ENVIRONMENTAL ENGINEERING, INC.
2680 Bishop Drive, Suite 203, San Ramon, CA 94583
TEL (925) 244-6600 * FAX (925) 244-6601

February 10, 2000

RO# 1754

Ms. Susan Hugo
Alameda County
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Subject: Site Closure Report
4550 San Pablo Avenue, Emeryville, California

Dear Susan:

A copy of SOMA's report entitled "Comprehensive Site Closure, 4550 San Pablo Avenue, Emeryville, California" is enclosed for your review and approval.

Please call me at (925) 244-6600, if you have any questions or comments.

Sincerely,

Mansour Sepehr, Ph.D., P.E.
Principal

Enclosure

MS/jb

cc: Mr. Robert Daoust w/enclosure

Mr. Joel Gregory w/enclosure
Geo-Logics

ENVIRONMENTAL ENGINEERING, INC.
2680 Bishop Drive, Suite 203, San Ramon, CA 94583
TEL (925) 244-6600 * FAX (925) 244-6601

LOP 1754

COMPREHENSIVE SITE CLOSURE REPORT

4550 San Pablo Avenue

Emeryville, California

Project 99-2370

February 1, 2000

(1201 PARK AVE
EMERYVILLE)

Prepared for

Attn: Carol Light

Emeryville Farms, L.L.C.

1201 Park Avenue, Suite 100

Emeryville, California 94608

Prepared by

SOMA Environmental Engineering, Inc.

2680 Bishop Drive, Suite 203

San Ramon, California 94583

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Executive Summary

The following document is the Site Closure Report for the former Berkeley Farms Dairy Facility located at 4550 San Pablo Avenue, Emeryville, California (the "Site"). This report has been prepared by SOMA Environmental Engineering, Inc. (SOMA) on behalf of Emeryville Farms, L.L.C., the current owner of the Site. The purpose of this closure report is to ensure that the following key issues have been adequately addressed in support of a No Further Action (NFA) regulatory decision for the Site:

- Has the Site been adequately investigated?
- Have all contaminant sources been removed or stabilized?
- Is the groundwater plume stable?
- Does the Site pose any current or future threats to public health or the environment?
- Does the Site pose any current or future threat to water resources?
- Have all the necessary risk management precautions been incorporated to mitigate any threats to human health and the environment during Site construction activities?

Site Background

The Site previously operated as a dairy facility, which pasteurized raw milk products brought in by tanker trucks, packaged milk products and distributed the milk products. Previous Site activities resulted in contamination of soil with gasoline and diesel fuel and contamination of groundwater with diesel fuel. The source of soil and groundwater contamination was leaking underground storage tanks (USTs), which have been removed from the Site. Although petroleum impacted soil has been removed and replaced with clean soil, petroleum constituents in the form of total recoverable petroleum hydrocarbons as diesel (TRPH-d), xylenes, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, fluorine, phenanthrene and pyrene have been detected in groundwater in the most recent sampling event.

Has the Site Been Adequately Characterized?

Previous Site investigations focused on the former UST contents, namely diesel (TRPH-d), gasoline (TRPH-g) and the mobile constituents of gasoline such as benzene, ethylbenzene, toluene and xylenes (BTEX). Chemicals used in the Site's daily operations included acids, caustics, sanitizers for cleanup, and freon and anhydrous ammonia for cooling systems. In January 2000, SOMA performed a supplemental investigation of soil and groundwater. Samples were comprehensively analyzed for the full range of possible Site contaminants, including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), ammonia, nitrates/nitrites and metals. Therefore, the nature and extent of soil and groundwater contamination at the Site has been well characterized. In January 2000, SOMA used the results of the Site investigations to 1) evaluate preferential groundwater flow beneath the Site; 2) perform VOC emission modeling; and 3) evaluate potential risks to human health and the environment.

Have All Contaminant Sources been removed or Stabilized?

The results of preliminary investigations revealed 1) total petroleum hydrocarbons as gasoline and diesel (TRPH-g and TRPH-d, respectively) and BTEX in soil; and 2) TRPH-d in groundwater following the initial removal of the USTs and petroleum contaminated soil. Following the removal of approximately 1,152 tons of TPH-contaminated soils from the original UST locations, the excavations were backfilled with clean soil. Consequently, no detectable TPH-g or BTEX remained in the soil at the Site. However, low levels of TRPH-d remained in the soil (average concentration of 220 mg/kg). Although the petroleum-impacted soils have been removed and replaced with clean soil, TRPH-d and its soluble constituents (xylene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, fluorine, phenanthrene and pyrene) still remain in the groundwater beneath the Site. In November 1999, SOMA conducted a magnetometer test to determine if any underground storage tank is still remaining

beneath the Site. The results of the field investigation did not indicate presence of any underground storage tank at the Site.

Is the Groundwater Plume Beneath the Site Stable?

The results of previous quarterly groundwater monitoring reports indicate that groundwater flow direction beneath the Site is consistently toward the west. The saturated sediments beneath the Site are comprised of clayey silt with the occasional occurrence of fine sand. The groundwater flow velocity beneath the site is very low and has been estimated to be about 1.2 feet per year. Therefore, the TRPH-d detected in groundwater beneath the Site is considered stable, with no off-Site migration expected to occur in the near future.

Does the Site pose Any Threats to Human Health or the Environment?

Using the results of the Site soil and groundwater investigations, SOMA performed a human health and ecological screening evaluation consistent with the State of California Preliminary Endangerment Assessment (PEA) Guidance. Consistent with this guidance, the human health screening evaluation evaluated the most stringent or health protective use of the property, namely hypothetical residential land use. No carcinogenic chemicals were detected in soil or groundwater. Groundwater is shallow and not a current or future drinking water source. Therefore, no direct contact with groundwater was assumed. The human health screening evaluation evaluated the following specific exposure scenarios:

- Current and future on-Site resident (child) through incidental ingestion of soil;
- Current and future on-Site resident (child) through dermal contact with soil;
- Current and future off-Site resident (child) through inhalation of suspended soil particulates; and
- Current and future off-Site resident (child) through inhalation of volatile groundwater emissions into a hypothetical building.

For all of the above exposure scenarios evaluated, the noncarcinogenic health hazards were found to be negligible. Therefore, the soil and groundwater contamination beneath the Site does not pose a threat to human health, currently or in the future, under a residential land use scenario.

There are no sensitive species, habitat types or special-status species on-site or in the vicinity of the site. Due to its highly disturbed nature, this Site 1) would be considered a low quality habitat; and 2) would not pose a threat to ecological resources.

Does the Site Pose Any Current or Future Threats to Water Resources?

As discussed previously, the groundwater flow velocity is very low (approximately 1 foot per year) and the TRPH-d detected in groundwater at MW-1 would not be expected to migrate off-site in the near future. The depth to the top of the sanitary sewer-line is about 6.63 feet below the San Pablo Avenue grade level. Reviewing the groundwater monitoring reports indicate that the depth to groundwater beneath the Site ranges between 4.21 feet in March and 7.8 in December 1999. Comparing the depth to groundwater with that of the sanitary sewer-line passing through San Pablo Avenue, it becomes evident that only during wet periods, groundwater may discharge into the preferential flow pathways. However, during the summer and fall seasons, the sanitary sewer lines will not act as a preferential flow path.

Have all the Necessary Risk Management Precautions been Incorporated to Mitigate any Threats to Human Health and the Environment During Site Construction Activities?

Risk management during construction addresses precautions that will be taken to mitigate risks to human health and the environment from residual groundwater

contaminants during Site construction activities. Precautions to be taken during construction will include the following:

- Protect construction workers who may directly (e.g., through dermal contact) contact residual contaminants in groundwater (e.g., during site preparation, grading, foundation construction, or landscape installation) through implementation of a Site Health and Safety Plan;
- implement routine construction impact mitigation measures, including control of nuisance dust generation at the Site, decontamination of groundwater sampling equipment, prevention of sediment from leaving the Site in storm water runoff, and management of groundwater extracted from excavations;
- implement procedures to protect monitoring wells remaining on the Site;
- implement construction methods that minimize the potential for creating conduits to deeper groundwater zones when driving piles.

Conclusions and Recommendations

Site-specific findings are summarized as follows:

1. Previous Site activities have resulted in contamination of soil (TRPH-g, BTEX and phenol) and groundwater (TRPH-d, xylene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, fluorine, phenanthrene and pyrene)).

2. Two former USTs have been removed along with the associated contaminated soil;

3. The Site has been adequately characterized for evaluation of impacts to current and future water resources, human health and the environment.

4. The groundwater plume beneath the Site has been shown to be very stable with no anticipated off-Site migration of detected TRPH-d.

5. Soil and groundwater contamination beneath the Site does not pose a threat to human health, currently or in the future, under a residential land use scenario.

6. The site is considered a low quality habitat and would not pose a threat to ecological resources.

7. Groundwater may discharge into the sanitary sewer lines (e.g., preferential flow pathways) only during wet periods. During the summer and fall seasons, the sanitary sewer lines will not act as a preferential flow path.

8. Risk Management during construction has been recommended to:
    - Protect construction workers from direct contact with residual groundwater contaminants;
    - implement routine construction impact mitigation measures (e.g., nuisance dust control);
    - Protect existing monitoring wells on-Site; and
    - Minimize the potential for creating conduits to deeper groundwater zones.

Based on the above findings, the former Berkeley Farm Dairy Facility located at 4550 San Pablo Avenue, Emeryville, California, is recommended for No Further Action.

1.0 Introduction

The following document is the Site Closure Report for the former Berkeley Farms Dairy Facility located at 4550 San Pablo Avenue, Emeryville, California (the "Site"). This report has been prepared by SOMA Environmental Engineering, Inc. (SOMA) on behalf of Emeryville Farms, L.L.C., the current owner of the Site. The purpose of this closure report is to ensure that the following key issues have been adequately addressed in support of a No Further Action (NFA) regulatory decision for the Site:

- Has the Site been adequately investigated?
- Have all contaminant sources been removed or stabilized?
- Is the groundwater plume stable?
- Does the Site pose any current or future threats to public health or the environment?
- Does the Site pose any current or future threat to water resources?
- Have all the necessary risk management precautions been incorporated to mitigate any threats to human health and the environment during Site construction activities?

This Site Closure Report is organized into the following sections:

1. **Introduction** - Provides a brief introduction to the Former Berkeley Farms Dairy Facility and the organization of this report.

2. **Site Background** - Provides a description of the Site, Site activities and the surrounding area.

3. **Site Characterization** – Summarizes the nature and extent of soil contamination, Site hydrogeology and the nature and extent of groundwater contamination.

4. **Human Health and Environmental Threats** - Evaluates potential on-site and off-site human health and environmental impacts which might result from exposure to chemical contaminants in soil and groundwater at the former Berkeley Farms Dairy facility, under both current and future conditions.

5. **Risk Management** - Provides a comprehensive plan for groundwater management, surface water/sediment management, and protection of workers during all phases of construction.

6. **Conclusions and Recommendations** - Summary of Site finding and overall recommendations.

2.0 Site Background

The former Berkeley Farms operation consisted of an operating dairy facility, a truck shop and a yard located on the opposite side of the Site across San Pablo Avenue between 47th and 45th Streets in Emeryville, California. The property was reportedly purchased in 1946 and operated as a dairy facility since that time. The dairy facility, which is the subject of this report, is located at 4550 San Pablo Avenue (Figure 1). The Site is bounded by San Pablo Avenue to the west, 47th Street to the north, and 45th Street to the south, see Figure 2. Currently, a two-story building occupies the northwestern portion of the property. The remainder of the property is entirely paved and enclosed within a concrete block wall. The facility is accessed through secured gates on San Pablo Avenue and 47th Street.

Berkeley Farms suspended operations at 4550 San Pablo Avenue in December of 1997. Following suspension of its operations in Emeryville, Berkeley Farms began operating from its new location in the City of Hayward. The Site is currently vacant.

Emeryville Farms and Associates purchased the property in December 1999. The objective of this report is to obtain a closure letter from the Alameda County Department of Environmental Health (ACDEH) so the current owner can utilize the subject property for their intended use without any environmental restrictions.

2.1 Site Vicinity

GEO-LOGIC performed a Site reconnaissance on July 26, 1997. To the north of the Site, across 47th Street, there is located a two-story commercial building (See Figure 2). To the south of the Site, across 45th Street, there are numerous commercial buildings located along the east side of San Pablo Avenue. The areas to the northeast, east and southeast are primarily residential.

2.2 Former Site Activities

The Site formerly pasteurized raw milk products, which was brought in by tanker trucks. Chemicals used in the Site's daily operations included:

- Acids
- Caustics
- Sanitizers for cleanup
- Freon and anhydrous ammonia for cooling systems.

Two 10,000-gallon underground fuel storage tanks (USTs) used to be located within the yard area in the central portion of the Site (Figure 2). One tank contained diesel fuel and the other contained unleaded gasoline. The tanks were single-walled steel with single-walled piping and electronic leak monitoring. The fuel dispensers were located toward the eastern edge of the Site. The USTs, associated piping, dispensers and contaminated soil were removed and disposed of in 1998, as described in more detail in Section 3.0.

3.0 Site Characterization

3.1 Geologic Setting

The Site is located at or near the mapped contact between medium-grained and fine-grained alluvium (Helley et al., 1979) deposits. Based on field observations, the soils underlying the Site appear to be fine-grained alluvium, consistent with "Bay Mud." The alluvium has been described as unconsolidated plastic, moderately to poorly sorted and clay that is rich in organic material (Helley et al., 1979).

3.2 Hydrogeology

The results of previous quarterly groundwater monitoring reports indicate that groundwater flow direction beneath the Site is consistently toward the west with an average flow gradient of .009. Figure 3 shows the groundwater elevation contour based on June 1999 groundwater monitoring data. Based on the available data gathered by Geo-Logic and SOMA, depth to groundwater in MW-1 and MW-2 ranges between 4.35 and 7.8 feet in MW-1 and 4.21 and 7.35 feet in MW-2. Reviewing the lithologic logs of groundwater monitoring wells indicates, that the saturated sediments beneath the Site are comprised of clayey silt with occasional occurrence of fine sand. Assuming that hydraulic conductivity of the saturated material is about 5×10^{-5} cm/sec and its porosity is 0.40, then estimated groundwater flow velocity would be about 1.2 feet per year. Appendix 2 shows the lithologic logs of MW-1 and MW-2.

3.3 Phase I Site Assessment

On July 29, 1997, Geo-Logic performed a Phase I Site Inspection. The key findings are summarized as follows:

- Hazardous materials were stored in a fenced and roofed compound located at the southwest corner of the Site. Cleaning chemicals and a double-walled waste-oil above ground storage tank were also located in this area.

- Pressurized tanks of anhydrous ammonia and stainless steel tanks containing cleaning chemicals were located at the southern and southeastern exterior of the building, respectively. A PG&E transformer was also located in this general area.

- Freon 12 was stored in valved-tanks located within the air compressor room in the southern portion of the first floor of the building. Oil/grease dispensers and metal cabinets containing paint were also located in this area.

- Several ammonia compressors were found in the maintenance room located centrally on the first floor of the building.

- A freon compressor room and ammonia condensers were found on the roof of the building.

The Phase I Site Inspection concluded that there was no visible evidence of adverse environmental impacts to soil or groundwater from previous use, storage or disposal of hazardous materials. This conclusion was validated through personal interviews with the Dairy Facility's chief engineer, Mr. Jim Piecuch (personal communication), Geo-Logic (1997).

3.4 Underground Storage Tank Removal

As discussed previously, two 10,000-gallon fuel USTs were removed and disposed of off-site in 1998. Following the excavation and UST removal, confirmatory soil samples were collected from 1) 6 sampling locations surrounding the UST excavation (N, S, NE, SE, SW, and NW, respectively); and 2) 6 sampling locations in the excavation for the associated piping and fuel dispenser (P1, P2, P3, P4, P5 and P6, respectively).

Confirmatory soil samples were analyzed for the following fuel-related chemical constituents:

- Total Recoverable Petroleum Hydrocarbons (TRPH)
- Total Recoverable Petroleum Hydrocarbons as gasoline (TRPH-g)
- Total Recoverable Petroleum Hydrocarbons as diesel (TRPH-d)
- Benzene
- Ethylbenzene
- Toluene
- Xylenes
- Methyl tertiary-butyl ether (MTBE)

Analytical results for the confirmatory soil sampling are summarized in Table 1. As can be seen from the sampling results, past fuel leakage to soil occurred with 1) TRPH-d contaminated soil at 5 of the 6 sampling locations; and 2) TRPH-g, benzene, ethylbenzene, toluene and xylenes (BTEX) contaminated soil at one localized location. Following removal of 1152 tons of fuel-impacted soil from the excavation pit, re-sampling revealed no detectable TRPH-g, no detectable BTEX and TRPH-d at an average concentration of 224 mg/kg. No detectable TRPH-d, TRPH-g, BTEX or MTBE were found along the associated piping, Geo-Logic (November 1998).

3.5 Groundwater Monitoring Program

In March 1999, Geo-Logic installed two groundwater monitoring wells MW-1 and MW-2, Geologic (March 1999). Lithologic logs of MW-1 and MW-2 have been presented in Appendix 2. The quarterly groundwater-monitoring program has been initiated since March 1999. Geo-Logic, in March and June 1999, conducted groundwater-monitoring programs, while SOMA has conducted another monitoring program in December 1999. Based on the groundwater monitoring reports oily droplets and minor free product sheen have been observed in MW-1.

In December 1999, groundwater samples collected from MW-1 and MW-2 were analyzed for a wide variety of chemicals as described earlier. The results of laboratory analysis on groundwater samples collected from MW-2 using EPA Method 8020 detected 25.9 µg/l of xylene and 130 µg/l of TPH-g in groundwater. The results of subsequent confirmatory sampling in January 2000 did not confirm the presence of TPH-g or xylenes in MW-2.

Based on the results of the previous groundwater monitoring data, groundwater flow direction is consistently toward the west and elevated levels of TPH-D exist in groundwater beneath the Site. The results of laboratory analyses on groundwater samples collected by Geo-Logic have not indicated presence of BTEX or MTBE in groundwater. However, per our approved Workplan by ACDEH, SOMA will conduct three additional groundwater events before decommissioning of the existing groundwater monitoring wells of MW-1 and MW-2.

3.6 Supplemental Site Investigation

As discussed previously, the source of fuel-related contamination has been stopped and two 10,000-gallon underground fuel storage tanks along with diesel and gasoline contaminated soil (Section 3.4, Underground Storage Tank Removal) have been removed from the Site. In addition, based on the groundwater monitoring reports no significant floating product exists beneath the Site (Section 3.5, Groundwater Monitoring Program). However, numerous potentially hazardous chemicals were stored and used on-site as part of the daily operations of the facility. Many of these chemicals may have been released or disposed of on-site. Site soil and groundwater have not been investigated for potential contamination by these on-Site hazardous chemicals and the Alameda County Department of Environmental Health (ACDEH) has identified this as a significant data gap.

In December 1999, SOMA developed a Workplan to conduct further site investigation and preparation of Site closure reports at the former Berkeley Farms Site, 4550 San

Pablo Avenue, Emeryville, California. This workplan was approved by the ACDEH and supplemental investigation activities began in December 1999.

3.6.1 Supplemental Soil Investigation

Six supplemental soil sampling locations were selected (SB-1, SB-2, SB-3, SB-4, SB-5 and SB-6) and soil samples were collected at 0.5- and 7-feet bgs (Figure 4). The shallow soil samples were analyzed by Delta Environmental Laboratories, Ltd., located in Benicia, California. The deeper samples were held for possible future analysis. The soil sampling locations and analytical methods used are summarized in Table 2. Laboratory analysis was designed to provide a comprehensive evaluation of collected soil samples for the full range of possible soil contaminants, including TRPH-d, TRPH-g, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), ammonia, nitrate/nitrite, and metals. In addition, sample SB-6 was also analyzed for polychlorinated biphenyls (PCBs) as a waste oil tank was located there.

