Risk Based Corrective Action
Tier 2 Assessment For Soil And
Groundwater Monitoring Report
Beck Roofing Company
Hayward, CA
March 31, 1999

Prepared for:
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1.0 INTRODUCTION

This report responds to a January 5, 1999 letter from Mr. Amir Gholami of the Alameda County Health Care Services Agency Environmental Health Services (EHS) to at Beck Roofing Company (Beck Roofing). The Beck Roofing location is 21123 Meekland Avenue, Hayward, Alameda County, California. Figure 1 is the site location map. This report presents the results of January 1999 groundwater monitoring including oxygenated fuel additives and lead scavengers (TAME, DIPE, ETBE, TBA, EDB and EDC). Groundwater monitoring data for the four monitoring wells are included in Table 1 (1-1 through 1-4). Section 7.0 presents report conclusions for the groundwater data at Beck Roofing.

This report also presents Risk Based Corrective Action (RBCA) Tier 2 site specific risk assessment as requested in the January 5, 1999 letter. Soil related activities are described in Section 4.0 to provide site background information. Sections 8 through 11 present a detailed evaluation of the existing soil data and the Tier 1 and Tier 2 analyses. Section 12 presents conclusions and recommendations based on the RBCA analysis.

2.0 SITE BACKGROUND

Beck Roofing is a commercial roofing business. The property is located on the south side of Meekland Avenue, 21123 Meekland Avenue. Site usage includes equipment and materials storage, shop and office facilities. Site specific information was obtained from the owners, Mr. Charles and Mrs. Mary Beck, or from the existing environmental reports and documents listed in Section 13.0 References.

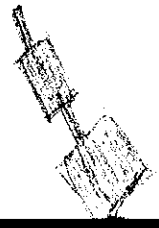
The site is in an unincorporated section of Alameda County, south of San Leandro and north of the Hayward city limits. Area land use is mixed residential, commercial and industrial. The yard contains an office building, warehouse and workshops. Beck Roofing also stores trucks and other equipment within the yard.

Beck Roofing installed an underground 1000-gallon steel tank during the 1970s following the gasoline crisis. The tank stored gasoline for refueling company trucks and serviced a single dispensing pump.

The tank was installed with a concrete slab cap over the backfill material. The original tank pit was probably filled with pea gravel available on-site. The tank was located in the driving area of the Beck Roofing yard, next to a previously existing shed. Figure 2 shows the former tank location. Beck Roofing personnel periodically cover the yard with additional gravel as part of on going yard maintenance activities. Gasoline usage was variable depending on number of active jobs and distance to job sites. Beck Roofing provided a rough estimated usage rate of 300 to 400 gallons per month.

Beck Roofing contracted with R.L. Stevens to have the tank tightness tested. The test was performed on January 11, 1990. R.L. Stevens followed the Precision Test Criteria as established by N.F.P.A. Publication 329. R. L. Stevens reported that the tank was tight at the time of the test, January 1990.

The tank was removed during May 1991. Several stages of environmental investigation, remediation and monitoring followed, from 1991 until the present. Figure 2 shows the facility layout and location of four groundwater monitoring wells and other soil borings installed during the environmental investigations.



3.0 SITE GEOLOGY AND HYDROGEOLOGY

L&W Environmental Services (L&W) January 1992 report briefly describes area geology and hydrogeology as follows. The site elevation is approximately 55 feet above sea level, in a geologic province of San Francisco Bay. The Bay to the west and the Berkeley Hills to the east affect site geology. Alluvial and bay sediments underlie the site with basement rock at depth. "Groundwater in this region is located at relatively shallow depths, in granular aquifers laid down by alluvial action on the nearby Berkeley Hills. Groundwater is often contained in granular deposits layered and confined by various fine grained deposits at depths of about 20 feet below ground surface." (L&W, 1992) Site lithology and hydrogeology are discussed further below.

9.1 Site Lithology

Site lithology, as indicated by the boring logs, consists of interbedded silty clay, clay, sand and silty sand. Appendix A includes boring logs for the four monitoring wells drilled at Beck Roofing. The site is typical of east bay regions close to San Francisco Bay with interfingered layers of fine grained and coarse grained materials.

Figures 3 and 4 are geologic cross sections of the facility based on soil borings drilled during 1991 and 1994. Figure 3 is an east-west cross section roughly through MW-2 in the east to B-2, MW-3 and MW-4 in the west. The data from the included borings suggests that the sediments are coarser grained (sand and silty sand) from about 15 to 20 feet below ground surface (bgs) in the eastern portion of the site. Fine-grained sediments (silty clay, clay) predominate the same depths near MW-4. Figure 4 is a north-south cross section intersecting Figure 3 at MW-4. This cross section shows primarily silty and clayey material with a sand layer of variable thickness. The sand layer ranges from approximately 15 feet thick, beginning at 17 feet bgs in SB-20 (north), to approximately three feet thick, beginning at 15 feet bgs in SB-19 (south).

3.2 Site Hydrogeology

Site hydrogeology describes aquifer characteristics such as the groundwater flow direction, gradient, levels and well productivity. Groundwater flows roughly west across this site. Thus, MW-2 is the site up-gradient well. MW-1 is cross-gradient to the former underground tank location. MW-3 and MW-4 are down gradient wells. The groundwater gradient varies from approximately 0.001 to 0.005 feet per foot. Water levels in the wells rose following well installation per the Anderson and Lush Geosciences quarterly monitoring reports. This suggests that the groundwater may be partially confined.

The September 1997 groundwater levels represent typical values for in the Beck Roofing monitoring wells. The September 1997 water levels prior to purging, were 26.3 to 26.8 feet below ground surface (bgs). Groundwater elevations at Beck Roofing range from a high of 21.2 feet bgs in MW-4 (2/5/97) to a low of 30.1 feet bgs in MW-1 and MW-4 (10/25/94). January 1999 groundwater levels fall within the typical range for this site.

Well pump tests were not performed to determine production rates. However, well purge pumps operating at an estimated 0.5 to 0.75 gallons per minute, did not empty the wells during the fall 1997 and January 1999 monitoring events.

3.3 Area Land Use and Water Supply

The site is located in a mixed industrial/residential area near the city of Hayward. The East Bay Municipal Utilities District (EBMUD) or the City of Hayward water district, supply drinking quality water to the area. Therefore, the shallow aquifer (groundwater zone) affected at Beck Roofing may be not used at all or may be used only for irrigation in this area.

Areas immediately adjacent to Beck Roofing include a railroad right of way and tracks west of the yard (down gradient) and two residences on either side of the yard driveway (up gradient). The railroad right of way provides a buffer between the yard and residences beyond the tracks. The Becks own the two residences adjacent to the site driveway. Both are supplied by EBMUD and neither has an on-site well. The residences down gradient of the facility are beyond railroad tracks and right of way, and part of a subdivision connected to the municipal water supply.

4.0 SITE ENVIRONMENTAL ACTIVITIES — SOILS

Various firms performed the tank removal, subsurface investigations and stockpiled soil sampling between 1991 and 1997. This section summarizes the soil related activities, data and findings. Soils data are presented in Tables 1 and 2.

4.1 Tank Removal and Soil Sampling - 1991

Beck Roofing contracted with Blaine Tech Services (Blaine) via R.L. Stevens to remove the underground gasoline tank. Blaine removed the tank on May 20, 1991. Field observations reported by Blaine included "two small holes in the bottom of the tank at each end."

Soil samples were collected from soils beneath the tank and soils excavated during tank removal. An estimated 14 cubic yards of soil were excavated and stockpiled during tank removal. Soil sample analyses for soils beneath the tank contained 1,300 and 1,800 ppm of gasoline range petroleum hydrocarbons (TPHg). Stockpiled (excavated) soils contained 11 ppm TPHg. Organic lead was below 1 ppm. Benzene, toluene, ethylbenzene and xylene analytical results for the stockpiled soils were at nondetectable levels.

An August 5, 1991 letter from the Alameda County Department of Environmental Health (DEH) required Beck Roofing to perform soil and groundwater investigations at the former underground tank site. Pursuant to the August 5, 1991, DEH letter, L&W Environmental Services (L&W) drilled and sampled five soil borings during October 1991. Three of these borings were converted to monitoring wells, MW-1, MW-2 and MW-3 (Figure 2). L&W excavated soils to remove contamination from the former tank location, based on the soil boring results. The December 1991 excavation had the approximate dimensions 10' x 13' x 17' deep. Excavated soils were stockpiled on-site for aeration.

L&W excavated additional soils during December 1991. Eight soil samples were collected and analyzed. Six of these eight soil samples contained TPHg at or above the state action level of 1000 ppm. The L&W January 7, 1992 report data shows detectable levels of contaminated soils only at depths greater than 15 feet below ground surface (bgs).

Appendix B includes Figures 14, 15, 16 and 17 from the L&W 1992 report. These figures show the extent of TPHg contamination at 15, 20, 25 and 30 foot depths. TPHg above 100 ppm was detected at the 20-foot depth in the area immediately surrounding the excavation only. TPHg levels at greater distances and other depths were less than 100 ppm. L&W backfilled the excavation with 189 cubic yards of a proprietary fill material resembling concrete.

4.2 Subsequent Soil Investigations –1994

Anderson Consulting Group (Anderson) drilled four additional soil borings during July 1994. Anderson converted one boring (SB-18) to an additional monitoring well, MW-4; other borings were backfilled. One boring (SB-21) was drilled in the location of the former underground tank. The other three borings were located westerly from the previous borings and wells.

The four soil borings drilled by Anderson were sampled and analyzed for TPHg and benzene, toluene, ethylbenzene and xylene (BTEX). Soil samples from 25.5 to 35.5 foot depths, and grab water samples were analyzed from borings SB-18, SB-19 and SB-20. Soil and water sample results for these three borings were consistently below detection limits (ND). SB-21 samples were analyzed from 28.5 to 29.5 foot depths. These samples each contained TPHg above 100 ppm and detectable levels of BTEX. Constituent concentrations increased with depth over this one foot distance. The highest ppm values measured were 550, 13, 64, 25, and 120 for TPHg and BTEX respectively. The TPHg levels are above 100 ppm, but are below the 1000 ppm TPHg guideline level often used as a remediation level. Exploratory soil borings were not drilled after July 1994. Figure 2 shows the location of the borings and wells described in the available reports.

4.3 Stockpiled Soil Sampling

Stockpiled soil resulting from the 1991 and 1992 excavation was stored on-site and occasionally turned by Beck Roofing personnel between 1992 and 1997. The estimated total volume of stockpiled soil was approximately 750 cubic yards. Soil contamination generally was not detected at depths less than 15 feet bgs, as stated above. Therefore, much of the excavated soil may have been clean overburden from above the contaminated soil layer.

The soils were sampled, analyzed and subsequently removed from the site in the fall of 1997 by Heilshorn Environmental Engineering (HE2). The analytical data for the stockpiled soil samples indicate very low or no detectable organic constituents associated with gasoline releases. The 1991 data show TPHg at 11 ppm, nondetectable BTEX, and no detectable organic lead. Organic lead is the chemical form of lead associated with gasoline (tetraethyl lead). The 1997 data show nondetectable levels of TPHg, BTEX and very low total lead levels (12 - 16 ppm). The total lead concentration was presumed below the STLC (5 mg/L, approximately 5 ppm), which is often the disposal limit allowed by commercial disposal facilities. The stockpiled soils were removed from the site during October 1997 and used for fill material.

5.0 SITE ENVIRONMENTAL ACTIVITIES — GROUNDWATER

Four groundwater monitoring wells were installed to determine groundwater quality and the extent of groundwater contamination. These wells have been sampled regularly since installation in 1991 and 1994. The data indicate decreasing concentrations of TPHg and BTEX compounds at low ppm, low ppb, to nondetectable levels. This section describes monitoring and data prior to 1999.

5.1 WELL INSTALLATION INFORMATION

The four monitoring wells were installed in phases. L&W Environmental Services installed three wells, during October 1991 (MW-1, MW-2 and MW-3). Anderson installed the fourth well during August 1994 (MW-4). L&W drilled MW-2 and MW-3 to 38 feet. MW-1 was drilled to 45.5 feet then grouted to 39 feet before installing the well screen. Groundwater was first encountered at 33 feet in MW-2 and MW-3 and at 30.5 feet in MW-1 (L&W, 1992). Anderson Consulting boring

logs reported saturated soil at approximately 28 feet in MW-4. The depths listed are presumed feet below ground surface (bgs). Appendix A contains the four well boring logs.

5.2 GROUNDWATER ANALYTICAL DATA 1991 to 1997

Analytical data are available for monitoring wells MW-1, MW-2, and MW-3 from 1991 and monitoring well MW-4 from 1994. The initial well sampling for MW-1, MW-2 and MW-3 (11/4/91) resulted in nondetectable (ND) levels of TPHg, BTEX, and lead in samples from each well. The results were reported in parts per million (ppm) (L&W, 1992). Analytical results of the initial sampling for MW 4 on August 4, 1994, showed most constituents measured below the method detection limits. Toluene was detected at 0.5 parts per billion (ppb). MW-1, MW-2 samples collected during the August 4, 1994, sampling event showed ND levels of TPHg and BTEX. MW-3 August 1994 results indicated concentrations of 4.2 ppm TPHg, and 450, ND, 180 and 160 ppb, BTEX respectively.

The analytical results for the September 1997 groundwater data indicate low levels of gasoline related hydrocarbons (TPHg, BTEX) in MW-3 only. MW-1, MW-2 and MW-4 did not contain detectable levels of these compounds. None of the four wells contained detectable levels of MTBE. MW-3 groundwater contained TPHg at 2.7 parts per million (ppm), nondetectable MTBE, and benzene, toluene, xylenes and ethylbenzene at 160, 0.65, 93, and 26 ppb respectively. The levels detected in MW-3 are below the remediation level of 100 ppm for TPHg, and below the MCLs for toluene, ethylbenzene and xylenes. The benzene level is below the TCLP level of 500 ppb.

Tables 3-1 through 3-4 summarize the groundwater analytical data for MW-1 through MW-4, respectively. These data show that groundwater analyses for the four wells resulted in TPHg concentrations at 4.4 ppm or below. Benzene levels were generally 10 ppb or lower. Only MW-3 sample results showed benzene levels at or above the Toxic Characteristic Leaching Procedure (TCLP) level of 500 ppb. These peaks were measured during 1992, 1993 and 1995. April 1996 to February 1997 benzene levels ranged from 1.2 ppb to 36 ppb. The results for toluene, ethylbenzene and total xylenes were consistently below the regulatory limit for drinking water established by the U.S. Environmental Protection Agency (EPA), the Maximum Contaminant Level (MCL). Toluene, ethylbenzene and total xylenes have MCLs of 150, 700 and 1750 micrograms per liter (µg/L) respectively. Micrograms/liter approximate parts per billion.

1000

6.0 JANUARY 1999 GROUNDWATER SAMPLE COLLECTION AND FIELD OBSERVATIONS

The wells were sampled on January 29, 1999. HE2 measured water levels, purged the wells, and collected groundwater samples. Water pH, specific conductivity, and temperature were measured during well purging. Table 4 presents the well sampling field data including pH, specific conductivity, temperature, depth to groundwater, and volume purged. No free product or sheen was noted in the purged well water. A slight odor was detected from MW-3 and MW-4.

6.1 GROUNDWATER SAMPLING PROCEDURES

The wells were purged then sampled using new clean polyethylene bailers. Three casing volumes of groundwater were removed from each well prior to sampling. The wells were allowed to recover to at least 80% of the initial water level reading prior to sampling. Groundwater samples were bailed and poured into 40 ml volatile organic analysis (VOA) vials with Teflon septa. The vials were sealed so that no air bubbles were trapped in the vials (zero headspace). Bailed water not

collected as a sample was placed in labeled, new, steel drum within the yard. The water in the drums will be disposed as hazardous waste if the analytical values exceed TCLP limits.

Samples were labeled, stored on ice and delivered to the laboratory the same day as collection. Samples were labeled with the project name, sample location, date, sampler's name, and analyses requested. After collection and labeling, the samples were sealed in plastic bags and placed in a cooler with ice. The groundwater samples were analyzed for: Total Petroleum Hydrocarbons-gasoline (TPHg), benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method 8015-modified. Per the January 5, 1999 letter, the samples were also analyzed for oxygenated fuel additives (DIPE, ETBE, MTBE, TAME) and lead scavengers (EDC, EDB) Samples were accompanied by a chain of custody form and delivered to a state certified laboratory, McCampbell Analytical, Pacheco, DHS Certification No. 1644) for analysis.

6.2 JANUARY 1999 GROUNDWATER ANALYTICAL RESULTS

Groundwater samples were analyzed for TPHg, BTEX, oxygenated fuel additives and lead scavengers as stated above. Appendix C includes the analytical reports and chain of custody forms for the January 1999 groundwater samples. Table 5 presents the analytical data for the January 1999 samples.

The analytical results for the January groundwater data indicate low levels of the analyzed gasoline related hydrocarbons and fuel additives in MW-3 only. MW-1, MW-2 and MW-4 did not contain detectable levels of any of these compounds. None of the four wells contained detectable levels of toluene, xylenes, DIPE, ETBE, TAME or EDB. MW-3 groundwater contained TPHg at 2.3 parts per million (ppm), benzene (6.2 µg/L), ethylbenzene (7.3 µg/L), MTBE (3.3 µg/L), and at 160, 0.65, 93, and 26 ppb respectively. The levels detected in MW-3 are below the remediation level of 100 ppm for TPHg, below available TCLP levels and below the MCLs for toluene, ethylbenzene and xylenes.

