0.3

ENVIRONMENTAL MANAGEMENT, INC.

Review soil vapor samples.
Verify w/ RBrunner that if no SV at 3' bgs, residual HC in GW does not appear to be volatilizing.

September 18, 2001
Project No. C80-000930A1

SEP 2 4 2001

Ms. Eva Chu
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway
Alameda, California 94502

Re: **Former Texaco Service Station**
930 Springtown Boulevard
Livermore, California
Incident No. 91995053

Dear Ms. Chu:

KHM Environmental Management, Inc. (KHM) has prepared this addendum to its report titled *Vadose Zone Investigation and Risk-Based Corrective Action (RBCA) Analysis* dated August 13, 2001. The report addendum is prepared in response to comments received from you in an email dated September 7, 2001. Your comments are highlighted, followed by KHM's response.

Please provide an evaluation of risk due to residual TPH-g. You may use the Massachusetts Department of Environmental Protection (MaDEP) fractionation approach.

There is no risk associated with the presence of TPH as gasoline (TPH-g) in groundwater beneath the site. KHM, in its August 15, 2001 report concluded that the only potential contaminant pathway was through volatilization of petroleum hydrocarbons and entry into an enclosed building. On June 21, 2001, a soil vapor sample was collected at a depth of three feet below grade adjacent to the groundwater monitoring well with the highest concentration of TPH-g in groundwater (Well MW-B, Soil Vapor Sample GP-3). A groundwater sample collected from Well MW-B on June 28, 2001, contained 16,000 ug/l TPH-g. Despite the elevated TPH-g concentration in groundwater, TPH-g was not detected in the soil vapor sample collected from the vadose zone adjacent to Well MW-B or in either of the other two soil vapor samples collected in the northeastern portion of the site. The lack of TPH-g in soil vapor samples reflects the ability of clay soils in the vadose zone to restrict the upward movement of vapors.

Since no TPH-g was detected in soil gas samples, there is no need to use the MaDEP fractionation approach for screening soil gas concentrations in the vadose zone (Massachusetts Department of Environmental Protection, *Characterizing Risks Posed by Petroleum Contaminated Site: Implementation of the MADEP VPH/EPH Approach,* June 2001).

Residual hydrocarbons in groundwater are currently not a threat to drinking water. No registered wells were identified within ½ -mile of the site. The TPH-g plume is confined to the northern portion of the site. Over time, natural attenuation will slowly reduce the size of the plume and concentrations of TPH-g in groundwater monitoring wells.

Please provide an evaluation of risk to a residential setting. You may wish to calculate the 95% Upper Confidence Level (UCL) for Contaminants of Concern (COCs) within the contaminant plume from the last four sampling events. The 95% UCL can be compared with the RWQCB's Risk Based Screening Levels (RBSLs). If a 95% UCL concentration exceeds the RBSL, then perform a Tier 2 spreadsheet analysis using the California Cancer slope factor for benzene.

The residual petroleum hydrocarbons in groundwater pose no risk to residential buildings. There is no need to calculate the 95% upper confidence level for contaminants of concern in groundwater. The only potential risk to a residential setting is through volatilization of petroleum hydrocarbons from the shallow groundwater and entry into an enclosed space. As discussed above, soil vapor samples were taken in the vadose zone above the petroleum hydrocarbon plume. The only contaminants of concern detected in soil vapor samples were toluene and xylene. Both compounds were detected at concentrations of less than 1.0 ug/l. Soil gas risk-based screening levels (RBSLs) for protection of indoor air quality are contained in Table E-2 of *Application of Risk-Based Screening Levels and Decision Making to Sites With Impacted Soil and Groundwater* prepared by the San Francisco Bay Region California Regional Water Quality Control Board (RWQCB). The RBSLs for toluene and xylene for a residential setting with fine-grained soils are $6.7 \times 10^{+7}$ ug/m^3 ($6.7 \times 10^{+4}$ ug/l) and $1.3 \times 10^{+8}$ ug/m^3 ($1.3 \times 10^{+5}$ ug/l), respectively. Site soil gas concentrations are well below the RBSLs.

Please note a typographical error in paragraph 5, page 8 of KHM's August 15, 2001 report. The reference to the RQWCB RBSL table used in evaluation of air quality impacts should have read Table E-2 rather than Table E-3.

Please call if you have any questions regarding the contents of this letter.

Sincerely,
KHM Environmental Management, Inc.

R. Lee Dooley
Senior Hydrogeologist
CHG 0183

REGISTERED GEOLOGIST
R. LEE DOOLEY
No. 0183
CERTIFIED
HYDROGEOLOGIST
EXP. 04/03
STATE OF CALIFORNIA

CC.

Ms. Karen Petryna, P.E., Equiva Services LLC, P.O. Box 7869, Burbank, CA 91510-7869
Environmental Manager, 7-Eleven, Inc., 2711 North Haskell Avenue, Dallas, TX 75204-2906
Attn: General Counsel, 7-Eleven, Inc., 2711 North Haskell Avenue, Dallas, TX 75204-2906
Mr. Bob DeNinno, 7-Eleven, Inc., 10220 S.W. Greenburg Road Suite 470, Portland, OR 97223

- COCs based on max GW conc in 6/01 DO 95% UCL max last 4 qtrs of mws w/in Source Zone
- Need to evaluate TPHg
- Run for residential, otherwise need deed restriction - GW only
- Can of benzene w/ RWQCB's Tier 1

AUG 14 2001

VADOSE ZONE INVESTIGATION AND RISK-BASED CORRECTIVE ACTION (RBCA) ANALYSIS

FORMER TEXACO SERVICE STATION
930 SPRINGTOWN BOULEVARD
LIVERMORE, CALIFORNIA

Prepared by:

KHM Environmental Management, Inc.
6284 San Ignacio Avenue, Suite E
San Jose, California 95119

August 13, 2001

Project No. C80-000930A1

KHM ENVIRONMENTAL MANAGEMENT, INC.

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

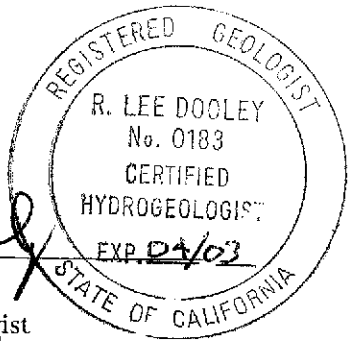
PROFESSIONAL CERTIFICATION

VADOSE ZONE INVESTIGATION AND RISK-BASED CORRECTIVE ACTION ANALYSIS

FORMER TEXACO SERVICE STATION 930 SPRINGTOWN BOULEVARD LIVERMORE, CALIFORNIA

At the request of Equiva Services LLC, KHM Environmental Management, Inc., (KHM) has performed a vadose zone investigation and prepared a Risk Based Corrective Action (RBCA) analysis for the former Texaco service station located at 930 Springtown Boulevard, Livermore, California.

This report was prepared by KHM staff under the professional supervision of the Senior Hydrogeologist, whose seal and signature appears hereon.



R. Lee Dooley
Senior Hydrogeologist
CHG 0183

1.0 INTRODUCTION

This report presents the results of a vadose zone investigation and risk-based corrective action (RBCA) analysis performed by KHM Environmental Management, Inc. (KHM) for the former Texaco service station located at 930 Springtown Boulevard, Livermore, California (Figure 1). The RBCA analysis updates a previous study performed in 1997 by Kaprealian Engineering, Inc. (KEI). Site-specific data for the vadose zone was obtained by KHM for use in the RBCA analysis. The purpose of the current RBCA analysis was to determine the impact of residual hydrocarbons to human health and the environment at the site and in surrounding areas. The study is used to provide recommendations regarding the need for further soil and groundwater remediation.

2.0 BACKGROUND

The following sections provide a historical overview of site activities related to the presence of petroleum hydrocarbons in soil and groundwater.

2.1 SITE INVESTIGATION

Texaco operated a gasoline service station at 930 Springtown Boulevard until mid-1985 (Weiss Associates, 1993) when the station was demolished and the underground tanks were removed. The three gasoline underground storage tanks (USTs) were removed from the site on June 26, 1985 (Groundwater Technology, 1991). Petroleum hydrocarbons were first detected in soil and groundwater in 1984. Since 1984, fourteen soil borings (Borings SB-1 and SB-2, B-1 through B-4, and Wells MW-1 through MW-8) have been drilled to characterize soil and groundwater conditions with respect to petroleum hydrocarbons beneath the site and in adjacent areas. Ten of the soil borings were converted to groundwater monitoring wells (Wells MW-1 through MW-8, MW-A, and MW-B), one boring was converted to a groundwater extraction well (Well EW-1), and one boring was used to install soil vapor extraction and air-sparge wells (VE-1 and SP-1). Historic boring and well locations are shown on a figure prepared by Weiss Associates (Figure 2, Appendix A). Groundwater monitoring has been performed on a quarterly basis at the site since January 1992.

2.2 REMEDIATION ACTIVITIES

A soil vapor extraction (SVE) system was installed at the site in 1994 for the removal of petroleum hydrocarbons from soil and the upper surface of groundwater. The SVE system began operation on November 29, 1994 (GTI, 1995). The system extracted soil vapor from Wells MW-A, MW-B, MW-3, MW-5, and VE-1 (see Site Map by GTI dated 2/21/95, Attachment A). Soil vapor extracted from wells was conveyed by piping to a treatment compound located in the western portion of the site. Soil vapors were passed through a catalytic oxidizer unit for the destruction of petroleum hydrocarbons. The SVE was operated until 1995 when it was shutdown due to low concentrations of petroleum hydrocarbons in the influent soil vapor (see graph of influent petroleum hydrocarbon concentrations in Appendix A).

2.3 PREVIOUS RBCA ANALYSIS

A RBCA Tier 2 analysis of the site was performed by Kaprealian Engineering, Inc. (KEI) in 1997 (*Risk-Based Corrective Action Analysis* dated October 31, 1997). Site Specific Target Levels (SSTLs) were established for benzene, toluene, ethylbenzene, and xylene (BTEX). None of the SSTLs were exceeded for any of the pathways modeled, either for cumulative

or site specific levels. KEI concluded, based on the results of the RBCA analysis, that no further remedial action or investigative activities were warranted and recommended that Texaco apply for case closure.

After a review of the KEI RBCA, the Alameda County Health Care Services Agency (ACHCSA) requested that the RBCA analysis be revised such that actual laboratory analytical results for vadose zone soil be used in the analysis. Pacific Environmental Group, Inc. (PEG) submitted a work plan, dated December 3, 1998, to ACHCSA. The work plan described the collection and analysis of soil vapor and soil samples from the vadose zone for use in a revised RBCA analysis. In a letter to Equiva Services LLC (Equiva) dated June 11, 1999, the ACHCSA approved PEG's work plan contingent on a number of changes and additions. The IT Corporation submitted a work plan addendum, dated January 18, 2000, to the ACHCSA. The revised work plan and addendum was accepted by the ACHCSA in a letter to Equiva dated January 21, 2000. The January 21, 2000 acceptance letter included a request for number of changes/additions to the work plan. Copies of the referenced correspondence are included as Appendix B.

3.0 SITE HYDROGEOLOGIC CONDITIONS

The following sections summarize site hydrogeologic conditions as determined in previous investigations, and as determined through a subsequent investigation performed by KHM. On May 17, 2001, Equiva and 7-Eleven, Inc. signed an access agreement in order to access the site for the collection of soil and soil vapor samples at the subject site. KHM collected soil and soil vapor samples on June 18, 2001 in accordance with the work plan approved by ACHCSA.

3.1 STRATIGRAPHY

The geologic materials underlying the site can be differentiated into two stratigraphic units – an upper unit consisting primarily of sandy clay that extends from the ground surface to a depth of approximately 10- to 14- feet below grade and an underlying unit composed of sand and gravel to the total depth explored of 30 feet below grade. Clay in the upper unit was classified in the field as a CL by the Unified Soil Classification System. The percentage of sand and silt in the clay appears variable. The clay in the upper unit is locally interlayered with sand and gravel deposits. Soils in the underlying coarse-grained unit range from poorly graded sand and gravel (SP and GP) to clayey sand (SC), silty sand (SM), and clayey gravel (GC). Site boring logs are included as Appendix C.

3.2 GROUNDWATER OCCURRENCE

Groundwater was first encountered in site borings at depths of 12 to 14 feet below grade. Groundwater was found near the contact between the upper and lower stratigraphic units. Depth to groundwater in on-site monitoring wells has ranged from 7.46 to 14.11 feet below top of casing. Depth to groundwater on June 28, 2001, ranged from 9.81 to 13.40 feet below top of casing. Depth to groundwater in off-site wells was 10.82 feet in Well MW-4 and 16.49 feet in Well MW-8.

3.3 GROUNDWATER MOVEMENT

Historic groundwater elevation contour maps indicate that the groundwater flow direction has varied from west to north. Groundwater flow has most frequently been observed toward the northwest, parallel with Springtown Boulevard. The distribution of dissolved petroleum hydrocarbon constituents in groundwater also indicates a northwest flow direction. The flow gradient in recent years has ranged from 0.003 to 0.006.

3.4 DISSOLVED PETROLEUM HYDROCARBONS IN GROUNDWATER

Groundwater monitoring has been performed at the site since January 1992. Historic groundwater analytical data is contained in Appendix D. Groundwater monitoring has

defined a narrow plume of dissolved petroleum hydrocarbons extending approximately 250 feet west of the former site UST (see maps in Appendix D). Highest concentrations of petroleum hydrocarbons have been in Wells MW-A, MW-B, and MW-5.

The most recent groundwater samples were obtained from site monitoring wells on June 28, 2001. The samples were analyzed for total petroleum hydrocarbons as gasoline (TPH-g), benzene, toluene, ethylbenzene, and xylene (BTEX), and methyl tert-butyl ether (MTBE) by EPA Method 8260B. Analytical results are presented in Table 1.

As in previous groundwater monitoring, analytical results of the most recent groundwater samples indicated that dissolved petroleum hydrocarbons occur near the former USTs located in the northeastern corner of the site (Figure 3). The highest concentrations of TPH-g and BTEX compounds were detected in the groundwater sample from Well MW-B located immediately north of the former USTs. TPH-g and benzene were detected at 16,000 micrograms per liter (ug/L) and 29 ug/L, respectively. MTBE was detected by EPA Method 8260B in Wells MW-1 (0.65 ug/L) and MW-3 (1.8 ug/L), located immediately north and west, respectively, of the former USTs. MTBE was also detected in the groundwater sample from Well MW-8 (29 ug/L) located approximately 150 feet west of the site. Groundwater from Well MW-8 was previously analyzed by EPA Method 8260 for MTBE once on November 11, 2000, at which time MTBE was not detected.

3.5 Well Survey

KHM conducted a water well survey to determine the location of registered wells in the vicinity of the site and to identify potential receptors of the site's groundwater. The Alameda County Flood Control and Water Conservation District, Zone 7 provided a map with the locations of all registered wells within approximately ½ mile of the subject site. In addition, KHM visited the Zone 7 office in Pleasanton to obtain well construction information and data on any other wells identified in the site vicinity.

No registered wells were identified within ½ mile of the site. The two nearest registered wells, 3S2E3E2 and 3S2E3H1, are both located approximately 2,800 feet from the subject site (Figure 2). Well 3S2E3H1 is owned by PG&E. Its use is indicated as irrigation. KHM was able locate the well and to confirm its location. The well is located upgradient of the site. Well 3S2E3E2 is reportedly a shallow 32-foot well. Registration data listed its usage as unknown. KHM attempted to locate the well in the field. No evidence of the well could be found in the area indicated on maps as the well location. The well location is on the opposite side of a low bedrock hill from the site (CDM&G, 1966). Local groundwater flow patterns and a long travel distance preclude impact groundwater from reaching the site from the well.

4.0 VADOSE ZONE CONDITIONS

The following section describes the recent investigation performed by KHM to determine physical and chemical properties of the vadose zone underlying the subject property. The investigation was performed in accordance with the work plan approved by ACHCSA dated January 21, 2000.

4.1 CURRENT INVESTIGATION

4.1.1 FIELD ACTIVITIES

On June 21, 2001 four Geoprobe™ borings were drilled at the locations shown on Figure 3. A copy of the drilling permit from the Alameda County Flood Control and Water Conservation District is included in Appendix E. Geoprobe™ borings GP-1 and GP-3 were drilled adjacent to the groundwater monitoring wells with the highest concentrations of dissolved petroleum hydrocarbons (Wells MW-A and MW-B). Boring GP-4 was drilled adjacent to the east side of the former UST complex. Boring GP-2 was drilled outside of the area of the UST complex for collection of soil samples for testing of physical parameters.

Borings GP-1, GP-3, and GP-4 were each initially drilled to a depth of 3 feet below grade. The drill rods were then retracted approximately 6-inches and a polyethylene tube inserted through the rods to the 3-foot depth. The drill rods were then sealed and a vacuum applied to the polyethylene tubing. After approximately one minute, a soil vapor sample was collected in a Tedlar bag.

After collection of the soil vapor sample, Borings GP-1, GP-3, and GP-4 were advanced until groundwater was encountered at a depth of approximately 12 to 16 feet below grade. Boring GP-2 was advanced to a depth of 8 feet below grade. All four borings were continuously cored for detailed logging of soils in the vadose zone. Soil types were classified in the field according to American Society for Testing and Materials (ASTM) method D-2488-00. Boring logs are included in Appendix E.

4.1.2 ANALYTICAL PROGRAM

Four soil samples from Boring GP-1 and three soil samples each from Borings GP-3 and GP-4 were placed on ice and transported to Kiff Analytical in Davis, California for chemical analysis. The three soil vapor samples were also sent to Kiff Analytical for analysis. Soil vapor and soil matrix samples were analyzed for TPH-g by EPA Method 8015m and for BTEX and methyl tert-butyl ether (MTBE) by EPA Method 8260. Chain of custody documentation is included in Appendix E.

Two soil samples from Boring GP-2 were sent to Cooper Testing Labs in Mountain View, California. The samples were test for physical parameters needed for the RBCA analysis. Tests performed were specific gravity, porosity, moisture content, dry density, and percent organic content.

4.2 RESULTS

4.2.1 PHYSICAL PROPERTIES

Examination of core samples from the Geoprobe™ borings indicates that the vadose zone consists of a complex interlayering of both fine- and coarse-grained soils. Soils types identified within the vadose zone included sandy lean clay (CL), clayey sand (SC), silty sand (SM), and silty gravel with sand (GM).

The two soil samples sent to Cooper Testing Labs were both classified as sandy clay, which is consistent with field descriptions included in boring logs. Results of testing for physical parameters is summarized on Table 2. Laboratory analytical report from Cooper Testing Labs is included in Appendix E.

4.2.2 PETROLEUM HYDROCARBON CONTENT IN SOIL

The petroleum hydrocarbon content of vadose zone soil was found to be minimal. TPH-g was detected in two of the eleven soil samples analyzed (Table 3). TPH-g was detected in the 14.5-foot sample from Boring GP-1 (11 mg/kg) and the 14.0-foot sample from Boring GP-4 (27 mg/kg). Both samples were collected near the contact between the vadose and saturated zones. The only detection of BTEX constituents was in the 3.5-foot sample of Boring GP-4 in which 0.0097 mg/kg of total xylenes was detected. MTBE was not detected in any soil sample.

4.2.3 SOIL VAPOR ANALYSIS

TPH-g was not detected in any of the three soil vapor samples collected (Table 3). Toluene and xylene were detected in each of the three samples at very low concentrations (less than 1.0 ug/L).

5.0 RBCA ANALYSIS

The following section presents a risk-based corrective action analysis for residual petroleum hydrocarbons remaining in soil and groundwater beneath the subject site. Included in this section is a presentation of methodology used in the analysis, the RBCA analysis, and a discussion of results.

5.1 LAND USE CLASSIFICATION

The subject property is located near the Springtown Boulevard exit from Interstate 580 (Figure 1). The site lies on the edge of undeveloped open space area. A map prepared by IT Corporation, updated by KHM, shows nearby land uses (Attachment A – IT Figure 1, Site Map). A 7-11 convenience store has occupied the site since at least 1990. No petroleum hydrocarbons have been stored on site since 1985. The site, with the exception of small landscaped area, is completely paved with either concrete or asphalt. The site is bounded to the north by Springtown Boulevard, to the south and east by a motel, and to the west by Lassen Road.

City of Livermore zoning classifications for the site and surrounding area are CN (Neighborhood Commercial District) and CHS (Highway Service Commercial District). Residential areas lie west of the site. For the purpose of this RBCA analysis, existing and future property use is classified as commercial.

5.2 SOURCES

All primary sources of petroleum hydrocarbons have been removed from the site. All gasoline USTs and associated piping were removed from the site in 1985. No gasoline or petroleum products have been stored on the site since 1985. Residual petroleum hydrocarbons remain primarily in shallow groundwater in the area of the former USTs. Recent soil analytical data indicate that little or no petroleum hydrocarbons remain in soil above groundwater. The vadose zone is not considered a source of petroleum hydrocarbons to groundwater.

5.3 CONSTITUENTS OF CONCERN

The primary constituents of concern (COCs) are the BTEX compounds and MTBE. BTEX and MTBE have been detected in the shallow groundwater beneath the site.

5.4 EXPOSURE PATHWAYS

The following petroleum hydrocarbon exposure pathways were evaluated based on an existing and future commercial use of the site: soil ingestion, soil dermal contact, vapor

inhalation through outdoor volatilization, vapor inhalation through enclosed-space volatilization, and groundwater ingestion.

5.4.1 Soil Ingestion and Dermal Contact

Ingestion of petroleum hydrocarbon impacted soil is not considered a viable exposure pathway. No TPH-g or benzene was detected within the upper 10 feet of the soil profile in the area of the former USTs during the recent investigation (Table 3). The site is completely paved with the exception of a narrow landscaping strip along the northern and western edges of the property. The area of the former USTs is completed paved as part of the site parking lot. **Dermal contact with impacted soil is also not considered a viable exposure pathway.** No impacted soils are have been identified in near surface soils. Recent soil analyzes indicate that exposure of a trench worker to petroleum hydrocarbons in soil is unlikely.

5.4.2 Vapor Inhalation Through Volatilization to Air

The potential for petroleum hydrocarbons to volatilize to the outdoor atmosphere or to a confined space is very low. Upward migration of soil vapors from the groundwater is restricted by the intervening clay soils of the vadose zone and by surface pavement and the foundation of the site building. The highest concentrations of petroleum hydrocarbons in groundwater lie outside the area of the 7-Eleven site building. TPH-g and BTEX were not detected in the recent groundwater sample from Well MW-1 located between the former USTs and the 7-Eleven store building. MTBE was detected in the sample at 0.65 ug/L (Method 8260B).

In August 2000, the California Regional Water Quality Board, San Francisco Bay Region, issued a document title *Application of Risk-Based Screening Levels and Decision Making to Sites With Impacted Soil and Groundwater – Interim Final*. A series of corrections and updates were issued on July 2, 2001. The document presents risk-based screening levels (RBSLs) for soil and groundwater impacted by chemical releases. These Tier 1 risk based levels do not take into consideration specific site conditions but are useful in eliminating exposure pathways prior to performing a Tier 2 analysis. The RWQCB states "...the presence of a chemical concentration below the corresponding RBSL can be assumed to not pose a significant threat to human health and the environment."

The only COCs detected in soil vapor samples were toluene and xylene (see Table 4). Both compounds were detected at concentrations of less than 1.0 ug/L. The toluene and xylene RBSLs for protection of air quality in enclosed spaces are 2.4 x 10^{+8} ug/m^3 (24,000 ug/L) and 4.5 x 10^{+8} ug/m^3 (45,000 ug/L), respectively (RWQCB, Table E-3, August 2000). Based on the RBSLs, the low concentrations of toluene and xylene in soil vapor do not pose a threat to human health or the environment. KHM confirmed this conclusion by

$1 m^3 = 1000 L$

performing a Tier 2 analysis using a model for volatilization of petroleum hydrocarbons from the shallow groundwater.

5.4.3 GROUNDWATER INGESTION

Residual hydrocarbons in groundwater are currently not a threat to drinking water. No registered water supply wells were identified within ½-mile of the site (see Section 3.5). A sand and gravel layer was encountered in borings at a depth of approximately 10- to 14-feet below grade. This sand and gravel layer is at least 15 feet thick and capable of producing usable quantities of water to a well. These deposits are currently not being used but could be developed in the future. Groundwater ingestion is considered an unlikely but possible future exposure pathway.

5.5 SITE SPECIFIC TARGET LEVELS (SSTLS)

KHM has performed a Tier 2 analysis using site-specific data. The purpose of the Tier 2 analysis was to determine if any site conditions pose a health threat requiring a remedial response. Site-specific target levels (SSTLs) were calculated for each contaminant of concern.

The RBCA Tier 2 analysis was performed using a software package titled *RBCA Tool Kit for Chemical Releases* developed by Groundwater Services, Inc. (1998). The software is designed to complete all calculations required for a Tier 2 analysis of the RBCA planning process, as defined in ASTM PS-104 *Standard Provisional Guideline for Risk-Based Corrective Action* (ASTM, 1998). Site evaluation was performed in accordance with ASTM E 1739-95 *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Hydrocarbon Release Sites.*

5.5.1 INPUT PARAMETERS

The following input values were used in the RBCA analysis:

Input Field	Input Value	Basis for Input Value
Vadose Zone Soil type	Sandy Clay	See logs in Attachments C and E
Depth to groundwater	7.46 feet	Historic Minimum Depth
Porosity	38 %	Avg. test result, Appendix E
Dry Density	107.8 pcf (1.7 kg/L)	Avg. test result, Appendix E
Water Content	18.7%	Avg. test result, Appendix E
Organic Carbon Content	1.6%	Avg. test result, Appendix E
Vert. Hydraulic Conductivity	1.0×10^{-5} cm/sec	Sandy clay
Vapor Permeability	1.1×10^{-14} ft^2	Default value for sandy clay
Capillary Zone Thickness	0.69 feet	Default value for sandy clay

The groundwater plume width was estimated to be 50 feet with a 10-foot vertical mixing zoning. In accordance with software recommendations, the Johnson-Ettinger volatilization model was used to predict volatilization from groundwater. Default values were used for commercial building parameters (see summary input sheet, Appendix F). Excess lifetime risk limits for carcinogens typically range from 1.0×10^{-6} to 1.0×10^{-4}. SSTLs were calculated using a target health risk limit of 1.0×10^{-5}.

5.5.2 ANALYSES

The following pathways and receptors were analyzed:

- Volatilization of BTEX and MTBE dissolved in groundwater to on-site outdoor air and inhalation by a person in a commercial setting.
- Volatilization of BTEX and MTBE dissolved in groundwater to on-site indoor air and inhalation by a person in a commercial setting.
- Migration of dissolved petroleum hydrocarbons to a future water supply located in the site area.

5.5.3 RESULTS

SSTLs were calculated for the two soil vapor volatilization pathways (Table 5). The maximum COC concentrations in groundwater as measured on June 28, 2001, were all well below the corresponding SSTLs for both pathways.

There is currently no risk associated with the groundwater migration pathway. There are no water supply wells in the site area and thus no receptors are at risk. Water is locally

provided by a public utility. It is possible that at sometime in the future, a well could be drilled in the site area. Even in the event that a new well is drilled, it is unlikely that any residual petroleum hydrocarbons remaining in shallow groundwater would reach a receptor through groundwater migration. The groundwater migration pathway between the source area and receptor would be disrupted by:

- Stratified nature of soils beneath the site area (low vertical hydraulic conductivity).
- Well construction. Most wells in the site area are drilled to depths of greater than 150 feet and do not tap shallow aquifers.
- Requirement for a surface seal to a depth of 50-feet below grade in any new well.
- Natural biodegradation of TPH-g and BTEX during potentially long travel time to a well.

6.0 CONCLUSIONS AND RECOMMENDATIONS:

The RBCA analysis indicates that current conditions do not pose a threat to human health or the environment. Based on the RBCA analysis, no further active site remediation is required. With time, TPH-g and BTEX concentrations in groundwater are anticipated to decline as the result of natural attenuation and biodegradation.

Although unlikely, the sand and gravel layer beneath the site could potentially be used as a water resource some time in the future. KHM recommends continued groundwater monitoring of on- and off-site wells for one additional year. The presence of MTBE in off-site Well MW-8 should be monitored on a quarterly basis using EPA Method 8260B. TPH-g and BTEX concentrations should continue to be monitored on a semi-annual basis in wells in which the highest concentrations have been observed (Wells MW-A, MW-B, and MW-5). KHM recommends an nnual sampling of wells that, with only one exception (11/11/99), have not had detectable concentrations of TPH-g and BTEX since 1995 (Wells MW-1, MW-2, and MW-4). After one year of additional monitoring, the need for additional monitoring will be evaluated.

7.0 REFERENCES

California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB), *Application of Risk-Based Screening Levels and Decision Making to Sites with Impacted Soil and Groundwater, Interim Final*, August 2000.

Groundwater Services, Inc., *Guidance Manual for RBCA Tool Kit for Chemical Releases*, 1998.

Kaprealian Engineering, Inc. (KEI), *Risk-Based Corrective Action (RBCA) Analysis, Former Texaco Service Station, 930 Springtown Boulevard, Livermore, California*, October 31, 1997.

Groundwater Technology, Inc. (GTI), *Remediation System Start-up/Air Monitoring and Sampling Report, 930 Springtown Boulevard, Livermore, California*, March 10, 1995.

Weiss Associates, *Extraction Well Installation and Feasibility Testing Report at Former Texaco Service Station, 930 Springtown Boulevard, Livermore, California*, January 5, 1993.

Groundwater Technology, Inc. (GTI), *Report of Additional Site Assessment and Results of Quarterly Monitoring and Sampling, Former Texaco Service Station, 930 Springtown Boulevard, Livermore, California*, April 10, 1990.

California Division of Mines and Geology (CDM&G), *Geologic Map of California, San Jose Sheet*, 1966.

TABLE 1
GROUNDWATER ANALYTICAL DATA
Former Texaco Service Station
930 Springtown Boulevard
Livermore, California

Well ID	Date Sampled	TPH-Gasoline (ug/L)	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes (ug/L)	MTBE (ug/L)
MW-A	06/28/01	1,100	1.2	2.4	51	64	<0.50
MW-B	06/28/01	16,000	29	550	470	1700	<2.5
MW-1	06/28/01	<50	<0.50	<0.50	<0.50	<0.50	0.65
MW-2	06/28/01	<50	<0.50	<0.50	<0.50	<0.50	<0.50
MW-3	06/28/01	110	<0.50	<0.50	0.56	1.8	1.8
MW-4	06/28/01	<50	<0.50	<0.50	<0.50	<0.50	<0.50
MW-5	06/28/01	1,500	15	2.5	74	5.5	<0.50
MW-8	06/28/01	<50	<0.50	<0.50	<0.50	<0.50	29

Notes:
All analysis by EPA Method 8260B
ug/L - micrograms per liter
TPH - Total petroleum hydrocarbons as gasoline
MTBE - methyl tert-butyl ether

TABLE 2
SOIL PHYSICAL TESTING DATA
Former Texaco Service Station
930 Springtown Boulevard
Livermore, California

Physical Parameter	Boring GP-2, 3- to 4-foot sample	Boring GP-2, 6.5- to 7.5- foot sample
Soil Type	**Sandy Clay**	**Sandy Clay**
Specific Gravity	2.75	2.8
Porosity (%)	38.1	37.5
Moisture Content (%)	18.2	19.3
Dry Density (pcf)	106.2	109.3
Organic Content (%)	1.6	1.1

TABLE 3
SOIL ANALYTICAL DATA
Former Texaco Service Station
930 Springtown Boulevard
Livermore, California

Boring ID	Sample Depth (feet)	Date Sampled	TPH-Gasoline (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	MTBE (mg/kg)
GP-1	3.5	06/21/01	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005
GP-1	6.0	06/21/01	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005
GP-1	11.0	06/21/01	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005
GP-1	14.5	06/21/01	**11**	<0.005	<0.005	<0.005	<0.010	<0.005
GP-3	3.5	06/21/01	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005
GP-3	7.0	06/21/01	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005
GP-3	10.5	06/21/01	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005
GP-4	3.5	06/21/01	<1.0	<0.005	<0.005	<0.005	**0.0097**	<0.005
GP-4	6.0	06/21/01	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005
GP-4	14.0	06/21/01	**27**	<0.005	<0.005	<0.005	<0.010	<0.005
Composite	---	06/21/01	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005

Notes:
All analysis by EPA Method 8260B
mg/kg - milligrams per kilogram
TPH - Total petroleum hydrocarbons as gasoline
MTBE - methyl tert-butyl ether

TABLE 4
SOIL VAPOR ANALYTICAL DATA
Former Texaco Service Station
930 Springtown Boulevard
Livermore, California

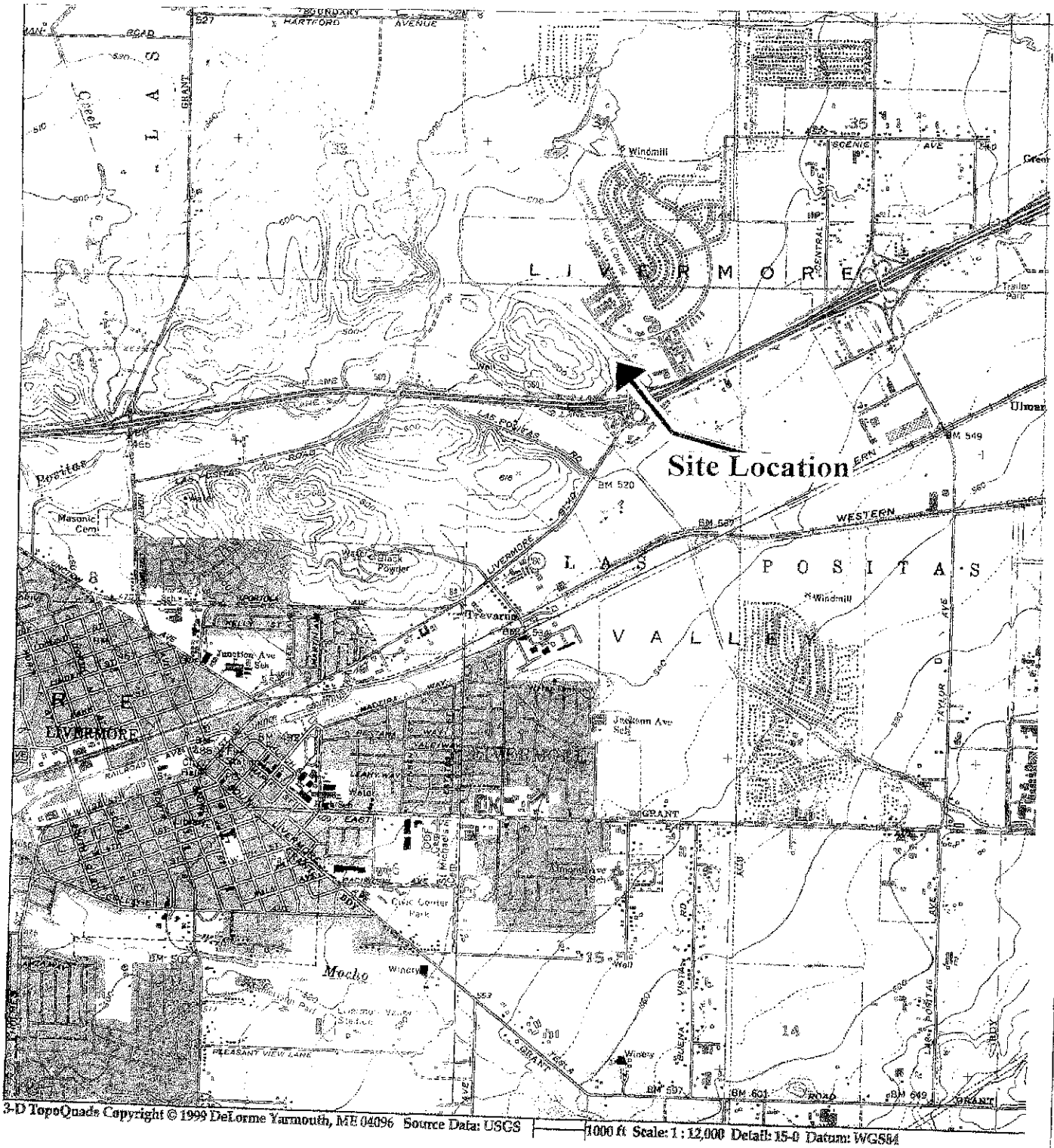
Boring ID	Sample Depth (feet)	Date Sampled	TPH-Gasoline (ug/L)	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	P,M Xylenes (ug/L)	O-Xylene (ug/L)	MTBE (ug/L)
GP-1	3.0	06/21/01	<20	<0.20	**0.46**	<0.20	**0.50**	<0.20	<0.20
GP-3	3.0	06/21/01	<20	<0.20	**0.49**	<0.20	**0.44**	<0.20	<0.20
GP-4	3.0	06/21/01	<20	<0.20	**0.72**	<0.20	**0.70**	**0.23**	<0.20
		RBSL	NA	NA	24,000	NA	45,000 (total)	NA	NA

Notes:
All analysis by EPA Method 8260B
ug/L - micrograms per liter
TPH - Total petroleum hydrocarbons as gasoline
MTBE - methyl tert-butyl ether
RBSL - Risk-based screening levels (California Regional Water Quality Control Board, August 2000)

TABLE 5
SITE SPECIFIC TARGET LEVELS
Former Texaco Service Station
930 Springtown Boulevard
Livermore, California

Constituent of Concern	Maximum Concentration in Groundwater (mg/L) (6/28/01)	SSTL (mg/L)		Maximum COC Concentration Exceeds SSTL ? Yes/No
		Groundwater Volatilization to Indoor Air*	Groundwater Volatilization to Outdoor Air	
Benzene	**0.029**	0.230	83	No
Toluene	**0.550**	250	>520	No
Ethylbenzene	**0.470**	>170	>170	No
Xylene (total)	**1.700**	>200	>200	No
MTBE	**0.029**	>5,600	>48,000	No

Notes:
All analysis by EPA Method 8260B
* Commercial Site
mg/L - milligrams per liter
MTBE - methyl tert-butyl ether
SSTL - Site Specific Target Level



LEGEND

0 1000 2000
Scale, Feet

3S2E3E2 Water Supply Well Location and Designation

KHM
ENVIRONMENTAL MANAGEMENT INC.