Laboratory analytical results are summarized in Table 3. Laboratory analytical reports and the field chain of custody sheets are included in Appendix 1. No BTEX, TRPH-g, VOCs, Ammonia, Nitrite, Nitrate, or PCBs were reported above detection limits in any of the soil samples collected during the supplemental investigation. Phenol was the only SVOC reported and was only detected in 3 out of 6 surface soil samples. The maximum reported concentration of phenol was 0.34 mg/kg. The presence of phenol would be consistent with the use of sanitizing cleaners at the facility, as phenol is a common disinfectant used for toilets, stables, cesspools, floors and drains. Several metals were detected in surface soil samples. Table 4 presents a comparison of the detected metals at the Site to the range of background concentrations in California soils. Only lead and thallium exceeded their background levels. Lead was just slightly elevated compared to its naturally occurring levels. Even though the maximum reported concentration of thallium exceeded the background level, these background levels are generic for the entire State of

California. Site-specific thallium levels could be substantially higher, especially if fill material was used during construction. Since thallium is an uncommon Site contaminant, has little industrial applications and there is no record of thallium use at the Site, thallium would most likely be naturally occurring.

3.6.2 Supplemental Groundwater Investigation

Existing Site monitoring wells MW-1 and MW-2 were sampled as part of the supplemental Site investigation. Groundwater samples were analyzed for TRPH-d, TRPH-g, BTEX, VOCs, and SVOCs. Analytical results for groundwater are summarized in Table 5. Laboratory analytical reports and the field chain of custody sheets are included in Appendix 1.

During the December 1999 sampling event, TRPH-d (219,200 µg/L), bis(2-ethylhexyl)phthalate (27 µg/L), fluorene (12 µg/L), phenantrene (13 µg/L) and pyrene (5.5 µg/L) were reported in MW-1. Bis(2-ethylhexyl)phthalate is a common plasticizer and is likely a sampling and/or laboratory artifact from the use of plastic materials. Fluorene, phenantrene and pyrene are polycyclic aromatic hydrocarbons (PAHs) and are most likely from the high concentration of TRPH-d detected. Xylene (25.9 µg/L), TRPH-g (130 µg/L), 1,2,4-trimethylbenzene (2.18 µg/L) and 1,3,5-trimethylbenzene (2.03 µg/L) were reported in MW-2 during the December 1999 sampling event. In the January 2000 sampling event, no TPH-g or xylenes were reported in groundwater samples using EPA Method 8020.

3.7 Preferential Flow Path Evaluation

Per ACDEH request, SOMA conducted an investigation to evaluate whether or not there is a preferential groundwater flow path beneath the Site. In conducting this investigation, SOMA contacted the City of Emeryville, Department of Public Works for file review. The results of SOMA's file review indicated that an 8-inch diameter

sanitary sewer-line passes through the middle of San Pablo Avenue and flows in a northerly direction. As the drawing indicated, the depth to the top of the sanitary sewer-line is about 6.64 feet below the San Pablo Avenue grade level. Reviewing the groundwater monitoring reports indicate, that the depth to groundwater beneath the Site ranges between 4.21 feet in March and 7.8 in December 1999. Comparing the depth to groundwater with that of sanitary sewer-line passes through San Pablo Avenue, it becomes evident that only during wet periods, groundwater may discharge into the preferential flow pathways. However, during the summer and fall seasons, the sanitary sewer lines will not act as a preferential flow path. Figure 5 shows the groundwater depth with respect to the sanitary sewer line passes through San Pablo Avenue. Appendix 3 shows subsurface utility maps passing through San Pablo Avenue.

3.8 Conducting Magnetometer Test

Based on our approved work plan, SOMA conducted a magnetometer test and an underground utility investigation at the subject property. The main purpose of the field magnetometer test was to:

1. Find out the presence of any abandoned underground storage tanks (USTs) at the Site;
2. Map the location of the on-site preferential flow pathways such as utility lines, conduits, sewer lines and power lines beneath the Site.

The above information would help to develop a risk management plan for future construction or remodeling of the subject property.

On September 27, 1999, Cruz Brothers of San Jose, California, under supervision of SOMA's Field Engineer, conducted the subsurface investigation. Initially, a magnetometer test was conducted to locate any abandoned USTs and associated pipes and conduits. Since the majority of the Site including the parking lot area is

paved by the reinforced concrete containing iron bars, the magnetometer test failed to locate any USTs. However, in certain areas where the reinforced concrete pavement was missing it did not indicate the presence of any metallic objects such as USTs. In regard to the second task, we successfully located the underground utility lines and potential preferential flow pathways. In addition we measured the depth of underground utility lines using a sewer/storm drain transmitter device, which was attached to the tip of a flexible fiberglass cord. In searching the utility lines all manholes and obvious metallic caps/lids throughout the Site were removed and tested by sending the fiberglass cord carrying a transmitter into the manholes. Then using a radio detector (BSEN ISO 9001, Radiodetection LTd.) the length, direction and depth of each utility line, pipes/conduits were measured. The aerial extent direction, and depth of different utility lines were marked on the ground surface. It was found that all underground sewer lines are running at a depth of 2.15 feet below the ground surface. As the utility map indicates, the sewer lines are leaving the northwest of the property and discharging into the City's main sewer line system at the middle of San Pablo Avenue. The depth of the City's main sanitary sewer line passing through San Pablo Avenue was about 6.64 feet as described in Section 3.7. As the result of this investigation revealed, the depth of on-site utility lines are shallower than groundwater depth, which occurs between 4.35 to 7.8 feet below groundwater surface. Therefore, the Site related groundwater contamination will be able to migrate to off-site through on-site preferential flow path. Figure 6 shows the map of on-site utility lines and storm drain system.

An electrical line is currently running from the south end of the property passing the excavated pit of the former USTs and ending at the two power switches near the corner of the work shop building. One of the switches was labeled gasoline tank and the other one was labeled diesel tank. No further USTs control switches were found on the property.

Based on these findings and also visual observations, it was concluded that there are no USTs under the subject property.

4.0 Human Health and Environmental Screening Evaluation

Chemicals detected in soil and groundwater will be evaluated for potential impacts to human health and the environment using the State of California, Department of Toxic Substances Control (DTSC) Preliminary Endangerment Assessment Guidance (PEA) (DTSC 1994). The PEA human health screening evaluation utilizes maximum reported concentrations of identified chemicals of potential concern (COPCs) to estimate contaminant intakes through the ingestion, dermal contact and inhalation routes of exposure. These estimated chemical intakes are evaluated for potential carcinogenic risks and noncarcinogenic health hazards using health-based toxicity criteria developed by the EPA and State of California (Department of Toxic Substances Control (DTSC)). This human health screening evaluation is health protective, in that only residential land use is considered, regardless of the current or future intended uses of the property.

The human health screening assessment is organized into the following sections:

Exposure Pathways and Media of Concern: identifies the receptors of concern, and identifies all relevant potential exposure pathways.

Exposure Concentrations and Chemicals: identifies the COPCs and estimates the concentration of each COPC, in each medium of concern (e.g., soil, air or water) to which receptors may be exposed.

Toxicity Values: describes the process of characterizing the relationship between the exposure to a chemical and the incidence of adverse health effects.

Risk Characterization Summary: presents the results of the human health screening evaluation and provides the framework for using these results in decision-making.

4.1 Exposure Pathways and Media of Concern

Consistent with PEA guidance for performing human health evaluations, it was assumed that the site was completely uncovered and that site soils were available for direct contact. In the future, exposure to COPCs in soil may occur through incidental ingestion, dermal contact, and inhalation of suspended soil particulates. In addition, volatile contaminants in groundwater could migrate beneath building foundations and into the indoor air environment. Consistent with PEA guidance, health effects were conservatively evaluated for a residential receptor. No carcinogenic COPCs were detected in soil or groundwater. Noncarcinogenic health effects were evaluated for a child, since this is a sensitive receptor and would maximize potential exposures.

4.1.1 Soil Exposure Pathways

COPCs in soil include lead, phenol, and SVOC. No VOCs, PAHs, or PCBs, were detected in soil samples. Potential residential exposure to metals exceeding background and phenol was evaluated through incidental ingestion and dermal contact. Exposures by these two routes were estimated according to the following equations.

Intake of Soil Contaminants

$$\text{Incidental Ingestion Intake (mg/kg-day)} = \frac{C_s * IngR * EF * ED * CF_1}{BW * AT}$$

Where,

C_s = Maximum reported COPC soil concentration, mg/kg

IngR = Adult soil ingestion rate, 100 mg/day (EPA 1991)

	=	Child ingestion rate, 200 mg/day (EPA 1991)
EF	=	Residential exposure frequency, 350 days/year (EPA 1991)
ED	=	Adult exposure duration, 24 years (EPA 1991)
	=	Child exposure duration, 6 years (EPA 1991)
CF_1	=	Conversion factor, 1×10^{-6} kg/mg
BW	=	Adult body weight, 70 kg (EPA 1991)
	=	Child body weight, 15 kg (EPA 1991)
AT	=	Averaging time, days
	=	ED * 365 days/year for noncarcinogens
	=	70 years * 365 days/year for carcinogens

$$\text{Dermal Contact Intake (mg/kg-day)} = \frac{C_s * SA * AF * CF_1 * EF * ED}{BW * AT}$$

Where:

Cs	=	Maximum reported COPC soil concentration, mg/kg
SA	=	Adult skin surface area for exposure, 5800 cm^2 (PEA 1994)
	=	Child skin surface area for exposure, 2000 cm^2 (PEA 1994)
AF	=	Soil-to-skin adherence factor, 1.0 mg/cm^2 (PEA 1994)
CF_1	=	Conversion factor, 1×10^{-6} kg/mg
EF	=	Adult exposure frequency, 100 days/year (EPA 1991)
	=	Child exposure frequency, 350 days/year (EPA 1991)
ED	=	Adult exposure duration, 24 years (EPA 1991)
	=	Child exposure duration, 6 years (EPA 1991)
BW	=	Adult body weight, 70 kg (EPA 1991)
	=	Child body weight, 15 kg (EPA 1991)
AT	=	Averaging time, days
	=	ED * 365 days/year for noncarcinogens
	=	70 years * 365 days/year for carcinogens

4.1.2 Water Exposure Pathways

Groundwater beneath the site is not a source of drinking water. VOCs detected in groundwater include xylenes, fluorene, phenantrene and pyrene. Groundwater will be conservatively evaluated for potential volatile emissions entering a building. Consistent with the State of California guidance, VOCs will be screened using the Johnson and Ettinger model for vapor intrusion into a building (Johnson and Ettinger, 1991).

4.1.3 Air Exposure Pathways

Potential residential exposure to COPCs detected in soil was evaluated for inhalation of suspended soil particulates (for phenol only) and inhalation of volatile emissions from groundwater into indoor air. Exposure through the inhalation route was estimated according to the following equation.

Intake of Air Contaminants

$$\text{Inhalation Intake (mg/kg-day)} = \frac{C_a * InhR * EF * ED}{BW * AT}$$

Where:

C_a	=	Estimated COPC concentration in air, mg/m^3
InhR	=	Adult inhalation rate, 20 m^3/day (EPA 1991)
	=	Child inhalation rate, 10 m^3/day (EPA 1991)
EF	=	Residential exposure frequency, 350 days/year (EPA 1991)
ED	=	Adult exposure duration, 24 years (EPA 1991)
	=	Child exposure duration, 6 years (EPA 1991)
BW	=	Adult body weight, 70 kg (EPA 1991)
	=	Child body weight, 15 kg (EPA 1991)
AT	=	Averaging time, days
	=	ED * 365 days/year for noncarcinogens
	=	70 years * 365 days/year for carcinogens

4.2 Exposure Concentrations of Chemicals

Metal concentrations detected in soil were compared to the range of background metals in California soils (UCR study)(Table 4). If the maximum detected metal concentration was within the range of concentrations of either background data set, that particular metal was excluded as a COPC. The only metal detected that was not considered to be naturally occurring was lead. Lead will be evaluated using the DTSC blood-lead model. As discussed previously, no VOCs, PAHs, or PCBs were ever detected in soil samples. Consequently, these chemical classes were excluded as COPCs.

Maximum reported concentrations of VOCs in groundwater were used as the input terms to estimate potential indoor air concentrations. Ultimate noncarcinogenic health hazards from indoor air VOCs were estimated using the Johnson and Ettinger (1991) Model for subsurface vapor intrusion into buildings. The actual model spreadsheet was obtained from EPA.

4.3 Toxicity Values

This section describes the process of characterizing the relationship between the exposure to an agent and the incidence of adverse health effects in exposed populations. In a quantitative carcinogenic risk assessment, the dose-response relationship of a carcinogen is expressed in terms of a slope factor (oral) or unit risk (inhalation), which are used to estimate the probability of risk of cancer associated with a given exposure pathway. Cancer slope factors and unit risk factors as published by Cal-EPA (1994) and EPA (Integrated Risk Information System (IRIS)) were used in this human health risk assessment.

For noncarcinogenic effects, toxicity data developed from animal or human studies are typically used to develop non-cancer acceptable levels, or reference doses (RfDs). A chronic reference dose is defined as an estimate of a daily exposure for

the human population, including sensitive subpopulations, that is likely to be without appreciable risk of deleterious effects during a lifetime. The chronic reference doses, as published in IRIS or EPA's Health Effects Assessment Summary Tables (HEAST), were used in this evaluation.

Table 6 summarizes the reference doses, and data source for each COPC evaluated in this human health screening evaluation.

The maximum reported lead concentration, 110 mg/kg, was evaluated for potential adverse health impacts using the DTSC blood-lead mathematical model. Model parameters and output are summarized in Appendix 6.

4.4 Risk Characterization Summary

This section describes the approach used to assess the noncarcinogenic health hazard for the populations of concern represented by the chemical contaminants in soil and groundwater at the Site. Potential carcinogenic effects will not be estimated, since no carcinogenic COPCs were detected. Potential noncarcinogenic effects will be estimated by comparing the predicted intakes of COPCs to their respective toxicity criteria (i.e., inhalation reference doses (RfD_i)).

4.4.1 Noncarcinogenic Health Effects for Soil Contaminants

In order to estimate the potential effects from exposure to multiple COPCs, the hazard index (HI) approach was used. The HI is defined as the summation of the hazard quotients for each COPC, for each route of exposure, and is represented by the following equation:

$$HI = \frac{\text{Predicted Dose}_a}{RfD_a} + \frac{\text{Predicted Dose}_b}{RfD_b} + \ldots + \frac{\text{Predicted Dose}_i}{RfD_i}$$

A total HI less than or equal to unity is indicative of acceptable levels of exposure for chemicals assumed to exhibit additive health effects. To be truly additive in effect, chemicals must affect the same target organ system or result in the same critical toxic endpoint. A HI less than or equal to 1.0 suggests that adverse health effects would not be expected following a lifetime of exposure, even in sensitive members of the population. Appendix 4 shows the detailed human health screening evaluation calculations.

4.4.2 Site Specific Risks and Hazards

The residential noncarcinogenic health hazards from ingestion, dermal contact and inhalation of Site soils are summarized in Table 7. The total noncarcinogenic health hazard for a child from incidental ingestion of soil, dermal contact with soil and inhalation of suspended soil particulates was 1.5×10^{-5}, which is well below the threshold level of concern (HI = 1). Therefore, Site soils would not pose a threat of adverse health effects, even under a residential use scenario.

The residential noncarcinogenic health hazards from volatilization of COPCs from groundwater into a hypothetical building are summarized in Table 8. The total noncarcinogenic hazard index from inhalation of groundwater VOCs in a hypothetical building was 8.6×10^{-5}, which is well below the threshold of 1.0. Therefore, COPCs detected in groundwater beneath the Site would not pose a threat of adverse health effects under a residential use scenario. Appendix 5 presents the Johnson and Ettinger indoor air model outputs.

The maximum reported concentration of lead in soil, 110 mg/kg, was evaluated using the DTSC Blood-Lead Model (Model out is included in Appendix 6). The estimated blood-lead concentration for a child was 8.3 µg/dl, which is well below the threshold

blood-lead concentration of 10 µg/dl. Therefore, lead detected in soil would not pose a threat to human health, even under a residential use scenario.

TRPH-d was detected in both soil (Maximum reported concentration of 1,976 mg/kg) and groundwater (maximum reported concentration of 219,200 µg/l). These detections most likely represent large-chain petroleum hydrocarbons of low overall toxicity. Both soil and groundwater were evaluated for the most mobile and toxic constituents of petroleum and found not to pose a threat to human health, even under the most stringent beneficial use of the Site, namely residential use. Therefore, residual TRPH in soil and groundwater would not pose a threat to human health.

4.5 Environmental Threat Evaluation

The Site and surrounding area are highly urbanized and have been developed with urban uses for many years. The Site contains a building and asphalt-covered yard. No sensitive, endangered, threatened, rare or designated species/habitats have been identified on-site or in the surrounding area. The Site does not serve as a wildlife corridor for animal life in the area. There are no large open areas in the vicinity of the site that would support wildlife or wildlife migratory patterns.

4.5.1 Ecological Pathway Assessment

The Site is highly developed and would be considered a low quality habitat. Therefore, there is no complete soil pathway of exposure for sensitive ecological receptors.

4.5.2 Ecological Screening Evaluation Summary

There are no sensitive species, habitat types or special-status species on-site or in the vicinity of the site. Due to its highly disturbed nature, this Site 1) would be

considered a low quality habitat; and 2) would not pose a threat to ecological resources.

5.0 Risk Management

Risk management during construction address precautions that will be taken to mitigate risks to human health and the environment from residual soil and groundwater contaminants during Site construction activities. Since all petroleum-contaminated soil was removed and replaced with clean soil, only residual phenol in soil, groundwater contaminants and nuisance dust will be addressed here. Precautions to be taken during construction will include the following:

- Protect construction workers who may directly contact residual contaminants in groundwater (e.g., during Site preparation, grading, foundation construction, or landscape installation) through implementation of a Site Health and Safety Plan. Health hazards from groundwater contaminants were shown to be negligible for a residential use scenario, but only inhalation of volatile chemicals were addressed, not direct contact.
- Implement construction impact mitigation measures, including control of nuisance dust generation at the Site, prevention of wet sediment from leaving the Site in storm water runoff, and management of groundwater extracted from excavations;
- Implement procedures to protect monitoring wells remaining on the Site;
- Implement construction methods that minimize the potential for creating conduits to deeper groundwater zones when driving piles;
- Based on the low level of threat represented by Site soils, monitoring of exposures to site-related contaminants through personal and fenceline air monitoring would not be necessary. No special precautions would be required to maintain airborne concentrations of site-related contaminants at or below acceptable levels.

5.1 Site-Specific Health and Safety Worker Planning Requirements

Even though the human health screening evaluation (Section 4.0) evaluated a residential scenario and demonstrated that soil and groundwater pose no threat, workers must be informed by law that residual chemical contaminants are present in groundwater. Further, these workers must be informed of the risks and hazards associated with these chemicals and precautions should be taken to minimize any exposures, no matter how minimal the threat.

Prior to development of the Site, a Site Health and Safety Plan must be developed and implemented to address all aspects of construction-related activities associated with the development of the Site. Each construction contractor with workers that may be exposed to groundwater contaminants, through direct (e.g., dermal contact) contact must adhere to the procedures and work practices specified in the Health and Safety Plan.

The Site Safety Officer (SSO) has the primary responsibility for on-site implementation of the Health and Safety Plan (HSP). Additional responsibilities include, but are not limited to:

- Verify that contractor/subcontractor personnel are aware of hazardous materials protection procedures and have been instructed in proper work practices and emergency procedures;

- Verify that appropriate personal protective equipment (PPE) is available and is properly used by contractor/subcontractor personnel;

- Monitor contractor/subcontractor activities and ensure that required safe work practices are followed;

- Conduct daily safety meetings prior to commencing operations. Meetings will cover:
    1. Expected Site conditions
    2. Daily activities
    3. Safety deficiencies noted previously
    4. Changes in safety and/or emergency procedures

Employees involved in disturbance of Site groundwater (e.g., dewatering activities, driving piles, etc.) known or suspected to contain potentially hazardous chemicals shall have received training covering the following items:

- Site safety plans
- Safe work practices
- Nature of anticipated hazards
- Handling emergencies and self-rescue
- Rules and regulations for vehicle use
- Safe use of field equipment
- Handling, storage and transportation of hazardous materials
- Employee rights and responsibilities
- Use, care and limitations of PPE

5.2 Construction Impact mitigation Measures

This section presents the general measures that will be implemented to mitigate potential impacts to human health and the environment during construction activities. Specifically, mitigation of the following potential impacts will be discussed:

- Nuisance dust generation associated with excavation and loading activities, construction or transportation equipment and wind suspension of stockpiled soil;

- Transport of site-sediments in surface water runoff; and

- Management of groundwater extracted during construction activities (dewatering activities).

