | ▽ | | | | | | 13 | | | | SP | As above - color 5% fines; 95% Sand; dry moist NPO; |
| | | | | | | | 14 | | | | | |
| | | | | | | | 15 | | | | | |
| | | | | | 0 | SB-6 16' 1610 | 16 | | | | | |
| BOTTOM OF BORING 16' | | | | | | | | | | | | |

WELL/BORING LOCATION MAP




**Remediation Risk Management, Inc.** | WELL/BORING: MW-4

| | |
|---|---|
| DATE: 6-20-07 | DRILLING METHOD: HSA |
| PROJECT: K655/4 | SAMPLING METHOD: SS |
| CLIENT: Kaiser | BORING DIAMETER: 8" |
| LOCATION: 900 Central Ave | BORING DEPTH: 18' |
| CITY: Alameda | WELL CASING: 2" PVC |
| CO./STATE: Alameda / CA | WELL SCREEN: 18-8' 0.020 |
| DRILLER: Explor. Geoserv. | SAND PACK: 18-6' #3 |

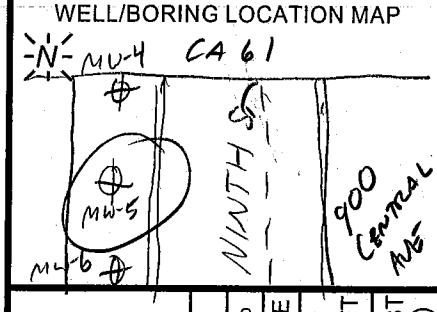
| | | |
|---|---|---|
| WATER LEVEL: | 11.5 | 10.43 |
| TIME: | 1300 | 1412 |
| DATE: | 6-20-07 | 6-20-07 |

DESCRIPTION/LOGGED BY: Cate Townsend

| WELL/BORING COMPLETION | FIRST | STABILIZED | MOISTURE | DENSITY BLOWS / FT | FIELD TEST PID (ppm) | SAMPLE NUMBER | DEPTH (FEET) | RECOVERY | SAMPLE INTERVAL | GRAPHIC | USCS SYMBOL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cement Grout / Bentonite Grout | | | | | | | 1 | | | | | 4" concrete |
| | | | D | | | | 2 | | | | ML | Silt w/ Sand, 7.5YR - 4/4 - Dark Brown; 15% very fine sand; 85% silt; occasional clast/pebble (sub-rounded) roots; dry loose; NPO |
| | | | | | | | 3 | | | | | |
| | | | | | | | 4 | | | | | |
| | | | D | 5,7,11 | 1.0 | MW-4 4.5 1215 | 5 | | | | ML | Sandy Silt; 10 YR - 4/6 - Dark Yellowish Brn 30-40% silt; 60-70% fine sand; Dry; loose; iron oxide staining; NPO |
| | | | D | 10,8,14 | 0.0 | MW-4 1226 6' | 6 | | | | | Same as above - color - 10YR 4/4 Dark Yellowish Brown |
| | | | | | | | 7 | | | | | |
| | | | DP | 12,20,24 | 0.1 | MW-4 7.5' 1237 | 8 | | | | SM | Silty Sand - 10YR - 4/4 Dark Yellowish Brn; 30% silt; 70% fine to medium sand; damp; NPO |
| | | | DP | 8,12,15 | 0.0 | MW-4' 12 48 9.5' | 9 | | | | SM | Same as above |
| | | | | | | | 10 | | | | | |
| | | | M | 14,20,21 | 0.5 | MW-4 1300 10.5' | 11 | | | | SM | Same as above - Moist |
| | | | W | 20,21,23 | 0.0 | MW-4 12 1315 | 12 | | | | SM | Silty Sand - 7.5YR - 4/3 - Strong Brown 15% silt / fine sand; 85% medium sand Wet; NPO |
| | | | | 18,21,22 | | | 13 | | | | | |
| | | | | | | | 14 | | | | | NO RECOVERY |
| | | | W | 8,13,20 | 0.0 | MW-4 15' 1327 | 15 | | | | SM | Same as above (11.5 - 13') |
| | | | | | | | 16 | | | | | |
| | | | W | 12,15,20 | 0.1 | MW-4 16.5 1349 | 17 | | | | SP | Poorly Graded Sand, 10 YR-4/4 - Dark Yellowish Brown; 5% silt / sand; 95% medium sand Wet; NPO |
| | | | | | | | 18 | | | | | |
| | | | | | | | 19 | | | | | |
| | | | | | | | 20 | | | | | |

→ BOTTOM OF BORING 18'

WELL/BORING LOCATION MAP




**Remediation Risk Management, Inc.** | WELL/BORING: MW-5

| | |
|---|---|
| DATE: 6-20-07 | DRILLING METHOD: HSA |
| PROJECT: KCE514 | SAMPLING METHOD: SS |
| CLIENT: Kelleher | BORING DIAMETER: 8" |
| LOCATION: 900 Central Ave | BORING DEPTH: 18' |
| CITY: Alameda | WELL CASING: 2" PVC |
| CO./STATE: Alameda / CA | WELL SCREEN: 18-8 .020 |
| DRILLER: Exp. Geoserv | SAND PACK: 18-6 #3 |

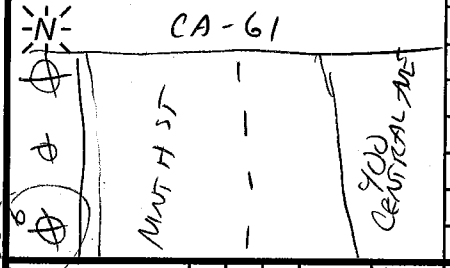
| | | |
|---|---|---|
| WATER LEVEL: | 10.5 | 11.1 |
| TIME: | 1030 | 1100 |
| DATE: | 6-20-07 | 6-20-07 |

DESCRIPTION/LOGGED BY: Cate Townsend

| WELL/BORING COMPLETION | FIRST | STABILIZED | MOISTURE | DENSITY BLOWS / FT | FIELD TEST PID (ppm) | SAMPLE NUMBER | DEPTH (FEET) | RECOVERY | SAMPLE INTERVAL | GRAPHIC | USCS SYMBOL | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vaughn Concrete | | | | | | | 0 | | | | | 4" Concrete |
| Cement Grout | | | D | | | | 1 | | | | ML | Sandy Silt; 10YR 3/4 Dark Yellowish Brn 30% fine sand; 70% silt; roots; loose. dry; NPO |
| | | | | | | | 2 | | | | | |
| | | | | | | | 3 | | | | SM | Silty Sand; 10 YR 5/4 Yellowish Brn; 15% silt / fine sand; 85% sand; dry; loose NPO |
| | | | | | | | 4 | | | | | |
| | | | D | 4,4,10 | 3.6 | MW-5-4.5 0920 | 5 | | | | SP | Poorly Graded Sand 10 YR 5/4 Yellowish Brown; 5% mot; 10% fine sand; 85% med sand; loose; dry; NPO |
| | | | D | 6,17,50 | 0 | NO SAMP | 6 | | | | SP | Poorly Graded Sand; Same color as above dry; silty; 10% mpl; 85% sand; damp; no odor; some iron oxide staining; NPO |
| | | | DP | 12,21,25 | 0 | MW-5-7.5 0945 | 7 8 | | | | SM | Silty Sand; 10YR - 4/4 Dark Yellowish Brown; 30% silt / fine sand; 70% sand; damp; roots; loose; NPO |
| | | | DP | 10,18,26 | 1.8 | NO SAMP | 9 | | | | SM | Same as above; numerous roots |
| | | | W | | | | 10 | | | | | |
| | | | | 10,15,23 | 1.9 | MW-5-10.5 1038 | 11 | | | | SM | Same as above - 10YR - 4/3 Dark Brown; Wet; roots; NPO |
| | | | W | 13,14,20 | 0 | MW-5-12 1040 | 12 | | | | SP | Poorly Graded Sand; 10YR - 4/4 Dark Yellowish Brown; 5% fine sand / silt; 15% medium sand; WET; NPO |
| | | | | | | | 13 | | | | | |
| | | | W | 10,12,18 | 3.5 | MW-5-13.5 1109 | 14 | | | | SP | Same as above |
| | | | W | 11,22,18 | 2.7 | MW-5-16 1125 | 15 16 | | | | SP | Same as above |
| | | | (W) | 10,18,16 | | | 17 | | | | | NO RECOVERY |
| | | | | | | | 18 | | | | | |
| | | | | | | | 19 | | | | | |
| | | | | | | | 20 | | | | | |

BOTTOM OF BORING 18'

WELL/BORING LOCATION MAP




| Remediation Risk Management, Inc. | | WELL/BORING: MW-6 |
|---|---|---|
| DATE: 6-20-07 | DRILLING METHOD: | HSA |
| PROJECT: KCB574 | SAMPLING METHOD: | SS |
| CLIENT: Kelleher | BORING DIAMETER: | 8" |
| LOCATION: 900 Central Ave | BORING DEPTH: | 18' |
| CITY: Alameda | WELL CASING: | 2" PVC |
| CO./STATE: Alameda / CA | WELL SCREEN: | 18-8', 0.020 |
| DRILLER: Expl. Geosv. | SAND PACK: | 18-6' #3 |

| | | | |
|---|---|---|---|
| WATER LEVEL: | ≈10.5 | 9.36 | |
| TIME: | 1525 | 1622 | |
| DATE: | 6-20-07 | 6-20-07 | |
| DESCRIPTION/LOGGED BY: | Cate Townsend | | |

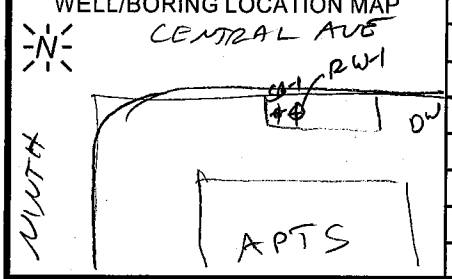
| WELL/BORING COMPLETION | FIRST ▽ | STABILIZED ▼ | MOISTURE | DENSITY BLOWS / FT | FIELD TEST PID (ppm) | SAMPLE NUMBER | DEPTH (FEET) | RECOVERY | SAMPLE INTERVAL | GRAPHIC | USCS SYMBOL | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cement Grout | | | | | | | 0 | | | | | 4" Concrete |
| Cement Grout | | | | | | | 1 | | | | ML | Silt w/ Sand; 15-20% very fine sand; 85-80-1 Silt; dry; loose; roots; NPD |
| | | | | | | | 2 | | | | | |
| | | | | | | | 3 | | | | | |
| | | | | | | | 4 | | | | | |
| | | | DP | 5,7,10 | 0.0 | MW-6 5' 1610 | 5 | | | | SM | Silty Sand 10YR-4/4 Dark Yellowish Brn; 20-30% silt; 70-80% very fine sand; loose; damp; roots; NPD |
| | | | | | | | 6 | | | | | |
| | | | | | | | 7 | | | | | |
| | | | | | | | 8 | | | | | |
| | | | | | | | 9 | | | | | |
| | ▽ | | W | | | | 10 | | | | SM | Silty Sand; 10YR-3/4 Dark Yellowish Brn 20% silt; 80% fine rounded sand; wet; NPD |
| | | | W | 10,18,26 | 0.0 | MW-6-10.5' 1612 | 11 | | | | | |
| | | | | | | | 12 | | | | | |
| | | | | | | | 13 | | | | | |
| | | | | | | | 14 | | | | | |
| | | | | | | | 15 | | | | SM | Same as above |
| | | | W | 18,26,25 | 0.0 | MW-6-15' 1630 | 16 | | | | SM | Same as above |
| | | | W | 17,28,28 | 0.0 | MW-6-17' 1650 | 17 | | | | | |
| | | | | | | | 18 | | | | | |
| | | | | | | | 19 | | | | | |
| | | | | | | | 20 | | | | | |

BOTTOM OF BORING @ 18'

SEND DWR TO

AC
PW
Alth
MH

WELL/BORING LOCATION MAP




| Remediation Risk Management, Inc. | | WELL/BORING: RW-1 |
|---|---|---|
| DATE: 8/3-07 | DRILLING METHOD: | HSA |
| PROJECT: KC6514 | SAMPLING METHOD: | SS |
| CLIENT: Kelleher | BORING DIAMETER: | 12" |
| LOCATION: 900 Central Ave | BORING DEPTH: | 20' |
| CITY: Alameda | WELL CASING: | 4" |
| CO./STATE: Alameda / CA | WELL SCREEN: | 0.020 |
| DRILLER: Expl. Geo | SAND PACK: | #3 Sand |

| WATER LEVEL: | 1138 | | |
|---|---|---|---|
| TIME: | 1033 | | |
| DATE: | 8-13-07 | | |
| DESCRIPTION/LOGGED BY: | C Townsend | | |

| WELL/BORING COMPLETION | FIRST | STABILIZED | MOISTURE | DENSITY BLOWS / FT | FIELD TEST PID (ppm) | SAMPLE NUMBER | DEPTH (FEET) | RECOVERY | SAMPLE INTERVAL | GRAPHIC | USCS SYMBOL | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cement Grout | | | | | | | 1 | | | | | |
| Cement Grout | | | | | | | 2 | | | | | See log for SB-1 |
| | | | | | | | 3 | | | | | Note ≈ 10' change in color from dark BRN to green grey; sand; silty sand |
| | | | | | | | 4 | | | | | |
| | | | | | | RW-1: 5' 0833 | 5 | | | | | |
| | | | | | | | 6 | | | | | |
| | | | | | | | 7 | | | | | |
| | | | | | | | 8 | | | | | |
| | | | | | | | 9 | | | | | |
| | | | | | 748 | RW1-10' 0840 | 10 | | | | | |
| | | | | | | | 11 | | | | | |
| | | | | | | | 12 | | | | | |
| | | | | | | | 13 | | | | | |
| | | | | | | | 14 | | | | | |
| | | | | | 200 | BW-1 15' 0850 | 15 | | | | | |
| | | | | | | | 16 | | | | | |
| | | | | | | | 17 | | | | | |
| | | | | | | | 18 | | | | | |
| | | | | | | | 19 | | | | | |
| | | | | | 938 | BW-1 20' 0904 | 20 | | | | | |
| | | | | | | | | | | | | |

Cont-1 0930

AllWest
AllWest Environmental, Inc.

