

**CORRECTIVE ACTION PLAN
STID 23
2801 MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA
SCI 838.006**

Aug 1999


Prepared for:

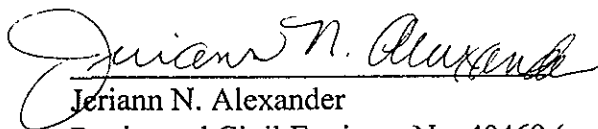
Ms. Eva Chu
Hazardous Materials Specialist
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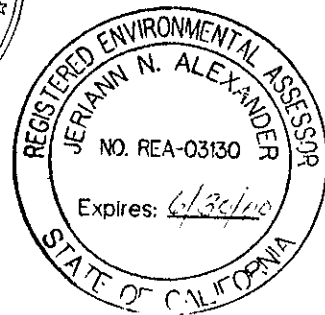
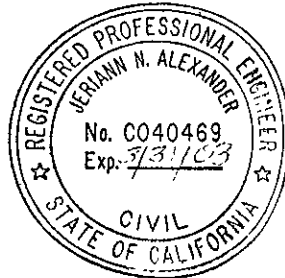
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August 13, 1999



Subsurface Consultants, Inc.

ENVIRONMENTAL
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LETTER OF TRANSMITTAL

TO: Eva Chu **DATE:** August 16, 1999
Hazardous Materials Specialist
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FROM: Gene Ng

PROJECT: Corrective Action Plan/STID 23/2801 MacArthur Blvd., Oakland

SCI JOB NUMBER: 838.006

OFFICE SENT FROM: Lafayette

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| <input type="checkbox"/> grading/foundation plans | <input type="checkbox"/> as requested |
| <input type="checkbox"/> soil samples/groundwater samples | <input type="checkbox"/> |
| <input type="checkbox"/> executed contract | <input type="checkbox"/> |

REMARKS:

cc: (2) Aniko Molnar, 7 Morning Sun Avenue, Mill Valley, CA 94941

(1) APA Fund, 1904 Franklin Street, #501, Oakland, CA 94612

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Distribution

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1.0 INTRODUCTION

This Corrective Action Plan (CAP) prepared by Subsurface Consultants, Inc. (SCI) addresses proposed remediation/cleanup actions to be undertaken at the 2801 MacArthur Boulevard property in Oakland, California, referred to herein as the Site (see Plate 1: Site Location Map). In their letter dated March 8, 1999, the Alameda County Health Care Services (ACHCSA) commented that before Site closure can be granted, the elevated benzene concentrations in soil must be remediated to protect construction and utility workers, and any future occupants of a commercial structure built on-Site. This CAP discusses and selects a strategy to remediate subsurface benzene concentrations in soil.

2.0 SITE DESCRIPTION

The Site occupies the western portion of a parcel bounded by MacArthur Boulevard to the north, Coolidge Avenue to the west, Georgia Street to the south, and a strip mall shopping center to the east (See Plate 2: Site Plan, Current Station Improvements). Businesses at the shopping center include a liquor store, a TV & VCR repair service, a beauty salon, a dry cleaner, and a termite control service. The Site is approximately 180 feet wide along MacArthur Boulevard, 240 feet wide along Georgia Street, and 180 feet wide along the eastern border. Remnants of a former gasoline service station, including the station building, canopy and pump islands, occupy the Site. Currently, the station building is being used by an auto repair business. The remainder of the property is covered by asphalt and concrete paved parking areas.

The Site is located within an upland area near the western flank of the Oakland Hills. The topography of the area is characterized by rolling terraces incised by narrow drainage channels. Locally, the Site is situated on a southwest trending terrace.

3.0 BACKGROUND

The property has been commercially developed since the early 1930s, and records indicate that the Site has a long history of occupancy by gasoline service stations. In May 1989, three underground storage tanks (USTs) and associated fuel dispensing underground lines were removed from the Site. Approximately 435 cubic yards (cy) of fuel impacted soil were subsequently excavated to a depth of 15 feet below ground surface (bgs) and removed from the Site, and clean fill was placed into the resulting excavation. A 1,000 gallon waste oil tank and previously abandoned underground lines were also removed from the Site in July 1989. Former UST and fuel line locations are shown on Plate 3: Site Plan, Former Station Improvements.