5.2.1 Dust Control

The generation of nuisance dust should be controlled in order to minimize 1) the on-Site generation of particulate matter; and 2) the migration of airborne particulate off-site. Dust control measures should include but should not be limited to:

- use of water spray or mist during excavation and vehicle loading;
- limit maximum vehicle speed on-site to 5 miles per hour;
- minimize drop heights during transportation vehicle loading; and
- cover stockpiled soil with plastic sheeting or tarps to prevent wind erosion.

5.2.2 Decontamination

During groundwater sampling on-site (e.g., for the purpose of off-site disposal of collected groundwater), decontamination of sampling equipment will be conducted according to the HSP decontamination procedures.

5.2.3 Storm Water Pollution Controls

In the event of rainfall during construction activities, storm water pollution controls will be implemented to minimize storm water runoff. On-site sediment and erosion protection controls will be implemented, including:

- construction of berms or silt fences at entrances to the Site;
- placing straw bale barriers around storm drains and catch basins; and
- during heavy rainfall, covering stockpiled soil with plastic sheeting or tarps.

5.2.4 Dewatering

Since groundwater contains residual chemical contaminants, all groundwater encountered during construction (e.g., driving piles) will be collected and stored on-Site in a Baker Tank for appropriate disposal at an off-site facility.

5.3 Protection of Monitoring Wells

For any construction or development activities that may occur at the Site, precautions will be taken to protect any existing wells that will remain part of the long-term groundwater monitoring program. All other monitoring wells associated with the Site will be abandoned in accordance with all applicable local and state laws and regulations.

5.4 Use of Construction Methods to Minimize the Potential for Creating Conduits to Deeper Groundwater Zones

If development plans call for construction of a pile foundation, mitigation measures are required to minimize 1) the potential to drive shallow groundwater contaminants (e.g., TRPH-d) into deeper soils; and 2) the potential to create conduits or preferential flow paths for the migration of shallow groundwater contaminants to deeper groundwater. Mitigation measures may include pre-drilling through saturated sediments containing residual contamination and utilizing conductor casing to prevent downward migration of contaminants.

5.5 Post-Construction Risk Management

The post-construction part of the risk management plan outlines precautions that should be undertaken to mitigate any long-term potential threats to human health or the environment from residual contaminants in groundwater following development of the Site.

5.5.1 Summary of Human Health Risks

From the results of the human health screening evaluation (Section 4.0), noncarcinogenic health hazards were acceptable for the most stringent beneficial use of the Site, namely residential development.

For the construction worker, potential exposures to groundwater contaminants should be minimized or eliminated through implementation of the Site Health and Safety Plan. Therefore, based on the planned commercial development of the Site, there would be no long-term risks to human health.

5.5.2 Future Construction Activities

Future construction-related activities must follow the procedures defined in the Site Health and Safety Plan and Risk Management Plan.

5.5.3 Long-Term Compliance

This risk management plan, including any addenda, will be on file with the ACDEH. As part of standard due diligence, the owner(s) of the Site will be required to disclose the risk management plan to potential buyers during future property transactions.

Procedures will be developed by the Site owner(s) and tenants to inform workers and contractors about the risk management plan, as needed, and to maintain compliance with the risk management plan.

The planned Site land use is commercial. Land use at the site will not change significantly (e.g., the Site will not be developed for single family housing) without approval from the ACDEH.

6.0 Conclusions and Recommendations

Site-specific findings are summarized as follows:

1. Previous Site activities have resulted in contamination of soil (TRPH-g, BTEX and phenol) and groundwater (TRPH-d, xylene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, fluorine, phenanthrene and pyrene)).

2. Two former USTs have been removed along with the associated contaminated soil;

3. The Site has been adequately characterized for evaluation of impacts to current and future water resources, human health and the environment.

4. The groundwater plume beneath the Site has been shown to be very stable with no anticipated off-Site migration of detected TRPH-d.

5. Soil and groundwater contamination beneath the Site does not pose a threat to human health, currently or in the future, under a residential land use scenario.

6. The Site is considered a low quality habitat and would not pose a threat to ecological resources.

7. Groundwater may discharge into the sanitary sewer lines (e.g., preferential flow pathways) only during wet periods. During the summer and fall seasons, the sanitary sewer lines will not act as a preferential flow path.

8. Risk Management during construction has been recommended to:

- Protect construction workers from direct contact with residual groundwater contaminants;
- implement routine construction impact mitigation measures (e.g., nuisance dust control);
- Protect existing monitoring wells on-Site; and
- Minimize the potential for creating conduits to deeper groundwater zones.

Based on the above findings, the former Berkeley Farm Dairy Facility located at 4550 San Pablo Avenue, Emeryville, California, is recommended for No Further Action.

7.0 References

Bradford, G.R., A.C. Chang, A.L. Page, D. Bakhtar, J.A. Frampton and H. Wright. Background Concentrations of Trace and Major Elements in California Soils. Department of Soil and Environmental Sciences, University of California, Riverside; Department of Toxic Substances Control (DTSC), California Environmental Protection Agency (Cal/EPA).

Cal/EPA 1994. California Cancer Potency Factors: Update. California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA).

DTSC 1994. Preliminary Endangerment assessment Guidance Manual. California Environmental Protection Agency, Department of Toxic Substances Control (DTSC).

EPA 1991, Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors, OSWER Directive 9285.6-03.

Johnson, P.C. and R.A. Ettinger. (1991). Heuristic Model for predicting the Intrusion Rate of Contaminant Vapors into Buildings. Environ. Sci. Technol. 25: 1445-1452.

Geo-Logic, August 14, 1997 "Phase I Environmental Site Assessment, Berkeley Farms, at Emeryville, 4550 and 4575 San Pablo Avenue, Emeryville, California 94608.

Geo-Logic, September 23, 1998, " Report of Soil and Groundwater During Removal of Fuel Tanks and Product Piping, Former Berkeley Farms Dairy Facility, 4550 San Pablo Avenue, Emeryville, California, 94608.

Geo-Logic, November 20, 1998, " Report of Additional Soil Sampling During Over-excavation of Former Fuel Tank Pit, Piping Trenches, and Dispenser Island, Former

Berkeley Farms Dairy Facility, 4550 San Pablo Avenue, Emeryville, California, 94608.

Geo-Logic, March 18, 1999, " Installation of Monitoring Wells, Former Berkeley Farms Dairy Facility, 4550 San Pablo Avenue, Emeryville, California, 94608.

Geo-Logic, June 11, 1999, " Second Quarterly Sampling of Monitoring Wells, Former Berkeley Farms Dairy Facility, 4550 San Pablo Avenue, Emeryville, California, 94608.

Helley, et al., 1979, "Fatland Deposits – Their Geology and Engineering Properties and Their Importance to Comprehensive Planning" USGS Professional Paper 943.

TABLES

Table 1
UST Excavation Confirmatory Soil Sample Results

Confirmatory Soil Sample Location	Sample Collection Date	Sample Depth (feet)	TRPH-g (mg/kg)	TRPH-d (mg/kg)	Benzene (mg/kg)	Ethylbenzene (mg/kg)	Toluene (mg/kg)	Xylenes (mg/kg)	MTBE (mg/kg)
N	14-Sep-98	12	<0.1	290	<0.005	<0.005	<0.005	<0.005	<0.1
S	14-Sep-98	12	<0.1	6,700	<0.005	<0.005	<0.005	<0.005	<0.1
NE	14-Sep-98	12	22	72	2.1	0.77	1.3	3.7	<0.1
SE	14-Sep-98	12	<0.1	150	<0.005	<0.005	<0.005	<0.005	<0.1
SW	14-Sep-98	12	<0.1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.1
NW	14-Sep-98	12	<0.1	410	<0.005	<0.005	<0.005	<0.005	<0.1
Composite	14-Sep-98	12	<0.1	1,110	<0.005	<0.005	<0.005	<0.005	<0.1
N2	25-Sep-98	12	NS	120	NS	NS	NS	NS	NS
S2	25-Sep-98	12	NS	770	NS	NS	NS	NS	NS
NE2	25-Sep-98	12	<0.1	100	<0.005	<0.005	<0.005	<0.005	<0.005
SE2	25-Sep-98	12	NS	59	NS	NS	NS	NS	NS
NW2	25-Sep-98	12	NS	66	NS	NS	NS	NS	NS
SW2	25-Sep-98	12	NS	230	NS	NS	NS	NS	NS
P1	11-Sep-98	3.5	<0.1	NA	<0.005	<0.005	<0.005	<0.005	<0.1
P2	11-Sep-98	3.5	<0.1	NA	<0.005	<0.005	<0.005	<0.005	<0.1
P3	11-Sep-98	3.5	<0.1	NA	<0.005	<0.005	<0.005	<0.005	<0.1
P4	11-Sep-98	3.5	<0.1	NA	<0.005	<0.005	<0.005	<0.005	<0.1
P5	11-Sep-98	3.5	<0.1	NA	<0.005	<0.005	<0.005	<0.005	<0.1
P6	11-Sep-98	3.5	<0.1	NA	<0.005	<0.005	<0.005	<0.005	<0.1
P7	5-Oct-98	3	<0.1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.005
P8	5-Oct-98	3	<0.1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.005
P9	5-Oct-98	5	<0.1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.005
P10	5-Oct-98	5	<0.1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.005
P11	5-Oct-98	4	<0.1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.005
P12	5-Oct-98	5.5	<0.1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.005
P13	5-Oct-98	6	<0.1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.005
P14	5-Oct-98	5.5	<0.1	<0.1	<0.005	<0.005	<0.005	<0.005	<0.005

NS Not Sampled

NA Not Analyzed

Table-2

Chemical Analysis Methods Conducted On Soil Samples Collected from SB-1 through SB-3 Former Berkley Farms, 4550 San Pablo Avenue Berkeley, California

PROPOSED SAMPLING LOCATION	CHEMICAL CLASS TO BE ANALYZED FOR	PROPOSED ANALYTICAL METHOD
SB-1, Former Milk Plant	Total Petroleum Hydrocarbons	EPA 8015M (TPH-D,G And Oil/Grease)
	Volatile Organics	EPA 8260
	Semivolatile Organics	EPA 8270
	Ammonia	EPA 350.1, 350.3
	Metals	EPA 6010/7000
	Nitrite/Nitrate	EPA 354.1/300
	pH	
SB-2, Former Cold Storage (West Building)	Total Petroleum Hydrocarbons	SW 8015M (TPH-D,G and Oil/Grease)
	Volatile Organics	EPA 8260
	Semivolatile Organics	EPA 8270
	Ammonia	EPA 350.1, 350.3
	Metals	6010/7000
	Nitrite/Nitrate	EPA 354.1/300
	pH	
SB-3, Former Cold Storage (East Building)	Total Petroleum Hydrocarbons	EPA 8015M (TPH-D,G and Oil/Grease)
	Volatile Organics	EPA 8260
	Semivolatile Organics	EPA 8270
	Ammonia	EPA 350.1, 350.3
	Metals	6010/7000
	Nitrite/Nitrate	EPA 354.1/ 300
	pH	

Table-2
Continued
Chemical Analysis Methods Conducted
On Soil Samples Collected from SB-4 and SB-5
Former Berkley Farms, 4550 San Pablo Avenue
Berkeley, California

PROPOSED SAMPLING LOCATION	CHEMICAL CLASS TO BE ANALYZED FOR	PROPOSED ANALYTICAL METHOD
SB-4, Former Gas and Diesel Pumps	Total Petroleum Hydrocarbons	EPA 8015M (TPH-D, -G)
	Volatile Organics	EPA 8260
	Semivolatile Organics	EPA 8270
	Metals	EPA 6010/7000
SB-5, Former USTs	Total Petroleum Hydrocarbons	EPA 8015M (TPH-D, -G)
	Volatile Organics	EPA 8260
	Semivolatile Organics	EPA 8270
	Metals	EPA 6010/7000

Table-2
Continued
Chemical Analysis Methods Conducted
On Soil Samples Collected from SB-6
Former Berkley Farms, 4550 San Pablo Avenue
Berkeley, California

PROPOSED SAMPLING LOCATION	CHEMICAL CLASS TO BE ANALYZED FOR	PROPOSED ANALYTICAL METHOD
SB-6, Former Waste Oil AST and Drum Storage Area	Total Petroleum Hydrocarbons	EPA 8015M (TPH-D, -G and Oil/Grease)
	Volatile Organics	EPA 8260
	Semivolatile Organics	EPA 8270
	Ammonia	EPA 350.1. 350.3
	PCBs	EPA 8080 or CLP
	Metals	EPA 6010/7000
	Nitrite/Nitrate	EPA 354.1/300

Table 3
Summary of Soil Analytical Results

Analyte/Method	Number of Samples	Number of Detections	Maximum Reported Concentration	Sample Location	Sample Depth (feet bgs)
BTEX (Method 8020)	6	0	N.D. (<0.005 mg/kg)		
TRPH-g (Method 8015M)	12	0	N.D. (<0.05 mg/kg)		
TRPH-d (Method 8015M)	12	4	1,976 mg/kg	SB-4	5
VOCs (Method 8260)	6	0	N.D. (<0.5 µg/kg)		
SVOCs (Method 8270)					
Phenol	6	3	0.34 mg/kg	SB-2	0.5
Ammonia (Method 350.3)	4	0	N.D. (<1 mg/kg)		
Nirite as N (Method 354.1)	4	0	N.D. (<1 mg/kg)		
Nitrate as N (Method 300)	4	0	N.D. (<1 mg/kg)		
PCBs (Method 8080)	1	0	N.D. (<0.02 mg/kg)		
Metals (Method 6010)					
Arsenic	6	0	N.D. (<5 mg/kg)		
Barium	6	6	170 mg/kg	SB-2	0.5
Beryllium	6	0	N.D.(< 1 mg/kg)		
Cadmium	6	0	N.D. (< 1 mg/kg)		
Cobalt	6	6	13 mg/kg	SB-1,-2	0.5
Chromium (III)	6	6	31 mg/kg	SB-1,-2	0.5
Copper	6	6	38 mg/kg	SB-2	0.5
Mercury	6	2	0.42 mg/kg	SB-4	0.5
Molybdenum	6	0	N.D. (< 1 mg/kg)		
Nickel	6	6	48 mg/kg	SB-1	0.5
Lead	6	6	110	SB-3	0.5
Antimony	6	0	N.D. (< 5 mg/kg)		
Selenium	6	0	N.D. (<5 mg/kg)		
Thallium	6	3	7.5 mg/kg	SB-4	0.5
Vanadium	6	6	37 mg/kg	SB-6	0.5
Zinc	6	6	60 mg/kg	SB-3	0.5

Table 4
Comparison of Site Metals to Background

Detected Metals	Range of Reported Concentrations (mg/kg)	Range of Background Concentrations in California Soils [1] (mg/kg)	Is The Detected Metal Within Background?
Antimony	< 5.0	0.15 - 1.95	Yes [2]
Arsenic	< 5.0	0.6 - 11	Yes
Barium	91 - 170	133 - 1,400	Yes
Beryllium	< 1.0	0.25 - 2.7	Yes
Cadmium	< 1.0	0.05 - 1.7	Yes
Chromium	5.5 - 31	23 - 1,579	Yes
Cobalt	6.9 - 13	2.7 - 46.9	Yes
Copper	16 - 38	9.1 - 96.4	Yes
Lead	6.5 - 110	12.4 - 97.1	No
Mercury	< 0.06 - 0.42	0.1 - 0.9	Yes
Molybdenum	< 1.0	0.1 - 9.6	Yes
Nickel	19 - 48	9 - 509	Yes
Selenium	< 5.0	0.015 - 0.43	Yes [2]
Silver	< 1.0	0.1 - 8.3	Yes
Thallium	< 5.0 - 7.5	0.17 - 1.10	No
Vanadium	14 - 37	39 - 288	Yes
Zinc	39 - 60	88 - 236	Yes

[1] Bradford, G.R. et al. Background Concentrations of Trace and Major Elements in California Soils. University of California, Riverside.

[2] Even though the detection limit is outside the range of background, this metal is an uncommon site contaminant, is not associated with any site uses and would most likely be naturally occurring.

Table 5
Groundwater Analytical Results

Analyte/Method	Sampled 08-Dec-99		Sampled 13-Jan-00	
	Reported Concentration MW-1 (µg/L)	Reported Concentration MW-2 (µg/L)	Reported Concentration MW-1 (µg/L)	Reported Concentration MW-2 (µg/L)
BTEX (Method 8020)				
Xylene, total	N.D. (< 0.5)	25.9	N.D. (< 5.0)	N.D. (< 5.0)
TRPH-g (Method 8015M)	N.D. (< 50))	130	N.D. (< 50)	N.D. (< 50)
TRPH-d (Method 8015M)	219,200	N.D. (< 100)	NA	NA
VOCs (Method 8260)	N.D. (<0.5)		NA	NA
1,2,4-Trimethylbenzene		2.18		
1,3,5-Trimethylbenzene		2.03		
Xylenes, total		22.4		
SVOCs (Method 8270)		N.D. (< 2.0)	NA	NA
Bis(2-ethylhexy)phthalate	27			
Fluorene	12			
Phenanthrene	13			
Pyrene	5.5			

NA Not Analyzed

Table 6
Toxicity Criteria

Chemical of Potential Concern (COPC)	Criteria for Noncarcinogens				Criteria for Carcinogens			
	Oral RfD (mg/kg-day)	Source	Inhalation RfD (mg/kg-day)	Source	Oral Slope Factor $(mg/kg\text{-}day)^{-1}$	Source	Inhalation Slope Factor $(mg/kg\text{-}day)^{-1}$	Source
VOCs								
1,3,5-Trimethylbenzene	5.00E-02	*a*	1.70E-03	*a*	N/A		N/A	
1,2,4-Trimethylbenzene	5.00E-02	*a*	1.70E-03	*a*	N/A		N/A	
Xylene (Total)	2.00E+00	*b*	2.00E-01	*b*	N/A		N/A	
SVOCs								
Phenol	6.00E-01	*b*	6.00E-01	*c*	N/A		N/A	
PAHs								
Fluorene	4.00E-02	*b*	4.00E-02	*c*	N/A		N/A	
Phenanthrene	3.00E-02	*d*	3.00E-02	*d*	N/A		N/A	
Pyrene	3.00E-02	*b*	3.00E-02	*c*	N/A		N/A	

a EPA Region IX PRG Tables

b USEPA Integrated Risk Information System (IRIS), January 2000

c Route-to-route extrapolation from the oral RfD.

d Pyrene was used as a surrogate.

Table 7
Noncarcinogenic Health Hazard Summary

COPCs	Hazard from Incidental Ingestion	Hazard from Dermal Contact	Hazard from Inhalation of Soil Particulates	Hazard Index
SVOCs				
Phenol	7.30E-06	7.30E-06	1.80E-08	**1.46E-05**

Berk. Farm Tables\haz. sum.