Log of Boring: MW-1

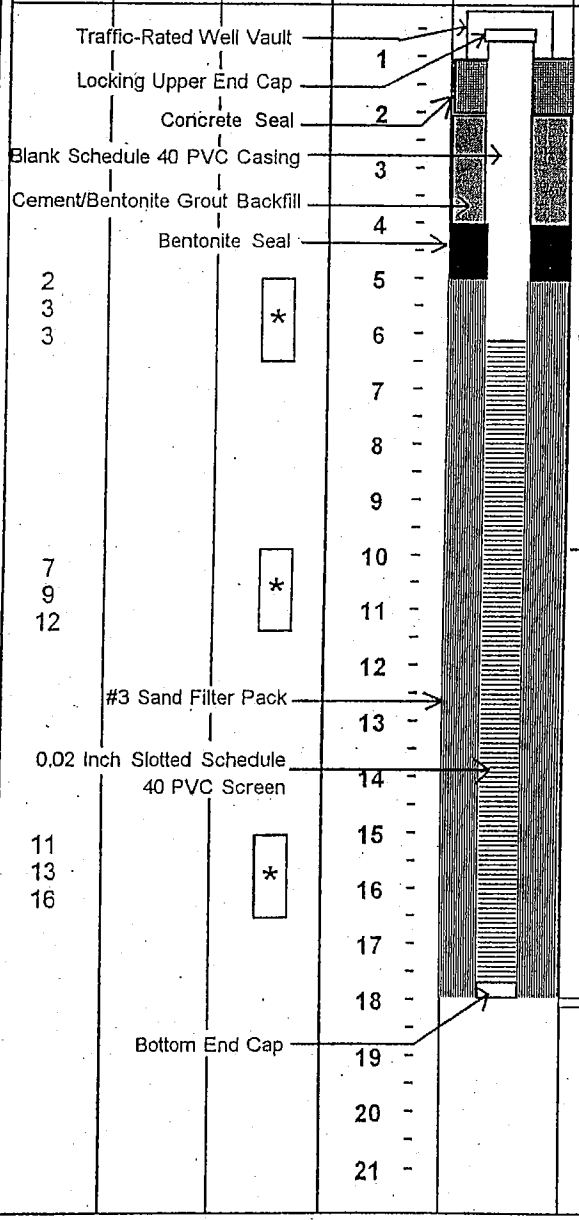
Sheet 1 of 1

Project Address: 900 Central Avenue, Alameda, CA

Project Number: 98115.23

Drilling Date: 11/16/98

Drilling Contractor: Bay Area Exploration
Drill Rig: CME 75
Auger: 8" Diameter Hollow-Stem
Sampler: SPT sampler
Hammer: 140 lbs, 30" drop
Logged By: L. Ching




| Blow Count | OVM Reading | Sample Interval | Depth in Feet | Well Profile | USCS Code | Soil Description |
|---|---|---|---|---|---|---|
| | | | | | SM | Grassy ground surface, landscaped area; Brown, silty fine to very fine SAND, loose, moist, non-plastic; |
| 2 3 3 | | * | 5 6 | | SM | Brown to dark brown, silty fine SAND, medium dense, non-plastic, moist to very moist; |
| 7 9 12 | | * | 10 11 12 | | SM | Olive brown to green brown, silty fine SAND, medium dense, non-plastic, very moist to wet, hydrocarbon odor; |
| | | | 13 14 | | | groundwater first encountered at 14'; |
| 11 13 16 | | * | 15 16 17 18 | | | boring terminated at 18'; |
| | | | 19 20 21 | | | |

Notes: * Sample not preserved

Reviewed By: R. Horwath

Drawn By: S. Poon

AllWest
AllWest Environmental, Inc.

Log of Boring: MW-2

Sheet 1 of 1

Project Address: 900 Central Avenue, Alameda, CA

Project Number: 98115.23

Drilling Date: 11/16/98

Drilling Contractor: Bay Area Exploration
Drill Rig: CME 75
Auger: 8" Diameter Hollow-Stem

Sampler: SPT sampler
Hammer: 140 lbs, 30" drop
Logged By: L. Ching

| Blow Count | OVM Reading | Sample Interval | Depth in Feet | Well Profile | USCS Code | Soil Description |
|---|---|---|---|---|---|---|
| | | | 1 | Traffic-Rated Well Vault; Locking Upper End Cap | SM | Grassy ground surface, landscaped area; Brown, silty fine to very fine SAND, loose, moist, non-plastic; |
| | | | 2 | Concrete Seal | | |
| | | | 3 | Blank Schedule 40 PVC Casing | | |
| | | | 4 | Cement/Bentonite Grout Backfill; Bentonite Seal | | |
| 2<br>3<br>4 | | * | 5 | | | |
| | | | 6 | | | |
| | | | 7 | | | |
| | | | 8 | | SM | Brown to dark brown, silty fine SAND, medium dense, non-plastic, moist to wet; |
| | | | 9 | | | |
| 7<br>9<br>10 | | * | 10 | | | |
| | | | 11 | | | |
| | | | 12 | #3 Sand Filter Pack | | |
| | | | 13 | | | |
| | | | 14 | | | groundwater first encountered at 14'; |
| | | | 15 | | | |
| 11<br>14<br>17 | | * | 16 | | | Brown to yellow brown, silty fine SAND, medium dense to dense, non-plastic, wet; |
| | | | 17 | 0.02 Inch Slotted Schedule 40 PVC Screen | SM | |
| | | | 18 | | | |
| | | | 19 | Bottom End Cap | | |
| 13<br>15<br>18 | | * | 20 | | | boring terminated at 21'; |
| | | | 21 | | | |

Notes: * Sample not preserved

Reviewed By: R. Horwath

Drawn By: S. Poon

AllWest
AllWest Environmental, Inc.

Log of Boring: MW-3

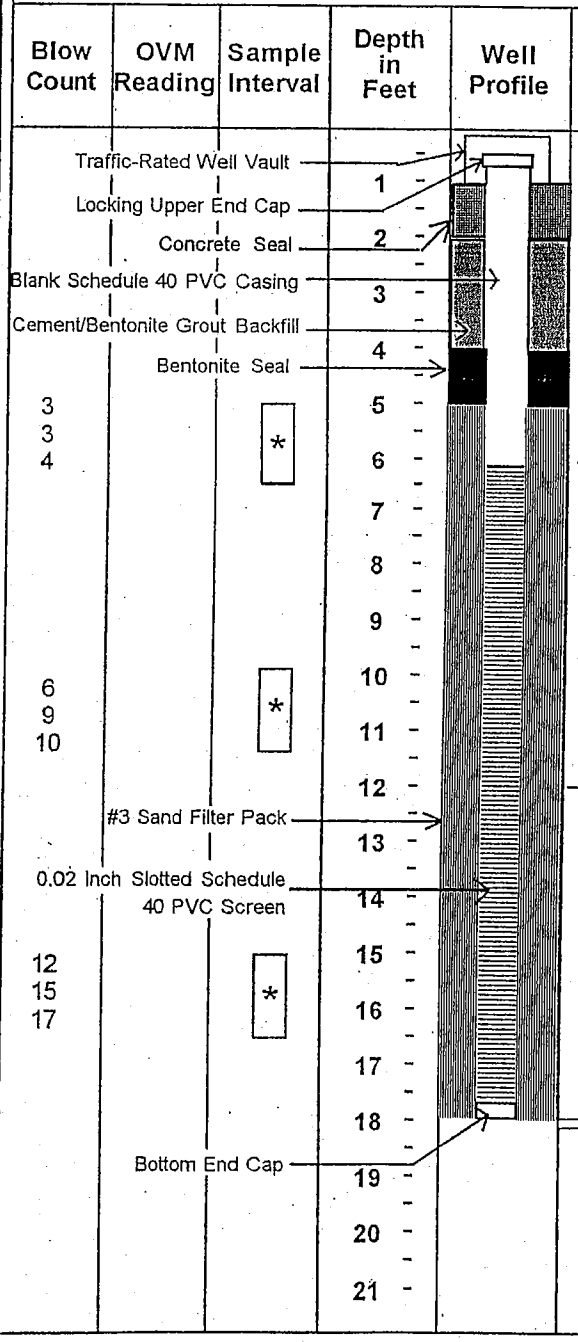
Sheet 1 of 1

Project Address: 900 Central Avenue, Alameda, CA

Project Number: 98115.23

Drilling Date: 11/16/98

Drilling Contractor: Bay Area Exploration
Drill Rig: CME 75
Auger: 8" Diameter Hollow-Stem
Sampler: SPT sampler
Hammer: 140 lbs, 30" drop
Logged By: L. Ching




| Blow Count | OVM Reading | Sample Interval | Depth in Feet | Well Profile | USCS Code | Soil Description |
|---|---|---|---|---|---|---|
| | | | | | SM | Grassy ground surface, landscaped area; Brown, silty fine to very fine SAND, loose, moist, non-plastic; |
| 3<br>3<br>4 | | * | | | | |
| | | | | | SM | Brown to dark brown, silty fine SAND, medium dense, non-plastic, moist to very moist; |
| 6<br>9<br>10 | | * | | | | |
| | | | | | SM | Brown to yellow brown, silty fine SAND, medium dense to dense non- plastic, very moist to wet; groundwater first encountered at 14'; |
| 12<br>15<br>17 | | * | | | | boring terminated at 18'; |

Notes: * Sample not preserved

Reviewed By: R. Horwath

Drawn By: S. Poon

AllWest
AllWest Environmental, Inc.

Log of Boring: P - 1

Project Address: 900 Central Avenue, Alameda, CA

Project Number: 97217.23

Drilling Date: 6/30/97



Drilling Contractor: ECA
Drill Rig: Geoprobe
Auger: N/A

Sampler: 2" x 4' macro core
Hammer: pneumatic hammer
Logged By: Long Ching

| OVM Reading | Sample Number | Sample Interval | Depth in Feet | Well Profile | USCS Code | Soil Description |
|---|---|---|---|---|---|---|
| | | | 1 | | SM/SP | Grassy ground surface (lawn);<br>Brown, silty sand, fine grain, poorly graded, slightly moist, loose, non-plastic; |
| ND | P-1-3 | | 3 | | | |
| | | | 4 | | | Brown, silty sand, fine to medium grain, moist, loose to medium dense, non-plastic; |
| | | | 5 | | | |
| | | | 6 | | | |
| ND | P-1-7 | | 7 | | | |
| | | | 8 | | SM | |
| | | | 9 | | | |
| | | | 10 | | | Grades very moist to wet below 10'; |
| ND | P-1-11 | | 11 | | | |
| | | | 12 | | | Groundwater encountered at 12'; |
| | | | 13 | | | |
| ND | P-1-14 | | 14 | | | |
| | | | 15 | | | Borehole terminated at 14';<br>Groundwater first encountered at 12';<br>Temporary 1" I.D. PVC casing installed to 14';<br>2 x 40-ml and 1 x 1-liter groundwater samples collected. |
| | | | 16 | | | |
| | | | 17 | | | |
| | | | 18 | | | |
| | | | 19 | | | |
| | | | 20 | | | |
| | | | 21 | | | |

Notes:

Reviewed By: L. Ching

Drawn By: S. Poon

AllWest
AllWest Environmental, Inc.

Log of Boring: P - 2

Project Address: 900 Central Avenue, Alameda, CA

Project Number: 97217.23

Drilling Date: 6/30/97



Drilling Contractor: ECA
Drill Rig: Geoprobe
Auger: N/A

Sampler: 2" x 4' macro core
Hammer: pneumatic hammer
Logged By: Long Ching

| OVM Reading | Sample Number | Sample Interval | Depth in Feet | Well Profile | USCS Code | Soil Description |
|---|---|---|---|---|---|---|
| | | | 1 | | SM/SP | Grassy ground surface (lawn);<br>Brown, silty sand, fine grain, poorly graded, slightly moist, loose, non-plastic; |
| ND | P-2-3.5 | | 3 | | SM | Brown, silty sand, fine to medium grain, moist, loose to medium dense, non-plastic; |
| ND | P-2-7.5 | | 7 | | | |
| | | | 10 | | | Grades very moist below 10'; |
| ND | P-2-10.5 | | 11 | | | |
| 10 | P-2-12.5 | | 12 | | | Grades greenish brown, slight hydrocarbon odor at 12';<br>Groundwater encountered at ~~12'.5;~~ |
| | | | 14 | | | Borehole terminated at 14';<br>Groundwater first encountered at 12.5';<br>Temporary 1" I.D. PVC casing installed to 14';<br>2 x 40-ml and 1 x 1-liter groundwater samples collected. |
| | | | 15 | | | |
| | | | 16 | | | |
| | | | 17 | | | |
| | | | 18 | | | |
| | | | 19 | | | |
| | | | 20 | | | |
| | | | 21 | | | |

Notes:

Reviewed By: L. Ching

Drawn By: S. Poon

AllWest
AllWest Environmental, Inc.