6.3 SUMMARY OF GROUNDWATER DATA

The analytical data for this site indicate the historical presence of constituents normally associated with a gasoline release to groundwater. Current data indicate that residual petroleum hydrocarbons and BTEX are below detection limits in wells MW-1, MW-2 and MW-4. Low levels of TPHg and benzene and ethylbenzene were detected in well MW-3 only. The ethylbenzene level is below the MCL limit where detected, MW-3. The benzene level is below the TCLP level of 500 parts per billion (ppb) and only 1.2 µg/L above the MCL drinking water standard.

The low level of MTBE should not be considered a serious health threat based on the December 1998 decisions by the California Office of Environmental Health Hazard Assessment (OEHHA). The Science Advisory Board is the body that determines if a chemical should be listed as a carcinogen or reproductive toxicant under California's Proposition 65. The Science Advisory board made the decision that MTBE is not a carcinogen or developmental toxicant during their December 1998 meeting. Their decision was based on a Hazard Identification Document developed by OEHHA scientists. The OEHHA documents may be viewed at www.OEHHA.ca.gov. A press release summarizing these findings may be viewed at www.calepa.ca.gov.

10.0 GROUNDWATER RELATED CONCLUSIONS

The contaminant plume at Beck Roofing is of limited extent and concentration. Both extent and concentration have decreased over time. Nondetectable levels of organic constituents in MW-1, MW-2 and MW-4 suggest a limited plume extent in the direction of the gradient.

The groundwater analytical data shows that only well MW-3 still shows measurable levels of contaminants. These levels, listed on Table 3-3 and Table 5, are below the MCLs for toluene, ethylbenzene and xylenes and well below the TCLP level for benzene. The maximum benzene level measured in MW-4 was 2.1 ppb in January 1996 and decreased to 1.3 ppb in 1997. The down gradient well, MW-4 showed nondetectable of benzene and other analyzed constituents in the January 1999 data. The up gradient and lateral gradient wells (MW-2 and MW-1) show no detectable levels of the measured constituents.

Based on these data it is reasonable to assume that the contamination has not migrated off-site, and the current extent of the contamination is limited to a small area around MW-3. Figure 5 illustrates the current estimated extent of benzene contamination at Beck Roofing. The data presented in Tables 3-1 through 3-4 and Table 5 also suggest that the concentrations currently observed in MW-3 would continue to drop naturally over time to nondetectable levels.

Beck Roofing is requesting permission to close and destroy the four monitoring wells at the Beck Roofing yard, 21123 Meekland Avenue, Hayward. This request is based on the data and information presented in this report and RBCA Tier II analysis in the sections below. The RBCA analysis addresses residual soil contamination.

8.0 Determination of Potential Exposure Pathways and Risk Based Screening Levels

This RBCA analysis follows the procedure presented in: Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites, published by the American Society for Testing Materials (ASTM). The version used was ASTM E 1739-95. This document subsequently will be referred to as ASTM 1739.

This assessment evaluates Risk Base Screening Levels (RBSL) for potential long term (chronic) threats to human health. The current site scenario per ASTM 1739 is that subsurface soils were significantly impacted and the first potable aquifer is less than 50 feet bgs. The site does not present short term (acute) health threats based on the data and the ASTM 1739 guidelines.

8.1 Exposure Pathways

Potential transport mechanism and exposure pathways applicable to this site scenario are those addressing subsurface soil contamination to air, resulting in inhalation of vapors. The receptor scenario for each case is a commercial/industrial setting. The soil data show that contamination was not measured at less than 15 feet below ground surface. Therefore, the surface soil transport mechanism does not apply. The soil transport mechanism that do apply are:

- Subsurface Soil Volatilization and Atmospheric Dispersion
- Subsurface Soil Volatilization and Enclosed Space Accumulation

The subsurface soil volatilization and atmospheric dispersion pathway evaluates the risk to employees working in the yard, outdoors. It will be referred to as the outdoor or ambient pathway.

The subsurface soil volatilization and enclosed space accumulation pathway evaluates the risk to workers indoors, in the office. It will be referred to as the indoor or enclosed space pathway.

Heilshorn Environmental Engineering

March 31, 1999

STID 3030

Mr. Amir Gholami
Alameda County Health Care Services
Environmental Health Services
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

SUBJECT: Groundwater Monitoring Well and RBCA Report
REGARDING: Beck Roofing, 21123 Meekland Avenue, Hayward, CA 94541

Dear Mr. Gholami:

Enclosed please find the Groundwater Monitoring Well and RBCA Report for the above site. The report was prepared in response to your January 5, 1999 letter to Beck Roofing. The report summarizes past activities at the site, describes the site setting, and presents the January 1999 and prior field data. The report includes RBCA Tier 1 and Tier 2 analyses based on the available site data.

Please feel free to call me with any questions regarding this report. I may be reached by telephone (510-222-7968), fax (510-222-8573) or email (edheilshorn@earthlink.net). Thank you for you support in preparation of this report.

Sincerely,
Heilshorn Environmental Engineering

Elyse D. Heilshorn, P.E.
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8.2 Risk Based Screening Levels

RBSL for Beck Roofing will be evaluated for benzene under both exposure pathways described above. Benzene is a known human carcinogen. Therefore, a risk analysis based on benzene concentrations presents the most conservative analysis for this site. The RBSL provide a generic guideline for evaluating potential threats to human health by contaminants in soil or groundwater. They are based on the assumptions, chemical specific constants and generalized default values for several parameters listed in the ASTM E 1739 document. The Tier 1 ASTM RBSL values are not based on site specific information.

The following equation is taken from Table X2.2 of the ASTM RBCA Guidelines titled, "Equations Used to Develop Example Tier 1 Risk-Based Screening Level (RBSL) Appearing in 'Look-up' Table X2.1–Carcinogenic Effects". It defines the RBSL for soil under the subsurface soil ambient (outdoor) vapor inhalation exposure pathway. The ambient RBSL equation assumes dispersion of chemical vapors through unsaturated soils into the outdoor breathing zone of workers.

$$RSBL_s\left[\frac{mg}{kg-soil}\right]=\frac{RSBL_{air}\left[\frac{\mu g}{m^3-air}\right]}{VF_{samb}}\times 10^{-3}\frac{mg}{\mu g}$$

The RBSL equation for the subsurface soil to indoor air (enclosed space) exposure is also represented by the equation above with the volatilization factor (VF) adjusted for dispersion into an enclose space (indoors) through foundation cracks.

9.0 DATA COMPARISON TO TIER 1 RBSL VALUES

The purpose of the risk based analysis is to determine if the contaminants at the site present a health risk to workers at the sight. Under RBCA protocol, risks are evaluated by first comparing the data to the Tier 1 RBSL. If site data exceed RBSL, the data are compared to Tier 2 SSTL values. The Result of the Tier 2 evaluation determine if additional data is required to better evaluate risk or if the risk may be severe enough to warrant remediation. This section compares calculated Tier 1 RBSL to the existing data.

Tables 6 and 7 present a comparison of the data to RBSL. Benzene concentrations that exceed the RBSL are indicated by a true value in the "Data Exceeds RBSL?" Column right of the corresponding RBSL value. The RBSL values are those listed in the ASTM 1739 document (Table 6) and those modified for the Beck Roofing site (Table 7).

9.1 Comparison of Existing Data to RBSL

The ASTM 1739 Table X2.1 RBSL for benzene in an industrial setting for the ambient exposure pathway are 45.7 mg/kg (cancer risk 1E-04) and 0.457 mg/kg (cancer risk 1E-06). The Table X2.1 RBSL for the indoor exposure pathway are 1.09 mg/kg (cancer risk 1E-04) and 0.0109 mg/kg (cancer risk 1E-06). Measured benzene concentrations in soil provide the basis of comparison. Samples with nondetectable results are not included in Tables 6 or 7. Appendix D includes the calculation sheets for the modified RBSL and a table comparing the ASTM RSBL to all the available soil data.

Multiple soil samples passed the outdoor and indoor RBSL. Boring samples did not exceed either outdoor RBSL or the 10-4 indoor RBSL. Pit samples did not exceed the outdoor 10-4 RBSL. Benzene concentrations did exceed the outdoor 10-6 RBSL and both indoor RBSL. The 1991 and 1994 pit and boring samples exceed the indoor 10-6 RBSL (0.0109 mg/kg) for each sample with

measurable levels of benzene, except the 15 foot north wall sample and 35 foot MW-2 sample. Pit samples only, exceeded the indoor 10-4 and outdoor 10-6 RBSL at some locations.

9.2 Data Comparison to Modified RBSL

The ASTM RBSL were modified with available site specific data to calculate modified RBSL. Depth to contamination, width of the plume parallel with wind direction, and wind speed are the site-specific values substituted into the RBSL equations. The depth to contamination used was 20 feet (610 cm). The plume length parallel to wind direction was based on the extent of plume figures provided in the Anderson 1994 report and wind direction and speed data provided by Ms. Peggy Baker of the Hayward Airport. The predominant wind direction appears to be southwest (more southerly in winter and more westerly in summer). The average wind speed is assumed at 4-6 knots or approximately 3.5 to 5.2 miles per hour. The plume length parallel to wind direction (Ls) used in the calculations was 100 feet or 3048 cm. The plume length was determined from information in the Anderson 1994 report. Figure 6 shows the estimated extend of the TPHg soil plume based on 1994 data.

Table 7 presents a comparison of the data to the modified RBSL. The calculated outdoor (ambient) SSTL is 0.6301 mg/kg. The calculated indoor (enclosed space) SSTL is 0.0567 mg/kg. Most of the 16 and 17 foot bgs pit samples exceeded the modified RBSL for indoor and outdoor air. None of the boring sample exceeded the outdoor modified RBSL.

11.0 DATA COMPARISON TO TIER 2 SSTL

ASTM 1739 Table X5.4 "Example Tier 2 Site Specific Target Level (SSTL) Table - Soil and Groundwater," presents example SSTL values for petroleum chemicals adjusted for distance soil type and distance of the source to the building. Appropriate values from Table X5.4 were selected for comparison to the site soil data. Section X5.5.8.2 (4) of ASTM 1739 states that the Subsurface soils -inhalation of outdoor vapors "pathway was not considered because exposure concentrations were very low. Therefore, the Tier 2 evaluation focuses on the subsurface soil to inhalation of indoor vapors pathway.

10.1 SSTL Selection

The SSTL selected for comparison were for sources 10, 25 and 50 feet from the building with sandy soil and natural biodegradation. The sandy soils with biodegradation values were selected over values for clay soil and no biodegradation. The site has both sandy and clay soils with significant apparent biodegradation. The sandy soil values are more conservative (lower) than the clay soil values. The 1994 plume in the Anderson report (Anderson, 1994) ended approximately 10 feet from the building. The source (former tank location represented by boring SB-21) is approximately 50 feet from the building. The Table X5.4 values for benzene SSTL are of 0.13 mg/kg (10 feet) and 1.2 mg/kg (25 feet). The value for 50 feet as extrapolated graphically from the 10, 25 and 100 foot values in Table X5.4.

The plume as defined by the Anderson report (Anderson, 1994) extended to about 10 feet south of the building. Plumes attenuate from the source to the plume edge. The plume edge is defined by locations with nondetectable levels of the contaminant. ASTM 1739 section X3.7.4.7 describes attenuation as affected by dispersion, retardation and biodegradation. The document states that biodegradation is the dominant factor in attenuation based on model sensitivity studies. Biodegradation is assumed to be the dominant factor at Beck Roofing because the plume is shrinking rather than spreading, which would indicate dispersion. The concentrations are decreasing as the plume area shrinks, implying biodegradation.

10.2 Data Comparison to ASTM Tier 2 SSTL

The most conservative and "best fit" comparison presented above is the 50-foot SSTL compared to the SB-21 benzene concentrations. The SB-21 1994 concentrations at 29.0 and 29.5 feet bgs, are 11 and 13 mg/kg, respectively. The estimated 50 foot SSTL is 3.4 mg/kg.

Table 8 compares the soil data to the SSTL values. Concentrations in the borings with greater than ND levels benzene (MW-2, B1, B2, MW3) were consistently below the 25 and 50 foot SSTL. The borings, including the pit boring, SB-21, are at least 50 feet from the building. The May 1991 initial pit samples exceed the 50 foot SSTL. The November 1991 expanded pit samples (16 to 18 feet bgs) on the north wall and floor also exceed the 50-foot SSTL. The SB-21 samples at 29.0 and 29.5 feet bgs also exceed the SSTL.

The groundwater data show that the plume has decreased significantly in concentration and extent since 1992. This suggests that the soil concentrations will also have decreased significantly over the past five to eight years. The MW-3 values have dropped approximately one order of magnitude since 1992. An order of magnitude drop in the soil values would bring the benzene concentrations below the applicable 50-foot SSTL.

11.0 RCBA RELATED CONCLUSIONS AND RECOMMENDATIONS

If the current (1999) concentration of equaled the value measured in the 1994 boring SB-21 samples, then the measured contamination would present an unacceptable risk to workers. This is an unlikely scenario because the data is five years old and there is significant decrease in groundwater concentrations over time. The maximum measured soil concentration, 13 mg/kg would need to drop approximately two-thirds to meet the 50-foot SSTL. The groundwater benzene concentration in MW-3 dropped by approximately one order of magnitude between 1994 (450 µg/L) and 1999 (6.2 µg/L).

ASTM 1739 contains degradation constant values for benzene in Tables X3.2 and X3.3. The degradation constant developed for a San Jose site was used to represent a conservative value in a similar climate and lithology. Values for benzene degrading over time were calculated and plotted using the known benzene concentrations in the soil at SB-21 (13mg/kg) and the degradation constant, k (0.007/day). An Excel trendline analysis was applied to the data to develop the regression equation for this site. Based on that equation, the benzene concentration in soil at SB-21 should now be approximately 7.76 x10-7 µg/kg. Appendix D includes these calculations and graph.

Beck Roofing and its consultant, HE2, assume that the current soil benzene concentrations are below the applicable 50-foot SSTL levels and that the site subsurface soils do not currently present a health hazard to employees based on the available data and analyses described above.

12.0 LIMITATIONS

The data, conclusions and recommendations presented in this report were developed in accordance with the generally accepted professional practice. The guidelines, data, conclusions and recommendations developed in, and used for, this report follows California Regional Water Quality Control Board guidelines. The analytical results are based on samples collected as limited locations, at limited times. Therefore, Heilshorn Environmental Engineering cannot have full knowledge of the soil or underlying conditions at the site. Conditions at the site may change with time due to human action or acts of nature. Thus, the findings of this report are subject to change should new information arise.

13.0 REFERENCES

1. R.L. Stevens Co., Data Chart for Tank System Tightness Test, January 11, 1990.

2. Alameda County Health Care Services Agency, Department of Environmental Health, Hazardous Materials Program, Letter to Charlie and Mary Beck, August 5, 1991.

3. Blaine Tech Services, Inc. Tank Removal Sampling Report 910520-C-1, To R. L. Stevens Co., Regarding Beck Roofing, June 4, 1991.

4. L&W Environmental Services, Inc., Progress Report Quarter Ending December 31, 1991, Beck Roofing, January 7,1992.

5. Anderson Consulting Group, Report To Beck Roofing Company, Quarterly Status Report And Supplemental Investigation Results, September 9, 1994.

