Mr. Jerry Wickham
Alameda County
Environmental Health Department
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

7/25/13

Re: B&C Gas Mini Mart, 2008 First Street, Livermore, California
(ACEHD Case No. RO0000278)

Dear Mr. Wickham:

Stratus Environmental, Inc. (Stratus) has recently prepared a document titled *Work Plan for Limited Subsurface Investigation and Low Threat Closure Policy Site Evaluation* on my behalf. The report was prepared in regards to Alameda County Fuel Leak Case No. RO0000278, located at 2008 First Street, Livermore, California.

I have reviewed a copy of this report, sent to me by representatives of Stratus, and "I declare, under penalty of perjury, that the information and or/recommendations contained in the attached document or report is true and correct to the best of my knowledge."

Sincerely,

Balaji Angle
B&C Gas Mini Mart

STRATUS
ENVIRONMENTAL, INC.

3330 Cameron Park Drive, Ste 550
Cameron Park, California 95682
**(530) 676-6004** ~ Fax: (530) 676-6005

July 25, 2013
Project No. 2146-2008-01

Mr. Jerry Wickham, P.G.
Alameda County Environmental Health Department
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Re: Work Plan for Limited Subsurface Investigation and Low Threat Closure Policy Site Evaluation, B&C Gasoline Service Station, 2008 First Street, Livermore, California

Dear Mr. Wickham:

On behalf of Mr. Balaji Angle, Stratus Environmental, Inc. (Stratus) has prepared this *Work Plan for Limited Subsurface Investigation and Low Threat Closure Policy Site Evaluation* for the B&C Gasoline service station (former Desert Petroleum Station No. 795), located at 2008 First Street, Livermore, California (the Site, see Figures 1 and 2). Petroleum hydrocarbon and fuel oxygenate impact to the subsurface has previously been documented beneath the subject property, and Alameda County Environmental Health Department (ACEHD) currently regulates an environmental case at the site. Soil excavation and in-situ chemical oxidation (ISCO) by ozone injection (OI) have been utilized at the site as contaminant remedial efforts. In a letter dated June 24, 2013, and in subsequent June 25, 2013 electronic mail correspondence, ACEHD requested that a minimum of two soil borings be advanced in areas of the site where the highest concentrations of petroleum hydrocarbons had been detected. The purpose of the borings is to collect soil samples to enable an evaluation of the effectiveness of remedial efforts on the property. ACEHD has also requested that the site be evaluated against criteria established by the State Water Resources Control Board's (SWRCB) 'Low Threat Closure Policy' (LTCP).

The highest concentrations of fuel contaminants were historically detected in compliance soil samples collected directly beneath two of the site's three former gasoline underground storage tanks (USTs). Therefore, Stratus is proposing to advance borings in these areas of the site, with each boring to be advanced in an angled direction to enable collection of samples (the current USTs prevent direct vertical access from the ground surface). A detailed description of the work tasks associated with implementing these soil borings is provided in the following subsections of this document. Stratus has also reviewed historical data collected on behalf of the site in order to evaluate the site in

context with the LTCP criteria, and a discussion of the site conditions in comparison to each item specified in the LTCP is provided in this report.

During the fall of 2012, Stratus began implementing tasks intended to begin supplemental remediation of the subject site using soil vapor extraction (SVE) technology, as had been previously requested and approved by ACEHD. The majority of this work consisted of installing remedial wells and working with Pacific Gas & Electric Company to obtain utility service for this equipment. Stratus had intended to begin remedial efforts during the summer months of 2013, at times of seasonally low groundwater levels on the property. However, given the directives specified in the June 24, 2013 letter, and June 25, 2013 electronic mail correspondence, Stratus will temporarily suspend work activities associated with initiating SVE at the site.

## SITE DESCRIPTION

The site is an active service station located at the northeast corner of the intersection of First Street and South L Street in downtown Livermore. Surrounding properties are developed for retail commercial use. The site utilizes a UST system situated on the western portion of the property, and two fuel dispenser islands situated in the south-central section of the site. The generalized configuration of the property is depicted on Figure 2.

An environmental case was also formerly managed northwest of the site, at the former Groth Brothers Oldsmobile property located at 57/59 L Street (see Figure 3 for location). The environmental case at this site is currently closed.

## BACKGROUND OVERVIEW

Petroleum hydrocarbon impact to the subsurface was discovered in 1988 during a subsurface investigation. One groundwater monitoring well (MW-1) was installed at that time, confirming that impact extended to shallow groundwater. In September 1995, a gasoline UST failed a tank tightness test. In the summer of 1996, the former fuel storage USTs were removed and replaced. Approximately 700 cubic yards of soil were excavated and removed at this time.

Numerous subsurface investigations have since been performed, predominately focusing on evaluating subsurface conditions north-northwest (downgradient) of the site. A municipal water well (California Water Service Company) is situated approximately 2,300 feet northwest of the site, and contaminant transport in groundwater appears to have been predominately towards this well. A groundwater monitoring well network that extends over a very large area has been installed adjacent to the site, and extensive groundwater monitoring and sampling has been performed to assess groundwater plume

conditions over time. Figure 3 illustrates the locations of the monitoring wells and the water supply well. Information regarding the construction of the site monitoring wells, such as date of installation and construction specifications, is provided in Appendix A.

Appendix B presents soil analytical data collected during historical site investigation work, and related information (such as maps depicting sampling locations, and figures depicting the extent of impact in plan view and cross sectional profile). Beneath the southern two USTs, gasoline range organics (GRO), benzene, and methyl tertiary butyl ether (MTBE) were detected at maximum concentrations of 8,500 milligrams per kilogram (mg/Kg), 61 mg/Kg, and 96 mg/Kg, respectively. Residual petroleum hydrocarbon mass in soil appears to extend offsite to the northwest, with these contaminants primarily situated between about 32 and 48 feet bgs, which is typically near the water table interface.

A groundwater contaminant plume extends offsite approximately 600 feet to the northwest, based on analytical data collected in March 2013. An ozone injection system operated onsite intermittently between late 2007 (initially as a pilot test) until February 2013, to remediate fuel contaminants situated immediately adjacent to the former UST area. Due in part to this remedial effort, the highest concentrations of fuel contaminants are currently present offsite in the vicinity of well MW-5; GRO, benzene, and MTBE were reported at levels of 6,800 micrograms per liter (µg/L), 57 µg/L, and 21 µg/L, respectively, at this time. Concentrations of petroleum hydrocarbons and fuel oxygenates have been reported below laboratory detection levels in recent samples collected from monitoring wells located downgradient (northwest) of well MW-7. Figures 4 through 6 depict the approximate extent of GRO, benzene, and MTBE impact to groundwater, respectively, based on the findings of the March 2013 sampling event.

## SCOPE OF WORK

The objective of the proposed scope of work is to assess current levels of fuel contaminants in soil beneath the area of historically greatest impact to the subsurface. To accomplish these objectives, Stratus is proposing the following work activities:

- Advance two (2) direct push soil borings (AB-1 and AB-2) within a 44-foot length directional borehole advanced at approximately 15 degrees from vertical.
- Collect soil samples from the soil borings for lithologic comparison and laboratory analysis.

The proposed scope of work has been subdivided into four tasks, as outlined below. All work will be conducted under the direct supervision of a State of California Professional Geologist or Professional Engineer, and will be conducted in accordance with standards

established by the *Tri-Regional Board Staff Recommendations of Preliminary Investigation and Evaluation of Underground Tank Sites* (RWQCB, April 2004).

## Task 1: Pre-field Activities

Following approval of this scope of work by ACEHD, the following activities will be completed:

- Obtain drilling permits, as needed, from Zone 7 Water Agency.
- Retain and schedule a licensed C-57 drilling contactor.
- Update the site specific Health and Safety Plan.
- Mark boring locations and contact Underground Service Alert to locate underground utilities in the vicinity of the work site.
- Notify ACEHD, Zone 7 Water Agency, and Mr. Angle, of the proposed work schedule.

## Task 2: Field Work

Soil Borings

A Stratus geologist, under the direct supervision of a California Registered Professional Geologist, will oversee a C-57 licensed drilling contractor advance borings AB-1 and AB-2 using a direct push drilling rig. The borings will be advanced approximately 44 feet in length at approximately 15 degrees from vertical. The initial 3 feet of each boring will be cleared using hand tools to reduce the possibility of damaging underground utilities. The proposed locations of the borings are depicted on Figure 2.

The soil borings will be continuously cored using a double-walled sampling system equipped with disposable acetate liners. During advancement of the borings, soil samples will be retained in approximately 2 to 4-foot intervals, depending upon the advancement length of each coring sampler. The bottom end of the acrylic lined soil sample section will be lined with Teflon™ sheets, capped, and sealed. Each sample will be labeled, placed in a resealable plastic bag, and stored in an ice-chilled cooler. The samples will remain chilled until relinquished to a state-certified analytical laboratory. Chain-of-custody procedures will be followed from the time the samples are collected until the time the samples are relinquished to the laboratory. Approximately seven soil samples collected from each soil boring will be submitted for chemical analysis; two of the samples will be submitted from each boring above 10 feet below ground surface (bgs) (for LTCP analyses, described below), and the remaining samples will be submitted from deeper within the boring. The exact number of samples submitted will be determined at

the time of the investigation. Photo-ionization detector (PID) screening of the samples (described below) will be used to assist in the determination of which samples will be submitted for chemical analysis.

The entire soil core will be classified onsite using the Unified Soil Classification System and recorded, along with other pertinent geologic information, on a boring log. Select sections of the soil core will also be placed and sealed in plastic bags to allow the accumulation of VOC vapors within the airspace in the bags. A PID will be used to measure VOC concentrations from each sample in parts per million (ppm), and will be recorded on the boring log. Appendix C includes a description of the field practices and procedures that will be used by Stratus personnel during implementation of this scope of work.

Waste Management

Drill cuttings and wastewater generated during the field activities will be contained in DOT-approved 55-gallon steel drums. The drums will be appropriately labeled and stored at the site pending proper disposal. A licensed contractor will transport the soil and wastewater to an appropriate facility for disposal.

## Task 3: Laboratory Analysis

Soil samples will be forwarded to a state-certified laboratory for chemical analyses. Soil samples collected from below 10 feet bgs will be analyzed for GRO using U.S. Environmental Protection Agency (USEPA) Method 8015, and for benzene, toluene, ethylbenzene, and total xylenes (BTEX compounds), MTBE, and tertiary butyl alcohol (TBA) using USEPA Method 8260. Soil samples collected from above 10 feet bgs will also be analyzed for naphthalene using USEPA Method 8260. If necessary, one soil sample from above 5 feet bgs in each boring will also be analyzed for polynuclear aromatic hydrocarbons (PAHs) using USEPA Method 8270. The naphthalene analysis, and potential PAH analysis, are proposed due to the absence of this testing in historical data, and the necessity of obtaining this information for property LTCP evaluation (discussed later in this report).

## Task 4: Site Assessment Report Preparation

Following completion of the additional site characterization activities, a site assessment report will be prepared. The report will include, but not be limited to, a scaled site plan, soil boring logs, tabulated analytical results, and a certified analytical report. The report will be uploaded to the State of California's GeoTracker website, and ACEHD's website, upon finalization.

## LOW THREAT CLOSURE POLICY EVALUATION

The following sections of this report present site specific discussions to each item specified in the LTCP in two general categories; general criteria and media specific criteria. The requirements outlined in the LTCP policy are presented below in bolded text font, and pertinent site information relating to each item discussed is addressed immediately following the bolded items.

### General Criteria

**The area is located within the service area of a public water system:** The area surrounding the site receives municipal water from California Water Service Company. The municipal water is a blend of water supplied by Zone 7 Water Agency and California Water Service Company.

**The unauthorized release consists only of petroleum:** All contaminants at the site appear to have originated from service station operations consisting only of petroleum products.

**The unauthorized release has been stopped:** The former single wall steel USTs and associated product piping that appear to have been the source of the release were removed and replaced with double walled fiberglass tanks and piping in 1996. The new USTs and associated equipment have been tested annually and meet appropriate guidelines and regulations.

**Free product has been removed to the maximum extent practicable:** Free product is not observed in any of the monitoring wells.

**A conceptual site model has been developed:** Two conceptual site model reports (an initial report in 2004, and an updated report in 2007) are on file with ACEHD.

**Secondary source removal has been addressed (Secondary source is defined as petroleum–impacted soil or groundwater located at or immediately beneath the point of release from the primary source):** Approximately 700 cubic yards of soil were excavated and removed from the property at the time of UST removal and replacement activities in 1996. Ozone injection was also performed intermittently between 2007 and early 2013, immediately adjacent to the former UST area.

**Soil and groundwater have been tested for MTBE and results reported in accordance with Health and Safety Code section 25296.15:** Soil and groundwater samples collected since the late 1990's have been chemically analyzed for MTBE, and these analytical results have been reported in the appropriate reports associated with sample collection.

**Nuisance as defined by Water Code Section 13050 does not exist at the site:** No nuisance exists at the site, as defined by Water Code Section 13050. Site conditions and the treatment and disposal of wastes are not injurious to health, are not indecent or offensive to the senses, and do not obstruct free use of property or interfere with the comfortable enjoyment of life or property. Site impacts are restricted to the subsurface and do not appear to affect the community at large.

## Media Specific Criteria

Three categories of media specific criteria must be satisfied under the LTCP; groundwater, petroleum vapor intrusion to indoor air, and direct contact and outdoor air exposure.

Groundwater

**The contaminant plume that exceeds Water Quality Objectives (WQOs) must be stable or decreasing in areal extent, and meet all of the additional characteristics of one of the five classes of sites:** Historically, many of the monitoring wells located downgradient of well MW-7 were impacted with fuel contaminants. However, based on the findings of recent well sampling, petroleum hydrocarbons and fuel oxygenates are now absent in this area. Given this observation, it appears that the downgradient portion of the contaminant plume is attenuating, and decreasing in areal extent. In addition, the contaminant plume meets the Class 4 criteria based on recent analytical data: (a) the contaminant plume that meets WQOs is less than 1,000 feet in length, (b) the nearest water supply well is greater than 1,000 feet from the defined plume boundary (about 1,400 feet), and (c) the dissolved concentration of benzene is less than 1,000 µg/L and the dissolved concentration of MTBE is less than 1,000 µg/L (see Figures 5 and 6 for benzene and MTBE plume limits, concentrations, and location of California Water Service Company well northwest of the site). The nearest surface water body (Arroyo Valley Stream) is situated over ½ mile south-southwest of the site.

Petroleum Vapor Intrusion to Indoor Air

As specified in the LTCP, satisfaction of the media-specific criteria for petroleum vapor intrusion to indoor air is not required at active commercial petroleum fueling facilities where there are no site specific characteristics that would pose an unacceptable health risk. Since the site is an active fueling facility with no unacceptable risk characteristics, the site appears to be exempt from the vapor intrusion to indoor air media specific criteria.