Site investigations conducted to date include studies performed by SCI, Riedel Environmental Services, Inc., and Streamborn. Documents prepared for the Site are listed in Section 10.0, References.

4.0 EXTENT OF PETROLEUM HYDROCARBON IMPACTS

The following sections summarize data from Site studies performed by SCI and others listed in Section 10.0.

4.1 Impacts to Soil

Analytical data indicate that total volatile hydrocarbons as gasoline (TVHg), and benzene, toluene, ethyl benzene, and total xylenes (BTEX) remain in soils left in-place following UST removal. No other volatile organic compounds other than BTEX have been detected in soil. Concentrations of TVHg detected in soil samples range from at or near non-detectable concentrations to 13,000 milligrams per kilogram (mg/kg) in sample location SG-3 at 15 feet bgs. BTEX concentrations in soil ranged from at or near non-detectable concentrations to maximum concentrations of 76, 280, 150, and 790 mg/kg, respectively (sample location SG-3 at 15 feet bgs).

Investigations indicate that the highest detected soil contamination is located within the vicinity of the two existing pump islands where significantly impacted soils appear to be localized between 7 to 15 feet bgs. No chemicals of concern were detected in borings upgradient of the USTs (B-1, B-2, and B-5); these borings bound the upgradient extent of soil contamination. In July 1994, TVHg and BTEX were detected in soil samples from well M-6 (the furthest downgradient well) at 300, 0.66, 0.78, 4, and 5.8 mg/kg respectively, at a depth interval of 39.5 to 40 feet bgs. No TVHg or BTEX were detected at concentrations above detection limits in soil samples from wells M-5 or M-3, the furthest outlying wells southwest and southeast of the former UST and pumping island locations. Soil data are summarized in Table 1.

4.2 Impacts to Groundwater

No free-product has been detected in any wells or piezometers sampled to date. The dissolved product plume consists of TVHg, BTEX, and MtBE. Monitoring data indicate that the dissolved product plume is centered within the vicinity of the pump islands. The highest TVHg and BTEX concentrations measured to date were detected in samples from piezometer P-2. MtBE, which had not been analyzed for in investigations prior to June 1999, was detected only in well M-2 at a concentration of 410 micrograms per liter (ug/L). Groundwater data are summarized in Table 2.

4.3 Groundwater Bio-parameters

Accompanying the October 1996 groundwater monitoring event was an analysis of groundwater bio-parameters including nutrients, total dissolved solids, pH, dissolved oxygen, and bacterial plate count. These analyses and similar analyses performed in November 1995 were conducted to evaluate the bio-treatability of the dissolved product plume.

These data indicated that naturally occurring hydrocarbon degrading bacteria were flourishing in the area of well M-4 and were active in the area of piezometer P-2 in November 1995. Nutrient

concentrations generally varied inversely with cell counts, indicating microbial consumption of petroleum hydrocarbons. Analyses performed in November 1996 indicated that naturally occurring petroleum hydrocarbon degrading bacteria were not present in wells M-4 and M-6. Groundwater bio-parameter data are summarized in Table 3.

4.4 Impacts to Vadose Zone Vapor

Soil vapor samples obtained in December 1998 from three test borings at depths of 3 and 6 feet bgs all detected the presence of TVHg and BTEX. Vapor samples collected from locations SG-2 and SG-3 situated near the pump islands detected concentrations of benzene which exceeded the Risk Based Screening Level (RBSL) of 0.384 parts per million by volume (ppmv). Benzene RBSLs were developed by Weiss Associates in conjunction with the San Francisco Bay Regional Water Quality Control Board (RWQCB-SFB). The RBSL for toluene was also exceeded in the vapor from sample SG-3 from a depth of 6 feet. Soil vapor data are summarized in Table 4.

5.0 HYDROGEOLOGY

5.1 Hydrogeologic Conditions

The Site is underlain by alluvial soils consisting of inter-layered stiff to very stiff sandy and silty clays and dense clayey sands and gravels. The first water bearing zone exists approximately 20 to 30 feet bgs. Historically, groundwater depths have varied from approximately 20 to 41 bgs. Based on data from this year, the groundwater depth ranges from approximately 24 to 32 feet bgs. Groundwater recharge rates vary between individual wells and piezometers; overall however, the wells recharge relatively slowly.