Table 8
Hazards from Indoor Air

VOCs in Indoor Air	Noncarcinogenic Hazard from Inhalation
VOCs	
1,3,5-Trimethylbenzene	3.90E-05
1,2,4-Trimethylbenzene	4.25E-05
Xylene (Total)	4.30E-06
Volatile PAHs	
Fluorene	1.00E-07
Phenanthrene	4.90E-08
Pyrene	2.10E-08
Total	**8.60E-05**

FIGURES

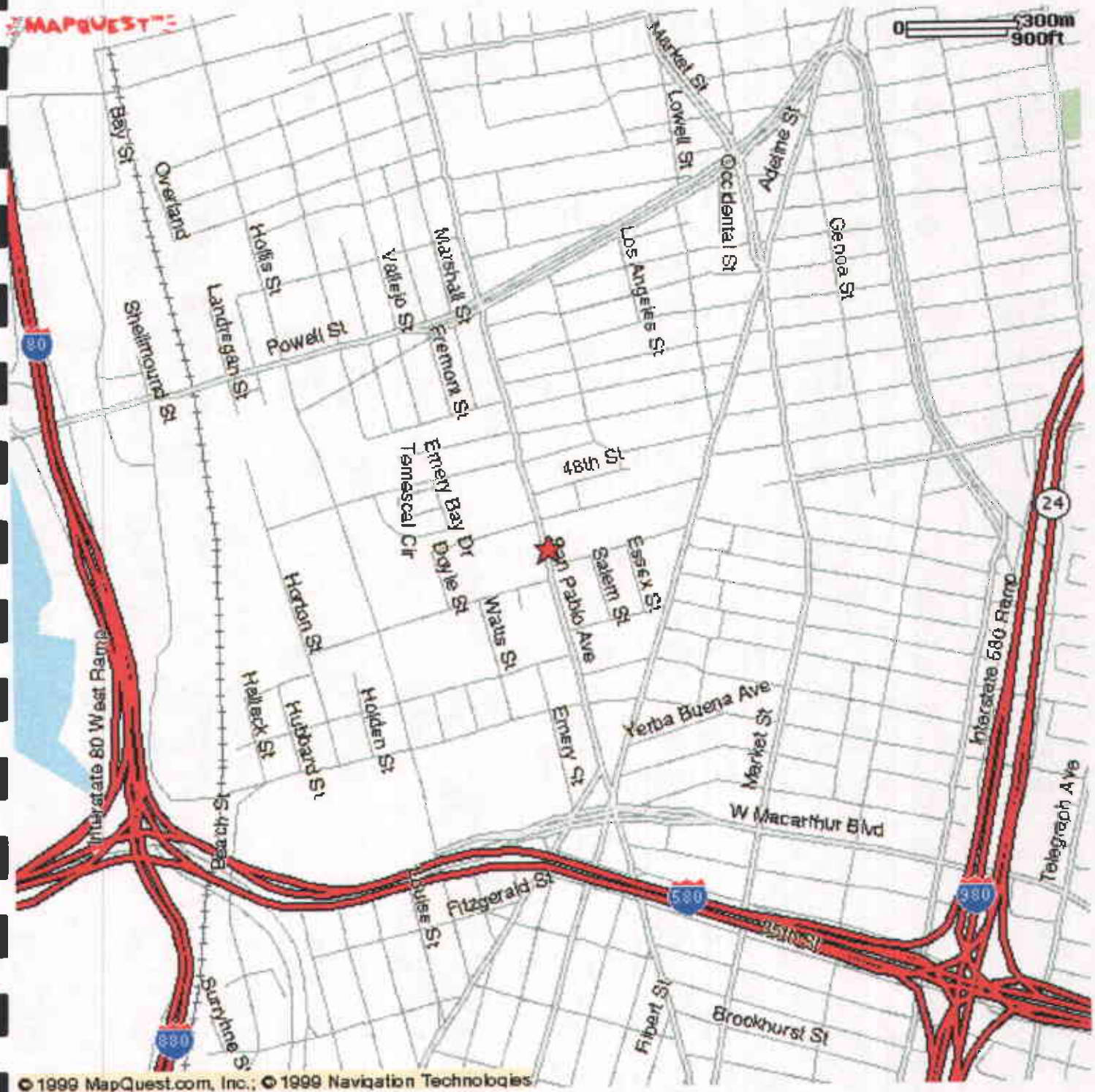

Figure 1: Site Vicinity Map

SOMA
ENVIRONMENTAL ENGINEERING, INC.

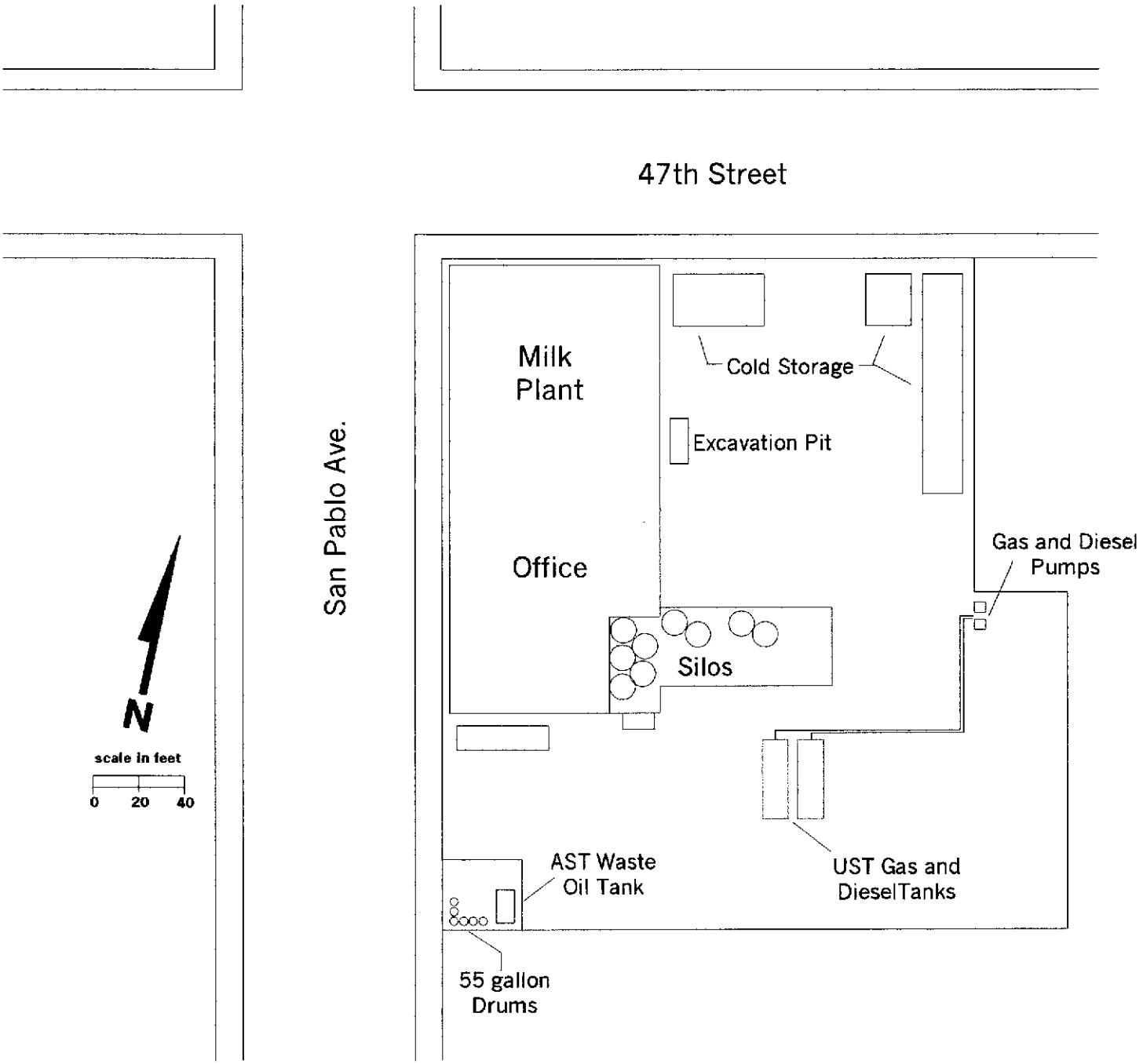

Figure 2: Site Map

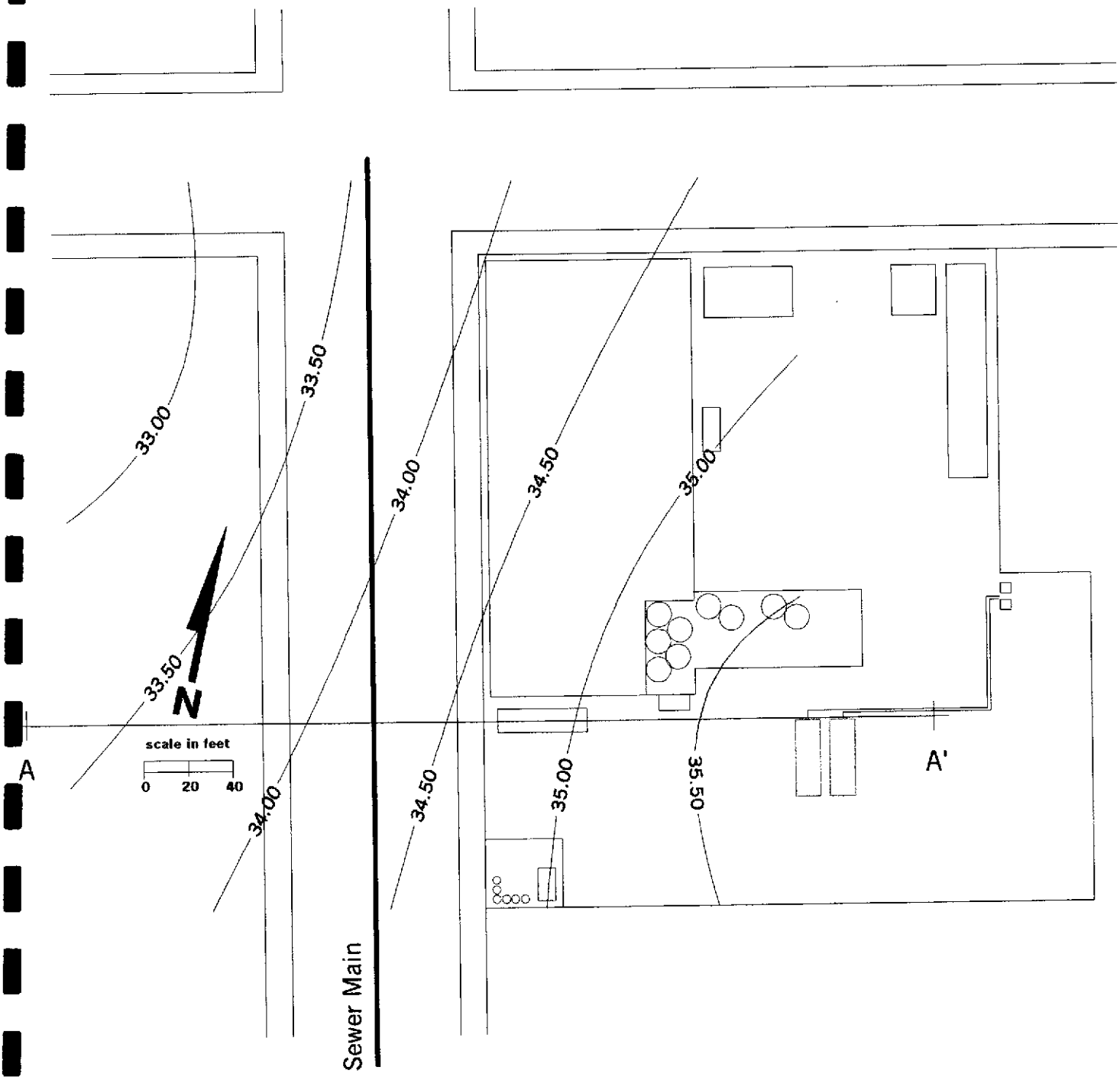

Figure 3: Groundwater Elevations Contour Map Based on June 7, 1999 Monitoring Data

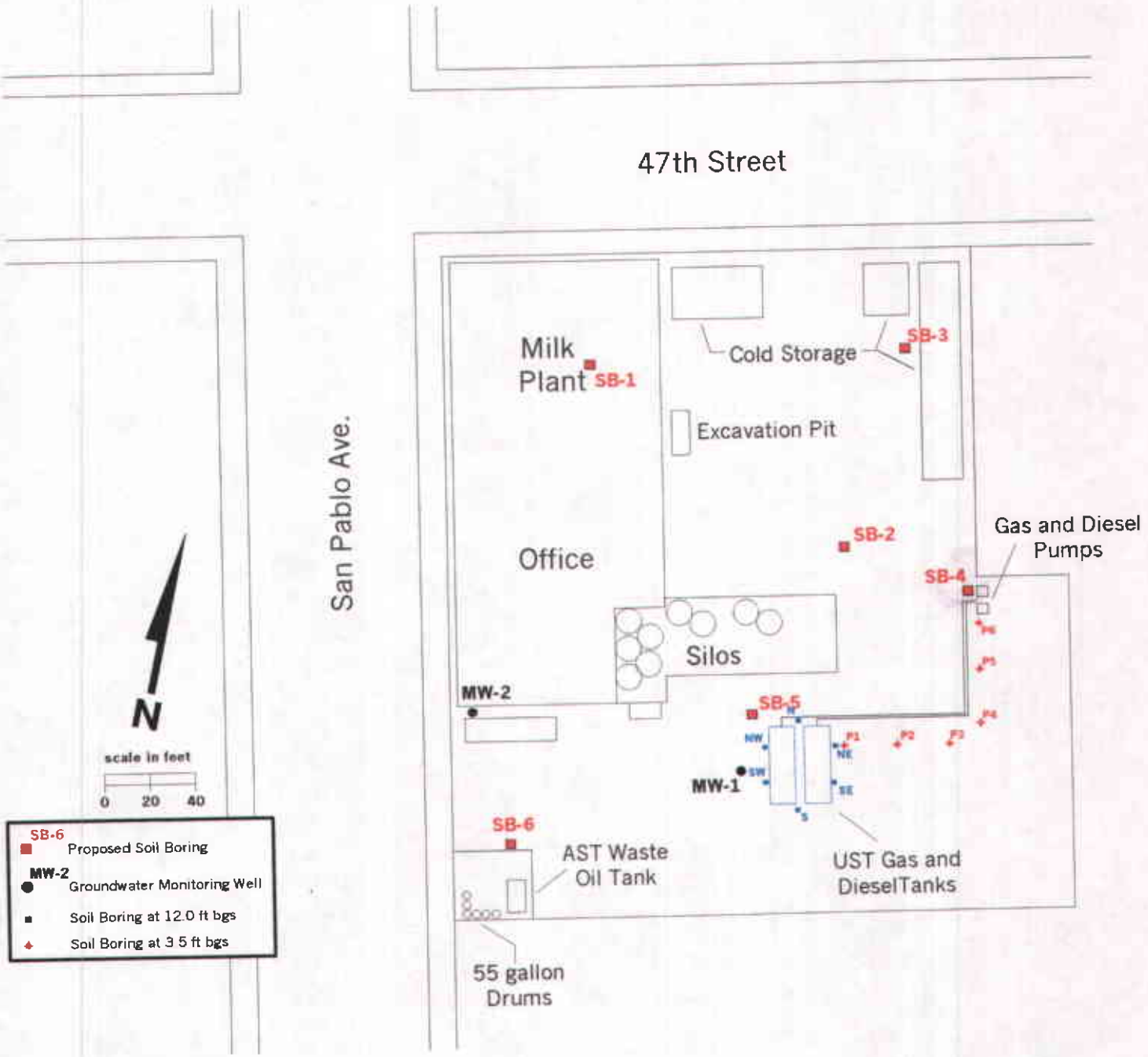

Figure 4: Location of Supplemental Soil Borings

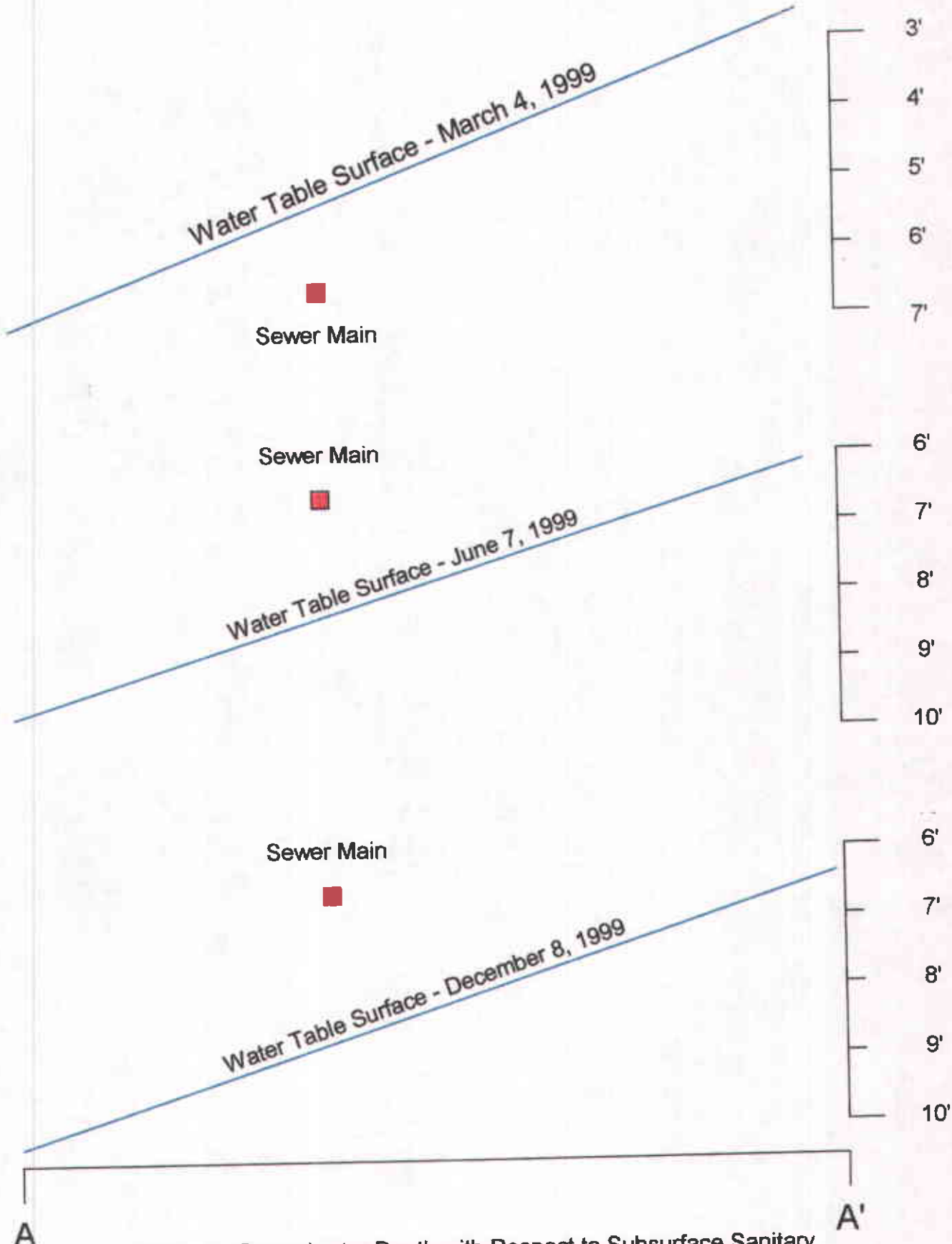

Figure 5: Groundwater Depth with Respect to Subsurface Sanitary Sewer Lines Passing Through San Pablo Avenue

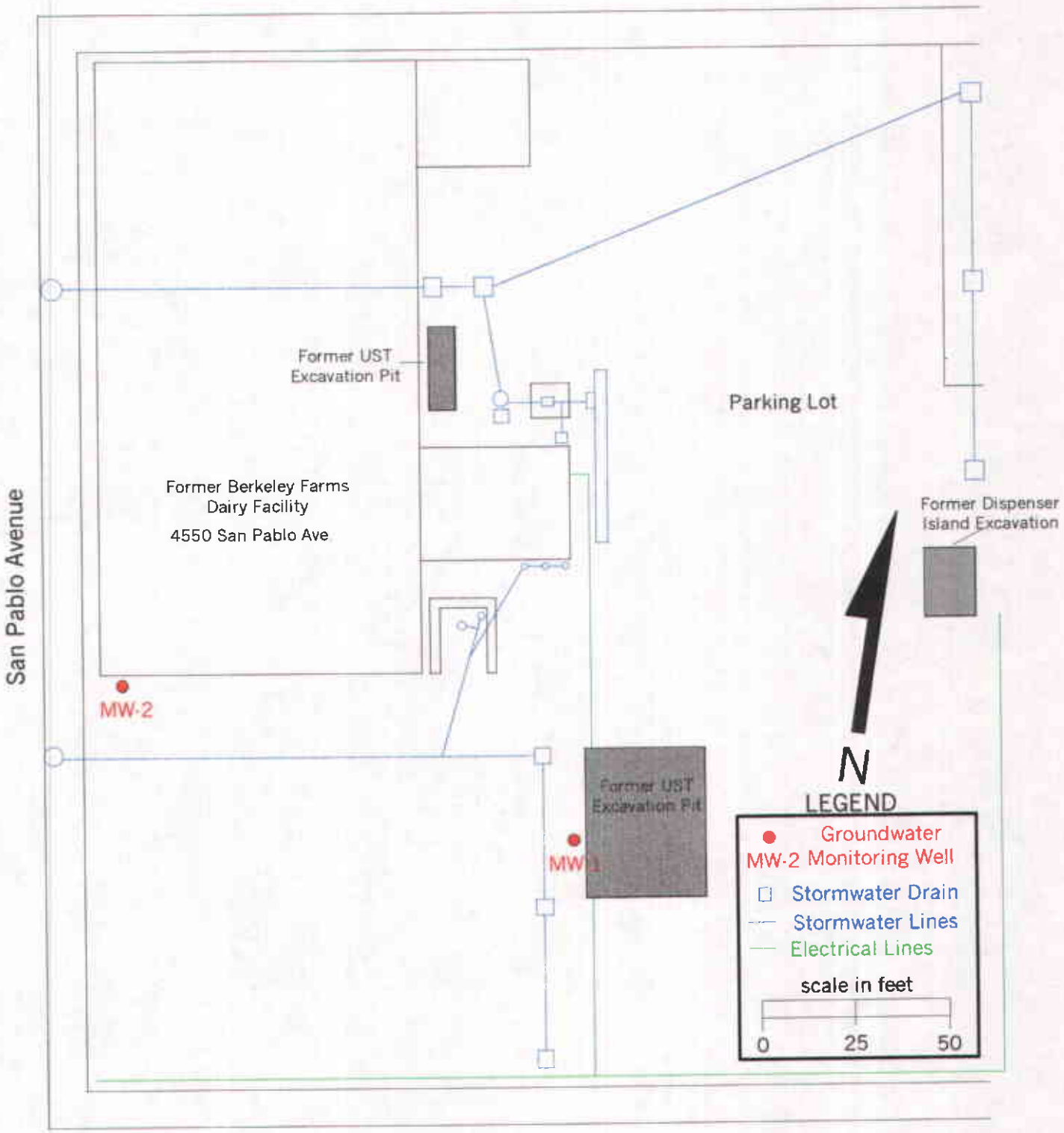

Figure 6: Site Map Showing Utility Lines and Storm Drain System

APPENDIX 1

Laboratory Analytical Reports and Chain of Custody Forms

DELTA
ENVIRONMENTAL LABORATORIES, Ltd

Soma

2680 Bishop Dr., Ste 203
San Ramon, CA 94583

Client Project ID:
Proj 2370
4550 San Pablo Avenue
Emeryville, CA

Ref.:	R4616400s
Method	5030 GCFID/ 8020/8015M
Sampled:	12/8/99
Received:	12/9/99
Matrix:	Soil
Analyzed:	12/16,18/1999
Reported:	12/20/99
Units:	mg/kg

Attention : Dr. M. Sepehr

Laboratory Results for TPH & BTEX Analysis

Analyte	Detection Limit mg/kg	Results						
		Sample ID						
		SB-1-0.5	SB-2-0.5	SB-3-0.5	SB-4-0.5	SB-4-5	SB-4-7	Method
TPH-Gas	0.050	ND	ND	ND	ND	ND	ND	5030/GCFID
TPH-Diesel	2.5	ND	ND	ND	ND	1976	80.6	8015M

ND:Not Detected(< MDL)

Delta Environmental Laboratories

Hossein Khosh Khoo, Ph.D.