6. Lush Geosciences, Inc., Quarterly Monitoring Report, Beck Roofing, Hayward, California, March 8, 1997.

TABLES

TABLE 1 SUMMARY OF SOIL DATA – TANK REMOVAL AND OVER EXCAVATION PIT

Date	Location	Depth Ft,bgs	TPHg mg/kg	Benzene µg/kg	Toluene µg/kg	Ethyl-benzene µg/kg	Xylenes µg/kg	Lead mg/kg
Tank	Removal	Pit	Sidewall	Samples	(Blaine per	L&W, 92)		(Organic)
5/20/91	Tank pit fill end	8	1,300	6400	7700	0800	230000	0.22
	Tank pit opposite fill end	7.5	1800	5800	75000	33000	210000	0.66
Tank Pit	Over Excavation	Sidewal l	Samples	(L&W,	92)			(Total)
11/91	North wall	15	1.5	8	50	16	210	
	North wall	16	4200	6300	240000	1000000	550000	11
	North wall	17	2740	16000	240000	120000	650000	ND
	Floor, center	16	780	830	1500	6300	48000	NT
	Center Floor	17	5760	30000	450000	230000	1270000	7.25
	Center floor	18	6800	4000	440000	140000	770000	12.2
	South wall	15	ND	11	71	15	87	8.3
	South wall	16	3200	1800	100000	60000	350000	8.4
	South wall	17	720	400	13000	8400	90000	9.35
	East wall	14	170	ND	2700	1500	10000	NT
	East Wall	16	1.2	ND	40	8	48	ND
	West Wall	16	1.0	ND	9	ND	29	4.0

Notes:
BTEX units µg/kg (original analyses in mg/kg)
TPHg and lead units, mg/kg
ND Not detected above method detection limit
NT Not tested

TABLE 2 SUMMARY OF SOIL DATA – SOIL BORINGS AND MONITORING WELL BORINGS

Date	Location	Depth Ft,bgs	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	Lead
Soil	Boring Samples	(L&W, 92)						Total
10/91	MW-1	5	ND	ND	16	ND	14	ND
		10	ND	ND	10	ND	7	ND
		15	ND	ND	13	ND	7	ND
		20	ND	ND	10	ND	6	ND
		25	ND	ND	24	ND	7	ND
		30	ND	ND	11	ND	6	5.00
		35	ND	ND	10	ND	6	5.50
		40	ND	ND	16	ND	6	ND
		45	ND	ND	15	ND	6	4.3
10/91	MW-2	5	ND	ND	ND	ND	ND	ND
		10	ND	ND	ND	ND	ND	ND
		15	ND	ND	ND	ND	ND	ND
		20	ND	ND	ND	ND	ND	5.90
		25	1.4	100	85	14	90	ND
		30	ND	44	8	ND	ND	ND
		35	ND	6	ND	ND	ND	4.20
10/91	B-1	5	ND	ND	17	ND	ND	ND
		10	ND	ND	11	ND	ND	ND
		15	ND	ND	12	ND	ND	ND
		20	5.7	250	600	100	570	5.82
		25	8.8	140	600	126	760	4.20
	B-2	5	ND	ND	18	ND	ND	ND
		10	ND	ND	13	ND	6	4.00
		15	ND	ND	6	ND	ND	ND
		20	ND	46	11	14	40	ND
		25	35	440	1200	320	1800	ND
		30	36	270	87	37	2.1	ND

TABLE 2 SUMMARY OF SOIL DATA – SOIL BORINGS AND MONITORING WELL BORINGS (continued)

Date	Location	Depth Ft,bgs	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	Lead
Soil	Boring Samples	(L & W,	92)					Total
	MW-3	5	1	ND	18	ND	ND	ND
		10	ND	ND	ND	ND	ND	3.60
		15	ND	ND	28	ND	ND	3.60
		20	2.9	21	17	6	25	5.80
		25	6.2	48	22	12	56	ND
		30	9.8	250	15	48	260	3.90
		35	ND	ND	14	ND	ND	3.75
Soil	Boring Samples	(Anderso n	94)					
7/94	SB18 (MW-4)	25.5-35.5	ND	ND	ND	ND	ND	NA
	SB19 North of MW4	25.5-35.5	ND	ND	ND	ND	ND	NA
	SB20 South of MW-4	25.5-35.5	ND	ND	ND	ND	ND	NA
	SB21 (within the excavation area)	28.5	180	2200	8700	4800	22000	NA
	SB21 (within the excavation area)	29.0	430	11000	42000	14000	69000	NA
	SB21 (within the excavation area)	29.5	550	13000	64000	25000	120000	NA

Notes:
BTEX units µg/kg (original analyses in mg/kg)
TPHg and lead units, mg/kg
ND Not detected above method detection limit
NA Not analyzed

TABLE 3-1 GROUNDWATER ANALYTICAL RESULTS for MW-1

Date	TPHg mg/L	MtBE µg/L	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Total Xylenes µg/L
11/4/91	ND	NA	ND	ND	ND	ND
12/23/91	ND	NA	ND	ND	ND	ND
2/24/92	0.09	NA	0.4	1	ND	ND
6/16/92	ND	NA	0.5	ND	ND	ND
9/9/92	ND	NA	ND	ND	ND	ND
7/16/93	ND	NA	ND	ND	ND	ND
8/4/94	ND	NA	ND	ND	ND	ND
10/25/94	ND	NA	ND	ND	ND	ND
1/20/95	ND	NA	ND	ND	ND	ND
4/11/95	ND	NA	ND	ND	ND	ND
7/13/95	WELL	INACCES	SIBLE			
10/10/95	ND	NA	ND	ND	ND	ND
1/11/96	ND	NA	ND	ND	ND	1.2
4/23/96	0.53	NA	ND	0.64	ND	0.82
7/30/96	ND	NA	1.3	2.1	0.64	3.0
11/5/96	0.139	NA	2.2	7.3	2.2	23.1
2/7/97	0.081	NA	2.0	3.9	2.3	9.2
9/19/97	ND	ND	ND	ND	ND	ND
1/29/99	ND	ND	ND	ND	ND	ND
MCL, µg/L	None		1 (TCLP = 500)	150	700	1,750

Notes:

ND = less than laboratory minimum detection limits, 1994-2/97 limits are <0.05 mg/L - TPHg, and <0.3 µg/L - BTEX (<0.5 for xylene on 8/4/94) for tables 2-1 through 2-4.

NA = Not analyzed

mg/L = milligram of compound per liter of liquid matrix (usually water). Roughly equivalent to parts per million.

µg/L = microgram of compound per liter of liquid matrix (usually water). Roughly equivalent to parts per billion.

MCL = Maximum Contaminant Limit for public drinking water supplies, California Code of Regulations (CCR), Title 22 section 64444.

TCLP = Toxicity Characteristic Limit per CCR Title 22 Section 66261.24. TCLP values are used to determine the level of a constituent which renders a waste hazardous under federal and state laws.

TABLE 3-2 GROUNDWATER ANALYTICAL RESULTS for MW-2

Date	TPHg mg/L	MtBE µg/L	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Total Xylenes µg/L
11/4/91	ND	NA	ND	ND	ND	ND
12/23/91	ND	NA	ND	ND	ND	ND
2/24/92	0.33	NA	110	2	ND	0.9
6/16/92	ND	NA	7.7	ND	ND	ND
9/9/92	ND	NA	2.8	ND	ND	ND
7/16/93	ND	NA	2.0	ND	ND	ND
8/4/94	ND	NA	ND	ND	ND	ND
10/25/94	ND	NA	ND	ND	ND	ND
1/20/95	ND	NA	1.0	ND	ND	ND
4/11/95	ND	NA	1.2	ND	ND	ND
7/13/95	ND	NA	ND	ND	ND	ND
10/10/95	ND	NA	0.69	ND	ND	52
1/11/96	ND	NA	ND	ND	ND	0.67
4/23/96	0.039	NA	0.29	0.68	ND	0.66
7/30/96	ND	NA	3.4	5.6	1.7	9.3
11/5/96	0.292	NA	9.3	29.3	5.7	57
2/7/97	0.092	NA	2.8	5.0	3.7	9.4
9/19/97	ND	ND	ND	ND	ND	ND
1/29/99	ND	ND	ND	ND	ND	ND
MCL, µg/L	None		1 (TCLP = 500)	150	700	1,750

ND = less than laboratory minimum detection limits, 1994-2/97 limits are <0.05 mg/L - TPHg, and <0.3 µg/L - BTEX (<0.5 for xylene on 8/4/94) for tables 2-1 through 2-4.

NA = Not analyzed

mg/L = milligram of compound per liter of liquid matrix (usually water). Roughly equivalent to parts per million.

µg/L = microgram of compound per liter of liquid matrix (usually water). Roughly equivalent to parts per billion.

MCL = Maximum Contaminant Limit for public drinking water supplies, California Code of Regulations (CCR), Title 22 section 64444.

TCLP = Toxicity Characteristic Limit per CCR Title 22 Section 66261.24. TCLP values are used to determine the level of a constituent which renders a waste hazardous under federal and state laws.

TABLE 3-3 GROUNDWATER ANALYTICAL RESULTS for MW-3

Date	TPHg mg/L	MtBE µg/L	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Total Xylenes µg/L
11/4/91	ND	NA	ND	ND	ND	ND
12/23/91	0.15	NA	60	0.5	0.6	9.7
2/24/92	4.36	NA	710	16	69	400
6/16/92	4.9	NA	770	ND	61	240
9/9/92	7.4	NA	1,200	7.7	95	170
7/16/93	7.9	NA	1,500	11	340	840
8/4/94	4.2	NA	450	ND	180	160
10/25/94	ND	NA	ND	ND	ND	ND
1/20/95	4.4	NA	580	2	130	160
4/11/95	1.8	NA	88	1.4	33	27
7/13/95	3.4	NA	500	ND	130	94
10/10/95	4.2	NA	360	2.4	190	96
1/11/96	ND	NA	ND	ND	ND	ND
4/23/96	0.079	NA	1.2	0.33	0.45	0.48
7/30/96	3.8	NA	240	8.2	14	9.1
11/5/96	3.09	NA	242	36	70	116
2/7/97	0.473	NA	36.3	1	10.7	8.9
9/19/97	2.7	ND	160	0.65	93	26
1/29/99	0.230	ND	6.2	ND	7.3	ND
MCL, µg/L	None		1 (TCLP = 500)	150	700	1,750

ND = less than laboratory minimum detection limits, 1994-2/97 limits are <0.05 mg/L - TPHg, and <0.3 µg/L - BTEX (<0.5 for xylene on 8/4/94) for tables 2-1 through 2-4.

NA = Not analyzed

mg/L = milligram of compound per liter of liquid matrix (usually water). Roughly equivalent to parts per million.

µg/L = microgram of compound per liter of liquid matrix (usually water). Roughly equivalent to parts per billion.

MCL = Maximum Contaminant Limit for public drinking water supplies, California Code of Regulations (CCR), Title 22 section 64444.

TCLP = Toxicity Characteristic Limit per CCR Title 22 Section 66261.24. TCLP values are used to determine the level of a constituent which renders a waste hazardous under federal and state laws.

TABLE 3-4 GROUNDWATER ANALYTICAL RESULTS for MW-4

Date	TPHg mg/L	MtBE µg/L	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Total Xylenes µg/L
8/4/94	ND	NA	ND	ND	ND	ND
10/25/94	ND	NA	ND	ND	ND	ND
1/20/95	ND	NA	ND	ND	ND	ND
4/11/95	ND	NA	ND	ND	ND	ND
7/13/95	ND	NA	ND	ND	ND	ND
10/10/95	ND	NA	ND	ND	ND	ND
1/11/96	ND	NA	2.1	4	ND	0.79
4/23/96	0.043	NA	0.42	1.1	0.39	0.79
7/30/96	ND	NA	0.97	1.7	0.67	3
11/5/96	0.0901	NA	1.3	2.7	1.8	7.5
2/7/97	0.072	NA	1.3	2.7	1.8	7.5
9/19/97	ND	ND	ND	ND	ND	ND
1/29/99	ND	ND	ND	ND	ND	ND
MCL, µg/L	None		1 (TCLP = 500)	150	700	1,750

ND = less than laboratory minimum detection limits, 1994-2/97 limits are <0.05 mg/L - TPHg, and <0.3 µg/L - BTEX (<0.5 for xylene on 8/4/94) for tables 2-1 through 2-4.

NA = Not analyzed

mg/L = milligram of compound per liter of liquid matrix (usually water). Roughly equivalent to parts per million.

µg/L = microgram of compound per liter of liquid matrix (usually water). Roughly equivalent to parts per billion.

MCL = Maximum Contaminant Limit for public drinking water supplies, California Code of Regulations (CCR), Title 22 section 64444.

TCLP = Toxicity Characteristic Limit per CCR Title 22 Section 66261.24. TCLP values are used to determine the level of a constituent which renders a waste hazardous under federal and state laws.

TABLE 4 SUMMARY OF JANUARY 1999 FIELD DATA

Well	Well Depth feet, bgs	Initial Depth to Water ft bgs	Volume of Water Purged Gal.	Average Temperature °F	Average Conductivity µmhos	Average pH*
MW-1	37.0	24.2	7	51	850	7.9
MW-2	37.0	24.3	8	53	840	8.0
MW-3	34.6	24.2	5.5	58	867	9.0
MW-4	39.1	23.8	9	60	888	10.1

* pH meter was difficult to calibrate. Values should be viewed as relative, not absolute.

TABLE 5 JANUARY 1999 GROUNDWATER ANALYTICAL REPORTS

Constituent Analyzed	MW-1	MW-2	MW-3	MW-4	Reporting Limit, µg/L
TPHg	ND	ND	230	ND	50
Benzene	ND	ND	6.2	ND	0.5
Toluene	ND	ND	ND	ND	0.5
Ethylbenzene	ND	ND	7.3	ND	0.5
Xylenes	ND	ND	ND	ND	0.5
Di-isopropyl Ether (DIPE)	ND	ND	ND	ND	1.0
Ethyl tert-Butyl Ether (ETBE)	ND	ND	ND	ND	1.0
Methyl tert-Butyl Ether (MTBE)	ND	ND	3.3	ND	1.0
tert-Amy Methyl Ether (TAME)	ND	ND	ND	ND	1.0
tert Butanol	ND	ND	ND	ND	5.0
Ethlyene Dibromide (EDB)	ND	ND	ND	ND	1.0
1,2-Dichloroethane (1,2-DCA) also called Ethylene Dichloride (EDC)	ND	ND	11	ND	1.0

Units: µg/L

TABLE 6 TIER 1 COMMERCIAL/INDUSTRIAL RSBL TO BECK SOIL DATA COMPARISON

Date	Location	Depth Ft,bgs	Benzene mg/kg	Outdoor 1E-04 RSBL mg/kg	Data exceeds RSBL?	Outdoor 1E-06 RSBL mg/kg	Data exceeds RSBL?	Indoor 1E-04 RSBL mg/kg	Data exceeds RSBL?	Indoor 1E-06 RSBL mg/kg	Data exceeds RSBL?
Tank	Removal Pit	Sidewall	Samples	(L&W,92)							
May-91	Tank pit fill end	8	6.4	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
	Tank pit opposite fill end	7.5	5.8	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
Tank Pit	Over Excavation	Sidewall	Samples	(L&W,92)							
Nov-91	North wall	15	0.008	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
	North wall	16	6.3	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
	North wall	17	16	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
	Floor, center	16	0.83	45.7	FALSE	0.457	TRUE	1.09	FALSE	0.0109	TRUE
	Center Floor	17	30	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
	Center floor	18	4	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
	South wall	15	0.011	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
	South wall	16	1.8	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
	South wall	17	0.4	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
Soil	Boring Samples	(L&W, 92)									
Oct-91	MW-2	25	0.1	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
		30	0.044	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
		35	0.006	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
Oct-91	B-1	20	0.25	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
		25	0.14	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
	B-2	20	0.046	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
		25	0.44	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
		30	0.27	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
	MW-3	20	0.021	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
		25	0.048	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
		30	0.25	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
Soil	Boring Samples	(Anderson, 94)									
Jul-94	SB21 (within the excavation area)	28.5	2.2	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
	SB21 (within the excavation area)	29	11	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
	SB21 (within the excavation area)	29.5	13	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE

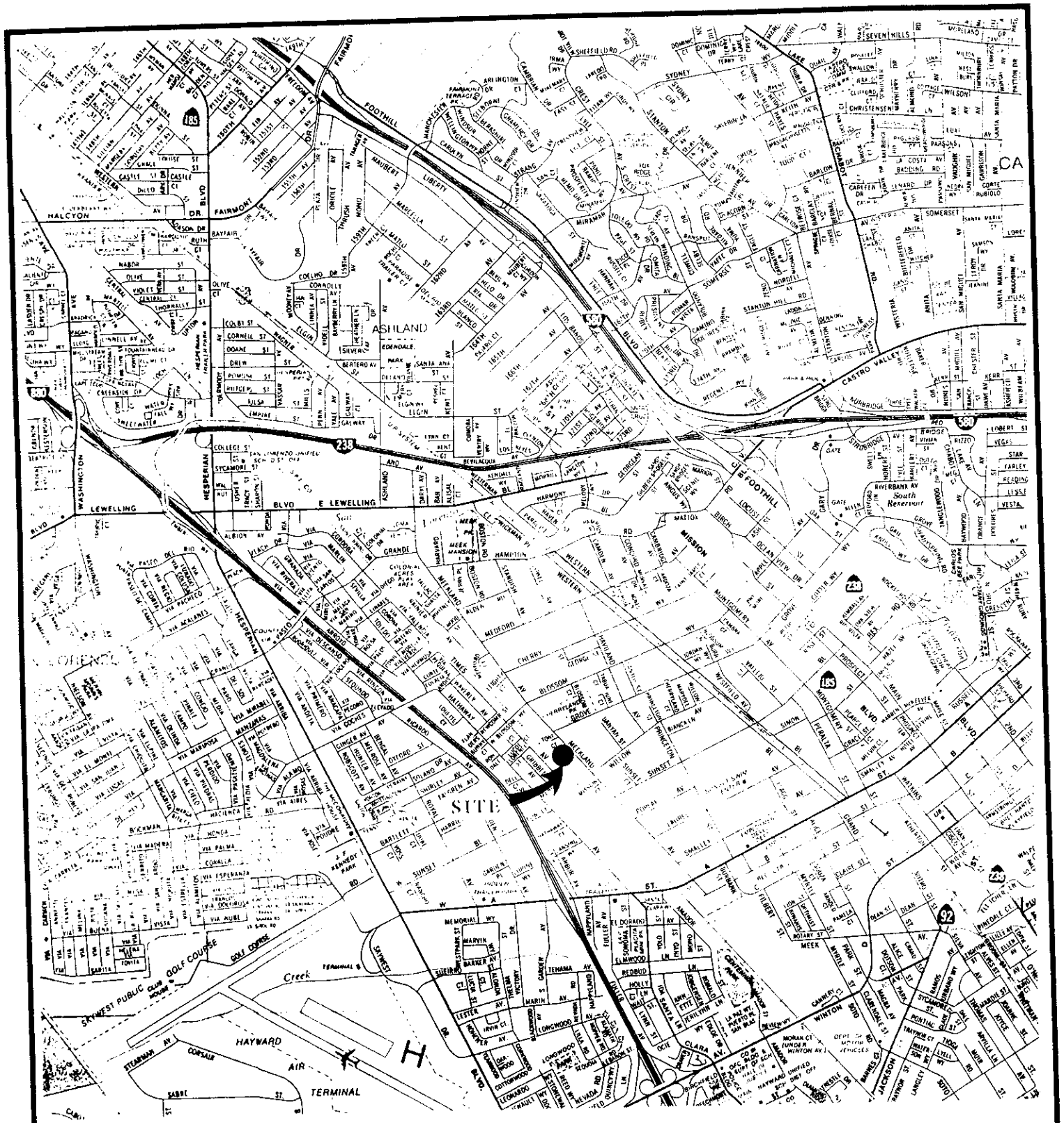
TABLE 7 TIER 1 MODIFIED RBSL TO BECK SOIL DATA COMPARISON