Based on the historic groundwater data, the groundwater flow direction has been consistently to the south or southwest at a gradient varying from approximately 2 to 10 percent. Groundwater levels fluctuate approximately 5 to 10 feet seasonally. Historic groundwater elevation data are presented in Table 5. Groundwater contours representing data collected in June 1999 are presented on Plate 4: Groundwater Elevation Contours.

5.2 Drinking Water Wells and Sensitive Receptors

According to a report prepared by David Keith Todd Consulting Engineers, Inc. (1986), groundwater is not used as a drinking water source or for any known purpose in this area. The potential for development of groundwater for municipal use is negligible due to low transmissivity of the aquifer, low storage capacity of the aquifer, and the potential for contamination from the densely urbanized location.

Based on a study by the California Regional Water Quality Control Board and the Alameda County Flood Control and Water Conservation District (1988), the closest well to the Site lies approximately 1,100 feet north-northwest of the Site at the northwest corner of Laguna and Scenic

Avenues. This well is used for industrial purposes. The total well depth is listed as 120 feet; no information regarding the depth to groundwater was listed. No other wells are known to exist within 2,000 feet of the Site.

Two branches of Peralta Creek exist as underground culverts approximately 600 feet from the Site. The Curran Branch is located east of the Site and the Laguna Branch is located west of the Site. Given their distance from the Site, the regional topography, and the chemical data generated to date, it is unlikely these drainages will be impacted by releases originating at the Site.

6.0 CORRECTIVE ACTION ALTERNATIVES

This section presents corrective action goals and corrective action alternatives for the Site. Based on SCI's Risk Assessment conducted in 1997, the contaminant of concern from a human health standpoint was determined to be benzene in the vadose zone. Benzene vapor has the potential to migrate vertically into utility and foundation trenches, construction worker spaces, and/or into interior spaces. Elevated benzene levels have been found in soil and soil vapor in the area of the existing pump islands. The ACHCSA has indicated that before site closure can be granted, benzene impacted soils must be remediated.

6.1 Corrective Action Goals

Corrective action goals have been determined for soil based on the Urban Land Redevelopment (ULR) Program - Oakland Specific Risk-Based Corrective Action (RBCA) model (1999). The Oakland RBCA approach is based on the methodologies prescribed in *the Standard Guide for Risk-Based Corrective Action Applied to Petroleum Release Sites* (ASTM, 1995). However, by using Oakland-specific geologic input parameters, the Oakland RBCA model now better represents site-specific risks.

The Oakland RBCA model allows the selection of geologic input parameters for three predominate soil types found in the Oakland area. For the model, soils are classified as follows:

Merritt Sands

Merritt Sands are mostly located in the flatlands area west of Lake Merritt. They are a fine-grained, silty sand with lenses of sandy clay and clay (Radbruch 1957). Merritt Sands have a low moisture content and high permeability.

Sandy Silts

Sandy Silts are found throughout Oakland. They are made up of unconsolidated, moderately sorted sand, silt and clay sediments, with fine-grained and course-grained materials. Sandy silts have a medium moisture content and moderate permeability.

other parameters changed:

Vadose zone thickness from 239.9 cm to $\overset{24.93'}{759.9}$ cm

Foundation air content from $0.26 \text{ cm}^3/\text{cm}^3$ to $0.25 \text{ cm}^3/\text{cm}^3$

Foundation water content from $0.12 \text{ cm}^3/\text{cm}^3$ to $0 \text{ cm}^3/\text{cm}^3$

Clayey Silts

Clayey Silts are primarily found along the Bay and estuary, and in land fills from these areas. They may contain organic materials, peaty layers and small lenses of sand. Clayey Silts have a high moisture content and low permeability.