Site Location Map

Former Texaco Service Station
930 Springtown Boulevard at Lassen Road
Livermore, California

DATE	PROJECT	FIGURE
7/17/01	C80-000930A1	1

APPENDIX A

PREVIOUS MAPS AND GRAPH

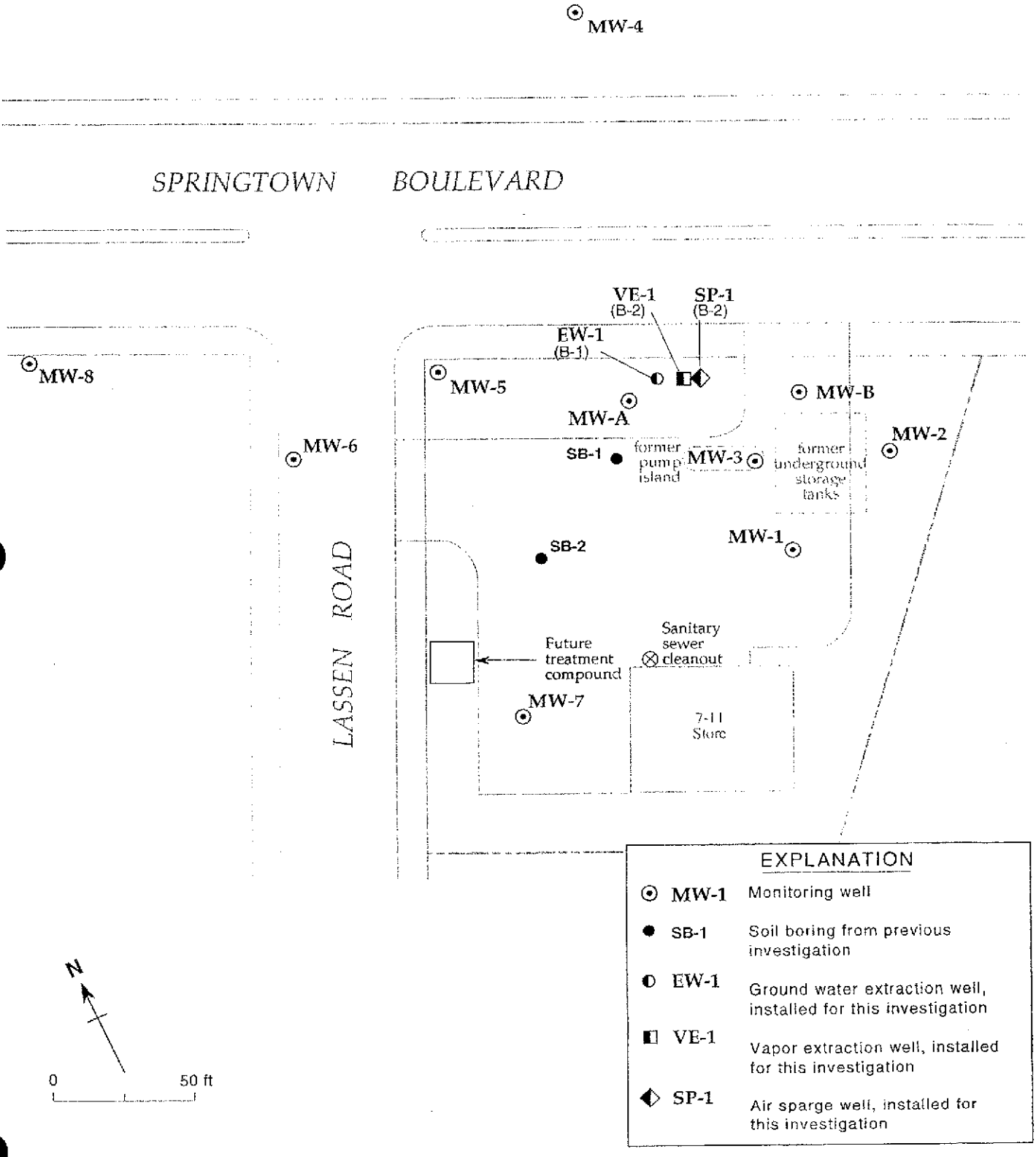
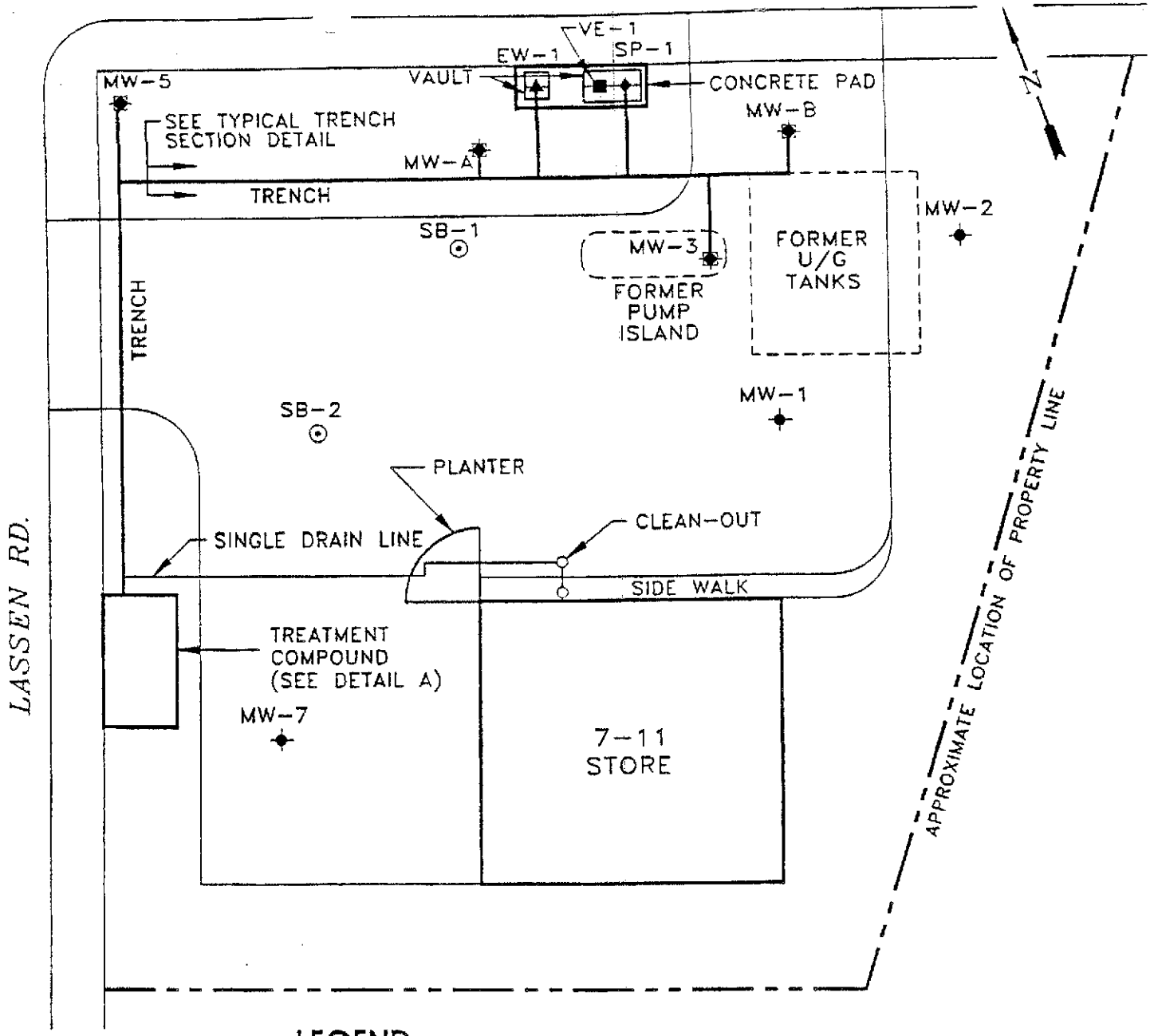


Figure 1. Site Plan and Well Location Map - Texaco Refining and Marketing Inc., 930 Springtown Boulevard, Livermore, California



LEGEND

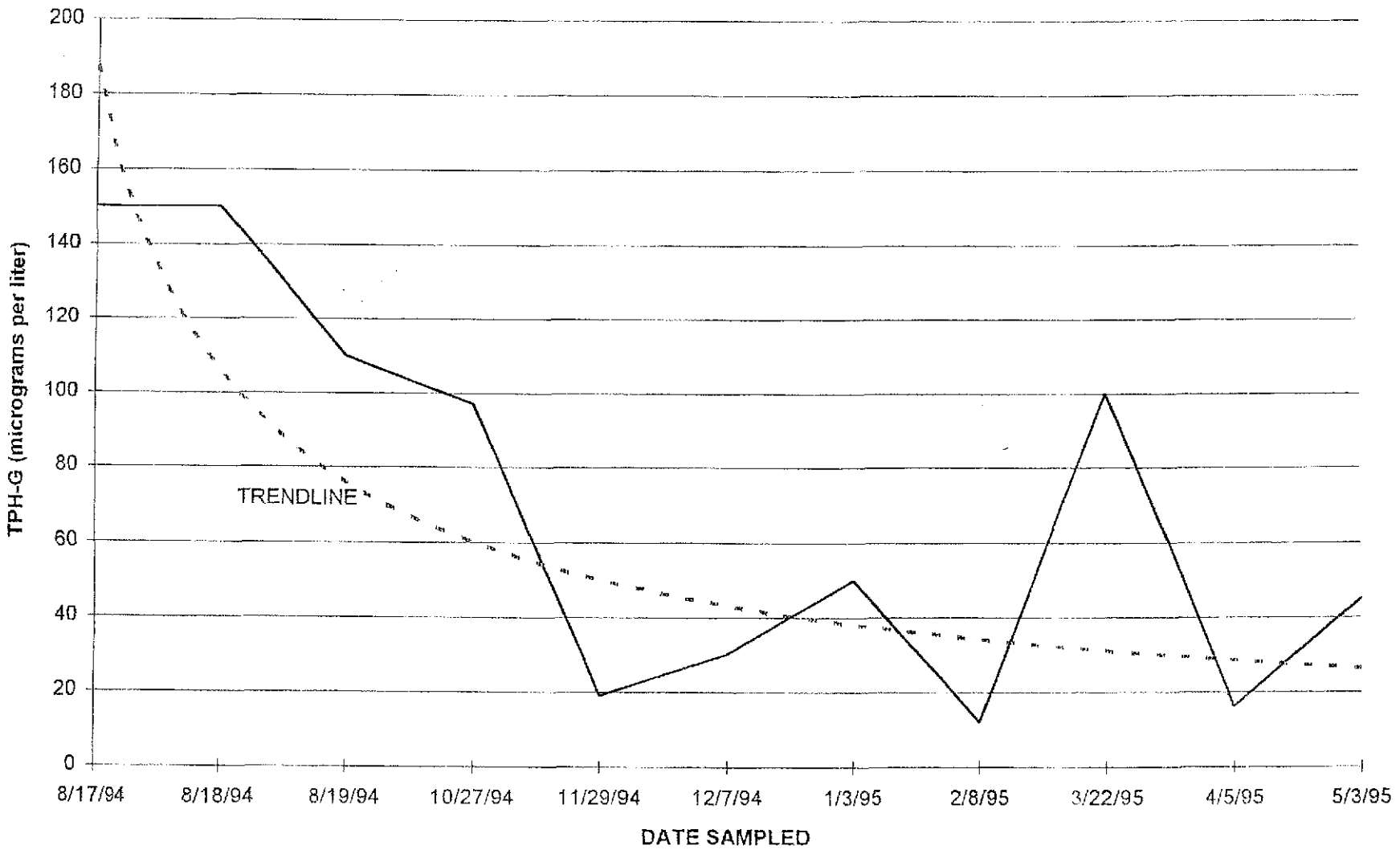
- GROUNDWATER MONITORING WELL
- GROUNDWATER MONITORING WELL CONVERTED TO A VAPOR EXTRACTION WELL
- RECOVERY WELL
- VAPOR EXTRACTION WELL
- SPARGE POINT
- SOIL BORING

GROUNDWATER TECHNOLOGY

0 FEET 30
SCALE

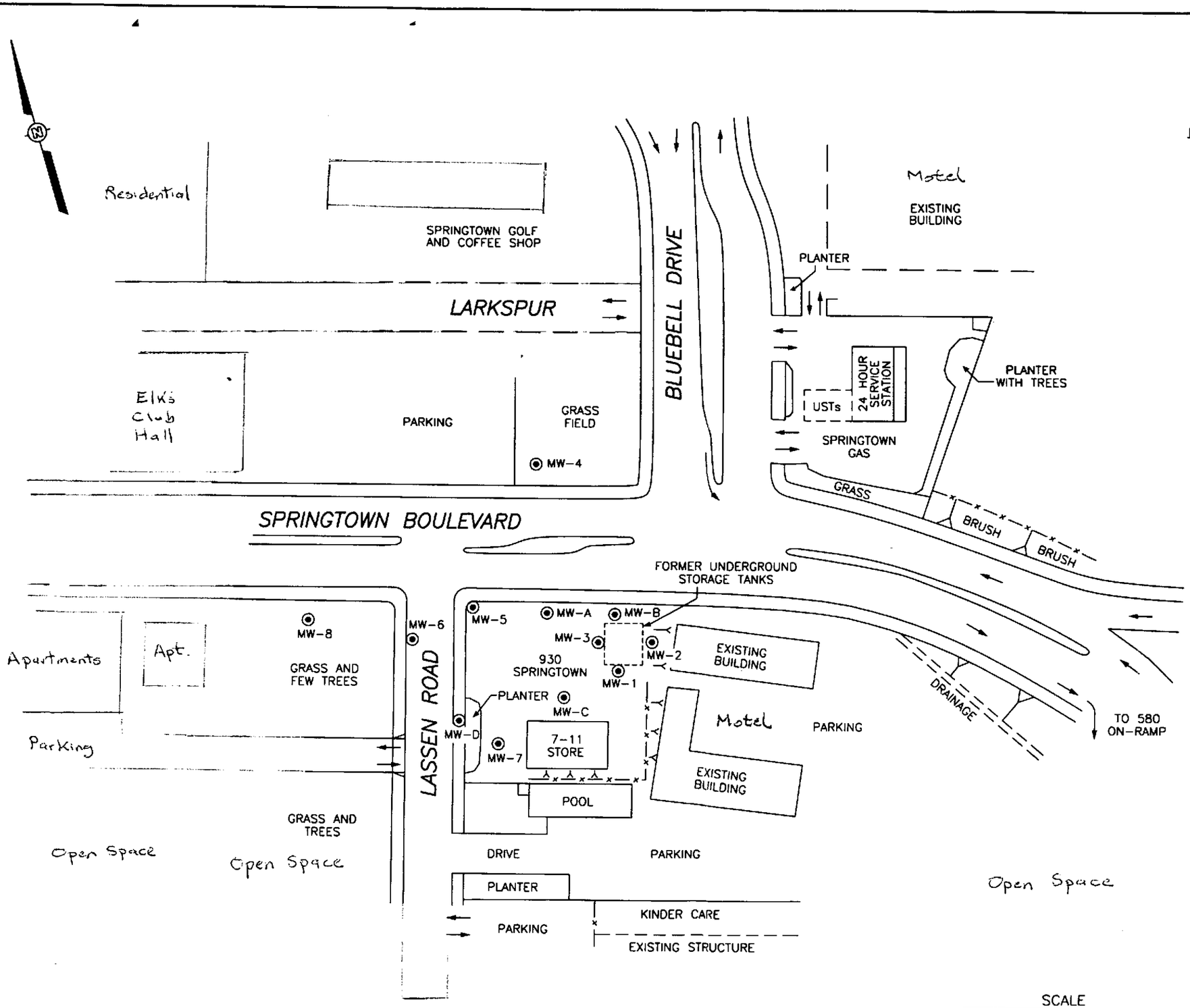
SITE MAP

CLIENT: TEXACO REFINING AND MARKETING INC.	FILE: 1383SM (1:50)	PROJECT NO.:	PM	PE/RG
	REV.			FIGURE: 1
LOCATION: 930 SPRINGTOWN BLVD. LIVERMORE, CALIFORNIA	DES. DL	DET. JC	DATE: 2/21/95	


INFLUENT SAMPLE
TPH-G (micrograms per liter)
200
180
160
140
120
100
80
60
40
20
0
TRENDLINE
8/17/94
8/18/94
8/19/94
10/27/94
11/29/94
12/7/94
1/3/95
2/8/95
3/22/95
4/5/95
5/3/95
DATE SAMPLED

00006447-1

PROJECT NUMBER 807298
APPROVED BY GM
CHECKED BY
DRAWN BY L. Wahlgren 7-20-00



LEGEND

MW-1 ◉ MONITORING WELL LOCATION AND DESIGNATION

Modified by KHM Mgmt. Inc 7/01

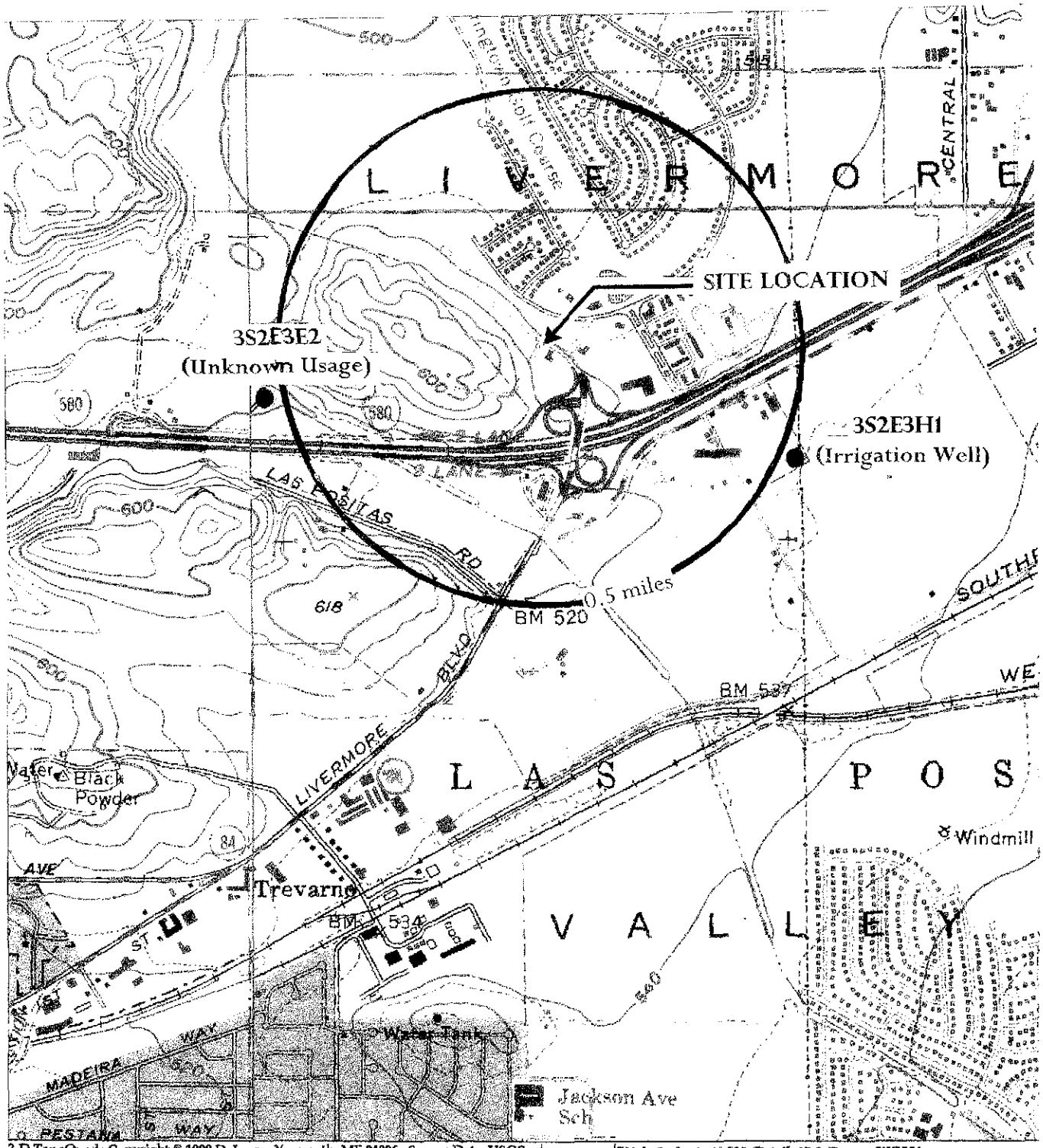
EQUIVA SERVICES LLC
FORMER TEXACO SERVICE STATION

IT CORPORATION

FIGURE 1
SITE MAP

930 SPRINGTOWN STREET
LIVERMORE, CALIFORNIA

N:\cad\Drawings\340\083\Area.dwg Thu, 01/Jun/00 02:25pm LWAHLGREN



LEGEND

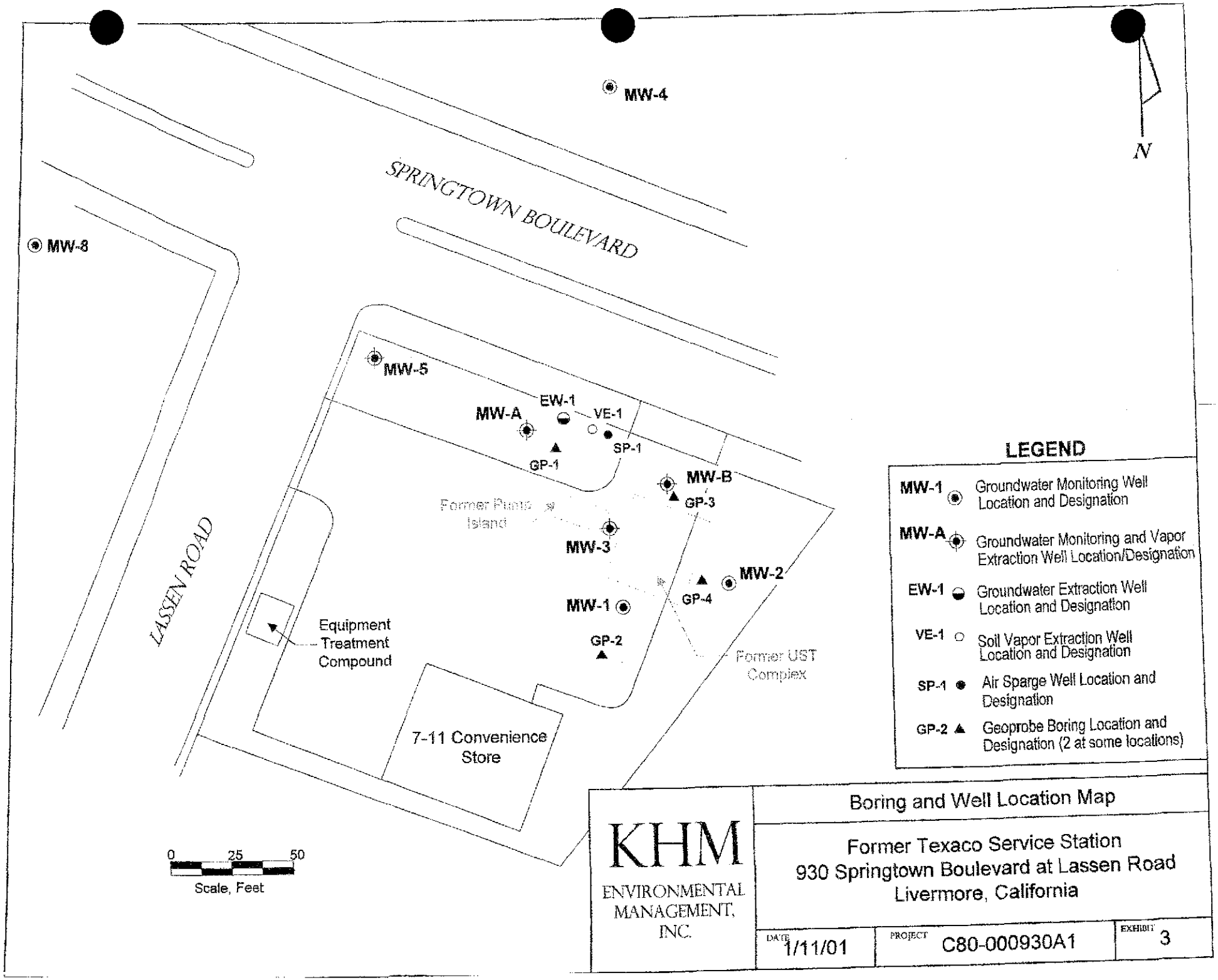
3S2E3E2 Water Supply Well Location and Designation

KHM ENVIRONMENTAL MANAGEMENT INC.

Well Survey Map

Former Texaco Service Station
930 Springtown Boulevard at Lassen Road
Livermore, California

DATE	PROJECT	FIGURE
7/17/01	C80-000930A1	2



KHM ENVIRONMENTAL MANAGEMENT, INC.

Boring and Well Location Map

Former Texaco Service Station
930 Springtown Boulevard at Lassen Road
Livermore, California

DATE	PROJECT	EXHIBIT
1/11/01	C80-000930A1	3

APPENDIX B

PROJECT CORRESPONDENCE

340-083.9A

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

ENVIRONMENTAL HEALTH SERVICES
ENVIRONMENTAL PROTECTION
1131 Harbor Bay Parkway
Alameda, CA 94502-6577
(510) 567-6700
(510) 337-9432

StID 3614

January 21, 2000

Ms. Karen Petryna
Equiva Services
P.O.Box 7869
Burbank, CA 91501-7869

RE: Work Plan Approval for 930 Springtown Blvd., Livermore, CA

Dear Ms. Petryna:

I have completed review of the IT Group's January 2000 report entitled *Addendum to Work Plan for Soil Vapor Sampling* prepared for the above referenced site. The proposal to advance on-site soil borings to collected soil and soil vapor samples from the vadose zone is acceptable with the following changes/additions:

1. The sampling probe should be advanced using Geoprobe direct push method to ensure a tight seal where ambient air will not mix with soil vapor samples
2. Summa canisters or Tedlar bags obtained from Air Toxics [(916) 985-1020)] should be used for the collection of soil vapor samples.
3. Soil vapor samples should be analyzed for VOCs using Method TO-14/TO-15
4. Soil samples to be collected for physical parameters should be collected from a "clean" or background borehole.

A revised Tier 2 RBCA analysis will be submitted using the soil and soil vapor analytical data collected from the above investigation.

Please provide 72 hours notice to this office prior to the start of field activities. If you have any questions, I can be reached at (510) 567-6762.

eva chu
Hazardous Materials Specialist

email: Debra Moser (dmoser@theitgroup.com)

texaco9

the IT group

IT Corporation
1921 Ringwood Avenue
San Jose, CA 95131-1721
Tel. 408.453.7300
Fax. 408.437.9526

A Member of The IT Group

FILE COPY

January 18, 2000
Project 340-083.1A

Ms. Eva Chu
Alameda County Health Services Agency
Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Re: **Addendum to Work Plan for Soil Vapor Sampling**
Former Texaco Service Station
930 Springtown Boulevard at Lassen Road
Livermore, California
Incident No. 91995053

Dear Ms. Chu:

On behalf of Equiva Services LLC (Equiva), this letter has been prepared by IT Corporation (IT), formerly Pacific Environmental Group, Inc. (PEG). This letter presents an addendum to PEG's *Work Plan for Soil Vapor Sampling* dated December 3, 1998. An Alameda County Health Care Services Agency (ACHCSA) letter dated June 11, 1999 authorized the implementation of the December 1998 work plan. However, the ACHCSA recommended additional work activities, which are addressed below.

The proposed scope of work, as stated in the December 1998 work plan, involves the collection of additional soil and soil vapor data, which will be used to revise Kaprealian Engineering, Inc.'s *Risk-Based Corrective Action (RBCA) Analysis* dated October 31, 1997. A RBCA Tier 2 assessment will be performed using soil analytical data collected from this investigation to evaluate the potential health risk to residents from the inhalation of volatile residual petroleum hydrocarbons, which may emanate from the site. The amended scope of work is also designed to collect additional soil samples to further characterize subsurface conditions in the vadose zone.

PROPOSED SCOPE OF WORK

IT proposes the following scope of work:

- **Soil Investigation.** IT proposes that 3 on-site borings be advanced at the site (Figure 1). One boring will be located in the vicinity of each of the following wells: Wells MW-A, MW-B, and MW-1. These locations appear to contain the highest concentrations of residual petroleum hydrocarbons in soil and/or groundwater at the site and are areas that could represent the greatest potential health risk in terms of exposure to volatilized petroleum hydrocarbons. Soil samples and soil vapor samples will be collected approximately 3 feet below ground surface (bgs), using a hand-driven sampling probe. The soil samples collected at approximately 3 feet bgs will be analyzed for physical parameters, which will be used in the RBCA Tier 2 analysis. Following the collection of soil and soil vapor samples at 3 feet bgs, soil samples will be collected at discrete 5-foot intervals using the Geoprobe® direct push method, until groundwater is encountered. Soil vapor samples and soil samples which exhibit the highest photo-ionization detector (PID) readings from each boring will be analyzed for petroleum hydrocarbon constituents. Field and laboratory procedures are presented as Attachment A.

- **Soil Analyses.** Soil samples collected approximately 3 feet bgs will be analyzed by a state-certified laboratory for the following physical parameters: total organic carbon content [using American Society for Testing and Materials (ASTM) Method 2974] and bulk density, porosity, and water content (using ASTM Method 2937). Soil samples collected from the vadose zone will be analyzed for the presence of total purgeable petroleum hydrocarbons (TPPH); benzene, toluene, ethylbenzene, and xylenes (BTEX compounds); and methyl tert-butyl ether (MtBE) by EPA Methods 8015 (modified) and 8020. If MtBE is detected in soil samples by EPA Method 8020, then the samples will be analyzed by EPA Method 8260 to confirm the presence of MtBE.

- **Soil Vapor Analyses.** Soil vapor samples will be analyzed for the presence of TPPH, BTEX compounds, and MtBE by EPA Methods 8015 (modified) and 8020. If MtBE is detected in soil vapor samples by EPA Method 8020, then the samples will be analyzed by EPA Method 8260 to confirm the presence of MtBE.

- **Report.** A report summarizing all field activities and results will be completed following receipt of the analytical data. A revised Tier 2

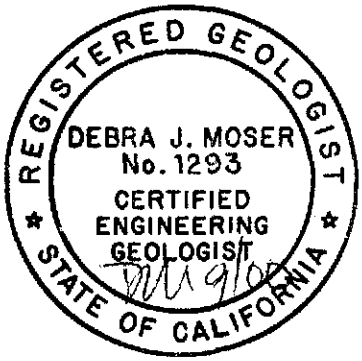
RBCA analysis will be submitted using the soil and soil vapor analytical data collected from this investigation.

This scope of work has been designed to collect additional data to quantify the residual petroleum hydrocarbon impact in an area subject to elevated volatilized petroleum hydrocarbon exposure levels and to collect additional data to confirm that site conditions do not present a public health risk. Equiva proposes to complete all field work within 30 days following approval of this work plan by the ACHCSA, and to submit a report and revised Tier 2 RBCA analysis within 60 days following receipt of all analytical data.

If you have any questions or comments regarding the contents of this letter, please do not hesitate to call (408) 453-7300.