The LTCP classifies sites as having a 'Bioattenuation Zone' if (a) there is more than 5-feet of soil between the soil vapor measurement and the building (i.e. above the water table), (b) dissolved benzene concentrations are less than 1,000 µg/L, (c) total petroleum hydrocarbons in soil are less than 100 parts per million within the 5-foot zone, and (d)

oxygen in shallow soil must be greater than 4-percent at the bottom of the 5-foot bioattenuation zone. For sites with a 'Bioattenuation Zone' (Scenario 4), residential and commercial property concentrations of benzene in shallow soil vapor must be less than 85,000 micrograms per cubic meter ($\mu g/m^3$) and 280,000 $\mu g/m^3$, respectively, residential and commercial property concentrations of naphthalene must be less than 93,000 $\mu g/m^3$ and 310,000 $\mu g/m^3$, respectively, and residential and commercial property concentrations of ethylbenzene must be less than 1,100,000 $\mu g/m^3$ and 3,600,000 $\mu g/m^3$, respectively.

Groundwater at the site is significantly deeper than 5-feet bgs, and thus the vadose zone thickness criteria between the dissolved groundwater plume and surface grade is satisfied at the site. In 2006, soil vapor samples were collected at the site, both onsite and offsite. These data are provided in Appendix D. In these samples, oxygen percentages ranged from 17 to 21 percent. On the offsite properties, petroleum hydrocarbons originating from the site should not impact the upper 5-feet of the subsurface, as these contaminants would be transported and adsorbed within the saturated interval. Therefore, given the site specific conditions, the subject site meets the criteria for a 'Bioattenuation Zone'.

In the soil vapor samples collected both onsite and offsite in 2006, benzene concentrations ranged from <3.4 $\mu g/m^3$ to 61 $\mu g/m^3$, and ethylbenzene concentrations ranged from <5.2 $\mu g/m^3$ to 49 $\mu g/m^3$, and are therefore well within the limits established by the LTCP. The 2006 soil vapor concentrations were not tested for naphthalene. It is our professional opinion that given the low benzene and ethylbenzene concentrations in soil vapor, naphthalene concentrations in soil vapor both onsite and offsite would also be low and well within the limits specified in the LTCP.

Direct Contact and Outdoor Air Exposure

**Release sites where human exposure may occur satisfy the media specific criteria for direct contact and outdoor air exposure if any of the following criteria are satisfied:**

**(a): From 0 to 5 feet bgs, benzene, ethylbenzene, naphthalene and polynuclear aromatic hydrocarbons (PAH) concentrations in soil are less than 8.2 mg/Kg, 89 mg/Kg, 45 mg/Kg, and 0.0688 mg/Kg, respectively, and from 5 to 10 feet bgs, benzene, ethylbenzene, and naphthalene concentrations in soil are less than 12 mg/Kg, 134 mg/Kg, and 45 mg/Kg, respectively (note PAH analysis only required on sites with waste oil or bunker C fuel, and is not applicable for soil samples below 5 feet bgs),**

**(b): Maximum concentrations of petroleum constituents in soil are less than levels that a site specific risk assessment demonstrates will have no significant risk of adversely affecting human health, or**

**(c) As a result of controlling exposure through the use of mitigation measures or through the use of institutional engineering controls, the regulatory agency determines that the concentrations of petroleum constituents in soil will have no significant risk of adversely affecting human health.**

Excavation work would have removed petroleum hydrocarbon mass in soil near the USTs, but fuel contamination may remain in shallow soil in other parts of the site, most notably near the fuel dispenser islands and/or product line trenches. Only a limited number of soil samples have been collected above 10 feet bgs, and none of the samples appear to have been tested for naphthalene or PAH's.

We believe that it is likely that the site will meet the direct contact and outdoor air exposure criteria mentioned above under situation (a). During the upcoming subsurface investigation, Stratus will collect the necessary shallow soil samples, and have the appropriate analytical testing performed, in order to evaluate this pathway of exposure under the LTCP criteria.

It should be noted that the ground surface of the site is predominately a paved surface (concrete/asphalt). These paving materials are not impervious to soil vapors, but the potential exposure risk associated with volatilization of petroleum hydrocarbon vapors to outdoor air is unlikely to represent an exposure risk. Normal surface air movement (wind, etc.) is likely to dilute and remove impacted soil vapors from the site before concentrations reach risk levels.

Construction workers involved in excavation within the area of impacted soil could be exposed through dermal contact, accidental ingestion, or inhalation of volatilized hydrocarbons if excavations were deeper than three feet bgs. However, as this is an active fuel storage facility, construction activities involving excavation at the site should be performed by personnel trained in handling hazardous materials. These workers should take precautions to properly check, and if necessary, ventilate excavations in the impacted areas. Likewise, these workers should be taking proper measures to monitor air quality, utilize breathing respirators where appropriate, wear the proper clothing while working at the site, and wash prior to eating or drinking. If properly trained workers are utilized, and proper care and attention is given to safety precautions and hygiene, the risk of exposure to construction workers appears low.

## CLOSING

Based on the available data, the site appears to meet all of the general criteria established by the LTCP. The media specific criteria for groundwater appear to be satisfied. In our opinion, it is likely that the media specific criteria for petroleum vapor intrusion to indoor air and direct contact and outdoor air exposure will also be satisfied. As requested, shallow

soil samples from the upcoming soil borings will be tested for benzene, ethylbenzene, naphthalene, and possibly PAH's, in order to evaluate these pathways of exposure under the LTCP.

## SCHEDULE

Following approval of the soil boring scope of work, Stratus will forward a drilling permit application to Zone 7 Water Agency and retain a C-57 licensed drilling contractor. We anticipate that approximately 3 to 4 weeks will be necessary to implement the scope of work upon receiving agency approval of the work scope. The site investigation report will be submitted within approximately 3 weeks of receiving all laboratory analytical results.

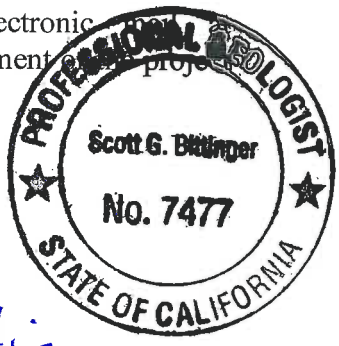
## LIMITATIONS

This document was prepared in general accordance with accepted standards of care that existed at the time this work was performed. No other warranty, expressed or implied, is made. Conclusions and recommendations are based on field observations and data obtained from this work and previous investigations. It should be recognized that definition and evaluation of geologic conditions is a difficult and somewhat inexact science. Judgments leading to conclusions and recommendations are generally made with an incomplete knowledge of the subsurface conditions present. More extensive studies may be performed to reduce uncertainties. This document is solely for the use and information of our client unless otherwise noted.

Please contact Scott Bittinger at (530) 676-2062, or via electronic mail at sbittinger@stratusinc.net, if you have any questions regarding this document or project in general.

Sincerely,

***STRATUS ENVIRONMENTAL, INC.***



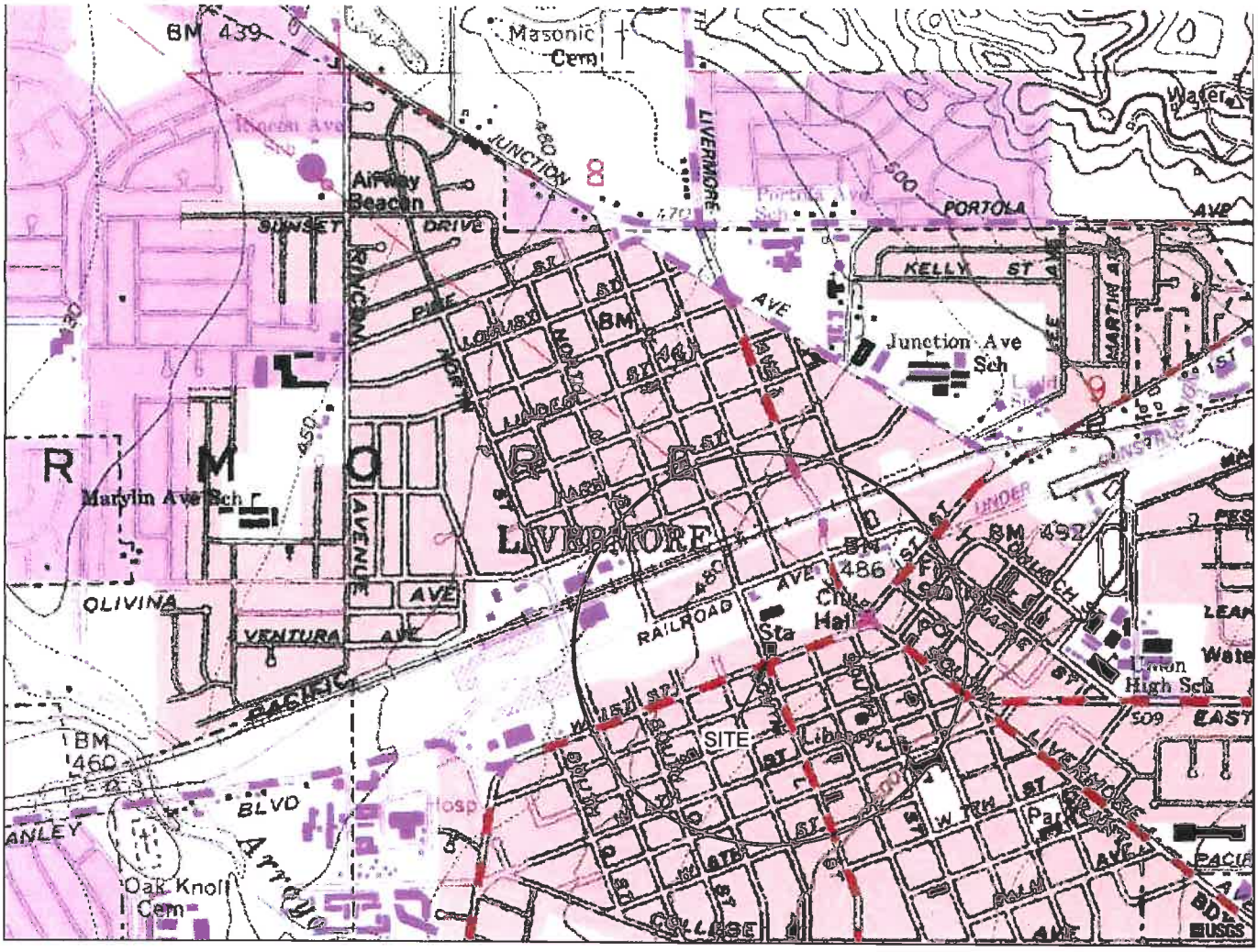

Stephen J. Carter, P.G.
Senior Geologist

Scott G. Bittinger, P.G.
Project Manager

Attachments:
Figure 1 Site Location Map
Figure 2 Site Plan
Figure 3 Site Vicinity Map
Figure 4 GRO Iso-Concentration Contour Map, First Quarter 2013

| | |
|---|---|
| Figure 5 | Benzene Iso-Concentration Contour Map, First Quarter 2013 |
| Figure 6 | MTBE Iso-Concentration Contour Map, First Quarter 2013 |
| Appendix A | Tabulated Well Construction Data |
| Appendix B | Historical Soil Analytical Data |
| Appendix C | Field Practices and Procedures |
| Appendix D | Soil Vapor Analytical Results |

cc: Mr. Balaji Angle, Property Owner




GENERAL NOTES:
BASE MAP FROM U.S.G.S.
LIVERMORE, CA.
7.5 MINUTE TOPOGRAPHIC
PHOTOREVISED 1999

N

QUADRANGLE LOCATION

0 1800 FT

APPROXIMATE SCALE

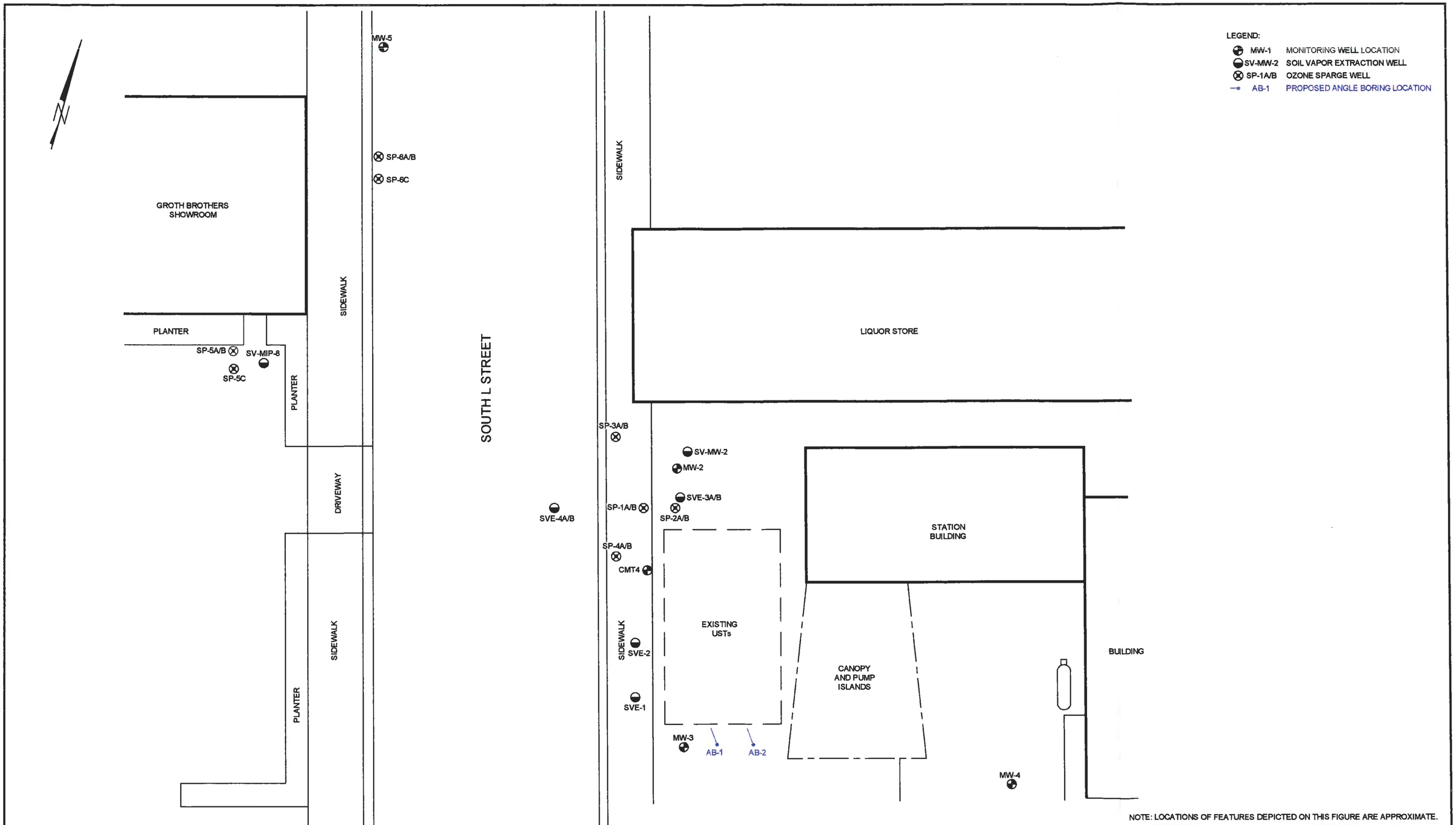
STRATUS
ENVIRONMENTAL, INC.