Log of Boring: P - 3
Project Address: 900 Central Avenue, Alameda, CA
Project Number: 97217.23
Drilling Date: 6/30/97

Drilling Contractor: ECA
Drill Rig: Geoprobe
Auger: N/A

Sampler: 2" x 4' macro core
Hammer: pneumatic hammer
Logged By: Long Ching

| OVM Reading | Sample Number | Sample Interval | Depth in Feet | Well Profile | USCS Code | Soil Description |
|---|---|---|---|---|---|---|
| | | | 1 | | SM/SP | Grassy ground surface (lawn);<br>Brown, silty sand, fine grain, poorly graded, slightly moist, loose, non-plastic; |
| ND | P-3-3.5 | | 2<br>3<br>4 | | | |
| | | | 5<br>6 | | SM/SP | Brown, silty sand, fine with some medium grain, moist, loose to medium dense, non-plastic; |
| ND | P-3-7.5 | | 7<br>8<br>9 | | | Grades oliver brown below 7.5' |
| 10 | P-3-11 | | 10<br>11<br>12 | | | Grades very moist to wet below 11', with hydrocarbon odor;<br>Groundwater encountered at 12'.5; |
| 15 | P-3-14.5 | | 13<br>14<br>15 | | | |
| | | | 16<br>17<br>18<br>19<br>20<br>21 | | | Borehole terminated at 15';<br>Groundwater first encountered at 12';<br>Temporary 1" I.D. PVC casing installed to 15';<br>2 x 40-ml and 1 x 1-liter groundwater samples collected. |

Notes:

Reviewed By: L. Ching
Drawn By: S. Poon

AllWest
AllWest Environmental, Inc.

Log of Boring: P - 4
Project Address: 900 Central Avenue, Alameda, CA
Project Number: 97217.23
Drilling Date: 6/30/97

Drilling Contractor: ECA
Drill Rig: Geoprobe
Auger: N/A

Sampler: 2" x 4' macro core
Hammer: pneumatic hammer
Logged By: Long Ching

| OVM Reading | Sample Number | Sample Interval | Depth in Feet | Well Profile | USCS Code | Soil Description |
|---|---|---|---|---|---|---|
| | | | 1 | | SM/SP | Grassy ground surface (lawn);<br>Brown, silty sand, fine grain, poorly graded, slightly moist, loose, non-plastic; |
| | | | 2 | | | |
| | | | 3 | | | |
| ND | P-4-3.5 | | 4 | | | |
| | | | 5 | | SM | Brown, silty sand, fine with some medium grain, moist, loose to medium dense, non-plastic; |
| | | | 6 | | | |
| | | | 7 | | | |
| ND | P-4-7.5 | | 8 | | | |
| | | | 9 | | | |
| | | | 10 | | | |
| ND | P-4-10.5 | | 11 | | | |
| | | | 12 | | | Grades oliver brown to greenish brown below 12'<br>Groundwater encountered at 12'.5 to 13', with hydrocarbon odor; |
| 10 | P-4-13 | | 13 | | | |
| | | | 14 | | | |
| | | | 15 | | | |
| 20 | P-4-15.5 | | 16 | | | |
| | | | 17 | | | Borehole terminated at 16';<br>Groundwater first encountered at 13';<br>Temporary 1" I.D. PVC casing installed to 16';<br>2 x 40-ml and 1 x 1-liter groundwater samples collected. |
| | | | 18 | | | |
| | | | 19 | | | |
| | | | 20 | | | |
| | | | 21 | | | |

Notes:

Reviewed By: L. Ching
Drawn By: S. Poon

AllWest
AllWest Environmental, Inc.

Log of Boring: P - 5
Project Address: 900 Central Avenue, Alameda, CA
Project Number: 97217.23
Drilling Date: 6/30/97

Drilling Contractor: ECA
Drill Rig: Geoprobe
Auger: N/A

Sampler: 2" x 4' macro core
Hammer: pneumatic hammer
Logged By: Long Ching

| OVM Reading | Sample Number | Sample Interval | Depth in Feet | Well Profile | USCS Code | Soil Description |
|---|---|---|---|---|---|---|
| | | | 1 | | SM/SP | Grassy ground surface (lawn);<br>Brown, silty sand, fine grain, poorly graded, slightly moist, loose, non-plastic; |
| ND | P-5-3.5 | | 4 | | | |
| | | | 5 | | SM | Brown, silty sand, fine with some medium grain, moist, loose to medium dense, non-plastic; |
| ND | P-5-7.5 | | 8 | | | |
| | | | 11 | | | Groundwater encountered at 11'.5; |
| ND | P-5-11.5 | | 12 | | | |
| | | | 15 | | | |
| ND | P-5-15.5 | | 16 | | | |
| | | | 17 | | | Borehole terminated at 16';<br>Groundwater first encountered at 11.5';<br>Temporary 1" I.D. PVC casing installed to 16';<br>2 x 40-ml and 1 x 1-liter groundwater samples collected. |
| | | | 18 | | | |
| | | | 19 | | | |
| | | | 20 | | | |
| | | | 21 | | | |

Notes:

Reviewed By: L. Ching
Drawn By: S. Poon

AllWest
AllWest Environmental, Inc.

Log of Boring: P - 6
Project Address: 900 Central Avenue, Alameda, CA
Project Number: 97217.23
Drilling Date: 6/30/97

Drilling Contractor: ECA
Drill Rig: Geoprobe
Auger: N/A

Sampler: 2" x 4' macro core
Hammer: pneumatic hammer
Logged By: Long Ching

| OVM Reading | Sample Number | Sample Interval | Depth in Feet | Well Profile | USCS Code | Soil Description |
|---|---|---|---|---|---|---|
| | | | 1 | | SW | Concrete ground surface (driveway);<br>Dark brown, gravelly sand, medium to coarse grain, slightly moist, medium dense, non-plastic; |
| | | | 2 | | SM/SP | Brown, silty sand, fine grain, slightly moist, loose, non-plastic; |
| | | | 3 | | | |
| ND | P-6-3.5 | | 4 | | | |
| | | | 5 | | | Brown, silty sand, fine with some medium grain, moist, loose to medium dense, non-plastic; |
| | | | 6 | | | |
| | | | 7 | | | |
| ND | P-6-7.5 | | 8 | | | |
| | | | 9 | | SM | |
| | | | 10 | | | |
| ND | P-6-10.5 | | 11 | | | Groundwater encountered at 11'.5; |
| | | | 12 | | | |
| | | | 13 | | | |
| ND | P-6-13.5 | | 14 | | | Borehole terminated at 14';<br>Groundwater first encountered at 11.5';<br>Temporary 1" I.D. PVC casing installed to 14';<br>2 x 40-ml and 1 x 1-liter groundwater samples collected. |
| | | | 15 | | | |
| | | | 16 | | | |
| | | | 17 | | | |
| | | | 18 | | | |
| | | | 19 | | | |
| | | | 20 | | | |
| | | | 21 | | | |

Notes:

Reviewed By: L. Ching
Drawn By: S. Poon

AllWest
AllWest Environmental, Inc.

Log of Boring: P - 7
Project Address: 900 Central Avenue, Alameda, CA
Project Number: 97217.23
Drilling Date: 6/30/97

Drilling Contractor: ECA
Drill Rig: Geoprobe
Auger: N/A

Sampler: 1" x 2' geoprobe
Hammer: pneumatic hammer
Logged By: Long Ching

| OVM Reading | Sample Number | Sample Interval | Depth in Feet | Well Profile | USCS Code | Soil Description |
|---|---|---|---|---|---|---|
| | | | 1 | | | Grassy ground surface (lawn); Brown, silty sand, fine grain, poorly graded, slightly moist, loose, non-plastic; |
| | | | 2 | | | |
| | | | 3 | | | |
| | | | 4 | | | |
| ND | P-7-4.5 | | 5 | | | |
| | | | 6 | | | |
| | | | 7 | | SM/SP | |
| | | | 8 | | | Grades moist below 8'; |
| | | | 9 | | | |
| ND | P-7-9.5 | | 10 | | | |
| | | | 11 | | | |
| | | | 12 | | | Groundwater encountered at 12; |
| | | | 13 | | | |
| ND | P-7-13.5 | | 14 | | | |
| | | | 15 | | | Borehole terminated at 14'; Groundwater first encountered at 12'; Temporary 1" I.D. steel casing installed to 14', very slow recharge; 2 x 40-ml groundwater samples collected. |
| | | | 16 | | | |
| | | | 17 | | | |
| | | | 18 | | | |
| | | | 19 | | | |
| | | | 20 | | | |
| | | | 21 | | | |

Notes:

Reviewed By: L. Ching
Drawn By: S. Poon

AllWest
AllWest Environmental, Inc.

Log of Boring: P - 8
Project Address: 900 Central Avenue, Alameda, CA
Project Number: 97217.23
Drilling Date: 6/30/97

Drilling Contractor: ECA
Drill Rig: Geoprobe
Auger: N/A

Sampler: 1" x 2' geoprobe
Hammer: pneumatic hammer
Logged By: Long Ching

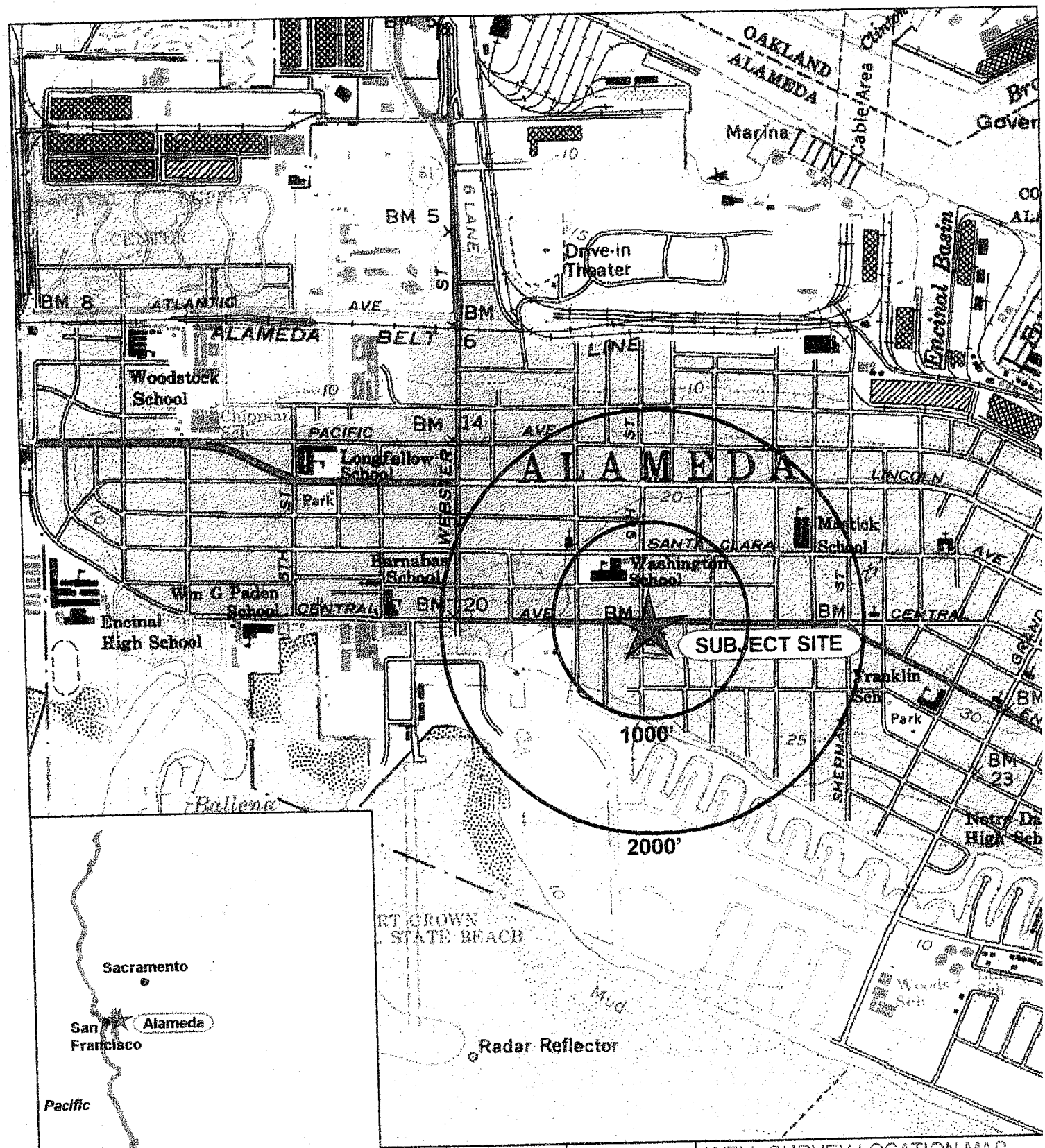
| OVM Reading | Sample Number | Sample Interval | Depth in Feet | Well Profile | USCS Code | Soil Description |
|---|---|---|---|---|---|---|
| | | | 1 | | SM/SP | Grassy ground surface (lawn);<br>Brown, silty sand, fine grain, poorly graded, slightly moist, loose, non-plastic; |
| | | | 2 | | | |
| | | | 3 | | | |
| ND | P-8-4 | | 4 | | | Brown, silty sand, fine to medium grain, moist, medium dense, non-plastic; |
| | | | 5 | | | |
| | | | 6 | | | |
| | | | 7 | | | |
| | | | 8 | | | |
| | | | 9 | | SM | Grades moist below 8'; |
| ND | P-8-9.5 | | 10 | | | |
| | | | 11 | | | |
| | | | 12 | | | Groundwater encountered at 12; |
| | | | 13 | | | |
| ND | P-8-14 | | 14 | | | |
| | | | 15 | | | Borehole terminated at 15';<br>Groundwater first encountered at 12';<br>Temporary 1" I.D. steel casing installed to 15', slow recharge;<br>2 x 40-ml and 1 x 1-liter groundwater samples collected. |
| | | | 16 | | | |
| | | | 17 | | | |
| | | | 18 | | | |
| | | | 19 | | | |
| | | | 20 | | | |
| | | | 21 | | | |