Sincerely,

IT Corporation

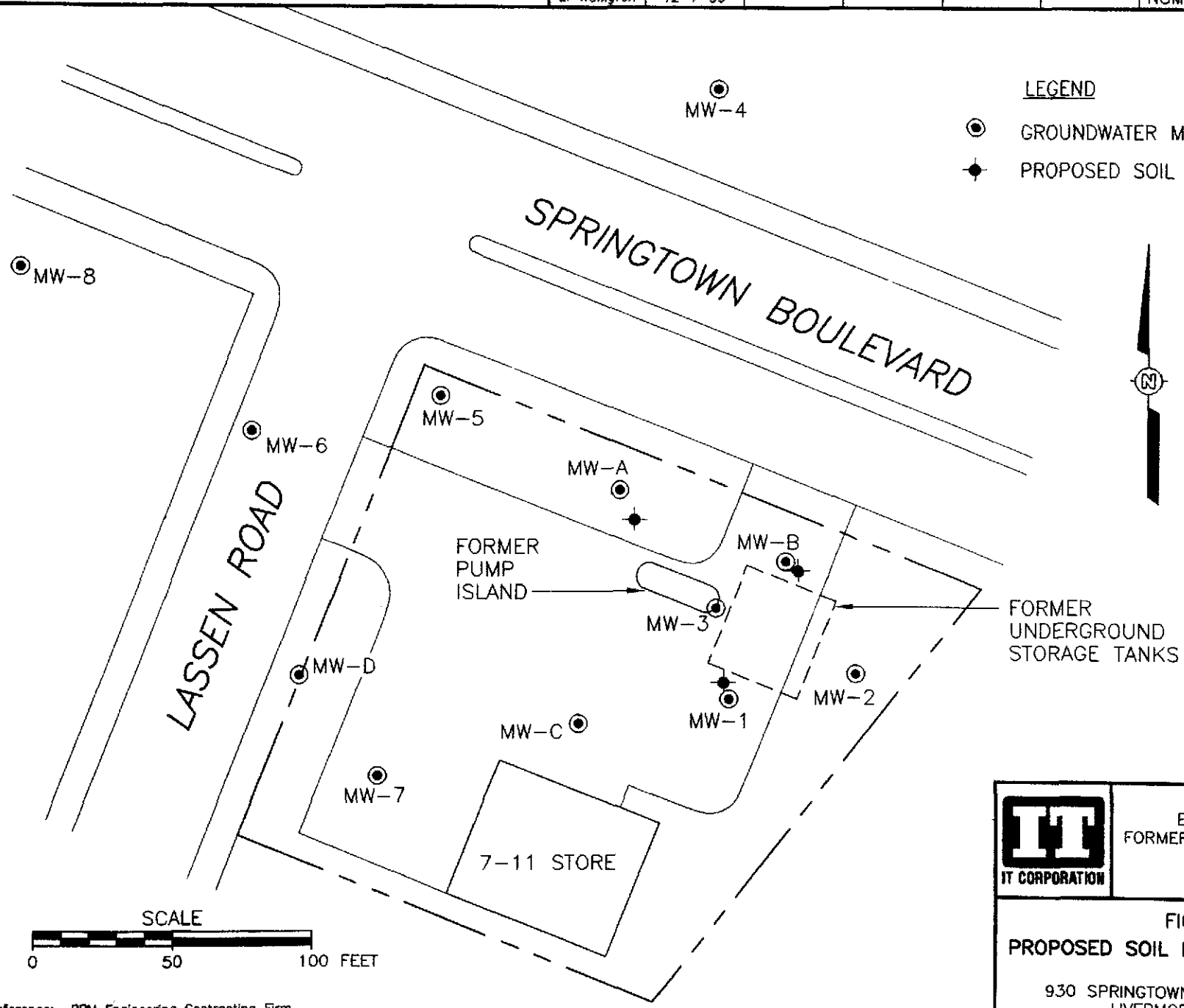


Debra J. Moser
Senior Geologist
CEG 1293

Attachments: Figure 1 - Proposed Soil Boring Location Map
Attachment A - Field and Laboratory Procedures

cc: Ms. Karen Petryna, P.O. Box 7869, Burbank, CA 91501-7869

DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
L. Wahlgren 12-7-99			340-083.9A



LEGEND

- GROUNDWATER MONITORING WELL
- PROPOSED SOIL BORING LOCATIONS

Reference: RRM Engineering Contracting Firm

IT CORPORATION

EQUIVA SERVICES LLC
FORMER TEXACO SERVICE STATION

FIGURE 1
PROPOSED SOIL BORING LOCATION MAP

930 SPRINGTOWN BLVD at LASSEN RD
LIVERMORE, CALIFORNIA

ATTACHMENT A

FIELD AND LABORATORY PROCEDURES

ATTACHMENT A
FIELD AND LABORATORY PROCEDURES

Shallow Soil Vapor and Shallow Soil Sampling Procedures

"Grab" soil vapor samples will be collected at discrete intervals using a hand-driven sampling probe. The sampling probe will consist of a hollow stem tube perforated at one end. A vacuum will then be applied to the hollow stem tube and approximately 1 or 2 volumes of air will be evacuated from the pipe so no atmospheric air is included in the vapor sample. The air samples will be collected in summa canisters and will be kept out of the direct sunlight until they are transported to the laboratory under chain-of-custody protocol.

Soil samples for sampled for physical parameters will be retained in 2-inch, clear polyvinyl chloride (PVC) plastic rings, capped with Teflon® and plastic end caps, and sealed in zip-lock plastic bags. These samples will be placed in a cooler with ice (at temperature of 4 degrees Celsius) for transport to the laboratory under chain-of-custody protocol.

Geoprobe® Procedures

The Geoprobe® is a hydraulically-powered percussion/probing machine designed specifically for use in the environmental industry. The Geoprobe® can be used to sample soil vapor, soil core, or groundwater. The soil borings will be advanced with the Geoprobe®, using a 2-inch diameter outer drive casing. An inner split spoon sampling barrel fitted with clear PVC plastic liners advances independently of the outer drive casing. The soil borings will be logged by an IT geologist using the Unified Soil Classification System and standard geologic techniques. Soil samples for logging and laboratory analysis will be continuously collected by advancing the inner split spoon sampler into undisturbed soil. The sampler will be driven a maximum of 4 feet using hydraulic pressure. Soil samples will be analyzed in the field for volatile organic compounds using a PID. Results of the PID tests will be used to assist in selection of samples for laboratory analysis if necessary. Soil samples for chemical analysis will be retained in 2-inch, clear PVC plastic rings, capped with Teflon® and plastic end caps, and sealed in zip-lock plastic bags. These samples will be placed in a cooler with ice (at

approximately 4 degrees Celsius) for transport to the laboratory under chain-of-custody protocol.

Laboratory Procedures

Selected soil samples from the vadose zone and shallow soil vapor samples will be analyzed in the laboratory for the presence of TPPH, BTEX compounds, and MtBE by EPA Methods 8015 (modified) and 8020. If MtBE is detected in soil and soil vapor samples, then the samples will also be analyzed by EPA Method 8260 to confirm the presence of MtBE. The samples will be examined using the purge and trap technique, with final detection by gas chromatography using a flame-ionization detector as well as a PID. All analyses will be performed by a California state-certified laboratory.

Shallow soil samples will be analyzed for physical parameters: bulk density, porosity, and water content by American Society for Testing and Materials (ASTM) Method 2937. Shallow soil samples will also be analyzed by ASTM Method 2974 for total organic content.

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

StID 3614

ENVIRONMENTAL HEALTH SERVICES
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577
(510) 567-6700
(510) 337-9335 (FAX)

June 11, 1999

Ms. Karen Petryna
Equiva Services
P.O. Box 6249
Carson, CA 90749-6249

RE: Workplan Approval for 930 Springtown Blvd, Livermore, CA

Dear Ms. Petryna:

I have completed review of Pacific Environmental Group, Inc.'s December 1998 *Work Plan for Soil Vapor Sampling* prepared for the above referenced site. The proposal to collected soil vapor samples from three borings is acceptable with the following changes/additions:

- provide SOP for soil vapor borings,
- soil vapor samples should also be analyzed for MTBE,
- soil sample for physical soil analyses (total organic carbon content, bulk density, porosity, water content) should be collected from "clean" soil,
- collect soil vapors with summa canisters, not Tedlar bags, and
- only one or two volumes of air should be evacuated from the tubing before a vapor sample is collected.

It is my understanding that data collected from the proposed investigation will be incorporated into a RBCA Tier 2 risk assessment. Be reminded that there is insufficient soil concentration data collected to date from the vadose zone at this site. Most of the soil concentrations are from below groundwater elevation. Therefore, it is recommended that the soil vapor borings be advanced to groundwater depth for the collection of soil samples. The boring should be continuously logged, soil screened with an OVM, and the soil (within the vadose zone) with the highest OVM reading be submitted for laboratory analysis for TPHg, BTEX, and MTBE.

If you have any questions, I can be reached at (510) 567-6762.

eva chu
Hazardous Materials Specialist

c: Krissy Flesoras, PEG, 2025 Gateway, Suite 440, San Jose, CA 95110

texaco8

December 3, 1998
Project 340-083.9A

Ms. Eva Chu
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, 2nd Floor
Alameda, California 94502-6577

Re: **Work Plan for Soil Vapor Sampling**
Former Texaco Service Station/Current 7-11 Store
930 Springtown Boulevard at Lassen Road
Livermore, California

Dear Ms. Chu:

On behalf of Equiva Services LLC (Equiva), Pacific Environmental Group, Inc. (PEG) has prepared this work plan to perform soil vapor sampling at the site referenced above. The purpose of this work is to collect additional site-specific data that will be used to revise the *Risk-Based Corrective Action (RBCA) Analysis* (Kaprealian Engineering Inc., October 31, 1997). This analysis will be updated using current analytical data and revised to evaluate the potential health risk to residents from the indoor inhalation of petroleum hydrocarbons that could volatilize from the residual petroleum hydrocarbons at the site. The Alameda County Health Care Services Agency (ACHCSA) has verbally proposed to grant unrestricted site closure provided a RBCA analysis determines there is no increased potential health risk from this exposure pathway/setting. The proposed scope of work and schedule follows.

SCOPE OF WORK

Site Health and Safety

A Certified Industrial Hygienist or other qualified professional will prepare a site-specific health and safety plan that describes known and potential hazards and emergency response procedures. All personnel involved in performing work on site during the investigation and remediation activities will review the plan before the beginning of each day of field activities. The plan will remain on site throughout the duration of work. This plan may be modified if warranted by site conditions.

Underground Utility Clearance

Prior to the commencement of any subsurface work, PEG will mark the proposed area and notify Underground Service Alert of the impending subsurface activities.

Sampling Locations

Three soil vapor sampling borings are proposed, and their locations are shown on Figure 1. One boring will be located in the vicinity of each of the following wells: Wells MW-A, MW-B, and MW-1. These locations were selected because they represent the areas containing the highest concentrations of residual petroleum hydrocarbons in soil and/or groundwater at the site. Thus, these locations provide the greatest level of conservatism for potential health risk estimation. A soil sample will also be collected from each soil vapor boring for physical soil analyses.

Sampling Procedures

The soil vapor samples will be collected by inserting a hand driven sampling probe approximately 3 feet below ground surface. The sampling probe will consist of a hollow stem tube perforated at one end. A vacuum will then be applied to the hollow stem tube and approximately 5 to 10 tube volumes of air will be evacuated from the pipe so that no atmospheric air is included in the vapor sample. After this is completed, a 1-liter Tedlar bag sample of the soil vapor will be collected. All Tedlar bags will be kept out of the direct sunlight in order to preserve the bag's integrity.

Soil samples for physical analysis will be retained in brass rings, capped with Teflon® sheets and plastic end caps, then sealed and labeled in plastic bags. All samples will be immediately placed in an ice chest (at approximately 4 degrees Celsius) until delivered to the analytical laboratory courier.

All soil vapor and soil samples will be accompanied by the appropriate chain-of-custody documentation.

Laboratory Analyses

Only laboratories that are certified by the State of California will be used to analyze the samples.

The soil vapor samples will be analyzed by EPA Method 8015 (modified) for total petroleum hydrocarbons calculated as gasoline, and by EPA Method 8020 for benzene, toluene, ethylbenzene, and total xylenes.

The soil samples will be analyzed by American Society for Testing and Materials (ASTM) Method 584 for falling head permeability, soil bulk density, soil moisture, soil pH, and by ASTM Method D-2974 for fraction of organic carbon.

Soil Boring Abandonment

The soil vapor borings will be abandoned in accordance with all applicable State of California and Alameda County regulations. Immediately upon completion of drilling and sampling activities, the soil vapor borings will be permanently abandoned. The abandonment procedure will consist of backfilling each boring using concrete to match existing site conditions.

Report Preparation

A report summarizing all field activities and results will be completed following receipt of the analytical data. A revised RBCA analysis will then be completed using the data collected from this investigation.

SCHEDULE

Equiva proposes to complete all field work within 30 days following approval of this work plan by ACHCSA, and to submit a report and revised RBCA analysis within 30 days following receipt of all analytical data.

If you have any questions or comments regarding this site, please contact me at your convenience at (408) 441-7500.

Sincerely,

Pacific Environmental Group, Inc.

Keith Winemiller, P.E.
Project Engineer

Attachment: Figure 1 - Site Map

cc: Ms. Karen Petryna, Equiva Services LLC, 108 Cutting Boulevard, Richmond, CA 94804
Mr. Bob DeNinno, The Southland Corporation, 1022 S. W. Greenburg Road, Suite 470
Portland, OR 97223

APPENDIX C

BORING LOGS – PREVIOUS INVESTIGATIONS

6CC70.C1

GROUNDWATER TECHNOLOGY

Division of Oil Recovery Systems, Inc.

Drilling Log

Well Number 1

Project Texaco/Livermore Owner Southland Corp.

Location Springtown&Lassen Project Number 20-4051

Date Drilled 6-20-85 Total Depth of Hole 25 ft. Diameter 7.5 in.

Surface Elevation _____ Water Level, Initial _____ 24-hrs. 11.68

Screen: Dia. 4-inch Length 20-feet Slot Size .020 in.

Casing: Dia. 4-inch Length 5-feet Type PVC

Drilling Company Sierra Pacific Drilling Method H.S. Auger

Driller Lynn Pera Log by Cori Condon

Sketch Map

Notes

Depth (Feet)	Well Construction	Notes Blow Counts	Sample Number	Graphic Log	Description/Soil Classification (Color, Texture, Structures)
1					Asphalt and fill sand and gravel.
					Brown sandy clay, damp, no odor.
2					
					Brown-green fine sand with subangular white gravels, damp, no odor.
6					
					Brown-green silty fine sand, stiff, damp, no odor.
7.5					
					Brown-green silty fine sand with rounded cobbles and gravels, moist, no odor.
10					
					Cobbles and gravels in fine sand, moist, no odor.
12					
					Gray brown fine sand and silt, less cobbles and pea size gravels, moist, no odor.
15		11-12-24	#1 ▽		
					Gray-brown coarse sand, wet, no odor.
20		12-18-18	#2		
					Gray-brown coarse sand, wet, no odor, contact with brown sandy clay.
25					
					Drilled 25 feet Cased 20 feet slotted, 5 feet blank Aquarium sand to 3 feet Cement seal to surface Finish with steel manhole

000064442

GROUNDWATER TECHNOLOGY
Division of Oil Recovery Systems, Inc.

Drilling Log

Well Number 2

Project: Texaco/Livermore Owner: Southland Corp.

Location: Springtown & Lassen Project Number: 20-4051

Date Drilled: 6-20-85 Total Depth of Hole: 24 ft. Diameter: 7.5 in.

Surface Elevation: ____ Water Level, Initial: ____ 24-hrs: 10.30

Screen: Dia 4-inch Length: 20-feet Slot Size: .020 in.

Casing: Dia 4-inch Length: 4-feet Type: PVC

Drilling Company: Sierra Pacific Drilling Method: H.S. Auger

Driller: Lynn Pera Log by: Cori Condon

Sketch Map

Notes

Depth (Feet)	Well Construction	Notes: Blow Counts	Sample Number	Graphic Log	Description/Soil Classification (Color, Texture, Structures)
1					Asphalt and fill.
					Red-brown clayey sand, occasional gravel, damp, no odor.
9.5			4'		
10		21-33-35	#3		Gray sand and gravel, wet, no odor.
15		9-25-25	#4		Gray sand and gravel, grading to cobbles, wet, very slight gas odor.
20		14-56+	Lost Sample		Gray sand and gravel, wet, slight gas odor, contact with sandy clay.
25					Drilled 25 feet Cased 20 feet slotted, 4 feet blank Aquarium sand to 3 feet Cement seal to surface Finished with steel manhole.

000064443

GROUND WATER TECHNOLOGY

Division of Oil Recovery Systems, Inc.

Drilling Log

Well Number 3

Project Texaco/Livermore Owner Southland Corp

Location Springtown & Lassen Project Number 20-4051

Date Drilled 6-20-85 Total Depth of Hole 24 ft. Diameter 7.5 in

Surface Elevation _____ Water Level, Initial _____ 24-hrs. 11.59

Screen: Dia. 4 inch Length 20 feet Slot Size .020 in

Casing: Dia. 4 inch Length 4 feet Type PVC

Drilling Company Sierra Pacific Drilling Method H.S. Auger

Driller Lynn Pera Log by Cori Gordon

Sketch Map

Notes

Depth (Feet)	Well Construction	Notes	Sample Number	Graphic Log	Description/Soil Classification (Color, Texture, Structures)
		Blow Counts			
1					Asphalt and fill.
					Light brown sandy clay with occasional gravel, damp, no odor.
7					Light brown sandy clay with occasional gravel, moist, gasoline odor.
10		13-27-37	# 5		Gray sand and gravel, wet, slight gasoline odor.
15		6-9-19	# 6		Gray sand and gravel, wet, slight gas odor, contact with sandy clay.
20		5-7-12	# 7		Mottled sandy clay, moist, slight gasoline odor.
25		8-22-25	# 8		Gray sand, wet, no odor.
26.5					Drilled 25 feet Cased 20 feet slotted, 4 feet blank Aquarium sand to 3 feet Cement seal to surface Finished with steel manhole

000064444

GROUNDWATER TECHNOLOGY
Division of Oil Recovery Systems, Inc.

Well Number 4

Drilling Log

Project Texaco/Livermore Owner Texaco U.S.A., Inc.

Location Springtown/Bluebell Project Number 20-4051

Date Drilled 9/10/85 Total Depth of Hole 25-ft. Diameter 7.5-ft.

Surface Elevation _____ Water Level, Initial 10-ft. 24-hrs. 10.49

Screen: Dia. 3-in. Length 20-ft. Slot Size .020-in.

Casing: Dia. 3-in. Length 5-ft. Type PVC

Drilling Company Sierra Pacific Drilling Method Hollow Stem Auger

Driller Lynn Pera Log by C. Condon

Sketch Map

Notes

Depth (Feet)	Well Construction	Notes	Sample Number	Graphic Log	Description/Soil Classification (Color, Texture, Structures)
0–1					Dark brown silty clay, occasional gravel, damp, no odor.
2–4					Light brown sandy silt, damp, no odor.
5–9					Light brown sandy clay, moist, no odor.
10		3-6-7	1		Light brown coarse sandy clay, wet, no odor.
11–25					Drilled 27 feet Sand Pack to 4 feet Bentonite and Cement Seal to Surface, Finished with Steel Locking Casing

000064445

02100144

GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

Monitoring Well 5

Drilling Lo

Project Texaco/Livermore Owner Texaco U.S.A.

Location 930 Springton Blvd Project Number 20-4051

Date Drilled 11/10/86 Total Depth of Hole 30 ft Diameter 7.5 in.

Surface Elevation ____ Water Level, Initial 12 ft. 24-hrs. ____

Screen: Dia. 2 in. Length 25 ft. Slot Size .020 in.

Casing: Dia. 2 in. Length 5 ft. Type PVC

Drilling Company Sierra Pacific Drilling Method hollow stem auger

Driller M. Isom Log by M. Winters

Sketch Map

Notes

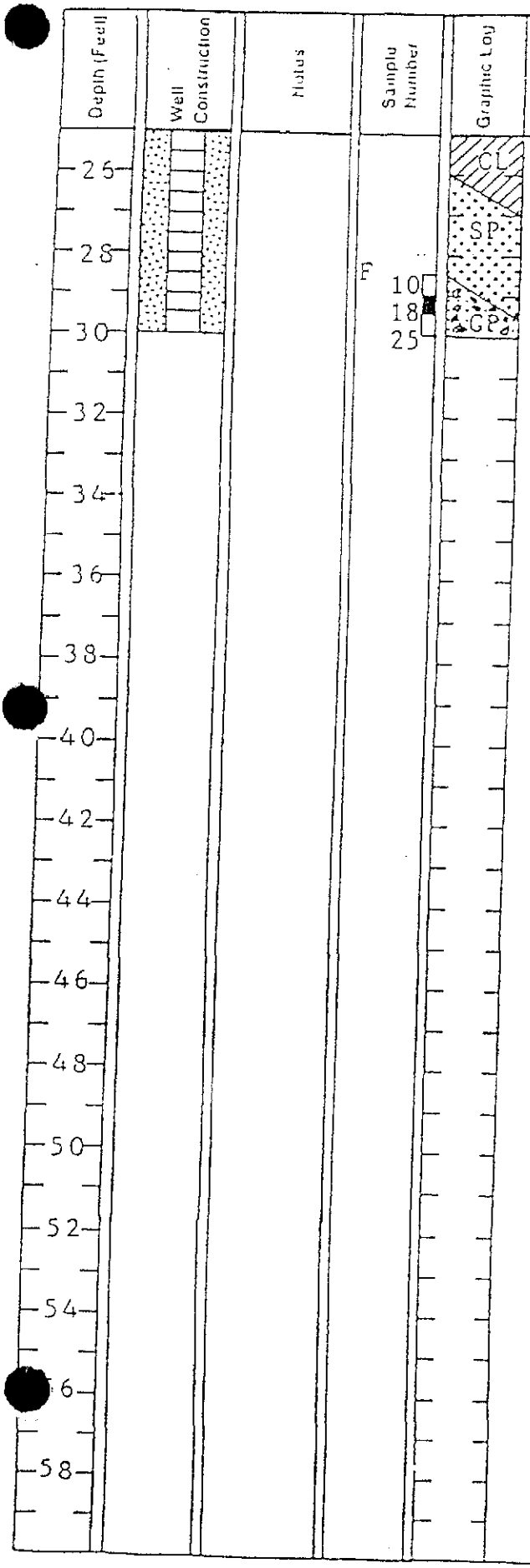
Depth (Feet)	Well Construction	Notes	Sample Number	Graphic Log	Description/Soil Classification
0					Brown, silty clay, (some gravel and sand, very stiff, moist, no odor).
2			A 4 7 10		
4					(Increase in sand, light brown color).
6					
8			B 3 4 8	CL	(Decrease in sand, increase in moisture).
10					(Increase in sand and silt, organics).
12					11/10/86 (1000)
14			C 6 17 42		
16					Multi-colored, fine to coarse gravel, (some sand, poorly sorted, very dense, wet, moderate product odor).
18			D 13 21 36	GP	
20					(Slight product odor).
22					
24			E 7 21 32		

000064446

GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

Monitoring Well 5

Drilling Log



Description/Soil Classification (Color, Texture, Structures)
Brown, sandy clay, (hard, wet, very slight product odor).
Light brown, medium sand, (wet, very slight product odor).
Multi-colored, sandy fine to coarse gravel, (some clay and silt, poorly sorted, dense, wet, very slight product odor).
Drilled to 30 feet.

000064447

GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

Monitoring Well 6

Drilling L

Project Texaco/Livermore Owner Texaco U.S.A.

Location 930 Springton Blvd. Project Number 20-4051

Date Drilled 11/10/86 Total Depth of Hole 25 ft Diameter 7.5 in.

Surface Elevation ____ Water Level, Initial 13 ft. 24-hrs. ____

Screen: Dia. 2 in. Length 20 ft. Slot Size .020 in.

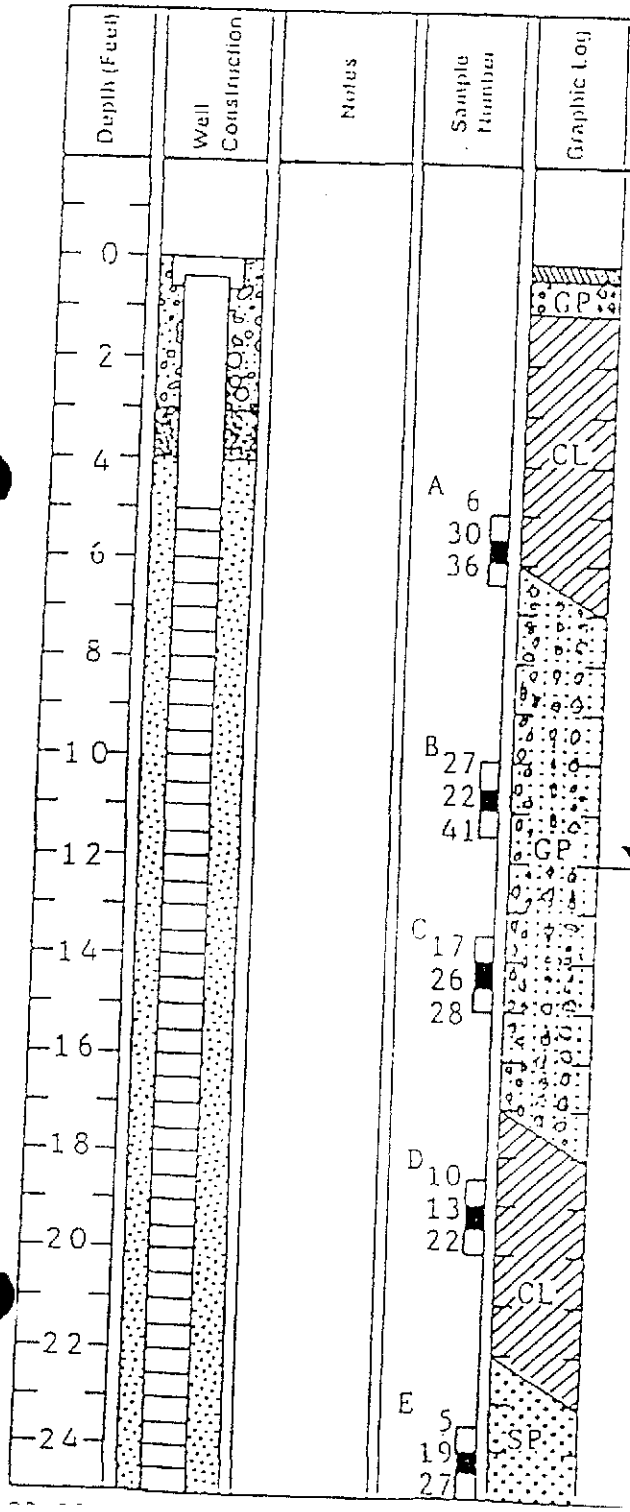
Casing: Dia. 2 in. Length 5 ft. Type PVC

Drilling Company Sierra Pacific Drilling Method hollow stem auger

Driller M. Isom Log by M. Winters

Sketch Map

Notes



Description/Soil Classification

Asphalt

Brown, sandy gravel fill, (slightly moist, very slight product odor).

Brown, silty clay, (some gravel and sand, very stiff, moist, no odor).

(Light brown color)

Multi-colored, sandy fine to coarse gravel,(some clay and sand, poorly sorted, very dense, moist, no odor).

11/10/86 (1530)

(Decrease in sand and clay, wet).

Brown, sandy clay, (some silt, hard, wet, no odor).

Light brown, medium sand, (dense, wet, no odor).

Drilled to 25 feet.

000064448

GROUNDWATER TECHNOLOGY, INC.

Drilling Log

Monitoring Well 7

Project Texaco/Livermore Owner Texaco Refining and Marketing
Location Livermore Project Number 203 150 4051
Date Drilled 12/5/89 Total Depth of Hole 25 ft Diameter 10.5 in
Surface Elevation ____ Water Level Initial 13 ft 24-hour ____
Screen: Dia. 4 in Length 20 ft Slot Size 0.020 in
Casing: Dia. 4 in Length 5 ft Type Sch. 40 PVC
Drilling Company Sierra Pacific Drilling Method hollow stem auger
Driller Chris DeSocio Log by Steve Kranyak
Geologist/Engineer ____ License No. ____

Sketch Map

SEE SITE MAP

Notes

Continuously sampled

Depth (Feet)	Well Construction	PID (ppm)	Sample	Graphic Log	Description/Soil Classification (Color, Texture, Structure)
0		0			3 inches asphalt over 2 inches aggregate base
2				CL	Brown gravelly, silty, sandy clay (soft, slightly moist, no product odor)
4		0			
6			A		Brown sandy, silty, gravelly clay (stiff, slightly moist, stiff, no product odor)
8		0		CL	(grades more stiff)
10		0	B		(grades light brown and tan)
12		0	C		
14					▼ Encountered water 12/5/89 (15:30 hours) (grades wet)
16		0	D E		Brown and black mottled sandy, silty, clayey gravel (loose, wet, no product odor)
18		0		GC	
20		0	F		(grades coarser)
22					
24		0			End of drilling, installed monitoring well to 25

000064449

Drilling Log

GROUNDWATER TECHNOLOGY, INC.

Monitoring Well 8

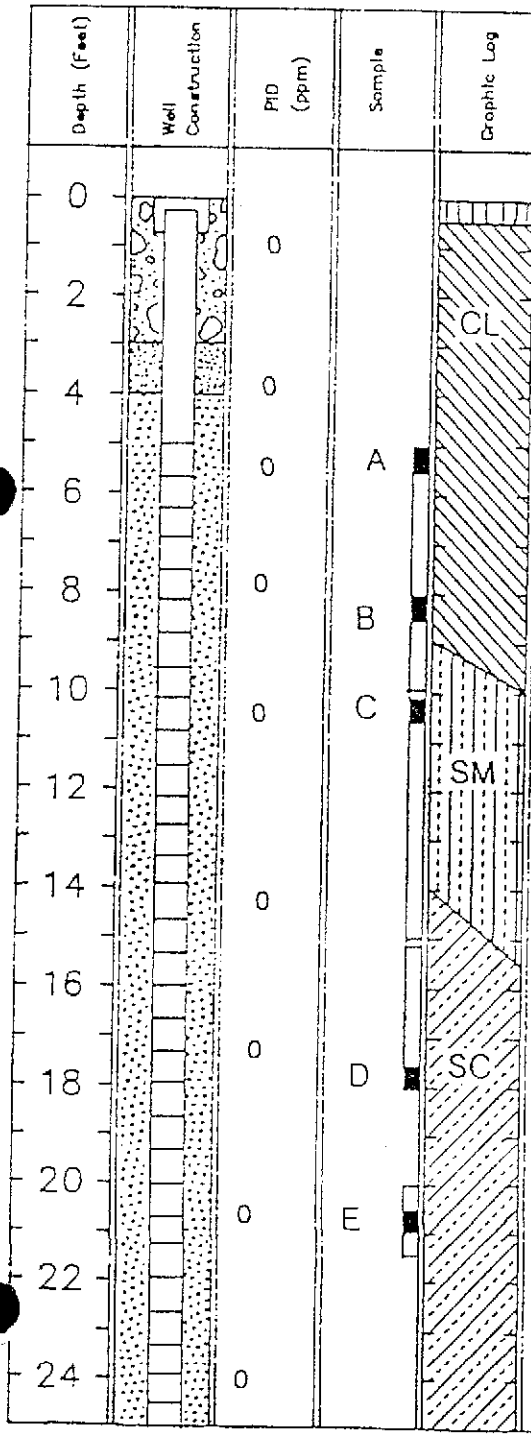
Project Texaco/Livermore Owner Texaco Refining and Marketing
Location Livermore Project Number 203 150 4051
Date Drilled 12/6/89 Total Depth of Hole 25 ft Diameter 10.5 in
Surface Elevation ____ Water Level Initial 15 ft 24-hour ____
Screen: Dia. 4 in Length 20 ft Slot Size 0.02 in
Casing: Dia. 4 in Length 5 ft Type ____
Drilling Company ____ Drilling Method hollow stem auger
Driller Chris DeSocio Log by Steve Kranyak
Geologist/Engineer ____ License No. ____

Sketch Map

SEE SITE MAP

Notes

Continuously sampled



Description/Soil Classification (Color, Texture, Structure)
6 inches grass and roots
Tan silty clay with trace gravels (stiff, moist, no product odor)
(grades with no gravels)
Brown fine sand with trace clay, wilt and gravel
(grades with cobbles)
▼ Encountered water 12/6/89 (15:00 hours)
Tan, silty, clayey sand (medium dense, wet, no product odor)
End of drilling, installed monitoring well

000064450

Date Completed: 1/20/89

Logged By: Timothy Huntting

Total Depth: 10.0 ft

Sampler: Modified California Sampler 2.5" O.D. 2.0" I.D.

Hammer Wt: 140 lbs.

Depth, ft	FIELD: Sample	FIELD: Blows/ft	LABORATORY: Dry Density pcf	LABORATORY: Moisture Content %	LABORATORY: Compress. strength tsf	LABORATORY: Other Tests	Pen, tsf	DESCRIPTION
								Surface Elevation: 520 ft
								ASPHALT - deteriorated.
		40	109	18	3.0	LL = 41 PI = 19	4.5+	CLAYEY GRAVEL (GC) - medium dense, brown, wet.
		20	106	19			4.5+	SILTY CLAY (CL) - very stiff, light reddish brown, wet, trace fine sand.
5								- stiff, grading to tan, increased silt content
		6					0.5	- soft, greenish gray, wet, strong gasoline odor.
								SANDY CLAY (CL) - soft, reddish brown, wet, strong odor.
		15					2.5	- firm, reddish brown mottled with gray, orange, and dark brown, wet, mild odor.
10								
15								
20								

000064451

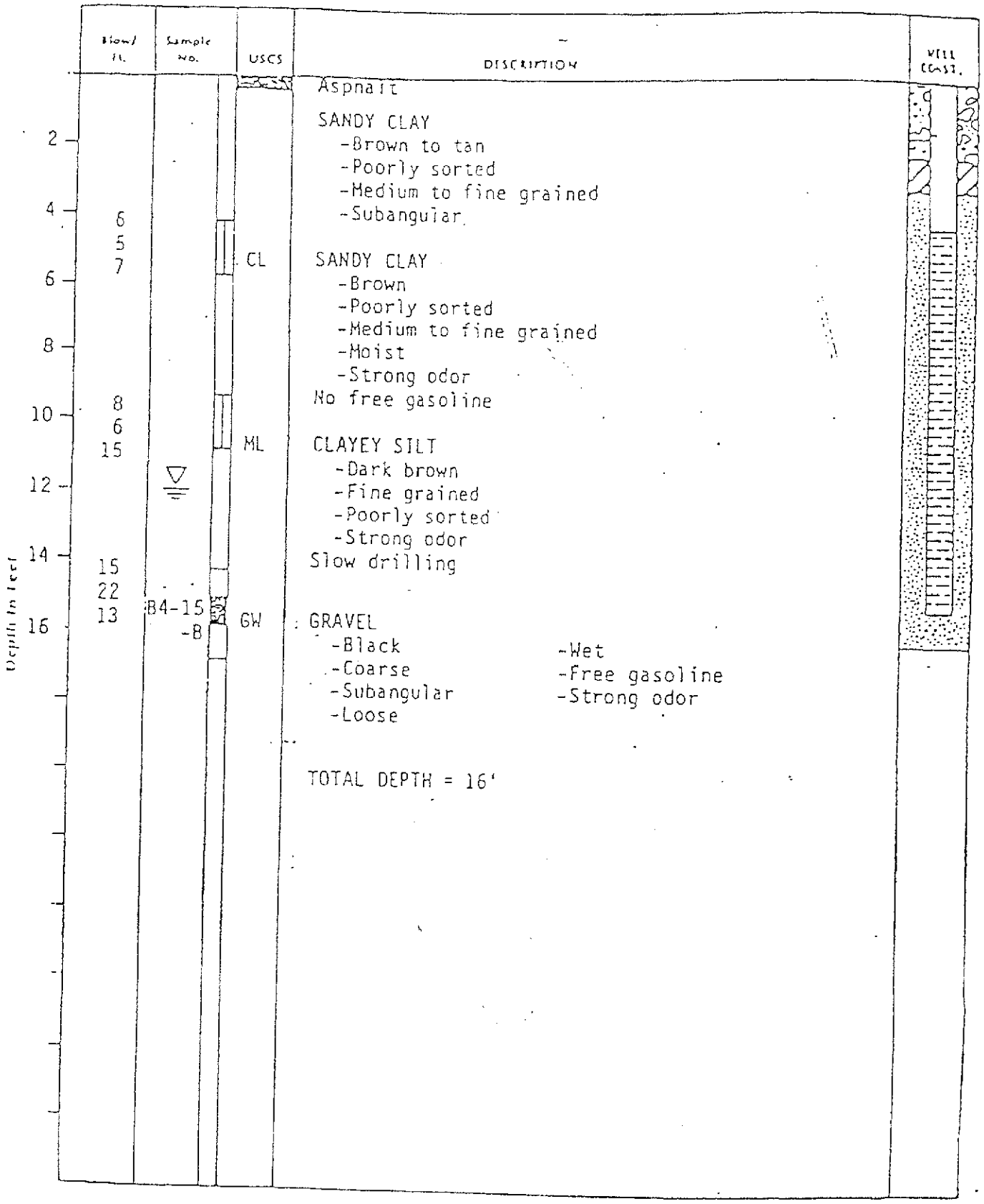
KLEINFELDER

PROJECT NO. 11-1978-01

SPRINGTOWN 7-ELEVEN
LIVERMORE, CALIFORNIA

LOG OF BORING NO. B-2

PLATE 5



000064456

H KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PROJECT NO. B-1423-1

PROPOSED 7-11 STORE
SPRINGTOWN BLVD. AND LASSEN RD
LIVERMORE, CA
LOG OF BORING NO. B-4

PLATE
4

GROUNDWATER TECHNOLOGY, INC.