B & C GAS MINI MART
2008 FIRST STREET
LIVERMORE, CALIFORNIA

SITE LOCATION MAP

FIGURE
1

PROJECT NO.
2146-2008-01




STRATUS ENVIRONMENTAL, INC.

0 20 FT

APPROXIMATE SCALE

B & C GAS MINI MART
2008 1st STREET
LIVERMOORE, CALIFORNIA

SITE PLAN

FIGURE
2

PROJECT NO.
2146-2008-01


STRATUS ENVIRONMENTAL, INC.

0 200 FT

APPROXIMATE SCALE

B & C GAS MINI MART
2008 1st STREET
LIVERMORE, CALIFORNIA

SITE VICINITY MAP

FIGURE
3

PROJECT NO.
2146-2008-01


STRATUS ENVIRONMENTAL, INC.

0 200 FT

APPROXIMATE SCALE

B & C GAS MINI MART
2008 1st STREET
LIVERMORE, CALIFORNIA

GRO ISO-CONCENTRATION CONTOUR MAP
1st QUARTER 2013

FIGURE
4

PROJECT NO.
2146-2008-01


LEGEND

| | |
|---|---|
| MW-4 | GROUNDWATER MONITORING WELL LOCATION (CMT-# DESIGNATES MULTI-LEVEL WELLS) |
| D-1 | DEEP GROUNDWATER MONITORING WELL LOCATION |
| SVE-3A/B | SOIL VAPOR EXTRACTION WELL LOCATION |
| CWS#8 | MUNICIPAL WATER SUPPLY WELL LOCATION |
| [<0.50] | BENZENE CONCENTRATION IN µg/L |

SAMPLES COLLECTED ON 3/18/13 & 3/19/13
BENZENE ANALYZED BY EPA METHOD SW8260B
[NS] = NOT SAMPLED

STRATUS ENVIRONMENTAL, INC.

0 200 FT
APPROXIMATE SCALE

B & C GAS MINI MART
2008 1st STREET
LIVERMORE, CALIFORNIA

BENZENE ISO-CONCENTRATION CONTOUR MAP
1st QUARTER 2013

FIGURE
5

PROJECT NO.
2146-2008-01


STRATUS ENVIRONMENTAL, INC.

0 200 FT

APPROXIMATE SCALE

B & C GAS MINI MART
2008 1st STREET
LIVERMORE, CALIFORNIA

MTBE ISO-CONCENTRATION CONTOUR MAP
1st QUARTER 2013

FIGURE
6

PROJECT NO.
2146-2008-01

# APPENDIX A

# TABULATED WELL CONSTRUCTION DATA

**Table 3a**
**Single-Screen Monitoring Well Construction Details**
**Corrective Action Plan**
**B&C Gas Station**
**Livermore, California**

| Well No. | Drilling Method | Date Installed | T.D. Boring (ft.-bgs) | T.D. Well (ft.-bgs) | Borehole Diameter (inches) | Casing Material (PVC) | Casing Diameter (inches) | Screen Size (inches) | Sand Pack Material | Screened Interval (ft.-bgs) | Sand Pack Interval (ft.-bgs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 | HSA | Destroyed Nov-07 | 77 | 77 | 8 | PVC | 2 | 0.020 | #3 sand | 27 - 77 | 25 - 77 |
| MW-2 | HSA | Jun-94 | 60 | 60 | 10 | PVC | 4 | 0.020 | #2/20 sand | 30 - 60 | 27 - 60 |
| MW-3 | HSA | Jun-94 | 60 | 60 | 10 | PVC | 4 | 0.020 | #2/20 sand | 30 - 60 | 27 - 60 |
| MW-4 | HSA | Jun-94 | 60 | 60 | 10 | PVC | 4 | 0.020 | #2/20 sand | 30 - 60 | 27 - 60 |
| MW-5 | HSA | Oct-95 | 42 | 40 | 10 | PVC | 4 | 0.020 | #2 sand | 15 - 40 | 12 - 40 |
| MW-6 | HSA | Oct-95 | 42 | 40 | 10 | PVC | 4 | 0.020 | #2 sand | 15 - 40 | 12 - 40 |
| MW-7 | HSA | Jun-99 | 62 | 49 | 8 | PVC | 2 | 0.020 | #3 sand | 29-49 | 27-51 |
| MW-8 | HSA | Jun-99 | 62 | 54 | 8 | PVC | 2 | 0.020 | #3 sand | 34-54 | 32-54 |
| MW-9 | HSA | Jun-99 | 45 | 45 | 8 | PVC | 2 | 0.020 | #3 sand | 25-45 | 23-45 |
| MW-10 | HSA | Jun-99 | 55 | 53.5 | 8 | PVC | 2 | 0.020 | #3 sand | 33.5-53.5 | 23-55 |
| MW-11 | HSA | Jun-99 | 50 | 49 | 8 | PVC | 2 | 0.020 | #3 sand | 29-49 | 27-49 |
| MW-12 | HSA | Jun-99 | 45 | 43.5 | 8 | PVC | 2 | 0.020 | #3 sand | 23.5-43.5 | 21-45 |
| MW-13 | HSA | Jul-99 | 55 | 55 | 8 | PVC | 2 | 0.020 | #3 sand | 35-55 | 32-55 |
| D-1 | HSA | Jun-99 | 125 | 125 | 8 | PVC | 2 | 0.020 | #3 sand | 110-125 | 104-125 |
| D-2 | HSA | Jun-99 | 115 | 114 | 8 | PVC | 2 | 0.020 | #3 sand | 99-114 | 94-114 |
| (MS)MW-1 | HSA | Apr-89 | 62 | 60 | NA | PVC | 2 | NA | NA | 30-60 | NA |

*Notes:*
HAS = Hollow-Stem Auger
T.D. = total depth
ft.-bgs = feet below ground surface
NA = not available
Well construction information for wells MW-2 through MW-6 collected from Remediation Service Int'l boring logs.

**Table 3b**
**Multi-Level Monitoring Well Construction Details**
**Corrective Action Plan**
**B&C Gas Station**
**Livermore, California**

| Well No. | Zone No. | Drilling Method | Date Installed | T.D. Boring (ft.-bgs) | T.D. CMT (ft.-bgs) | Borehole Diameter (inches) | Casing Material | Casing Diameter (inches) | Sand Pack Material | Port Depth (ft.-bgs) | Sand Pack Interval (ft.-bgs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CMT-1 | Z1 | Sonic | 7-Aug-03 | 147 | 146 | 6.0 | CMT | 1.7 | #2/12 | 46 | 43 - 48.8 |
| | Z2 | | | | | | | | #2/12 | 61 | 59 - 62 |
| | Z3 | | | | | | | | #2/12 | 69 | 66.8 - 70.7 |
| | Z4 | | | | | | | | #2/12 | 91 | 89 - 93.3 |
| | Z5 | | | | | | | | #2/12 | 106 | 104 - 108.4 |
| | Z6 | | | | | | | | #2/12 | 123 | 120.5 - 125.5 |
| | Z7 | | | | | | | | #2/12 | 145 | 142 - 147 |
| CMT-2 | Z1 | Sonic | 11-Aug-03 | 147 | 144 | 6.0 | CMT | 1.7 | #2/12 | 49 | 46 - 50.5 |
| | Z2 | | | | | | | | #2/12 | 59 | 57.1 - 60.5 |
| | Z3 | | | | | | | | #2/12 | 68 | 66 - 70 |
| | Z4 | | | | | | | | #2/12 | 88 | 86 - 89.9 |
| | Z5 | | | | | | | | #2/12 | 106 | 104 - 107.5 |
| | Z6 | | | | | | | | #2/12 | 125 | 123 - 126.5 |
| | Z7 | | | | | | | | #2/12 | 144 | 142 - 147 |
| CMT-3 | Z1 | Sonic | 13-Aug-03 | 187 | 155 | 6.0 | CMT | 1.7 | #2/16 | 44 | 41 - 46 |
| | Z2 | | | | | | | | #2/16 | 55 | 53 - 58 |
| | Z3 | | | | | | | | #2/16 | 65 | 61.5 - 67.5 |
| | Z4 | | | | | | | | #2/16 | 88 | 86 - 90 |
| | Z5 | | | | | | | | #2/16 | 108 | 104.5 - 110 |
| | Z6 | | | | | | | | #2/16 | 132 | 128.5 - 134 |
| | Z7 | | | | | | | | #2/16 | 155 | 152.5 - 157 |
| CMT-4 | Z1 | Sonic | 14-Aug-03 | 137 | 136 | 6.0 | CMT | 1.7 | #2/16 | 26 | 24 - 28.5 |
| | Z2 | | | | | | | | #2/16 | 38 | 35.5 - 40 |
| | Z3 | | | | | | | | #2/16 | 52 | 48.6 - 55 |
| | Z4 | | | | | | | | #2/16 | 62 | 60 - 65 |
| | Z5 | | | | | | | | #2/16 | 72 | 69.6 - 73.5 |
| | Z6 | | | | | | | | #2/16 | 107 | 104 - 110 |
| | Z7 | | | | | | | | #2/16 | 136 | 132.5 - 137 |

*Notes:*
T.D. = total depth
ft.-bgs = feet below ground surface
CMT = continuous multi-channel tubing (7 discrete internal channels in a "honeycomb" pattern within the larger tubing)
faint line indicates approximate location of aquiclude in each well

**Table 5**
**Sparge Well Construction Details**
**Corrective Action Plan**
**B&C Gas Station**
**Livermore, California**

| Well No. | Drilling Method | Date Completed | T.D. Boring (ft.-bgs) | T.D. Well (ft.-bgs) | Borehole Diameter (inches) | Casing Material (PVC) | Casing Diameter (inches) | Screen Size and Type | Sand Pack Material | Seal Material | Seal Interval (ft-bgs) | Screened Interval (ft.-bgs) | Sand Pack Interval (ft.-bgs) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SP-1A | HSA | 8/22/2007 | 48.5 | 42.0 | 8.25 | SCH 80 | 1 | 1.5 in.x 18 in., 25 micron porous PVDF | #0/30 | Bentonite Chips | 36.5-39.5 | 40.5-42.0 | 39.5-42.0 |
| SP-1B | HSA | 8/22/2007 | 48.5 | 48.5 | 8.25 | SCH 80 | 1 | 1.5 in.x 18 in., 25 micron porous PVDF | #0/30 | Bentonite Chips | 42.0-45.5 | 47-48.5 | 45.5-48.5 |
| SP-2A | HSA | 8/21/2007 | 48.5 | 42.5 | 8.25 | SCH 80 | 1 | 1.5 in.x 18 in., 25 micron porous PVDF | #0/30 | Bentonite Chips | 37.0-40.0 | 41.0 - 42.5 | 40.0-42.5 |
| SP-2B | HSA | 8/21/2007 | 48.5 | 48.5 | 8.25 | SCH 80 | 1 | 1.5 in.x 18 in., 25 micron porous PVDF | #0/30 | Bentonite Chips | 42.5-46.0 | 47.0-48.5 | 46.0-48.5 |
| SP-3A | HSA | 8/24/2007 | 49.0 | 42.0 | 8.25 | SCH 80 | 1 | 1.5 in.x 18 in., 25 micron porous PVDF | #0/30 | Bentonite Chips | 36.5 - 39.5 | 40.5-42.0 | 39.5-42.0 |
| SP-3B | HSA | 8/24/2007 | 49.0 | 48.0 | 8.25 | SCH 80 | 1 | 1.5 in.x 18 in., 25 micron porous PVDF | #0/30 | Bentonite Chips | 42.0-45.5 | 46.5-48.0 | 45.5-48.0 |
| SP-4A | HSA | 8/22/2007 | 49.0 | 42.0 | 8.25 | SCH 80 | 1 | 1.5 in.x 18 in., 25 micron porous PVDF | #0/30 | Bentonite Chips | 36.5-39.5 | 40.5-42.0 | 39.5-42.0 |
| SP-4B | HSA | 8/22/2007 | 49.0 | 49.0 | 8.25 | SCH 80 | 1 | 1.5 in.x 18 in., 25 micron porous PVDF | #0/30 | Bentonite Chips | 42.0-45.5 | 47.5-49.0 | 45.5-49.0 |
| SP-5A | HSA | 8/21/2007 | 51.0 | 41.0 | 8.25 | SCH 80 | 1 | 1.5 in.x 18 in., 25 micron porous PVDF | #0/30 | Bentonite Chips | 35.5-38.5 | 39.5-41.0 | 38.5-41.0 |
| SP-5B | HSA | 8/21/2007 | 51.0 | 48.0 | 8.25 | SCH 80 | 1 | 1.5 in.x 18 in., 25 micron porous PVDF | #0/30 | Bentonite Chips | 41.0-45.5 | 46.5-48.0 | 45.5-48.0 |
| SP-5C | HSA | 8/21/2007 | 54.0 | 54.0 | 8.25 | SCH 80 | 1 | 1.5 in.x 18 in., 25 micron porous PVDF | #0/30 | Bentonite Chips | 48.5-51.5 | 52.5-54.0 | 51.5-54.0 |
| SP-6A | HSA | 8/23/2007 | 54.0 | 42.0 | 8.25 | SCH 80 | 1 | 1.5 in.x 18 in., 25 micron porous PVDF | #0/30 | Bentonite Chips | 36.5-39.5 | 40.5-42.0 | 39.5-42.0 |
| SP-6B | HSA | 8/23/2007 | 54.0 | 49.0 | 8.25 | SCH 80 | 1 | 1.5 in.x 18 in., 25 micron porous PVDF | #0/30 | Bentonite Chips | 42.0-44.0 | 47.5-49.0 | 44.0-49.0 |
| SP-6C | HSA | 8/24/2007 | 56.0 | 54.0 | 8.25 | SCH 80 | 1 | 1.5 in.x 18 in., 25 micron porous PVDF | #0/30 | Bentonite Chips | 48.5-51.5 | 52.5-54.0 | 51.5-54.0 |

*Notes:*
HAS = Hollow-Stem Auger
T.D. = total depth
ft.-bgs = feet below ground surface
PVDF = polyvinylidene fluoride (Kynar)

# APPENDIX B

# HISTORICAL SOIL ANALYTICAL DATA

# TABLE A
## Gasoline UST and Product Piping Sampling Summary
## B&C Gas Mini Mart
## 2008 1st Street, Livermore, California

Results in mg/Kg - parts per million (ppm)

**Gasoline UST and Product Piping Sampling Results**

| Sample ID | Depth (ft.) | Laboratory | Date | TPH-Gasoline | Benzene | Toluene | Ethylbenzene | Xylenes | MTBE | Total Lead |
|---|---|---|---|---|---|---|---|---|---|---|
| T1-S-14.0 | 14 | Analytical Science | 18-Jul-96 | 8500 | 61 | 250 | 75 | 380 | 80 | 18.4 |
| T1-N-14.0 | 14 | Analytical Science | 18-Jul-96 | 5200 | 41 | 92 | 46 | 260 | 46 | 29.7 |
| T2-S-14.0 | 14 | Analytical Science | 18-Jul-96 | 7800 | 33 | 260 | 100 | 400 | 96 | 9.94 |
| T2-N-14.0 | 14 | Analytical Science | 18-Jul-96 | 270 | 0.27 | 0.43 | 0.39 | 2.2 | 6.6 | 7.3 |
| T3-S-13.5 | 13.5 | Analytical Science | 18-Jul-96 | ND | ND | ND | ND | ND | 0.24 | 6.49 |
| T3-N-13.5 | 13.5 | Analytical Science | 18-Jul-96 | 52 | 1.9 | 1.5 | ND | 2.8 | 36 | 7.24 |
| TOX-1-21.0 | 21 | Analytical Science | 18-Jul-96 | 760 | 8.1 | 38 | 9.9 | 50 | 16 | NA |
| P-1-3.0 | 3 | Analytical Science | 18-Jul-96 | ND | ND | 0.013 | ND | 0.017 | 0.012 | 7.6 |
| P-2-3.5 | 3.5 | Analytical Science | 18-Jul-96 | ND | ND | ND | ND | ND | 0.17 | 9.63 |
| P-3-3.5 | 3.5 | Analytical Science | 18-Jul-96 | ND | ND | ND | ND | ND | 0.015 | 11.4 |
| P-4-3.0 | 3 | Analytical Science | 18-Jul-96 | ND | ND | ND | ND | ND | ND | 176 |

TPH-Gasoline = Total Petroleum Hydrocarbons calculated as Gasoline.