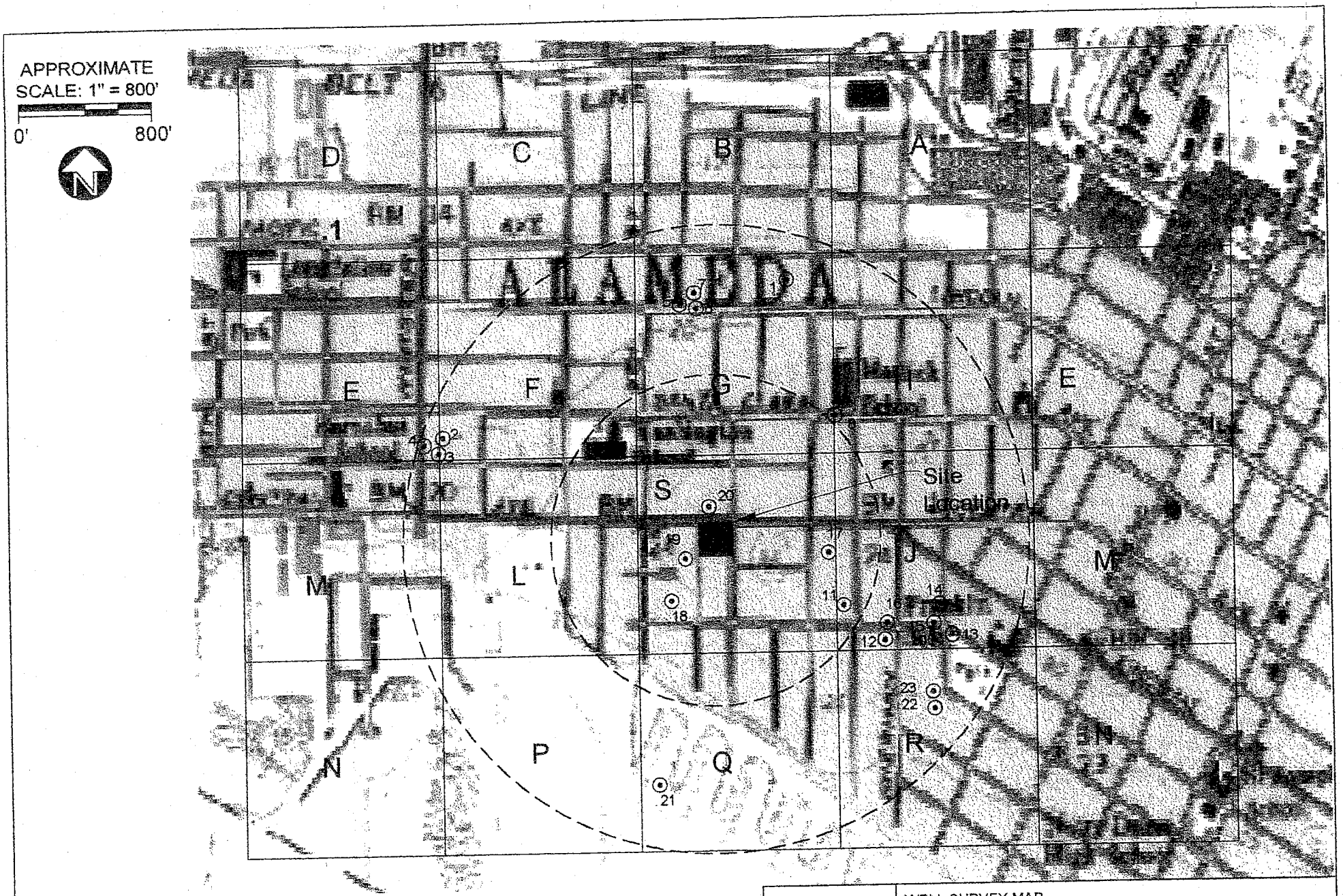
Notes:

Reviewed By: L. Ching
Drawn By: S. Poon

# B

# WELL SURVEY INFORMATION


OAKLAND
ALAMEDA
Marina
Drive-in Theater
Encinal Basin
BM 5
BM 8
ATLANTIC AVE
ALAMEDA BELT LINE
Woodstock School
PACIFIC AVE
Long Fellow School
Park
ALAMEDA
LINCOLN
SANTA CLARA
Mastick School
Washington School
Barnabas School
Wm G Paden School
CENTRAL
Encinal High School
SUBJECT SITE
Franklin Sch
1000'
2000'
Radar Reflector
Mud
Sacramento
San Francisco
Alameda
Pacific
Ocean
Los Angeles
San Diego
N
S
E
W
NOT TO SCALE
AllWest
PROJECT NO. 22002.28
WELL SURVEY LOCATION MAP
FIGURE 2
900 CENTRAL AVENUE
ALAMEDA, CALIFORNIA
SOURCE: USGS TOPO
PREPARED BY: ELIZA YU
DATE: 10/10/02



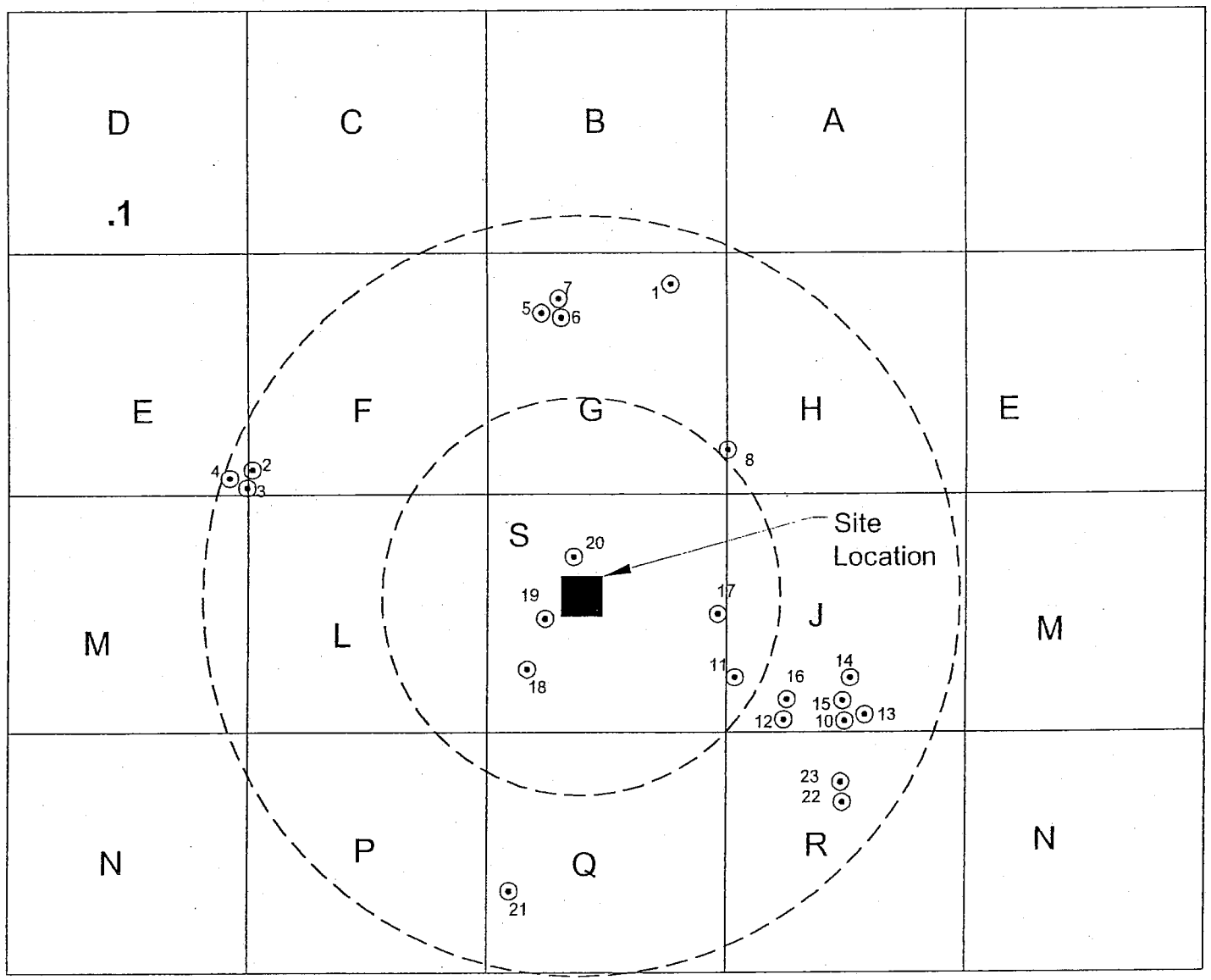

**LEGEND**

18⊙ - Well Location

| | |
|---|---|
| AllWest | WELL SURVEY MAP |
| | |
| | 900 CENTRAL AVENUE |
| | ALAMEDA, CALIFORNIA |
| PROJECT NO. 22002.28 | SOURCE: ALLWEST |
| | PREPARED BY: I.R.R. (10/02/02) |

APPROXIMATE
SCALE: 1" = 800'

0' 800'




**LEGEND**

18 ⊙ - Well Location

| | |
|---|---|
| AllWest | WELL SURVEY MAP OVERLAY |
| | |
| | 900 CENTRAL AVENUE |
| | ALAMEDA, CALIFORNIA |
| PROJECT NO. 22002.28 | SOURCE: ALLWEST |
| | PREPARED BY: I.R.R. (10/02/02) |

APPENDIX C
WELL SURVEY RESULTS

900 Central Avenue, Alameda, California

| ID | Well # | Township/ Range | Section | Total Depth | Screen Interval | Casing Diameter | Water Level | Use | Location | Dist (mile) | Dist (feet) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| #1 | 3-1797 | 2S/4W | 11A80 | 120 | unknown | unknown | unknown | Cath Prot | Pacific Av S/O Chapin | 0.35 | 1848 |
| #2 | MW-1 | 2S/4W | 11F4 | 24 | 6-24 | 2 | unknown | Mon | 1435 Webster St/Taylor | 0.38 | 2006 |
| #3 | MW-2 | 2S/4W | 11F5 | 24 | 6-24 | 2 | unknown | Mon | 1435 Webster St/Taylor | 0.38 | 2006 |
| #4 | MW-3 | 2S/4W | 11F6 | 24 | 6-24 | 2 | unknown | Mon | 1435 Webster St/Taylor | 0.38 | 2006 |
| #5 | MW-1 | 2S/4W | 11G1 | 16.5 | 5-15 | 2 | 10 | Mon | 901 Lincoln Av | 0.30 | 1584 |
| #6 | MW-2 | 2S/4W | 11G2 | 18 | 8-18 | 2 | 10 | Mon | 901 Lincoln Av | 0.30 | 1584 |
| #7 | MW-3 | 2S/4W | 11G3 | 18 | 8-18 | 2 | 10 | Mon | 901 Lincoln Av | 0.30 | 1584 |
| #8 | 1-1837 | 2S/4W | 11H | 120 | unknown | unknown | unknown | Cath Prot | Santa Clara E/O Verdi St | 0.22 | 1162 |
| #9 | MW-3 | 2S/4W | 11H4 | 20 | 5-20 | 4 | 7 | Mon | 1127 Lincoln Av E/O Bay S | 0.40 | 2112 |
| #10 | unknown | 2S/4W | 11J1 | 70 | 55-70 | 4 | 14 | Irrig | 1205 Bay St | 0.32 | 1690 |
| #11 | 32175 | 2S/4W | 11J2 | 68 | unknown | 4 | 15 | Irrig | 1036 San Antonio Av | 0.18 | 950 |
| #12 | unknown | 2S/4W | 11J3 | 80 | 65-80 | 4 | 20 | Irrig | 1236 St Charles | 0.25 | 1320 |
| #13 | unknown | 2S/4W | 11J4 | 75 | 53-73 | 4 | 14 | Irrig | 1224 Bay St | 0.33 | 1742 |
| #14 | unknown | 2S/4W | 11J5 | unknown | unknown | unknown | 14 | Irrig | 1200 San Antonio Av | 0.30 | 1584 |
| #15 | unknown | 2S/4W | 11J6 | 60 | 40-60 | 5 | 10 | Irrig | 1251 Bay St | 0.25 | 1320 |
| #16 | unknown | 2S/4W | 11J7 | 60 | 40-60 | 5 | 10 | Irrig | 1261 St Charles | 0.25 | 1320 |
| #17 | unknown | 2S/4W | 11J8 | 60 | 40-60 | 5 | 10 | Irrig | 1040 Fair Oaks Dr | 0.15 | 792 |
| #18 | unknown | 2S/4W | 11K1 | unknown | unknown | 3 | 9 |  | 801 San Antonio Av | 0.11 | 581 |
| #19 | unknown | 2S/4W | 11K2 | 70 | 24-70 | 6 | 18 | Irrig | 920 Centennial | 0.05 | 264 |
| #20 | unknown | 2S/4W | 11K3 | 75 | 30-70 | unknown | 15 | Mon | 905 Central E/O 9th | 0.05 | 264 |
| #21 | MW-1 | 2S/4W | 11Q1 | 20 | 2-20 | 4 | 3 | Dewater | 900 Otis Dr | 0.33 | 1742 |
| #22 | unknown | 2S/4W | 11R1 | 70 | unknown | 4 | unknown | Irrig | 1204 Bay | 0.35 | 1848 |
| #23 | unknown | 2S/4W | 11R2 | 70 | unknown | 4 | unknown | Irrig | 1209 Bay | 0.35 | 1848 |