Soil Boring 1

Drilling Log

Project Texaco/Livermore Owner Texaco Refining and Marketing
Location Livermore Project Number 203 150 4051
Date Drilled 12/4/89 Total Depth of Hole 32 ft Diameter 7.5 in
Surface Elevation ____ Water Level Initial 14.5 ft 24-hour ____
Screen: Dia. ____ Length ____ Slot Size ____
Casing: Dia. ____ Length ____ Type ____
Drilling Company Sierra Pacific Drilling Method hollow stem auger
Driller Chris DeSocio Log by Jan Prasil
Geologist/Engineer ____ License No. ____

Sketch Map

SEE SITE MAP

Notes

Continuously sampled

Depth (Feet)	Well Construction	PID (ppm)	Sample	Graphic Log	Description/Soil Classification (Color, Texture, Structure)
0					2 inches asphalt
2				CL	Brown sandy, silty clay (soft, moist, no product odor)
4					(grades yellow, less sandy, less moist)
6		0	A		
8					(grades yellow-green with gravels)
10		5	B		(grades more sandy) (grades with slight product odor)
12			C		
14		3	D		
16		120	30 50 E 28	GC	▼ Encountered water 12/4/90 (12:00 hours) Grey clayey, coarse gravel (wet, dense, strong product odor)
18					
20		84		SM	Grey clayey, coarse gravel (wet, dense, strong product odor)
22		115	F		
		160	15 15 15	GC	
24					
		140			

000064452

GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

Soil Boring 1

Drilling Log

Depth (Feet)	Well Construction	Holes	Sample Number	Graphic Log	Description/Soil Classification (Color, Texture, Structures)
26		140			(grades black, sandy)
28		80 75	G	SM	(grades with increasing product odor)
30		280			(grades more clayey, less sandy)
32		80	H	CL	Yellow sandy clay (wet, medium stiff, moderate product odor) End of drilling, backfilled with concrete)
34					
36					
38					
40					
42					
44					
46					
48					
50					
52					
54					
56					
58					

02100144

000064453

GROUNDWATER TECHNOLOGY, INC.

Soil Boring 2

Drilling Log

Project Texaco/Livermore Owner Texaco Refining and Marketing
Location Livermore Project Number 203 150 4051
Date Drilled 12/5/89 Total Depth of Hole 25 ft Diameter 7.5 in
Surface Elevation ____ Water Level Initial 15 ft 24-hour ____
Screen: Dia. ____ Length ____ Slot Size ____
Casing: Dia. ____ Length ____ Type ____
Drilling Company Sierra Pacific Drilling Method hollow stem auger
Driller Chris DeSocio Log by Steve Kranyak
Geologist/Engineer AB Shum License No. RG-4394

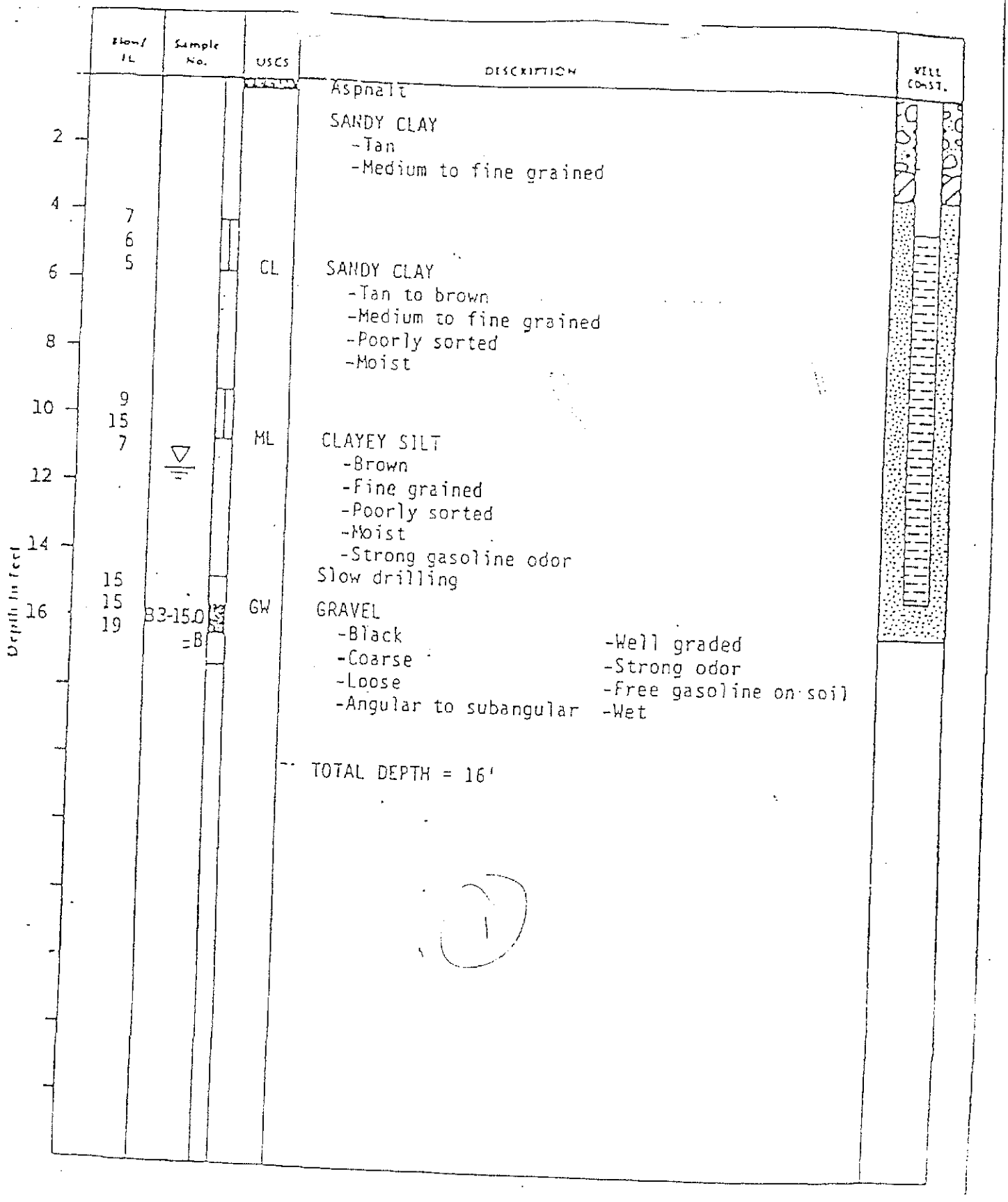
Sketch Map

SEE SITE MAP

Notes
Continuously sampled

Depth (Feet)	Well Construction	PID (ppm)	Sample	Graphic Log	Description/Soil Classification (Color, Texture, Structure)
0					3 inches asphalt over 2 inches aggregate base
2		0		CL	Tan and brown silty clay with some very fine sand (soft, moist, no product odor)
4					
6		0		SM	Greyish tan clayey, silty, fine sand with trace gravels (loose, wet, slight product odor)
8		0			Dark brown gravel with little clay, silt, and sand (loose, moist, no product odor)
10		0	A B	GM	
12		0			
14		0	C		
16					▼ Encountered water 12/5/90 (12:00 hours)
18		0			(grades brown)
20		0	D		
22		0		SC	Light brown silty, sandy clay with some pebbles (stiff, wet, no product odor)
24		0	E		End of drilling, backfilled with concrete

000064454



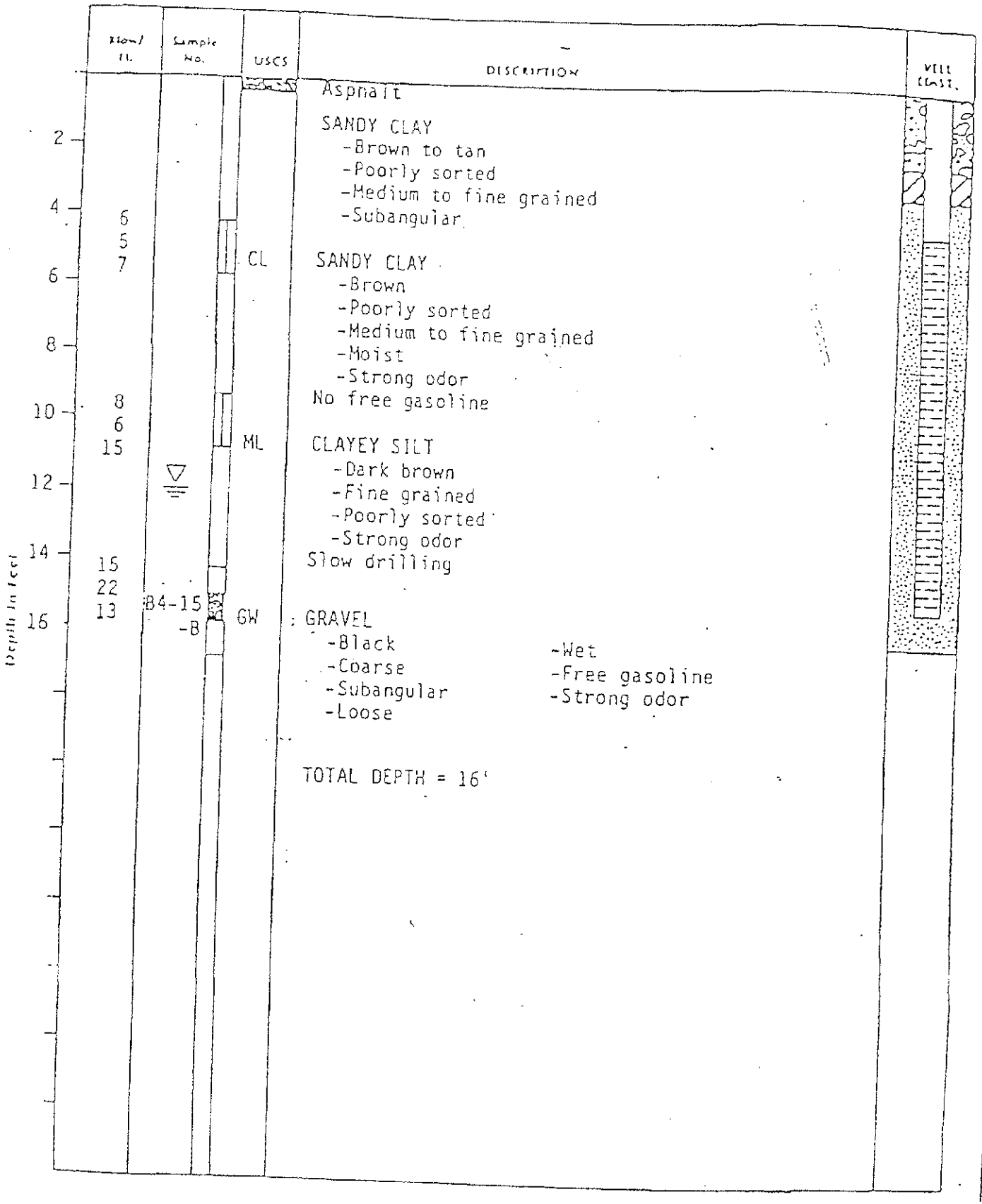
000064455

H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PROJECT NO. B-1423-1

PROPOSED 7-11 STORE
SPRINGTOWN BLVD. AND LASSEN RD.
LIVERMORE, CA
LOG OF BORING NO. B-3
(MWJ-A)

PLATE 3



000064456

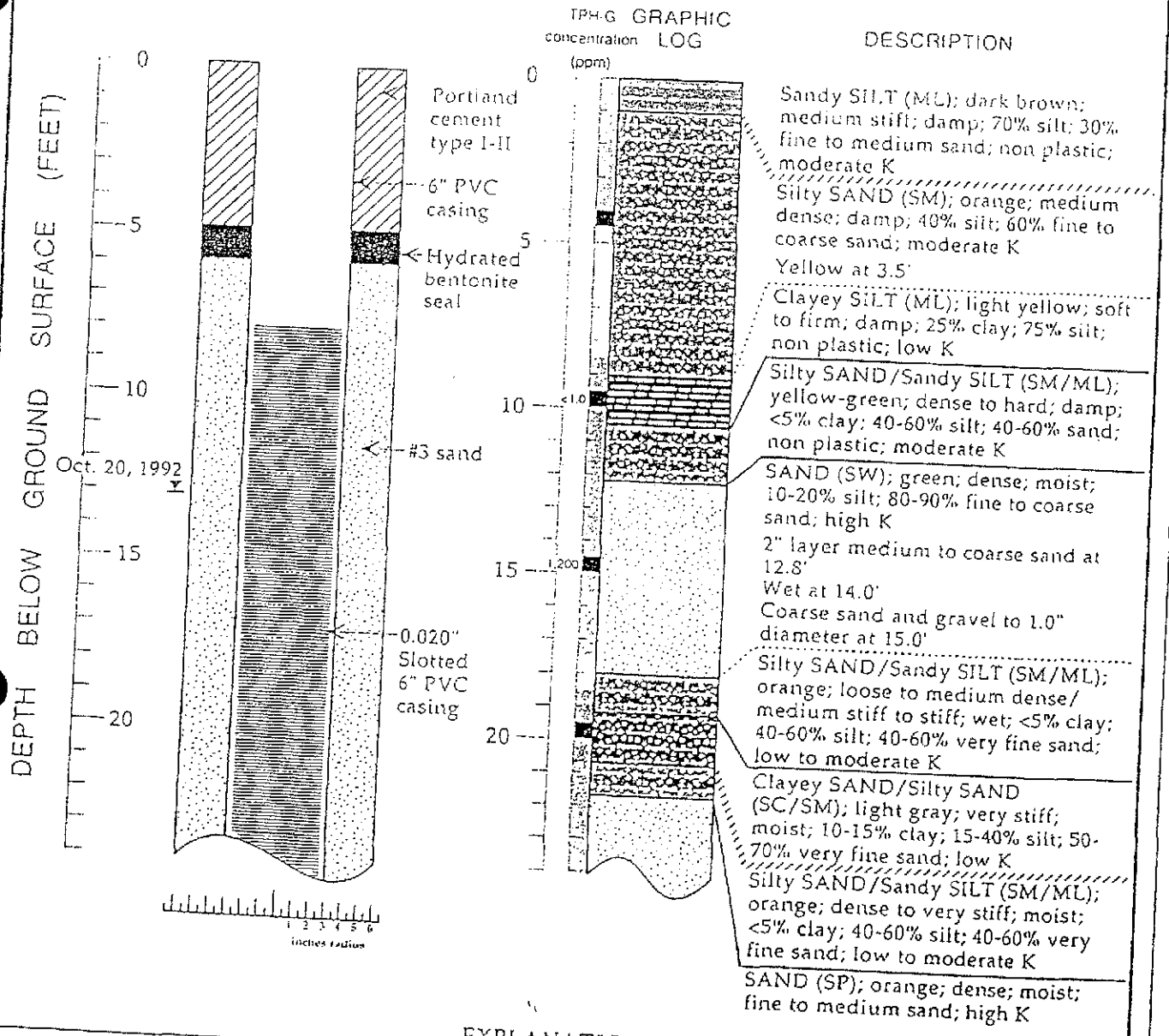
H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PROJECT NO. B-1423-1

PROPOSED 7-11 STORE
SPRINGTOWN BLVD. AND LASSEN RD
LIVERMORE, CA
LOG OF BORING NO. B-4

PLATE 4

WELL EW-1 (B-1)



EXPLANATION

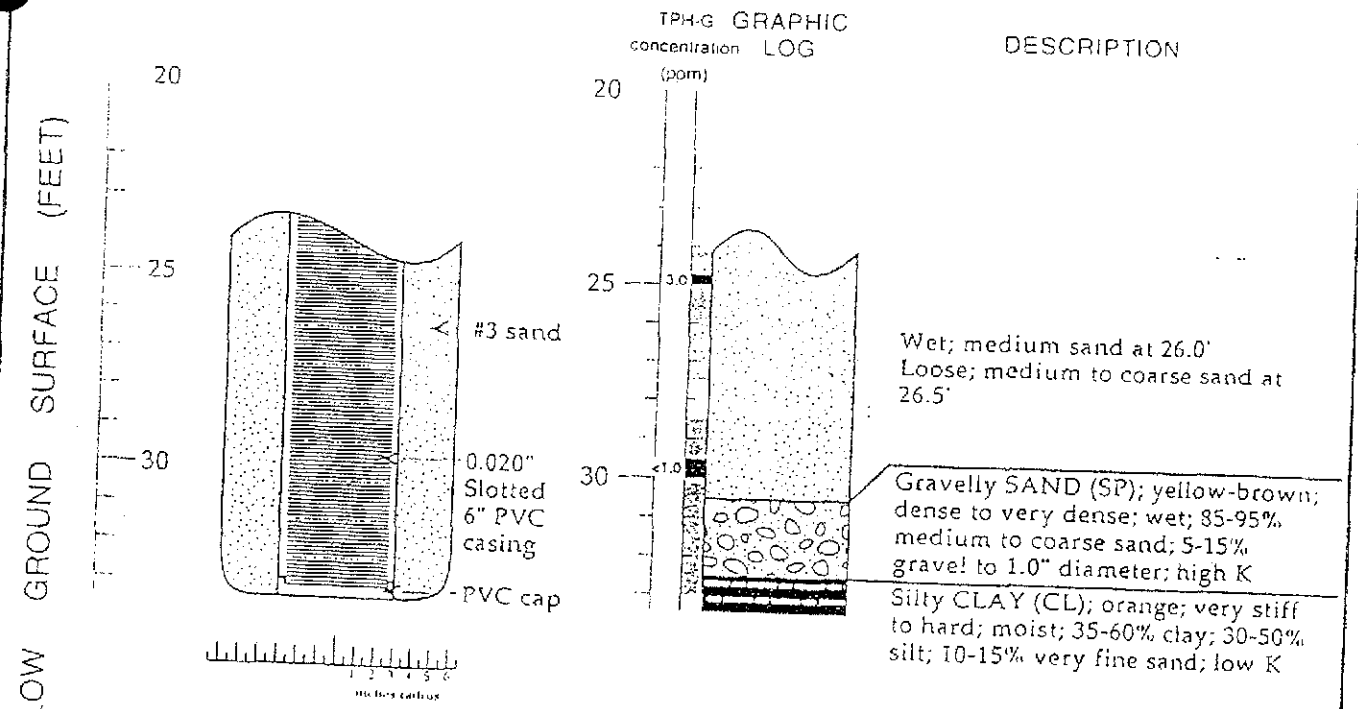
- Water level during drilling (date)
- Water level (date)
- Contact (dotted where approximate)
- Uncertain contact
- Gradational contact
- Location of recovered drive sample
- Location of drive sample sealed for chemical analysis
- Cutting sample
- K = Estimated hydraulic conductivity

Logged By: Eric Anderson
Supervisor: Joseph P. Theisen; CEG 1645
Drilling Company: HEW Drilling, East Palo Alto, CA
License Number: C57-384167
Driller: Tomas Jaime
Drilling Method: 6" and 12" O.D. hollow-stem auger
Date Drilled: October 19-20, 1992
Well Head Completion: Temporary, traffic-rated vault
Type of Sampler: Split barrel (1.5", 2", 2.5" ID)
Ground Surface Elevation: Approximately 520 feet above mean sea level
TPH-G: Total petroleum hydrocarbon as gasoline in soil by EPA Method 5030 with GC/FID

Boring Log and Well Construction Details - Well EW-1 (B-1) - Former Texaco Service Station, 930 Springtown Boulevard, Livermore, California

000064457

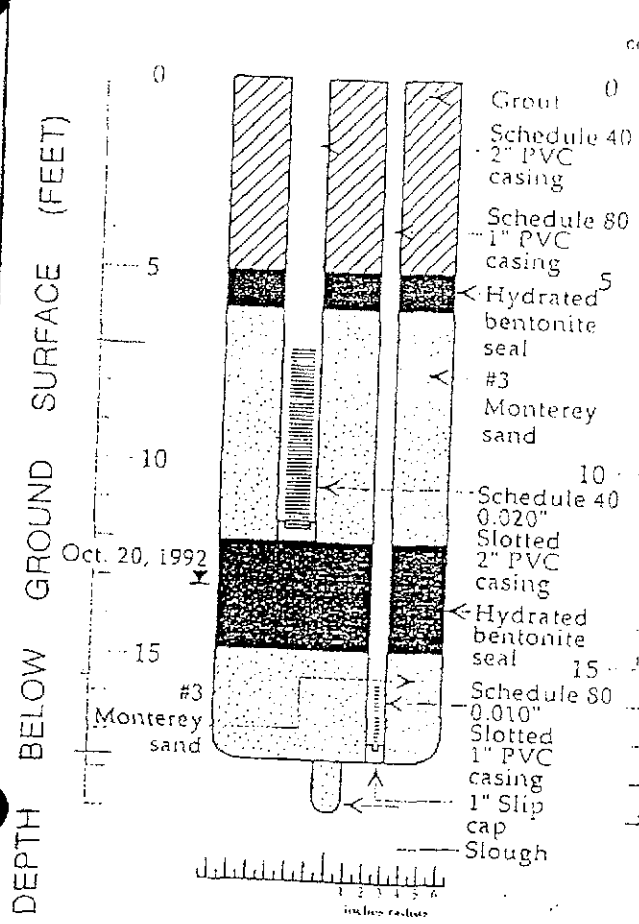
WELL EW-1 (B-1) (cont.)

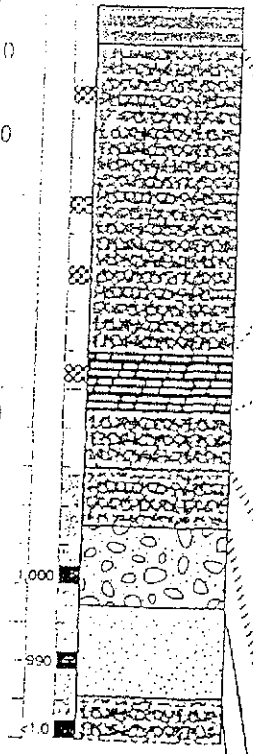


Boring Log and Well Construction Details - Well EW-1 (B-1) - Former Texaco Service Station, 930 Springtown Boulevard, Livermore, California

1/5/93

WELL VE-1/SP-1 (B-2)





TPH-G GRAPHIC LOG

DESCRIPTION

Sandy SILT (ML); dark brown; medium stiff; damp; 70% silt; 30% fine to medium sand; non plastic; moderate K

Silty SAND (SM); orange; medium dense; damp; 40% silt; 60% fine to coarse sand; moderate K
Yellow at 3.5'

Clayey SILT (ML); light yellow; soft to firm; damp; 25% clay; 75% silt; non plastic; low K

Silty SAND/Sandy SILT (SM/ML); yellow-green; medium dense to dense to very stiff; damp; <5% clay; 40-60% silt; 40-60% sand; moderate K

Silty SAND (SM); green; medium dense to dense; moist; 10-20% silt; 80-90% fine sand; moderate to high K
Angular to subangular gravel to 1.0" diameter at 13.0'

Gravelly SAND/Silty SAND (SW); green; medium dense to dense; moist; 15% silt; 75% fine sand; 10% gravel to 0.5" diameter; high K

SAND (SP); green; medium dense to dense; wet; 95% medium sand; 5% gravel to 1" diameter; high K
Subangular to sub rounded gravel to 2.0" diameter at 16.5'
95% coarse sand; very high K at 16.7'

Silty SAND/Clayey SAND (SM/SC); orange; medium dense; damp; 10-15% clay; 15-40% silt; 50-70% very fine sand; low K

EXPLANATION

- Water level during drilling (date)
- Water level (date)
- Contact (dotted where approximate)
- Uncertain contact
- Gradational contact
- Location of recovered drive sample
- Location of drive sample sealed for chemical analysis
- Cutting sample
- K = Estimated hydraulic conductivity

Logged By: Eric Anderson
Supervisor: Joseph P. Theisen; CEG 1645
Drilling Company: HEW Drilling, East Palo Alto, CA
License Number: C57-384157
Driller: Tomas Jaime
Drilling Method: 6" and 12" O.D. hollow-stem auger
Date Drilled: October 20, 1992
Well Head Completion: Temporary, traffic-rated vault
Type of Sampler: Split barrel (1.5", 2", 2.5" ID)
Ground Surface Elevation: Approximately 520 feet above mean sea level
TPH-G: Total petroleum hydrocarbon as gasoline in soil by EPA Method 5030 with GC/FID

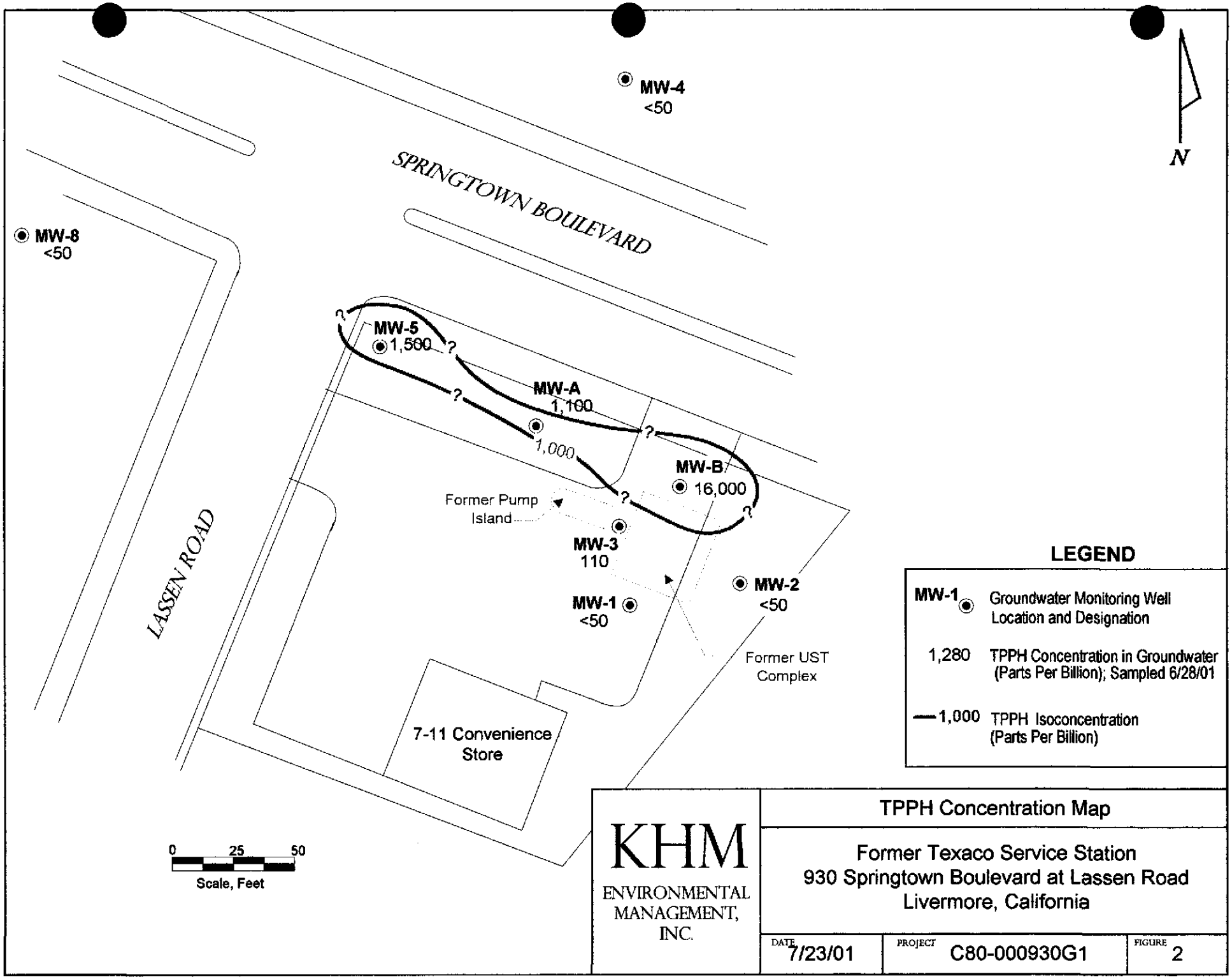
Boring Log and Well Construction Details - Well VE-1/SP-1 (B-2) - Former Texaco Service Station, 930 Sprintown Boulevard, Livermore, California