MTBE = Methyl t-Butyl Ether.

ND = Not detected at or above laboratory detection limits.

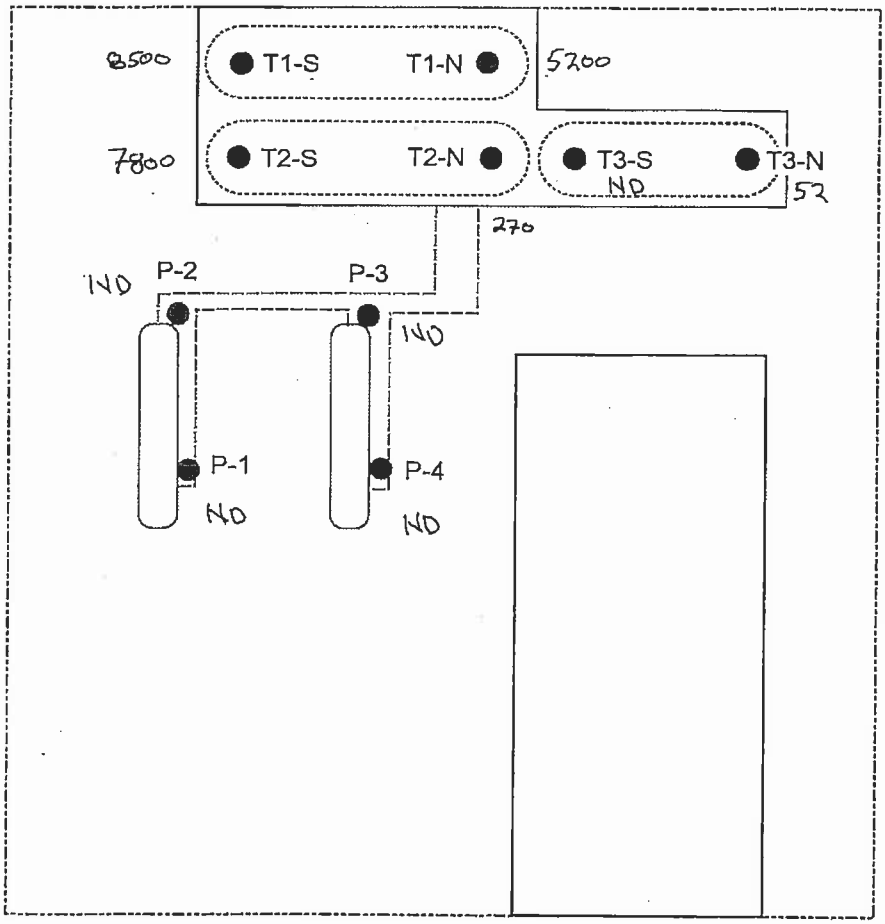
NA = Analysis not requested.

## EXPLANATION

| | |
|---|---|
| UST | Underground Storage Tank |
| ---- | Product Piping |
| ● | Soil sample location and ID |

SOUTH L STREET

FIRST STREET




N

0 10 20

approximate scale in feet

# SOIL SAMPLE LOCATION MAP

FIGURE 2

Touchstone Developments
Environmental Management

B&C Gas Mini Mart
2008 1st Street
Livermore, California

| PROJECT NO. | DATE: | DRAWN BY: | BASE MAP |
|---|---|---|---|
| B&C Mini | 8/96 | WTJ | Touchstone Field Measurements |

# TABLE B
## Unknown UST Sampling Summary
## B&C Gas Mini Mart
## 2008 1st Street, Livermore, California

Results in mg/Kg - parts per million (ppm)

**Unknown UST Sampling Results**

| Sample ID | Depth (ft.) | Laboratory | Date | TPH-Gasoline | Benzene | Toluene | Ethylbenzene | Xylenes | TPH-Diesel | TRPH | 8010 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| UT-W-7.0 | 7 | Analytical Sciences | 26-Jul-96 | ND | ND | ND | ND | ND | ND | ND | ND |

TPH-Gasoline = Total Petroleum Hydrocarbons calculated as Gasoline.

TPH-Diesel = Total Petroleum Hydrocarbons calculated as Diesel.

TRPH = Total Recoverable Petroleum Hydrocarbons (SM 5520 E&F).

8010 = Halogenated Volatile Organics.

ND = Not detected at or above laboratory detection limits.

# TABLE C
## Soil Stockpile Sampling Summary
## B&C Gas Mini Mart
## 2008 1st Street, Livermore, California

Results in mg/Kg - parts per million (ppm)

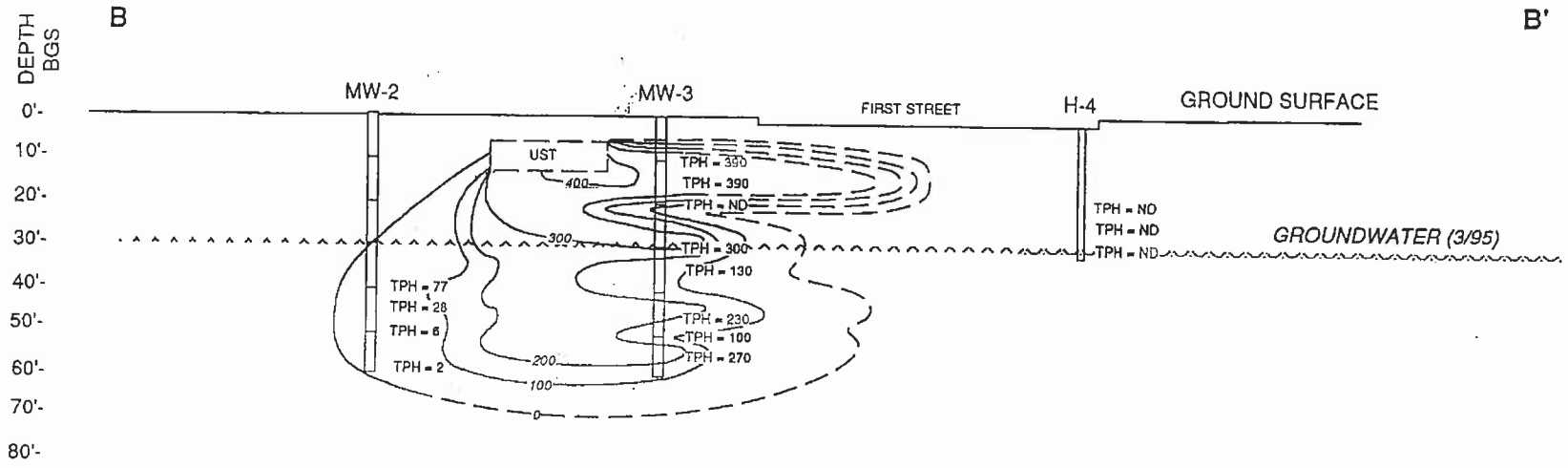
**UST Excavation and Product Piping Soil Stockpile Sampling Results**

| Sample ID | Laboratory | Date | TPH-Gasoline | Benzene | Toluene | Ethylbenzene | Xylenes | Total Lead | Soluble Lead |
|---|---|---|---|---|---|---|---|---|---|
| SP-1(A-D) | Analytical Science | 18-Jul-96 | 320 | ND | ND | 1.5 | 3.3 | 28.6 | NA |
| SP-2(A-D) | Analytical Science | 18-Jul-96 | 300 | ND | ND | ND | 6.9 | 22.4 | NA |
| SP-3(A-D) | Analytical Science | 18-Jul-96 | 130 | ND | ND | ND | 1.2 | 50 | 4.93 |
| SP-4(A-D) | Analytical Science | 18-Jul-96 | 130 | ND | ND | ND | 0.90 | 60.8 | 3.51 |

TPH-Gasoline = Total Petroleum Hydrocarbons calculated as Gasoline.

ND = Not detected at or above laboratory detection limits.

NA = Analysis not requested.




**LEGEND**

DP-1 BORING #

**TPH BTEX**
Laboratory Analysis
in mg/kg

TPH = TOTAL PETROLEUM HYDROCARBONS

ND = NOT DETECTED AT OR ABOVE PRACTICAL QUANTITATION LIMIT.

SOIL CONTAMINATION CONTOUR WITH TPH CONCENTRATION IN MG/KG

MW-2 & MW-3 SAMPLES COLLECTED BY RSI 6/94
H-4 SAMPLE COLLECTED 3/95

0 40'

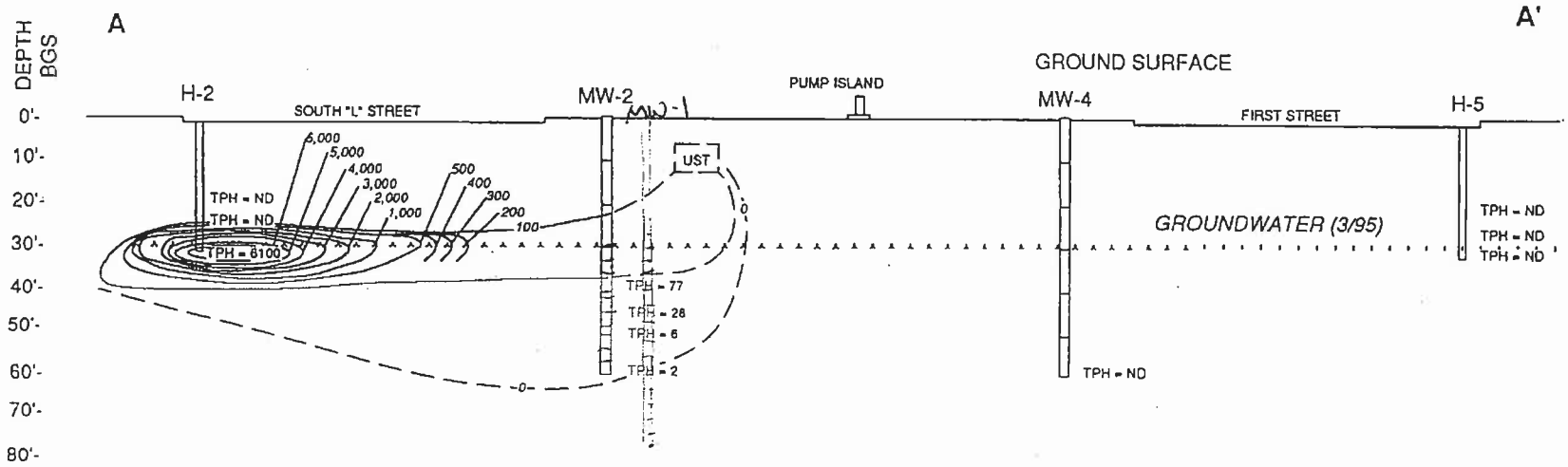
40'

SCALE IN FEET

2008 FIRST STREET
LIVERMORE, CA

FIGURE 10: CROSS SECTION B-B' WITH VERTICAL EXTENT OF TPH IMPACTED SOIL

REMEDIATION SERVICE, INT'L.




LEGEND

DP-1 BORING #

TPH BTEX
Laboratory Analysis
in mg/kg

TPH = TOTAL PETROLEUM HYDROCARBONS

ND = NOT DETECTED AT OR ABOVE PRACTICAL QUANTITATION LIMIT.