Location	Depth	Benzene Ft, bgs	Outdoor (ambient) RBSL mg/kg	Data exceeds RBSL?	Indoor (enclosed space) RBSL mg/kg	Data exceeds RBSL?
Removal Pit	Sidewall	Samples	(L&W,92)			
Tank pit fill end	8	6.4	0.6301	TRUE	0.0567	TRUE
Tank pit opposite fill end	7.5	5.8	0.6301	TRUE	0.0567	TRUE
Over Excavation	Sidewall	Samples	(L&W,92)			
North wall	15	0.008	0.6301	FALSE	0.0567	FALSE
North wall	16	6.3	0.6301	TRUE	0.0567	TRUE
North wall	17	16	0.6301	TRUE	0.0567	TRUE
Floor, center	16	0.83	0.6301	TRUE	0.0567	TRUE
Center Floor	17	30	0.6301	TRUE	0.0567	TRUE
Center floor	18	4	0.6301	TRUE	0.0567	TRUE
South wall	15	0.011	0.6301	FALSE	0.0567	FALSE
South wall	16	1.8	0.6301	TRUE	0.0567	TRUE
South wall	17	0.4	0.6301	FALSE	0.0567	TRUE
Boring Samples	(L&W, 92)					
MW-2	25	0.1	0.6301	FALSE	0.0567	TRUE
	30	0.044	0.6301	FALSE	0.0567	FALSE
	35	0.006	0.6301	FALSE	0.0567	FALSE
B-1	20	0.25	0.6301	FALSE	0.0567	TRUE
	25	0.14	0.6301	FALSE	0.0567	TRUE
B-2	20	0.046	0.6301	FALSE	0.0567	FALSE
	25	0.44	0.6301	FALSE	0.0567	TRUE
	30	0.27	0.6301	FALSE	0.0567	TRUE
MW-3	20	0.021	0.6301	FALSE	0.0567	FALSE
	25	0.048	0.6301	FALSE	0.0567	FALSE
	30	0.25	0.6301	FALSE	0.0567	TRUE
Boring Samples	(Anderson, 94)					
SB21 (within the excavation area)	28.5	2.2	0.6301	TRUE	0.0567	TRUE
SB21 (within the excavation area)	29	11	0.6301	TRUE	0.0567	TRUE
SB21 (within the excavation area)	29.5	13	0.6301	TRUE	0.0567	TRUE

TABLE 8 TIER 2 COMMERCIAL /INDUSTRIAL SSTL TO BECK DATA COMPARISON

Location	Depth	Benzene Ft, bgs	Indoor (enclosed space) sandy soil, 10 ft, SSTL mg/kg	Data exceeds SSTL?	Indoor (enclosed space) sandy soil, 25 feet, SSTL mg/kg	Data exceeds SSTL?	Indoor (enclosed space) sandy soil, 50 feet, SSTL mg/kg	Data exceeds SSTL?
Removal Pit Sidewall Samples (L&W,92)								
Tank pit fill end	8	6.4	0.13	TRUE	1.2	TRUE	3.4	TRUE
Tank pit opposite fill end	7.5	5.8	0.13	TRUE	1.2	TRUE	3.4	TRUE
Over Excavation Sidewall Samples (L&W,92)								
North wall	15	0.008	0.13	FALSE	1.2	FALSE	3.4	FALSE
North wall	16	6.3	0.13	TRUE	1.2	TRUE	3.4	TRUE
North wall	17	16	0.13	TRUE	1.2	TRUE	3.4	TRUE
Floor, center	16	0.83	0.13	TRUE	1.2	FALSE	3.4	FALSE
Center Floor	17	30	0.13	TRUE	1.2	TRUE	3.4	TRUE
Center floor	18	4	0.13	TRUE	1.2	TRUE	3.4	TRUE
South wall	15	0.011	0.13	FALSE	1.2	FALSE	3.4	FALSE
South wall	16	1.8	0.13	TRUE	1.2	TRUE	3.4	FALSE
South wall	17	0.4	0.13	TRUE	1.2	FALSE	3.4	FALSE
Boring Sample (L&W, 92)								
MW-2	25	0.1	0.13	FALSE	1.2	FALSE	3.4	FALSE
	30	0.044	0.13	FALSE	1.2	FALSE	3.4	FALSE
	35	0.006	0.13	FALSE	1.2	FALSE	3.4	FALSE
B-1	20	0.25	0.13	TRUE	1.2	FALSE	3.4	FALSE
	25	0.14	0.13	TRUE	1.2	FALSE	3.4	FALSE
B-2	20	0.046	0.13	FALSE	1.2	FALSE	3.4	FALSE
	25	0.44	0.13	TRUE	1.2	FALSE	3.4	FALSE
	30	0.27	0.13	TRUE	1.2	FALSE	3.4	FALSE
MW-3	20	0.021	0.13	FALSE	1.2	FALSE	3.4	FALSE
	25	0.048	0.13	FALSE	1.2	FALSE	3.4	FALSE
	30	0.25	0.13	TRUE	1.2	FALSE	3.4	FALSE
Boring Sample (Anderson, 94)								
SB21 (within the excavation area)	28.5	2.2	0.13	TRUE	1.2	TRUE	3.4	FALSE
SB21 (within the excavation area)	29	11	0.13	TRUE	1.2	TRUE	3.4	TRUE
SB21 (within the excavation area)	29.5	13	0.13	TRUE	1.2	TRUE	3.4	TRUE

FIGURES



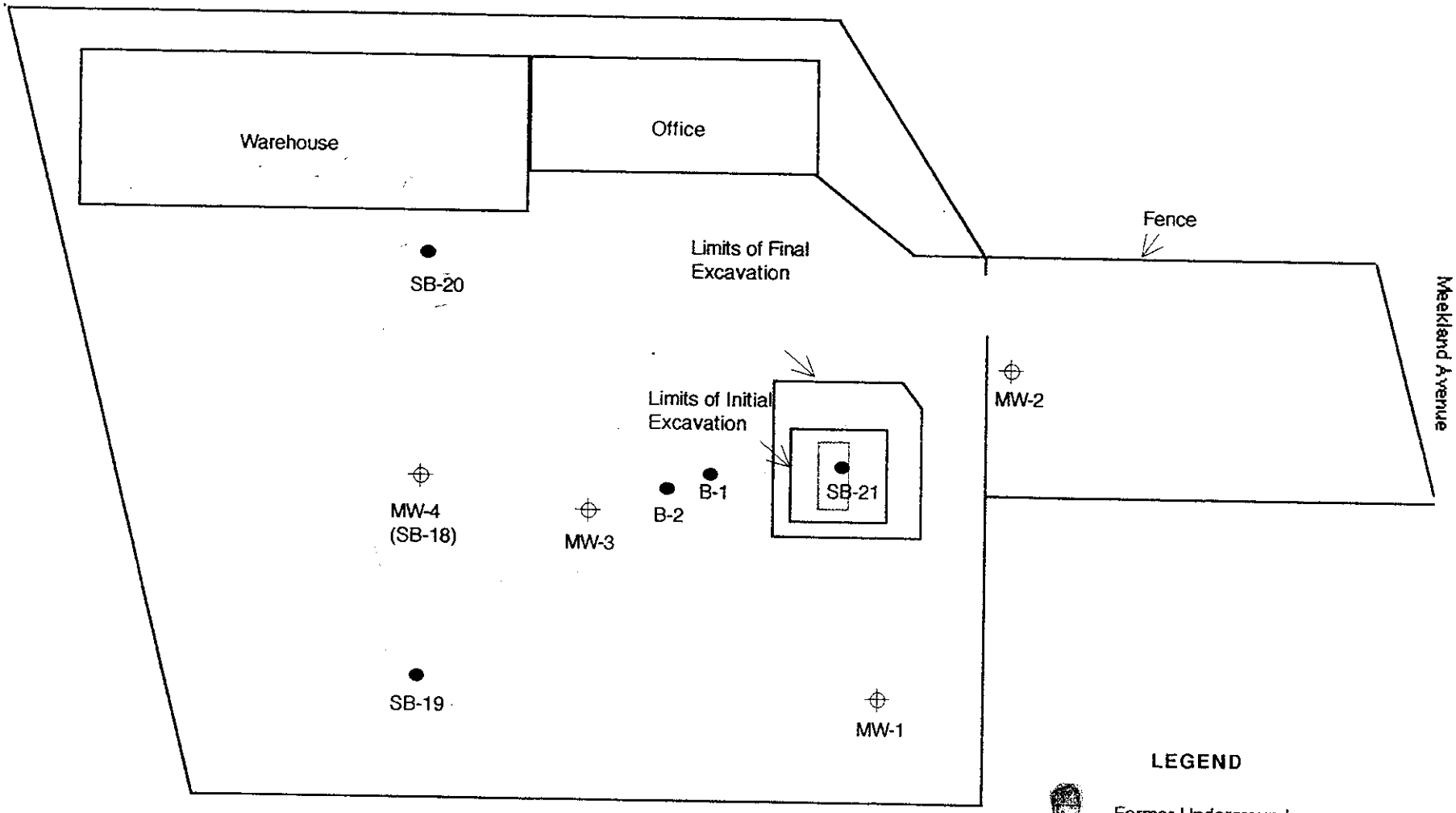
Source: CSAA Map of Hayward, San Leandro, Union City, 3/92

Beck Roofing, Hayward, CA Soil Sampling

FIGURE 1 Site Location

HEILSHORN ENVIRONMENTAL ENGINEERING
P.O. Box 20546, El Sobrante, CA
(510) 222-7968 Fax (510) 222-8573

Rev. 0
Date: 10/6/97



Scale 1" = 30'

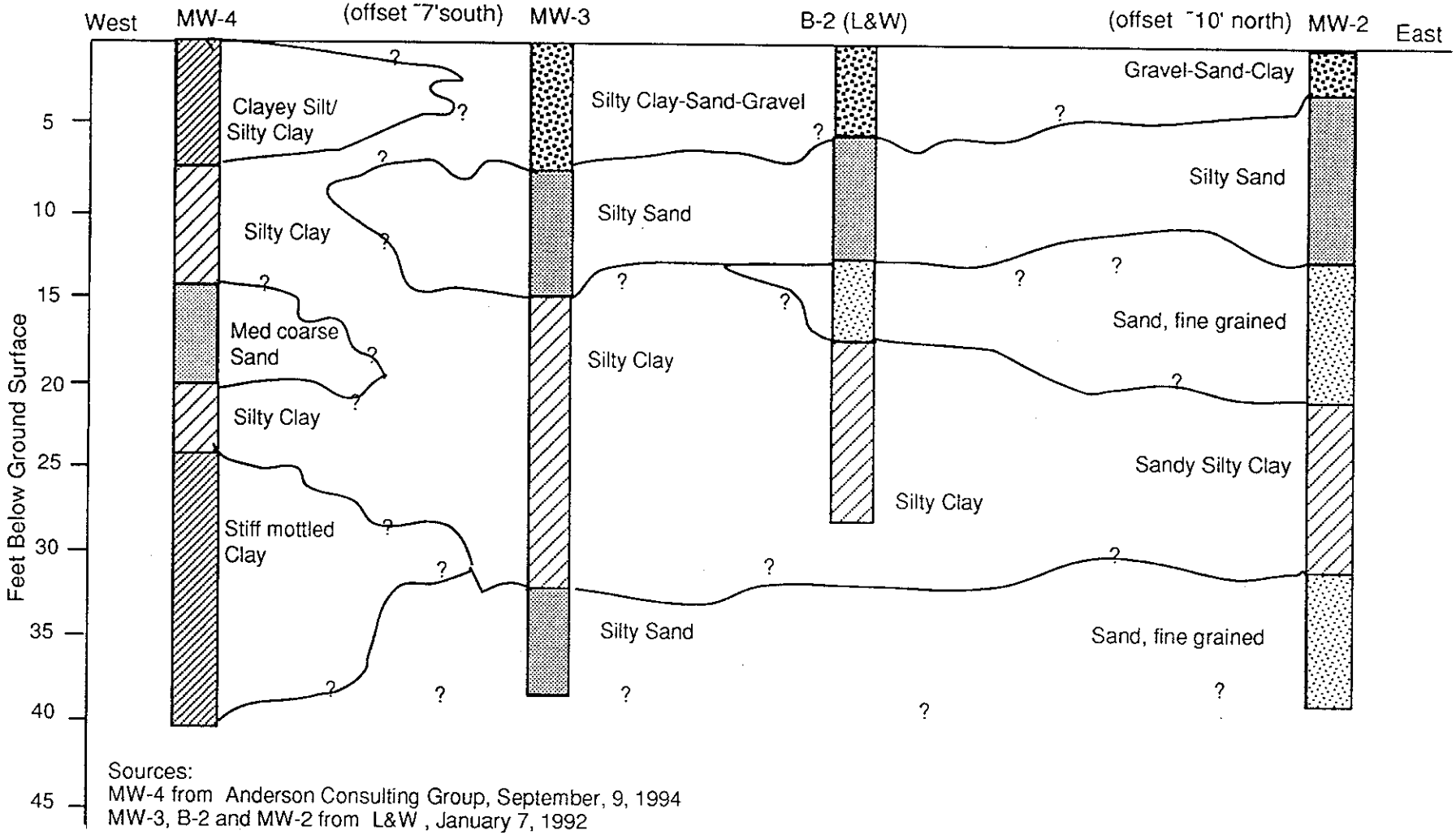
Source: Adapted from Lush Geosciences, Inc., Quarterly Monitoring Report, Figure 2, March 8, 1997

Beck Roofing, Hayward, CA

FIGURE 2 Site Plan

HEILSHORN ENVIRONMENTAL ENGINEERING
P.O. Box 20546, El Sobrante, CA
(510) 222-7968 Fax (510) 222-8573

Rev. 3
Date: 3/25/99



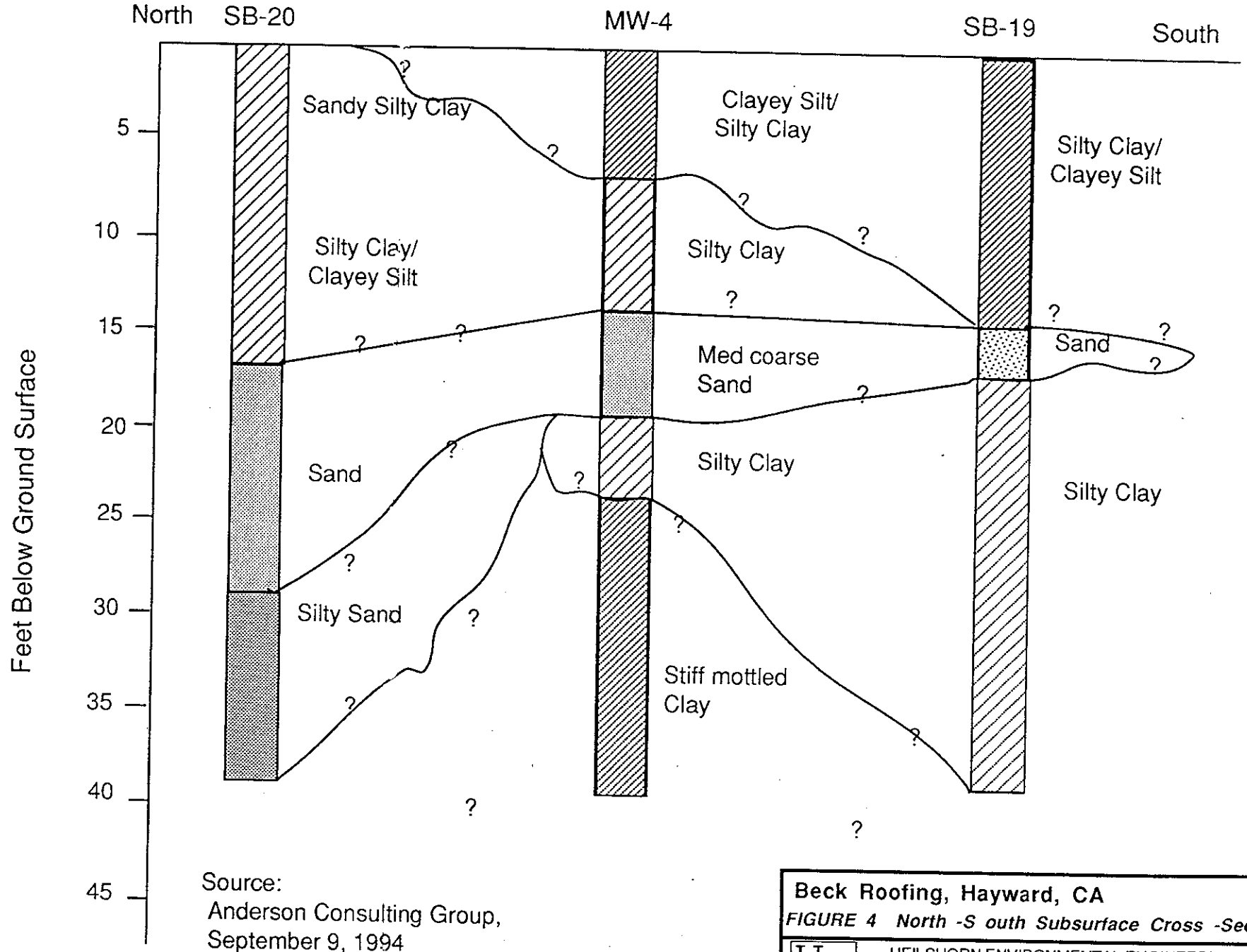
Sources:
MW-4 from Anderson Consulting Group, September, 9, 1994
MW-3, B-2 and MW-2 from L&W , January 7, 1992