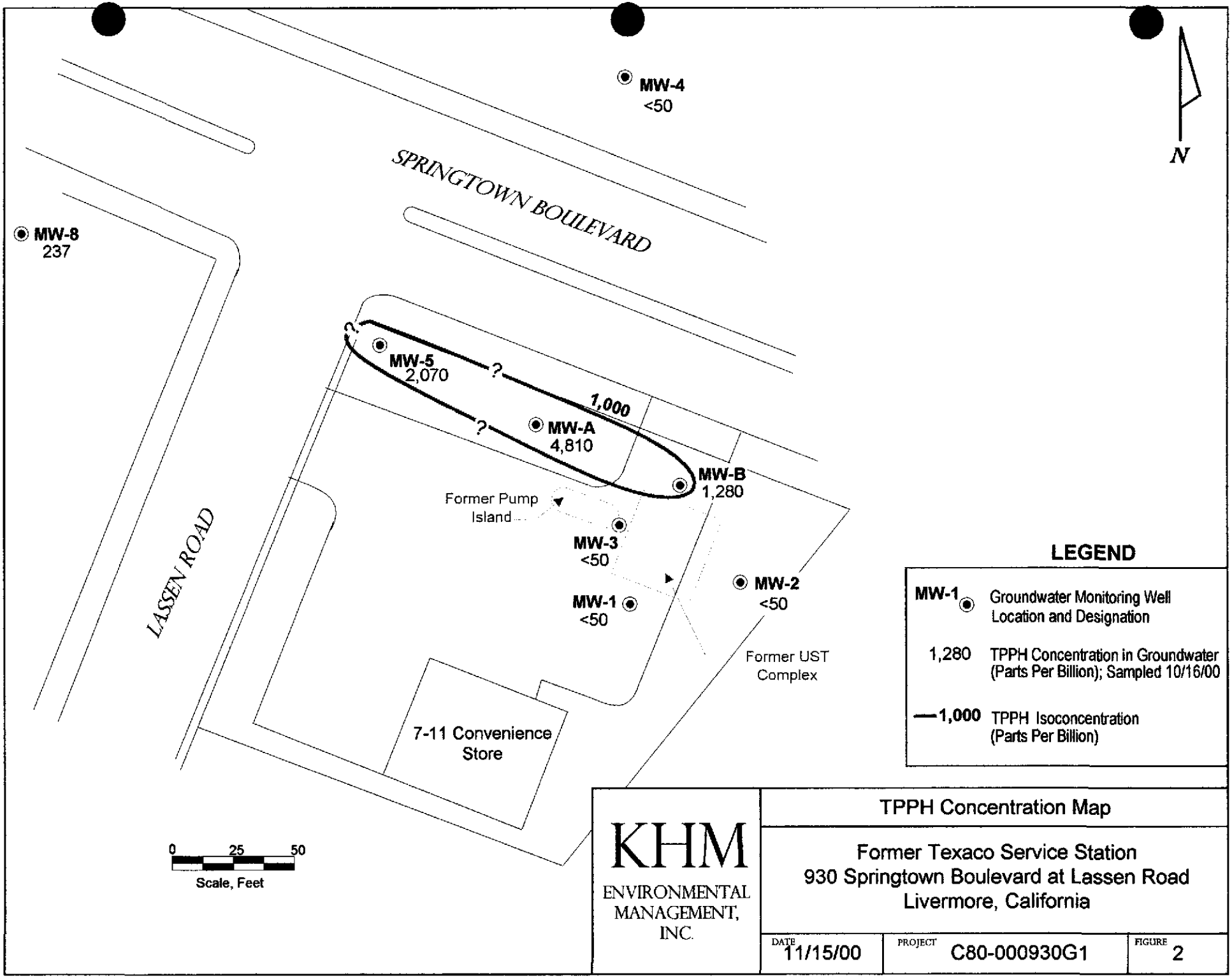
000064459

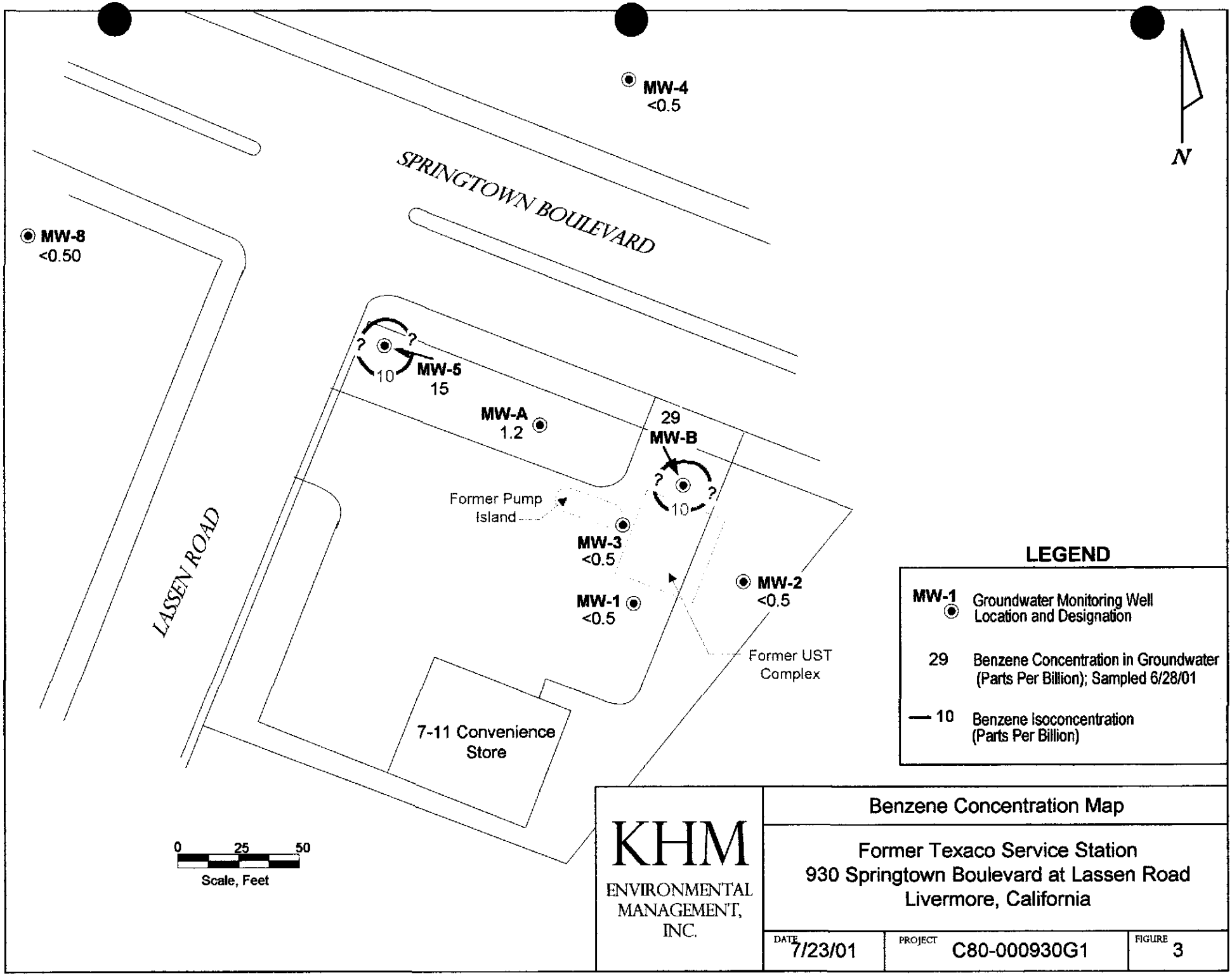
1/5/93

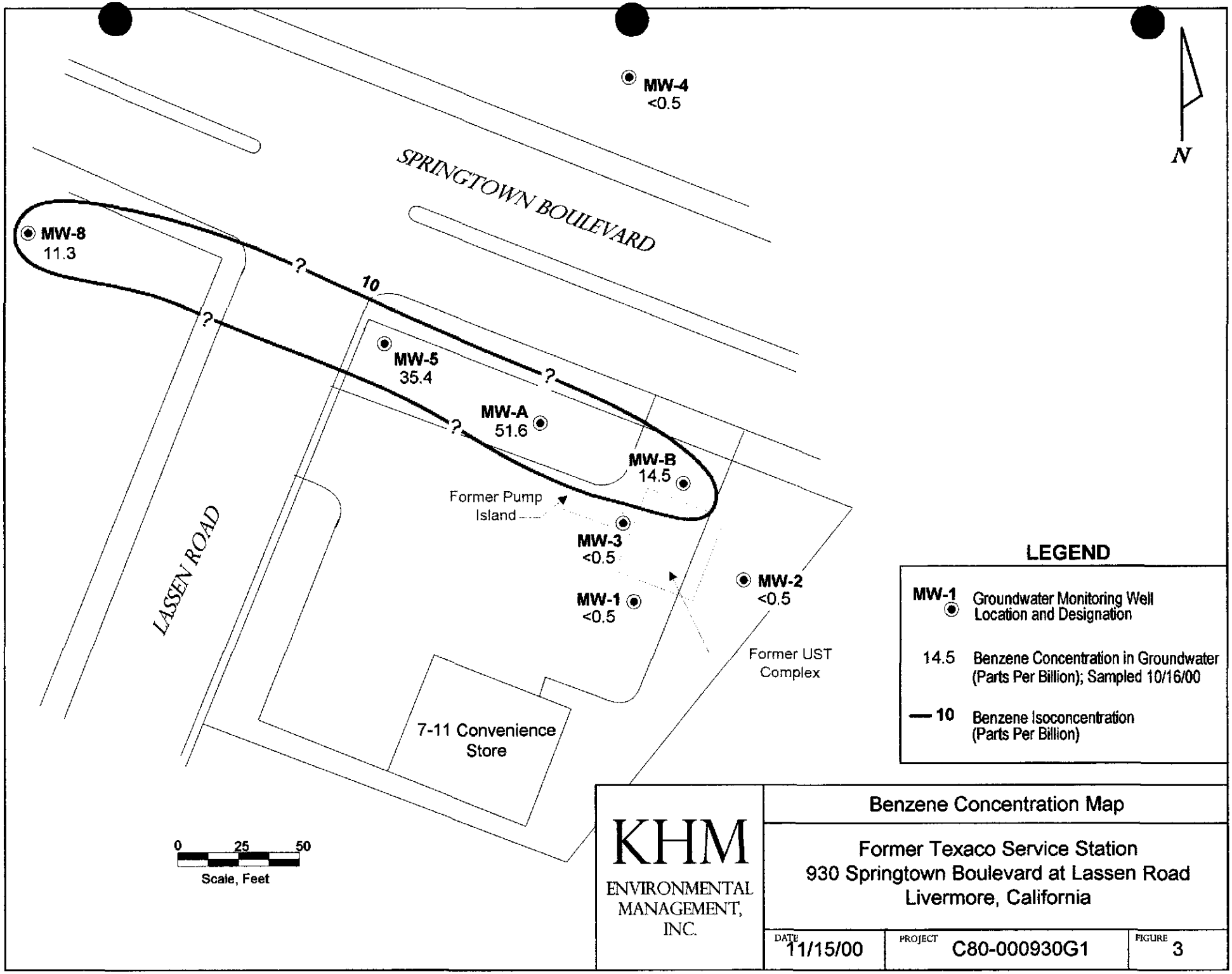
APPENDIX D

GROUNDWATER ANALYTICAL DATA


MW-4
<50
SPRINGTOWN BOULEVARD
N
MW-8
<50
MW-5
1,500
MW-A
1,100
1,000
MW-B
16,000
Former Pump
Island
MW-3
110
MW-1
<50
MW-2
<50
LASSEN ROAD
Former UST
Complex
7-11 Convenience
Store
0 25 50
Scale, Feet
LEGEND
MW-1 Groundwater Monitoring Well Location and Designation
1,280 TPPH Concentration in Groundwater (Parts Per Billion); Sampled 6/28/01
1,000 TPPH Isoconcentration (Parts Per Billion)
KHM
ENVIRONMENTAL MANAGEMENT, INC.
TPPH Concentration Map
Former Texaco Service Station
930 Springtown Boulevard at Lassen Road
Livermore, California
DATE 7/23/01
PROJECT C80-000930G1
FIGURE 2


MW-4
<50
SPRINGTOWN BOULEVARD
N
MW-8
237
?
MW-5
2,070
?
1,000
?
MW-A
4,810
MW-B
1,280
Former Pump
Island
MW-3
<50
MW-2
<50
MW-1
<50
LASSEN ROAD
Former UST
Complex
7-11 Convenience
Store
0
25
50
Scale, Feet
LEGEND
MW-1
Groundwater Monitoring Well
Location and Designation
1,280
TPPH Concentration in Groundwater
(Parts Per Billion); Sampled 10/16/00
1,000
TPPH Isoconcentration
(Parts Per Billion)
KHM
ENVIRONMENTAL
MANAGEMENT,
INC.
TPPH Concentration Map
Former Texaco Service Station
930 Springtown Boulevard at Lassen Road
Livermore, California
DATE
11/15/00
PROJECT
C80-000930G1
FIGURE
2


MW-4
<0.5
SPRINGTOWN BOULEVARD
N
MW-8
<0.50
LASSEN ROAD
MW-5
15
10
MW-A
1.2
29
MW-B
10
Former Pump
Island
MW-3
<0.5
MW-1
<0.5
MW-2
<0.5
Former UST
Complex
7-11 Convenience
Store
0 25 50
Scale, Feet
LEGEND
MW-1 Groundwater Monitoring Well Location and Designation
29 Benzene Concentration in Groundwater (Parts Per Billion); Sampled 6/28/01
10 Benzene Isoconcentration (Parts Per Billion)
KHM
ENVIRONMENTAL MANAGEMENT, INC.
Benzene Concentration Map
Former Texaco Service Station
930 Springtown Boulevard at Lassen Road
Livermore, California
DATE 7/23/01
PROJECT C80-000930G1
FIGURE 3


MW-4
<0.5
SPRINGTOWN BOULEVARD
N
MW-8
11.3
?
10
?
?
?
MW-5
35.4
MW-A
51.6
MW-B
14.5
Former Pump
Island
MW-3
<0.5
LASSEN ROAD
MW-1
<0.5
MW-2
<0.5
Former UST
Complex
7-11 Convenience
Store
0
25
50
Scale, Feet
LEGEND
MW-1
Groundwater Monitoring Well
Location and Designation
14.5
Benzene Concentration in Groundwater
(Parts Per Billion); Sampled 10/16/00
10
Benzene Isoconcentration
(Parts Per Billion)
KHM
ENVIRONMENTAL
MANAGEMENT,
INC.
Benzene Concentration Map
Former Texaco Service Station
930 Springtown Boulevard at Lassen Road
Livermore, California
DATE
11/15/00
PROJECT
C80-000930G1
FIGURE
3

WELL CONCENTRATIONS
Former Texaco Service Station
930 Springtown Boulevard
Livermore, CA

Well ID	Date	TPPH (ug/L)	B (ug/L)	T (ug/L)	E (ug/L)	X (ug/L)	MTBE 8020 (ug/L)	MTBE 8260 (ug/L)	TOC (MSL)	Depth to Water (ft.)	GW Elevation (MSL)
MW-A	01/02/1992	NA	NA	NA	NA	NA	NA	NA	520.10	13.61	506.49
MW-A	04/02/1992	27000	1200	570	1700	2300	NA	NA	520.10	12.44	507.66
MW-A	07/21/1992	57000	1500	1800	2700	7100	NA	NA	520.10	13.35	506.75
MW-A	10/09/1992	56000	2900	2600	4600	12000	NA	NA	520.10	12.92	507.18
MW-A	01/11/1993	NA	NA	NA	NA	NA	NA	NA	520.10	11.78	508.32
MW-A	05/05/1993	NA	NA	NA	NA	NA	NA	NA	520.10	11.39	508.71
MW-A	08/09/1993	NA	NA	NA	NA	NA	NA	NA	520.10	12.80	507.30
MW-A	10/14/1993	NA	NA	NA	NA	NA	NA	NA	520.10	13.48	506.62
MW-A	01/24/1994	1400000	6900	2100	15000	38000	NA	NA	520.10	12.74	507.36
MW-A	05/31/1994	48000	1200	900	1900	4200	NA	NA	520.10	12.28	507.82
MW-A	08/31/1994	24000	140	120	830	1500	NA	NA	520.10	13.20	506.90
MW-A	11/02/1994	15000	230	360	1100	1800	NA	NA	520.10	13.15	506.95
MW-A	02/20/1995	12000	290	330	570	1300	NA	NA	520.10	11.71	508.39
MW-A	05/09/1995	1200	6.1	5.9	12	15	NA	NA	520.10	12.37	507.73
MW-A	08/21/1995	9600	85	140	250	860	160	NA	520.10	11.37	508.73
MW-A	10/20/1995	360	5.2	7.9	15	43	NA	NA	520.10	12.04	508.06
MW-A	02/07/1996	6100	130	180	320	840	NA	NA	520.10	10.11	509.99
MW-A	04/30/1996	410	1.2	0.67	1.2	1.5	NA	NA	520.10	10.28	509.82
MW-A	08/14/1996	3000	65	75	170	460	57	NA	520.10	10.82	509.28
MW-A	11/22/1996	6300	100	170	310	710	64	NA	520.10	10.97	509.13
MW-A	02/14/1997	8100	140	180	700	1600	<300	NA	520.10	10.00	510.10
MW-A	05/23/1997	24000	340	520	1600	3800	<2000	NA	520.10	11.36	508.74
MW-A	07/25/1997	440	<0.5	<0.5	<0.5	<0.5	<30	NA	520.10	11.66	508.44
MW-A	10/31/1997	3700	21	48	200	430	35	NA	520.10	11.56	508.54
MW-A	02/06/1998	1500	2.1	4.4	55	77	<30	NA	520.10	9.00	511.10

WELL CONCENTRATIONS
Former Texaco Service Station
930 Springtown Boulevard
Livermore, CA

Well ID	Date	TPPH (ug/L)	B (ug/L)	T (ug/L)	E (ug/L)	X (ug/L)	MTBE 8020 (ug/L)	MTBE 8260 (ug/L)	TOC (MSL)	Depth to Water (ft.)	GW Elevation (MSL)
MW-A	05/19/1998	32000	310	380	1800	3700	1300	NA	520.10	9.85	510.25
MW-A	07/31/1998	<50	<0.5	<0.5	<0.5	<0.5	<2.5	NA	520.10	10.04	510.06
MW-A	11/04/1998	15000	86	180	960	1800	<50	<50	520.10	11.09	509.01
MW-A	11/11/1999	1010	4.72	<2.50	26.1	59.9	87.6	<0.500	520.10	11.39	508.71
MW-A	04/03/2000	12800	23.8	54.9	704	1070	242	NA	520.10	10.41	509.69
MW-A	10/16/2000	4810	51.6	<20.0	251	434	108	<10.0	520.10	11.59	508.51
MW-A	**06/28/2001**	**1100**	**1.2**	**2.4**	**51**	**64**	**NA**	**<0.50**	**520.10**	**12.13**	**507.97**
MW-B	01/02/1992	NA	NA	NA	NA	NA	NA	NA	518.05	11.27	506.78
MW-B	04/02/1992	1900	ND	39	24	35	NA	NA	518.05	10.18	507.87
MW-B	07/21/1992	16000	180	1600	270	1100	NA	NA	518.05	11.27	506.78
MW-B	10/09/1992	38000	490	8300	1400	5100	NA	NA	518.05	11.64	506.41
MW-B	01/11/1993	NA	NA	NA	NA	NA	NA	NA	518.05	9.65	508.40
MW-B	05/05/1993	NA	NA	NA	NA	NA	NA	NA	518.05	9.28	508.77
MW-B	08/09/1993	NA	NA	NA	NA	NA	NA	NA	518.05	11.02	507.03
MW-B	10/14/1993	NA	NA	NA	NA	NA	NA	NA	518.05	11.34	506.71
MW-B	01/24/1994	23000	110	1700	600	1900	NA	NA	518.05	10.54	507.51
MW-B	05/31/1994	13000	780	310	370	1400	NA	NA	518.05	10.19	507.86
MW-B	08/31/1994	35000	160	2800	1000	4500	NA	NA	518.05	10.98	507.07
MW-B	11/02/1994	2500	170	3200	1100	4700	NA	NA	518.05	10.90	507.15
MW-B	02/20/1995	10000	46	1400	330	1200	NA	NA	518.05	9.47	508.58
MW-B	05/09/1995	4100	9.1	47	26	30	NA	NA	518.05	10.58	507.47
MW-B	08/21/1995	4000	9.6	110	120	270	98	NA	518.05	9.34	508.71
MW-B	10/20/1995	9300	35	1300	370	1300	NA	NA	518.05	9.83	508.22
MW-B	02/07/1996	8900	33	700	110	360	NA	NA	518.05	7.85	510.20
MW-B	04/30/1996	5500	17	460	120	400	NA	NA	518.05	8.02	510.03

WELL CONCENTRATIONS
Former Texaco Service Station
930 Springtown Boulevard
Livermore, CA

Well ID	Date	TPPH (ug/L)	B (ug/L)	T (ug/L)	E (ug/L)	X (ug/L)	MTBE 8020 (ug/L)	MTBE 8260 (ug/L)	TOC (MSL)	Depth to Water (ft.)	GW Elevation (MSL)
MW-B	08/14/1996	9000	<5	260	120	320	<300	NA	518.05	8.66	509.39
MW-B	11/22/1996	560000	56	2400	1600	5500	<3000	NA	518.05	8.70	509.35
MW-B	02/14/1997	4600	5.2	110	72	210	<300	NA	518.05	7.75	510.30
MW-B	05/23/1997	34000	75	1700	590	2100	1800	NA	518.05	9.05	509.00
MW-B	07/25/1997	39000	250	5200	1600	5900	<800	NA	518.05	9.37	508.68
MW-B	10/31/1997	36000	130	2600	1200	4800	<800	NA	518.05	9.29	508.76
MW-B	02/06/1998	4800	10	120	72	200	<80	NA	518.05	6.68	511.37
MW-B	05/19/1998	25000	200	900	410	1600	570	NA	518.05	7.57	510.48
MW-B	07/31/1998	580	<0.5	<0.5	<0.5	<0.5	14	NA	518.05	8.03	510.02
MW-B	11/04/1998	24000	150	1400	850	2400	<50	<66	518.05	8.85	509.20
MW-B	11/11/1999	685	7.22	14.7	6.10	17.8	<12.5	NA	518.05	9.03	509.02
MW-B	04/03/2000	9250	106	477	346	1320	231	<1.00a	518.05	8.14	509.91
MW-B	10/16/2000	1280	14.5	13.8	13.3	38.8	26.5	NA	518.05	9.42	508.63
MW-B	**06/28/2001**	**16000**	**29**	**550**	**470**	**1700**	**NA**	**<2.5**	**518.05**	**9.81**	**508.24**
MW-1	01/02/1992	16	6	ND	ND	ND	NA	NA	520.61	14.11	506.50
MW-1	04/02/1992	ND	ND	ND	ND	ND	NA	NA	520.61	12.98	507.63
MW-1	07/21/1992	<50	3.2	<0.5	<0.5	<0.5	NA	NA	520.61	13.92	506.69
MW-1	10/09/1992	<50	8.5	<0.5	<0.5	<0.5	NA	NA	520.61	14.25	506.36
MW-1	01/11/1993	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	520.61	12.30	508.31
MW-1	05/05/1993	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	520.61	11.88	508.73
MW-1	08/09/1993	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	520.61	13.63	506.98
MW-1	10/14/1993	440	16	2.9	2.9	11	NA	NA	520.61	13.91	506.70
MW-1	01/24/1993	NA	NA	NA	NA	NA	NA	NA	520.61	13.12	507.49
MW-1	05/31/1994	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	520.61	12.74	507.87
MW-1	08/31/1994	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	520.61	13.68	506.93

WELL CONCENTRATIONS
Former Texaco Service Station
930 Springtown Boulevard
Livermore, CA

Well ID	Date	TPPH (ug/L)	B (ug/L)	T (ug/L)	E (ug/L)	X (ug/L)	MTBE 8020 (ug/L)	MTBE 8260 (ug/L)	TOC (MSL)	Depth to Water (ft.)	GW Elevation (MSL)
MW-1	11/02/1994	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	520.61	13.48	507.13
MW-1	02/20/1995	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	520.61	12.02	508.59
MW-1	05/09/1995	450	22	25	23	100	NA	NA	520.61	12.83	507.78
MW-1	08/21/1995	58	<0.5	1.5	1.8	4.5	<10	NA	520.61	11.93	508.68
MW-1	10/20/1995	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	520.61	12.40	508.21
MW-1	02/07/1996	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	520.61	10.42	510.19
MW-1	04/30/1996	NA	NA	NA	NA	NA	NA	NA	520.61	10.48	510.13
MW-1	08/14/1996	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	520.61	11.18	509.43
MW-1	11/22/1996	NA	NA	NA	NA	NA	NA	NA	520.61	11.10	509.51
MW-1	02/14/1997	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	520.61	10.25	510.36
MW-1	05/23/1997	NA	NA	NA	NA	NA	NA	NA	520.61	11.48	509.13
MW-1	07/25/1997	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	520.61	11.99	508.62
MW-1	10/31/1997	NA	NA	NA	NA	NA	NA	NA	520.61	11.74	508.87
MW-1	02/06/1998	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	520.61	9.27	511.34
MW-1	05/19/1998	NA	NA	NA	NA	NA	NA	NA	520.61	10.51	510.10
MW-1	07/31/1998	<50	<0.5	<0.5	<0.5	<0.5	<2.5	NA	520.61	10.41	510.20
MW-1	11/04/1998	<50	<0.50	<0.50	<0.50	<0.50	<2.5	NA	520.61	11.32	509.29
MW-1	11/11/1999	82.5	6.35	7.08	4.76	10.9	3.13	1.08	520.61	11.54	509.07
MW-1	04/03/2000	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50	NA	520.61	10.65	509.96
MW-1	10/16/2000	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50	NA	520.61	11.91	508.70
MW-1	**06/28/2001**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**NA**	**0.65**	**520.61**	**12.37**	**508.24**
MW-2	01/02/1992	ND	ND	ND	ND	ND	NA	NA	518.29	11.96	506.33
MW-2	04/02/1992	ND	ND	ND	ND	ND	NA	NA	518.29	10.89	507.40
MW-2	07/21/1992	NA	NA	NA	NA	NA	NA	NA	518.29	11.55	506.74
MW-2	05/31/1994	NA	NA	NA	NA	NA	NA	NA	518.29	10.37	507.92

WELL CONCENTRATIONS
Former Texaco Service Station
930 Springtown Boulevard
Livermore, CA

Well ID	Date	TPPH (ug/L)	B (ug/L)	T (ug/L)	E (ug/L)	X (ug/L)	MTBE 8020 (ug/L)	MTBE 8260 (ug/L)	TOC (MSL)	Depth to Water (ft.)	GW Elevation (MSL)
MW-2	08/31/1994	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	518.29	11.16	507.13
MW-2	11/02/1994	NA	NA	NA	NA	NA	NA	NA	518.29	11.07	507.22
MW-2	02/20/1995	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	518.29	9.66	508.63
MW-2	05/09/1995	NA	NA	NA	NA	NA	NA	NA	518.29	10.14	508.15
MW-2	08/21/1995	<50	<0.5	<0.5	<0.5	<0.5	<10	NA	518.29	9.58	508.71
MW-2	10/20/1995	NA	NA	NA	NA	NA	NA	NA	518.29	9.91	508.38
MW-2	02/07/1996	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	518.29	8.00	510.29
MW-2	04/30/1996	NA	NA	NA	NA	NA	NA	NA	518.29	8.21	510.08
MW-2	08/14/1996	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	518.29	8.88	509.41
MW-2	11/22/1996	NA	NA	NA	NA	NA	NA	NA	518.29	8.88	509.41
MW-2	02/14/1997	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	518.29	7.92	510.37
MW-2	05/23/1997	NA	NA	NA	NA	NA	NA	NA	518.29	9.25	509.04
MW-2	07/25/1997	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	518.29	9.51	508.78
MW-2	10/31/1997	NA	NA	NA	NA	NA	NA	NA	518.29	9.30	508.99
MW-2	02/06/1998	<50	<0.5	<0.5	<0.5	1.4	<30	NA	518.29	6.88	511.41
MW-2	05/19/1998	NA	NA	NA	NA	NA	NA	NA	518.29	8.35	509.94
MW-2	07/31/1998	<50	<0.5	<0.5	<0.5	<0.5	<2.5	NA	518.29	8.14	510.15
MW-2	11/04/1998	<50	<0.50	<0.50	<0.50	<0.50	<2.5	NA	518.29	9.00	509.29
MW-2	11/11/1999	65.8	6.34	7.04	4.71	10.8	3.21	1.04	518.29	9.19	509.10
MW-2	04/03/2000	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50	NA	518.29	8.31	509.98
MW-2	10/16/2000	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50	NA	518.29	9.36	508.93
MW-2	**06/28/2001**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**NA**	**<0.50**	**518.29**	**9.88**	**508.41**
MW-3	01/02/1992	340	0.4	ND	ND	ND	NA	NA	519.60	12.87	506.73
MW-3	04/02/1992	160	5	ND	0.3	0.5	NA	NA	519.60	11.97	507.63
MW-3	07/21/1992	260	1.7	<0.5	<0.5	<0.5	NA	NA	519.60	12.60	507.00

WELL CONCENTRATIONS
Former Texaco Service Station
930 Springtown Boulevard
Livermore, CA

Well ID	Date	TPPH (ug/L)	B (ug/L)	T (ug/L)	E (ug/L)	X (ug/L)	MTBE 8020 (ug/L)	MTBE 8260 (ug/L)	TOC (MSL)	Depth to Water (ft.)	GW Elevation (MSL)
MW-3	10/09/1992	88	<0.5	<0.5	<0.5	<0.5	NA	NA	519.60	12.93	506.67
MW-3	01/11/1993	130	<0.5	<0.5	<0.5	<0.5	NA	NA	519.60	11.16	508.44
MW-3	05/05/1993	340	1.8	<0.5	1.3	<0.5	NA	NA	519.60	10.72	508.88
MW-3	08/09/1993	610	18	<0.5	2.4	0.9	NA	NA	519.60	12.34	507.26
MW-3	10/14/1993	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	519.60	12.71	506.89
MW-3	01/24/1994	320	3.5	<0.5	<0.5	<0.5	NA	NA	519.60	12.03	507.57
MW-3	05/31/1994	830	11	12	5.0	1.2	NA	NA	519.60	11.54	508.06
MW-3	08/31/1994	660	2	<0.5	1	<0.5	NA	NA	519.60	12.60	507.00
MW-3	11/02/1994	1500	260	36	34	76	NA	NA	519.60	12.16	507.44
MW-3	02/20/1995	410	1.2	1.9	1.4	2.2	NA	NA	519.60	11.05	508.55
MW-3	05/09/1995	730	23	43	21	95	NA	NA	519.60	11.97	507.63
MW-3	08/21/1995	<50	<0.5	<0.5	<0.5	<0.5	<10	NA	519.60	7.60	512.00
MW-3	10/20/1995	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	519.60	11.46	508.14
MW-3	02/07/1996	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	519.60	9.42	510.18
MW-3	04/30/1996	NA	NA	NA	NA	NA	NA	NA	519.60	9.60	510.00
MW-3	08/14/1996	<50	<0.5	0.60	<0.5	<0.5	<30	NA	519.60	10.24	509.36
MW-3	11/22/1996	NA	NA	NA	NA	NA	NA	NA	519.60	10.34	509.26
MW-3	02/14/1997	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	519.60	9.38	510.22
MW-3	05/23/1997	NA	NA	NA	NA	NA	NA	NA	519.60	10.67	508.93
MW-3	07/25/1997	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	519.60	11.11	508.49
MW-3	10/31/1997	NA	NA	NA	NA	NA	NA	NA	519.60	10.86	508.74
MW-3	02/06/1998	63	1.5	2.8	0.77	8.6	<30	NA	519.60	8.41	511.19
MW-3	05/19/1998	NA	NA	NA	NA	NA	NA	NA	519.60	9.40	510.20
MW-3	07/31/1998	<50	<0.5	<0.5	<0.5	<0.5	<2.5	NA	519.60	9.04	510.56
MW-3	11/04/1998	230	11	7.2	7.6	33	18	14	519.60	10.45	509.15
MW-3	11/11/1999	569	103	47.1	14.1	29.6	521	604	519.60	10.73	508.87

WELL CONCENTRATIONS
Former Texaco Service Station
930 Springtown Boulevard
Livermore, CA

Well ID	Date	TPPH (ug/L)	B (ug/L)	T (ug/L)	E (ug/L)	X (ug/L)	MTBE 8020 (ug/L)	MTBE 8260 (ug/L)	TOC (MSL)	Depth to Water (ft.)	GW Elevation (MSL)
MW-3	04/03/2000	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50	NA	519.60	9.78	509.82
MW-3	10/16/2000	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50	NA	519.60	10.97	508.63
MW-3	**06/28/2001**	**110**	**<0.50**	**<0.50**	**0.56**	**1.8**	**NA**	**1.8**	**519.60**	**11.49**	**508.11**
MW-4	01/02/1992	ND	ND	ND	ND	ND	NA	NA	518.79	12.22	506.57
MW-4	04/02/1992	ND	ND	ND	ND	ND	NA	NA	518.79	11.03	507.76
MW-4	07/21/1992	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	518.79	12.36	506.43
MW-4	10/09/1992	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	518.79	12.40	506.39
MW-4	01/11/1993	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	518.79	10.72	508.07
MW-4	05/05/1993	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	518.79	10.21	508.58
MW-4	08/09/1993	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	518.79	12.25	506.54
MW-4	10/14/1993	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	518.79	12.58	506.21
MW-4	01/24/1994	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	518.79	11.72	507.07
MW-4	05/31/1994	NA	NA	NA	NA	NA	NA	NA	518.79	11.29	507.50
MW-4	08/31/1994	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	518.79	12.00	506.79
MW-4	11/02/1994	NA	NA	NA	NA	NA	NA	NA	518.79	11.96	506.83
MW-4	02/20/1995	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	518.79	10.42	508.37
MW-4	05/09/1995	NA	NA	NA	NA	NA	NA	NA	518.79	11.22	507.57
MW-4	08/21/1995	<50	<0.5	<0.5	<0.5	<0.5	<10	NA	518.79	10.51	508.28
MW-4	10/20/1995	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	518.79	10.86	507.93
MW-4	02/07/1996	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	518.79	8.93	509.86
MW-4	04/30/1996	NA	NA	NA	NA	NA	NA	NA	518.79	9.03	509.76
MW-4	08/14/1996	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	518.79	9.84	508.95
MW-4	11/22/1996	NA	NA	NA	NA	NA	NA	NA	518.79	9.73	509.06
MW-4	02/14/1997	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	518.79	8.85	509.94
MW-4	05/23/1997	NA	NA	NA	NA	NA	NA	NA	518.79	10.15	508.64

WELL CONCENTRATIONS
Former Texaco Service Station
930 Springtown Boulevard
Livermore, CA

Well ID	Date	TPPH (ug/L)	B (ug/L)	T (ug/L)	E (ug/L)	X (ug/L)	MTBE 8020 (ug/L)	MTBE 8260 (ug/L)	TOC (MSL)	Depth to Water (ft.)	GW Elevation (MSL)
MW-4	07/25/1997	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	518.79	10.61	508.18
MW-4	10/31/1997	NA	NA	NA	NA	NA	NA	NA	518.79	10.36	508.43
MW-4	02/06/1998	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	518.79	7.46	511.33
MW-4	05/19/1998	NA	NA	NA	NA	NA	NA	NA	518.79	8.91	509.88
MW-4	07/31/1998	<50	<0.5	<0.5	<0.5	<0.5	<2.5	NA	518.79	8.99	509.80
MW-4	11/04/1998	<50	<0.50	<0.50	<0.50	<0.50	<2.5	NA	518.79	10.08	508.71
MW-4	11/11/1999	83.6	6.50	7.52	4.31	9.59	<2.50	NA	518.79	9.81	508.98
MW-4	04/03/2000	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50	NA	518.79	9.24	509.55
MW-4	10/16/2000	<50.0	<0.500	<0.500	<0.500	<0.500	<2.50	NA	518.79	10.49	508.30
MW-4	**06/28/2001**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**NA**	**<0.50**	**518.79**	**10.82**	**507.97**
MW-5	01/02/1992	1800	74	41	84	94	NA	NA	521.19	14.56	506.63
MW-5	04/02/1992	ND	ND	ND	ND	ND	NA	NA	521.19	13.58	507.61
MW-5	07/21/1992	1000	69	16	40	31	NA	NA	521.19	13.77	507.42
MW-5	10/09/1992	3400	890	51	110	110	NA	NA	521.19	14.09	507.10
MW-5	01/11/1993	15000	460	110	900	370	NA	NA	521.19	12.24	508.95
MW-5	05/05/1993	4500	160	19	280	110	NA	NA	521.19	11.90	509.29
MW-5	08/09/1993	2300	180	19	130	80	NA	NA	521.19	13.35	507.84
MW-5	10/14/1993	2200	160	27	90	64	NA	NA	521.19	13.89	507.30
MW-5	01/24/1994	2600	69	11	65	25	NA	NA	521.19	13.32	507.87
MW-5	05/31/1994	3100	130	64	140	120	NA	NA	521.19	12.75	508.44
MW-5	08/31/1994	600	20	2.9	14	7.1	NA	NA	521.19	14.34	506.85
MW-5	11/02/1994	2300	68	18	52	54	NA	NA	521.19	14.22	506.97
MW-5	02/20/1995	12000	130	<30	240	138	NA	NA	521.19	12.78	508.41
MW-5	05/09/1995	2500	57	60	54	37	NA	NA	521.19	13.41	507.78
MW-5	08/21/1995	11000	91	28	140	120	<100	<100	521.19	12.32	508.87

WELL CONCENTRATIONS
Former Texaco Service Station
930 Springtown Boulevard
Livermore, CA

Well ID	Date	TPPH (ug/L)	B (ug/L)	T (ug/L)	E (ug/L)	X (ug/L)	MTBE 8020 (ug/L)	MTBE 8260 (ug/L)	TOC (MSL)	Depth to Water (ft.)	GW Elevation (MSL)
MW-5	10/20/1995	2300	38	3.8	28	19	NA	NA	521.19	13.28	507.91
MW-5	02/07/1996	1800	35	8.1	37	20	NA	NA	521.19	11.31	509.88
MW-5	04/30/1996	NA	NA	NA	NA	NA	NA	NA	521.19	11.52	509.67
MW-5	08/14/1996	3500	130	22	170	47	71	NA	521.19	12.03	509.16
MW-5	11/22/1996	3500	160	15	190	28	<200	NA	521.19	12.22	508.97
MW-5	02/14/1997	2900	150	54	330	68	<300	NA	521.19	11.20	509.99
MW-5	05/23/1997	10000	170	98	380	68	<200	NA	521.19	12.55	508.64
MW-5	07/25/1997	2700	110	<0.5	33	<0.5	<30	NA	521.19	12.93	508.26
MW-5	10/31/1997	NA	NA	NA	NA	NA	NA	NA	521.19	12.78	508.41
MW-5	02/06/1998	67	<0.5	<0.5	<0.5	<0.5	<30	NA	521.19	10.26	510.93
MW-5	05/19/1998	4200	120	25	360	76	510	NA	521.19	11.12	510.07
MW-5	07/31/1998	270	<0.5	<0.5	<0.5	<0.5	<2.5	NA	521.19	11.79	509.40
MW-5	11/04/1998	2800	120	14	590	140	<25	<10	521.19	12.33	508.86
MW-5	11/11/1999	1220	40.5	22.8	16.4	6.22	<12.5	NA	521.19	12.64	508.55
MW-5	04/03/2000	5060	130	20.8	281	30.6	74.1	NA	521.19	11.64	509.55
MW-5	10/16/2000	2070	35.4	33.6	114	57.6	50.1	NA	521.19	12.82	508.37
MW-5	**06/28/2001**	**1500**	**15**	**2.5**	**74**	**5.5**	**NA**	**<0.50**	**521.19**	**13.40**	**507.79**
MW-6	01/02/1992	23	ND	0.3	0.6	3	NA	NA	522.18	16.64	505.54
MW-6	04/02/1991	ND	ND	ND	ND	ND	NA	NA	522.18	15.61	506.57
MW-6	07/21/1992	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	522.18	15.53	506.65
MW-6	10/09/1992	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	522.18	15.69	506.49
MW-6	08/09/1993	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	522.18	14.50	507.68
MW-6	10/14/1993	NA	NA	NA	NA	NA	NA	NA	522.18	NA	NA
MW-6	01/24/1994	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	522.18	15.09	507.09
MW-6	05/31/1994	NA	NA	NA	NA	NA	NA	NA	522.18	14.64	507.54