WATER • WASTE WATER • HAZARDOUS WASTE • FUEL • AIR • SOIL

DELTA

ENVIRONMENTAL LABORATORIES, Ltd

Soma

2680 Bishop Dr., Ste 203
San Ramon, CA 94583

Client Project ID:
Proj 2370
4550 San Pablo Avenue
Emeryville, CA

Ref.:	R4616401s
Method	5030 GCFID/ 8020/8015M
Sampled:	12/8/99
Received:	12/9/99
Matrix:	Soil
Analyzed:	12/16,18/1999
Reported:	12/20/99
Units:	mg/kg

Attention : Dr. M. Sepehr

Laboratory Results for TPH & BTEX Analysis

Analyte	Detection Limit mg/kg	Results						
		Sample ID						
		SB-5-0.5	SB-5-5	SB-5-7	SB-6-0.5	SB-6-5	SB-6-7	Method
BTEX								
Benzene	0.005	-	ND	ND	-	ND	ND	8020
Toluene	0.005	-	ND	ND	-	ND	ND	8020
Ethylbenzene	0.005	-	ND	ND	-	ND	ND	8020
Total Xylene	0.005	-	ND	ND	-	ND	ND	8020
TPH-Gas	0.050	ND	ND	ND	ND	ND	ND	5030/GCFID
TPH-Diesel	2.5	ND	324	988	ND	ND	ND	8015M

ND:Not Detected(< MDL)

Delta Environmental Laboratories

Hossein Khosh Khoo, Ph.D.

DELTA

ENVIRONMENTAL LABORATORIES, Ltd

Client:
Soma

2680 Bishop Dr., Ste 203
San Ramon, CA 94583

Client Project ID:
Proj 2370
4550 San Pablo Avenue
Emeryville, CA

Attention :Dr. Sepehr

Ref	R4616100s
Method:	8260
Sampled:	12/8/99
Received:	12/9/99
Matrix	Soil
Analyzed:	12/14-16/99
Reported:	12/20/99
Analyst:	DS
Unit	ug/kg

Purgeable Hydrocarbons

EPA 8260

VOC

Analyte	Detection Limit	Results		
		Sample ID		
		SB-1-0.5	SB-2-0.5	SB-3-0.5
	ug/kg			
Benzene	5	ND	ND	ND
Bromobenzene	5	ND	ND	ND
Bromochloromethane	5	ND	ND	ND
Bromodichloromethane	10	ND	ND	ND
Bromoform	5	ND	ND	ND
Bromomethane	10	ND	ND	ND
n-Butylbenzene	5	ND	ND	ND
sec-Butylbenzene	5	ND	ND	ND
tert-Butylbenzene	5	ND	ND	ND
Carbon Tetrachloride	5	ND	ND	ND
Chlorobenzene	5	ND	ND	ND
Chloroethane	10	ND	ND	ND
Chloroform	5	ND	ND	ND
Chloromethane	10	ND	ND	ND
2-Chlorotoluene	5	ND	ND	ND
4-Chlorotoluene	5	ND	ND	ND
Dibromochloromethane	5	ND	ND	ND
1,2-Dibromo-3-chloropropane	20	ND	ND	ND
1,2-Dibromoethane	5	ND	ND	ND
Dibromomethane	5	ND	ND	ND
1,2-Dichlorobenzene	5	ND	ND	ND
1,3-Dichlorobenzene	5	ND	ND	ND
1,4-Dichlorobenzene	5	ND	ND	ND
dichlorodifluoromethane	10	ND	ND	ND
1,1-Dichloroethane	5	ND	ND	ND
1,2,-Dichloroethane	5	ND	ND	ND
1,1-Dichloroethene	5	ND	ND	ND
cis-1,2-Dichloloethene	5	ND	ND	ND
trans-1,2-Dichloroethene	5	ND	ND	ND
1,2-Dichloropropane	5	ND	ND	ND
1,3-Dichloropropane	5	ND	ND	ND

WATER • WASTE WATER • HAZARDOUS WASTE • FUEL • AIR • SOIL

DELTA

ENVIRONMENTAL LABORATORIES Ltd

Client:
Soma

2680 Bishop Dr., Ste 203
San Ramon, CA 94583

Attention :Dr. Sepehr

Client Project ID:
Proj 2370
4550 San Pablo Avenue
Emeryville, CA

Ref: [illegible]
Method: 8260
Sampled: 12/8/99
Received: 12/9/99
Matrix Soil
Analyzed: 12/14-16/99
Reported: 12/20/99
Analyst: DS
Unit ug/kg

Purgeable Hydrocarbons
EPA 8260
VOC

Analyte	Detection Limit ug/kg	Results Sample ID SB-1-0.5	SB-2-0.5	SB-3-0.5
2,2-Dichloropropane	5	ND	ND	ND
1,1-Dichloropropene	5	ND	ND	ND
Ethylbenzene	5	ND	ND	ND
Hexachlorobutadiene	5	ND	ND	ND
Isopropylbenzene	5	ND	ND	ND
p-Isopropyltoluene	5	ND	ND	ND
Methylene Chloride	20	ND	ND	ND
Naphthalene	5	ND	ND	ND
n-Propylbenzene	5	ND	ND	ND
Styrene	5	ND	ND	ND
1,1,1,2-Tetrachloroethane	5	ND	ND	ND
1,1,2,2-Tetrachloroethane	5	ND	ND	ND
Tetrachloroethene	5	ND	ND	ND
Toluene	5	ND	ND	ND
1,2,3-Trichlorobenzene	5	ND	ND	ND
1,2,4-Trichlorobenzene	5	ND	ND	ND
1,1,1-Trichloroethane	5	ND	ND	ND
1,1,2-Trichloroethane	5	ND	ND	ND
Trichloroethene	5	ND	ND	ND
Trichlorofluoromethane	5	ND	ND	ND
1,2,3-Trichloropropane	5	ND	ND	ND
1,2,4-Trimethylbenzene	5	ND	ND	ND
1,3,5-Trimethylbenzene	5	ND	ND	ND
Vinyl Chloride	10	ND	ND	ND
Xylenes, Total	10	ND	ND	ND
cis-1,3-Dichloropropene	5	ND	ND	ND
trans-1,3-Dichlopropene	5	ND	ND	ND

ND: Not Detected
DELTA Environmental Laboratories
California Certification #1857

H.Khosh Khoo, PhD., H Khoshkhoo
Laboratory Director/President

2/2

685 Stone Road #11 & 12 • Benicio, CA 94510 • (707) 747-6081 • (800) 747-6082 • Fax (707) 747-6082

DELTA

ENVIRONMENTAL LABORATORIES, Ltd

Client:
Soma

2680 Bishop Dr., Ste 203
San Ramon, CA 94583

Client Project ID:
Proj 2370
4550 San Pablo Avenue
Emeryville, CA

Attention :Dr. Sepehr

Ref	R4616101s
Method:	8260
Sampled:	12/8/99
Received:	12/9/99
Matrix	Soil
Analyzed:	12/14-16/99
Reported:	12/20/99
Analyst:	DS
Unit	ug/kg

Purgeable Hydrocarbons

EPA 8260

VOC

Analyte	Detection Limit	Results		
		Sample ID		
		SB-4-0.5	SB-5-0.5	SB-6-0.5
	ug/kg			
Benzene	5	ND	ND	ND
Bromobenzene	5	ND	ND	ND
Bromochloromethane	5	ND	ND	ND
Bromodichloromethane	10	ND	ND	ND
Bromoform	5	ND	ND	ND
Bromomethane	10	ND	ND	ND
n-Butylbenzene	5	ND	ND	ND
sec-Butylbenzene	5	ND	ND	ND
tert-Butylbenzene	5	ND	ND	ND
Carbon Tetrachloride	5	ND	ND	ND
Chlorobenzene	5	ND	ND	ND
Chloroethane	10	ND	ND	ND
Chloroform	5	ND	ND	ND
Chloromethane	10	ND	ND	ND
2-Chlorotoluene	5	ND	ND	ND
4-Chlorotoluene	5	ND	ND	ND
Dibromochloromethane	5	ND	ND	ND
1,2-Dibromo-3-chloropropane	20	ND	ND	ND
1,2-Dibromoethane	5	ND	ND	ND
Dibromomethane	5	ND	ND	ND
1,2-Dichlorobenzene	5	ND	ND	ND
1,3-Dichlorobenzene	5	ND	ND	ND
1,4-Dichlorobenzene	5	ND	ND	ND
dichlorodifluoromethane	10	ND	ND	ND
1,1-Dichloroethane	5	ND	ND	ND
1,2,-Dichloroethane	5	ND	ND	ND
1,1-Dichloroethene	5	ND	ND	ND
cis-1,2-Dichloloethene	5	ND	ND	ND
trans-1,2-Dichloroethene	5	ND	ND	ND
1,2-Dichloropropane	5	ND	ND	ND
1,3-Dichloropropane	5	ND	ND	ND

1/2

WATER • WASTE WATER • HAZARDOUS WASTE • FUEL • AIR • SOIL

DELTA ENVIRONMENTAL LABORATORIES, Ltd

Client:
Soma

2680 Bishop Dr., Ste 203
San Ramon, CA 94583

Client Project ID:
Proj 2370
4550 San Pablo Avenue
Emeryville, CA

Attention :Dr. Sepehr

Ref: ATC0161, 1

Method:	8260
Sampled:	12/8/99
Received:	12/9/99
Matrix	Soil
Analyzed:	12/14-16/99
Reported:	12/20/99
Analyst:	DS
Unit	ug/kg

Purgeable Hydrocarbons
EPA 8260
VOC

Analyte	Detection Limit ug/kg	Results Sample ID SB-4-0.5	SB-5-0.5	SB-6-0.5
2,2-Dichloropropane	5	ND	ND	ND
1,1-Dichloropropene	5	ND	ND	ND
Ethylbenzene	5	ND	ND	ND
Hexachlorobutadiene	5	ND	ND	ND
Isopropylbenzene	5	ND	ND	ND
p-Isopropyltoluene	5	ND	ND	ND
Methylene Chloride	20	ND	ND	ND
Naphthalene	5	ND	ND	ND
n-Propylbenzene	5	ND	ND	ND
Styrene	5	ND	ND	ND
1,1,1,2-Tetrachloroethane	5	ND	ND	ND
1,1,2,2-Tetrachloroethane	5	ND	ND	ND
Tetrachloroethene	5	ND	ND	ND
Toluene	5	ND	ND	ND
1,2,3-Trichlorobenzene	5	ND	ND	ND
1,2,4-Trichlorobenzene	5	ND	ND	ND
1,1,1-Trichloroethane	5	ND	ND	ND
1,1,2-Trichloroethane	5	ND	ND	ND
Trichloroethene	5	ND	ND	ND
Trichlorofluoromethane	5	ND	ND	ND
1,2,3-Trichloropropane	5	ND	ND	ND
1,2,4-Trimethylbenzene	5	ND	ND	ND
1,3,5-Trimethylbenzene	5	ND	ND	ND
Vinyl Chloride	10	ND	ND	ND
Xylenes, Total	10	ND	ND	ND
cis-1,3-Dichloropropene	5	ND	ND	ND
trans-1,3-Dichlopropene	5	ND	ND	ND

ND: Not Detected
DELTA Environmental Laboratories
California Certification #1857

H.Khosh Khoo, PhD.,
Laboratory Director/President

2/2

DELTA
ENVIRONMENTAL LABORATORIES, Ltd

Client:
City & County of San Francisco
DPW/BCM-SAR
1680 Mission Street, 1st Floor
San Francisco, CA 94103-24

Attention: John Chester

ASAP

Client Project ID:
Moscone Expansion
J.O.# 1691N
DPW CSO # DEL 34

Ref:	R4643300s
Method:	7000/6010
Sampled:	12/21/99
Received:	12/21/99
Analyzed:	12/21/99
Reported:	12/21/99
Analyst:	AD
Matrix:	Solid
Units:	mg/kg

Analytical Results for TTLC Analysis

Digestion :EPA 3050

Analyte	TTLC Max. Limit (mg/kg)	Detection Limit (mg/kg)	Results Sample ID	
			Composite A-1,2,3 & 4	Composite B-1,2,3 & 4
Silver	500	1.0	ND	ND
Arsenic	500	5.0	ND	ND
Barium	10,000	1.0	59	49
Beryllium	75	1.0	ND	ND
Cadmium	100	1.0	ND	1.2
Cobalt	8,000	1.0	6.2	7.2
Chromium (III)	2,500	1.0	55	63
Copper	2,500	1.0	100	32
Mercury	20	0.06	0.67	0.40
Molybdenum	3,500	1.0	ND	ND
Nickel	2,000	2.0	29	25
Lead	1,000	5.0	270	98
Antimony	500	5.0	ND	ND
Selenium	100	5.0	ND	ND
Thallium	700	5.0	ND	ND
Vanadium	2,400	1.0	48	58
Zinc	5,000	1.0	110	130

ND: Not Detected

H.Khosh Khoo, PhD.,
Laboratory Director/President

Delta#1/general/RTMP_17_300s

WATER • WASTE WATER • HAZARDOUS WASTE • FUEL • AIR • SOIL

DELTA ENVIRONMENTAL LABORATORIES, Ltd

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Client Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Attention: Dr. Sepehr

Ref.	R4616201sR
	CL1094
Method:	8270
Sampled:	12/8/99
Received:	12/9/99
Matrix	soil
Analyzed	12/18/.99
Reported:	12/18/99
Units:	mg/kg

Semi-volatile Organics
EPA 8270

Analyte	Detection Limit (mg/kg)	Results Sample ID SB-1-0.5	SB-2-0.5	SB-3-0.5
Acenaphthene	0.10	ND	ND	ND
Acenaphthylene	0.10	ND	ND	ND
Anthracene	0.10	ND	ND	ND
Benzidine	0.10	ND	ND	ND
Benzoic Acid	0.50	ND	ND	ND
Benzo (a) anthracene	0.10	ND	ND	ND
Benzo (b) fluoranthene	0.10	ND	ND	ND
Benzo (k) fluoranthene	0.20	ND	ND	ND
Benzo (g,h,i) perylene	0.20	ND	ND	ND
Benzo (a) pyrene	0.02	ND	ND	ND
Benzyl Alcohol	0.20	ND	ND	ND
Bis (2-chloroethoxy) methane	0.10	ND	ND	ND
Bis (2-choroethyl) Ether	0.10	ND	ND	ND
Bis (2-Chloroisopropyl) Ether	0.10	ND	ND	ND
Bis (2-ethylhexy) Phthalate	0.50	ND	ND	ND
4-Bromophenyl Phenyl Ether	0.10	ND	ND	ND
Butylbenzyl Phthalate	0.50	ND	ND	ND
4- Chloroaniline	0.20	ND	ND	ND
2-Chloronaphthalene	0.10	ND	ND	ND
4-Chlorophenyl Phenyl Ether	0.10	ND	ND	ND
Chrysene	0.10	ND	ND	ND
Dibenzo (a,h) anthracene	0.20	ND	ND	ND
Dibenzofuran	0.10	ND	ND	ND
Di-n-butyl Phthalate	2.00	ND	ND	ND
1,2-Dichlorobenzene	0.10	ND	ND	ND
1,3-Dichlorobenzene	0.10	ND	ND	ND
1,4-Dichlorobenzene	0.10	ND	ND	ND
3,3'-Dichlorobenzidine	0.10	ND	ND	ND
Diethyl Phthalate	0.50	ND	ND	ND
Dimethyl Phthalate	0.50	ND	ND	ND

685 Stone Road #11 & 12 • Benicia, CA 94510 • (707) 747-6081 • (800) 747-6082 • Fax (707) 747-6082

WATER • WASTE WATER • HAZARDOUS WASTE • FUEL • AIR • SOIL

DELTA ENVIRONMENTAL LABORATORIES, Ltd

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Client Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Attention: Naser Pakrov

Ref.	R4616201sR
	CL1094
Method:	8270
Sampled:	12/8/99
Received:	12/9/99
Matrix	soil
Analyzed	12/18/99
Reported:	12/18/99
Units:	mg/kg

Semi-volatile Organics
EPA 8270

Analyte	Detection Limit (mg/kg)	Results Sample ID SB-1-0.5	SB-2-0.5	SB-3-0.5
2,4-Dinitrotoluene	0.10	ND	ND	ND
2,6-Dinitrotoluene	0.20	ND	ND	ND
Di-n-octyl Phthalate	0.50	ND	ND	ND
Fluoranthene	0.10	ND	ND	ND
Fluorene	0.10	ND	ND	ND
Hexachlorobenzene	0.10	ND	ND	ND
Hexachlorobutadiene	0.10	ND	ND	ND
Hexachlorocyclopentadiene	0.10	ND	ND	ND
Hexachloroethane	0.10	ND	ND	ND
Indeno (1,2,3-cd) pyrene	0.20	ND	ND	ND
Isophorone	0.10	ND	ND	ND
2-Methylnaphthalene	0.10	ND	ND	ND
Naphthalene	0.10	ND	ND	ND
2-Nitroaniline	0.50	ND	ND	ND
3-Nitroaniline	0.10	ND	ND	ND
4-Nitroaniline	0.50	ND	ND	ND
Nitrobenzene	0.10	ND	ND	ND
N-Nitrosodiphenylamine	0.10	ND	ND	ND
N-Nitrosodi-n-propylamine	0.10	ND	ND	ND
Phenanthrene	0.10	ND	ND	ND
Pyrene	0.10	ND	ND	ND
1,2,4-Trichlorobenzene	0.10	ND	ND	ND
4-Chloro-3-methylphenol	0.20	ND	ND	ND
Benzo(a)anthracene	0.10	ND	ND	ND

685 Stone Road #11 & 12 • Benicia, CA 94510 • (707) 747-6081 • (800) 747-6082 • Fax (707) 747-6082

WATER • WASTE WATER • HAZARDOUS WASTE • FUEL • AIR • SOIL

DELTA ENVIRONMENTAL LABORATORIES, Ltd

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Client Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Attention: Naser Pakrov