Beck Roofing, Hayward, CA

FIGURE 3 East - West Subsurface Cross -Section

HEILSHORN ENVIRONMENTAL ENGINEERING
P.O. Box 20546, El Sobrante, CA
(510) 222-7968 Fax (510) 222-8573

Rev. 0
Date: 11/14/97



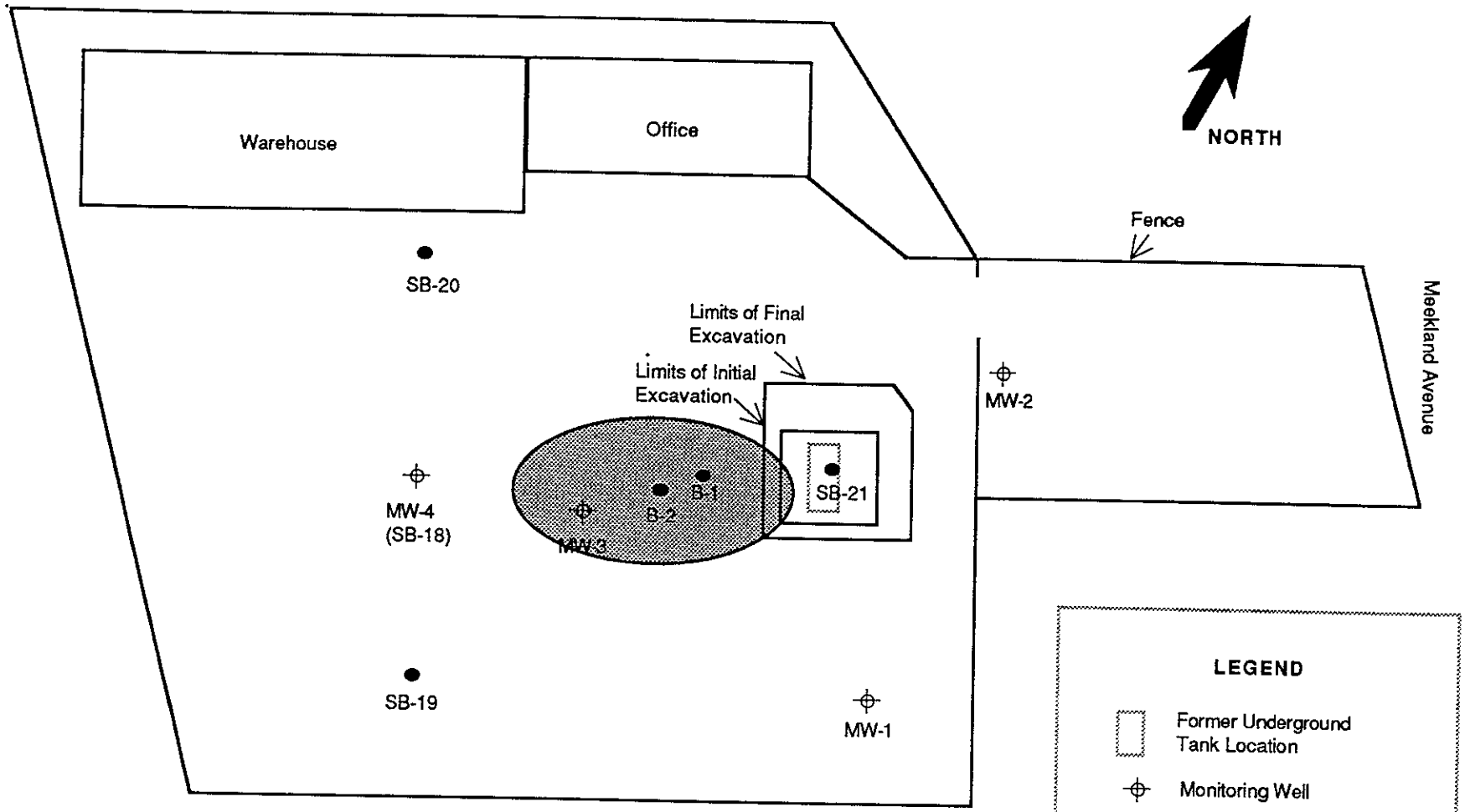
Source:
Anderson Consulting Group,
September 9, 1994

Beck Roofing, Hayward, CA

FIGURE 4 North -S outh Subsurface Cross -Section

HEILSHORN ENVIRONMENTAL ENGINEERING
P.O. Box 20546, El Sobrante, CA
(510) 222-7968 Fax (510) 222-8573

Rev. 0
Date: 11/14/97



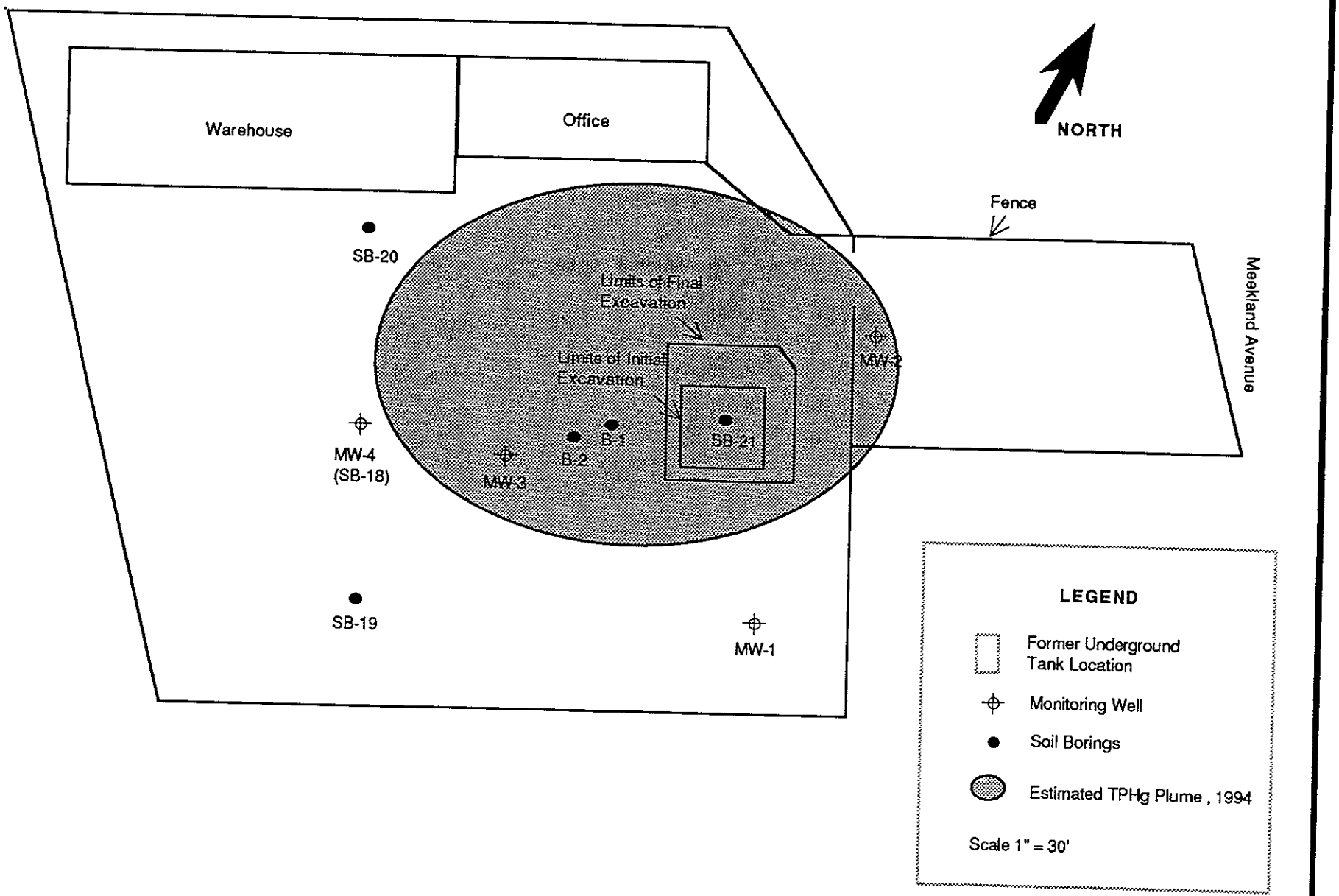
Beck Roofing, Hayward, CA

FIGURE 5 Estimated Extent of TPHg Plume 1999

Source: Adapted from Lush Geosciences, Inc., Quarterly Monitoring Report, Figure 2, March 8, 1997

HEILSHORN ENVIRONMENTAL ENGINEERING
P.O. Box 20546, El Sobrante, CA
(510) 222-7968 Fax (510) 222-8573

Rev. 1
Date: 3/25/99



Beck Roofing, Hayward, CA

FIGURE 6 Estimated Extent of TPHg Plume 1994

Source: Adapted from Lush Geosciences, Inc., Quarterly Monitoring Report, Figure 2, March 8, 1997

HEILSHORN ENVIRONMENTAL ENGINEERING
P.O. Box 20546, El Sobrante, CA
(510) 222-7968 Fax (510) 222-8573

Rev. 1
Date: 3/25/99

APPENDICES

A Boring Logs for MW-1, MW-2, MW-3, and MW-4

B Contaminant Plume Figures from L&W 1992

C January 1999 Analytical Reports and Chain of Custody

D RBSL Calculation Sheets and Data Table

APPENDIX A

Boring Logs for MW-1, MW-2, MW-3, MW-4

Sample Number	Blows per Foot	Soil Type	Time	Log	Depth in Feet	DESCRIPTION
					0	Brown sandy silty clay, moist, no odor, medium plasticity.
2116-5-MW1	20	CL	911		5	Brown sandy silty clay, very stiff, moist, no odor, low plasticity.
2116-10-MW1	15	SM	917		10	Brown silty sand, fine-grained, medium dense, moist, no odor.
2116-15-MW1	12	SP	925		15	Brown sand with subangular gravel, fine-grained, medium dense, moist, no odor.
2116-20-MW1	5	CL	935			Brown silty clay, medium stiff, moist, no odor, low plasticity.

L & W Environmental Services, Inc.

2111 Jennings Street
San Francisco, California

Log of Boring Number: MW 1
Sheet 1 of 3
Beck Roofing
21123 Meekland Avenue
Hayward, California

Project Number: 2116

Date: November, 1991

Figure Number: 5

Sample Number	Blows per Foot	Soil Type	Time	Log	Depth in Feet	DESCRIPTION
2116-25-MW1	13	CL	944		25	Same, with medium plasticity.
2116-30-MW1	9	CL/ SP	959		30	Same, but stiff.
						Brown sand, fine-grained, medium loose, moist, no odor.
2116-35-MW1	9	SP/ CL	1008		35	Brown silty clay, stiff, moist to wet near top of sample, no odor, medium plasticity.
2116-40-MW1	11	CL	1025		40	Same.

L & W Environmental Services, Inc.

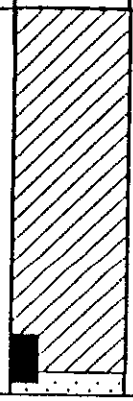
2111 Jennings Street
San Francisco, California

Log of Boring Number: MW 1
Sheet 2 of 3
Beck Roofing
21123 Meekland Avenue
Hayward, California

Project Number: 2116

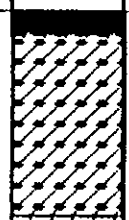
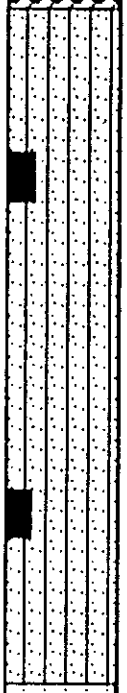
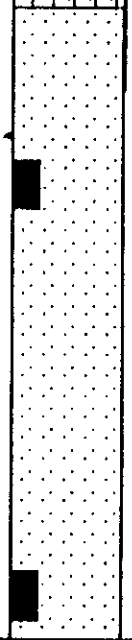
Date: November, 1991

Figure Number: 5

Sample Number	Blows per Foot	Soil Type	Time	Log	Depth in Feet	DESCRIPTION
		CL				Same.
2116-45-MW1	13	CL/SP	1035		45	Brown sand, fine-grained, medium dense, wet, no odor.

Boring terminated at 45.5 feet.
Groundwater encountered at 30.5 feet.
Boring drilled 10/30/91 with CME 75 rig.
Boring grouted from 45.5 to 39 feet and converted into Monitoring Well 1 on 10/30/91

L & W Environmental Services, Inc. 2111 Jennings Street San Francisco, California	**Log of Boring Number: MW 1** **Sheet 3 of 3** Beck Roofing 21123 Meekland Avenue Hayward, California
Project Number: 2116	December, 1991 / Figure Number: 5

Sample Number	Blows per Foot	Soil Type	Time	Log	Depth in Feet	DESCRIPTION
		GC			0	3" asphalt cover. Brown gravel-sand-clay mixture, moist, no odor.
2116-5-MW2	18	SM	145		5	Brown silty sand, fine-grained, medium dense, moist, no odor.
2116-10-MW2	10	SM	150		10	Brown silty sand, fine-grained, loose to medium dense, moist, no odor.
2116-15-MW2	12	SP	200		15	Brown sand, fine-grained, medium dense, moist, no odor.
2116-20-MW2	6	SP			20	Same, but loose.

L & W Environmental Services, Inc.

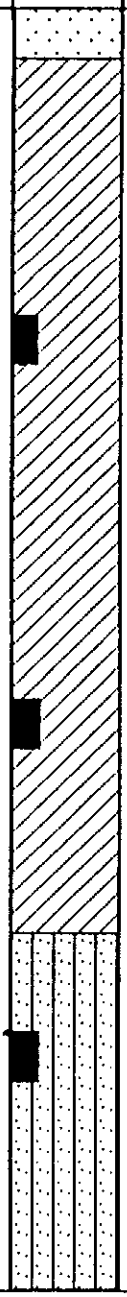
2111 Jennings Street
San Francisco, California

Log of Boring Number: MW 2
Sheet 1 of 2
Beck Roofing
21123 Meekland Avenue
Hayward, California

Project Number: 2116

Date: December, 1991

Figure Number: 6

Sample Number	Blows per Foot	Soil Type	Time	Log	Depth in Feet	DESCRIPTION
2116-25-MW2	19	CL	235		25	Brown sandy silty clay, very stiff, moist, no odor, medium plasticity.
2116-30-MW2	18	CL	245		30	Same.
2116-35-MW2	12	SM	255		35	Brown sand, fine-grained, medium stiff, wet, no odor.

Boring terminated at 38 feet.
Groundwater encountered at 33 feet.
Boring drilled 10/30/91 with CME 75 rig.
Boring converted into Monitoring Well 2 on 10/30/91

L & W Environmental Services, Inc. 2111 Jennings Street San Francisco, California	**Log of Boring Number: MW 2** **Sheet 2 of 2** Beck Roofing 21123 Meekland Avenue Hayward, California	
Project Number: 2116	Date: December, 1991	Figure Number: 6

Sample Number	Blows per Foot	Soil Type	Time	Log	Depth in Feet	DESCRIPTION
					0	Brown sandy silty clay, moist, no odor, medium plasticity.
2116-5-B1	12	CL	910		5	Brown sandy silty clay, stiff, moist, no odor, low plasticity.
		SC				Brown clayey sand, fine-grained, moist, no odor, grades downward to a silty clay.
2116-10-B1	10	CL	915		10	Brown sandy silty clay, stiff, moist, no odor, low plasticity.
2116-15-B1	12	SP	927		15	Brown sand, fine-grained, medium dense, moist, no odor.
2116-20-B1	8	CL	940		20	Brown sandy silty clay, medium stiff, moist, odor.

L & W Environmental Services, Inc.

2111 Jennings Street
San Francisco, California

Log of Boring Number: B1
Sheet 1 of 2
Beck Roofing
21123 Meekland Avenue
Hayward, California

Project Number: 2116

Date: December, 1991

Figure Number: 7

Sample Number	Blows per Foot	Soil Type	Time	Log	Depth in Feet	DESCRIPTION
2116-25-B1	10	CL	950		25	Brown sandy silty clay, stiff, moist, strong odor, medium plasticity.

Boring terminated at 25.5 feet.
Groundwater not encountered.
Boring drilled 10/31/91 with CME 75 rig.