## Regulatory History

**GRAY & KAREN PEARCE (ALAMEDA)**
900 CENTRAL AVE
ALAMEDA , CA 94501
**CASE STATUS:** OPEN
(Show this Site on Map)

**Regional Board - Case #: 01-2273**
SAN FRANCISCO BAY RWQCB (REGION 2) - **(BG)**
**Local Agency (lead agency) - Case #: 6897**
ALAMEDA COUNTY LOP - **(UNK)**

| Begin Date | Status |
|---|---|
| 1/1/1975 | Leak Stopped |
| 4/20/1994 | Leak Discovery |
| 9/19/1997 | Leak Reported |
| 1/23/1998 | 3B - Preliminary Site Assessment Underway |
| 1/23/1998 | System Entry |
| 4/5/2001 | Regulatory Review |

Geotracker Home | Site/Facility Finder | Case Finder | MTBE/Case Reports

## Detailed Release Information

**GRAY & KAREN PEARCE (ALAMEDA)**
900 CENTRAL AVE
ALAMEDA , CA 94501
**CASE STATUS:** OPEN
(Show this Site on Map)

**Regional Board - Case #: 01-2273**
SAN FRANCISCO BAY RWQCB (REGION 2) - **(BG)**
**Local Agency (lead agency) - Case #: 6897**
ALAMEDA COUNTY LOP - **(UNK)**

**Case Type:**
Soil Only

**Enforcement Type:**

**Funding:**
F

**How leak was discovered:**
Tank Closure

**Method used to stop discharge:**
Close Tank

**Interim:**

**Cause of leak:**
UNK

**Source of leak:**
UNK

**SUBSTANCES RELEASED:**

| Begin Date | Substance | Quantity |
|---|---|---|
| UNKNOWN | GASOLINE | |

Geotracker Home | Site/Facility Finder | Case Finder | MTBE/Case Reports

## Regulatory History

**CHEVRON (ALAMEDA)**
900 OTIS DR
ALAMEDA , CA 94501
**CASE STATUS:** CLOSED
(Show this Site on Map)

**Regional Board - Case #: 01-0388**
SAN FRANCISCO BAY RWQCB (REGION 2) - **(BG)**
**Local Agency (lead agency) - Case #: 598**
ALAMEDA COUNTY LOP - **(UNK)**

| Begin Date | Status |
|---|---|
| 8/1/1989 | Leak Discovery |
| 8/1/1989 | Leak Reported |
| 8/1/1989 | Leak Stopped |
| 9/28/1990 | System Entry |
| 11/13/1997 | 8 - Verification Monitoring Underway |
| 2/2/1999 | 9 - Case Closed |
| 3/18/1999 | Regulatory Review |

Geotracker Home | Site/Facility Finder | Case Finder | MTBE/Case Reports

## Detailed Release Information

**CHEVRON (ALAMEDA)**
900 OTIS DR
ALAMEDA , CA 94501
**CASE STATUS:** CLOSED
(Show this Site on Map)

**Regional Board - Case #: 01-0388**
SAN FRANCISCO BAY RWQCB (REGION 2) - **(BG)**
**Local Agency (lead agency) - Case #: 598**
ALAMEDA COUNTY LOP - **(UNK)**

**Case Type:**
Other Groundwater

**Enforcement Type:**

**Funding:**
F

**How leak was discovered:**
Tank Closure

**Method used to stop discharge:**
Close Tank

**Interim:**
Y = Interim Action Taken

**Cause of leak:**
Structural Failure

**Source of leak:**
Tank

**SUBSTANCES RELEASED:**

| Begin Date | Substance | Quantity |
|---|---|---|
| UNKNOWN | GASOLINE | |

Geotracker Home | Site/Facility Finder | Case Finder | MTBE/Case Reports

# C

# DETAILED CORRECTIVE ACTION ALTERNATIVE COST ESTIMATES

**Alternative 1**
Cost Estimate to Implement Natural Attenuation
900 Central Avenue
Alameda, CA

| | | Unit Cost | Total Cost |
|---|---|---|---|
| 00010 | Pre-field Activities | | $18,780 |
| 00020 | Slab Venting System Installation | | $23,115 |
| 00030 | Annual Slab Venting System Start-up and Operation (10 years) | $9,575 | $95,750 |
| 00040 | Groundwater Monitoring and Reporting Event (2 per year for 10 years) | $6,000 | $120,000 |
| 00050 | Slab Vent System Installation Report | | $6,850 |
| 00060 | Well Abandonment and Closure Request Preparation and Submittal | | $17,013 |
| | **TOTAL** | | $281,508 |

**Alternative 1**
Cost Estimate to Implement Natural Attenuation
900 Central Avenue
Alameda, CA

**00010 Pre-field Activities**

Scope: Prepare Corrective Action Implementation Plan and Design for Slab Venting System; obtain building permit from the City of Alameda and permit to operate from the BAAQMD; and perform site reconnaisance.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 24.00 | Hrs | Senior Professional | $145 | $3,480 |
| 36.00 | Hrs | Project Manager | $120 | $4,320 |
| 44.00 | Hrs | Staff Geologist | $90 | $3,960 |
| 8.00 | Hrs | Draftsperson | $65 | $520 |
| 1,000.00 | Miles | Support Truck | $0.75 | $750 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | Bonding Fees | $750 | $863 |
| 1.00 | Each | City of Alameda - Building Permit Fees | $1,250 | $1,438 |
| 1.00 | Each | BAAQMD - Permit to Operate | $3,000 | $3,450 |
| | | | Total | $18,780 |

**00020 Slab Venting System Installation**

Install three slab venting extraction locations alongside building; concrete core through slab and block wall; install PVC piping from extraction location to rooftop; anchor piping with standard pipe supports; install 1/4 horsepower Briedert Centrifugal Duct Fan alongside building; connect piping using sheet metal flanges; install doghouse enclosure over unit; install sample port and access from ground level; install electrical conduit and wiring from nearest sub-panel with dedicated 15A circuit; seal all piping penetrations using caulking or equivalent method.

| Total | | Description | Rate | Cost |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 20.00 | Hrs | Project Manager | $120 | $2,400 |
| 38.00 | Hrs | Staff Engineer | $90 | $3,420 |
| 60.00 | Hrs | Field Technician | $85 | $5,100 |
| 560.00 | miles | Support Truck | $0.50 | $280 |
| | | SUBCONT. & MATERIALS | | |
| 2.00 | Days | Impact Hammer | $150 | $300 |
| 1.00 | Each | Doghouse enclosure | $350 | $403 |
| 3.00 | Days | Electrician | $1,150 | $3,968 |
| 1.00 | Each | Briedert Centrifugal Fan | $4,400 | $5,060 |
| 1.00 | Job | Concrete Corer | $400 | $460 |
| 1.00 | Job | Piping, Bracing, and Anchors | $750 | $863 |
| 1.00 | Job | Other Materials and Fittings | $750 | $863 |
| | | | Total | $23,115 |

**Alternative 1**
Cost Estimate to Implement Natural Attenuation
900 Central Avenue
Alameda, CA

**00030 Annual Slab Venting System Start-up and Operation (10 years)**
Conduct monthly/quarterly site visit to collect system performance data and collect compliance airbag sample per BAAQMD permit to operate conditions.

| Total | | Description | Rate | Cost |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 12.00 | Hrs | Project Manager | $120 | $1,440 |
| 24.00 | Hrs | Staff Engineer | $90 | $2,160 |
| 32.00 | Hrs | Field Technician | $85 | $2,720 |
| 700.00 | miles | Support Truck | $0.75 | $525 |
| 5.00 | Each | Airbags | $12 | $60 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | Estimated Electrical Useage (annually) | $600 | $600 |
| 1.00 | Job | Replacement and Maintenance Parts | $750 | $863 |
| 6.00 | Each | Torrent Labs - TO-14A for VOC's | $175 | $1,208 |
| | | | Total | $9,575 |

**00040 Groundwater Monitoring and Reporting Event (2 per year for 10 years)**
Includes the following tasks: Gauge water levels, purge and collect groundwater samples from existing groundwater wells for five events including one baseline and four follow-up events.
submit samples to Accutest Labs and analyze for TPHg, BTEX, and fuel oxygenates; dispose of purge water and prepare and submit quarterly report.

| Total | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 2.00 | Hrs | Professional Geologist | $145 | $290 |
| 6.00 | Hrs | Project Manager | $120 | $720 |
| 14.00 | Hrs | Staff Engineer | $90 | $1,260 |
| 14.00 | Hrs | Senior Technician | $85 | $1,190 |
| 4.00 | Hrs | Drafting | $65 | $260 |
| 2.00 | Hrs | Clerical | $55 | $110 |
| 160 | Miles | Support Vehicle Mileage | $0.75 | $120 |
| 10.0 | Each | Disposabale Bailers | $11 | $110 |
| 2.0 | Hrs | Administration (EDF) | $50 | $100 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | Waste Water Disposal | $250 | $288 |
| 1.00 | Job | EDF Reporting | $30 | $35 |
| 10.00 | Each | Analytical - TPHg,BTEX, Fuel Oxys | $132 | $1,518 |
| | | | | $6,000 |

**Alternative 1**
Cost Estimate to Implement Natural Attenuation
900 Central Avenue
Alameda, CA

**00050 Slab Vent System Installation Report**

Scope: Prepare and submit report addendum detailing procedures and findings of work.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 8.00 | Hrs | Senior Professional | $145 | $1,160 |
| 16.00 | Hrs | Project Manager | $120 | $1,920 |
| 30.00 | Hrs | Staff Engineer | $90 | $2,700 |
| 8.00 | Hrs | Draftsperson | $65 | $520 |
| 10.00 | Hrs | Clerical | $55 | $550 |
| | | | Total | $6,850 |

**00060 Well Abandonment and Closure Request Preparation and Submittal**

Scope: Prepare and submit low-risk case closure summary; following case closure, permit and abandon all existing groundwater and remediation wells using pressure grout methodology. Well box rims to be left in place in hard surface areas.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 8.00 | Hrs | Senior Professional | $145 | $1,160 |
| 18.00 | Hrs | Project Manager | $120 | $2,160 |
| 24.00 | Hrs | Staff Geologist | $90 | $2,160 |
| 36.00 | Hrs | Senior Technician | $85 | $3,060 |
| 2.00 | Hrs | Draftsperson | $65 | $130 |
| 2.00 | Hrs | Clerical | $55 | $110 |
| 320.00 | Miles | Support Truck | $0.75 | $240 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | Exploration Geo - Well Drilling Contractor | $3,500 | $4,025 |
| 10.00 | Each | Alameda County Health Services - Well Permit | $345 | $3,968 |
| | | | Total | $17,013 |

**Alternative 2**
Fixed Cost Estimate to Implement Soil Excavation, Disposal, and Backfill
900 Central Avenue
Alameda, CA

This cost estimate was prepared in response to a request made by Kelleher & Associates on May 6, 2009, following a request by the stakeholders to prepare a turn-key remediation and closure program for the site. The costs presented herein are based on an interpretation of site conditions using information made available to RRM by the Responsible Party.

| | | Unit Cost | Extended Cost |
|---|---|---|---|
| 00010 | Pre-field Activities | | $32,654 |
| 00020 | Feasibility Study Corrective Action Plan | | $0 |
| 00030 | Contaminated Soil Excavation and Backfill | | $95,132 |
| 00040 | Contaminated Soil Transportation and Disposal | | $39,008 |
| 00050 | Groundwater Removal and Disposal | | $16,827 |
| 00060 | Site Restoration | | $24,480 |
| 00070 | Remediation Report Preparation | | $6,850 |
| 00080 | Additional Groundwater Monitoring Well Installation | | $16,734 |
| 00090 | Follow-Up Groundwater Monitoring and Reporting (Six Events) | $6,350 | $38,100 |
| 00100 | Well Abandonment and Closure Request Preparation and Submittal | | $15,940 |
| | **TOTAL** | | $285,724 |

**Alternative 2**

Fixed Cost Estimate to Implement Soil Excavation, Disposal, and Backfill
900 Central Avenue
Alameda, CA

**00010 Pre-field Activities**

Scope: Obtain grading, encroachment, building and concrete permit from the City of Alameda; obtain permit from Caltrans to work in right-of-way; obtain site access from private property owners; install two soil borings for landfill profiling; analyze up to six soil samples for TPHg; BTEX; and total lead; obtain landfill acceptance approval for soil disposal; notify BAAQMD of intent to dig; obtain geotechnical report and structural engineering plans for permit submittal; perform scheduling and oversight activities; prepare brief corrective action implementation plan and submit to County of Alameda Health Department.

LABOR & EQUIPMENT

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| 4.00 | Hrs | Senior Professional | $145 | $580 |
| 30.00 | Hrs | Project Manager | $120 | $3,600 |
| 40.00 | Hrs | Staff Geologist | $90 | $3,600 |
| 8.00 | Hrs | Draftsperson | $65 | $520 |
| 1,000.00 | Miles | Support Truck | $0.75 | $750 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | Vironex - Geoprobe contractor | $2,250 | $2,588 |
| 8.00 | Each | Analytical - TPHg, BTEX | $130 | $1,196 |
| 1.00 | Job | Bonding Fees | $2,500 | $2,875 |
| 1.00 | Job | Romig Engineers - Geotechnical Report | $2,500 | $2,875 |
| 1.00 | Job | Pacific Engineers - Shoring Design and Plans | $7,500 | $8,625 |
| 2.00 | Each | Alameda County Public Works - Well Permit | $345 | $794 |
| 1.00 | Each | Alameda County Public Works - Soil Boring Permit | $345 | $397 |
| 1.00 | Job | Encroachment Permit - City of Alameda | $500 | $575 |
| 1.00 | Job | Grading Permit - City of Alameda | $500 | $575 |
| 1.00 | Job | Building Permit - City of Alameda | $500 | $575 |
| 1.00 | Job | Concrete Permit - City of Alameda | $500 | $575 |
| 1.00 | Each | BAAQMD Notification Fees | $200 | $230 |
| 1.00 | Each | Parking Space Closure Fees - City of Alameda | $250 | $288 |
| 1.00 | Each | Right-of-way Permit - Caltrans | $1,250 | $1,438 |
| | | | Total | $32,654 |

**00020 Feasibility Study Corrective Action Plan**

Scope: Obtain grading, encroachment, building and concrete permit from the City of Alameda; obtain permit from Caltrans to work in right-of-way; obtain site access from private property owners; install two soil borings for landfill profiling; analyze up to six soil samples for TPHg; BTEX; and total lead; obtain landfill acceptance approval for soil disposal; notify BAAQMD of intent to dig; obtain geotechnical report and structural engineering plans for permit submittal; perform scheduling and oversight activities; prepare brief corrective action implementation plan and submit to County of Alameda Health Department.