Ref.	R4616201eR
	CL1094
Method:	8270
Sampled:	12/8/99
Received:	12/9/99
Matrix	soil
Analyzed	12/18/99
Reported:	12/18/99
Units:	mg/kg

Semi-volatile Organics
EPA 8270

Analyte	Detection Limit (mg/kg)	Results Sample ID SB-1-0.5	SB-2-0.5	SB-3-0.5
2-Chlorophenol	0.10	ND	ND	ND
2,4-Dichlorophenol	0.50	ND	ND	ND
2,4-Dimethylphenol	0.10	ND	ND	ND
4,6-Dinitro-2-methylphenol	0.50	ND	ND	ND
2,4-Dinitrophenol	0.10	ND	ND	ND
2-Methylphenol	0.10	ND	ND	ND
4-Methylphenol	0.20	ND	ND	ND
2-Nitrophenol	0.10	ND	ND	ND
4-Nitrophenol	0.50	ND	ND	ND
Pentchlorophenol	0.50	ND	ND	ND
Phenol	0.10	0.10	0.34	0.13
2,4,5-Trichlorophenol	0.10	ND	ND	ND
2,4,6-Trichlorophenol	0.10	ND	ND	ND

ND: Not Detected

DELTA Environmental Laboratories
California Certification #1857

H.Khosh Khoo, Ph.D.,
Laboratory Director/President

Rtmp_soil8270

685 Stone Road #11 & 12 • Benicia, CA 94510 • (707) 747-6081 • (800) 747-6082 • Fax (707) 747-6082

WATER • WASTE WATER • HAZARDOUS WASTE • FUEL • AIR • SOIL

DELTA ENVIRONMENTAL LABORATORIES, Ltd

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Client Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Attention: Dr. M. Sepehr

Ref. R46616202sR
CL1094
Method: 8270
Sampled: 12/8/99
Received: 12/9/99
Matrix soil
Analyzed 12/18/.99
Reported: 12/18/99
Units: mg/kg

Semi-volatile Organics
EPA 8270

Analyte	Detection Limit (mg/kg)	Results Sample ID SB-4-0.5	SB-5-0.5	SB-6-0.5
Acenaphthene	0.10	ND	ND	ND
Acenaphthylene	0.10	ND	ND	ND
Anthracene	0.10	ND	ND	ND
Benzidine	0.10	ND	ND	ND
Benzoic Acid	0.50	ND	ND	ND
Benzo (a) anthracene	0.10	ND	ND	ND
Benzo (b) fluoranthene	0.10	ND	ND	ND
Benzo (k) fluoranthene	0.20	ND	ND	ND
Benzo (g,h,i) perylene	0.20	ND	ND	ND
Benzo (a) pyrene	0.02	ND	ND	ND
Benzyl Alcohol	0.20	ND	ND	ND
Bis (2-chloroethoxy) methane	0.10	ND	ND	ND
Bis (2-choroethyl) Ether	0.10	ND	ND	ND
Bis (2-Chloroisopropyl) Ether	0.10	ND	ND	ND
Bis (2-ethylhexy) Phthalate	0.50	ND	ND	ND
4-Bromophenyl Phenyl Ether	0.10	ND	ND	ND
Butylbenzyl Phthalate	0.50	ND	ND	ND
4- Chloroaniline	0.20	ND	ND	ND
2-Chloronaphthalene	0.10	ND	ND	ND
4-Chlorophenyl Phenyl Ether	0.10	ND	ND	ND
Chrysene	0.10	ND	ND	ND
Dibenzo (a,h) anthracene	0.20	ND	ND	ND
Dibenzofuran	0.10	ND	ND	ND
Di-n-butyl Phthalate	2.00	ND	ND	ND
1,2-Dichlorobenzene	0.10	ND	ND	ND
1,3-Dichlorobenzene	0.10	ND	ND	ND
1.4-Dichlorobenzene	0.10	ND	ND	ND
3,3'-Dichlorobenzidine	0.10	ND	ND	ND
Diethyl Phthalate	0.50	ND	ND	ND
Dimethyl Phthalate	0.50	ND	ND	ND

685 Stone Road #11 & 12 • Benicia, CA 94510 • (707) 747-6081 • (800) 747-6082 • Fax (707) 747-6082

WATER • WASTE WATER • HAZARDOUS WASTE • FUEL • AIR • SOIL

DELTA ENVIRONMENTAL LABORATORIES, Ltd

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Client Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Attention: Naser Pakrov

Ref.	R4616202sR
	CL1094
Method:	8270
Sampled:	12/8/99
Received:	12/9/99
Matrix	soil
Analyzed	12/18/.99
Reported:	12/18/99
Units:	mg/kg

Semi-volatile Organics
EPA 8270

Analyte	Detection Limit (mg/kg)	Results		
		Sample ID		
		SB-4-0.5	SB-5-0.5	SB-6-0.5
2,4-Dinitrotoluene	0.10	ND	ND	ND
2,6-Dinitrotoluene	0.20	ND	ND	ND
Di-n-octyl Phthalate	0.50	ND	ND	ND
Fluoranthene	0.10	ND	ND	ND
Fluorene	0.10	ND	ND	ND
Hexachlorobenzene	0.10	ND	ND	ND
Hexachlorobutadiene	0.10	ND	ND	ND
Hexachlorocyclopentadiene	0.10	ND	ND	ND
Hexachloroethane	0.10	ND	ND	ND
Indeno (1,2,3-cd) pyrene	0.20	ND	ND	ND
Isophorone	0.10	ND	ND	ND
2-Methylnaphthalene	0.10	ND	ND	ND
Naphthalene	0.10	ND	ND	ND
2-Nitroaniline	0.50	ND	ND	ND
3-Nitroaniline	0.10	ND	ND	ND
4-Nitroanilne	0.50	ND	ND	ND
Nitrobenzene	0.10	ND	ND	ND
N-Nitrosodiphenylamine	0.10	ND	ND	ND
N-Nitrosodi-n-propylamine	0.10	ND	ND	ND
Phenanthrene	0.10	ND	ND	ND
Pyrene	0.10	ND	ND	ND
1,2,4-Trichlorobenzene	0.10	ND	ND	ND
4-Chloro-3-methylphenol	0.20	ND	ND	ND
Benzo(a)anthracene	0.10	ND	ND	ND

685 Stone Road #11 & 12 • Benicia, CA 94510 • (707) 747-6081 • (800) 747-6082 • Fax (707) 747-6082

WATER • WASTE WATER • HAZARDOUS WASTE • FUEL • AIR • SOIL

DELTA ENVIRONMENTAL LABORATORIES, Ltd

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Client Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Attention: Naser Pakrov

Ref. R4616202sR
CL1094
Method: 8270
Sampled: 12/8/99
Received: 12/9/99
Matrix soil
Analyzed 12/18/.99
Reported: 12/18/99
Units: mg/kg

Semi-volatile Organics
EPA 8270

Analyte	Detection Limit (mg/kg)	Results		
		Sample ID		
		SB-4-0.5	SB-5-0.5	SB-6-0.5
2-Chlorophenol	0.10	ND	ND	ND
2,4-Dichlorophenol	0.50	ND	ND	ND
2,4-Dimethylphenol	0.10	ND	ND	ND
4,6-Dinitro-2-methylphenol	0.50	ND	ND	ND
2,4-Dinitrophenol	0.10	ND	ND	ND
2-Methylphenol	0.10	ND	ND	ND
4-Methylphenol	0.20	ND	ND	ND
2-Nitrophenol	0.10	ND	ND	ND
4-Nitrophenol	0.50	ND	ND	ND
Pentchlorophenol	0.50	ND	ND	ND
Phenol	0.10	ND	ND	ND
2,4,6-Trichlorophenol	0.10	ND	ND	ND
2,4,6-Trichlorophenol	0.10	ND	ND	ND

ND: Not Detected

DELTA Environmental Laboratories
California Certification #1857

H.Khesh Khoe, Ph.D.,
Laboratory Director/President

Rtmp_soil8270

685 Stone Road #11 & 12 • Benicia, CA 94510 • (707) 747-6081 • (800) 747-6082 • Fax (707) 747-6082

DELTA

ENVIRONMENTAL LABORATORIES, Ltd

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Attention: Dr. Sepehr

Client Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Ref: R4616Wet1
Sampled: 12/8/99
Received: 12/9/99
Analyzed: 12/16/99
Reported: 12/16/99
Analyst: AD
Matrix: Soil
Units: mg/Kg

Analyte	Detection Limit mg/Kg	Sample ID			Method
		SB-1-0.5	SB-2-0.5	SB-3-0.5	
Nitrite as N	1	ND	ND	ND	EPA 354.1/SM 4500 NO_2^- B
Nitrate as N	1	ND	ND	ND	EPA 300/SM 4500 NO_3^- D
Ammonia, NH3 as N	1	ND	ND	ND	EPA 350.3/SM 4500 NH_3 F

H. Khosh Khoo PhD.,
Laboratory Director/President

rtmp_wetchem

DELTA

ENVIRONMENTAL LABORATORIES, Ltd

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Attention:Dr.Sepehr

Client Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Ref: R4616Wet2
Sampled: 12/8/99
Received: 12/9/99
Analyzed: 12/16/99
Reported: 12/16/99
Analyst: AD
Matrix: Soil
Units: mg/Kg

Analyte	Detection Limit mg/Kg	Sample ID			Method
			SB-6-0.5		
Nitrite as N	1		ND		EPA 354.1/SM 4500 NO_2^- B
Nitrate as N	1		ND		EPA 300/SM 4500 NO_3^- D
Ammonia, NH3 as N	1		ND		EPA 350.3/SM 4500 NH_3 F

H. Khosh Khoo PhD.,
Laboratory Director/President

rtmp_wetchem

DELTA
ENVIRONMENTAL LABORATORIES, Ltd

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Attention: Dr.Sepehr

Client Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Ref:	R4616301s
Method:	7000/6010
Sampled:	12/8/99
Received:	12/9/99
Analyzed:	12/10/99
Reported:	12/16/99
Analyst:	AD
Matrix:	Solid
Units:	mg/kg

Analytical Results for TTLC Analysis

Digestion :EPA 3050

Analyte	TTLC Max. Limit (mg/kg)	Detection Limit (mg/kg)	Results Sample ID		
			SB-1-0.5	SB-2-0.5	SB-3-0.5
Silver	500	1.0	ND	ND	ND
Arsenic	500	5.0	ND	ND	ND
Barium	10,000	1.0	160	170	160
Beryllium	75	1.0	ND	ND	ND
Cadmium	100	1.0	ND	ND	ND
Cobalt	8,000	1.0	13	13	8.0
Chromium (III)	2,500	1.0	31	31	27
Copper	2,500	1.0	23	38	23
Mercury	20	0.06	ND	ND	ND
Molybdenum	3,500	1.0	ND	ND	ND
Nickel	2,000	2.0	48	37	31
Lead	1,000	5.0	11	12	110
Antimony	500	5.0	ND	ND	ND
Selenium	100	5.0	ND	ND	ND
Thallium	700	5.0	5.9	ND	ND
Vanadium	2,400	1.0	35	35	32
Zinc	5,000	1.0	46	54	60

ND: Not Detected

H.Khosh Khoo, PhD.,
Laboratory Director/President

Delta#1/general/RTMP_17_300s

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Attention: Dr. M. Sepehr

Client Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Ref:	R4616302s
Method:	7000/6010
Sampled:	12/8/99
Received:	12/9/99
Analyzed:	12/10/99
Reported:	12/16/99
Analyst:	AD
Matrix:	Solid
Units:	mg/kg

Analytical Results for TTLC Analysis

Digestion :EPA 3050

Analyte	TTLC Max. Limit (mg/kg)	Detection Limit (mg/kg)	Results Sample ID		
			SB-4-0.5	SB-5-0.5	SB-6-0.5
Silver	500	1.0	ND	ND	ND
Arsenic	500	5.0	ND	ND	ND
Barium	10,000	1.0	91	150	150
Beryllium	75	1.0	ND	ND	ND
Cadmium	100	1.0	ND	ND	ND
Cobalt	8,000	1.0	6.9	8.4	12
Chromium (III)	2,500	1.0	5.5	27	29
Copper	2,500	1.0	16	20	21
Mercury	20	0.06	0.42	ND	0.24
Molybdenum	3,500	1.0	ND	ND	ND
Nickel	2,000	2.0	19	29	37
Lead	1,000	5.0	10	6.5	8.8
Antimony	500	5.0	ND	ND	ND
Selenium	100	5.0	ND	ND	ND
Thallium	700	5.0	7.5	5.2	ND
Vanadium	2,400	1.0	14	31	37
Zinc	5,000	1.0	41	39	49

ND: Not Detected

H.Khosh Khoo, PhD.,
Laboratory Director/President

Delta#1/general/RTMP_17_300s

Quality Control Report

Soma

2680 Bishop Dr., Ste 203
San Ramon, CA 94583

Attention :Dr. Sepehr

Client Project ID:
Proj 2370
4550 San Pablo Avenue
Emeryville, CA

Ref.:	Q4616400s
Method	5030/8020/ GCFID
Sampled:	12/8/99
Received:	12/16/99
Matrix:	Soil
Analyzed:	12/16,18/1999
Analyst	DS
Reported:	12/20/99
Units:	mg/kg
Sample Spiked:	Blank

Quality Control Report for TPH &BTEX

Analyte	Detection Limit mg/kg	Sample Result mg/kg	Spike Added mg/kg	% MS Recovery	% MSD Recovery	Relative % Difference RPD	Method
Benzene	0.005	ND	0.020	97	97	0.0	8020
Toulene	0.005	ND	0.020	97	98	1.0	8020
Ethylbenzene	0.005	ND	0.020	99	91	8.4	8020
Total-Xylene	0.005	ND	0.040	93	96	3.2	8020
TPH-Gas,GC/FID	0.05	ND	0.40	105	103	1.9	5030
TPH-Diesel	2.5	ND	20	103	114	10.1	8015M

Delta Environmental Laboratories

H.Khosh Khoo, PhD.,
Laboratory Director/President

Quality Control Report

Client:
Soma

2680 Bishop Dr., Ste 203
San Ramon, CA 94583

Client Project #:
Proj 2370
4550 San Pablo Avenue
Emeryville, CA

Ref. Q4616100s

Matrix: Soil
Unit: ug/kg

Reported 12/20/99

Attention :Dr. Sepehr

Surrogate Standard Recovery Summary
Method : EPA8260

Date Analyzed	Lab Id.	Percent Recovery Pentafluoro-benzene	Toluene d8	p-Bromofluoro-Benzene
12/14/99	Blank	87	104	104
12/14/99	Blank	81	102	103
QC limit:		70-121	81-117	74-121

Date Analyzed: 12/14/99
Sample Spiked: Blank

Matrix Spike Recovery

Analyte	Spike Added ug/kg	MatrixSpike Spike % Recovery	Matrix Spike Dup % Recovery	Relative % Difference RPD
1,1-Dichloroethene	20	99	87	13
Trichloroethene	20	106	104	1.9
Benzene	20	113	113	0.0
Toluene	20	111	108	2.7
Chlorobenzene	20	110	107	2.8

H.Khosh Khoo, PhD.,
Laboratory Director/President

DELTA
ENVIRONMENTAL LABORATORIES, Ltd

Quality Control Report

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Client Project ID:

Semi-Voalatile Organic Compounds
EPA 8270

Attention: Dr. M. Sepehr

Ref.	Q4616200s
	C L 1094
Method:	8270
Sampled:	12/8/99
Received:	12/9/99
Matrix	Soil
Analyzed	12/18/99
Reported:	12/18/99
Unit	mg/kg

Laboratory Control Sample Recovery

Analyte	Spike Added mg/kg	Percent Recovery	Percent Recovery	Relative Percent Difference	QC Limit Percent Recovery
Phenol	2.00	62.0	58.0	6.7	20-90
2-Chlorophenol	2.00	60.0	57.5	4.3	27-123
1,4-Dichlorobenze	1.00	54.0	52.0	3.8	28-104
N-Nitroso-di-n-propylamine	1.00	58.0	55.0	5.3	25-114
1,2,4-Trichlorobenzene	1.00	48.0	46.0	4.3	38-107
4-chloro-3-methylphenol	2.00	58.0	53.0	9.0	26-103
Acenaphtene	1.00	50.0	50.0	0.0	49-102
4-Nitrophenol	2.00	60.0	45.0	28.6	17-109
2,4-Dinitrotoluene	1.00	55.0	47.0	15.7	28-89
Pentachlorophenol	2.00	55.0	46.0	17.8	11-114
Pyrene	1.00	49.0	59.0	18.5	25-117
Surrogate(s)					
Nitrobenzene -d5	25	60	56.8	5.5	23-120
2-Fluorobiphenyl	25	59.6	58.8	1.4	30-115
p-Terphenyl-d14	25	67.2	77.2	13.9	18-137
Phenol -d5	50	65	60	8.0	24-113
2-Fluorophenol	50	65.2	58	11.7	25-121
2,4,6 tribromophenol	50	67.2	54.6	20.7	19-122

* Surrogate recoveries were lower than QC limit due to matrix interferences. conformed by reanalysis.

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Quality Control Report

Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Ref:	Q4616300
Method:	7000/6010
Sampled:	12/8/99
Received:	12/9/99
Analyzed:	12/10/99
Reported:	12/16/99
Analyst:	AD
Matrix:	Solid
Units:	mg/kg

Analytical Results for TTLC Tests

Analyte	Inst. Method	Spike Added mg/kg	Detection Limit mg/kg	MS percent Recovery	MSD percent Recovery	Relative Percent Difference
Silver	6010	50	1.00	82	83	1.2
Arsenic	6010	50	5.00	104	100	3.9
Barium	6010	50	1.00	96	101	5.1
Beryllium	6010	50	1.00	100	100	0.0
Cadmium	6010	50	1.00	100	102	2.0
Cobalt	6010	50	1.00	104	109	4.7
Chromium (III)	6010	50	1.00	110	110	0.0
Copper	6010	50	1.00	102	110	7.5
Mercury	7471	0.625	0.060	96	90	6.5
Molybdenum	6010	50	1.00	106	106	0.0
Nickel	6010	50	2.00	98	96	2.1
Lead	6010	50	5.00	106	106	0.0
Antimony	6010	50	5.00	106	106	0.0
Selenium	6010	50	5.00	100	998	163.6
Thallium	6010	50	5.00	125	122	2.4
Vanadium	6010	50	1.00	102	102	0.0
Zinc	6010	50	1.00	102	101	1.0

ND: Not Detected

H.Khosh Khoo, PhD.,
Laboratory Director/President

Delta#1/general/QTMP_17_300s

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Quality Control Report

Client Project #:
2370
4550 San Pablo Ave
Emeryville, CA

Ref: Q4616Wet

Sampled: 12/8/99
Received: 12/9/99
Analyzed: 1216/99
Reported: 12/16/99
Analyst: AD
Matrix: Soil
Unit: mg/Kg

Sample ID: Blank spiked sample

Analyte	Detection Limit mg/Kg	Method	Spike Added mg/L	MS Spike Recovery	MSD Spike Recovery	Relative Percent Difference
Ammonia	1	SM 4500 NH_3 F/EPA 350.3	50	90	103	13.5
Nitrite as N	1	SM 4500 NO_2^- B/EPA 354.1	20	110	107	2.8
Nitrate as N	1	SM 4500 NO_3^- D/EPA 300	50	111	110	0.9

H. Khosh Khoo PhD.,
Laboratory Director/President

delta#1/general/Qtmp_wetchem

Client:
Soma
2680 Bishop Dr., Ste 203
San Ramon, CA 94583

Client Project ID:
Proj 2370
4550 San Pablo Avenue
Emeryville, CA

Ref: R4616800pcbs
Method: 8080pcb
Sampled: 12/8/99
Received: 12/9/99
Matrix: Soil
Analyzed: 12/16,18/1999
Reported: 12/20/99
Units: mg/kg

Attention : Dr. M. Sepehr

Analytical Results for PCBs
EPA 8080

Analyte	Detection Limit mg/kg	Results Sample ID SB-6-0.5
PCBs		
PCB 1016	0.02	ND
PCB 1221	0.08	ND
PCB 1232	0.02	ND
PCB 1242	0.02	ND
PCB 1248	0.02	ND
PCB 1254	0.02	ND
PCB 1260	0.02	ND

ND:Not Detected(<MDL)