L & W Environmental Services, Inc. 2111 Jennings Street San Francisco, California	Log of Boring Number: B1 **Sheet 2 of 2** Beck Roofing 21123 Meekland Avenue Hayward, California	
Project Number: 2116	Date: December, 1991	Figure Number: 7

Sample Number	Blows per Foot	Soil Type	Time	Log	Depth in Feet	DESCRIPTION
					0	
2116-5-B2	16	CL	1050		5	Brown silty sandy clay, very stiff, moist, no odor, medium plasticity.
2116-10-B2	10	SM	1112		10	Brown silty sand, fine-grained, loose to medium dense, moist, no odor.
2116-15-B2	9	SP	1120		15	Brown sand, fine-grained, loose, moist, no odor.
2116-20-B2	7	CL	1130		20	Brown silty clay, medium stiff, moist, no odor, medium plasticity.

L & W Environmental Services, Inc.

2111 Jennings Street
San Francisco, California

Log of Boring Number: B2
Sheet 1 of 2
Beck Roofing
21123 Meekland Avenue
Hayward, California

Project Number: 2116

Date: December, 1991

Figure Number: 8

Sample Number	Blows per Foot	Soil Type	Time	Log	Depth in Feet	DESCRIPTION
2116-25-B2	9	CL	1136		25	Brown sandy silty clay, stiff, moist, strong odor, medium plasticity.
2116-30-B2	8	CL	1145		30	Same.

Boring terminated at 30.5 feet.
Groundwater not encountered.
Boring drilled 10/31/91 with CME 75 rig.

L & W Environmental Services, Inc. 2111 Jennings Street San Francisco, California	**Log of Boring Number: B2** **Sheet 2 of 2** Beck Roofing 21123 Meekland Avenue Hayward, California	
Project Number: 2116	Date: December, 1991	Figure Number: 8

Sample Number	Blows per Foot	Soil Type	Time	Log	Depth in Feet	DESCRIPTION
					0	Brown silty clay with sand and gravel, moist, no odor.
2116-5-MW3	9	CL	115		5	Brown silty clay, stiff, moist, no odor medium plasticity.
2116-10-MW3	12	SM	125		10	Brown silty sand, fine-grained, medium dense, moist, no odor.
2116-15-MW3	12	SM	135		15	Same.
						Brown silty clay, stiff, moist, slight odor, medium plasticity.
2116-20-MW3	5	CL			20	Brown silty clay, medium stiff, moist, odor, medium plasticity.

L & W Environmental Services, Inc.

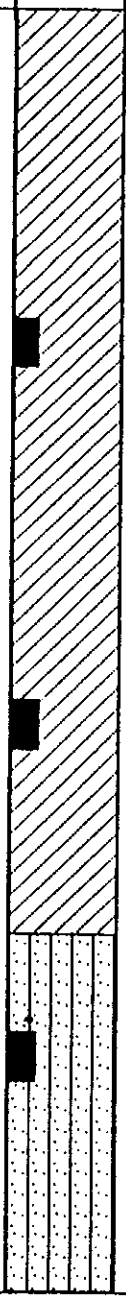
2111 Jennings Street
San Francisco, California

Log of Boring Number: MW 3
Sheet 1 of 2
Beck Roofing
21123 Meekland Avenue
Hayward, California

Project Number: 2116

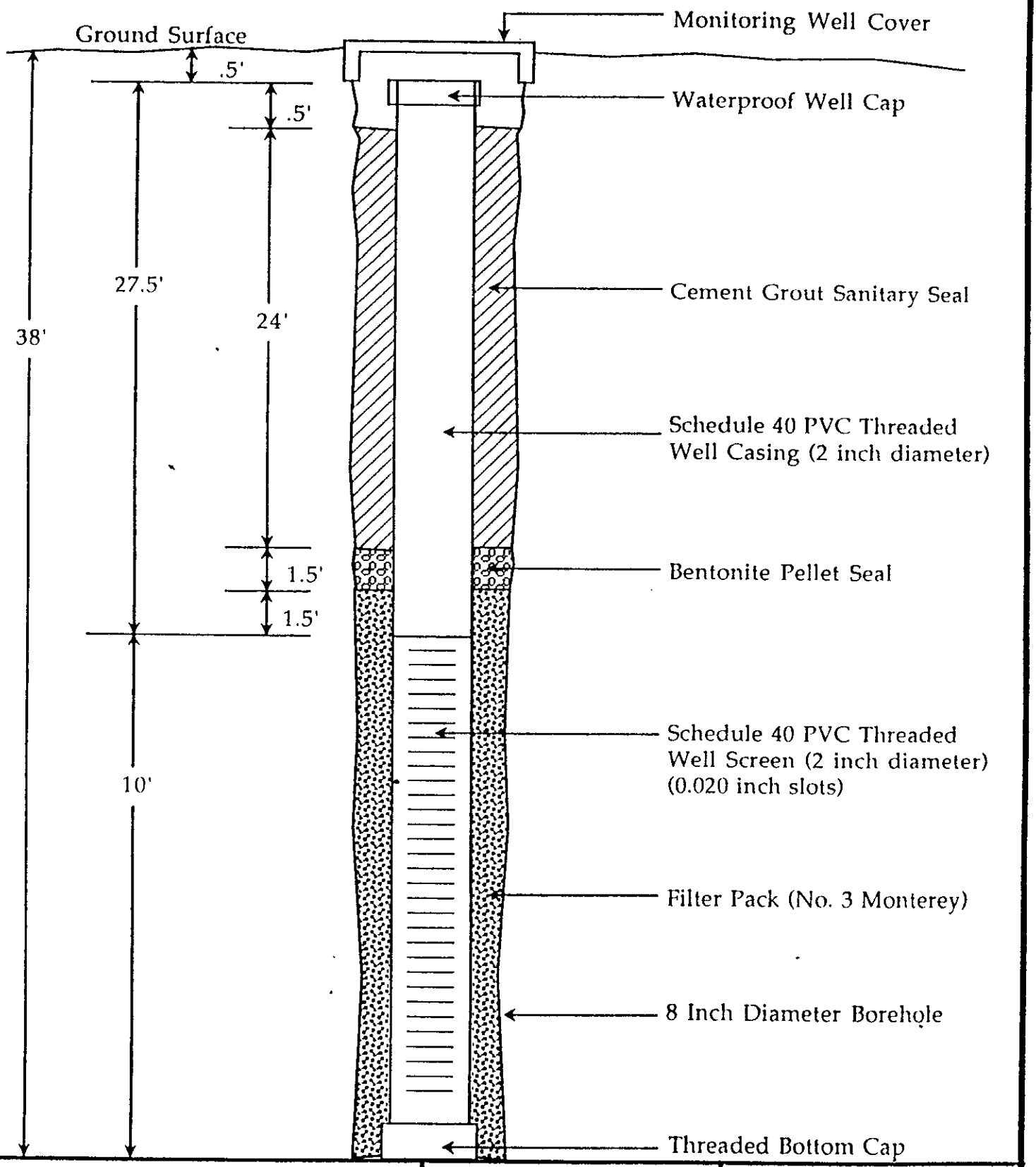
Date: December, 1991

Figure Number: 9

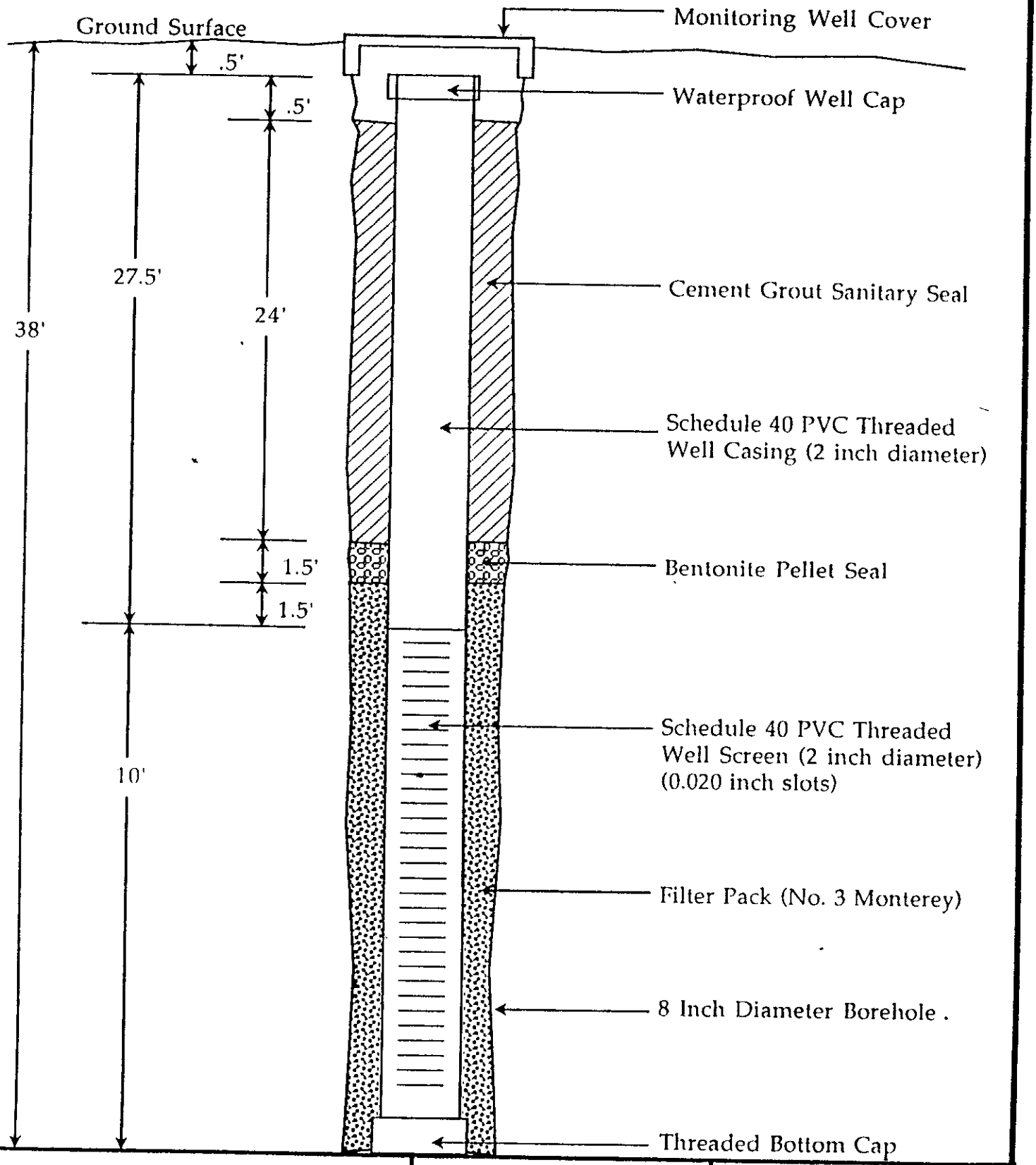
Sample Number	Blows per Foot	Soil Type	Time	Log	Depth in Feet	DESCRIPTION
2116-25-MW3	14	CL	207		25	Same.
2116-30-MW3	13	CL	225		30	Same.
2116-35-MW3	13	SM	230		35	Brown silty sand, fine-grained, medium dense, wet.

Boring terminated at 38 feet.
Groundwater encountered at 33 feet.
Boring drilled 10/31/91 with CME 75 rig.
Boring converted into Monitoring Well 3 on 10/31/91

L & W Environmental Services, Inc. 2111 Jennings Street San Francisco, California	**Log of Boring Number: MW 3** **Sheet 2 of 2** Beck Roofing 21123 Meekland Avenue Hayward, California	
Project Number: 2116	Date: December, 1991	Figure Number: 9



L & W Environmental Services, Inc. 2111 Jennings Street San Francisco, California	**Beck Roofing** 21123 Meekland Avenue Hayward, California	**Monitoring Well MW-1** **Installation Detail**
Project Number: 2116	Date: December, 1991	Figure Number: 10



L & W Environmental Services, Inc. 2111 Jennings Street San Francisco, California	Beck Roofing 21123 Meekland Avenue Hayward, California	Monitoring Well MW-2 Installation Detail
Project Number: 2116	Date: December, 1991	Figure Number: 11

LOG OF BORING: SB-18

[redacted]: Beck Roofing

File: 3288-44

Date: 1 August 1994

Elevation: feet

Surface:

Water: None encountered

ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS & BLOW COUNTS	Sample Number	USCS	Material Description and Remarks	Dry Density (pcf)	Moisture Content (%)	Phi	C (ksf)
0			CL	Dark grey, moist, medium stiff, silty Clay - some fine Sand				
1								
2								
3								
4								
5								
6	11/6	SB18-1						
7								
8			ML-CL	Yellow brown, moist, medium stiff, clayey Silt/silty Clay				
9								
10								
11	9/6	SB18-2						
12								
13								
14			SP	Light brown, moist, loose-medium dense, medium coarse, Sand				
15								
16								
17								
18								
19								
20			ML-CL	Olive-mottled, moist, soft to medium soft, clayey silt/silty Clay				
21								

Site description and comments:

ANDERSON CONSULTING GROUP

Boring: SB-18
Depth: 40.0 ft
Figure:

LOG OF BORING: SB-18 (Continued)

[redacted] Beck Roofing

File: 3288-44

ELEV / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS & BLOW COUNTS	Sample Number	USCS	Material Description and Remarks	Dry Density (pcf)	Moisture Content (%)	Phi	C (ksf)
22								
23								
24			CL	Olive, moist, stiff, mottled Clay with trace of silt and rhizomes				
25								
26	10/6	SB18-3						
27								
28				Saturated				
29								
30								
31	9/6	SB18-4						
32								
33								
34								
35								
36	9/6	SB18-5						
37								
38								
39								
40				Boring terminated at 40 feet				

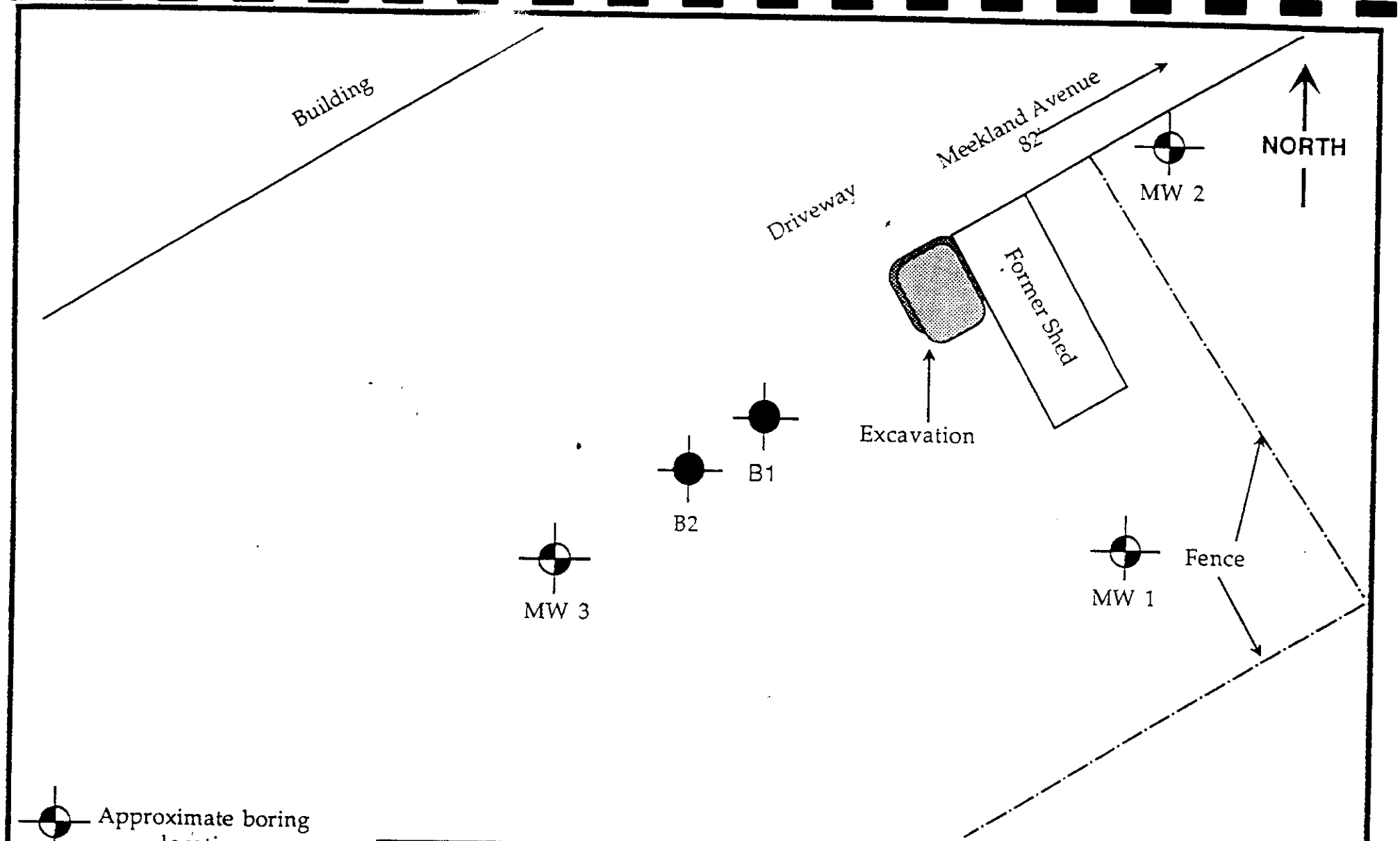
ANDERSON CONSULTING GROUP

Boring: SB-18
Depth: 40.0 ft
Figure:

APPENDIX B

Contaminant Plume Figures from L&W 1992 Report

Figures 14-17 from L&W Environmental Services, Inc. Report
"Progress Report Quarter Ending December 31, 1991", January 7, 1992



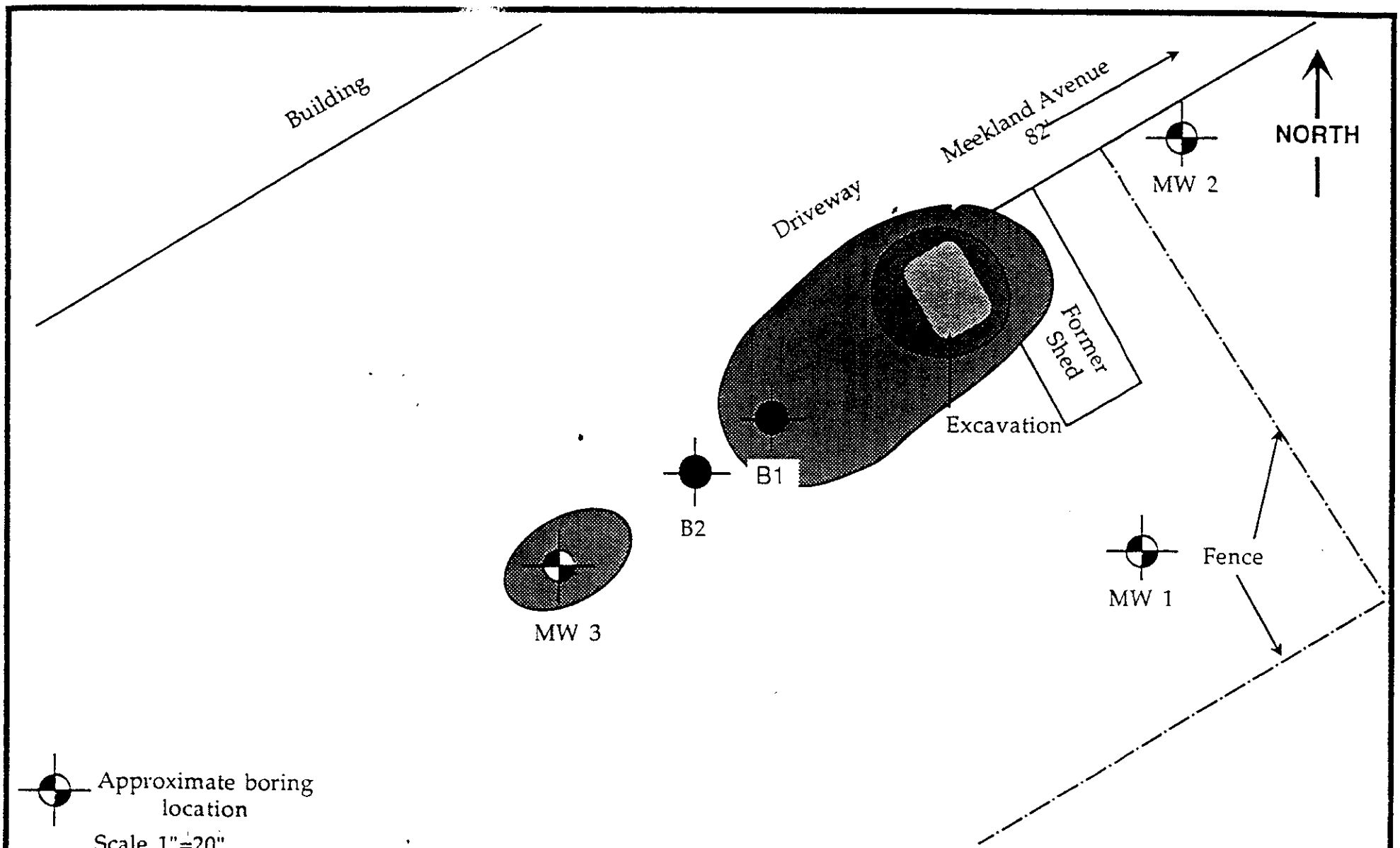
Approximate boring location

Scale 1"=20"

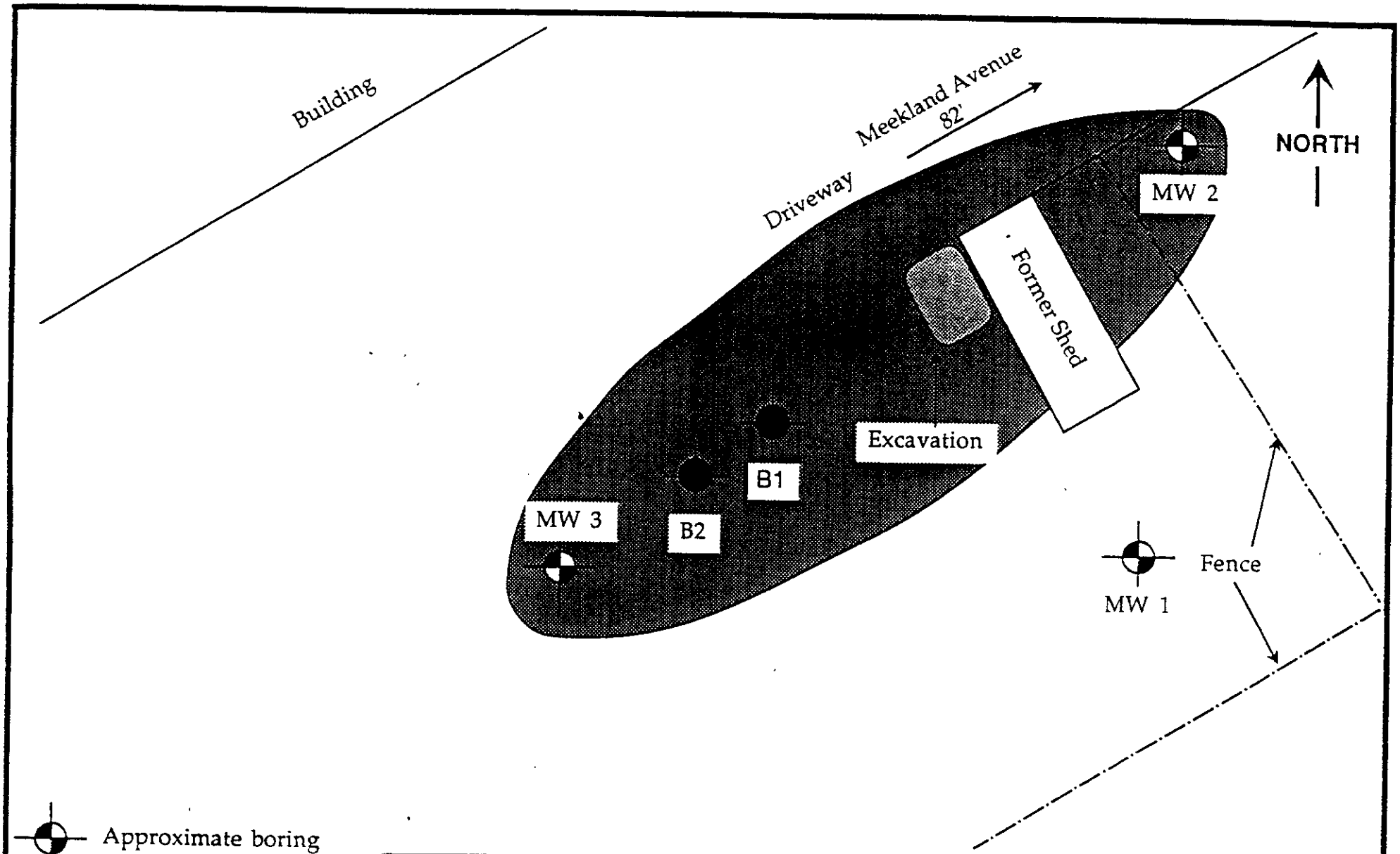
TPH is greater than ND, but less than 100 ppm.

TPH is ND.

L & W Environmental Services, Inc. 2111 Jennings Street San Francisco, California		TPH-G Limits at 15' Depth Beck Roofing Hayward, California	
Project Number: 2116	Drawn by: MJK	Date: December, 1991	Figure Number: 14



L & W Environmental Services, Inc.		TPH-G Limits at 20' Depth	
2111 Jennings Street San Francisco, California		Beck Roofing Hayward, California	
Project Number: 2116	Drawn by: MJK	Date: December, 1991	Figure Number: 15



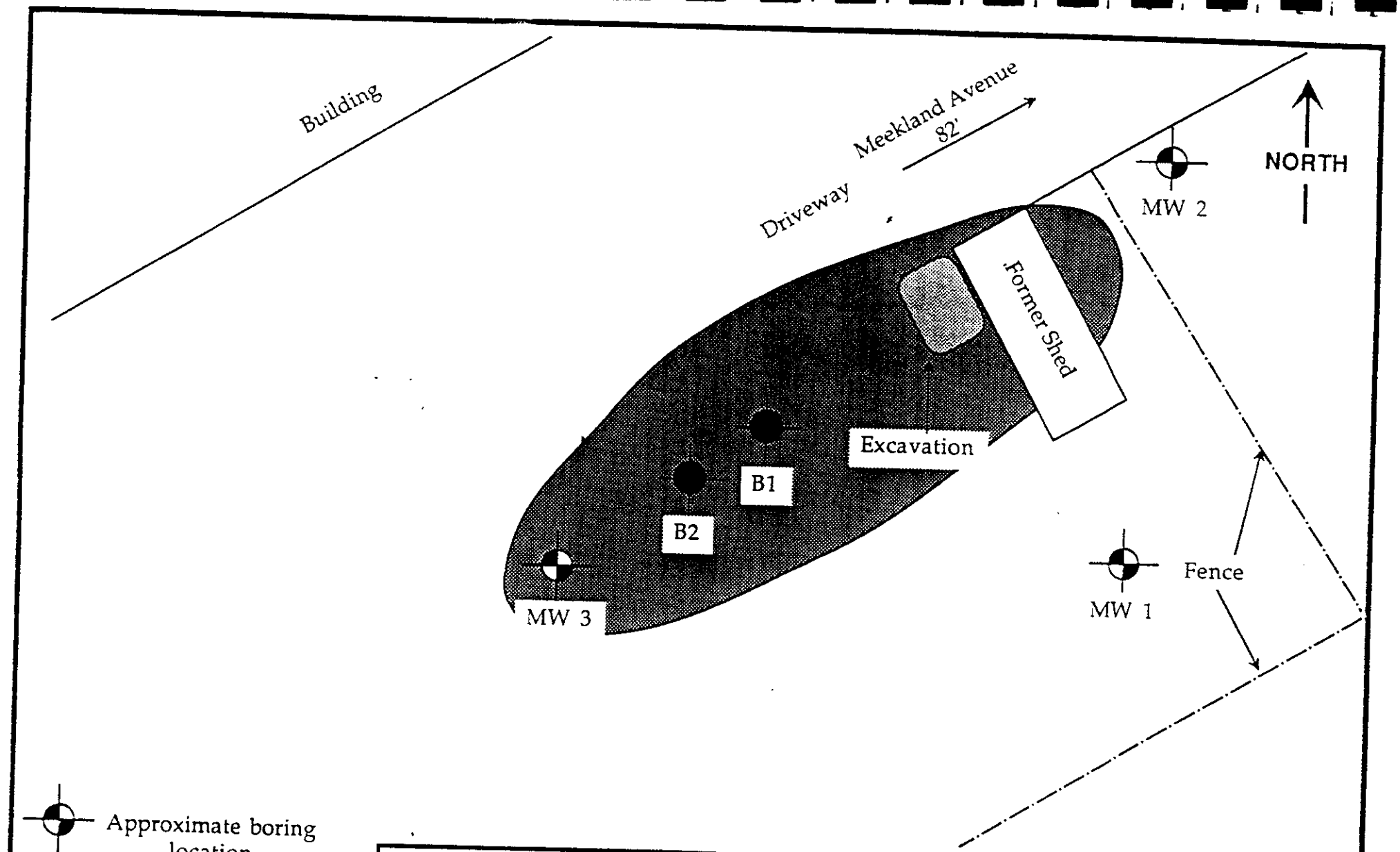
Approximate boring location

Scale 1"=20"

TPH is greater than ND, but less than 100 ppm.

TPH is ND.

L & W Environmental Services, Inc.		TPH-G Limits at 25' Depth	
2111 Jennings Street San Francisco, California		Beck Roofing Hayward, California	
Project Number: 2116	Drawn by: MJK	Date: December, 1991	Figure Number: 16



Approximate boring location

Scale 1"=20"

TPH is greater than ND, but less than 100 ppm.

TPH is ND.

L & W Environmental Services, Inc. 2111 Jennings Street San Francisco, California		TPH-G Limits at 30' Depth Beck Roofing Hayward, California	
Project Number: 2116	Drawn by: MJK	Date: December, 1991	Figure Number: 17

APPENDIX C

January 1999 Analytical Reports and Chain of Custody

McCAMPBELL ANALYTICAL INC.
110 Second Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
http://www.mccampbell.com E-mail: main@mccampbell.com

Heilshorn Environmental Eng.	Client Project ID: Beck Roofing	Date Sampled: 01/29/99
P.O. Box 20546		Date Received: 01/29/99
El Sobrante, CA 94820	Client Contact: Elyse Heilshorn	Date Extracted: 02/01/99
	Client P.O:	Date Analyzed: 02/01/99

Gasoline Range (C6-C12) Volatile Hydrocarbons as Gasoline*, with Methyl tert-Butyl Ether* & BTEX*

EPA methods 5030, modified 8015, and 8020 or 602; California RWQCB (SF Bay Region) method GCFID(5030)

Lab ID	Client ID	Matrix	TPH(g)+	MTBE	Benzene	Toluene	Ethylben-zene	Xylenes	% Recovery Surrogate
02564	MW1	W	ND	ND	ND	ND	ND	ND	107
02565	MW2	W	ND	ND	ND	ND	ND	ND	108
02566	MW3	W	230,a	ND	6.2	ND	7.3	ND	110
02567	MW4	W	ND	ND	ND	ND	ND	ND	111
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit		W	50 ug/L	5.0	0.5	0.5	0.5	0.5	
		S	1.0 mg/kg	0.05	0.005	0.005	0.005	0.005	

* water and vapor samples are reported in ug/L, wipe samples in ug/wipe, soil and sludge samples in mg/kg, and all TCLP and SPLP extracts in ug/L

* cluttered chromatogram; sample peak coelutes with surrogate peak

+The following descriptions of the TPH chromatogram are cursory in nature and McCampbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified gasoline is significant; b) heavier gasoline range compounds are significant(aged gasoline?); c) lighter gasoline range compounds (the most mobile fraction) are significant; d) gasoline range compounds having broad chromatographic peaks are significant; biologically altered gasoline?; e) TPH pattern that does not appear to be derived from gasoline (?); f) one to a few isolated peaks present; g) strongly aged gasoline or diesel range compounds are significant; h) lighter than water immiscible sheen is present; i) liquid sample that contains greater than ~5 vol. % sediment; j) no recognizable pattern.

DHS Certification No. 1644

Edward Hamilton, Lab Director

McCAMPBELL ANALYTICAL INC.
110 Second Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
http://www.mccampbell.com E-mail: main@mccampbell.com

Heilshorn Environmental Eng.	Client Project ID: Beck Roofing	Date Sampled: 01/29/99
P.O. Box 20546		Date Received: 01/29/99
El Sobrante, CA 94820	Client Contact: Elyse Heilshorn	Date Extracted: 02/01-02/03/99
	Client P.O:	Date Analyzed: 02/01-02/03/99

Ethylene Dibromide (1,2-Dibromoethane) & Ethylene Dichloride (1,2-Dichloroethane)
EPA method 8260

Lab ID	Client ID	Matrix	EDB*	1,2-DCA (EDC)*	% Recovery Surrogate
02564	MW1	W	ND	ND	100
02565	MW2	W	ND	ND	98
02566	MW3	W	ND	11	103
02567	MW4	W	ND	ND	104
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit		W	1.0 ug/L	1.0 ug/L	
		S	5.0 ug/kg	5.0 ug/kg	

* water and vapor samples are reported in ug/L, soil and sludge samples in ug/kg, wipes in ug/wipe and all TCLP / SPLP extracts in ug/L

h) lighter than water immiscible sheen is present; i) liquid sample that contains greater than ~5 vol. % sediment; j) sample diluted due to high organic content.