LABOR & EQUIPMENT

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| 4.00 | Hrs | Senior Professional | $145 | $580 |
| 16.00 | Hrs | Project Manager | $120 | $1,920 |
| 24.00 | Hrs | Staff Geologist | $90 | $2,160 |
| 6.00 | Hrs | Draftsperson | $65 | $390 |
| | | SUBCONT. & MATERIALS | | |
| 0.00 | Each | Postage and Handling | $35 | $0 |
| | | | Total | $5,050 |

**Alternative 2**
Fixed Cost Estimate to Implement Soil Excavation, Disposal, and Backfill
900 Central Avenue
Alameda, CA

**00030 Contaminated Soil Excavation and Backfill**
Scope: Set-up K-Rail and security fencing; remove light pole and secure on-site; strip and remove sidewalk and landscape as required to clear work area; set-up traffic control including lane 1 closure for loading and staging 6 a.m. to 6 p.m. daily; install shoring around excavation area approximately 25 feet wide by 30 feet long; dig and direct load all soil and transport to Keller Canyon Landfill for disposal; collect up to 14 confirmation soil samples and analyze for TPHg and BTEX; place up to 4 feet of crushed rock into bottom of excavation followed by imported bank run fill; compact soil to grade to a minimum relative density of 90%; remove shoring and clean-up site. Total depth of excavation assumed to be 18 to 20 feet below ground surface.

LABOR & EQUIPMENT

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| 5.00 | Hrs | Senior Professional | $145 | $725 |
| 20.00 | Hrs | Project Manager | $120 | $2,400 |
| 80.00 | Hrs | Senior Technician | $85 | $6,800 |
| 1,000.00 | Miles | Support Truck | $0.75 | $750 |
| 5.00 | Day | Photo-ionization detector | $75 | $375 |
| 20.00 | Each | Brass Liners | $6 | $120 |

SUBCONT. & MATERIALS

| | | | | |
|---|---|---|---|---|
| 1.00 | Job | Security Fence - Rental and set-up | $1,000 | $1,150 |
| 1.00 | Job | Jensen Precast - K-Rail set-up (8 @ 20 feet) | $3,950 | $4,543 |
| 5.00 | Days | STOP Company - Traffic control | $700 | $4,025 |
| 1.00 | Job | Compaction Testing | $2,400 | $2,760 |
| 14.00 | Each | Analytical - TPHg, BTEX | $130 | $2,093 |
| 1.00 | Job | Typar Filter Fabric | $750 | $863 |
| 1.00 | Each | Plastic Sheeting | $125 | $144 |
| 750.00 | Tons | Pilarcitos Quarry - bank run fill | $7 | $6,458 |
| 200.00 | Tons | Pilarcitos Quarry - crushed rock | $18 | $4,428 |
| 150.00 | Hours | Rich Voss Trucking - Import of Backfill | $95 | $16,388 |
| 1.00 | Job | Johns Excavating - Shore, Dig, Load, and Backfill | $35,750 | $41,113 |
| | | | Total | $95,132 |

**00040 Contaminated Soil Transportation and Disposal**
Transportation and disposal of approximately 850 tons of contaminated soil at Allied Waste Industries, Inc. Keller Canyon Landfill.

LABOR & EQUIPMENT

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| 4.00 | Hrs | Senior Professional | $145 | $580 |
| 8.00 | Hrs | Project Manager | $120 | $960 |

SUBCONT. & MATERIALS

| | | | | |
|---|---|---|---|---|
| 850.00 | Tons | Intrinsic Transportation - Keller Canyon Landfill | $12.75 | $12,463 |
| 850.00 | Ton | Keller Canyon Landfill -Soil Disposal | $25.58 | $25,004 |

| | | | | |
|---|---|---|---|---|
| | | Total | | $39,008 |

**00050 Groundwater Removal and Disposal**

Scope: Pump standing groundwater from the excavation during backfilling activities at an approximate maximum flow rate of 5 gpm, pass through temporary filter and GAC treatment and discharge into sanitary sewer under permit from the City of Alameda. Assumes that holding tanks will not be required and treated water can be directly discharged into sewer connection.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 8.00 | Hrs | Senior Professional | $145 | $1,160 |
| 20.00 | Hrs | Project Manager | $120 | $2,400 |
| 40.00 | Hrs | Senior Technician | $85 | $3,400 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | City of Alameda Sewer Discharge Permit | $1,500 | $1,725 |
| 16.00 | Each | Analytical - TPHg, BTEX | $130 | $2,392 |
| 1.00 | Job | Equipment and Supplies | $1,500 | $1,725 |
| 0.00 | Month | Baker Tanks - Frac Tank Rental, mob/demob | $2,500 | $0 |
| 0.00 | Job | Baker Tanks - Decon | $1,400 | $0 |
| 1.00 | Job | Carbon Treatment System | $3,500 | $4,025 |
| | | | Total | $16,827 |

**00060 Site Restoration**

Scope: Obtain concrete contractor to replace approximately 80 linear feet of curb, sidewalk and gutter; and 60 linear feet of culvert; replace topsoil and sod approximately 400 square feet; replace shrubbery, repair irrigation system disturbed by soil work; and re-install street light and wiring.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 12.00 | Hrs | Project Manager | $120 | $1,440 |
| 24.00 | Hrs | Senior Technician | $85 | $2,040 |
| 400.00 | Miles | Support Truck | $0.75 | $300 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | Electrical Contractor - remove and re-install light pole | $1,500 | $1,725 |
| 1.00 | Job | Landscape contractor - replace grass and irrigation | $4,000 | $4,600 |
| 1.00 | Job | Concrete contractor - curb, gutter, sidewalk | $12,500 | $14,375 |
| | | | Total | $24,480 |

**00070 Remediation Report Preparation**

Scope: Prepare and submit report addendum detailing procedures and findings of work.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 8.00 | Hrs | Senior Professional | $145 | $1,160 |
| 16.00 | Hrs | Project Manager | $120 | $1,920 |
| 30.00 | Hrs | Staff Engineer | $90 | $2,700 |
| 8.00 | Hrs | Draftsperson | $65 | $520 |
| 10.00 | Hrs | Clerical | $55 | $550 |
| | | | Total | $6,850 |

**Alternative 2**
Fixed Cost Estimate to Implement Soil Excavation, Disposal, and Backfill
900 Central Avenue
Alameda, CA

**00080 Additional Groundwater Monitoring Well Installation**
Scope: Prepare and submit workplan; obtain well installation permits; install, develop and purge up to three additional groundwater monitoring wells for evaluation of the effect of subsurface utilities on dissolved groundwater plume.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 8.00 | Hrs | Senior Professional | $145 | $1,160 |
| 12.00 | Hrs | Project Manager | $120 | $1,440 |
| 24.00 | Hrs | Staff Geologist | $90 | $2,160 |
| 24.00 | Hrs | Senior Technician | $85 | $2,040 |
| 2.00 | Hrs | Draftsperson | $65 | $130 |
| 2.00 | Hrs | Clerical | $55 | $110 |
| 160.00 | Miles | Support Truck | $0.75 | $120 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | Kavanagh Engineers - Licensed Well Survey | $3,000 | $3,450 |
| 1.00 | Job | Exploration Geo - Well Drilling Contractor | $3,250 | $3,738 |
| 3.00 | Each | Alameda County Health Services - Well Permit | $345 | $1,190 |
| 8.00 | Each | Analytical - TPHg, BTEX | $130 | $1,196 |
| | | | Total | $16,734 |

**00090 Follow-Up Groundwater Monitoring and Reporting (Six Events)**
Scope: Perform groundwater monitoring and reporting event; dispose of well purge water. Follow-up monitoring should be performed for at least 6 consecutive quarters.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 2.00 | Hrs | Senior Professional | $145 | $290 |
| 6.00 | Hrs | Project Manager | $120 | $720 |
| 16.00 | Hrs | Staff Geologist | $90 | $1,440 |
| 16.00 | Hrs | Senior Technician | $85 | $1,360 |
| 4.00 | Hrs | Draftsperson | $65 | $260 |
| 2.00 | Hrs | Clerical | $55 | $110 |
| 160.00 | Miles | Support Truck | $0.75 | $120 |
| 10.00 | Each | Disposable Bailers | $11 | $110 |
| 1.00 | Day | Meters and Instruments | $100 | $100 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | Waste Water Disposal | $250 | $288 |
| 1.00 | Job | EDF Reporting | $30 | $35 |
| 10.00 | Each | Analytical - TPHg, BTEX, Fuel Oxys | $132 | $1,518 |
| | | | Total | $6,350 |

**00100 Well Abandonment and Closure Request Preparation and Submittal**
Scope: Prepare and submit low-risk case closure summary; following case closure, permit and abandon all existing groundwater and remediation wells using pressure grout methodology. Well box rims to be left in place in hard surface areas.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |

**Alternative 2**

Fixed Cost Estimate to Implement Soil Excavation, Disposal, and Backfill

900 Central Avenue

Alameda, CA

| | | | | |
|---|---|---|---|---|
| 8.00 | Hrs | Senior Professional | $145 | $1,160 |
| 18.00 | Hrs | Project Manager | $120 | $2,160 |
| 24.00 | Hrs | Staff Geologist | $90 | $2,160 |
| 20.00 | Hrs | Senior Technician | $85 | $1,700 |
| 2.00 | Hrs | Draftsperson | $65 | $130 |
| 2.00 | Hrs | Clerical | $55 | $110 |
| 320.00 | Miles | Support Truck | $0.75 | $240 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | Exploration Geo - Well Drilling Contractor | $3,750 | $4,313 |
| 10.00 | Each | Alameda County Health Services - Well Permit | $345 | $3,968 |
| | | | Total | $15,940 |

**Alternative 3**
Cost Estimate to Implement Sparging Enhanced Vapor Extraction with Mobile Treatment Unit
900 Central Avenue
Alameda, CA

Client: 900 Central Avenue Corrective Action Account
c/o Brian Kelleher, Project Coordinator
Kelleher & Associates
5655 Silver Creek Valley Road, PMB 281
San Jose, CA 95138

prepared by Matt Kaempf
3/3/2009

This cost estimate was prepared in response to a request made by Kelleher & Associates in February 2009 and describes costs to perform corrective action using a mobile dual-phase vapor extraction treatment unit with air sparging as an alternative to soil excavation and backfill.

| | | Unit Cost | Total Cost |
|---|---|---|---|
| 00010 | Pre-field Activities | | $21,414 |
| 00020 | Remediation Well Installation | | $17,432 |
| 00030 | Air Sparge and Soil Vapor Extraction Treatment (two 45 day events) | | $194,633 |
| 00040 | Groundwater Removal and Disposal | | $19,050 |
| 00050 | Baseline and Follow-up Groundwater Monitoring and Reporting Event | $5,071 | $40,568 |
| 00060 | Remediation Well Abandonment Activities | | $9,460 |
| 00070 | Report Preparation | | $6,850 |
| | **TOTAL** | | $309,405 |

**Alternative 3**
Cost Estimate to Implement Sparging Enhanced Vapor Extraction with Mobile Treatment Unit
900 Central Avenue
Alameda, CA

**00010 Pre-field Activities**

Scope: Obtain necessary permits from the City of Alameda; East Bay MUD, and Caltrans to work in right-of-way; prepare and submit corrective action implementation plan to the County of Alameda Health Department; obtain well drilling permits from the Alameda County Public Works Agency; schedule and coordinate field work.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 8.00 | Hrs | Senior Professional | $145 | $1,160 |
| 40.00 | Hrs | Project Manager | $120 | $4,800 |
| 44.00 | Hrs | Staff Geologist | $90 | $3,960 |
| 8.00 | Hrs | Draftsperson | $65 | $520 |
| 1,000.00 | Miles | Support Truck | $0.75 | $750 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | Bonding Fees | $750 | $863 |
| 6.00 | Each | Alameda County Public Works - Well Destruction Permit | $345 | $2,381 |
| 6.00 | Each | Alameda County Public Works - Well Permit | $345 | $2,381 |
| 1.00 | Job | Encroachment Permit - City of Alameda | $750 | $863 |
| 1.00 | Job | East Bay MUD - Sewer Discharge Permit Fees | $3,000 | $3,450 |
| 1.00 | Each | Parking Space Closure Fees - City of Alameda | $250 | $288 |
| 0.00 | Each | Right-of-way Permit - Caltrans | $1,250 | $0 |
| | | | Total | $21,414 |