Hossein Khosh Khoo, Ph.D.
Laboratory Director/President

Quality Control Report

Client:
Soma
2680 Bishop Dr., Ste 203
San Ramon, CA 94583

Attention : Dr. M. Sepehr

Client Project ID:
Proj 2370
4550 San Pablo Avenue
Emeryville, CA

Ref.: R4616800pcbs
Method 8080pcb
Sampled: 12/8/99
Received: 12/9/99
Matrix: Soil
Analyzed: 12/16,18/1999
Analyst DAE
Reported: 12/20/99
Units: mg/kg

Quality Control Report for PCB's

Analyte	Detection Limit mg/kg	Sample Result mg/kg	Spike Added mg/kg	% MS Recovery	% MSD Recovery	Relative % Difference RPD	Method
PCB 1260	0.02	ND	40	117	120	2.5	8080

Delta Environmental Laboratories

H.Khosh Khoo, PhD.,
Laboratory Director/President

Soma

2680 Bishop Dr., Ste 203
San Ramon, CA 94583

Client Project ID:
Proj 2370
4550 San Pablo Avenue
Emeryville, CA

Ref.:	4616400w
Method	5030GCFID/ 8020/8015M
Sampled:	12/8/99
Received:	12/9/99
Matrix:	Water
Analyzed:	12/15,18/99
Reported:	12/20/99
Units:	ug/L

Attention : Dr. M. Sepehr

Laboratory Results for BTEX & TPH Analysis

Sample	Benzene	Toluene	Ethylbenzene	Total-Xylene	TPH-Gas	TPH-Diesel
MW-1	ND	ND	ND	ND	ND	219200
MW-2	ND	ND	ND	25.9	130	ND
Det.Limits	0.5 ug/L	0.5 ug/L	0.5 ug/L	0.5 ug/L	50 ug/L	100 ug/L
Method	8020	8020	8020	8020	5030/GCFID	8015M

ND:Not Detected(< MDL)

Delta Environmental Laboratories

Hossein KhoshKhoo, Ph.D.
Laboratory Director/ President

685 Stone Road #11 & 12 • Benicia, CA 94510 • (707) 747-6081 • (800) 747-6082 • Fax (707) 747-6082

DELTA
ENVIRONMENTAL LABORATORIES, Ltd

Client:
Soma

2680 Bishop Dr., Ste 203
San Ramon, CA 94583

Attention :Dr. Sepehr

Client Project ID:
Proj 2370
4550 San Pablo Avenue
Emeryville, CA

Ref.	R4616100w
Method:	8260
Sampled:	12/8/99
Received:	12/9/99
Matrix	Water
Analyzed:	12/16/99
Reported:	12/20/99
Analyst:	DS
Unit	ug/L

Purgeable Hydrocarbons
EPA 8260
VOC

Analyte	Detection Limit ug/L	Results Sample ID MW-1	Results Sample ID MW-2
Benzene	0.5	ND	ND
Bromobenzene	0.5	ND	ND
Bromochloromethane	0.5	ND	ND
Bromodichloromethane	0.5	ND	ND
Bromoform	0.5	ND	ND
Bromomethane	0.5	ND	ND
n-Butylbenzene	0.5	ND	ND
sec-Butylbenzene	0.5	ND	ND
tert-Butylbenzene	0.5	ND	ND
Carbon Tetrachloride	0.5	ND	ND
Chlorobenzene	0.5	ND	ND
Chloroethane	0.5	ND	ND
Chloroform	0.5	ND	ND
Chloromethane	0.5	ND	ND
2-Chlorotoluene	0.5	ND	ND
4-Chlorotoluene	0.5	ND	ND
Dibromochloromethane	0.5	ND	ND
1,2-Dibromo-3-chloropropane	0.5	ND	ND
1,2-Dibromoethane	0.5	ND	ND
Dibromomethane	0.5	ND	ND
1,2-Dichlorobenzene	0.5	ND	ND
1,3-Dichlorobenzene	0.5	ND	ND
1,4-Dichlorobenzene	0.5	ND	ND
dichlorodifluoromethane	0.5	ND	ND
1,1-Dichloroethane	0.5	ND	ND
1,2,-Dichloroethane	0.5	ND	ND
1,1-Dichloroethene	0.5	ND	ND
cis-1,2-Dichloloethene	0.5	ND	ND
trans-1,2-Dichloroethene	0.5	ND	ND
1,2-Dichloropropane	0.5	ND	ND
1,3-Dichloropropane	0.5	ND	ND

1/2

DELTA

ENVIRONMENTAL LABORATORIES, Ltd

Client:
Soma

2680 Bishop Dr., Ste 203
San Ramon, CA 94583

Attention :Dr. Sepehr

Client Project ID:
Proj 2370
4550 San Pablo Avenue
Emeryville, CA

Ref.	R4616100w
Method:	8260
Sampled:	12/8/99
Received:	12/9/99
Matrix	Water
Analyzed:	12/16/99
Reported:	12/20/99
Analyst:	DS
Unit	ug/L

Purgeable Hydrocarbons
EPA 8260
VOC

Analyte	Detection Limit ug/L	Results Sample ID MW-1	MW-2
2,2-Dichloropropane	0.5	ND	ND
1,1-Dichloropropene	0.5	ND	ND
Ethylbenzene	0.5	ND	ND
Hexachlorobutadiene	0.5	ND	ND
Isopropylbenzene	0.5	ND	ND
p-Isopropyltoluene	0.5	ND	ND
Methylene Chloride	0.5	ND	ND
Naphthalene	0.5	ND	ND
n-Propylbenzene	0.5	ND	ND
Styrene	0.5	ND	ND
1,1,1,2-Tetrachloroethane	0.5	ND	ND
1,1,2,2-Tetrachloroethane	0.5	ND	ND
Tetrachloroethene	0.5	ND	ND
Toluene	0.5	ND	ND
1,2,3-Trichlorobenzene	0.5	ND	ND
1,2,4-Trichlorobenzene	0.5	ND	ND
1,1,1-Trichloroethane	0.5	ND	ND
1,1,2-Trichloroethane	0.5	ND	ND
Trichloroethene	0.5	ND	ND
Trichlorofluoromethane	0.5	ND	ND
1,2,3-Trichloropropane	0.5	ND	ND
1,2,4-Trimethylbenzene	0.5	ND	2.18
1,3,5-Trimethylbenzene	0.5	ND	2.03
Vinyl Chloride	0.5	ND	ND
Xylenes, Total	0.5	ND	22.4
cis-1,3-Dichloropropene	0.5	ND	ND
trans-1,3-Dichlopropene	0.5	ND	ND

ND: Not Detected

DELTA Environmental Laboratories
California Certification #1857

H.Khosh Khoo, PhD.
Laboratory Director/President

2/2

DELTA
ENVIRONMENTAL LABORATORIES, Ltd

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Client Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Attention: Dr. M. Sepehr

Ref. R4616200w
CL1094
Method: 8270
Sampled: 12/8/99
Received: 12/9/99
Matrix Water
Analyzed 12/15/99
Reported: 12/15/99
units: µg/L

Semi-volatile Organics

EPA 8270

Analyte	Detection Limit (µg/L)	Results	
		Sample ID	
		MW-1	MW-2
Acenaphthene	2.0	ND	ND
Acenaphthylene	2.0	ND	ND
Anthracene	2.0	ND	ND
Benzidine	2.0	ND	ND
Benzoic Acid	10.0	ND	ND
Benzo (a) anthracene	2.0	ND	ND
Benzo (b) fluoranthene	2.0	ND	ND
Benzo (k) fluoranthene	2.0	ND	ND
Benzo (g,h,i) perylene	2.0	ND	ND
Benzo (a) pyrene	2.0	ND	ND
Benzyl Alcohol	2.0	ND	ND
Bis (2-chloroethoxy) methane	5.0	ND	ND
Bis (2-choroethyl) Ether	2.0	ND	ND
Bis (2-Chloroisopropyl) Ether	2.0	ND	ND
Bis (2-ethylhexy) Phthalate	5.0	27	ND
4-Bromophenyl Phenyl Ether	5.0	ND	ND
Butylbenzyl Phthalate	5.0	ND	ND
4- Chloroaniline	2.0	ND	ND
2-Chloronaphthalene	2.0	ND	ND
4-Chlorophenyl Phenyl Ether	2.0	ND	ND
Chrysene	2.0	ND	ND
Dibenzo (a,h) anthracene	2.0	ND	ND
Dibenzofuran	2.0	ND	ND
Di-n-butyl Phthalate	5.0	ND	ND
1,2-Dichlorobenzene	2.0	ND	ND
1,3-Dichlorobenzene	2.0	ND	ND
1.4-Dichlorobenzene	2.0	ND	ND
3,3'-Dichlorobenzidine	5.0	ND	ND
Diethyl Phthalate	5.0	ND	ND
Dimethyl Phthalate	5.0	ND	ND

685 Stone Road #11 & 12 • Benicia, CA 94510 • (707) 747-6081 • (800) 747-6082 • Fax (707) 747-6082

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Client Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Attention: Naser Pakrov

Ref.	R4616200w
	CL1094
Method:	8270
Sampled:	12/8/99
Received:	12/9/99
Matrix	Water
Analyzed	12/15/99
Reported:	12/15/99
units:	µg/L

Semi-volatile Organics
EPA 8270

Analyte	Detection Limit (µg/L)	Results Sample ID	
		MW-1	MW-2
2,4-Dinitrotoluene	2.0	ND	ND
2,6-Dinitrotoluene	5.0	ND	ND
Di-n-octyl Phthalate	5.0	ND	ND
Fluoranthene	2.0	ND	ND
Fluorene	5.0	12	ND
Hexachlorobenzene	2.0	ND	ND
Hexachlorobutadiene	2.0	ND	ND
Hexachlorocyclopentadiene	2.0	ND	ND
Hexachloroethane	2.0	ND	ND
Indeno (1.2.3-cd) pyrene	2.0	ND	ND
Isophorone	2.0	ND	ND
2-Methylnaphthalene	2.0	ND	ND
Naphthalene	2.0	ND	ND
2-Nitroaniline	10.0	ND	ND
3-Nitroaniline	10.0	ND	ND
4-Nitroaniline	10.0	ND	ND
Nitrobenzene	2.0	ND	ND
N-Nitrosodiphenylamine	2.0	ND	ND
N-Nitrosodi-n-propylamine	2.0	ND	ND
Phenanthrene	2.0	13	ND
Pyrene	2.0	5.5	ND
1,2,4-Trichlorobenzene	2.0	ND	ND
4-Chloro-3-methylphenol	5.0	ND	ND

685 Stone Road #11 & 12 • Benicia, CA 94510 • (707) 747-6081 • (800) 747-6082 • Fax (707) 747-6082

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Attention: Naser Pakrov

Client Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Ref. R4616200w
CL1094
Method: 8270
Sampled: 12/8/99
Received: 12/9/99
Matrix Water
Analyzed 12/15/99
Reported: 12/15/99
units: µg/L

Semi-volatile Organics
EPA 8270

Analyte	Detection Limit (µg/L)	Results Sample ID MW-1	Results Sample ID MW-2
2-Chlorophenol	2.0	ND	ND
2,4-Dichlorophenol	10.0	ND	ND
2.4-Dimethylphenol	2.0	ND	ND
4,6-Dinitro-2-methylphenol	10.0	ND	ND
2,4-Dinitrophenol	2.0	ND	ND
2-Methylphenol	2.0	ND	ND
4-Methylphenol	2.0	ND	ND
2-Nitrophenol	2.0	ND	ND
4-Nitrophenol	10.0	ND	ND
Pentachlorophenol	10.0	ND	ND
Phenol	2.0	ND	ND
2,4,5-Trichlorophenol	2.0	ND	ND
2,4,6-Trichlorophenol	2.0	ND	ND

DELTA Environmental Laboratories
California Certification #1857

H.Khosh Khoo, PhD.,
Laboratory Director/President

Rtmp_8270_200W

685 Stone Road #11 & 12 • Benicia, CA 94510 • (707) 747-6081 • (800) 747-6082 • Fax (707) 747-6082

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Client Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Attention: Dr. M. Sepehr

Ref.	R4616200w
	CL1094
Method:	8270
Sampled:	12/8/99
Received:	12/9/99
Matrix	Water
Analyzed	12/15/99
Reported:	12/15/99
units:	µg/L

Semi-volatile Organics

EPA 8270

Analyte	Detection Limit (µg/L)	Results	
		Sample ID	
		MW-1	MW-2
Acenaphthene	2.0	ND	ND
Acenaphthylene	2.0	ND	ND
Anthracene	2.0	ND	ND
Benzidine	2.0	ND	ND
Benzoic Acid	10.0	ND	ND
Benzo (a) anthracene	2.0	ND	ND
Benzo (b) fluoranthene	2.0	ND	ND
Benzo (k) fluoranthene	2.0	ND	ND
Benzo (g,h,i) perylene	2.0	ND	ND
Benzo (a) pyrene	2.0	ND	ND
Benzyl Alcohol	2.0	ND	ND
Bis (2-chloroethoxy) methane	5.0	ND	ND
Bis (2-choroethyl) Ether	2.0	ND	ND
Bis (2-Chloroisopropyl) Ether	2.0	ND	ND
Bis (2-ethylhexy) Phthalate	5.0	27	ND
4-Bromophenyl Phenyl Ether	5.0	ND	ND
Butylbenzyl Phthalate	5.0	ND	ND
4- Chloroaniline	2.0	ND	ND
2-Chloronaphthalene	2.0	ND	ND
4-Chlorophenyl Phenyl Ether	2.0	ND	ND
Chrysene	2.0	ND	ND
Dibenzo (a,h) anthracene	2.0	ND	ND
Dibenzofuran	2.0	ND	ND
Di-n-butyl Phthalate	5.0	ND	ND
1,2-Dichlorobenzene	2.0	ND	ND
1,3-Dichlorobenzene	2.0	ND	ND
1.4-Dichlorobenzene	2.0	ND	ND
3,3'-Dichlorobenzidine	5.0	ND	ND
Diethyl Phthalate	5.0	ND	ND
Dimethyl Phthalate	5.0	ND	ND

685 Stone Road #11 & 12 • Benicia, CA 94510 • (707) 747-6081 • (800) 747-6082 • Fax (707) 747-6082

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Client Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Attention: Naser Pakrov

Ref. R4616200w
CL1094
Method: 8270
Sampled: 12/8/99
Received: 12/9/99
Matrix Water
Analyzed 12/15/99
Reported: 12/15/99
units: µg/L

Semi-volatile Organics
EPA 8270

Analyte	Detection Limit (µg/L)	Results Sample ID	
		MW-1	MW-2
2,4-Dinitrotoluene	2.0	ND	ND
2,6-Dinitrotoluene	5.0	ND	ND
Di-n-octyl Phthalate	5.0	ND	ND
Fluoranthene	2.0	ND	ND
Fluorene	5.0	12	ND
Hexachlorobenzene	2.0	ND	ND
Hexachlorobutadiene	2.0	ND	ND
Hexachlorocyclopentadiene	2.0	ND	ND
Hexachloroethane	2.0	ND	ND
Indeno (1.2.3-cd) pyrene	2.0	ND	ND
Isophorone	2.0	ND	ND
2-Methylnaphthalene	2.0	ND	ND
Naphthalene	2.0	ND	ND
2-Nitroaniline	10.0	ND	ND
3-Nitroaniline	10.0	ND	ND
4-Nitroaniline	10.0	ND	ND
Nitrobenzene	2.0	ND	ND
N-Nitrosodiphenylamine	2.0	ND	ND
N-Nitrosodi-n-propylamine	2.0	ND	ND
Phenanthrene	2.0	13	ND
Pyrene	2.0	5.5	ND
1,2,4-Trichlorobenzene	2.0	ND	ND
4-Chloro-3-methylphenol	5.0	ND	ND

685 Stone Road #11 & 12 • Benicia, CA 94510 • (707) 747-6081 • (800) 747-6082 • Fax (707) 747-6082

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Attention: Naser Pakrov

Client Project ID:
2370
4550 San Pablo Ave
Emeryville, CA

Ref. R4616200w
CL1094
Method: 8270
Sampled: 12/8/99
Received: 12/9/99
Matrix Water
Analyzed 12/15/99
Reported: 12/15/99
units: µg/L

Semi-volatile Organics
EPA 8270

Analyte	Detection Limit (µg/L)	Results Sample ID MW-1	MW-2
2-Chlorophenol	2.0	ND	ND
2,4-Dichlorophenol	10.0	ND	ND
2.4-Dimethylphenol	2.0	ND	ND
4,6-Dinitro-2-methylphenol	10.0	ND	ND
2,4-Dinitrophenol	2.0	ND	ND
2-Methylphenol	2.0	ND	ND
4-Methylphenol	2.0	ND	ND
2-Nitrophenol	2.0	ND	ND
4-Nitrophenol	10.0	ND	ND
Pentachlorophenol	10.0	ND	ND
Phenol	2.0	ND	ND
2,4,5-Trichlorophenol	2.0	ND	ND
2,4,6-Trichlorophenol	2.0	ND	ND

DELTA Environmental Laboratories
California Certification #1857

H.Khosh Khoo, PhD.,
Laboratory Director/President

Rtmp_8270_200W

685 Stone Road #11 & 12 • Benicia, CA 94510 • (707) 747-6081 • (800) 747-6082 • Fax (707) 747-6082

Quality Control Report

Client Project ID:
Proj 2370
4550 San Pablo Avenue
Emeryville, CA

Client:
Soma

2680 Bishop Dr., Ste 203
San Ramon, CA 94583

Ref. Q4616100w

Matrix: Water
Unit: ug/L

Reported 12/20/99

Attention :Dr. Sepehr

Surrogate Standard Recovery Summary
Method : EPA8260

Date Analyzed	Lab Id.	Percent Recovery Pentafluoro-benzene	Toluene d8	p-Bromofluoro-Benzene
12/16/99	Blank	100	98	100
12/16/99	Blank	99	98	100
QC limit:		70-121	81-117	74-121

Date Analyzed: 12/16/99
Sample Spiked: Blank

Matrix Spike Recovery

Analyte	Spike Added ug/L	Matrix Spike %Recovery	Matrix Spike Dup % Recovery	Relative % Difference RPD
1,1-Dichloroethene	20	90	96	6.5
Trichloroethene	20	86	88	2.3
Benzene	20	90	93	3.3
Toluene	20	88	90	2.2
Chlorobenzene	20	88	90	2.2

H.Khosh Khoo, PhD.,
Laboratory Director/President

Quality Control Report

Client:
Soma
2680 Bishop, Suite 203
San Ramon, CA 94583

Semi-Volatile Organic Compounds
EPA 8270

Ref.	Q4616200w
Method:	8270
Sampled:	12/8/99
Received:	12/9/99
Matrix	Water
Analyzed	12/14/99
Reported:	12/15/99
Unit	ug/L

Laboratory Control Sample Recovery

Analyte	Spike Added ug/L	Percent Recovery	Percent Recovery	Relative Percent Difference	QC Limit Percent Recovery
Phenol	60	26.7	26.0	2.7	12-89
2-Chlorophenol	60	46.3	47.0	1.5	12-123
1,4-Dichlorobenze	30	50.3	50.3	0.0	36-110
N-Nitroso-di-n-propylamine	30	56.3	53.3	5.5	41-130
1,2,4-Trichlorobenzene	30	45.3	44.0	2.9	39-120
4-chloro-3-methylphenol	60	60.3	58.5	3.0	20-110
Acenaphtene	30	45.3	43.3	4.5	46-135
4-Nitrophenol	60	25.0	25.3	1.2	10-130
2,4-Dinitrotoluene	30	46.3	44.7	3.5	24-115
Pentachlorophenol	60	47.8	50.2	4.9	9-190
Pyrene	30	75.0	72.3	3.7	26-140
Surrogate(s)					
Nitrobenzene -d5	25	50.8	52	2.3	35-114
2-Fluorobiphenyl	25	51.2	51.2	0.0	43-116
p-Terphenyl-d14	25	86	85.2	0.9	33-141
Phenol -d5	50	25.6	25.6	0.0	10-110
2-Fluorophenol	50	33.6	35.4	5.2	25-100
2,4,6 tribromophenol	50	48.8	51.2	4.8	10-123