DHS Certification No. 1644

Edward Hamilton, Lab Director

McCAMPBELL ANALYTICAL INC.
110 Second Avenue South, #D7, Pacheco, CA 94553-5560
Telephone : 925-798-1620 Fax : 925-798-1622
http://www.mccampbell.com E-mail: main@mccampbell.com

Heilshorn Environmental Eng. P.O. Box 20546 El Sobrante, CA 94820	Client Project ID: Beck Roofing	Date Sampled: 01/29/99
		Date Received: 01/29/99
	Client Contact: Elyse Heilshorn	Date Extracted: 02/01-02/03/99
	Client P.O:	Date Analyzed: 02/01-02/03/99

Oxygenated Volatile Organics By GC/MS

EPA method 8260 modified

Lab ID	02564	02565	02566	02567	Reporting Limit	
Client ID	MW1	MW2	MW3	MW4		
Matrix	W	W	W	W	S	W
Compound	Concentration*				ug/kg	ug/L
Di-isopropyl Ether (DIPE)	ND	ND	ND	ND	5.0	1.0
Ethyl tert-Butyl Ether (ETBE)	ND	ND	ND	ND	5.0	1.0
Methyl-tert Butyl Ether (MTBE)	ND	ND	3.3	ND	5.0	1.0
tert-Amyl Methyl Ether (TAME)	ND	ND	ND	ND	5.0	1.0
tert-Butanol	ND	ND	ND	ND	25	5.0
Surrogate Recoveries (%)						
Dibromofluoromethane	100	98	103	104		
Comments:						

* water samples are reported in ug/L, soil and sludge samples in ug/kg, wipes in ug/wipe and all TCLP / STLC / SPLP extracts in ug/L

ND means not detected above the reporting limit; N/A means surrogate not applicable to this analysis

(h) lighter than water immiscible sheen is present; (i) liquid sample that contains greater than ~5 vol. % sediment; (j) sample diluted due to high organic content

DHS Certification No. 1644

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QC REPORT FOR HYDROCARBON ANALYSES

Date: 02/01/99-02/02/99 Matrix: WATER

Analyte	Concentration (mg/L) Sample (#02263)	MS	MSD	Amount Spiked	% Recovery MS	MSD	RPD
TPH (gas)	0.0	116.8	112.2	100.0	116.8	112.2	4.0
Benzene	0.0	11.1	11.6	10.0	111.0	116.0	4.4
Toluene	0.0	11.4	11.8	10.0	114.0	118.0	3.4
Ethyl Benzene	0.0	11.3	11.3	10.0	113.0	113.0	0.0
Xylenes	0.0	32.4	32.2	30.0	108.0	107.3	0.6
TPH(diesel)	0.0	154	161	150	103	107	4.5
TRPH (oil & grease)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

% Rec. = (MS - Sample) / amount spiked x 100

RPD = (MS - MSD) / (MS + MSD) x 2 x 100

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QC REPORT FOR VOCs (EPA 8240/8260)

Date: 02/01/99-02/02/99 Matrix: WATER

Analyte	Concentration (ug/kg,u Sample (#01934)	MS	MSD	Amount Spiked	% Recovery MS	MSD	RPD
1,1-Dichloroethe	0	98	107	100	98	107	8.8
Trichloroethene	0	103	112	100	103	112	8.4
EDB	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chlorobenzene	0	107	116	100	107	116	8.1
Benzene	0	102	114	100	102	114	11.1
Toluene	0	96	102	100	96	102	6.1

% Rec. = (MS - Sample) / amount spiked x 100

RPD = (MS - MSD) / (MS + MSD) x 2 x 100

CHAIN OF CUSTODY RECORD

13835 xhe12

BCA Log Number _____

Client name HE2		Project or PO# Beck Roofing	
Address P.O. Box 20546		Phone # 510/222-7968	
City, State, Zip El Sobrante CA 94803		Report attention Elyse Heilstorn	Fax 510 222-8573

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sampled by EDH / Sample description	Number of containers	TPHg, BTEX, MTBE	8015 add'l EPA Oxygenates	Hazardous sample Special handling required	Remarks
MW1	1/29/99		wellwtr	Monit well sample (UST)	5	✓	✓		02564
MW2						✓	✓		02565
MW3						✓	✓		02566
MW4						✓	✓		02567

ICE/● ✓
GOOD CONDITION ✓
HEAD SPACE ABSENT ✓

PRESERVATION APPROPRIATE CONTAINERS ✓

VOAs | O&G | METALS | OTHER

Signature	Print Name	Company	Date	Time
Relinquished by ED Heilstorn	Elyse D. Heilstorn	HE2	1/29/99	2:05
Received by				
Relinquished by				
Received by				
Relinquished by				
Received by Laboratory Gina A Butler	Gina A Butler	MAI	1/29/99	2:05

B C ANALYTICAL
1255 Powell Street, Emeryville, CA 94608 (510) 428-2300
801 Western Avenue, Glendale, CA 91201 (818) 247-5737
1200 Gene Autry Way, Anaheim, CA 92805 (714) 978-0113

Note: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client's expense.

Disposal arrangements: _____

*KEY: WW—Wastewater SU—Surface Water SO—Soil SL—Sludge PE—Petroleum OT—Other NA—Nonaqueous GW—Groundwater AQ—Aqueous

APPENDIX D

RBCA RBSL and SSTL Calculations

Exposure Parameters for Commercial/ Industrial Scenario

Parameter	Definition	Units	Value
RSBL air	Risk Based Screening Level for air via inhalation route	mg/m3	calculated
TR	Target excess individual lifetime cancer risk	unitless	"10^{-5}"
BW	Adult body weight	kg	70
AT c	Averaging Time for Carcinogens	years	70
SF i	Inhalation Cancer slope factor, benzene	kg-day/mg	0.029
IR air-indoor	Daily indoor inhalation rate	m3/day	20
IR air-outdoor	Daily outdoor inhalation rate	m3/day	20
EF	Exposure Frequency	days /year	250
ED	Exposure duration	Years	25
THQ	Target hazard quotient	unitless	1
RfCi*	Inhalation chronic reference dose	mg/m3-day	8.30E-03
RSBL s	Risk Based Screening Level for soil via inhalation route	mg/kg-soil	calculated
$VF_{s\ amb}$	Volatilization Factor for soil to ambient air	(mg/m3-air)/ (mg/kg-soil)	calculated
H	Henry's law constant, benzene	cm3w/cm3-air	0.22
ρ_s	Soil bulk density	gm/cm3	1.7
θ_{ws}	Volumetric water content in vadose zone soil	cm3 water/ cm3 soil	0.12
θ_{as}	Volumetric air content in vadose zone soil	cm3 air/ cm3 soil	0.26
k_s	Water-soil sorption coefficient	cm3 w/gm soil	$f_{oc} \times k_{oc}$
foc	Fraction of organic content in soil	gm-C/gm-soil	0.01
koc	Carbon-water sorption coefficient, benzene	cm3-water/gm-C	38.02
U_{air}	Wind speed above ground surface in ambient mixing zone	cm/sec	195
δ_{air}	Ambient air mixing zone height	cm	200
Ls	Depth to subsurface soil sources	cm	610
D_s^{eff}	Effective diffusion coefficient-soil	cm2/sec	calculated
Dair	Diffusion coefficient in air, benzene	cm2/sec	0.093
θ_T	Total soil Porosity	cm3/cm3-soil	0.38
D^{wat}	Diffusion coefficient in water benzene	cm2/sec	1.10E-05

Exposure Parameters for Commercial/ Industrial Scenario

Parameter	Definition	Units	Value
W	Width of source area parallel to wind or groundwater flow direction	cm	3048
$V_{s\ esp}$	Volatilization Factor, Subsurface soil to indoor air(enclosed space)	mg/m3-air/ mg/kg-soil	calculated
D^{eff} crack	Effective diffusion coefficient through foundation cracks	cm2/sec	calculated
θa crack	Volumetric air content in foundation/ wall cracks	cm3-air/cm3 total volume	0.26
θw crack	Volumetric water content in foundation/ wall cracks	cm3-water/ cm3 total volume	0.12
ER	Enclosed space air exchange rate	L/sec	0.00023
L_B	Enclosed space volume infiltration area ratio	cm	300
Lcrack	Enclosed space foundation or wall thickness	cm	15
η	Areal fraction of cracks in foundation/walls	cm2 cracks/ cm2 total area	0.01

Notes:

Values obtained from Tables X2.3 through X2.7 in ASTM E 1739
* Value listed as inhalation risk unit for benzene perASTM E1739

RISK BASED SCREENING LEVEL SUBSURFACE SOIL TO AMBIENT (OUTDOOR) VAPOR VIA INHALATION ROUTE

D_s^{eff}	Effective diffusion coefficient-soil	cm2/sec

$$D_s^{eff}\left[\frac{cm^2}{\sec}\right] = D^{air}\frac{\theta_{as}^{3.33}}{\theta_T^2} + D^{wat}\frac{1}{H}\frac{\theta_{ws}^{3.33}}{\theta_T^2}$$

θasexp3.33=	0.01127
θT2=	0.1444
1/H=	4.5455
θasexp3.33/θT2 =	0.07803583

D_s^{eff}= 0.0463

K_s	Water-soil sorption coefficient	cm3 water/ gm soil

$k_{s=foc\ x\ koc}$ 0.3802

$VF_{s\ amb}$	Volatilization Factor for soil to ambient air	(mg/m3-air)/ (mg/kg-soil)

$$VF_{samb}\left[\frac{\left(mg/m^3-air\right)}{\left(mg/kg-soil\right)}\right] = \frac{H\rho_s}{\left[\theta_{ws}+k_s\rho_s+H\theta_{as}\right]\left(1+\frac{U_{air}\delta_{air}L_s}{D_s^{eff}W}\right)}\times 10^3\frac{cm^3-kg}{m^3-g}$$

$H\rho_s$=	0.374
θws + ksρs + Hθas=	0.82354
$U_{air}\delta_{air}L_s$=	23,790,000
$D_s^{eff}W$=	141.05

$VF_{s\ amb}$= 0.00269

RISK BASED SCREENING LEVEL SUBSURFACE SOIL TO AMBIENT (OUTDOOR) VAPOR VIA INHALATION ROUTE

	Risk Based Screening Level for	
RSBL air	air via inhalation route	mg/m3

$$RSBL_{air}\left[\frac{\mu g}{m^3 - air}\right] = \frac{THQ \times RfD_i \times BW \times AT_c \times 365\frac{days}{year} \times 10^3 \frac{\mu g}{mg}}{IR_{air} \times EF \times ED}$$

THQ x RfD x BW x Atn x 365 x 10^3=	212,065
IRair x EF x ED=	125,000

RSBL air= **1.697**

	Risk Based Screening Level for	
RSBL s-amb	soil via inhalation route	mg/kg-soil

$$RSBL_s\left[\frac{mg}{kg - soil}\right] = \frac{RBSL_{air}\left[\frac{\mu g}{m^3 - air}\right]}{VF_{samb}} \times 10^{-3}\left[\frac{mg}{\mu g}\right]$$

RSBL s-amb= **0.6301** 6.3009E-01

RISK BASED SCREENING LEVEL SUBSURFACE SOIL TO ENCLOSED SPACE (INDOOR) VAPOR VIA INHALATION ROUTE

D_s^{eff} Effective diffusion coefficient-soil cm2/sec

$$D_s^{eff}\left[\frac{cm^2}{\sec}\right] = D^{air}\frac{\theta_{as}^{3.33}}{\theta_T^2} + D^{wat}\frac{1}{H}\frac{\theta_{ws}^{3.33}}{\theta_T^2}$$

θasexp3.33=	0.01127
θT2=	0.1444
1/H=	4.5455
θasexp3.33/θT2=	0.07804

D_s^{eff}= **0.0463**

K_s Water-soil sorption coefficient cm3 water/ gm soil

$K_{s=foc\ x\ koc}$ **0.3802**

D^{eff} crack Effective diffusion coefficient through foundation cracks cm2/sec

$$D_{crack}^{eff}\left[\frac{cm2}{\sec}\right] = D^{air}\frac{\theta_{acrack}^{3.33}}{\theta_T^2} + D^{wat}\frac{1}{H}\frac{\theta_{wcrack}^{3.33}}{\theta_T^2}$$

θacrackE+3.33=	0.01127
θT2=	0.1444
1/H=	4.5455
θwcrackE+3.33=	0.000858
θacrackE+3.33/ θT2=	0.07804
θwcrackE+3.33/ θT2=	0.00594

D^{eff} crack= **0.007258**

RISK BASED SCREENING LEVEL SUBSURFACE SOIL TO ENCLOSED SPACE (INDOOR) VAPOR VIA INHALATION ROUTE

VF_{sesp}	Volatilization Factor for soil to ambient air	(mg/m3-air)/ (mg/kg-soil)

$$VF_{sesp}\left[\frac{\left(mg/m^3-air\right)}{\left(mg/kg-soil\right)}\right]=\frac{\dfrac{H\rho_s}{\left[\theta_{ws}+k_s\rho_s+H\theta_{as}\right]}\left[\dfrac{D_s^{eff}/L_s}{ERL_B}\right]}{1+\left[\dfrac{D_s^{eff}/L_s}{ERL_B}\right]+\left[\dfrac{D_s^{eff}/L_s}{\left(D_{crack}^{eff}/L_{crack}\right)\eta}\right]}\times 10^3\,\frac{cm^3-kg}{m^3-g}$$

$H\rho_B$=	0.374
θws + ksρs + Hθas=	0.82354
Ds^{eff}/Ls=	0.000076
ERL_B=	0.069
$D^{eff}crack/Lcrack$	0.00048
$Ds^{eff}/Ls\ /ERL_B$=	0.00110

VF_{sesp}= 0.02993

RSBL air	Risk Based Screening Level for air via inhalation route	mg/m3

$$RSBL_{air}\left[\frac{\mu g}{m^3-air}\right]=\frac{THQ\times RfD_i\times BW\times AT_c\times 365\,\frac{days}{year}\times 10^3\,\frac{\mu g}{mg}}{IR_{air}\times EF\times ED}$$

THQ x RfD x BW x Atn x 365 x 10^3=	212,065.00
IRair x EF x ED=	125,000.00

***RSBL air*= 1.697**

RISK BASED SCREENING LEVEL SUBSURFACE SOIL TO ENCLOSED SPACE (INDOOR) VAPOR VIA INHALATION ROUTE

RSBLsoil-esp	Risk Based Screening Level for subsurface soil to indoor air (enclosed space) via inhalation route	mg/kg soil

$$RSBLsoil-esp\left[\frac{mg}{kg-soil}\right]=\frac{RSBLair\left[\frac{\mu g}{m^3 air}\right]}{VFsesp}\times 10^{-3}\frac{mg}{\mu g}$$

RSBLsoil-esp= **0.05668** 5.66759E-02

TIER 1 RSBL TO BECK DATA COMPARISON

Date	Location	Depth Ft,bgs	Benzene mg/kg	Tier 1 Commercial/Industrial Scenario RSBL to Data Comparison: outdoor 1E-04 RBSL mg/kg	Data exceeds RBSL?	outdoor 1E-06 RBSL mg/kg	Data exceeds RBSL?	indoor 1E-04 RBSL mg/kg	Data exceeds RBSL?	indoor 1E-06 RBSL mg/kg	Data exceeds RBSL?
Tank	Removal Pit	Sidewall	Samples								
5/20/91	Tank pit fill end	8	6.4	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
	Tank pit opposite fill end	7.5	5.8	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
Tank Pit	Over Excavation	Sidewall	Samples	(L&W,92)				1.09		0.0109	
Nov-91	North wall	15	0.008	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
	North wall	16	6.3	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
	North wall	17	16	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
	Floor, center	16	0.83	45.7	FALSE	0.457	TRUE	1.09	FALSE	0.0109	TRUE
	Center Floor	17	30	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
	Center floor	18	4	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
	South wall	15	0.011	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
	South wall	16	1.8	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
	South wall	17	0.4	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
	East wall	14	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
	East Wall	16	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
	West Wall	16	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
Soil	Boring Samples	(L&W, 92)						1.09		0.0109	
Oct-91	MW-1	5	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
		10	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
		15	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
		20	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
		25	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
		30	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
		35	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
		40	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
		45	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
Oct-91	MW-2	5	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
		10	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
		15	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
		20	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
		25	0.1	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE

TIER 1 RSBL TO BECK DATA COMPARISON

			Depth Ft,bgs	Benzene mg/kg	Tier 1 Commercial/Industrial Scenario RSBL to Data Comparison: outdoor 1E-04 RSBL mg/kg	Data exceeds RSBL?	outdoor 1E-06 RBSL mg/kg	Data exceeds RBSL?	indoor 1E-04 RBSL mg/kg	Data exceeds RBSL?	indoor 1E-06 RBSL mg/kg	Data exceeds RBSL?
			30	0.044	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
			35	0.006	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
Oct-91	B-1		5	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
			10	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
			15	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
			20	0.25	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
			25	0.14	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
	B-2		5	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
			10	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
			15	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
			20	0.046	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
			25	0.44	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
			30	0.27	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
Soil	Boring Samples	(L&W, 92)			45.7		0.457		1.09		0.0109	
	MW-3		5	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
			10	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
			15	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
			20	0.021	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
			25	0.048	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
			30	0.25	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	TRUE
			35	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
Soil	Boring Samples	(Anderson, 94)							1.09		0.0109	
Jul-94	SB18 (MW-4)		25.5-35.5	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
	SB19 (North of MW		25.5-35.5	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
	SB20 (South or MW		25.5-35.5	ND	45.7	FALSE	0.457	FALSE	1.09	FALSE	0.0109	FALSE
	SB21 (within the excavation area)		28.5	2.2	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
	SB21 (within the excavation area)		29	11	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE
	SB21 (within the excavation area)		29.5	13	45.7	FALSE	0.457	TRUE	1.09	TRUE	0.0109	TRUE

Degradation of Benzene in Soils

Degradation equation for benzene based on ASTM 1739 Table X3.3 value for k, %/day in SanJose

y=13e^-0.021x
y=mg/kg benzene
x=days

For x=4 years (1460 days) y (mg/kg)= 7.7567E-13
y (µg/kg)= 7.7567E-07