WELL CONCENTRATIONS
Former Texaco Service Station
930 Springtown Boulevard
Livermore, CA

Well ID	Date	TPPH (ug/L)	B (ug/L)	T (ug/L)	E (ug/L)	X (ug/L)	MTBE 8020 (ug/L)	MTBE 8260 (ug/L)	TOC (MSL)	Depth to Water (ft.)	GW Elevation (MSL)
MW-6	08/31/1994	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	522.18	15.32	506.86
MW-6	11/02/1994	NA	NA	NA	NA	NA	NA	NA	522.18	15.32	506.86
MW-6	02/20/1995	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	522.18	14.07	508.11
MW-6	05/09/1995	NA	NA	NA	NA	NA	NA	NA	522.18	14.30	507.88
MW-6	10/20/1995	NA	NA	NA	NA	NA	NA	NA	522.18	14.31	NA
MW-6	07/25/1997	NA	NA	NA	NA	NA	NA	NA	522.18	NA	NA
MW-7	01/02/1992	NA	NA	NA	NA	NA	NA	NA	522.19	11.17	511.02
MW-7	04/02/1992	ND	ND	ND	ND	ND	NA	NA	522.19	10.34	511.85
MW-7	07/21/1992	NA	NA	NA	NA	NA	NA	NA	522.19	9.02	513.17
MW-7	05/31/1994	NA	NA	NA	NA	NA	NA	NA	522.19	9.42	512.77
MW-7	08/31/1994	NA	NA	NA	NA	NA	NA	NA	522.19	6.84	515.35
MW-7	11/02/1994	NA	NA	NA	NA	NA	NA	NA	522.19	6.48	515.71
MW-7	02/20/1995	NA	NA	NA	NA	NA	NA	NA	522.19	7.71	514.48
MW-7	05/09/1995	NA	NA	NA	NA	NA	NA	NA	522.19	7.65	514.54
MW-7	08/21/1995	NA	NA	NA	NA	NA	NA	NA	522.19	7.83	514.36
MW-7	10/20/1995	NA	NA	NA	NA	NA	NA	NA	522.19	8.61	513.58
MW-7	07/25/1997	NA	NA	NA	NA	NA	NA	NA	522.19	NA	NA
MW-8	01/02/1992	12000	32	980	200	760	NA	NA	524.03	18.42	505.61
MW-8	04/02/1992	ND	ND	ND	ND	ND	NA	NA	524.03	17.39	506.64
MW-8	07/21/1992	NA	NA	NA	NA	NA	NA	NA	524.03	14.02	510.01
MW-8	05/31/1994	NA	NA	NA	NA	NA	NA	NA	524.03	19.65	504.38
MW-8	08/31/1994	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	524.03	17.40	506.63
MW-8	11/02/1994	NA	NA	NA	NA	NA	NA	NA	524.03	17.38	506.65
MW-8	02/20/1995	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	524.03	15.99	508.04

WELL CONCENTRATIONS
Former Texaco Service Station
930 Springtown Boulevard
Livermore, CA

Well ID	Date	TPPH (ug/L)	B (ug/L)	T (ug/L)	E (ug/L)	X (ug/L)	MTBE 8020 (ug/L)	MTBE 8260 (ug/L)	TOC (MSL)	Depth to Water (ft.)	GW Elevation (MSL)
MW-8	05/09/1995	NA	NA	NA	NA	NA	NA	NA	524.03	16.54	507.49
MW-8	08/21/1995	<50	<0.5	<0.5	0.67	0.62	<10	NA	524.03	15.77	508.26
MW-8	10/20/1995	NA	NA	NA	NA	NA	NA	NA	524.03	16.24	507.79
MW-8	02/07/1996	<50	7.0	<0.5	<0.5	<0.5	NA	NA	524.03	14.42	509.61
MW-8	04/30/1996	61	9.6	<0.5	<0.5	<0.5	NA	NA	524.03	14.65	509.38
MW-8	08/14/1996	<50	0.73	<0.5	<0.5	<0.5	<30	NA	524.03	15.08	508.95
MW-8	11/22/1996	120	5.9	2.2	2.4	8.3	<30	NA	524.03	15.35	508.68
MW-8	02/14/1997	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	524.03	14.32	509.71
MW-8	05/23/1997	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	524.03	13.35	510.68
MW-8	07/25/1997	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	524.03	16.05	507.98
MW-8	10/31/1997	<50	<0.5	<0.5	<0.5	<0.5	<30	NA	524.03	15.86	508.17
MW-8	02/06/1998	180	17	<0.5	<0.5	6.0	<30	NA	524.03	13.62	510.41
MW-8	05/19/1998	<50	4.9	<0.5	<0.5	<0.5	<2.5	NA	524.03	14.23	509.80
MW-8	07/31/1998	140	<0.5	<0.5	<0.5	<0.5	<2.5	NA	524.03	14.95	509.08
MW-8	11/04/1998	<50	1.2	100	1.9	7.8	<2.5	NA	524.03	15.42	508.61
MW-8	11/11/1999	<50.0	<0.500	<0.500	<0.500	<0.500	3.70	<0.500	524.03	15.74	508.29
MW-8	04/03/2000	87.7	10.8	<0.500	<0.500	<0.500	<2.50	NA	524.03	14.76	509.27
MW-8	10/16/2000	237	11.3	<0.500	<0.500	0.544	7.93	NA	524.03	15.91	508.12
MW-8	**06/28/2001**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<0.50**	**NA**	**29**	**524.03**	**16.49**	**507.54**

APPENDIX E

VADOSE ZONE INVESTIGATION

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
5997 PARKSIDE DRIVE PLEASANTON, CALIFORNIA 94588-5127 PHONE (925) 484-2600 FAX (925) 462-3914

May 9, 2001

Ms. Janet Yantis
KHM Environmental Management, Inc.
6284 San Ignacio Avenue, Suite E
San Jose, CA 95119

Dear Ms. Yantis:

Enclosed is drilling permit 21091 for a contamination investigation at 930 Springtown Boulevard in Livermore for Equiva Services LLC.

Please note that permit condition A-2 requires that a report be submitted after completion of the work. The report should include drilling and completion logs, location sketch, and permit number. Please submit the original of your completion report. We will forward your submittal to the California Department of Water Resources.

If you have any questions, please contact me at extension 235 or Matt Katen at extension 234.

Sincerely,

Wyman Hong

Wyman Hong
Water Resources Technician II

Enc.

P:\WRE\GPOs\GPO1\GPO1.CONTAMINATION.wpd

ZONE 7 WATER AGENCY

5997 PARKSIDE DRIVE PLEASANTON, CALIFORNIA 94588-5127 VOICE (925) 484-2600 X235
FAX (925) 462-3814

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT 930 Springtown Blvd. at Lassen Rd., Livermore

California Coordinates Source _____ ft. Accuracy± _____ ft.
CCN _____ ft. CCE _____ ft.
APN _____

CLIENT
Name Equiva Services LLC
Address P.O. Box 7869 Phone 559-645-9306
City Burbank, CA 91501 Zip _____

APPLICANT
Name KHM Environmental Management
Address 6284 San Ignacio Ave, Suite E Fax 408-224-4518
City San Jose, CA Phone 408-224-4724
Zip 95119

TYPE OF PROJECT

Well Construction		Geotechnical Investigation	
Cathodic Protection	☐	General	☐
Water Supply	☐	Contamination	☑
Monitoring	☐	Well Destruction	☐

PROPOSED WATER SUPPLY WELL USE

New Domestic	☐	Replacement Domestic	☐
Municipal	☐	Irrigation	☐
Industrial	☐	Other _____	☐

DRILLING METHOD:
Mud Rotary ☐ Air Rotary ☐ Auger ☐
Cable ☐ Other ☒ GeoProbe Borings

DRILLER'S LICENSE NO. 485165

WELL PROJECTS
Drill Hole Diameter _____ in. Maximum
Casing Diameter _____ in. Depth _____ ft.
Surface Seal Depth _____ ft. Number _____

GEOTECHNICAL PROJECTS
Number of Borings 4 Maximum
Hole Diameter 2.5 in. Depth 12 ft.

ESTIMATED STARTING DATE May 22, 2001
ESTIMATED COMPLETION DATE May 22, 2001

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE Janet W Yanitis Date 05/07/01

FOR OFFICE

PERMIT NUMBER 21091
WELL NUMBER _____
APN _____

PERMIT CONDITIONS

Circled Permit Requirements Apply

(A.) GENERAL
1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or drilling logs and location sketch for geotechnical projects.
3. Permit is void if project not begun within 90 days of approval date.

B. WATER SUPPLY WELLS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved.
3. An access port at least 0.5 inches in diameter is required on the wellhead for water level measurements.
4. A sample port is required on the discharge pipe near the wellhead.

C. GROUNDWATER MONITORING WELLS INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

(D.) GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

E. CATHODIC. Fill hole above anode zone with concrete placed by tremie.

F. WELL DESTRUCTION. See attached.

G. SPECIAL CONDITIONS

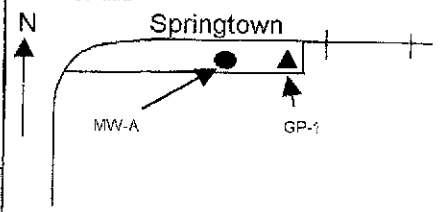
Approved Wyman Hong Date 5/9/01
Wyman Hong

8/6/99

KHM
ENVIRONMENTAL MANAGEMENT INCORPORATED

PROJECT NO:	C80-000930	CLIENT:	Equiva	BORING/WELL NO:	GP-1
LOGGED BY:	Janet Yantis	LOCATION:	6/21/01	PAGE	1 OF 1
DRILLER:	Vironex	DATE DRILLED:	930 Springtown		
DRILLING METHOD:	Hyd. Push	HOLE DIAMETER:	2 in.		
SAMPLING METHOD:	Continuous	HOLE DEPTH:	16 ft.		
CASING TYPE:		WELL DIAMETER:	NA		
SLOT SIZE:		WELL DEPTH:	NA		
GRAVEL PACK:		CASING STICKUP:	NA		
ELEVATION		NORTHING		EASTING	

LOCATION MAP



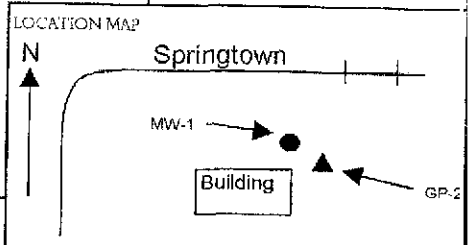
Well Completion: Backfill / Casing	Static Water Level	Moisture Content	PID Reading (ppm)	Time	Depth (feet)	Sample: Recovery / Interval	Soil Type	LITHOLOGY / DESCRIPTION
					0			Grass
		Moist			1		SC/CL	Clayey Sand/Sandy Clay, olive gray; roots; no odors
					2		GW	Gravel; fine gravel; 5% fines
		Dry			3		SM	Silty Sand; olive yellow; ~20% non-plastic fines, ~80% fine to medium sand; minor root holes; occasional MnO stains; dry; no odors
				7:30	4		GW	Gravel; fine gravel; 5% fines
					5			
				7:40	6		SM	Silty Sand; olive yellow; ~20% non-plastic fines, ~80% fine to medium sand; minor root holes; occasional MnO stains; dry; no odors
		Moist			7			
					8			
					9		GM	Silty Gravel with Sand; light yellowish brown; ~30% non-med. Plasticity fines, ~30% fine to medium sand, ~40% fine gravel; npo
					10			
				7:50	11		SC	Clayey Sand; Pale Yellow; 30% med./ plastic. Fines; 70% fine to medium sand;
		Very Moist			12		SC	Clayey Sand with Gravel; olive; ~25% non-med. plastic. fines (increase in plasticity) ~75% fine to coarse sand; occasional gray mottling;occasional caliche coating and nodules; common MnO coating occasional FeO stains;
					13			
					14		SC/CL	Sandy Clay/Clayey Sand; moderate Odors
				8:10	15			
		Wet			16		SP	Poorly Graded Sand with Gravel; gray; <5% fines; fine to coarse sand with occasional gravel; wet; moderate odors
					17			
					18			
					19			
					20			
					21			
					22			

KHM
ENVIRONMENTAL MANAGEMENT INCORPORATED

PROJECT NO:	C80-000930	CLIENT:	Equiva
LOGGED BY:	Yantis	LOCATION:	6/21/01
DRILLER:	Vironex	DATE DRILLED:	930 Springtown
DRILLING METHOD:	Push	HOLE DIAMETER:	2 in.
SAMPLING METHOD:	Continuous	HOLE DEPTH:	8 ft.
CASING TYPE:		WELL DIAMETER:	
SLOT SIZE:		WELL DEPTH:	
GRAVEL PACK:		CASING STICKUP:	
ELEVATION		NORTHING	EASTING

BORING/WELL NO: GP 2
PAGE 1 OF 1

LOCATION MAP

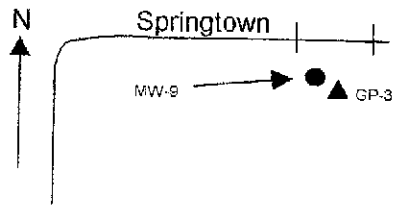


Well Completion: Backfill / Casing	Static Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Depth (feet)	Sample: Recovery / Interval	Soil Type	LITHOLOGY / DESCRIPTION
		Damp			1–3		GW	Poorly Graded Gravel with Sand; Light olive brown; ~40% fine to coarse sand & ~60% gravel
					3–5		CL	Gravelly lean clay with sand; olive brown; ~45% medium pl. fines, ~20% fine to coarse sand, ~35% gravel; gravel is subamngular; abundant small caliche nodules; common rootholes; damp; no odors
					5–6		CL	Sandy lean clay; olive grey; 60% med. Plast. Fines, 40% fine sand, rare gravel; common tiny calicke vensovice
					7–8		ML	Sandy silt; ~60% non-plastic, ~40% fine sand; damp to moist; no odors

KHM
ENVIRONMENTAL MANAGEMENT INCORPORATED

PROJECT NO:	C80-000930	CLIENT:	Equiva	BORING/WELL NO:	GP-3
LOGGED BY:	Janet Yantis	LOCATION:	6/21/01	PAGE	1 OF 1
DRILLER:	Vironex	DATE DRILLED:	930 Springtown		
DRILLING METHOD:	Push	HOLE DIAMETER:	2 in.		
SAMPLING METHOD:	Continuous	HOLE DEPTH:	12 ft.		
CASING TYPE:		WELL DIAMETER:	NA		
SLOT SIZE:		WELL DEPTH:	NA		
GRAVEL PACK:		CASING STICKUP:	NA		
ELEVATION		NORTHING		EASTING	

LOCATION MAP



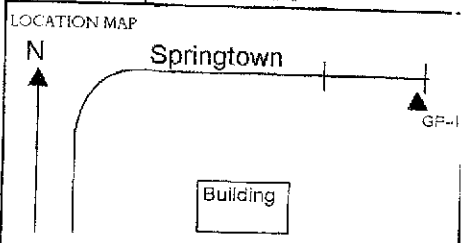
Well Completion (Backfill / Casing)	Static Water Level	Moisture Content	PID Reading (ppm)	Time	Depth (feet)	Sample Recovery / Interval	Soil Type	LITHOLOGY / DESCRIPTION
		Dry			1		SM	Silty Sand with gravel; light yellow brown; ~20% fines; ~50% fine to coarse sand; 30% gravel; dry; no odors
				10:00	2			
		Damp			3			
					4		CL	Sandy lean Clay; light olive brown; 60% medium plastic fines, 40% fine to coarse sand; occasional root holes; damp no odors; @ 4 feet roots
					5			
					6		CL, SC	Sandy clay/Clayey sand ~45-55% low to medium plastic fines, 45-55% fine to coarse sand; occasional cliché veins; occasional FeO stains
				10:10	7			
		Damp			8		CL	Sandy lean Clay with gravel; ~30% medium plastic fines, 40% fines to coarse sand, 30% gravel to 1/2 inch; damp; no odors
					9			
				10:20	10		GM	Silty Gravel with sand; dark gray; ~15% low to medium plastic fines, 30% fine to coarse sand, 55% gravel; occasional caliche nodules; very moist; moderate odors
		Wet			11		GW	Well graded Gravel with sand; dark gray; ~10% medium plastic fines, 80% fine to coarse sand, 10% gravel; wet; moderate odors
					12			Depth to Water ~ 12 feet; moderate product odors
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			
					21			
					22			

KHM
ENVIRONMENTAL MANAGEMENT INCORPORATED

PROJECT NO:	C80-000930	CLIENT:	Equiva
LOGGED BY:	Janet Yantis	LOCATION:	6/21/01
DRILLER:	Vironex	DATE DRILLED:	930 Springtown
DRILLING METHOD:	Hyd. Push	HOLE DIAMETER:	2 in.
SAMPLING METHOD:	Continuous	HOLE DEPTH:	16 ft.
CASING TYPE:		WELL DIAMETER:	NA
SLOT SIZE:		WELL DEPTH:	NA
GRAVEL PACK:		CASING STICKUP:	NA

BORING/WELL NO: GP-4
PAGE 1 OF 1

LOCATION MAP



ELEVATION | NORTHING | EASTING

Well Completion: Backfill / Casing	Static Water Level	Moisture Content	PID Reading (ppm)	Time	Depth (feet)	Sample: Recovery / Interval	Soil Type	LITHOLOGY / DESCRIPTION
		Damp to dry			1–3		SC	Clayey Sand with gravel; light to olive brown; ~20% medium plasticity fines, ~45% fine to coarse sand, 35% fine gravel; occasional roots
				8:50	3–5		SC	Clayey Sand; light olive brown; ~35% medium plasticity fines, ~65% fine to coarse sand; occasional caliche veins; small root holes; occasional Mn stains; damp; no odors
					5–6		GW	Well Graded Gravel with clay and sand
		Damp-Moist		9:00	6–7		GC	Clayey Gravel with sand; ~<10% medium plasticity fines, 25% fine to coarse sand, 65% gravel; sub-angular; damp to dry; no odor
					8–9		CL	Sandy lean Clay; light olive brown; 70% medium plasticity fines, 30% fine to medium sand,; pervasive caliche coatings; occasional MnO stains; damp to moist; no odors
		Moist		9:10	10–12		SM	Silty Sand; light olive brown; 40% non to low plasticity fines, 60% fine to medium sand; at ~ 10 feet; occasional caliche nodules to 1/2 inch; moist
					12–14		SC	Clayey Sand; ~45% low to medium plasticity fines, 55% fine to medium sand; caliche absent; occasional gray mottling; occasional FeO stains; no odors; very moist
					14–15		GW	well graded Gravel with Sand
				9:15	15–16		GW	Gravel with Sand; dark gray; 0% fines; sand coarsening downward; wet; strong odors
					16–22			

COOPER TESTING LABORATORY

1951 Colony St., Unit X, Mountain View, CA 94043
Tel: 650 968-9472 Fax: 650 968-4228
1360-D Industrial Ave., Petaluma, CA 94952
Tel: 707 765-2589 Fax: 707 765-1227
email: cooper@coopertestinglabs.com
www.coopertestinglabs.com

LETTER OF TRANSMITTAL

TO: KHM Environmental
6284 San Ignacio Ave., Suite E
San Jose, CA 95119
Attn: Lee Dooley

DATE: July 3, 2001

PROJECT: 930 Springtown

CTL # : 420-001

ENCLOSED: Laboratory soil test data.

REMARKS:

David R. Cooper
COOPER TESTING LABS

JUN. 22. 2001 8:20AM NO. 940 P. 1/1

FROM: KHM Environmental Management
6284 San Ignacio Ave, #E
San Jose, CA ~~4500~~ 95119

420-001
CTL# ~~500-001~~

1951-X Colony St.
Mt. View, CA 94043
TEL 650-968-9472
FAX 650-968-4228

Cooper Testing Labs, Inc.
Test Request Sheet

1360-D Industrial Ave.
Petaluma, CA 94952
TEL 707-765-2589
FAX 707-765-1227

Please check appropriate box for billing purposes: Mountain View Lab ☒ Petaluma Lab ☐

(email: cooper@coopertestinglabs.com) (home page: www.coopertestinglabs.com)

CTL#	P.O. #:	Your Client: EQUVA
Our Client: KHM	Date In: 6/22/01	Project Name: 930 Springtown
Results To: Lee Dooley	Due Date:	Project No.: C80-000930

Boring	Depth ft	Test	Instructions
GP-4	~11.5'	X	Test No.: 1
GP-4			Please test for: 2
			total organic carbon 3
			bulk density 4
			porosity 5
			water content 6
		X	7
			8
			9
			10
			11
			12
			13
			14
			15
			16
			17
			18
			19
			20
			21
			22
			23
			24
			25
			26
			27
			28
			29
			30
			31
			32
			33
			34
			35
			36
			37
			38
			39
			40
			41

FAXED 6/28/01

Test	Price	Quantity
Moisture (MC)	$11	
MD, 2-2.5" diameter	15	
MD 3" diameter	20	
PI A/B	105/150	
Sieve (SA)	75	
Sieve + Hydrometer	135	
#200Wash	50	
Specific Gravity	60	
% Organics	60	2
Total Porosity	75	2
UC	55	
Direct Shear - UU *	50/point	
DS-CU	65/point	
DS-CD	135/point	
DS-Residual-Quick *	100/point	
DS-CD-Residual *	250/point	
TX-UU	85	
TX-ICU	155/point	
TX-ICU- Staged	300 3point	
TX-ICU-PP	350/point	
TX-ICU-PP- Staged	700 3point	
Torsional pk. & Resid.	300/point	
Torsional resid. Staged	200/point	
Torsional Peak	180/point	
Incremental - Consol	245	
CRS - Consol	300	
TX-ACU or Stress Path	Quote	
Durability Index	175	
Collapse	110	
Permeability 2-3" dia.	210	
PERM on drain rock	300	
Standard Proctor 4"	135	
Standard Proctor 6"	170	
Modified Proctor 4"	170	
Modified Proctor 6"	210	
Cal Impact	250	
R-value/batch	155/180	
Sand Equivalent (SE)	55	
SS+Expansion-Pressure	175	
Shrink Swell (SS)	100	
Class 2 Spec	455	

Post-it® Fax Note 7671 | Date 6/22 | # of pages ▶
To JANET YANTIS | From Diane
Co./Dept. | Co. Cooper.
Phone # | Phone #
Fax # | Fax #

Logging $90/hour
Remolding $40/point
Discount %
Sample P/U $40 ☑

N:\My Documents\Request Sheet

* Residual values are best achieved by the torsional-shear rather than direct shear.

UU is tested quickly at field moisture. DS-CU is consolidated under the normal stress.

COOPER TESTING LABS

MOISTURE DENSITY - POROSITY DATA SHEET

Job #	420-001
Client	KHM Environmental
Project/Location	C80-000930
Date	06/27/01

Boring #	GP2	GP2			
Depth (ft)	11.5				
Soil Type	yel. brn. sandy CLAY/ clayey sand	brown sandy CLAY			
Specific Gravity	2.80	2.75			
Volume Total cc	106.606	76.968			
Volume of Solids	66.669	47.623			
Volume of Voids	39.937	29.345			
Void Ratio	0.599	0.616			
Porosity %	37.5%	38.1%			
Saturation %	90.2%	81.2%			
Moisture %	19.3%	18.2%			
Dry Density (pcf)	109.3	106.2			

Remarks

Organic Content
ASTM D2974

Cooper Testing Lab

JOB NO.: 420-001a					
CLIENT: KHM			DATE:	06/27/01	
PROJECT C80-000930			BY:	DC	
BORING: -	GP-2	GP-2			
SAMPLE:					
DEPTH, ft.:	11.5				
SOIL CLASSIFICATION: (visual)	see porosity				
SOIL, ORGANICS & DISH, gm:	131.23	142.81			
SOIL & DISH, gm:	130.68	141.85			
DISH, gm:	82.23	83.27			
SOIL, gm:	48.45	58.58	0	0	0
SOIL & ORGANICS, gm:	49	59.54	0	0	0
% ORGANICS:	1.1	1.6	ERR	ERR	ERR

Specific Gravity
ASTM D-854

Cooper Testing Lab

Job#: 420-001				Date: 06/27/01		
Client: KHM				By: DC		
Project: C80-000930						
Boring:	GP-2	GP-2				
Sample:						
Depth, ft.:	11.5					
Soil Classification: (visual)	see porosity					
Wt. of Pycnometer Soil & Water, gm:	354.5	340.8				
Temp. centigrade:	23	23				
Wt. of Pycnometer & Water, gm:	316.06	302.14				
Wt. Dry Soil, gm:	59.81	60.7				
Temp. Correction Factor:	1	1				
Specific Gravity:	2.80	2.75	ERR	ERR	ERR	ERR

Remarks: The temperature correction factor is shown as 1 if the weight of the pycnometer is taken from the lab temperature correction curve.

KIFF ANALYTICAL LLC

Report Number : 20956
Date : 7/11/2001

Lee Dooley
KHM Environmental Management
6284 San Ignacio Ave, #E
San Jose, CA 95119

Subject : 11 Soil Samples and 3 Air Samples
Project Name : 930 Springtown Blvd., Livermore, CA
Project Number : C80-000930
P.O. Number : 91995053

Dear Dooley,

Chemical analysis of the samples referenced above has been completed. Summaries of the data are contained on the following pages. Sample(s) were received under documented chain-of-custody. US EPA protocols for sample storage and preservation were followed.

Kiff Analytical is certified by the State of California (# 2236). If you have any questions regarding procedures or results, please call me at 530-297-4800.

Sincerely,

Joel Kiff

Joel Kiff

KIFF ANALYTICAL LLC

Report Number : 20956
Date : 7/11/2001

Sample : **GP-1@ 3 1/2'**

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930**

Date Analyzed : 6/30/2001 Lab Number : 20956-01

Matrix : Soil Sample Date :6/21/2001 Analysis Method: EPA 8260B

Parameter	Measured Value	MRL [1]	Units
Benzene	< 0.0050	0.0050	mg/Kg
Toluene	< 0.0050	0.0050	mg/Kg
Ethylbenzene	< 0.0050	0.0050	mg/Kg
Total Xylenes	< 0.0050	0.0050	mg/Kg
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg
TPH as Gasoline	< 1.0	1.0	mg/Kg
Toluene - d8 (Surr)	99.4		% Recovery
4-Bromofluorobenzene (Surr)	110		% Recovery

1) MRL = Method reporting limit
tr = Trace detected below reporting limit

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 20956
Date : 7/11/2001

Sample : **GP-1@ 6'**

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930**

Date Analyzed : 7/2/2001 Lab Number : 20956-02

Matrix : Soil Sample Date :6/21/2001 Analysis Method: EPA 8260B

Parameter	Measured Value	MRL [1]	Units
Benzene	< 0.0050	0.0050	mg/Kg
Toluene	< 0.0050	0.0050	mg/Kg
Ethylbenzene	< 0.0050	0.0050	mg/Kg
Total Xylenes	< 0.0050	0.0050	mg/Kg
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg
TPH as Gasoline	< 1.0	1.0	mg/Kg
Toluene - d8 (Surr)	99.8		% Recovery
4-Bromofluorobenzene (Surr)	103		% Recovery

1) MRL = Method reporting limit
tr = Trace detected below reporting limit

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 20956
Date : 7/11/2001

Sample : **GP-1@ 11'**

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930**

Date Analyzed : 6/29/2001 Lab Number : 20956-03

Matrix : Soil Sample Date :6/21/2001 Analysis Method: EPA 8260B

Parameter	Measured Value	MRL [1]	Units
Benzene	< 0.0050	0.0050	mg/Kg
Toluene	< 0.0050	0.0050	mg/Kg
Ethylbenzene	< 0.0050	0.0050	mg/Kg
Total Xylenes	< 0.0050	0.0050	mg/Kg
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg
TPH as Gasoline	< 1.0	1.0	mg/Kg
Toluene - d8 (Surr)	99.3		% Recovery
4-Bromofluorobenzene (Surr)	111		% Recovery

1) MRL = Method reporting limit
tr = Trace detected below reporting limit

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 20956
Date : 7/11/2001

Sample : **GP-1@ 14 1/2'**

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930**

Date Analyzed : 7/2/2001 Lab Number : 20956-04

Matrix : Soil Sample Date :6/21/2001 Analysis Method: EPA 8260B

Parameter	Measured Value	MRL [1]	Units
Benzene	< 0.0050	0.0050	mg/Kg
Toluene	< 0.0050	0.0050	mg/Kg
Ethylbenzene	< 0.0050	0.0050	mg/Kg
Total Xylenes	< 0.010	0.010	mg/Kg
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg
TPH as Gasoline	**11**	1.0	mg/Kg
Toluene - d8 (Surr)	92.9		% Recovery
4-Bromofluorobenzene (Surr)	112		% Recovery

1) MRL = Method reporting limit
tr = Trace detected below reporting limit

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 20956
Date : 7/11/2001

Sample : **GP-4@ 3 1/2'**

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930**

Date Analyzed : 7/2/2001 Lab Number : 20956-05

Matrix : Soil Sample Date :6/21/2001 Analysis Method: EPA 8260B

Parameter	Measured Value	MRL [1]	Units
Benzene	< 0.0050	0.0050	mg/Kg
Toluene	< 0.0050	0.0050	mg/Kg
Ethylbenzene	< 0.0050	0.0050	mg/Kg
Total Xylenes	**0.0097**	0.0050	mg/Kg
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg
TPH as Gasoline	< 1.0	1.0	mg/Kg
Toluene - d8 (Surr)	93.5		% Recovery
4-Bromofluorobenzene (Surr)	109		% Recovery

1) MRL = Method reporting limit
tr = Trace detected below reporting limit

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 20956
Date : 7/11/2001

Sample : **GP-4@ 6'**

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930** Date Analyzed : 6/30/2001 Lab Number : 20956-06

Matrix : Soil Sample Date :6/21/2001 Analysis Method: EPA 8260B

Parameter	Measured Value	MRL [1]	Units
Benzene	< 0.0050	0.0050	mg/Kg
Toluene	< 0.0050	0.0050	mg/Kg
Ethylbenzene	< 0.0050	0.0050	mg/Kg
Total Xylenes	< 0.0050	0.0050	mg/Kg
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg
TPH as Gasoline	< 1.0	1.0	mg/Kg
Toluene - d8 (Surr)	99.4		% Recovery
4-Bromofluorobenzene (Surr)	106		% Recovery

1) MRL = Method reporting limit
tr = Trace detected below reporting limit

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 20956
Date : 7/11/2001

Sample : **GP-4@ 14'**

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930** Date Analyzed : 7/4/2001 Lab Number : 20956-07

Matrix : Soil Sample Date :6/21/2001 Analysis Method: EPA 8260B

Parameter	Measured Value	MRL [1]	Units
Benzene	< 0.0050	0.0050	mg/Kg
Toluene	< 0.0050	0.0050	mg/Kg
Ethylbenzene	< 0.0050	0.0050	mg/Kg
Total Xylenes	< 0.010	0.010	mg/Kg
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg
TPH as Gasoline	**27**	1.0	mg/Kg
Toluene - d8 (Surr)	99.8		% Recovery
4-Bromofluorobenzene (Surr)	101		% Recovery

1) MRL = Method reporting limit
tr = Trace detected below reporting limit

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 20956
Date : 7/11/2001

Sample : **GP-3@ 3 1/2'**

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930** Date Analyzed : 6/30/2001 Lab Number : 20956-08

Matrix : Soil Sample Date :6/21/2001 Analysis Method: EPA 8260B

Parameter	Measured Value	MRL [1]	Units
Benzene	< 0.0050	0.0050	mg/Kg
Toluene	< 0.0050	0.0050	mg/Kg
Ethylbenzene	< 0.0050	0.0050	mg/Kg
Total Xylenes	< 0.0050	0.0050	mg/Kg
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg
TPH as Gasoline	< 1.0	1.0	mg/Kg
Toluene - d8 (Surr)	100		% Recovery
4-Bromofluorobenzene (Surr)	101		% Recovery

1) MRL = Method reporting limit
tr = Trace detected below reporting limit

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 20956
Date : 7/11/2001

Sample : **GP-3@ 7'**

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930**

Date Analyzed : 6/30/2001

Lab Number : 20956-09

Matrix : Soil

Sample Date :6/21/2001

Analysis Method: EPA 8260B

Parameter	Measured Value	MRL [1]	Units
Benzene	< 0.0050	0.0050	mg/Kg
Toluene	< 0.0050	0.0050	mg/Kg
Ethylbenzene	< 0.0050	0.0050	mg/Kg
Total Xylenes	< 0.0050	0.0050	mg/Kg
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg
TPH as Gasoline	< 1.0	1.0	mg/Kg
Toluene - d8 (Surr)	99.5		% Recovery
4-Bromofluorobenzene (Surr)	105		% Recovery

1) MRL = Method reporting limit
tr = Trace detected below reporting limit

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 20956

Date : 7/11/2001

Sample : **GP-3@ 10 1/2'**

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930**

Date Analyzed : 6/30/2001 Lab Number : 20956-10

Matrix : Soil Sample Date :6/21/2001 Analysis Method: EPA 8260B

Parameter	Measured Value	MRL [1]	Units
Benzene	< 0.0050	0.0050	mg/Kg
Toluene	< 0.0050	0.0050	mg/Kg
Ethylbenzene	< 0.0050	0.0050	mg/Kg
Total Xylenes	< 0.0050	0.0050	mg/Kg
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg
TPH as Gasoline	< 1.0	1.0	mg/Kg
Toluene - d8 (Surr)	99.2		% Recovery
4-Bromofluorobenzene (Surr)	107		% Recovery

1) MRL = Method reporting limit
tr = Trace detected below reporting limit

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 20956
Date : 7/11/2001

Sample : **Composite**

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930** Date Analyzed : 6/28/2001 Lab Number : 20956-11