**00020 Remediation Well Installation**

Scope: Using Exploration Geoservices, Inc. install four 2-inch diameter air sparge wells and two 4-inch diameter soil vapor extraction wells; collect up to three soil samples from each well and analyze for TPHg and BTEX; prepare geologic logs for each soil boring; develop each well to remove fine grained materials form the filter pack.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 6.00 | Hrs | Senior Professional | $145 | $870 |
| 12.00 | Hrs | Project Manager | $120 | $1,440 |
| 24.00 | Hrs | Staff Geologist | $90 | $2,160 |
| 1,250.00 | Miles | Support Truck | $0.75 | $938 |
| | | SUBCONT. & MATERIALS | | |
| 12.00 | Each | Accutest Laboratories - TPHg and BTEX | $130 | $1,794 |
| 1.00 | Week | Photo-ionization detector | $225 | $225 |
| 1.00 | Job | Exploration Geoservices - Well Driller | $7,500 | $8,625 |
| 1.00 | Job | Cones and Barricades | $1,200 | $1,380 |
| | | | Total | $17,432 |

**Alternative 3**
Cost Estimate to Implement Sparging Enhanced Vapor Extraction with Mobile Treatment Unit
900 Central Avenue
Alameda, CA

**00030 Air Sparge and Soil Vapor Extraction Treatment (two 45 day events)**

Scope: CalClean, Inc. will set up a mobile treatment unit at the corner of Ninth Street and Central Avenue and connect to vapor extraction and air sparge well field; co-extraction will be performed at one or more of the vapor extraction wells and air sparging will be performed at one or more of the air sparge wells using an auxiliary air compressor powered by the mobile treatment unit; soil vapor samples will be collected periodically to analyze influent concentrations to measure effectiveness of remediation. Assumes 24 hour per day operation and ability to access well heads with above ground piping and/or hoses.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 32.00 | Hrs | Project Manager | $120 | $3,840 |
| 140.00 | Hrs | Staff Geologist | $90 | $12,600 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | SCS - Temporary security fencing | $850 | $978 |
| 40.00 | Each | Accutest Laboratories - TO-14A Airbag Analysis | $130 | $5,980 |
| 40.00 | Job | Tedlar Airbag | $10 | $460 |
| 2.00 | Job | CalClean, Inc. - mob/demob | $500.00 | $1,150 |
| 45.00 | Days | CalClean, Inc. - on-site field service first event | $1,600.00 | $82,800 |
| 45.00 | Days | CalClean, Inc. - on-site field service second event | $1,600.00 | $82,800 |
| 1.00 | Job | High Pressure Air Sparge Unit | $3,500.00 | $4,025 |
| | | | Total | $194,633 |

**00040 Groundwater Removal and Disposal**

Scope: CalClean, Inc. will treat and discharge up to 10,000 gallons of gasoline-impacted groundwater from the vapor extraction wells into the nearest sanitary sewer connection under permit from East Bay MUD; oversight and compliance sampling activities to be performed by RRM, Inc. during this time period.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 4.00 | Hrs | Senior Professional | $145 | $580 |
| 16.00 | Hrs | Project Manager | $120 | $1,920 |
| 60.00 | Hrs | Staff Geologist | $90 | $5,400 |
| 300.00 | Miles | Support Truck | $0.75 | $225 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | Accutest Laboratories - Compliance Testing | $2,500 | $2,875 |
| 20,000 | Gallon | CalClean, Inc. - groundwater treatment and discharge | $0.35 | $8,050 |
| | | | Total | $19,050 |

**Alternative 3**
Cost Estimate to Implement Sparging Enhanced Vapor Extraction with Mobile Treatment Unit
900 Central Avenue
Alameda, CA

**00050 Baseline and Follow-up Groundwater Monitoring and Reporting Event**

Includes the following tasks: Gauge water levels, purge and collect groundwater samples from soil vapor extraction wells and existing groundwater wells for five events including one baseline and four follow-up events.
submit samples to Accutest Labs and analyze for TPHg, BTEX, and fuel oxygenates; dispose of purge water and prepare and submit quarterly report. Estimated to be performed quarterly for two years.

LABOR & EQUIPMENT

| Total | Units | Description | Rate | Total |
|---|---|---|---|---|
| 1.00 | Hrs | Professional Geologist | $145 | $145 |
| 4.00 | Hrs | Project Manager | $120 | $480 |
| 10.00 | Hrs | Staff Engineer | $90 | $900 |
| 16.00 | Hrs | Field Technician | $80 | $1,280 |
| 4.00 | Hrs | Drafting | $65 | $260 |
| 300 | Miles | Support Vehicle Mileage | $0.75 | $225 |
| 2.0 | Hrs | Administration (EDF) | $55 | $110 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | Instrumentation and Sample Containers | $150 | $173 |
| 1.00 | Job | Waste Water Disposal | $175 | $201 |
| 1.00 | Job | EDF Charge | $30 | $35 |
| 9.00 | Each | Accutest - TPHg,BTEX, MtBE and disposal | $122 | $1,263 |
| | | | | $5,071 |

**00060 Remediation Well Abandonment Activities**

Scope: Abandon four soil vapor extraction wells and four air sparge wells following effective clean-up and confirmation of impacted soil and groundwater; remove well boxes from all sidewalk locations and patch holes to match existing surface cover.
Document well abandonment procedures in brief letter report.

LABOR & EQUIPMENT

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| 4.00 | Hrs | Senior Professional | $145 | $580 |
| 8.00 | Hrs | Project Manager | $120 | $960 |
| 24.00 | Hrs | Staff Geologist | $90 | $2,160 |
| 2.00 | Hrs | Drafting | $65 | $130 |
| 300.00 | Miles | Support Truck | $0.75 | $225 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | Exploration Geoservices, Inc. - Well abandonment | $4,500 | $5,175 |
| 1.00 | Job | Concrete supplies | $200.00 | $230 |
| | | | Total | $9,460 |

**Alternative 3**
Cost Estimate to Implement Sparging Enhanced Vapor Extraction with Mobile Treatment Unit
900 Central Avenue
Alameda, CA

**00070 Report Preparation**
Scope: Prepare and submit report addendum detailing procedures and findings of work.

LABOR & EQUIPMENT

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| 8.00 | Hrs | Senior Professional | $145 | $1,160 |
| 16.00 | Hrs | Project Manager | $120 | $1,920 |
| 30.00 | Hrs | Staff Engineer | $90 | $2,700 |
| 8.00 | Hrs | Draftsperson | $65 | $520 |
| 10.00 | Hrs | Clerical | $55 | $550 |
| | | | Total | $6,850 |

**Alternative 4**
Fixed Cost Estimate to Perform In-situ Chemical Oxidation
900 Central Avenue
Alameda, CA

This cost estimate was developed using a subcontractors quote for in-situ chemical oxidation by CALIBRE.

| | | Unit Cost | Extended Cost |
|---|---|---|---|
| 00010 | Perform In-Situ Chemical Oxidation | | $155,000 |
| 00020 | Chemical Oxidation Confirmation Groundwater Sampling (Six Events) | $15,000 | $90,000 |
| 00030 | Additional Remedial Performance and Summary Report | | $10,000 |
| 00040 | Follow-Up Groundwater Monitoring and Reporting (Six Events) | $5,071 | $30,426 |
| 00050 | Well Abandonment and Closure Request Preparation and Submittal | | $15,940 |
| | **TOTAL** | | $301,366 |

**Alternative 4**
Fixed Cost Estimate to Perform In-situ Chemical Oxidation
900 Central Avenue
Alameda, CA

**00010 Perform In-Situ Chemical Oxidation**

Scope: Perform initial and additional in-situ Chemical Oxidation in the saturated zone and shallow groundwater. This task to to be performed by CALIBRE.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 0.00 | Hrs | Senior Professional | $145 | $0 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | CALIBRE - In-situ Chemical Oxidation set-up and 1 event | $105,000 | $105,000 |
| 1.00 | Job | CALIBRE - Second Chemical Oxidation Event | $50,000 | $50,000 |
| | | | Total | $155,000 |

**00020 Chemical Oxidation Confirmation Groundwater Sampling (Six Events)**

Scope: Perform follow-up groundwater monitoring to determine effectiveness of chemical oxidation. Performed for at least 6 events.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 0.00 | Hrs | Senior Professional | $145 | $0 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | CALIBRE - Follow-up Groundwater Monitoring Event | $15,000 | $15,000 |
| | | | Total | $15,000 |

**00030 Additional Remedial Performance and Summary Report**

Scope: Prepare additional evaluation of second chemical oxidation event.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 0.00 | Hrs | Senior Professional | $145 | $0 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Each | CALIBRE - Remedial Performance and Summary Report | $10,000 | $10,000 |
| | | | Total | $10,000 |

**Alternative 4**
Fixed Cost Estimate to Perform In-situ Chemical Oxidation
900 Central Avenue
Alameda, CA

**00040 Follow-Up Groundwater Monitoring and Reporting (Six Events)**

Includes the following tasks: Gauge water levels, purge and collect groundwater samples from soil vapor extraction wells and existing groundwater wells for six events including one baseline and five follow-up events.
Submit samples to Accutest Labs and analyze for TPHg, BTEX, and fuel oxygenates; dispose of purge water and prepare and submit quarterly report.

| Total | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 1.00 | Hrs | Professional Geologist | $145 | $145 |
| 4.00 | Hrs | Project Manager | $120 | $480 |
| 10.00 | Hrs | Staff Engineer | $90 | $900 |
| 16.00 | Hrs | Field Technician | $80 | $1,280 |
| 4.00 | Hrs | Drafting | $65 | $260 |
| 300 | Miles | Support Vehicle Mileage | $0.75 | $225 |
| 2.0 | Hrs | Administration (EDF) | $55 | $110 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | Instrumentation and Sample Containers | $150 | $173 |
| 1.00 | Job | Waste Water Disposal | $175 | $201 |
| 1.00 | Job | EDF Charge | $30 | $35 |
| 9.00 | Each | Accutest - TPHg,BTEX, MtBE and disposal | $122 | $1,263 |
| | | | | $5,071 |

**00050 Well Abandonment and Closure Request Preparation and Submittal**

Scope: Prepare and submit low-risk case closure summary; following case closure, permit and abandon all existing groundwater and remediation wells using pressure grout methodology. Well box rims to be left in place in hard surface areas.

| Quantity | Units | Description | Rate | Total |
|---|---|---|---|---|
| | | LABOR & EQUIPMENT | | |
| 8.00 | Hrs | Senior Professional | $145 | $1,160 |
| 18.00 | Hrs | Project Manager | $120 | $2,160 |
| 24.00 | Hrs | Staff Geologist | $90 | $2,160 |
| 20.00 | Hrs | Senior Technician | $85 | $1,700 |
| 2.00 | Hrs | Draftsperson | $65 | $130 |
| 2.00 | Hrs | Clerical | $55 | $110 |
| 320.00 | Miles | Support Truck | $0.75 | $240 |
| | | SUBCONT. & MATERIALS | | |
| 1.00 | Job | Exploration Geo - Well Drilling Contractor | $3,750 | $4,313 |
| 10.00 | Each | Alameda County Health Services - Well Permit | $345 | $3,968 |
| | | | Total | $15,940 |

**Letter Proposal for**

**Remediation of Benzene Contamination at Former Gas Station**

**900 Central Avenue and 1326 Ninth Street, Alameda, California**

## Introduction

CALIBRE Systems, Inc. (CALIBRE) proposes to conduct remedial action measures at 900 Central Avenue, Alameda, California (the site) to reduce benzene levels below 1 µg/L in the underlying ground water. This proposal is offered on a fixed price basis and includes a guarantee to work at the contractor's expense up to a specified ceiling amount (guarantee limit), should the approach require more effort than currently anticipated.

## Background

A reconnaissance study of the subject property was conducted by Lowney Associates in 1994. Activities included records research, interpretation of aerial photos, and the collection and analysis of soil and groundwater samples.

Based on records obtained by Lowney Associates, a gas station was erected at the site in 1931, at which time three underground fuel storage tanks and a waste oil tank were installed. The tanks were removed in 1975. Historic Sanborn maps and aerial photos suggest the most likely location of the fuel tanks was the northwest corner of the parcel beneath the present day sidewalk. The original location of the waste oil tank has never been ascertained.

Three borings were made to obtain soil and groundwater samples as a part of the 1994 study. Two of the borings were located in the vicinity of the fuel tanks, while the third was place to the northeast in what was thought to be the down-gradient direction. Results of the sampling indicated hydrocarbon contamination within the zone of water table fluctuation. Analytical results were interpreted to indicate the presence of gasoline and diesel range hydrocarbons. However, according to the analytical laboratory, the diesel fractions could include weathered gasoline and Stoddard solvent, rather than fuel grade diesel. Some residues indicative of motor oil were also observed in a water sample from the down-gradient boring. The 1994 investigation included sample analysis using method 8260 from selected soil and groundwater samples. This test method includes analysis for ethylene dichloride (EDC) and ethylene dibromide (EDC), two common lead scavenging additives to fuel. The results of these analysis did not detect either of these compounds (EDC is also known as 1,2 dichloroethane, or 1, 2 DCA) at that time.

In 1997, Allwest Environmental, Inc. conducted a more extensive subsurface investigation in order to prepare a risk-based corrective action evaluation. After obtaining anecdotal evidence confirming the probable location of the former underground tanks, the contractor made eight borings at the site, each of which was used to obtain four soil samples and one groundwater sample. No hydrocarbon contamination was detected in any samples taken above the water table. However, gasoline range hydrocarbons were detected in two soil samples from the saturated zone and five of the eight groundwater samples within an approximately 30 foot square footprint. At that time, the contractor concluded that no corrective action was required, since no one was using the ground water and there was no contamination in the vadose zone. Confirmation of an historical gas station across the intersection at 841 Central Avenue raised the prospect that the reason the residues are all present below the water table is that they originated across the street and not on the subject property.