SOIL CONTAMINATION CONTOUR WITH TPH CONCENTRATION IN MG/KG

0 40'

40'

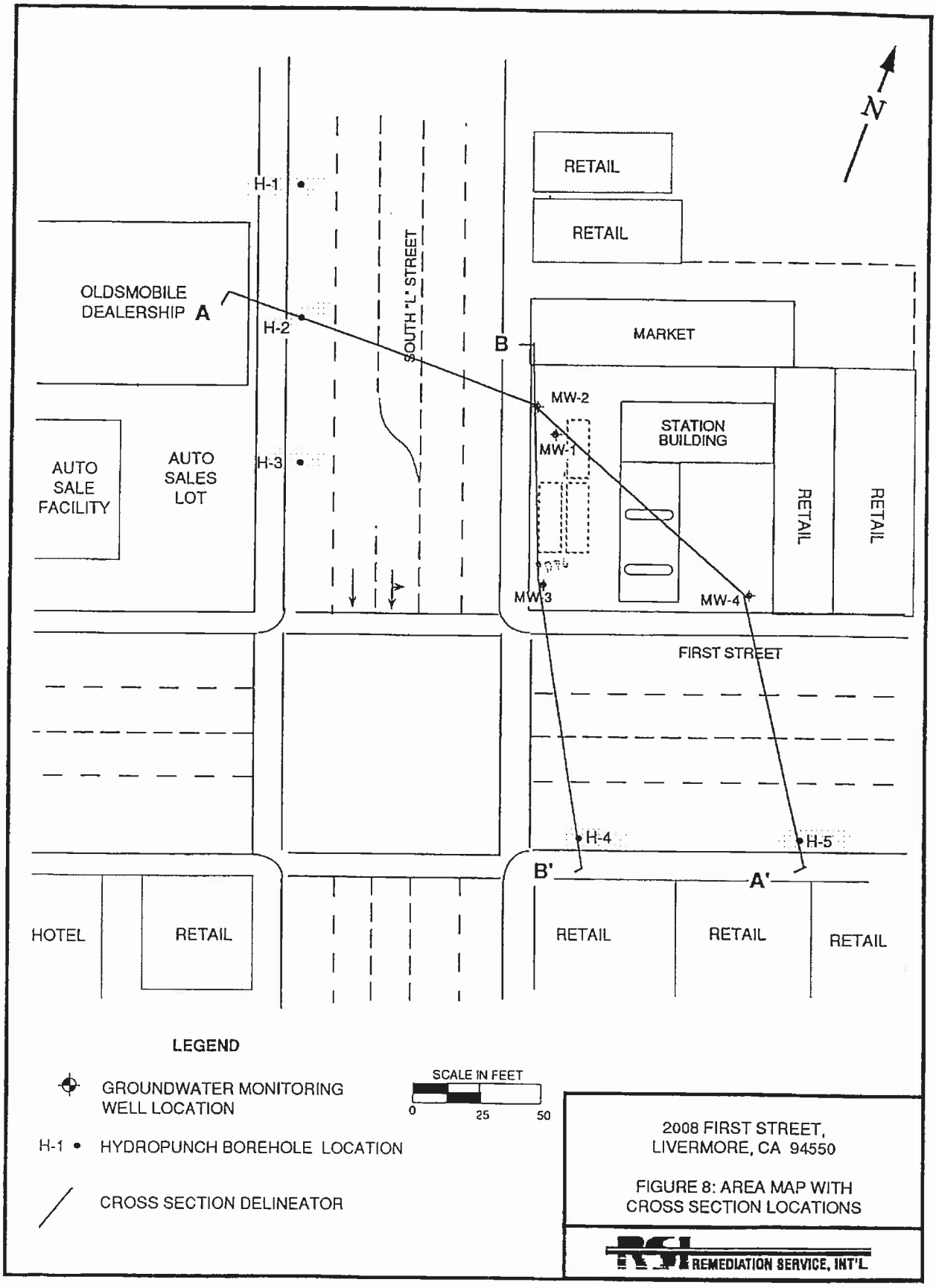
SCALE IN FEET

MW-2 & MW-3 SAMPLES COLLECTED BY RSI 6/94
H-2 & H-5 SAMPLES COLLECTED BY RSI 3/95

2008 FIRST STREET
LIVERMORE, CA

FIGURE 9: CROSS SECTION A-A' WITH VERTICAL EXTENT OF TPH IMPACTED SOIL

REMEDIATION SERVICE, INT'L.


N
RETAIL
RETAIL
H-1
SOUTH "L" STREET
OLDSMOBILE DEALERSHIP
A
H-2
B
MARKET
MW-2
STATION BUILDING
MW-1
AUTO SALE FACILITY
AUTO SALES LOT
H-3
RETAIL
RETAIL
MW-3
MW-4
FIRST STREET
H-4
H-5
B'
A'
HOTEL
RETAIL
RETAIL
RETAIL
RETAIL
LEGEND
GROUNDWATER MONITORING WELL LOCATION
H-1 • HYDROPUNCH BOREHOLE LOCATION
CROSS SECTION DELINEATOR
SCALE IN FEET
0
25
50
2008 FIRST STREET,
LIVERMORE, CA 94550
FIGURE 8: AREA MAP WITH
CROSS SECTION LOCATIONS
REMEDIATION SERVICE, INT'L.

## TABLE 1

Soil samples results:

Note: < means less than the detection limit.

| Sample # | Depth (ft) | TPH as Gasoline (PPM) | Benzene (PPM) | Toluene (PPM) | Total Xylenes (PPM) | Ethyl/ benzene (PPM) |
|---|---|---|---|---|---|---|
| Water Well: | | | | | | |
| GX136-1 | 16.0 | <0.5 | <0.03 | <0.03 | <0.07 | <0.04 |
| GX136-2A | 23.5 | <0.5 | <0.03 | <0.03 | <0.07 | <0.04 |
| GX136-3 | 28.5 | <0.5 | <0.03 | <0.03 | <0.07 | <0.04 |
| GX136-4 | 33.5 | 31 | 0.14 | 0.87 | 4.70 | 0.74 |
| GX136-5 | 38.5 | 72 | <0.70 | <0.70 | 4.00 | <1.00 |
| GX136-6 | 43.5 | 10 | 0.14 | 0.13 | 0.72 | 0.18 |
| GX136-7 | 48.5 | 0.51 | <0.03 | <0.03 | <0.07 | <0.04 |
| GX136-8 | 53.5 | 1.70 | 0.12 | 0.11 | 0.29 | 0.049 |
| GX136-9 | 58.5 | 54 | <0.70 | <0.70 | 4.40 | <1.00 |
| Soil Borings: | | | | | | |
| DPL 5-1 | 16.0 | <0.50 | <0.03 | <0.03 | <0.07 | <0.04 |
| DPL 5-2 | 21.0 | <0.50 | <0.03 | <0.03 | <0.07 | <0.04 |
| DPL 5-3 | 26.0 | <0.50 | <0.03 | <0.03 | <0.07 | <0.04 |
| DPL 5-4 | 31.0 | 33 | 0.71 | 1.70 | 6.20 | 0.77 |
| DPL 5-5 | 36.0 | 8.5 | 0.054 | 1.10 | 2.00 | 0.23 |
| DPL 5-6 | 41.0 | 0.80 | 0.097 | 0.10 | 0.13 | <0.04 |
| DPL 5-7 | 46.0 | <0.50 | <0.05 | <0.05 | <0.07 | <0.04 |
| DPL 6-1A | 17.5 | <0.50 | <0.03 | <0.03 | <0.07 | <0.04 |
| DPL 6-2 | 21.0 | <0.50 | <0.03 | <0.03 | <0.07 | <0.04 |
| DPL 6-3 | 26.0 | 2.5 | <0.03 | <0.03 | <0.07 | <0.04 |
| DPL 6-4 | 31.0 | 12 | 0.14 | 0.083 | 1.40 | 0.31 |
| DPL 6-5 | 36.0 | 1600 | <1.00 | 3.70 | 32 | 5.30 |
| DPL 6-6 | 41.0 | 11 | 0.035 | <0.03 | <0.07 | <0.04 |
| DPL 6-7 | 46.0 | 100 | <0.70 | <0.70 | 4.80 | <1.00 |

MW-1

Groundwater sample results:

| Sample # | Depth (ft) | TPH as Gasoline (PPB) | Benzene (PPB) | Toluene (PPB) | Total Xylenes (PPB) | Ethyl/ benzene (PPB) |
|---|---|---|---|---|---|---|
| GX136-1W | 55.8 | <7.0 | <0.3 | <0.3 | <0.5 | <0.3 |

## TABLE 3

## HYDROPUNCH SOIL & GROUNDWATER ANALYTICAL RESULTS

## 2008 FIRST STREET LIVERMORE, CA

Soil sample analytical results are in mg/Kg
Groundwater sample analytical results are in ug/L

**SOIL** ppm

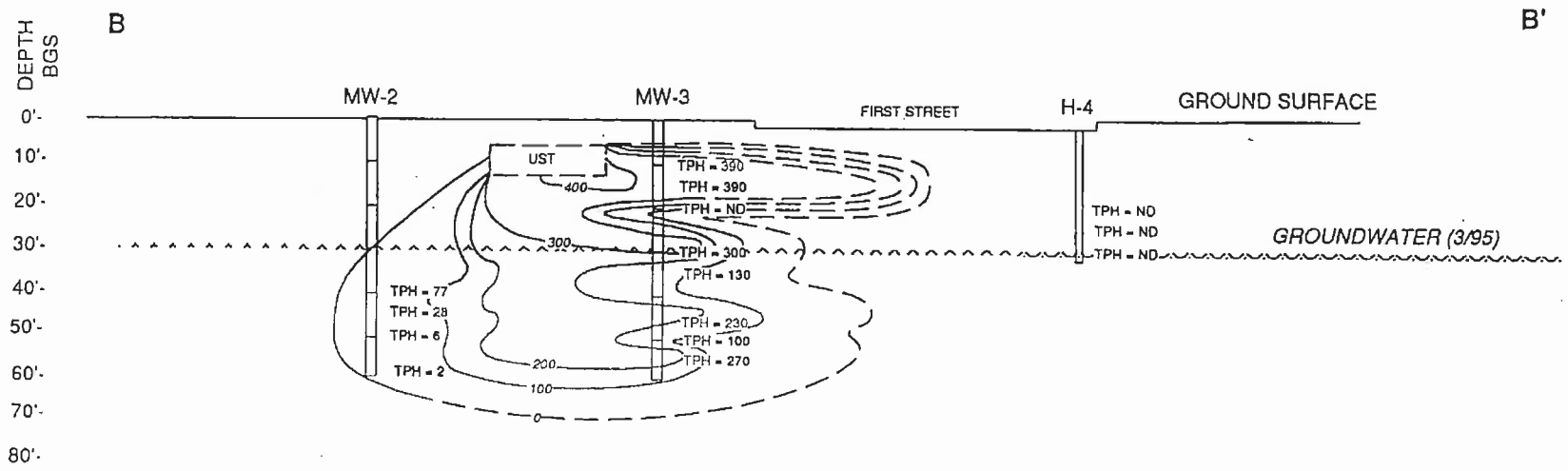
| SAMPLE DATE | SAMPLE DESCRIPTION | TPH | BENZENE | TOLUENE | ETHYL-BENZENE | TOTAL XYLENES |
|---|---|---|---|---|---|---|
| 3/8/95 | H-1 @ 20' | ND | 0.019 | 0.043 | 0.014 | 0.061 |
| 3/8/95 | H-1 @ 25' | ND | ND | ND | ND | ND |
| 3/8/95 | H-1 @ 30' | 380 | 4.8 | 16 | 7.4 | 34 |
| 3/8/95 | H-2 @ 20' | ND | ND | ND | ND | ND |
| 3/8/95 | H-2 @ 25' | ND | 0.024 | 0.008 | 0.013 | 0.04 |
| 3/8/95 | H-2 @ 30' | 6,100 | 35 | 180 | 120 | 540 |
| 3/8/95 | H-3 @ 20' | ND | ND | ND | ND | ND |
| 3/8/95 | H-3 @ 25' | ND | ND | ND | ND | ND |
| 3/8/95 | H-3 @ 30' | 980 | 9.1 | 45 | 20 | 98 |
| 3/8/95 | H-4 @ 20' | ND | ND | ND | ND | ND |
| 3/8/95 | H-4 @ 25' | ND | ND | ND | ND | ND |
| 3/8/95 | H-4 @ 30' | ND | ND | ND | ND | ND |
| 3/8/95 | H-4 @ 20' | ND | ND | ND | ND | ND |
| 3/8/95 | H-4 @ 25' | ND | ND | ND | ND | ND |
| 3/8/95 | H-4 @ 30' | ND | ND | ND | ND | ND |

**GROUNDWATER** ppb

| SAMPLE DATE | SAMPLE DESCRIPTION | TPH | BENZENE | TOLUENE | ETHYL-BENZENE | TOTAL XYLENES |
|---|---|---|---|---|---|---|
| 3/8/95 | H-4 | 1,500 | 57 | 33 | 9.4 | 42 |
| 3/8/95 | H-5 | 620 | 22 | 24 | 8 | 42 |

TPH = Total petroleum hydrocarbons as gasoline
NA = Not analyzed for this constituent

REMEDIATION SERVICE, INT'L.




LEGEND

DP-1 BORING #

TPH BTEX
Laboratory Analysis
in mg/kg

TPH = TOTAL PETROLEUM HYDROCARBONS

ND = NOT DETECTED AT OR ABOVE PRACTICAL QUANTITATION LIMIT.

SOIL CONTAMINATION CONTOUR WITH TPH CONCENTRATION IN MG/KG

0 40'

40'

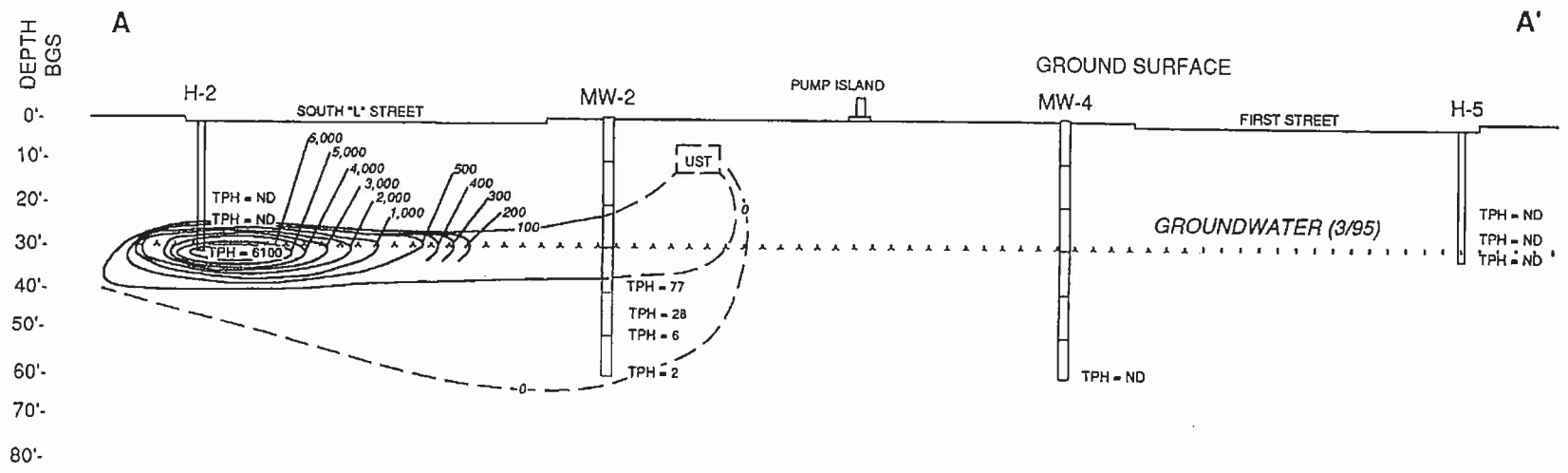
SCALE IN FEET

MW-2 & MW-3 SAMPLES COLLECTED BY RSI 6/94
H-4 SAMPLE COLLECTED 3/95

2008 FIRST STREET
LIVERMORE, CA

FIGURE 10: CROSS SECTION B-B' WITH VERTICAL EXTENT OF TPH IMPACTED SOIL

REMEDIATION SERVICE, INT'L.