Matrix : Soil Sample Date :6/21/2001 Analysis Method: EPA 8260B

Parameter	Measured Value	MRL [1]	Units
Benzene	< 0.0050	0.0050	mg/Kg
Toluene	< 0.0050	0.0050	mg/Kg
Ethylbenzene	< 0.0050	0.0050	mg/Kg
Total Xylenes	< 0.0050	0.0050	mg/Kg
Methyl-t-butyl ether (MTBE)	< 0.0050	0.0050	mg/Kg
TPH as Gasoline	< 1.0	1.0	mg/Kg
Toluene - d8 (Surr)	100		% Recovery
4-Bromofluorobenzene (Surr)	106		% Recovery

1) MRL = Method reporting limit
tr = Trace detected below reporting limit

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 20956
Date : 7/11/2001

Sample : **GP-1@ 3'**

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930**

Date Analyzed : 6/26/2001 Lab Number : 20956-12

Matrix : Air Sample Date :6/21/2001 Analysis Method: EPA 8260B

Parameter	Measured Value	MRL [1]	Units
Methyl-t-butyl ether (MTBE)	< 0.20	0.20	ug/L
TPH as Gasoline	< 20	20	ug/L
Dichlorodifluoromethane	< 0.20	0.20	ug/L
Chloromethane	< 0.20	0.20	ug/L
Vinyl Chloride	< 0.20	0.20	ug/L
Bromomethane	< 0.20	0.20	ug/L
Chloroethane	< 0.20	0.20	ug/L
Trichlorofluoromethane	< 0.20	0.20	ug/L
1,1-Dichloroethene	< 0.20	0.20	ug/L
Methylene Chloride	< 0.50	0.50	ug/L
trans-1,2-Dichloroethene	< 0.20	0.20	ug/L
1,1-Dichloroethane	< 0.20	0.20	ug/L
2,2-Dichloropropane	< 0.20	0.20	ug/L
cis-1,2-Dichloroethene	< 0.20	0.20	ug/L
Chloroform	< 0.20	0.20	ug/L
Bromochloromethane	< 0.20	0.20	ug/L
1,1,1-Trichloroethane	< 0.20	0.20	ug/L
1,1-Dichloropropene	< 0.20	0.20	ug/L
1,2-Dichloroethane	< 0.20	0.20	ug/L
Carbon Tetrachloride	< 0.20	0.20	ug/L
Benzene	< 0.20	0.20	ug/L
Trichloroethene	< 0.20	0.20	ug/L
1,2-Dichloropropane	< 0.20	0.20	ug/L
Bromodichloromethane	< 0.20	0.20	ug/L
Dibromomethane	< 0.20	0.20	ug/L
cis-1,3-Dichloropropene	< 0.20	0.20	ug/L
Toluene	**0.46**	0.20	ug/L
trans-1,3-Dichloropropene	< 0.20	0.20	ug/L
1,1,2-Trichloroethane	< 0.20	0.20	ug/L
1,3-Dichloropropane	< 0.20	0.20	ug/L
Tetrachloroethene	< 0.20	0.20	ug/L
Dibromochloromethane	< 0.20	0.20	ug/L
1,2-Dibromoethane	< 0.20	0.20	ug/L
Chlorobenzene	< 0.20	0.20	ug/L
1,1,1,2-Tetrachloroethane	< 0.20	0.20	ug/L
Ethylbenzene	< 0.20	0.20	ug/L
P,M-Xylene	**0.50**	0.20	ug/L
O-Xylene	< 0.20	0.20	ug/L

Parameter	Measured Value	MRL [1]	Units
Styrene	< 0.20	0.20	ug/L
Isopropyl benzene	< 0.20	0.20	ug/L
Bromoform	< 0.20	0.20	ug/L
1,1,2,2-Tetrachloroethane	< 0.20	0.20	ug/L
1,2,3-Trichloropropane	< 0.20	0.20	ug/L
n-Propylbenzene	< 0.20	0.20	ug/L
Bromobenzene	< 0.20	0.20	ug/L
1,3,5-Trimethylbenzene	< 0.20	0.20	ug/L
2+4-Chlorotoluene	< 0.50	0.50	ug/L
tert-Butylbenzene	< 0.20	0.20	ug/L
1,2,4-Trimethylbenzene	< 0.20	0.20	ug/L
sec-Butylbenzene	< 0.20	0.20	ug/L
p-Isopropyltoluene	< 0.20	0.20	ug/L
1,3-Dichlorobenzene	< 0.20	0.20	ug/L
1,4-Dichlorobenzene	< 0.20	0.20	ug/L
n-Butylbenzene	< 0.20	0.20	ug/L
1,2-Dichlorobenzene	< 0.20	0.20	ug/L
1,2-Dibromo-3-chloropropane	< 0.20	0.20	ug/L
1,2,4-Trichlorobenzene	< 0.20	0.20	ug/L
Hexachlorobutadiene	< 0.20	0.20	ug/L
Naphthalene	< 0.20	0.20	ug/L
1,2,3-Trichlorobenzene	< 0.20	0.20	ug/L
Dibromofluoromethane (Surr)	98.2		% Recovery
1,2-Dichloroethane-d4 (Surr)	104		% Recovery
Toluene-d8 (Surr)	97.6		% Recovery
4-Bromofluorobenzene (Surr)	101		% Recovery

1) MRL = Method reporting limit
tr = Trace detected below reporting limit

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 20956

Date : 7/11/2001

Sample : **GP-4@ 3'**

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930**

Date Analyzed : 6/23/2001

Lab Number : 20956-13

Matrix : Air

Sample Date :6/21/2001

Analysis Method: EPA 8260B

Parameter	Measured Value	MRL [1]	Units
Methyl-t-butyl ether (MTBE)	< 0.20	0.20	ug/L
TPH as Gasoline	< 20	20	ug/L
Dichlorodifluoromethane	< 0.20	0.20	ug/L
Chloromethane	< 0.20	0.20	ug/L
Vinyl Chloride	< 0.20	0.20	ug/L
Bromomethane	< 0.20	0.20	ug/L
Chloroethane	< 0.20	0.20	ug/L
Trichlorofluoromethane	< 0.20	0.20	ug/L
1,1-Dichloroethene	< 0.20	0.20	ug/L
Methylene Chloride	< 0.50	0.50	ug/L
trans-1,2-Dichloroethene	< 0.20	0.20	ug/L
1,1-Dichloroethane	< 0.20	0.20	ug/L
2,2-Dichloropropane	< 0.20	0.20	ug/L
cis-1,2-Dichloroethene	< 0.20	0.20	ug/L
Chloroform	< 0.20	0.20	ug/L
Bromochloromethane	< 0.20	0.20	ug/L
1,1,1-Trichloroethane	< 0.20	0.20	ug/L
1,1-Dichloropropene	< 0.20	0.20	ug/L
1,2-Dichloroethane	< 0.20	0.20	ug/L
Carbon Tetrachloride	< 0.20	0.20	ug/L
Benzene	< 0.20	0.20	ug/L
Trichloroethene	< 0.20	0.20	ug/L
1,2-Dichloropropane	< 0.20	0.20	ug/L
Bromodichloromethane	< 0.20	0.20	ug/L
Dibromomethane	< 0.20	0.20	ug/L
cis-1,3-Dichloropropene	< 0.20	0.20	ug/L
Toluene	**0.72**	0.20	ug/L
trans-1,3-Dichloropropene	< 0.20	0.20	ug/L
1,1,2-Trichloroethane	< 0.20	0.20	ug/L
1,3-Dichloropropane	< 0.20	0.20	ug/L
Tetrachloroethene	< 0.20	0.20	ug/L
Dibromochloromethane	< 0.20	0.20	ug/L
1,2-Dibromoethane	< 0.20	0.20	ug/L
Chlorobenzene	< 0.20	0.20	ug/L
1,1,1,2-Tetrachloroethane	< 0.20	0.20	ug/L
Ethylbenzene	< 0.20	0.20	ug/L
P,M-Xylene	**0.70**	0.20	ug/L
O-Xylene	**0.23**	0.20	ug/L

Parameter	Measured Value	MRL [1]	Units
Styrene	< 0.20	0.20	ug/L
Isopropyl benzene	< 0.20	0.20	ug/L
Bromoform	< 0.20	0.20	ug/L
1,1,2,2-Tetrachloroethane	< 0.20	0.20	ug/L
1,2,3-Trichloropropane	< 0.20	0.20	ug/L
n-Propylbenzene	< 0.20	0.20	ug/L
Bromobenzene	< 0.20	0.20	ug/L
1,3,5-Trimethylbenzene	< 0.20	0.20	ug/L
2+4-Chlorotoluene	< 0.50	0.50	ug/L
tert-Butylbenzene	< 0.20	0.20	ug/L
1,2,4-Trimethylbenzene	< 0.20	0.20	ug/L
sec-Butylbenzene	< 0.20	0.20	ug/L
p-Isopropyltoluene	< 0.20	0.20	ug/L
1,3-Dichlorobenzene	< 0.20	0.20	ug/L
1,4-Dichlorobenzene	< 0.20	0.20	ug/L
n-Butylbenzene	< 0.20	0.20	ug/L
1,2-Dichlorobenzene	< 0.20	0.20	ug/L
1,2-Dibromo-3-chloropropane	< 0.20	0.20	ug/L
1,2,4-Trichlorobenzene	< 0.20	0.20	ug/L
Hexachlorobutadiene	< 0.20	0.20	ug/L
Naphthalene	< 0.20	0.20	ug/L
1,2,3-Trichlorobenzene	< 0.20	0.20	ug/L
Dibromofluoromethane (Surr)	91.8		% Recovery
1,2-Dichloroethane-d4 (Surr)	105		% Recovery
Toluene-d8 (Surr)	98.9		% Recovery
4-Bromofluorobenzene (Surr)	104		% Recovery

1) MRL = Method reporting limit
tr = Trace detected below reporting limit

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 20956

Date : 7/11/2001

Sample : **GP-3@ 3'**

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930**

Date Analyzed : 6/23/2001

Lab Number : 20956-14

Matrix : Air

Sample Date :6/21/2001

Analysis Method: EPA 8260B

Parameter	Measured Value	MRL [1]	Units
Methyl-t-butyl ether (MTBE)	< 0.20	0.20	ug/L
TPH as Gasoline	< 20	20	ug/L
Dichlorodifluoromethane	< 0.20	0.20	ug/L
Chloromethane	< 0.20	0.20	ug/L
Vinyl Chloride	< 0.20	0.20	ug/L
Bromomethane	< 0.20	0.20	ug/L
Chloroethane	< 0.20	0.20	ug/L
Trichlorofluoromethane	< 0.20	0.20	ug/L
1,1-Dichloroethene	< 0.20	0.20	ug/L
Methylene Chloride	< 0.50	0.50	ug/L
trans-1,2-Dichloroethene	< 0.20	0.20	ug/L
1,1-Dichloroethane	< 0.20	0.20	ug/L
2,2-Dichloropropane	< 0.20	0.20	ug/L
cis-1,2-Dichloroethene	< 0.20	0.20	ug/L
Chloroform	< 0.20	0.20	ug/L
Bromochloromethane	< 0.20	0.20	ug/L
1,1,1-Trichloroethane	< 0.20	0.20	ug/L
1,1-Dichloropropene	< 0.20	0.20	ug/L
1,2-Dichloroethane	< 0.20	0.20	ug/L
Carbon Tetrachloride	< 0.20	0.20	ug/L
Benzene	< 0.20	0.20	ug/L
Trichloroethene	< 0.20	0.20	ug/L
1,2-Dichloropropane	< 0.20	0.20	ug/L
Bromodichloromethane	< 0.20	0.20	ug/L
Dibromomethane	< 0.20	0.20	ug/L
cis-1,3-Dichloropropene	< 0.20	0.20	ug/L
Toluene	**0.49**	0.20	ug/L
trans-1,3-Dichloropropene	< 0.20	0.20	ug/L
1,1,2-Trichloroethane	< 0.20	0.20	ug/L
1,3-Dichloropropane	< 0.20	0.20	ug/L
Tetrachloroethene	< 0.20	0.20	ug/L
Dibromochloromethane	< 0.20	0.20	ug/L
1,2-Dibromoethane	< 0.20	0.20	ug/L
Chlorobenzene	< 0.20	0.20	ug/L
1,1,1,2-Tetrachloroethane	< 0.20	0.20	ug/L
Ethylbenzene	< 0.20	0.20	ug/L
P,M-Xylene	**0.44**	0.20	ug/L
O-Xylene	< 0.20	0.20	ug/L

Parameter	Measured Value	MRL [1]	Units
Styrene	< 0.20	0.20	ug/L
Isopropyl benzene	< 0.20	0.20	ug/L
Bromoform	< 0.20	0.20	ug/L
1,1,2,2-Tetrachloroethane	< 0.20	0.20	ug/L
1,2,3-Trichloropropane	< 0.20	0.20	ug/L
n-Propylbenzene	< 0.20	0.20	ug/L
Bromobenzene	< 0.20	0.20	ug/L
1,3,5-Trimethylbenzene	< 0.20	0.20	ug/L
2+4-Chlorotoluene	< 0.50	0.50	ug/L
tert-Butylbenzene	< 0.20	0.20	ug/L
1,2,4-Trimethylbenzene	< 0.20	0.20	ug/L
sec-Butylbenzene	< 0.20	0.20	ug/L
p-Isopropyltoluene	< 0.20	0.20	ug/L
1,3-Dichlorobenzene	< 0.20	0.20	ug/L
1,4-Dichlorobenzene	< 0.20	0.20	ug/L
n-Butylbenzene	< 0.20	0.20	ug/L
1,2-Dichlorobenzene	< 0.20	0.20	ug/L
1,2-Dibromo-3-chloropropane	< 0.20	0.20	ug/L
1,2,4-Trichlorobenzene	< 0.20	0.20	ug/L
Hexachlorobutadiene	< 0.20	0.20	ug/L
Naphthalene	< 0.20	0.20	ug/L
1,2,3-Trichlorobenzene	< 0.20	0.20	ug/L
Dibromofluoromethane (Surr)	100		% Recovery
1,2-Dichloroethane-d4 (Surr)	97.5		% Recovery
Toluene-d8 (Surr)	95.0		% Recovery
4-Bromofluorobenzene (Surr)	100		% Recovery

1) MRL = Method reporting limit
tr = Trace detected below reporting limit

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

Report Number : 20956

QC Report : Laboratory Control Sample (LCS)

Date : 7/11/2001

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930**

Parameter	Spike Level	Units	Analysis Method	Date Analyzed	LCS Percent Recov.	LCS Percent Recov. Limit
Benzene	0.0393	mg/Kg	EPA 8260B	6/30/2001	86.7	70-130
Toluene	0.0393	mg/Kg	EPA 8260B	6/30/2001	85.1	70-130
Tert-Butanol	0.196	mg/Kg	EPA 8260B	6/30/2001	98.1	70-130
Methyl-t-Butyl Ether	0.0393	mg/Kg	EPA 8260B	6/30/2001	85.2	70-130

Approved By: Joel Kiff

KIFF ANALYTICAL, LLC

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

Report Number : 20956

Date : 7/11/2001

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930**

20956 Quality Control Data - Method Blank

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.0050**	0.0050	mg/Kg	EPA 8260B	6/30/2001
Toluene	**< 0.0050**	0.0050	mg/Kg	EPA 8260B	6/30/2001
Ethylbenzene	**< 0.0050**	0.0050	mg/Kg	EPA 8260B	6/30/2001
Total Xylenes	**< 0.0050**	0.0050	mg/Kg	EPA 8260B	6/30/2001
Methyl-t-butyl ether (MTBE)	**< 0.0050**	0.0050	mg/Kg	EPA 8260B	6/30/2001
TPH as Gasoline	**< 1.0**	1.0	mg/Kg	EPA 8260B	6/30/2001
Toluene - d8 (Surr)	101		% Recovery	EPA 8260B	6/30/2001
4-Bromofluorobenzene (Surr)	98.3		% Recovery	EPA 8260B	6/30/2001

Approved By: Joel Kiff

Report Number : 20956

Date : 7/11/2001

QC Report : Matrix Spike/ Matrix Spike Duplicate

Project Name : **930 Springtown Blvd.,**

Project Number : **C80-000930**

Parameter	Spiked Sample	Sample Value	Spike Level	Spike Dup. Level	Spiked Sample Value	Duplicate Spiked Sample Value	Units	Analysis Method	Date Analyzed	Spiked Sample Percent Recov.	Duplicate Spiked Sample Percent Recov.	Relative Percent Diff.	Spiked Sample Percent Recov. Limit	Relative Percent Diff. Limit
Spike Recovery Data														
Benzene	20956-08	<0.0050	0.0380	0.0385	0.0270	0.0296	mg/Kg	EPA 8260B	6/30/2001	71.1	77.0	8.00	70-130	25
Toluene	20956-08	<0.0050	0.0380	0.0385	0.0267	0.0288	mg/Kg	EPA 8260B	6/30/2001	70.1	74.8	6.48	70-130	25
Tert-Butanol	20956-08	<0.0050	0.190	0.192	0.144	0.146	mg/Kg	EPA 8260B	6/30/2001	76.0	75.9	0.132	70-130	25
Methyl-t-Butyl Ether	20956-08	<0.0050	0.0380	0.0385	0.0263	0.0260	mg/Kg	EPA 8260B	6/30/2001	69.2	67.6	2.34	70-130	25

Approved By: Joel Kiff

KIFF ANALYTICAL, LLC

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

Calscience
Environmental
Laboratories, Inc.

July 06, 2001

Joel Kiff
Kiff Analytical
720 Olive Drive, Suite D
Davis,Ca 95616-0000

Subject: **Calscience Work Order No.:** **01-06-1397**
Client Reference: **930 Springtown Blvd., Livermore, CA**

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 6/28/2001 and analyzed in accordance with the attached chain-of-custody.

The results in this analytical report are limited to the samples tested and any reproduction of this report must be made in its entirety.

If you have any questions regarding this report, require sampling supplies or field services, or information on our analytical services, please feel free to call me at (714) 895-5494.

Sincerely,

Calscience Environmental
Laboratories, Inc.
Larry Lem
Project Manager

William H. Christensen
Quality Assurance Manager

Calscience Environmental Laboratories, Inc.

ANALYTICAL REPORT

Kiff Analytical
720 Olive Drive, Suite D
Davis,Ca 95616-0000

Date Received: 06/28/01
Work Order No: 01-06-1397
Preparation: Total Digestion
Method: EPA 6010B

Project: 930 Springtown Blvd., Livermore, CA

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
Composite	**01-06-1397-1**	**Solid**	**06/21/01**	**07/03/01**	**07/05/01**	**010703ics3**

Parameter	Result	RL	DF	Qual	Units
Lead	6.12	0.50	1		mg/kg

Method Blank	097-01-002-2,551	Solid	N/A	07/03/01	07/03/01	010703ics3

Parameter	Result	RL	DF	Qual	Units
Lead	ND	0.500	1		mg/kg

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

Kiff Analytical
720 Olive Drive, Suite D
Davis,Ca 95616-0000

Date Received: 06/28/01
Work Order No: 01-06-1397
Preparation: Total Digestion
Method: EPA 6010B

Project: 930 Springtown Blvd., Livermore, CA

Spiked Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
01-07-0036-23	Solid	ICP 3300	07/03/01	07/03/01	070301ms3

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Lead	77	82	75-125	6	0-20	

Calscience Environmental Laboratories, Inc.

Quality Control - Laboratory Control Sample

Kiff Analytical
720 Olive Drive, Suite D
Davis,Ca 95616-0000

Project: 930 Springtown Blvd., Livermore, CA

Date Received: 06/28/01
Work Order No: 01-06-1397
Preparation: Total Digestion
Method: EPA 6010B

LCS Sample Number	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
097-01-002-2,551	Solid	ICP 3300	07/03/01	010703-I	010703lcs3

Parameter	Conc Added	Conc Recovered	%Rec	%Rec CL	Qualifiers
Lead	50	46.4	93	80-120	

Calscience Environmental Laboratories, Inc.

GLOSSARY OF TERMS AND QUALIFIERS

Work Order Number: 01-06-1397

Qualifier	Definition
ND	Not detected at indicated reporting limit.

7440 Lincoln Way, Garden Grove, CA 92841-1432 • TEL: (714) 895-5494 • FAX: (714) 894-7501

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 01-0 6 - 1 3 9 7

Cooler 1 of 1

SAMPLE RECEIPT FORM

CLIENT: Kiff **DATE:** 6/28/01

TEMPERATURE – SAMPLES RECEIVED BY:

CALSCIENCE COURIER:

_____ Chilled, cooler with temperature blank provided.
_____ Chilled, cooler without temperature blank.
_____ Chilled and placed in cooler with wet ice.
_____ Ambient and placed in cooler with wet ice.
_____ Ambient temperature.
_____ °C Temperature blank.

LABORATORY (Other than Calscience Courier):

5.0 °C Temperature blank.
_____ Chilled, without temperature blank.
_____ Ambient temperature.

Initial: NC

CUSTODY SEAL INTACT:

Sample(s): _____ Cooler: ✓ No (Not Intact) : _____ Not Applicable (N/A): _____

Initial: NC

SAMPLE CONDITION:

	Yes	No	N/A
Chain-Of-Custody document(s) received with samples	✓		
Sample container label(s) consistent with custody papers	✓		
Sample container(s) intact and good condition	✓		
Correct containers for analyses requested			
Proper preservation noted on sample label(s)			✓
VOA vial(s) free of headspace			✓
Tedlar bag(s) free of condensation			✓

Initial: NC

COMMENTS:

CALSCIENCE ENVIRONMENTAL LABORATORIES, INC.
7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date 062701

Incident No. 91995053

Page 1 of 1

LABORATORY CLIENT: Kiff Analytical, LLC
ADDRESS: 720 Olive Drive Suite D
CITY Davis STATE CA ZIP 95616
TEL: 530-297-4800 FAX: 530-297-4803 E-MAIL:

CLIENT PROJECT NAME / NUMBER: C80-000930
930 Springtown Blvd., Livermore, CA
~~P.O. NO.~~ COC # 20956
PROJECT CONTACT: Joel Kiff
LAB USE ONLY: 06-1397
SAMPLER(S): (SIGNATURE)
COOLER RECEIPT TEMP = ______ °C

TURNAROUND TIME
☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 DAYS ☒ 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
☐ RWQCB REPORTING ☐ ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH (G)	TPH (D) or	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	VOCs (5035 / 8260B) EnCore	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	PNAs (8310)	VOCs (TO-14A) or (TO-15)	CH4 / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	TTLC Pb, IF >13ppm THEN TEST FOR ORGANIC LEAD		
1	Composite		6/21/01	11:45	Soil																	X		

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
[signature] Kiff Analytical		062701	1750
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature) Cal Overnight	Received for Laboratory by: (Signature) [signature]	6/28/01	1030

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.

10/01/00 Revision

EQUIVA[illegible]ces LLC Chain Of Custody Record

720 Olive Drive, Suite D
Davis, CA 95616
(530) 297-4800 (530) 297-4803 fax

Equiva Project Manager to be invoiced:
☐ SCIENCE & ENGINEERING
☐ TECHNICAL SERVICES
☐ DEPT. HOUSTON

20956

9 1 9 9 5 0 5 3

1 2 8 1 2 8

DATE: 6/21/01
PAGE: 1 of 3

CONSULTANT COMPANY: KHM Environmental Management
ADDRESS: 6294 San Ignacio Ave., #E
CITY: San Jose, CA 95119
TELEPHONE: 408-224-4724 FAX: 408-224-4518 E-MAIL: jyanti@KHM1.com

SITE ADDRESS (Street and City): 930 Springtown Blvd., Livermore, CA
PROJECT CONTACT (Report to): Lee Dooley
CONSULTANT PROJECT NO.: CBD-000930
SAMPLER NAME(S) (Print): Janet Yantis

TURNAROUND TIME (BUSINESS DAYS):
☒ 10 DAYS ☐ 5 DAYS ☐ 72 HOURS ☐ 48 HOURS ☐ 24 HOURS ☐ LESS THAN 24 HOURS

☐ LA - RWQCB REPORT FORMAT ☐ UST AGENCY: Zone 7

GC/MS MTBE CONFIRMATION: HIGHEST _____ HIGHEST per BORING _____ ALL X

SPECIAL INSTRUCTIONS OR NOTES: Confirm all MtBE hits by 8260

TEMPERATURE ON RECEIPT C°

REQUESTED ANALYSIS

Field Sample Identification	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH - Purgeable (8015m)	TPH - Extractable (8015m)	BTEX / MTBE (8021B)	BTEX / MTBE + Oxygenates (8260B)	VOCs Full List + Oxygenates (8260B)	MTBE (8260B) Confirmation, See Note	EPA 8038 Extraction for Volatiles	VOCs Halogenated/Aromatic (8021B)	Ethanol, Methanol (8016B)	Metals (Specify)	TRPH (418.1)	Vapor VOCs BTEX / MTBE (TO-15)	Vapor VOCs Full List (TO-15)	Vapor TPH (ASTM 3416m)	Vapor Fixed Gases (ASTM D1946)	Test for Disposal (48–	FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes
GP-1 @ 3½'	6/21/01	7:30	SOIL	1	X		X														1
GP-1 @ 6'		7:40			X		X														2
GP-1 @ 11'		7:50			X		X														3
GP-1 @ 14½'		8:10			X		X														4
GP-4 @ 3½'		8:30			X		X														5
GP-4 @ 6'		9:00			X		X														6
GP-4 @ 11½'		9:10			X		X														
GP-4 @ 14'		9:15			X		X														-07
GP-3 @ 3½'		10:00			X		X														-08
GP-3 @ 7'		10:10			X		X														-09

Relinquished by: (Signature) Janet Yantis 6/22/01
Received by: (Signature)
Date: Time:

Relinquished by: (Signature)
Received by: (Signature)
Date: Time:

Relinquished by: (Signature)
Received by: (Signature)
Date: 062201 Time: 1050

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.

10/23/00 Revision

Equiva Services LLC Chain Of Custody Record

720 Olive Drive, Suite D
Davis, CA 95616
(530) 297-4800 (530) 297-4803 fax

Equiva Project Manager to be invoiced:
- ☐ SCIENCE & ENGINEERING
- ☐ TECHNICAL SERVICES
- ☐ CRMT HOUSTON

Z0956

[illegible]: 9 1 9 9 5 0 5 3
[illegible]: 1 1 2 8 1 2 8

DATE: 6/21/01
PAGE: 2 of 3

CONSULTANT COMPANY: KHM Environmental Management
ADDRESS: 6284 San Ignacio Ave., #E
CITY: San Jose, CA 95119
TELEPHONE: 408-224-4724 FAX: 408-224-4518 E-MAIL: jyantis@KHM1.com

SITE ADDRESS (Street and City): 930 Springtown Blvd., Livermore, CA
PROJECT CONTACT (Report to): Lee Dooley
CONSULTANT PROJECT NO.: C80-000930
SAMPLER NAME(S) (Print): Janet Yantis

TURNAROUND TIME (BUSINESS DAYS): ☒ 10 DAYS ☐ 5 DAYS ☐ 72 HOURS ☐ 48 HOURS ☐ 24 HOURS ☐ LESS THAN 24 HOURS

☐ LA - RWQCB REPORT FORMAT ☐ UST AGENCY: Zone 7

GC/MS MTBE CONFIRMATION: HIGHEST ____ HIGHEST per BORING ____ ALL X

SPECIAL INSTRUCTIONS OR NOTES: Confirm all hits of MTBE by 8260

TEMPERATURE ON RECEIPT C°: ____

REQUESTED ANALYSIS

Field Sample Identification	Sampling Date	Sampling Time	Matrix	No. of Cont.	TPH - Purgeable (8015m)	TPH - Extractable (8015m)	BTEX / MTBE (8021B)	BTEX / MTBE + Oxygenates (8260B)	VOCs Full List + Oxygenates (8260B)	MTBE (8260B) Confirmation, See Note	EPA 5035 Extraction for Volatiles	VOCs Halogenated/Aromatic (8021B)	Ethanol, Methanol (8015B)	Metals (Specify)	TRPH (418.1)	Vapor VOCs BTEX / MTBE (TO-15)	Vapor VOCs Full List (TO-15)	Vapor TPH (ASTM 3416m)	Vapor Fixed Gases (ASTM D1946)	Test for Disposal (48-)	FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes
GP-3 @ 10½'	6/21/01	10:20	Soil	1	X		X														-10
Composite	6/21/01	11:45	Soil	1																X	-11

Relinquished by: (Signature) Janet W. Yantis 6/22/01
Received by: (Signature)
Date:
Time:

Relinquished by: (Signature)
Received by: (Signature)
Date:
Time:

Relinquished by: (Signature)
Received by: (Signature) [signature] [illegible]
Date: 062201
Time: 1050

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.

10/23/00 Revision

EQUIVA Services LLC Chain Of Custody Record

720 Olive Drive, Suite D
Davis, CA 95616
(530) 297-4800 (530) 297-4803 fax

Equiva Project Manager to be invoiced:
☐ SCIENCE & ENGINEERING
☐ TECHNICAL SERVICES
☐ CRMT HOUSTON

20956

9 1 1 9 9 5 0 5 3

1 2 8 1 2 8

DATE: 6/21/01
PAGE: 3 of 3

CONSULTANT COMPANY: KHM Environmental Management
ADDRESS: 6294 San Ignacio Ave., #E
CITY: San Jose, CA 95119
TELEPHONE: 408-224-4724 FAX: 408-224-4518 E-MAIL: jyantis@KHMl...com

SITE ADDRESS (Street and City): 930 Springtown Blvd., Livermore, CA
PROJECT CONTACT (Report to): Lee Dooley
CONSULTANT PROJECT NO.: C80-000930
SAMPLER NAME(S) (Print): Janet Yantis

TURNAROUND TIME (BUSINESS DAYS): ☒ 10 DAYS ☐ 5 DAYS ☐ 72 HOURS ☐ 48 HOURS ☐ 24 HOURS ☐ LESS THAN 24 HOURS

☐ LA - RWQCB REPORT FORMAT ☐ UST AGENCY: Zone 7

GC/MS MTBE CONFIRMATION: HIGHEST ______ HIGHEST per BORING ______ ALL X

SPECIAL INSTRUCTIONS OR NOTES: Confirm at MTBE hits by 8260

TEMPERATURE ON RECEIPT C°:

REQUESTED ANALYSIS

Field Sample Identification	Sampling Date	Sampling Time	Matrix	No. of Cont.	TPH - Purgeable (8015m)	TPH - Extractable (8015m)	BTEX / MTBE (8021B)	BTEX / MTBE + Oxygenates (8260B)	VOCs Full List + Oxygenates (8260B)	MTBE (8260B) Confirmation, See Note	EPA 5035 Extraction for Volatiles	VOCs Halogenated/Aromatic (8021B)	Ethanol, Methanol (8015B)	Metals (Specify)	TRPH (418.1)	Vapor VOCs BTEX / MTBE (TO-15)	Vapor VOCs Full List (TO-15)	Vapor TPH (ASTM 3416m)	Vapor Fixed Gases (ASTM D1946)	Test for Disposal (48-)	FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes
GP-1 @ 3'	6/21/01	7:30	Vapor	1												X	X				12
GP-4 @ 3'	↓	8:45	↓	↓												X	X				13
GP-3 @ 3'	↓	9:50	↓	↓												X	X				14

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Janet W. Yantis 6/22/01			
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature) Blake Brown Kiff analytical	Date: 062201	Time: 1050

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.

10/23/00 Revision

KIFF ANALYTICAL LLC

Report Number : 21052
Date : 7/13/2001

Nick Sudano
Blaine Tech Services
1680 Rogers Avenue
San Jose, CA 95112-1105

Subject : 8 Water Samples
Project Name : 930 Springtown Blvd., Livermore
Project Number : 010628-R3
P.O. Number : 91995053

Dear Mr. Sudano,

Chemical analysis of the samples referenced above has been completed. Summaries of the data are contained on the following pages. Sample(s) were received under documented chain-of-custody. US EPA protocols for sample storage and preservation were followed.

Kiff Analytical is certified by the State of California (# 2236). If you have any questions regarding procedures or results, please call me at 530-297-4800.