H.Khosh Khoo, PhD.,
Laboratory Director/President

Quality Control Report

SOMA
2680 Bishop Drive, Suite 203
San Ramon, CA 94583

Client Project ID:
Proj 2370
4550 San Pablo Avenue
Emeryville, CA

Sample Spiked:Blank

Attention: Dr. M Sepehr

Ref.:	Q4616400w
Method	5030 GCFID/ 8020/8015M
Sampled:	12/8/99
Received:	12/9/99
Matrix:	Water
Analyzed:	12/15,18/99
Analyst	DS
Reported:	12/20/99
Units:	ug/L

Quality Control Report for TPH & BTEX

Analyte	Detection Limit ug/L	Sample Result ug/L	Spike Added ug/L	% MS Recovery	% MSD Recovery	Relative % Difference RPD	Method
Benzene	5.0	ND	20	97	97	0.0	8020
Toulene	5.0	ND	20	98	97	1.0	8020
Ethylbenzene	5.0	ND	20	91	93	2.2	8020
T-Xylene	5.0	ND	40	96	96	0.0	8020
TPH-Gas,GC/FID	50	ND	400	103	98	5.0	5030
TPH-Diesel	100	ND	0.4	112	109	2.7	8015M

Delta Environmental Laboratories

H.Khosh Khoo, PhD.,
Laboratory Director/President

Delta Environmental

Chain of Custody (COC) Form

685 Stone Road #11 & 12
Benicia, Ca. 94510
(707) 747-6081, 800-747-6082 FAX (707) 747-6082

s to: Naser Pakrou
Name SOMA Environmental Engineering
ess
Phone 925 244 6600 Fax: 925 244 6601
PLER (signature)
naround Time Standard

Project Name Proj. 2376
1550 San Pablo
LAB ID Avenue, Emeryville
Ref # CA

4616
2/2

Special Instructions::

#	Sample ID	Date	Time	Matrix	No. of containers	pH	Temperature	8015 M	8260	8220	350.1 & 350.3	6010/7000	354.1/300	8080	8020	Comments
11	SB-5-5	12/8/99		S				✓	-	-	-	-	-	-	✓	
12	SB-5-7							✓	-	-	-	-	-	-	✓	
13	SB-6-0.5							✓	✓	✓	✓	✓	✓	✓		
14	SB-6-5							✓	-	-	-	-	-	-	✓	
15	SB-6-7			W				✓	✓	✓					✓	
16	MW-1			W				✓	✓	✓					✓	
17	MW-2															

Relinquished by: Bruce Schmidt Date 12/9/99 1)
Received By: Date 2)
Date 3)
Date 12/9/99 4)

Have all samples received been stored on ice? ___
Did any VOA samples received have any head space? ___
Were samples in appropriate containers and packaged properly? ___
Were samples received in good condition? ___

Delta Env[redacted]

Chain of Custody (COC) Form

[redacted] Benicia, Ca. 94510
(707) 747-6081, 800-747-6082 FAX (707) 747-6082

Results to:	Naser Pakirou
Client Name	SOMA Environmental Engineering
Address	
Telephone	925 244 6600
Fax:	925 244 1601
SAMPLER (signature)	[signature]
Turnaround Time	Standard

Project Name: Proj. 2370

4550 San Pablo Avenue, Emeryville

LAB ID

Ref # CA

4616 (1/2)

Analysis Requested

Special Instructions::

#	Sample ID	Date	Time	Matrix	No. of containers	ill	Temperature	8015 Modified	8260	8270	350.1 & 350.3	6010/7000	354.1/300	8080		Comments
1	SB-1-0.5	12/8		Soil		✓		✓	✓	✓	✓	✓	✓	—		Do not analyze now
2	SB-1-7'	12/8		"										—		
3	SB-2-0.5	12/8		"		✓		✓	✓	✓	✓	✓	✓	—		Do not analyze now.
4	SB-2-7	12/8		"										—		
5	SB-3-0.5	12/8		"		✓		✓	✓	✓	✓	✓	✓	—		Do not analyze now
6	SB-3-7	12/8		"										—		
7	SB-4-0.5	12/8		"				✓	✓	✓	—	✓	—	—		Do not analyze for the rest
8	SB-4-5	12/8		"				✓	—	—	—	—	—	—		"
9	SB-4-7	12/8		"				✓	—	—	—	—	—	—		"
10	SB-5-0.5	12/8		"				✓	✓	✓	—	✓	—	—		

Relinquished by: [signature]	Date 12/9/99	1)
Received By: [signature]	Date 12/9/99	2)
Relinquished by:	Date	3)
Received By:	Date 12/9/99	4)

Have all samples received been stored on ice?

Have all samples received have any head space?

Did any VOA samples received have any head space?

Were samples in appropriate containers and packaged properly?

Were samples received in good condition?

WATER • WASTE WATER • HAZARDOUS WASTE • FUEL • AIR • SOIL

DELTA ENVIRONMENTAL LABORATORIES, Ltd

SOMA
2680 Bishop Drive, Suite 203
San Ramon, CA 94583

Client project ID:
Berkley Farms
San Pablo Ave
Emeryvill

Ref.:	R4689400
Method	5030 GCFID/ 8020
Sampled:	1/13/00
Received:	1/13/00
Matrix:	Water
Analyzed:	1/18/00
Reported:	1/21/00
Units:	ug/L
Analyst	DS

Attention: Dr. M Sepehr

Laboratory Results for TPH + BTEX Analysis

Analyte	EPA Method	Detection Limit ug/L	Results Sample ID	
			MW-1	MW-2
BTEX				
Benzene	8020	5.0	ND	ND
Toluene	8020	5.0	ND	ND
Ethylbenzene	8020	5.0	ND	ND
Total-Xylene	8020	5.0	ND	ND
TPH-g	5030/GCFID	50	ND	ND

ND:Not Detected(<MDL)

Delta Environmental Laboratories

Hossein Khosh Khoo, Ph.D.

Delta Environmental Laboratories

Chain of Custody (COC) Form

685 Stone Road #11 & 12
Benicia, Ca. 94510
(707) 747-6091, 800-747-6082 FAX (707) 747-6082

Results to: NASER BARROU
Client Name SOMA ENV. ENG
Address
City
Telephone 925 244 6609 Fax 925 244 6601
SAMPLER (signature)
Turnaround Time Standard

Project Name Berkeley Farms
San Pablo Ave.
Emeryville

LAB ID
Ref #

4689

Analysis Requested

#	Sample ID	Date	Time	Matrix	No. of containers	pH	Temperature	TPH g/BTEX										Comments
1	MW-1	1/13	2:30					✓										
2	MW-2	1/13	2:40					✓										

Special Instructions:

Relinquished by:	Date 1/13	1)	Have all samples received been stored on ice? ___
Received by:	Date 1/13/00	2)	Did any VOA samples received have any head space? ___
Relinquished by:	Date	3)	Were samples in appropriate containers and packaged properly? ___
	Date	4)	Were samples received in good condition?

APPENDIX 2

Lithologic Logs of MW-1 and MW-2

BORING LOG

Project No. 1011	Boring and casing diameter: 8", 2"	Logged By: JG
Project: Former Berkeley Farms Dairy	Well Cover Elevation: 42.43	Date drilled: 2/26/99
Boring No. MW-2-Dairy	Drilling Method: Hollow Stem Auger	Drilling Company: Woodward Drilling

Penetration Blows/6" PID	G.W. level	Sample Depth (ft)	Stratigraphy (USCS)	Description
		0		8" of concrete pavement over 4" of sand and gravel base.
			CL	@1' - Silty clay (CL), black (5Y 2.5/2), moist, very stiff.
5/6/10/12	PID-0	5	ML	@ 5' - Clayey silt (ML), dark olive gray (5Y 3/2), moist, very stiff, trace angular gravels to 3/8" diameter.
10/14/15/15	▽	10		@ 10' - Clayey silt with gravel (ML), olive gray (5Y 5/3), very moist, very stiff, estimated 15–25% variable gravel content, gravels are angular, to 1.5" diameter.
13/6/15/20				@ 11.5'-Sandy silt (ML), yellowish brown (10YR 5/4), v. moist, v. stiff.
		15		@ 13' - Silt (ML), light olive gray (5Y 6/2), saturated, very stiff, locally with up to 15% angular gravels to 1/2" diameter, locally clayey to sandy. Abundant Fe0 staining.
				@ 20' - Silty sand with gravel, weak red (2.5Y 4/2), saturated, medium dense, sand very fine to coarse-grained, 15% subangular gravels to 1/4" diameter, 10-15% silt and clay.
8/12/19/22		20	SM	@ 20.5' - Clayey silt (ML), olive gray (5Y 5/3), saturated, hard, trace angular gravels to 1/8" diameter, abundant Feo and MnO staining.
			ML	
		25		Total Depth: 22 feet Screen: 0.010 slot from 6-22 feet Sandpack: #2/12 sand from 5-22 feet Seal: Bentonite 3,5-5 feet, neat cement grout 0-3.5 feet.
		30		

Former Berkeley Farms Dairy
4550 San Pablo Avenue
Emeryville, California

MW2 -Dairy

Date: March 12,1999

Drawn By: JG/Geo-Logic

Boring Log and Well Completion Details

BORING LOG

Project No. 1011	Boring and casing diameter: 8", 2"	Logged By: JG
Project: Former Berkeley Farms Dairy	Well Cover Elevation: 43.27	Date drilled: 2/26/99
Boring No. MW-1-Dairy	Drilling Method: Hollow Stem Auger	Drilling Company: Woodward Drilling

Penetration Blows/6" PID	G.W. level	Sample Depth (ft)	Stratigraphy (USCS)	Description
		0		8" of concrete pavement over 4" of sand and gravel base.
			CL	@1' - Silty clay (CL), black (5Y 2.5/2), moist, very stiff.
3/6/12/15		5		@5' - Silty clay (CL), very dark gray (5Y 3/1), moist, very stiff, estimated 10% subangular gravels to 1/4" diameter.
5/6/10/14	PID-0			@7' - As above except gray (5Y 5/1), very moist, very stiff, slight odor of hydrocarbons.
9/14/14/15		10	ML	@9' - Clayey silt with gravel (ML), dark greenish gray (5G 4/1), wet, estimated 15-30% variable gravel content, mod. odor of hydrocarbons.
15/15/8/11			GW	@11' - Sandy gravel, dk. greenish gray (5G 4/1), saturated, v. stiff, v. fine to med.-grained, angular gravels to 1/2", est. 10% silt, str. odor.
		15	ML	@12.4' - Sandy silt (ML), yellowish brown (10YR 5/4), saturated, slight odor of hydrocarbons.
18/26/50-6"				@16' - Sandy silt, as above except very hard.
		20		@20' - Clayey silt with gravel (ML), yellowish brown (10YR 5/4), saturated, hard, up to 15% variable subangular gravels to 3/8"
16/20/20/36				diameter, trace to 10% v. fine-grained sand, sl. of hydrocarbons.
		25		Total Depth: 22 feet Screen: 0.010 slot from 6-22 feet Sandpack: #2/12 sand from 5-22 feet Seal: Bentonite 3,5-5 feet, neat cement grout 0-3.5 feet.
		30		

Former Berkeley Farms Dairy
4550 San Pablo Avenue
Emeryville, California

MW1 -Dairy

Date: March 12,1999

Drawn By: JG/Geo-Logic

Boring Log and Well Completion Details

APPENDIX 3

Map of Subsurface Utility Lines Passing Through San Pablo Avenue

45TH ST.

EXIST. 6" SAN. SEWER MAIN. N.I.C.

REMOVE 1,100 L.F. OF 8" SANITARY SEWER MAIN FROM STA. 23+00 (MATCHLINE) TO STA. 34+00 (MATCHLINE). REPLACE WITH 10" VCP EXTRA STRENGTH SEWER PIPE. INSTALL WYE FITTING AT EACH ACTIVE HOUSE CONNECTION SEWER LOCATION. REMOVE AND REPLACE ACTIVE HOUSE CONNECTION SEWER. INSTALL TWO-WAY CLEANOUT AT PROPERTY LINE

NON-FLOW RAISED INVERT ON SOUTH PIPE IN MANHOLE DIRECTS FLOW NORTH. MAINTAIN SAME.

STREET

4575

PLUG

23-002-22 (23-002-37)

TEL.

6" water main

23-002-23

23-002-47

Gas main

23-002-46

MEDIAN ISLAND - S

EXIST. 8" SAN. SEWER

26.47

27.85

29.21

31.69

EXIST. 8" SANITARY SEWER MAIN

CHECK MANHOLE AND MAIN FOR POSSIBLE EXISTING PLUG.

5' JOINTS ON MAIN

2' JOINTS ON MAIN

2' JOINTS ON MAIN.

2' JOINTS ON

27+00

28+00

29+00

30+00

31+00

32+00

4334, # 4336

4340

4342

4344

4346

4348

4500

4550

4700

45TH ST.

23-002-48

47TH

EXIST. 6" SAN. SEWER MAIN

46, 47, 48 NECESSARY PROCEDURES

MATCH LINE STA. 1+18
SEE SHEET NO. 9.

REMOVE EXISTING 6" SANITARY SEWER MAIN. INSTALL 118 L.F. OF 8" V.C.P. EXTRA STRENGTH SEWER PIPE FROM STA. 0+00 TO STA. 1+18 (MATCH LINE). INSTALL WYE FITTING AT EACH ACTIVE HOUSE CONNECTION SEWER LOCATION. REPLACE HOUSE CONNECTION SEWERS. INSTALL TWO WAY CLEANOUT AT PROPERTY LINE.

FOR LOCATION AND WORK INCLUDED SEE SHEET Nos 10 AND 11.

PLAN

6+00

27+00

28+00

29+00

30+00

31+00

32+00

RIM EL. 43.70 FT.

EL. 43.22 FT.

PLAN

27+00

28+00

29+00

30+00

31+00

32+00

33+00

S.RIM EL. 43.22

S.RIM EL. 42.52 FT

S.RIM EL. 41.21 FT

EXISTING STREET GRADE P

ANHOLE

EXIST. MANHOLE

EXISTING MANHOLE

EXISTING MANHOLE

EX

38.01 FT

INV. ELE. 36.91 FT

INV. ELE. 35.88 FT

INV. ELE. 34.55 FT

PROFILE SCALE 1" = 2' VERTICAL

1" = 40' HORIZONTAL

APPENDIX 4

Human Health Screening Evaluation Detailed Dose and Hazard Calculations

Incidental Ingestion of Soil

COPC		Maximum Soil Concentration (mg/kg)	Residential Average Daily Intake (mg/kg-day)	Oral RfD (mg/kg-day)	Noncarcinogenic Hazard Quotient
	SVOCs				
Phenol		3.40E-01	4.35E-06	6.00E-01	7.25E-06
				Hazard Index	**7.25E-06**

Dermal Contact with Soil

COPC	Maximum Soil Concentration (mg/kg)	Dermal Absorption Factor	Residential Average Daily Intake (mg/kg-day)	Dermal RfD (mg/kg-day)	Noncarcinogenic Hazard Quotient
SVOCs					
Phenol	3.40E-01	0.10	4.35E-06	6.00E-01	7.25E-06
				Hazard Index	**7.25E-06**

Inhalation of Soil Particulates

COPC	Maximum Soil Concentration (mg/kg)	Air Concentration of Suspended Particulate (mg/m^3)	Residential Average Daily Intake (mg/kg-day)	Inhalation RfD (mg/kg-day)	Noncarcinogenic Hazard Quotient
SVOCs					
Phenol	0.34	1.70E-08	1.09E-08	6.00E-01	1.81E-08
				Hazard Index	**1.81E-08**

APPENDIX 5

Indoor Air – Vapor Intrusion Model Output

Indoor Air – Vapor Intrusion Model Output

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

S

YES	

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	25.9	o-Xylene

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)
15	213.36	SIC	19

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
SIC			1.5	0.43	0.3

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinoger (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	NA	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	4.3E-06

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES	

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	X

conservative surrogate for 1,2,4-trimethylbenzene

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	2.18	o-Xylene

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)
15	213.36	SIC	19

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
SIC			1.5	0.43	0.3

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinoger (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	NA	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	4.2E-05

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

S

YES	

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	2.03	o-Xylene

Conservative surrogate for 1,3,5-trimethylbenzene

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)
15	213.36	SIC	19

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
SIC			1.5	0.43	0.3

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinoger (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	NA	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	3.9E-05

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

S

YES	

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_w (µg/L)	Chemical
86737	12	Fluorene

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)
15	213.36	SIC	19

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
SIC			1.5	0.43	0.3

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinoger (µg/L)	Risk-based Indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final Indoor exposure groundwater conc., (µg/L)
NA	NA	NA	NA	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.0E-07

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

S

YES	

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	X

surrogate for phenanthrene

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
129000	13	Pyrene

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)
15	213.36	SIC	19

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
SIC			1.5	0.43	0.3

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

RESULTS SHEET

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinoger (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	NA	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to Indoor air, noncarcinogen (unitless)
NA	4.9E-08

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

S

YES	

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
129000	5.5	Pyrene

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)
15	213.36	SIC	19

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone soil dry bulk density, ρ_b^v (g/cm^3)	ENTER Vadose zone soil total porosity, n^v (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^v (cm^3/cm^3)
SIC			1.5	0.43	0.3

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
1.0E-06	1	70	30	30	350

Used to calculate risk-based groundwater concentration.

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinoger (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	NA	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.1E-08

APPENDIX 6

Blood-Lead Model Output

Blood-Lead Model Output

LEAD RISK ASSESSMENT SPREADSHEET

CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

INPUT

MEDIUM	LEVEL
LEAD IN AIR (ug/m^3)	0.1
LEAD IN SOIL (ug/g)	110.0
LEAD IN WATER (ug/l)	15
LANT UPTAKE? 1=YES 0=NC	0
RESPIRABLE DUST (ug/m^3)	50

OUTPUT

	percentiles					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT (ug/dl)	2.0	3.1	3.5	4.0	4.4	3531.6	5217.2
BLOOD Pb, CHILD (ug/dl)	3.7	5.8	6.5	7.6	8.3	288.0	581.8
BLOOD Pb, PICA CHILD (ug/dl)	9.4	14.7	16.7	19.3	21.2	21.2	42.9
BLOOD Pb, INDUSTRIAL (ug/dl)	1.9	3.0	3.4	3.9	4.3	4361.5	6405.5

EXPOSURE PARAMETERS

	units	residential adults	residential children	residential children with pica	industrial adults
eneral					
Days per week	days/wk	7	7	7	5
rmal Contact					
Skin area	cm^2	3700	2800	2800	5800
Soil adherence	mg/cm^2	0.5	0.5	0.5	0.5
Route-specific constant	(ug/dl)/(ug/day)	0.00011	0.00011	0.00011	0.00011
oil ingestion					
Soil ingestion	mg/day	25	55	790	25
Route-specific constant	(ug/dl)/(ug/day)	0.0176	0.0704	0.0704	0.0176
halation					
Breathing rate	m^3/day	20	10	10	20
Route-specific constant	(ug/dl)/(ug/day)	0.082	0.192	0.192	0.082
ater ingestion					
Water ingestion	l/day	1.4	0.4	0.4	1.4
Route-specific constant	(ug/dl)/(ug/day)	0.04	0.16	0.16	0.04
ood ingestion					
Food ingestion	kg/day	2.2	1.3	1.3	2.2
Route-specific constant	(ug/dl)/(ug/day)	0.04	0.16	0.16	0.04
Dietary concentration	ug/kg	10.0	10.0	10.0	10.0
Lead in produce	ug/kg	10.0	10.0	10.0	

PATHWAYS, ADULTS

Pathway	Residential Blood Pb ug/dl	Residential percent of total	Industrial Blood Pb ug/dl	Industrial percent of total	Concentration in medium
SOIL CONTACT:	0.02	1%	0.02	1%	110 ug/g
SOIL INGESTION:	0.05	2%	0.03	2%	110 ug/g
INHALATION:	0.17	9%	0.12	6%	0.11 ug/m^3
WATER INGESTION:	0.84	43%	0.84	44%	15 ug/l
FOOD INGESTION:	0.88	45%	0.88	46%	10.0 ug Pb/kg diet

PATHWAYS, CHILDREN

Pathway	Typical Blood Pb ug/dl	Typical percent of total	with pica Blood Pb ug/dl	with pica percent of total	concentration in medium
SOIL CONTACT:	0.02	0%	0.02	0%	110 ug/g
SOIL INGESTION:	0.43	12%	6.12	65%	110 ug/g
INHALATION:	0.20	5%	0.20	2%	0.11 ug/m^3
VATER INGESTION:	0.96	26%	0.96	10%	15 ug/l
OOD INGESTION:	2.08	56%	2.08	22%	10.0 ug Pb/kg diet