**LEGEND**

DP-1 BORING #

**TPH BTEX**
Laboratory Analysis
in mg/kg

TPH = TOTAL PETROLEUM HYDROCARBONS

ND = NOT DETECTED AT OR ABOVE PRACTICAL QUANTITATION LIMIT.

SOIL CONTAMINATION CONTOUR WITH TPH CONCENTRATION IN MG/KG

MW-2 & MW-3 SAMPLES COLLECTED BY RSI 6/94
H-2 & H-5 SAMPLES COLLECTED BY RSI 3/95

0 40'

40'

SCALE IN FEET

2008 FIRST STREET
LIVERMORE, CA

FIGURE 9: CROSS SECTION A-A' WITH VERTICAL EXTENT OF TPH IMPACTED SOIL

REMEDIATION SERVICE, INT'L.

TABLE 1
SUMMARY OF ANALYTICAL RESULTS FROM SOIL SAMPLES
COLLECTED DURING SOIL BORING

2008 FIRST STREET
LIVERMORE, CA

Results are in mg/Kg

| SAMPLE DATE | SAMPLE DESCRIPTION | TPH | BENZENE | TOLUENE | ETHYL-BENZENE | TOTAL XYLENES | TOTAL LEAD |
|---|---|---|---|---|---|---|---|
| 6/16/94 | MW-4 @ 40' | ND | 0.009 | 17 | 0.006 | 0.02 | 12 |
| 6/17/94 | MW-3 @ 10' | 390 | 0.4 | 2.2 | 2.2 | 11 | 150 |
| 6/17/94 | MW-3 @ 15' | 390 | 0.3 | 1.9 | 2.2 | 11 | 190 |
| 6/17/94 | MW-3 @ 20' | ND | 0.17 | 0.012 | 0.006 | 0.081 | 12 |
| 6/17/94 | MW-3 @ 30' | 300 | ND | 1.6 | 1.7 | 8.3 | 14 |
| 6/17/94 | MW-3 @ 35' | 130 | 1.1 | 3.6 | 1.1 | 4.9 | 12 |
| 6/17/94 | MW-3 @ 45' | 230 | 0.62 | 3.8 | 2.5 | 10 | 28 |
| 6/17/94 | MW-3 @ 50' | 100 | 0.35 | 0.82 | 0.56 | 2 | 7 |
| 6/17/94 | MW-3 @ 55' | 270 | 0.47 | 3 | 1.9 | 6.7 | 24 |
| 6/17/94 | MW-2 @ 40' | 77 | 0.36 | 2.5 | 1.1 | 7 | 10 |
| 6/18/94 | MW-2 @ 45' | 28 | 0.3 | 0.16 | 0.4 | 0.97 | 8 |
| 6/18/94 | MW-2 @ 50' | 6 | 0.04 | 0.08 | 0.07 | 0.3 | 9 |
| 6/18/94 | MW-2 @ 60' | 2 | 0.045 | 0.18 | 0.041 | 0.23 | 14 |

TPH = Total petroleum hydrocarbons as gasoline
TPH & BTEX analyzed by EPA methods 8015M & 8020, respectively.
Total Lead analyzed by EPA method 7420.

REMEDIATION SERVICE, INT'L.

## TABLE 1

## HISTORIC SUMMARY OF SOIL SAMPLE ANALYTICAL RESULTS

### 2008 FIRST STREET
### LIVERMORE, CA

TPH & BTEX Concentrations are in mg/Kg

| SAMPLE DATE | SAMPLE ID | SAMPLE LOCATION | TPH | BENZENE | TOLUENE | ETHYL-BENZENE | TOTAL XYLENES | TOTAL LEAD |
|---|---|---|---|---|---|---|---|---|
| 2/24/88 | DPL288-1 | DPL-1 @ 14.5' | 400 | 7.5 | 9.5 | NA | 27 | NA |
| 2/24/88 | DPL288-3 | DPL-3 @ 15' | ND | ND | ND | NA | ND | NA |
| 2/24/88 | DPL288-4 | DPL -4 @ 16.5' | ND | ND | ND | NA | ND | NA |
| 9/22/88 | GX136-1 | MW-1 @ 16' | ND | ND | ND | ND | ND | NA |
| 9/22/88 | GX136-2A | MW-1 @ 23.5' | ND | ND | ND | ND | ND | NA |
| 9/22/88 | GX136-3 | MW-1 @ 28.5' | ND | ND | ND | ND | ND | NA |
| 9/22/88 | GX136-4 | MW-1 @ 33.5' | 31 | 0.14 | 0.87 | 0.74 | 4.7 | NA |
| 9/22/88 | GX136-5 | MW-1 @ 38.5' | 72 | ND | ND | ND | 4 | NA |
| 9/22/88 | GX136-6 | MW-1 @ 43.5' | 10 | 0.14 | 0.13 | 0.18 | 0.72 | NA |
| 9/22/88 | GX136-7 | MW-1 @ 48.5' | 0.51 | ND | ND | ND | ND | NA |
| 9/22/88 | GX136-8 | MW-1 @ 53.5' | 1.7 | 0.12 | 0.11 | 0.049 | 0.29 | NA |
| 9/22/88 | GX136-9 | MW-1 @ 58.5 | 54 | ND | ND | ND | 4.4 | NA |
| 9/23/88 | DPL5-1 | DPL-5 @ 16' | ND | ND | ND | ND | ND | NA |
| 9/23/88 | DPL5-2 | DPL-5 @ 21' | ND | ND | ND | ND | ND | NA |
| 9/23/88 | DPL5-3 | DPL-5 @ 26' | ND | ND | ND | ND | ND | NA |
| 9/23/88 | DPL5-4 | DPL-5 @ 31' | 33 | 0.71 | 1.7 | 0.77 | 6.2 | NA |
| 9/23/88 | DPL5-5 | DPL-5 @ 36' | 8.5 | 0.054 | 1.1 | 0.23 | 2 | NA |
| 9/23/88 | DPL5-6 | DPL-5 @ 41' | 0.8 | 0.097 | 0.1 | ND | 0.13 | NA |
| 9/23/88 | DPL5-7 | DPL-5 @ 46' | ND | ND | ND | ND | ND | NA |
| 9/23/88 | DPL6-1A | DPL-6 @ 17.5' | ND | ND | ND | ND | ND | NA |
| 9/23/88 | DPL6-2 | DPL-6 @ 21' | ND | ND | ND | ND | ND | NA |
| 9/23/88 | DPL6-3 | DPL-6 @ 26' | 2.5 | ND | ND | ND | ND | NA |
| 9/23/88 | DPL6-4 | DPL-6 @ 31' | 12 | 0.14 | 0.083 | 0.31 | 1.4 | NA |
| 9/23/88 | DPL6-5 | DPL-6 @ 36' | 1,600 | <1 ND | 3.7 | 5.3 | 32 | NA |
| 9/23/88 | DPL6-6 | DPL-6 @ 41' | 11 | 0.035 | ND | ND | ND | NA |
| 9/23/88 | DPL6-7 | DPL-6 @ 46' | 100 | ND | ND | ND | 4.8 | NA |
| 6/16/94 | MW-4 @ 40' | MW-4 @ 40' | ND | 0.009 | 17 | 0.006 | 0.02 | 12 |
| 6/17/94 | MW-3 @ 10' | MW-3 @ 10' | 390 | 0.4 | 2.2 | 2.2 | 11 | 150 |
| 6/17/94 | MW-3 @ 15' | MW-3 @ 15' | 390 | 0.3 | 1.9 | 2.2 | 11 | 190 |
| 6/17/94 | MW-3 @ 20' | MW-3 @ 20' | ND | 0.17 | 0.012 | 0.006 | 0.081 | 12 |
| 6/17/94 | MW-3 @ 30' | MW-3 @ 30' | 300 | ND | 1.6 | 1.7 | 8.3 | 14 |
| 6/17/94 | MW-3 @ 35' | MW-3 @ 35' | 130 | 1.1 | 3.6 | 1.1 | 4.9 | 12 |
| 6/17/94 | MW-3 @ 45' | MW-3 @ 45' | 230 | 0.62 | 3.8 | 2.5 | 10 | 28 |
| 6/17/94 | MW-3 @ 50' | MW-3 @ 50' | 100 | 0.35 | 0.82 | 0.56 | 2 | 7 |
| 6/17/94 | MW-3 @ 55' | MW-3 @ 55' | 270 | 0.47 | 3 | 1.9 | 6.7 | 24 |
| 6/17/94 | MW-2 @ 40' | MW-2 @ 40' | 77 | 0.36 | 2.5 | 1.1 | 7 | 10 |
| 6/18/94 | MW-2 @ 45' | MW-2 @ 45' | 28 | 0.3 | 0.16 | 0.4 | 0.97 | 8 |
| 6/18/94 | MW-2 @ 50' | MW-2 @ 50' | 6 | 0.04 | 0.08 | 0.07 | 0.3 | 9 |
| 6/18/94 | MW-2 @ 60' | MW-2 @ 60' | 2 | 0.045 | 0.18 | 0.041 | 0.23 | 14 |

2/88 Sampling results from Geonomics Inc. report
9/88 Sampling results from On-Site Technologies Inc. report
6/94 Sampling results from RSI report
TPH = Total petroleum hydrocarbons as gasoline
NA = Not analyzed for this constituent

REMEDIATION SERVICE, INT'L.

B N C Gas Station
2008 1st Street, Livermore, California

**Table 1a**
**Soil Analytical Results - Hydrocarbons**

| Sample ID | Depth | Date | TPH-Gas | Benzene | Toluene | Ethylbenzene | Xylenes | MTBE | DIPE | ETBE | TAME | Tert-Butanol | Methanol | Ethanol |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (feet) | Sampled | (mg/Kg) | (mg/Kg) | (mg/Kg) | (mg/Kg) | (mg/Kg) | (mg/Kg) | (mg/Kg) | (mg/Kg) | (mg/Kg) | (mg/Kg) | (mg/Kg) | (mg/Kg) |
| CB-2 40-40.5 | 40 - 40.5 | 3/28/06 | <1.0 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | **0.02** | <0.0050 | <0.0050 | <0.0050 | **0.0066** | <0.20 | <0.010 |
| CB-3 46.5-47 | 46.5 - 47 | 3/29/06 | <1.0 | <0.0050 | <0.0050 | **0.014** | **0.0088** | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.2 | <0.010 |
| CB-8 46.5-47 | 46.5 - 47 | 3/29/06 | **13** | **0.0081** | <0.0050 | **0.066** | **0.11** | **0.018** | <0.0050 | <0.0050 | <0.0050 | <0.015 | <0.25 | <0.025 |
| CB-10 45-45.5 | 45 - 45.5 | 3/29/06 | <1.0 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | **0.0057** | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.2 | <0.010 |
| CB-11 41.5-42 | 41.5 - 42 | 3/28/06 | <1.0 | <0.0050 | <0.0050 | **0.0051** | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.2 | <0.010 |
| CB-12 47.5-48 | 47.5 - 48 | 3/28/06 | <1.0 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.20 | <0.010 |
| CB-13 42-42.5 | 42 - 42.5 | 3/29/06 | **460** | **0.081** | **0.058** | **2.1** | **0.36** | <0.025 | <0.025 | <0.025 | <0.025 | <0.15 | <5.0 | <0.50 |

Notes: mg/Kg = miligram per kilogram
TPH = Total petroleum hydrocarbons
MTBE = Methyl tert-butyl ether
DIPE = Di-isopropyl ether
ETBE = Ethyl tert-butyl ether
TAME = tert-Amyl methyl ether

**Table 1b**
**Soil Analytical Results - Metals**

| Sample ID | Depth | Date | Arsenic | Barium | Cadmium | Chromium | Copper | Lead | Selenium | Iron | Chrome VI |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | (feet) | Sampled | (mg/Kg) | (mg/Kg) | (mg/Kg) | (mg/Kg) | (mg/Kg) | (mg/Kg) | (mg/Kg) | (mg/Kg) | (µg/kg) |
| CB-2 40-4 | 40 - 40.5 | 3/28/06 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| CB-3 46.5 | 46.5 - 47 | 3/29/06 | **1.43** | **94.9** | <0.50 | **63.4** | **22.8** | **3.83** | <0.75 | **20,600** | <10 |
| CB-8 46.5 | 46.5 - 47 | 3/29/06 | **0.97** | **62.4** | <0.50 | **37.1** | **18.8** | **4.84** | <0.75 | **16,100** | <10 |
| CB-10 45- | 45 - 45.5 | 3/29/06 | **1.31** | **133** | <0.50 | **61.9** | **26.3** | **7.59** | <0.75 | **20,300** | <10 |
| CB-11 41. | 41.5 - 42 | 3/28/06 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| CB-12 47. | 47.5 - 48 | 3/28/06 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| CB-13 42- | 42 - 42.5 | 3/29/06 | NA | NA | NA | NA | NA | NA | NA | NA | NA |

Notes: mg/Kg = miligram per kilogram
µg/kg = microgram per kilogram

Table__
Third Quarter 2003 Soil Analytical Results
B&C Gas Mini Mart
Livermore, California

| Sample ID | Headspace Analyses | TPH-G (µg/kg) | Benzene (µg/kg) | Toluene (µg/kg) | Ethylbenzene (µg/kg) | Xylenes (total) (µg/kg) | MtBE (µg/kg) | MtBE[1] (µg/kg) |
|---|---|---|---|---|---|---|---|---|
| | | EPA Method 8015B/8021B | | | | | | EPA Method 8260B |
| 4-23 | 8 | <1000 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | |
| 4-28 | 200 | **190,000** | <250 | **660** | **3,100** | **12,000** | <250 | |
| 4-34 | 500 | **240,000** | **1,500** | **13,000** | **4,800** | **26,000** | **1,200** | <1000 |
| 4-37 | 45000 | **290,000** | **1,100** | **11,000** | **6,100** | **31,000** | <1000 | |
| 4-40 | 1000 | **96,000** | **80** | **1,400** | **2,200** | **9,300** | **350** | <1000 |
| 4-48.5 | 30 | **16,000** | <50 | <50 | <50 | <50 | <50 | |
| 4-55 | 2 | <1000 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | |
| 4-62 | 15 | <1000 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | |
| 4-66 | 15 | <1000 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | |
| 4-75 | 2 | <1000 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | |
| 4-80 | 2 | <1000 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | |
| 4-90 | 2 | <1000 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | |

*Notes:*

*All samples obtained on 8/14/03*

µg/kg = micrograms per kilogram

TPH-G = total petroleum hydrocarbons as gasoline

MtBE = Methyl *tertiary*-Butyl Ether

(1) Confirmation sample by mass spectroscopy

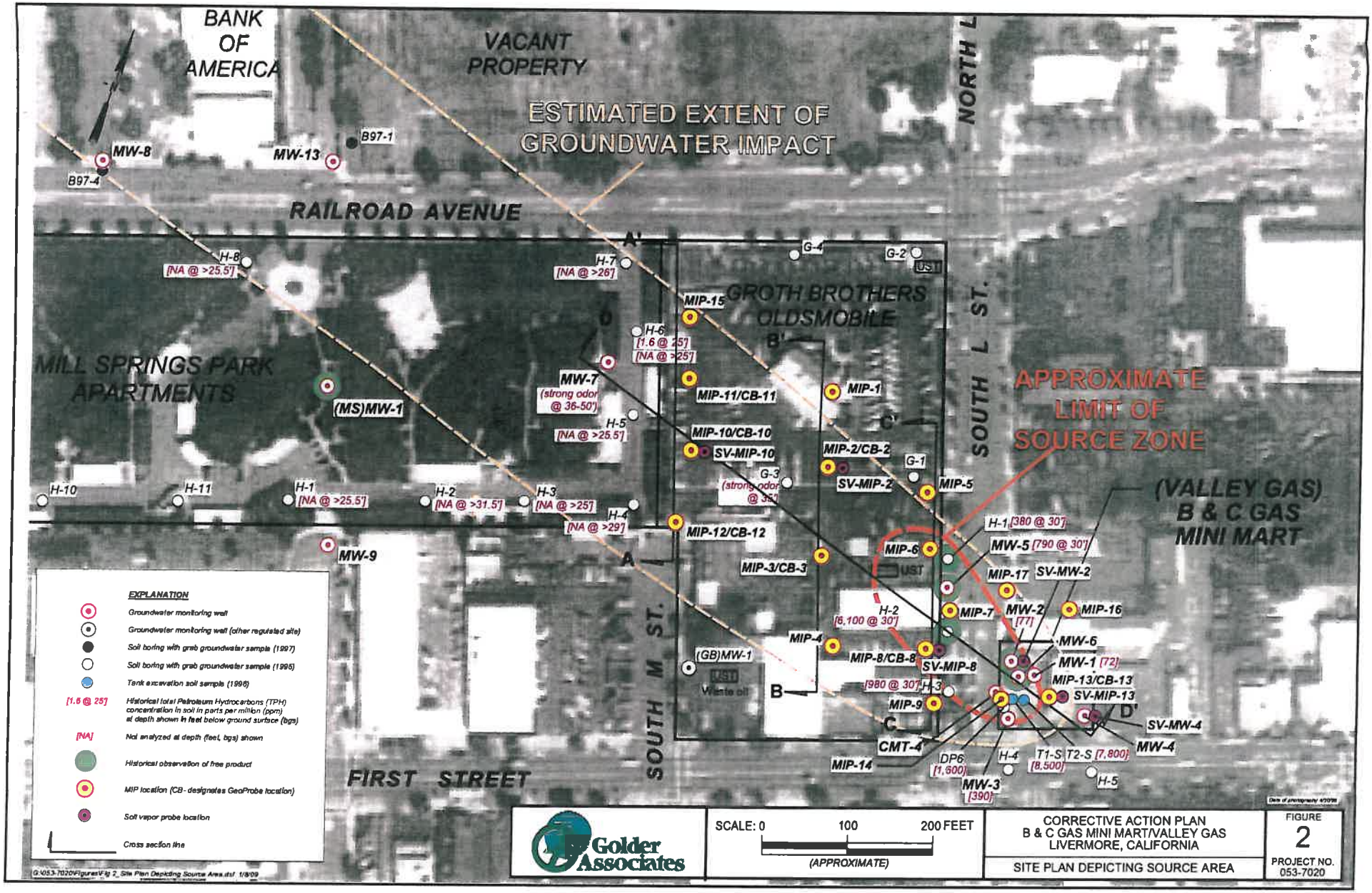
NS = not sampled

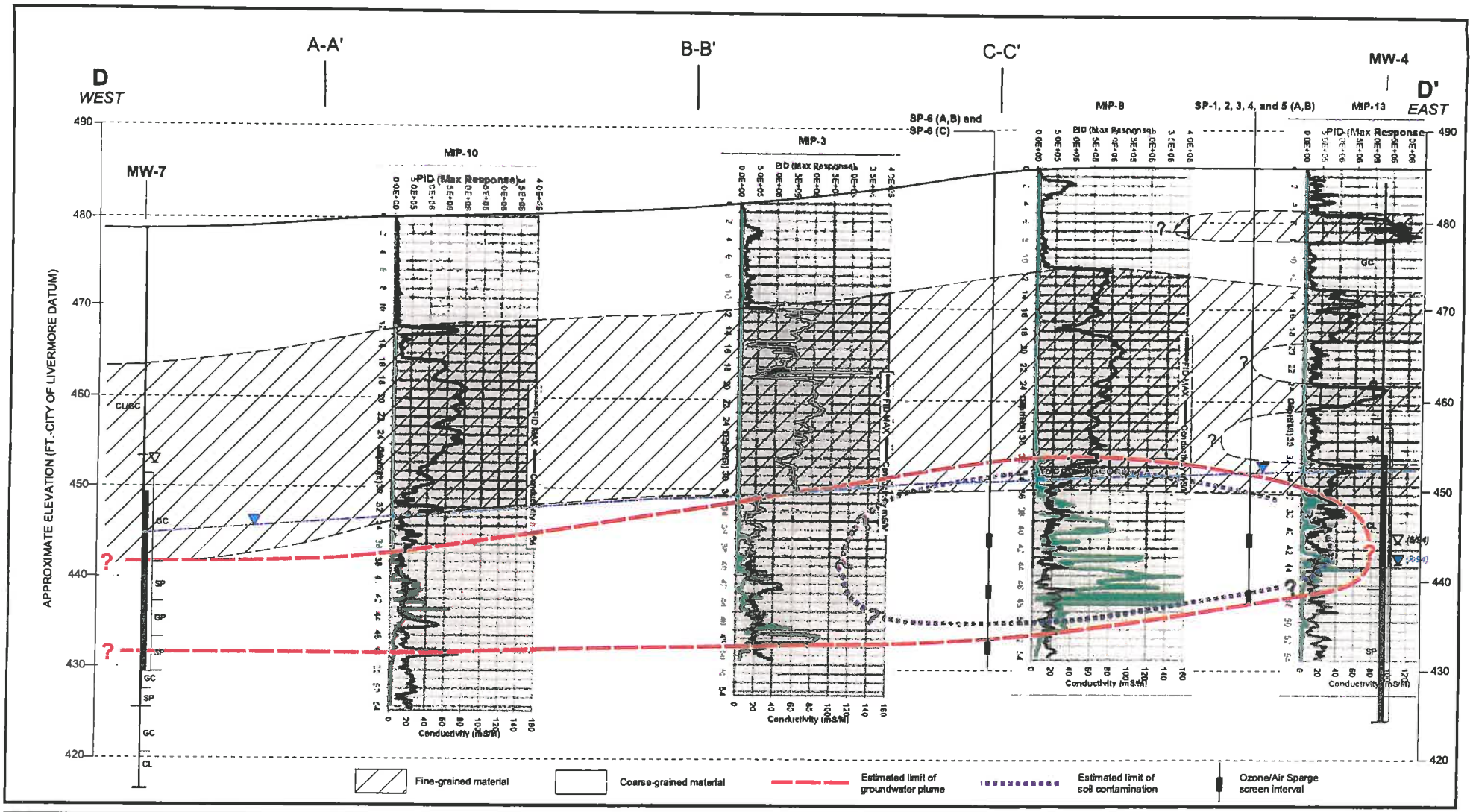
< = less than the laboratory reporting limit

**Table 1**
**2006 & 2007 Soil Analytical Results**
**B & C Gas Station**
**Livermore, California**

| Sample ID | Depth (feet) | Date Sampled | TPH-Gas (mg/kg) | Benzene (mg/kg) | Toluene (mg/kg) | Ethyl benzene (mg/kg) | Xylenes (mg/kg) | MTBE (mg/kg) | DIPE (mg/kg) | ETBE (mg/kg) | TAME (mg/kg) | Tert-Butanol (mg/kg) | Methanol (mg/kg) | Ethanol (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ceiling Value | | | 5000 | 870 | 650 | 400 | 420 | 500 | | | | | | |
| Residential Direct Exposure | | | 4200 | 11 | 650 | 400 | 420 | 2600 | | | | | | |
| Vapor Intrusion | | | soil gas | soil gas | soil gas | soil gas | soil gas | soil gas | | | | | | |
| Drinking Water Source | | | 83 | 0.044 | 2.9 | 3.3 | 2.3 | 0.023 | | | | | | |
| Tier 1 Soil ESL | | | 83 | 0.044 | 2.9 | 3.3 | 2.3 | 0.023 | NE | NE | NE | NE | NE | NE |
| CB-2 40-40.5 | 40 - 40.5 | 3/28/2006 | <1.0 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | 0.02 | <0.0050 | <0.0050 | <0.0050 | 0.0066 | <0.20 | <0.010 |
| CB-3 46.5-47 | 46.5 - 47 | 3/29/2006 | <1.0 | <0.0050 | <0.0050 | 0.014 | 0.0088 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.2 | <0.010 |
| CB-8 46.5-47 | 46.5 - 47 | 3/29/2006 | 13 | 0.0081 | <0.0050 | 0.066 | 0.11 | 0.018 | <0.0050 | <0.0050 | <0.0050 | <0.015 | <0.25 | <0.025 |
| CB-10 45-45.5 | 45 - 45.5 | 3/29/2006 | <1.0 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | 0.0057 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.2 | <0.010 |
| CB-11 41.5-42 | 41.5 - 42 | 3/28/2006 | <1.0 | <0.0050 | <0.0050 | 0.0051 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.2 | <0.010 |
| CB-12 47.5-48 | 47.5 - 48 | 3/28/2006 | <1.0 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | <0.20 | <0.010 |
| CB-13 42-42.5 | 42 - 42.5 | 3/29/2006 | **460** | **0.081** | 0.058 | 2.1 | 0.36 | <0.025 | <0.025 | <0.025 | <0.025 | <0.15 | <5.0 | <0.50 |
| SP-1 | 40 | 8/22/2007 | **260** | <0.050 | 0.056 | **4.7** | **18** | NA | NA | NA | NA | NA | NA | NA |
| SP-2 | 43 | 8/20/2007 | 71 | <0.025 | <0.025 | 0.72 | 2.0 | NA | NA | NA | NA | NA | NA | NA |
| SP-3 | 35 | 8/24/2007 | 4.4 | <0.0050 | <0.0050 | 0.019 | <0.0050 | NA | NA | NA | NA | NA | NA | NA |
| SP-5 | 45 | 8/20/2007 | **290** | **0.070** | 0.059 | **4.5** | **3.5** | NA | NA | NA | NA | NA | NA | NA |
| SP-6 | 35 | 8/20/2007 | 2.8 | 0.058 | <0.0050 | 0.070 | 0.015 | NA | NA | NA | NA | NA | NA | NA |
| SVE-1 | 10 | 8/24/2007 | <1.0 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | NA | NA | NA | NA | NA | NA | NA |
| SVE-1 | 15 | 8/24/2007 | <1.0 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | NA | NA | NA | NA | NA | NA | NA |
| SVE-1 | 20 | 8/24/2007 | <1.0 | <0.0050 | <0.0050 | <0.0050 | <0.0050 | NA | NA | NA | NA | NA | NA | NA |
| SVE-1 | 25 | 8/24/2007 | 6.6 | <0.0050 | <0.0050 | 0.16 | 1.6 | NA | NA | NA | NA | NA | NA | NA |

Notes:
mg/kg = milligram per kilogram
TPH = Total petroleum hydrocarbons
MTBE = Methyl tert-butyl ether
DIPE = Di-isopropyl ether
ETBE = Ethyl tert-butyl ether
TAME = tert-Amyl methyl ether
**Bold** = exceedance of Tier 1 ESL
NA = not analyzed
NE = not established


BANK OF AMERICA
VACANT PROPERTY
ESTIMATED EXTENT OF GROUNDWATER IMPACT
NORTH L
RAILROAD AVENUE
MW-8
B97-4
MW-13
B97-1
H-8 [NA @ >25.5']
H-7 [NA @ >26']
G-4
G-2
UST
GROTH BROTHERS OLDSMOBILE
MIP-15
H-6 [1.6 @ 25'] [NA @ >25']
MILL SPRINGS PARK APARTMENTS
MW-7 (strong odor @ 36-50')
(MS)MW-1
MIP-11/CB-11
MIP-1
H-5 [NA @ >25.5']
MIP-10/CB-10
SV-MIP-10
MIP-2/CB-2
SV-MIP-2
G-3 (strong odor @ 35')
G-1
MIP-5
SOUTH L ST.
APPROXIMATE LIMIT OF SOURCE ZONE
H-10
H-11
H-1 [NA @ >25.5']
H-2 [NA @ >31.5']
H-3 [NA @ >25']
H-4 [NA @ >29']
MIP-12/CB-12
(VALLEY GAS) B & C GAS MINI MART
H-1 [380 @ 30']
MW-5 [790 @ 30']
MW-9
MIP-6
UST
MIP-3/CB-3
MIP-17
SV-MW-2
MIP-7
MW-2 [77]
MIP-16
H-2 [6,100 @ 30']
MW-6
MIP-4
(GB)MW-1
UST
Waste oil
MIP-8/CB-8
SV-MIP-8
MW-1 [72]
[980 @ 30']
H-3
MIP-13/CB-13
SV-MIP-13
MIP-9
SV-MW-4
CMT-4
MW-4
MIP-14
DP6 [1,600]
H-4
T1-S [8,500]
T2-S [7,800]
H-5
MW-3 [390]
SOUTH M ST.
FIRST STREET
A
A'
B
B'
C
C'
D
D'
EXPLANATION
Groundwater monitoring well
Groundwater monitoring well (other regulated site)
Soil boring with grab groundwater sample (1997)
Soil boring with grab groundwater sample (1995)
Tank excavation soil sample (1996)
[1.6 @ 25'] Historical total Petroleum Hydrocarbons (TPH) concentration in soil in parts per million (ppm) at depth shown in feet below ground surface (bgs)
[NA] Not analyzed at depth (feet, bgs) shown
Historical observation of free product
MIP location (CB - designates GeoProbe location)
Soil vapor probe location
Cross section line
G:\053-7020\Figures\Fig 2_ Site Plan Depicting Source Area.dsf 1/8/09
Golder Associates
SCALE: 0 100 200 FEET
(APPROXIMATE)
CORRECTIVE ACTION PLAN
B & C GAS MINI MART/VALLEY GAS
LIVERMORE, CALIFORNIA
SITE PLAN DEPICTING SOURCE AREA
FIGURE
2
PROJECT NO.
053-7020




Golder Associates

SCALE: 0 50 100 150 FEET

(V.E.= 5X)

CORRECTIVE ACTION PLAN
B & C GAS MINI MART/VALLEY GAS
LIVERMORE, CALIFORNIA

GEOLOGIC CROSS SECTION D-D'

FIGURE 3

PROJECT NO. 053-7020

G:\053-7020\FIGURES\Fig 3_XSEC DD_CAP.DSF 1/8/09

# TABLE 1
## SOIL ANALYTICAL RESULTS
Former B&C Gas Mini Mart
2008 First Street, Livermore, California

| Sample ID | Sample Depth (feet bgs) | Date Collected | GRO (mg/Kg) | Benzene (mg/Kg) | Toluene (mg/Kg) | Ethyl-benzene (mg/Kg) | Total Xylenes (mg/Kg) | MTBE (mg/Kg) |
|---|---|---|---|---|---|---|---|---|
| **Boring SVE-2** | | | | | | | | |
| SVE-2-30 | 30 | 12/17/2012 | **26** | **0.67** | <0.005 | **0.85** | **0.42** | **5.6** |
| SVE-2-35 | 35 | 12/17/2012 | **2.4** | **0.025** | <0.01* | **0.018** | **0.01** | **0.25** |
| SVE-2-40 | 40 | 12/17/2012 | **4.0** | <0.005 | <0.005 | <0.005 | <0.005 | **0.0053** |
| **Boring SVE-4** | | | | | | | | |
| SVE-4-30 | 30 | 12/27/2012 | **230** | <0.25* | <0.25* | **1.6** | **7.65** | <0.25* |
| SVE-4-55 | 55 | 12/27/2012 | <1.0 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |

**Explanation**

GRO = Gasoline range organics / total petroleum hydrocarbons as gasoline
BTEX = Benzene, toluene, ethylbenzene, and xylenes
MTBE = Methyl tertiary butyl ether
bgs = below ground surface
mg/Kg = milligrams per kilogram
* = Reporting limits increased due to high concentrations of target analytes

**Analytical Laboratory**

Alpha Analytical, Inc. (ELAP #2019)

**Analytical Methods**

GRO analyzed using EPA Method SW8015B
BTEX and MTBE analyzed using EPA Method SW8260B

# APPENDIX C

# FIELD PRACTICES AND PROCEDURES

# FIELD PRACTICES AND PROCEDURES

General procedures used by Stratus in site assessments for drilling exploratory borings, collecting samples, and installing monitoring wells are described herein. These general procedures are used to provide consistent and reproducible results; however, some procedure may be modified based on site conditions. A California state-registered geologist supervises the following procedures.