Sincerely,

Joel Kiff

Joel Kiff

KIFF ANALYTICAL LLC

Report Number : 21052
Date : 7/13/2001

Project Name : **930 Springtown Blvd., Livermore**
Project Number : **010628-R3**

Sample : **MW-A** Matrix : Water Lab Number : 21052-01
Sample Date :6/28/2001

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**1.2**	0.50	ug/L	EPA 8260B	7/7/2001
Toluene	**2.4**	0.50	ug/L	EPA 8260B	7/7/2001
Ethylbenzene	**51**	0.50	ug/L	EPA 8260B	7/7/2001
Total Xylenes	**64**	0.50	ug/L	EPA 8260B	7/7/2001
Methyl-t-butyl ether (MTBE)	**< 0.50**	0.50	ug/L	EPA 8260B	7/7/2001
TPH as Gasoline	**1100**	50	ug/L	EPA 8260B	7/7/2001
Toluene - d8 (Surr)	101		% Recovery	EPA 8260B	7/7/2001
4-Bromofluorobenzene (Surr)	101		% Recovery	EPA 8260B	7/7/2001

Sample : **MW-B** Matrix : Water Lab Number : 21052-02
Sample Date :6/28/2001

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**29**	2.5	ug/L	EPA 8260B	7/7/2001
Toluene	**550**	2.5	ug/L	EPA 8260B	7/7/2001
Ethylbenzene	**470**	2.5	ug/L	EPA 8260B	7/7/2001
Total Xylenes	**1700**	2.5	ug/L	EPA 8260B	7/7/2001
Methyl-t-butyl ether (MTBE)	**< 2.5**	2.5	ug/L	EPA 8260B	7/7/2001
TPH as Gasoline	**16000**	250	ug/L	EPA 8260B	7/7/2001
Toluene - d8 (Surr)	100		% Recovery	EPA 8260B	7/7/2001
4-Bromofluorobenzene (Surr)	101		% Recovery	EPA 8260B	7/7/2001

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 21052
Date : 7/13/2001

Project Name : **930 Springtown Blvd., Livermore**
Project Number : **010628-R3**

Sample : **MW-1** Matrix : Water Lab Number : 21052-03
Sample Date :6/28/2001

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.50**	0.50	ug/L	EPA 8260B	7/8/2001
Toluene	**< 0.50**	0.50	ug/L	EPA 8260B	7/8/2001
Ethylbenzene	**< 0.50**	0.50	ug/L	EPA 8260B	7/8/2001
Total Xylenes	**< 0.50**	0.50	ug/L	EPA 8260B	7/8/2001
Methyl-t-butyl ether (MTBE)	**0.65**	0.50	ug/L	EPA 8260B	7/8/2001
TPH as Gasoline	**< 50**	50	ug/L	EPA 8260B	7/8/2001
Toluene - d8 (Surr)	100		% Recovery	EPA 8260B	7/8/2001
4-Bromofluorobenzene (Surr)	101		% Recovery	EPA 8260B	7/8/2001

Sample : **MW-2** Matrix : Water Lab Number : 21052-04
Sample Date :6/28/2001

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.50**	0.50	ug/L	EPA 8260B	7/8/2001
Toluene	**< 0.50**	0.50	ug/L	EPA 8260B	7/8/2001
Ethylbenzene	**< 0.50**	0.50	ug/L	EPA 8260B	7/8/2001
Total Xylenes	**< 0.50**	0.50	ug/L	EPA 8260B	7/8/2001
Methyl-t-butyl ether (MTBE)	**< 0.50**	0.50	ug/L	EPA 8260B	7/8/2001
TPH as Gasoline	**< 50**	50	ug/L	EPA 8260B	7/8/2001
Toluene - d8 (Surr)	98.5		% Recovery	EPA 8260B	7/8/2001
4-Bromofluorobenzene (Surr)	100		% Recovery	EPA 8260B	7/8/2001

Approved By: Joel Kiff

KIFF ANALYTICAL LLC

Report Number : 21052
Date : 7/13/2001

Project Name : **930 Springtown Blvd., Livermore**
Project Number : **010628-R3**

Sample : **MW-3** Matrix : Water Lab Number : 21052-05
Sample Date :6/28/2001

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.50**	0.50	ug/L	EPA 8260B	7/7/2001
Toluene	**< 0.50**	0.50	ug/L	EPA 8260B	7/7/2001
Ethylbenzene	**0.56**	0.50	ug/L	EPA 8260B	7/7/2001
Total Xylenes	**1.6**	0.50	ug/L	EPA 8260B	7/7/2001
Methyl-t-butyl ether (MTBE)	**1.8**	0.50	ug/L	EPA 8260B	7/7/2001
TPH as Gasoline	**110**	50	ug/L	EPA 8260B	7/7/2001
Toluene - d8 (Surr)	101		% Recovery	EPA 8260B	7/7/2001
4-Bromofluorobenzene (Surr)	100		% Recovery	EPA 8260B	7/7/2001

Sample : **MW-4** Matrix : Water Lab Number : 21052-06
Sample Date :6/28/2001

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.50**	0.50	ug/L	EPA 8260B	7/7/2001
Toluene	**< 0.50**	0.50	ug/L	EPA 8260B	7/7/2001
Ethylbenzene	**< 0.50**	0.50	ug/L	EPA 8260B	7/7/2001
Total Xylenes	**< 0.50**	0.50	ug/L	EPA 8260B	7/7/2001
Methyl-t-butyl ether (MTBE)	**< 0.50**	0.50	ug/L	EPA 8260B	7/7/2001
TPH as Gasoline	**< 50**	50	ug/L	EPA 8260B	7/7/2001
Toluene - d8 (Surr)	100		% Recovery	EPA 8260B	7/7/2001
4-Bromofluorobenzene (Surr)	101		% Recovery	EPA 8260B	7/7/2001

Approved By: Joel Kiff

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

KIFF ANALYTICAL LLC

Report Number : 21052
Date : 7/13/2001

Project Name : **930 Springtown Blvd., Livermore**
Project Number : **010628-R3**

Sample : **MW-5** Matrix : Water Lab Number : 21052-07
Sample Date :6/28/2001

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**15**	0.50	ug/L	EPA 8260B	7/8/2001
Toluene	**2.5**	0.50	ug/L	EPA 8260B	7/8/2001
Ethylbenzene	**74**	0.50	ug/L	EPA 8260B	7/8/2001
Total Xylenes	**5.5**	0.50	ug/L	EPA 8260B	7/8/2001
Methyl-t-butyl ether (MTBE)	**< 0.50**	0.50	ug/L	EPA 8260B	7/8/2001
TPH as Gasoline	**1500**	50	ug/L	EPA 8260B	7/8/2001
Toluene - d8 (Surr)	97.2		% Recovery	EPA 8260B	7/8/2001
4-Bromofluorobenzene (Surr)	107		% Recovery	EPA 8260B	7/8/2001

Sample : **MW-8** Matrix : Water Lab Number : 21052-08
Sample Date :6/28/2001

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.50**	0.50	ug/L	EPA 8260B	7/8/2001
Toluene	**< 0.50**	0.50	ug/L	EPA 8260B	7/8/2001
Ethylbenzene	**< 0.50**	0.50	ug/L	EPA 8260B	7/8/2001
Total Xylenes	**< 0.50**	0.50	ug/L	EPA 8260B	7/8/2001
Methyl-t-butyl ether (MTBE)	**29**	0.50	ug/L	EPA 8260B	7/8/2001
TPH as Gasoline	**< 50**	50	ug/L	EPA 8260B	7/8/2001
Toluene - d8 (Surr)	96.2		% Recovery	EPA 8260B	7/8/2001
4-Bromofluorobenzene (Surr)	106		% Recovery	EPA 8260B	7/8/2001

Approved By: Joel Kiff

Report Number : 21052
Date : 7/13/2001

Project Name : **930 Springtown Blvd.,**
Project Number : **010628-R3**

21052 Quality Control Data - Method Blank

Parameter	Measured Value	Method Reporting Limit	Units	Analysis Method	Date Analyzed
Benzene	**< 0.50**	0.50	ug/L	EPA 8260B	7/7/2001
Toluene	**< 0.50**	0.50	ug/L	EPA 8260B	7/7/2001
Ethylbenzene	**< 0.50**	0.50	ug/L	EPA 8260B	7/7/2001
Total Xylenes	**< 0.50**	0.50	ug/L	EPA 8260B	7/7/2001
Methyl-t-butyl ether (MTBE)	**< 0.50**	0.50	ug/L	EPA 8260B	7/7/2001
TPH as Gasoline	**< 50**	50	ug/L	EPA 8260B	7/7/2001
Toluene - d8 (Surr)	95.6		% Recovery	EPA 8260B	7/7/2001
4-Bromofluorobenzene (Surr)	104		% Recovery	EPA 8260B	7/7/2001

Approved By: Joel Kiff

Report Number : 21052

QC Report : Matrix Spike/ Matrix Spike Duplicate

Date : 7/13/2001

Project Name : **930 Springtown Blvd.,**

Project Number : **010626-R3**

Parameter	Spiked Sample	Sample Value	Spike Level	Spike Dup. Level	Spiked Sample Value	Duplicate Spiked Sample Value	Units	Analysis Method	Date Analyzed	Spiked Sample Percent Recov.	Duplicate Spiked Sample Percent Recov.	Relative Percent Diff.	Spiked Sample Percent Recov. Limit	Relative Percent Diff. Limit
Spike Recovery Data														
Benzene	21062-02	<0.50	19.9	19.4	16.6	17.1	ug/L	EPA 8260B	7/7/2001	83.5	88.1	5.39	70-130	25
Toluene	21062-02	<0.50	19.9	19.4	16.6	17.1	ug/L	EPA 8260B	7/7/2001	83.7	88.2	5.15	70-130	25
Tert-Butanol	21062-02	<5.0	99.3	97.3	83.6	120	ug/L	EPA 8260B	7/7/2001	84.2	124	38.1	70-130	25
Methyl-t-Butyl Ether	21062-02	<0.50	19.9	19.4	17.4	18.6	ug/L	EPA 8260B	7/7/2001	87.5	95.7	8.95	70-130	25

Approved By: Joel Kiff

KIFF ANALYTICAL, LLC

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

Report Number : 21052

Date : 7/13/2001

QC Report : Laboratory Control Sample (LCS)

Project Name : **930 Springtown Blvd.,**

Project Number : **010628-R3**

Parameter	Spike Level	Units	Analysis Method	Date Analyzed	LCS Percent Recov.	LCS Percent Recov. Limit
Benzene	20.0	ug/L	EPA 8260B	7/7/2001	85.6	70-130
Toluene	20.0	ug/L	EPA 8260B	7/7/2001	85.8	70-130
Tert-Butanol	100	ug/L	EPA 8260B	7/7/2001	93.0	70-130
Methyl-t-Butyl Ether	20.0	ug/L	EPA 8260B	7/7/2001	90.3	70-130

Approved By: Joel Kiff

KIFF ANALYTICAL, LLC

720 Olive Drive, Suite D Davis, CA 95616 530-297-4800

LAB: KIFF

EQUIVA Services LLC Chain Of Custody Record

Lab Identification (if necessary):
Address:
City, State, Zip:

Equiva Project Manager to be invoiced:
- [x] SCIENCE & ENGINEERING
- [ ] TECHNICAL SERVICES
- [ ] CRMT HOUSTON

Karen Petryna 21052

INCIDENT NUMBER (S&E ONLY): 9 1 8 9 5 0 5 3

SAP or CRMT NUMBER (TS/CRMT):

DATE: 6/28/01
PAGE: 1 of 1

CONSULTANT COMPANY: Blaine Tech Services
ADDRESS: 1680 Rogers Avenue
CITY: San Jose, CA 95112
TELEPHONE: 408-573-0555 FAX: 408-573-7771 EMAIL: mailme@blainetech.com

SITE ADDRESS (Street and City): 930 Springtown Blvd., Livermore
PROJECT CONTACT (Report to): Nick Sudano
CONSULTANT PROJECT NO.: BTS # 010628-R3
SAMPLER NAME(S) (Print): Trei
LAB USE ONLY

TURNAROUND TIME (BUSINESS DAYS): [x] 10 DAYS [ ] 5 DAYS [ ] 72 HOURS [ ] 48 HOURS [ ] 24 HOURS [ ] LESS THAN 24 HOURS

[ ] LA - RWQCB REPORT FORMAT [ ] UST AGENCY:

GC/MS MTBE CONFIRMATION: HIGHEST [redacted] HIGHEST per BORING ____ ALL ____

SPECIAL INSTRUCTIONS OR NOTES: TEMPERATURE ON RECEIPT C°

~~MTBE Confirmation by EPA~~

REQUESTED ANALYSIS

LAB USE ONLY	Field Sample Identification	Sampling Date	Sampling Time	Matrix	No. of Cont.	TPH - Gas, Purgeable (8260)	BTEX (8260)	MTBE (8021B)	MTBE (8260B)	TPH - Diesel, Extractable (8015m)	Oxygenates (5) by 8260	Ethanol, Methanol (8015B)												FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes
	MW-A	6/28	1610	W	5	X	X		X															01
	MW-B	↓	1536	↓	↓	X	X		X															02
	MW-1	↓	1444	↓	↓	X	X		X															03
	MW-2	↓	1600	↓	↓	X	X		X															04
	MW-3	↓	1510	↓	↓	X	X		X															05
	MW-4	↓	1236	↓	↓	X	X		X															06
	MW-5	↓	1340	↓	↓	X	X		X															07
	MW-9	↓	1306	W	5	X	X		X															08

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
[signature]	[signature]	6/29/01	1752
[signature]			
	[signature]	062901	1015

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.

10/16/00 Revision

BLAINE TECH SERVICES

1680 Rogers Avenue
San Jose, CA 95112-1105

(408) 573-0555 Phone
(408) 573-7771 Fax

DATE 7/17/01

Total pages including cover sheet 2

TO VERA

OF EHM

FROM JAMES, X216

REMARKS: DTW'S FOR 930 SPRINGTOWN BLVD.,
REGARDS,
JAMES

WELL GAUGING DATA

Project # 010628-R Date 6/28/01 Client 9199505

Site 930 Springtown BLVD

Well ID	Well Size (in.)	Sheen / Odor	Depth to Immiscible Liquid (ft.)	Thickness of Immiscible Liquid (ft.)	Volume of Immiscibles Removed (ml)	Depth to water (ft.)	Depth to well bottom (ft.)	Survey Point: TOB or TOC	
MW-A	2					12.13	16.35	TOC	4
MW-B	2					9.81	22.20		7
MW-1	4					12.37	25.40		5
MW-2	4					9.88	22.48		8
MW-3	4					11.49	24.52		6
MW-4	3					10.82	24.85		1
MW-5	2					13.40	22.00		3
MW-8	4					16.49	24.20	TOC	2

APPENDIX F
RBCA DATA SHEETS

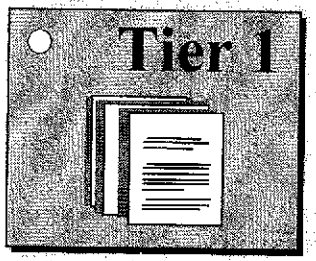
Main Screen

RBCA Tool Kit for Chemical Releases
Version 1.3a © 2000

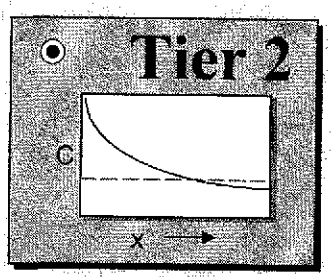
1. Project Information

Site Name:	Former Texaco Service Station		
Location:	930 Springtown Blvd., Livermore, California		
Compl. By:	L. Dooley		
Date:	1-Aug-01	Job ID:	C80-000930A1

2. Which Type of RBCA Analysis? ?



Generic Values
On-Site
Exposure



Site-Specific Values

On- or Off-Site Exposure

3. Calculation Options ?

Affects which input data are required

- ☑ ***Baseline Risks (Forward mode)***
- ☑ ***RBCA Cleanup Standards (Backward mode)***

4. RBCA Evaluation Process

Prepare Input Data

Data Complete? (■= yes, ■= no)

- ■□ Exposure Pathways
- ■□ Constituents of Concern (COCs)
- ■□ Transport Models
- ■□ Soil Parameters
- ■□ GW Parameters
- ■□ Air Parameters

Review Output

- Exposure Flowchart
- COC Chem. Parameters
- Input Data Summary
- User-Spec. COC Data...
- Transient Domenico Analysis...
- Baseline Risks...
- Cleanup Standards...

5. Commands and Options

New Site	Load Data...	Save Data As...	Quit
Print Sheet	Set Units	Custom Chem. Data...	*Help*

RBCA Tool Kit for Chemical Releases, Version 1.0a

Site Name: Former Texaco Service Station
Location: 930 Springtown Blvd., Livermore, California
Compl. By: L. Dooley
Job ID: C80-000930A1
Date: 1-Aug-01

Commands and Options

Main Screen | Print Sheet | *Help*

Source Media Constituents of Concern (COCs)

Apply Raoult's Law ?

Selected COCs

COC Select: *Sort List:* ?

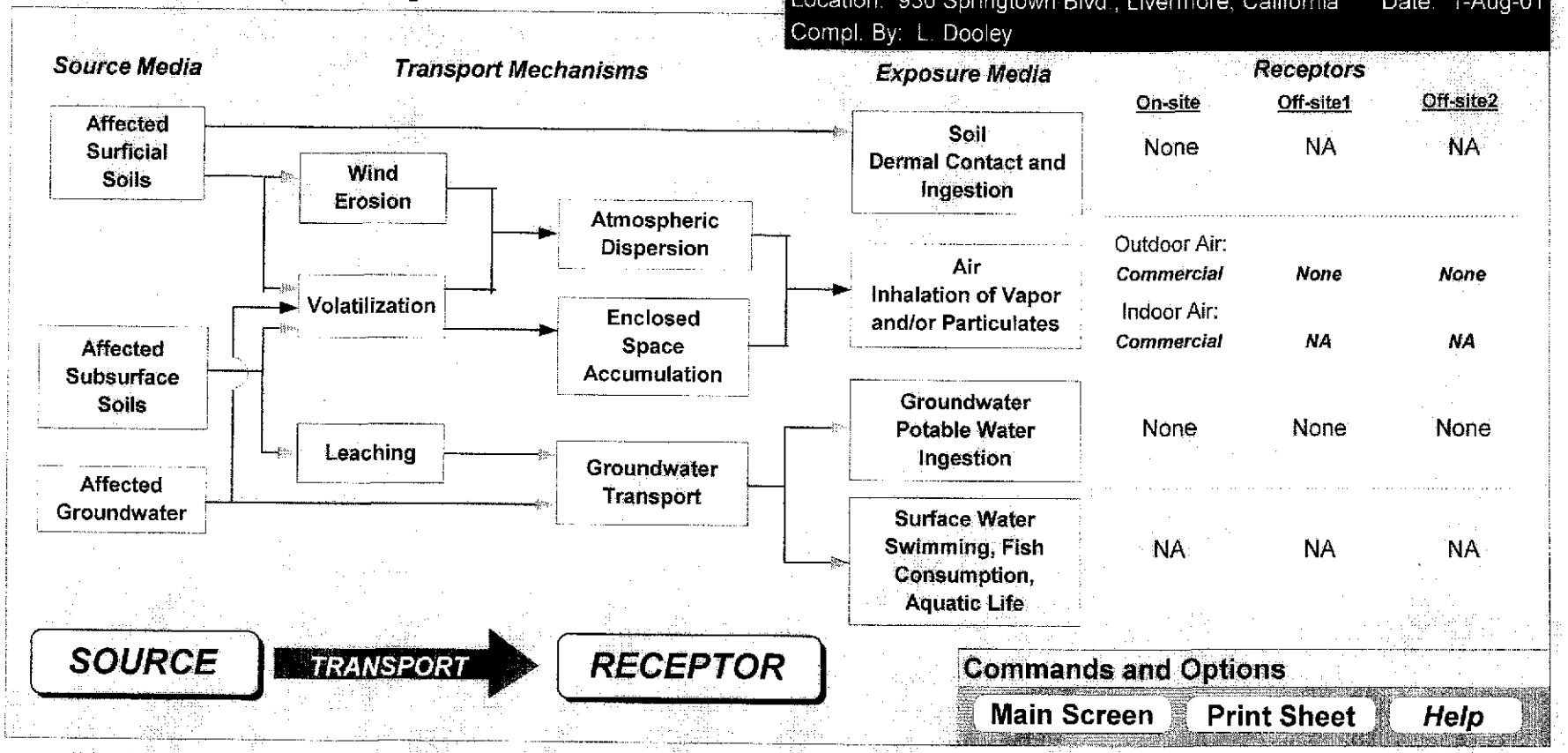
Add/Insert | Top | MoveUp
Delete | Bottom | MoveDown

Representative COC Concentration ?

Selected COCs	Groundwater Source Zone		Soil Source Zone		Mole Fraction in Source Material
	Calculate / Enter Site Data		Calculate / Enter Site Data		
	(mg/L)	note	*(mg/kg)*	note	*(-)*
Xylene (mixed isomers)	1.7E+0	MW-B			
Ethylbenzene	4.7E-1	MW-B			
Toluene	5.5E-1	MW-B			
Benzene	2.9E-2	MW-B			
Methyl t-Butyl ether	2.9E-2	MW-8			

Exposure Pathway Flowchart

Site Name: Former Texaco Service Station Job ID: C80-000930A1
Location: 930 Springtown Blvd., Livermore, California Date: 1-Aug-01
Compl. By: L. Dooley



Receptors	On-site	Off-site1	Off-site2
Soil Dermal Contact and Ingestion	None	NA	NA
Air Inhalation of Vapor and/or Particulates	Outdoor Air: *Commercial*	*None*	*None*
	Indoor Air: *Commercial*	*NA*	*NA*
Groundwater Potable Water Ingestion	None	None	None
Surface Water Swimming, Fish Consumption, Aquatic Life	NA	NA	NA

Commands and Options

Main Screen | Print Sheet | Help

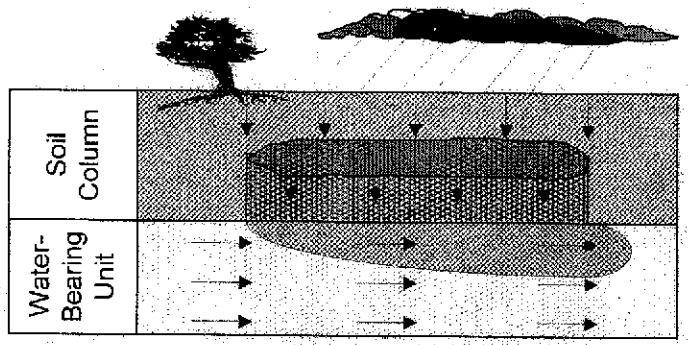
Site-Specific Soil Parameters

Site Name: Former Texaco Service Station Job ID: C80-000930A1
Location: 930 Springtown Blvd., Livermore, California Date: 1-Aug-01
Compl. By: L. Dooley

1. Soil Source Zone Characteristics

Hydrogeology

	General Case Construction	
Depth to water-bearing unit	7.46	(ft)
Capillary zone thickness	0.79	(ft)
Soil column thickness	6.67	(ft)
Affected Soil Zone		
Depth to top of affected soils		(ft)
Depth to base of affected soils		(ft)
Affected soil area		(ft^2)
Length of affected soil parallel to assumed wind direction		(ft)
Length of affected soil parallel to assumed GW flow direction		(ft)



2. Surface Soil Column

Vadose Zone Capillary Fringe

Predominant USCS Soil Type

ults

or Calculate or

Total porosity	0.38		(-)
Volumetric water content	0.23	0.34	(-)
Volumetric air content	0.15	0.04	(-)
Dry bulk density	1.7		(kg/L)
Vertical hydraulic conductivity	1.0E-5		(cm/s)
Vapor permeability	1.1E-14		(ft^2)
Capillary zone thickness	7.9E-1		(ft)

Net Rainfall Infiltration

Net infiltration estimate		(cm/yr)
or NA	or	
Average annual precipitation		(cm/yr)

Partitioning Parameters

Fraction organic carbon	0.015	(-)
Soil/water pH	6.8	(-)

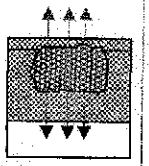
3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | *Help*

Transport Modeling Options

Site Name: Former Texaco Service Station Job ID: C80-000930A1
Location: 930 Springtown Blvd., Livermore, California Date: 1-Aug-01
Compl. By: L. Dooley

1. Vertical Transport, Surface Soil Column



Outdoor Air Volatilization Factors ?

- ○ Surface soil volatilization model only
- ◉ Combination surface soil/Johnson & Ettinger models
  Thickness of surface soil zone [3.28] *(ft)*
- ○ User-specified VF from other model Enter VF Values

Indoor Air Volatilization Factors ?

- ◉ Johnson & Ettinger model
- ○ User-specified VF from other model Enter VF Values

Soil-to-Groundwater Leaching Factor ?

- ○ ASTM Model
  - ☐ Apply Soil Attenuation Model (SAM)
  - ☐ Allow first-order biodecay Enter Decay Rates
- ○ User-specified LF from other model Enter LF Values

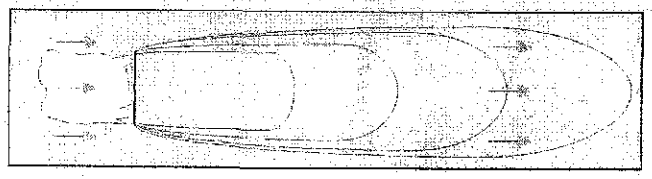
2. Lateral Air Dispersion Factor

?

- ○ 3-D Gaussian dispersion model
- ○ User-Specified ADF

Off-site 1	Off-site 2	
1.00E+0	1.00E+0	*(-)*

3. Groundwater Dilution Attenuation Factor



Calculate DAF using Domenico Model ?

- ○ Domenico equation with dispersion only (no biodegradation)
- ○ Domenico equation first-order decay Enter Decay Rates
- ○ Modified Domenico equation using electron acceptor superposition Enter Site Data

Enter Directly Biodegradation Capacity [NC] *(mg/L)*

— or —

User-Specified DAF Values

- ○ DAF values from other model or site data Enter DAF Values

n o

4. Commands and Options

Main Screen **Print Sheet** ***Help***

Site-Specific Air Parameters

Site Name: Former Texaco Service Station Job ID: C80-000930A1
Location: 930 Springtown Blvd., Livermore, California Date: 1-Aug-01
Compl. By: L. Dooley

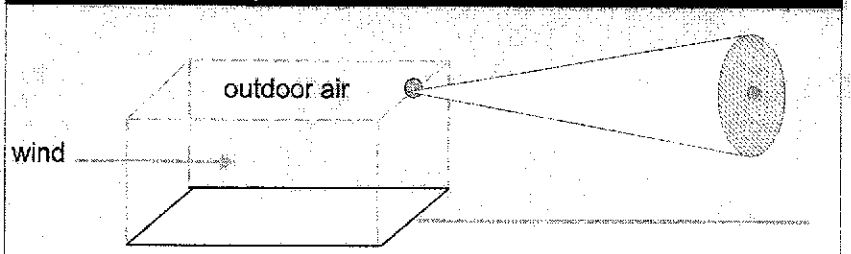
1. Outdoor Air Pathway

Dispersion in Air

	Off-site 1	Off-site 2	
Distance to offsite air receptor			(ft)
or NA		or	
Horizontal dispersivity			(ft)
Vertical dispersivity			(ft)

Air Source Zone

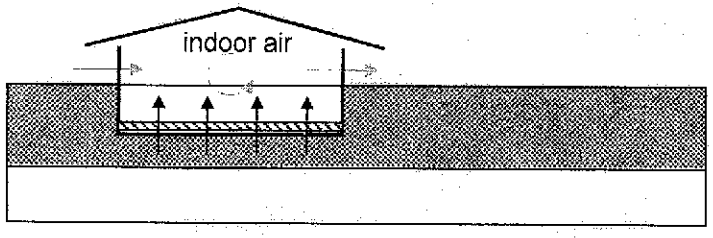
Air mixing zone height	6.56167979	(ft)
Ambient air velocity in mixing zone	7.381889764	(ft/s)
Areal particulate emission flux	6.9E-14	(g/cm^2/s)



2. Indoor Air Pathway

Building Parameters

	Residential	Commercial	
Building volume/area ratio	6.56168	9.84252	(ft)
Foundation area	753.474	753.474	(ft^2)
Foundation perimeter	111.549	111.549	(ft)
Building air exchange rate	1.4E-4	2.3E-4	(1/s)
Depth to bottom of foundation slab	0.49213	0.49213	(ft)
Convective air flow through cracks	0.0E+0	0.0E+0	(ft^3/s)
Foundation thickness	0.492125984		(ft)
Foundation crack fraction	0.01		(-)
Volumetric water content of cracks	0.12		(-)
Volumetric air content of cracks	0.26		(-)
Indoor/Outdoor differential pressure	0		(g/cm/s^2)



3. Commands and Options

Main Screen | Use Default Values | Print Sheet
Set Units | | *Help*

RBCA SITE ASSESSMENT

Input Parameter Summary

Site Name: Former Texaco Service Station
Site Location: 930 Springtown Blvd., Livermore, California

Completed By: L. Dooley
Date Completed: 1-Aug-01

Job ID: C80-000930A1

Exposure Parameters		Residential			Commercial/Industrial	
		Adult	(1-6 yrs)	(1-16 yrs)	Chronic	Construc.
AT_c	Averaging time for carcinogens (yr)	70				
AT_n	Averaging time for non-carcinogens (yr)	30			25	1
BW	Body weight (kg)	70	15	35	70	
ED	Exposure duration (yr)	30	6	16	25	1
τ	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure frequency (days/yr)	350			250	180
EF_D	Exposure frequency for dermal exposure	350			250	
IR_w	Ingestion rate of water (L/day)	2			1	
IR_s	Ingestion rate of soil (mg/day)	100	200		50	100
SA	Skin surface area (dermal) (cm^2)	5800		2023	5800	5800
M	Soil to skin adherence factor	1				
ET_{swim}	Swimming exposure time (hr/event)	3				
EV_{swim}	Swimming event frequency (events/yr)	12	12	12		
IR_{swim}	Water ingestion while swimming (L/hr)	0.05	0.5			
SA_{swim}	Skin surface area for swimming (cm^2)	23000		8100		
IR_{fish}	Ingestion rate of fish (kg/yr)	0.025				
FI_{fish}	Contaminated fish fraction (unitless)	1				

Complete Exposure Pathways and Receptors	On-site	Off-site 1	Off-site 2
Groundwater:			
Groundwater Ingestion	None	None	None
Soil Leaching to Groundwater Ingestion	None	None	None
Applicable Surface Water Exposure Routes:			
Swimming			NA
Fish Consumption			NA
Aquatic Life Protection			NA
Soil:			
Direct Ingestion and Dermal Contact	None		
Outdoor Air:			
Particulates from Surface Soils	None	None	None
Volatilization from Soils	None	None	None
Volatilization from Groundwater	Commercial	None	None
Indoor Air:			
Volatilization from Subsurface Soils	None	NA	NA
Volatilization from Groundwater	Commercial	NA	NA

Receptor Distance from Source Media	On-site	Off-site 1	Off-site 2	(Units)
Groundwater receptor	NA	NA	NA	(ft)
Soil leaching to groundwater receptor	NA	NA	NA	(ft)
Outdoor air inhalation receptor	0	NA	NA	(ft)

Target Health Risk Values		Individual	Cumulative
TR_{ca}	Target Risk (class A&B carcinogens)	1.0E-6	1.0E-5
TR_c	Target Risk (class C carcinogens)	1.0E-5	
THQ	Target Hazard Quotient (non-carcinogenic risk)	1.0E+0	1.0E+0

Modeling Options	
RBCA tier	Tier 2
Outdoor air volatilization model	Surface & subsurface models
Indoor air volatilization model	Johnson & Ettinger model
Soil leaching model	NA
Use soil attenuation model (SAM) for leachate?	NA
Air dilution factor	NA
Groundwater dilution-attenuation factor	NA

NOTE: NA = *Not applicable*

Surface Parameters		General	Construction	(Units)
A	Source zone area	0.0E+0	NA	(ft^2)
W	Length of source-zone area parallel to wind	0.0E+0	NA	(ft)
W_{gw}	Length of source-zone area parallel to GW flow	NA		(ft)
U_{air}	Ambient air velocity in mixing zone	7.4E+0		(ft/s)
δ_{air}	Air mixing zone height	6.6E+0		(ft)
P_a	Areal particulate emission rate	NA		(g/cm^2/s)
L_{ss}	Thickness of affected surface soils	NA		(ft)

Surface Soil Column Parameters		Value			(Units)
h_{cap}	Capillary zone thickness	7.9E-1			(ft)
h_v	Vadose zone thickness	6.7E+0			(ft)
ρ_s	Soil bulk density	1.7E+0			(g/cm^3)
f_{oc}	Fraction organic carbon	1.5E-2			(-)
θ_T	Soil total porosity	3.8E-1			(-)
K_{vs}	Vertical hydraulic conductivity	1.0E-5			(cm/s)
k_v	Vapor permeability	1.1E-14			(ft^2)
L_{gw}	Depth to groundwater	7.5E+0			(ft)
L_s	Depth to top of affected soils	NA			(ft)
L_{base}	Depth to base of affected soils	NA			(ft)
L_{subs}	Thickness of affected soils	NA			(ft)
pH	Soil/groundwater pH	6.8E+0			(-)
		capillary	vadose	foundation	
θ_w	Volumetric water content	*0.34*	*0.23*	*0.12*	(-)
θ_a	Volumetric air content	0.04	0.15	0.26	(-)

Building Parameters		Residential	Commercial	(Units)
L_b	Building volume/area ratio	NA	9.84E+0	(ft)
A_b	Foundation area	NA	7.53E+2	(ft^2)
X_{crk}	Foundation perimeter	NA	1.12E+2	(ft)
ER	Building air exchange rate	NA	2.30E-4	(1/s)
L_{crk}	Foundation thickness	NA	4.92E-1	(ft)
Z_{crk}	Depth to bottom of foundation slab	NA	4.92E-1	(ft)
η	Foundation crack fraction	NA	1.00E-2	(-)
dP	Indoor/outdoor differential pressure	NA	0.00E+0	(g/cm/s^2)
Q_s	Convective air flow through slab	NA	0.00E+0	(ft^3/s)

Groundwater Parameters		Value	(Units)
δ_{gw}	Groundwater mixing zone depth	NA	(ft)
I_f	Net groundwater infiltration rate	NA	(cm/yr)
U_{gw}	Groundwater Darcy velocity	NA	(cm/s)
V_{gw}	Groundwater seepage velocity	NA	(cm/s)
K_s	Saturated hydraulic conductivity	NA	(cm/s)
I	Groundwater gradient	NA	(-)
S_w	Width of groundwater source zone	NA	(ft)
S_d	Depth of groundwater source zone	NA	(ft)
θ_{eff}	Effective porosity in water-bearing unit	NA	(-)
f_{oc-sat}	Fraction organic carbon in water-bearing unit	NA	(-)
pH_{sat}	Groundwater pH	NA	(-)
	Biodegradation considered?	NA	

Transport Parameters		Off-site 1	Off-site 2	Off-site 1	Off-site 2	(Units)
Lateral Groundwater Transport		Groundwater Ingestion		Soil Leaching to GW		
α_x	Longitudinal dispersivity	NA	NA	NA	NA	(ft)
α_y	Transverse dispersivity	NA	NA	NA	NA	(ft)
α_z	Vertical dispersivity	NA	NA	NA	NA	(ft)
Lateral Outdoor Air Transport		Soil to Outdoor Air Inhal.		GW to Outdoor Air Inhal.		
σ_y	Transverse dispersion coefficient	NA	NA	NA	NA	(ft)
σ_z	Vertical dispersion coefficient	NA	NA	NA	NA	(ft)
ADF	Air dispersion factor	NA	NA	NA	NA	(-)

Surface Water Parameters		Off-site 2	(Units)
Q_{sw}	*Surface water flowrate*	NA	(ft^3/s)
W_{pl}	Width of GW plume at SW discharge	NA	(ft)
δ_{pl}	Thickness of GW plume at SW discharge	NA	(ft)
DF_{sw}	Groundwater-to-surface water dilution factor	NA	(-)

RBCA SITE ASSESSMENT

Site Name: Former Texaco Service Station
Site Location: 930 Springtown Blvd., Livermore, California

Completed By: L. Dooley
Date Completed: 1-Aug-01

Job ID: C80-000930A1

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

Groundwater DAF Option:

SSTL Results For Complete Exposure Pathways ("X" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	Groundwater Ingestion / Discharge to Surface Water			X	GW Vol. to Indoor Air	X	Groundwater Volatilization to Outdoor Air			Applicable SSTL	SSTL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	On-site (0 ft) None	Off-site 1 (300 ft) None	Off-site 2 (0 ft) None		On-site (0 ft) Commercial		On-site (0 ft) Commercial	Off-site 1 (0 ft) None	Off-site 2 (0 ft) None	(mg/L)	"■" if yes	Only if "yes" left
1330-20-7	Xylene (mixed isomers)	1.7E+0	NA	NA	NA		>2.0E+2		>2.0E+2	NA	NA	>2.0E+2	☐	NA
100-41-4	Ethylbenzene	4.7E-1	NA	NA	NA		>1.7E+2		>1.7E+2	NA	NA	>1.7E+2	☐	NA
108-88-3	Toluene	5.5E-1	NA	NA	NA		2.5E+2		>5.2E+2	NA	NA	2.5E+2	☐	<1
71-43-2	Benzene	2.9E-2	NA	NA	NA		2.3E-1		8.3E+1	NA	NA	2.3E-1	☐	<1
1634-04-4	Methyl t-Butyl ether	2.9E-2	NA	NA	NA		5.6E+3		>4.8E+4	NA	NA	5.6E+3	☐	<1

">" indicates risk-based target concentration greater than constituent solubility value. NA = Not applicable. NC = Not calculated.