The following year (1998), Allwest Environmental, Inc. installed three groundwater monitoring wells on the property. Results of analysis of groundwater samples were consistent with previous observations. A single groundwater sample from one of the three wells was observed to contain gasoline range hydrocarbons and the volatile aromatic constituents of gasoline: benzene, ethyl benzene, toluene, and xylene (BETX). The benzene concentration was nearly six times its maximum concentration limit (MCL) of 1 µg/L. No other site contaminants were observed at levels in excess of their respective MCL. The apparent absence of hydrocarbons from the motor oil range in 1997 as compared to 1994 may indicate that the heavier petroleum compounds observed in 1994 were drug down from the surface by the boring equipment. That is a common issue with small bore investigations.

Monitoring wells were installed across Ninth Street and quarterly monitoring was implemented in 2002. Concentrations of total petroleum hydrocarbons in the gasoline range (TPHg) and benzene have been significantly higher since 2002 and have resulted in the Alameda County Health Care Services requesting a Corrective Action Plan. Based on the monitoring data since 2002, it appears that groundwater concentrations of benzene increase when the water level drops. This pattern is commonly associated with sites for which the primary source is now beneath the water table, as opposed to a source in the vadose zone from which increased recharge (higher water table) increases the concentration of contaminant. Both excavation and air sparging have been discussed as potential corrective actions for the site.

**Conceptual Site Model**

Under the conditions observed at the subject site, gasoline will travel vertically in the unsaturated zone much more slowly than it will travel laterally in the saturated zone. As such, the persistence of contamination in the underlying ground water and its

absence in the soil column above that contamination suggests: 1) the primary source was removed at the time the tanks were pulled; or 2) the original source lies somewhere other than where the soil borings have been installed. Given the site information provided, the most likely location of a source is from the former tanks at 900 Central Ave and a secondary possibility is the former oil and gas operation across the intersection at 841 (listed as 845 in some telephone directories) Central Avenue.

In either case, the conceptual site model indicates that the extant contamination on the 900 Central Avenue property is being sustained by gasoline adsorbed onto soil in a 5 - 10 foot thick band of soil within the zone of normal fluctuation for the water table. This "smear zone" was likely created when there was free gasoline floating on the water table and being adsorbed on soil at the interface. Due to seasonal fluctuations and long-term changes in the height of the water table, the interface moved within the 5 - 10 foot vertical distance, thus creating the observed thickness of the smear zone. Benzene and TPHg continue to leach from the adsorbed residues in the smear zone. As the water table rises, the concentrations decrease because the fresh recharge from precipitation dilutes the underlying ground water.

If the source of the contamination was the former tanks at 900 Central Avenue, and the primary contaminated soil was excavated when the tanks were removed, then corrective actions need to target the saturated soil beneath the site and the ground water beneath the intersection. If the source was 841 Central Avenue, then the corrective action at 900 Central Avenue may address a portion of the plume, but will not necessarily address the entire source and there could be rebound if other sources not on 900 Central Avenue are present. The work proposed here is predicated on removal of gasoline that originated on the 900 Central Avenue. To the extent there are hydrocarbons that originated elsewhere, they are not included in the guarantee offered in this proposal. Given the distances and the flow directions, our assumption is

that rebound that occurs within months is indicative of on-site contamination. Rebound that takes a year or more to occur is likely sourced from off-site.

**Selection of Technical Approach**

Two different corrective action designs have been previously identified for 900 Central Avenue: 1) Excavation; and 2) Dual phase extraction with sparging. Both have been successfully applied to hydrocarbon releases. However, both approaches create concerns regarding operation in this residential setting and the proposed costs are high for a relatively small gasoline site.

Excavation

Excavation is not typically applied to contamination below the water table. Moreover, the footprint targeted for excavation is relatively small for the depth anticipated in what appears to be silty sand. At a minimum, the proposed excavation will require shoring because of the need to contain the opening and not damage the dwelling on the site or disrupt the sidewalk and road pavement any more than necessary. At that, the soil conditions below the water table lend themselves to liquefaction and the potential for the excavation to grow well beyond its intended dimensions unless the area is effectively dewatered. Moreover, because the extent of the contaminated soil has not been bounded on the north and west sides, there is a possibility that when the excavation is open, contamination will be found beyond the targeted footprint. In that event, the work will take longer than anticipated and disrupt traffic in the area. Finally, the existing proposal assumes no cost for managing ground water. And yet, all contaminated soil lies below the water table. That would mean that excavation will have to wait for low water conditions or will require dewatering and driving the costs up more than anticipated. Indeed, if the absence of source soil is a reflection of over-excavation at the time the tanks were removed, it was the prospect of digging below the water table and the need to manage

contaminated water that stopped that effort short of its goal to remove all contaminated soil.

In order to contain costs, the excavation approach is designed around the ability to put uncontaminated soil back in the excavation as fill. That necessitates the ability to stockpile clean soil on site throughout the excavation process. The parcel in question is small and in use as a residential dwelling. Open stockpiles of soil will magnify the disruption posed by implementation of corrective actions, and may pose an attractive nuisance in the area. Stockpiles would have to be maintained until analytical results determined the suitability of the soil as backfill.

Dual Phase Extraction with Sparging

Dual phase extraction and sparging are aimed at stripping out volatile chemicals like benzene under vacuum while providing oxygen to foster enhanced biodegradation of residual hydrocarbons. The stripping phenomenon applies well to benzene and can be applied for the fuel additives EDC or EDB, but is less effective because of their lower Henry's Law partition coefficients. The enhanced biodegradation is only applicable to the petroleum hydrocarbons and will not be effective for EDC or EDB. As a consequence, this approach is less robust with regards to the potential presence of fuel additives.

Sparging by design is introducing air into the saturated zone and forcing it upward into the soil column where it is collected with soil vapor extraction (SVE) ports. Extra precautions are needed when applying this technology in residential areas because of the potential for vapors to escape capture and migrate to residences where they pose a vapor intrusion hazard. Sparging technology takes time to meet objectives. This is even truer when biodegradation is being relied upon for part of the restoration process. In the original work by Allwest, they estimated an approach of this nature would take about two years to meet objectives. That comports with our experience

using this technology. The current proposal is designed on the basis of an estimated operating period of only a few months. That is believed to be unrealistic. As the period of performance extends, costs will grow accordingly.

Proposed Technical Approach

Given the small footprint of the targeted area and its presence below the water table, CALIBRE believes use of in-situ chemical oxidation (ISCO) technology would be more cost-effective. A number of ISCO agents are available and there is significant information available on their performance in remediation projects. We have selected a powerful reagent for which there are no volatile emissions that could pose problems at the dwelling or along the sidewalk.

Chemical oxidation processes have been widely used for treatment of organic contaminants in waste waters. Many common chemical oxidants are aggressive and applicable to a wide variety of organic compounds. In the last 15 years these processes have been coupled with delivery techniques for in-situ remediation of organic compounds in groundwater and subsurface soils. In-situ chemical oxidation (ISCO) is a proven technology applicable to treating source areas of organic chemicals in soil and groundwater. The oxidants used are commercially available, and treatment time is usually measured in months rather than years.

In-situ chemical oxidation is based on the delivery of chemical oxidants to contaminated media in order to destroy the contaminants by converting them to innocuous compounds commonly found in nature. The common oxidants applied in ISCO applications are typically hydrogen peroxide ($H_2O_2$), permanganate ($KMnO_4$ or $NaMnO_4$), ozone and persulfate ($Na_2S_2O_8$).

Ozone is applied as a gas and therefore more generally applicable to vadose zone soils. Permanganate is rated as low effectiveness for hydrocarbon sites. Based on the above, the two candidate oxidants are peroxide (also described as Fenton's reagents with other catalysts/additives) and persulfate. Peroxide is a strong oxidant (inexpensive) that can have very rapid reaction rates (minutes) which are exothermic and can potentially generate subsurface gas. Persulfate is also a strong oxidant but has much slower reactions rates (weeks to a month) without generating heat or excess gas. Based on the above, and the existing residential use of the property, persulfate is recommended as the oxidant of choice for this site. Persulfate is more expensive than peroxide, but for smaller sites such as this the purchase cost of the reagent is a small portion of the project implementation cost.

It is our understanding that the Alameda County has requested a Corrective Action Plan (CAP) for the site along with collection of additional data. We have included an optional task in this proposal to prepare the CAP. In our experience, it is more efficient for the CAP to be prepared by the contractor proposing to implement the plan to ensure compatibility of approach with the language in the plan and to have the contractor familiar with the regulatory authorities' expectations relative to the performance of the work. Should the CAP be prepared by other parties, we would request to work with them while drafting the CAP so that it does not preclude or significantly impair our ability to conduct the work as proposed. Our fixed price for the CAP option does not include ACEH approval of the CAP because approval may be withheld pending completion of the other analyses requested by ACEH for which we do not have responsibility (e.g., conduct of soil vapor analysis and investigation for fuel additives).

**Proposed Approach**

The objective of our approach is to reduce all benzene concentrations in the plume beneath 900 Central Avenue to levels below 1 µg/L. The objective will be met by application of ISCO technology using sodium persulfate solution as the active oxidant. The objective will be determined to be met when two consecutive monitoring events 60 days apart yield no samples with benzene in excess of 1 µg/L. It is our expectation that the first post-treatment monitoring event will be conducted 45 days after injection. We anticipate that sample will indicate the benzene has been destroyed in the ground water to levels below 1 µg/L. In that event, we will confirm the absence of benzene with a subsequent sample 60 days thereafter or some other suitable period of time as specified in the CAP after discussions with ACEH. We recognize that ACEH may require four or more quarters of clean ground water in order to determine that no further action or monitoring are required. The exact number of sample events will be determined by the approved monitoring plan in the CAP. We are prepared to conduct any required monitoring over and above the three proposed monitoring events on a time and materials basis. We have not included the cost of more than three sample events due to the potential for another source of gasoline across the intersection to foster rebound after migration from that source that would extend monitoring indefinitely. Should rebound occur after two more than 60 days of clean samples, we interpret that as evidence of migration from off-site sources.

If the 45-day sample has benzene contamination above 1 µg/L, we will review the data and design a second application of ISCO to address residual gasoline levels. We will bear the cost of the second application as a part of our guarantee (described below).

The proposed ISCO remedial action approach for this site (900 Central Ave) includes the following elements:

1) Identify all known utilities/access constraints in the planned work area.
2) Prepare work plan (stamped by California licensed P.E.) for ACEH review and approval.
3) Obtain required permits for planned activities (drilling, access to City right of way, others).
4) Mobilize to site and erect security fencing around work area and set-up temporary equipment (containment area, 1 or 2 mix tanks approximate 500-1,000 gallons), mark grid of planned injection locations.
5) Complete independent subsurface utility clearance in planned work area, adjust locations as necessary based any new utilities identified, complete coring of any concrete surfaces where injection is planned (in sidewalks, asphalt surfaces do not need to be cored).
6) Start oxidant injection process with Geoprobe rig; conceptual design includes a total of 21 injection points over a 20 by 50 ft area with injection points placed on approximate 7 ft centers (using a radius of influence of 3.5 ft for each injection point). The oxidant solution would be mixed in small day tank (under 1,000 gallons, within a containment area and consumed completely each day).
7) Complete injections (estimated at 1 week duration) and demobilize all equipment and fencing from the site.
8) After 45 days, start first of 3 rounds of groundwater monitoring from selected wells (MW-1, MW-2, MW-3, and MW-4).
9) Conduct confirmation monitoring or supplemental injection, depending on results of first monitoring event.
10) Complete remedial action summary report.

The CALIBRE team will be managed by Gaynor Dawson, P.E., a chemical engineer registered in California. He will oversee the work, prepare reports, and sign as the cognizant P.E. as required.

**Proposed Price, Contractor Guarantee, and Milestone Payment Schedule**

Proposed Price

CALIBRE's proposed price to achieve the stated remediation objective is $125,000. The fixed price for the optional task of preparing the CAP is $18,100. Our fixed price for both activities is contingent on being granted reasonable access to the property and obtaining permits without unreasonable delay.

Contractor Guarantee

In lieu of an insurance policy, CALIBRE is offering a Guarantee Limit for this project of $150,000. The Guarantee Limit represents an additional $25,000 of project costs above the project price that CALIBRE agrees to incur to achieve the stated remediation objective at no additional cost to the customer.

- The project price is equal to the approved proposed price for achieving completion of remediation objectives, the payment of which will be tied to one or more project milestones. For this effort, the project price is $125,000. [Note that the option for the CAP is not included within the project price and, if exercised, will be conducted on a straight firm fixed price basis.]
- Project costs are defined as those costs incurred by CALIBRE in executing the work required to achieve the remediation objective.

CALIBRE agrees to meet the stated remediation objective subject to the Guarantee Limit. This guarantee shall not exceed the Guarantee Limit provided that CALIBRE maintains an acceptable performance rating during project execution. In the event that CALIBRE's effort reaches $125,000 without achieving the objective, CALIBRE and the customer shall enter into discussions to determine if completion can be accomplished within the Guarantee Limit. If it is determined that completion will not be accomplished within the Guarantee Limit, work on the project will stop when 100% of the Guarantee Limit is reached; unless and until there is agreement by modification

to the contract to continue the work. Any costs above the Guarantee Limit will be mutually agreed to on a Time and Materials basis.

Proposed Payment Milestones

CALIBRE will submit invoices upon completion of the following payment milestones:

1. ACEH Approval of Corrective Action Plan (CAP) [if option is selected]
   $18,100.00
2. ACEH Approved Work Plan
   $20,000.00
3. Completion of Mobilization, Injections, and Demobilization
   $50,000.00
4. Completion of First Sampling Event
   $15,000.00
5. Completion of Second Sampling Event
   $15,000.00
6. Completion of Third Sampling Event
   $15,000.00
7. Submittal of Approved Remedial Action Summary Report
   $10,000.00

Attachments

Figure 1: Site Layout and Sample Locations with Most Recent Data

Figure 2: Conceptual Design ISCO Injection Location