## PRE-FIELD WORK ACTIVITIES

### Health and Safety Plan

Field work performed by Stratus at the site is conducted according to guidelines established in a Site Health and Safety Plan (SHSP). The SHSP is a document which describes the hazards that may be encountered in the field and specifies protective equipment, work procedures, and emergency information. A copy of the SHSP is at the site and available for reference by appropriate parties during work at the site.

### Locating Underground Utilities

Prior to commencement of any work that is to be below surface grade, the location of the excavation, boring, etc., is marked with white paint as required by law. An underground locating service such as Underground Service Alert (USA) is contacted. The locating company contacts the owners of the various utilities in the vicinity of the site to mark the locations of their underground utilities. Any invasive work is preceded by hand augering to a minimum depth of five feet below surface grade to avoid contact with underground utilities.

## FIELD METHODS AND PROCEDURES

### Exploratory Soil Borings

Soil borings will be drilled using a truck-mounted, hollow stem auger drill rig. Soil samples for logging will be obtained from auger-return materials and by advancing a modified California split-spoon sampler equipped with brass or stainless steel liners into undisturbed soil beyond the tip of the auger. Soils will be logged by a geologist according to the Unified Soil Classification System and standard geological techniques. Drill cuttings well be screened using a portable photoionization detector (PID) or a flame ionization detector (FID). Exploratory soil borings not used for monitoring well installation will be backfilled to the surface with a bentonite-cement slurry pumped into the boring through a tremie pipe.

Soil sampling equipment will be cleaned with a detergent water solution, rinsed with clean water, and equipped with clean liners between sampling intervals. Augers and

samplers will be steam cleaned between each boring to reduce the possibility of cross contamination. Steam cleaning effluent will be contained in 55-gallon drums and temporarily stored on site. The disposal of the effluent will be the responsibility of the client.

Drill cuttings generated during the drilling procedure will be stockpiled on site. Stockpiled drill cuttings will be placed on and covered with plastic sheeting. The stockpiled soil is typically characterized by collecting and analyzing composite samples from the stockpile. Stratus Environmental will recommend an appropriate method for disposition of the cuttings based on the analytical results. The client will be responsible for disposal of the drill cuttings.

## Soil Sample Collection

During drilling, soil samples will be collected in cleaned brass, two by six inch tubes. The tubes will be set in an 18-inch-long split-barrel sampler. The sampler will be conveyed to bottom of the borehole attached to a wire-line hammer device on the drill rig. When possible, the split-barrel sampler will be driven its entire length, either hydraulically or by repeated pounding a 140-pound hammer using a 30-inch drop. The number of drops (blows) used to drive the sampler will be recorded on the boring log. The sampler will be extracted from the borehole, and the tubes containing the soil samples will be removed. Upon removal, the ends of the lowermost tube will be sealed with Teflon sheets and plastic caps. Soil samples for chemical analysis will be labeled, placed on ice, and delivered to a state-certified analytical laboratory, along with the appropriate chain-of-custody documentation.

## Soil Classification

As the samples are obtained in the field, they will be classified by the field geologist in accordance with the Unified Soil Classification System. Representative portions of the samples will be retained for further examination and for verification of the field classification. Logs of the borings indicating the depth and identification of the various strata and pertinent information regarding the method of maintaining and advancing the borehole will be prepared.

## Soil Sample Screening

Soil samples selected for chemical analysis will be determined from a head-space analysis using a PID or an FID. The soil will be placed in a Ziploc® bag, sealed, and allowed to reach ambient temperature, at which time the PID probe will be inserted into the Ziploc® bag. The total volatile hydrocarbons present are detected by the PID and reported in parts per million by volume (ppmv). The PID will be calibrated to an isobutylene standard.

Generally two soil samples from each soil boring will be submitted for chemical analysis unless otherwise specified in the scope of work. Soil samples selected for analysis typically represent the highest PID reading recorded for each soil boring and the sample just above first-encountered groundwater.

## Stockpiled Drill Cuttings and Soil Sampling

Soil generated during drilling operations will be stockpiled on-site. The stockpile will be set on and covered by plastic sheeting in a manner to prevent rain water from coming in contact with the soil. Prior to collecting soil samples, Stratus personnel will calculate the approximate volume of soil in the stockpile. The stockpile will then divided into sections, if warranted, containing the predetermined volume sampling interval. Soil samples will be collected at 0.5 to 2 feet below the surface of the stockpile. Four soil samples will be collected from the stockpile and composited into one sample by the laboratory prior to analysis. The soil samples will be collected in cleaned brass, two by six inch tubes using a hand driven sampling device. To reduce the potential for cross-contan1ination between samples, the sampler will be cleaned between each sampling event. Upon recovery, the sample container will be sealed at each end with Teflon sheeting and plastic caps to minimize the potential of volatilization and cross-contan1ination prior to chemical analysis. The soil sample will be labe1ed, placed on ice, and delivered to a state-certified analytical laboratory, along with the appropriate chain-of-custody documentation.

## Direct Push Technology, Soil Sampling

GeoProbe™ is a drilling method of advancing small diameter borings without generating soil cuttings. The GeoProbe™ system consists of a 2-inch diameter, 5-feet long, stainless steel soil sampling tool that is hydraulically advanced into subsurface soils by a small, truck-mounted rig. The sampling tool is designed similar to a California-modified split-spoon sampler, and lined with a 5-foot long, clear acrylic sample tube that enables continuous core sampling.

To collect soil samples, the sampler is advanced to the desired sampling depth. The mouth of the sampling tool is plugged to prevent soil from entering the sampler. Upon reaching the desired sampling depth, the plug at the mouth of the sample tool is disengaged and retracted, the sampler is advanced, and the sampler is filled with soil. The sample tool is then retrieved from the boring, and the acrylic sample tube removed. The sample tool is then cleaned, a new acrylic tube is placed inside and the sampling equipment is advanced back down the borehole to the next sample interval.

The Stratus geologist describes the entire interval of soil visible in the acrylic tube. The bottom-most 6-inch long section is cut off and retained for possible chemical analysis. The ends of the chemical sample are lined with Teflon™ sheets, capped, labeled, and placed in an ice-chilled cooler for transport to California Department of Health Services-certified analytical laboratory under chain-of-custody.

## Direct Push Technology, Water Sampling

A well known example of direct push technology for water sampling is the Hydropunch®. For the purpose of this field method the term hydropunch will be used instead of direct push technology for water sampling.

The hydropunch is typically used with a drill rig. A boring is drilled with hollow stem-augers to just above the sampling zone. In some soil conditions the drill rig can push directly from the surface to the sampling interval. The hydropunch is conveyed to the bottom of the boring using drill rods. Once on bottom the hydropunch is driven a maximum of five feet. The tool is then opened by lifting up the drill rod no more than four feet. Once the tool is opened, water enters and a sample can be collected with a bailer or tubing utilizing a peristaltic pump. Soil particles larger than silt are prevented from entering the tool by a screen within the tool. The water sample is collected, labeled, and handled according to the Quality Assurance Plan.

## Monitoring Well Installation

Monitoring wells will be completed by installing 2 to 6 inch-diameter Schedule 40 polyvinyl chloride (PVC) casing. The borehole diameter for a monitoring well will be a minimum of four inches larger than the outside diameter of the casing. The 2-inch-diameter flush-threaded casing is generally used for wells dedicated for groundwater monitoring purposes.

A monitoring well is typically cased with threaded, factory-perforated and blank Schedule 40 PVC. The perforated interval consists of slotted casing, generally with 0.01 or 0.02 inch-wide by 1.5-inch-long slots, with 42 slots per foot. The screened sections of casing are factory machine slotted and will be installed approximately 5 feet above and 10 feet below first-encountered water level. The screened interval will allow for seasonal fluctuation in water level and for monitoring floating product. A threaded or slip PVC cap is secured to the bottom of the casing. The slip cap can be secured with stainless steel screws or friction; no solvents or cements are used. Centering devices may be fastened to the casing to ensure even distribution of filter material and grout within the borehole annulus. The well casing is thoroughly washed and/or steam cleaned, or may be purchased as pre-cleaned, prior to completion.

A filter pack of graded sand will be placed in the annular space between the PVC casing and the borehole wall. Sand will be added to the borehole through the hollow stem of the augers to provide a uniform filter pack around the casing and to stabilize the borehole. The sand pack will be placed to a maximum of 2 feet above the screens, followed by a minimum 1-foot seal consisting of bentonite pellets.

Cement grout containing 5 percent bentonite or concrete will be placed above the bentonite seal to the ground surface. A concrete traffic-rated vault box will be installed over the monitoring well(s). A watertight locking cap will be installed over the top of the

well casing. Reference elevations for each monitoring well will be surveyed when more than two wells will be located on site. Monitoring well elevations will be surveyed by a California licensed surveyor to the nearest 0.01-foot relative to mean sea level (MSL). Horizontal coordinates of the wells will be measured at the same time.

Exploratory boring logs and well construction details will be prepared for the final written report.

# APPENDIX D

# SOIL VAPOR ANALYTICAL RESULTS

**Table 2**
**Soil Vapor Results**
**Corrective Action Plan**
**B&C Gas Station**
**Livermore, CA**

| Sample ID | Depth (feet) | Date Sampled | Oxygen[1] (%) | Methane[1] (%) | Carbon Dioxide[1] (%) | 2-Propanol[2] (µg/m3) | MTBE[2] (µg/m3) | Benzene[2] (µg/m3) | Toluene[2] (µg/m3) | Ethyl benzene[2] (µg/m3) | m,p-Xylene[2] (µg/m3) | o-Xylene[2] (µg/m3) | TPH ref. to Gasoline[2] (µg/m3) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-2 | 5 | 4/25/06 | 18 | 0.0011 | 2.4 | < 11 | < 4.1 | 5.1 | 11 | < 5.0 | 9.6 | < 5.0 | 930 |
| MW-2 | 5 | 10/16/08 | 18 | < 0.0010 | 2.4 | < 33 | < 3.6 | < 3.2 | 5.7 | < 4.3 | < 4.1 | < 5.4 | 1130 |
| MW-4 | 5 | 4/25/06 | 20 | 0.0026 | 1 | 52 | < 4.0 | 12 | 580 | 16 | 62 | 17 | 3,700 |
| MIP-2 | 5 | 4/25/06 | 18 | 0.001 | 2.6 | 36 | < 4.2 | < 3.7 | 1,000 | 32 | 120 | 38 | 3,400 |
| MIP-2 Dup | 5 | 4/25/06 | 18 | 0.001 | 2.6 | NA | NA | NA | NA | NA | NA | NA | NA |
| MIP-8-5' | 5 | 4/25/06 | 17 | 0.004 | 3 | 26 | < 4.4 | 8.6 | 210 | 9.1 | 30 | 11 | 2,200 |
| MIP-8-5' | 5 | 11/19/07 | NM | NM | NM | NM | <3.8 | <3.4 | 12 | 7.0 | 12 | <4.6 | 1,800 |
| MIP-8-5' | 5 | 10/16/08 | 17 | < 0.0010 | 3.2 | 76 | < 3.6 | < 3.2 | < 3.8 | < 4.3 | < 4.1 | < 5.4 | 990 |
| MIP-8-10' | 10 | 4/25/06 | 17 | 0.0045 | 3.2 | < 12 | < 4.4 | 7.3 | 4.9 | < 5.2 | < 5.2 | < 5.2 | 1,300 |
| MIP-8-15' | 15 | 4/25/06 | 20 | 0.01 | 0.26 | 44 | < 11 | 61 | 1,600 | 30 | 97 | 25 | 18,000 |
| MIP-8-15' Dup | 15 | 4/25/06 | NA | NA | NA | 57 | < 4.0 | 55 | 1,800 (A) | 34 | 110 | 30 | 16,000 |
| MIP-10 | 5 | 4/25/06 | 19 | 0.0022 | 2.5 | 16 | < 4.3 | 11 | 660 | 33 | 130 | 39 | 3,500 |
| MIP-13 | 5 | 4/25/06 | 21 | 0.0021 | 0.58 | 34 | < 8.2 | 12 | 2,600 | 49 | 180 | 50 | 9,400 |
| ESL (Residential)* | | | | | | | 9,400 | 84 | 63,000 | 210,000 | 21,000 | 21,000 | 10,000 |

Notes:

(µg/m3) microgram per cubic meter
NM = not measured
TPH = Total petroleum hydrocarbons
MTBE = Methyl tert-butyl ether
Dup = Duplicate Sample
1 = Samples analyzed by ASTM D-1946
2 = Samples analyzed by TO-15
(A) = Value exceeds instrument calibration range
* = Table E-2. Shallow Soil Gas Screening Levels (less than 5') for Evaluation of Potential Vapor Intrusion Concerns California Regional Water Quality Control Board, *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater* , Interim-Final November 2007,