Based on our studies, the sandy silt classification best represents the vadose zone soil conditions at the Site. The Oakland RBCA model for a site underlain by soils of the sandy silt classification was used as the basis for calculating the corrective action goals of site-specific target levels (SSTLs) for benzene. A complete listing of the Oakland RBCA model input parameters is listed in Table 6. The model was then further modified (Tier 3 Analysis) to reflect the following existing site and future commercial/light industrial property use conditions:

Exposure Parameters	Exposure Duration	24 years	
	Exposure Time to Indoor/Outdoor Air (occupational exposure time per USEPA 1997)	8hr/day	
	Indoor Inhalation Rate (1.4m ³ /hr based on moderate activity after Lawton 1993)	11m ³ /day	<i>- why want 20 m³/d used?</i>
Saturated Zone Parameters	Groundwater Mixing Zone	300 cm	= 9.84'
Vadose Zone Parameters	Depth to Subsurface Soil Sources (As discussed below impacts to 15 feet bgs will be removed)	457.2 cm	= 15 feet
	Depth to Groundwater	820 cm	= 26.9'

The Commercial indoor and Outdoor SSTLs for benzene versus depth bgs as calculated in the Tier 3 Analysis are summarized in the following table:

- use DTW avg around P1 and P2 (around dispenser) = 25' = 762 cm
- for Depth to soil source, Run one for 10' (304 cm) and 15' (457 cm)

SSTL for Benzene

<i>Depth (feet bgs)</i>	<i>Commercial Outdoor SSTL (mg/kg)</i>	<i>Commercial Indoor SSTL (mg/kg)</i>
2.5	68	45
5	140	46
7.5	210	47
10	270	49
12.5	340	50
15	410	51
17.5	480	52
20	550	54
22.5	620	55
25	680	56
27.5	750	57
30	820	58
32.5	890	60
35	960	61

The benzene concentrations in soil at sample location SG-3 near the pump islands exceed the commercial indoor SSTLs at a depth of 15 feet bgs. In addition, elevated levels of benzene were measured in shallow soil vapor from the same area. Therefore to be protective of human health, soil containing benzene concentrations higher than those presented in the preceding table and soil containing benzene vapors above 0.384 ppmv should be remediated.

6.2 Corrective Action Alternatives for Soil

The overall goal of soil remediation at the Site is to reduce the residual mass of benzene in the vadose zone to levels which will be protective of human health. Three corrective action alternatives were considered as follows:

- Natural Attenuation (Passive Bioremediation Techniques),
- Enhanced Bioremediation (Bio-stimulation or Bio-augmentation Techniques), and
- Excavation (Total Soil Removal).

Natural Attenuation

The objective of this in situ alternative is to allow passive natural processes, specifically indigenous bacteria, to destroy the residual benzene that remains in the Site soil. This "no action" alternative can be appropriate if several conditions are satisfied:

- Water wells and/or sensitive receptors are not likely to be impacted by benzene mobilized from impacted soil, and
- Residual contamination in soil does not pose a significant risk to human health or the environment.

Enhanced Bioremediation

By providing existing bacteria with additional oxygen, it may be possible to accelerate the rate of benzene destruction in soil. This would be accomplished by installing a network of air extraction and injection wells to force air movement through the vadose zone. The vapor purged or extracted would contain volatilized hydrocarbons, and may need to be treated prior to release into the atmosphere.

Excavation

This option involves over-excavating soil to reduce the mass of benzene. The area of required excavation would include at a minimum the area between the station building and the sidewalk along MacArthur Boulevard, extending east to west from the former tank area excavation to piezometer P-3 (see Plate 5). This area covers all areas estimated to have benzene levels above commercial SSTLs. Cross sections which illustrate the extent of soil potentially containing elevated benzene levels are shown on Plates 6 to 8. The excavation would be extended to a minimum of 15 feet bgs and confirmation soil samples would be analyzed for benzene for comparison to the SSTL. If found to be below the SSTL, excavation will stop. Otherwise, areas where benzene concentrations exceed the SSTL will be excavated further until benzene concentrations are below the SSTL, or the excavation reaches the groundwater table (approximately 25 feet bgs).

7.0 EVALUATION OF CORRECTIVE ACTION ALTERNATIVES

The evaluation of remedial options examines each option in regards to the expected remedial effectiveness of the option, time necessary for remediation, and implementability of the option.

7.1 Natural Attenuation

The overall effectiveness of natural attenuation is judged to be very limited due to the presence of high benzene concentrations in the shallow soil in the vicinity of the pump islands. This is essentially a source of benzene vapor exposure that has been left in-place. Microbial activity would be optimal only in the areas where moisture conditions facilitate bacterial growth, such as in the groundwater mixing zone. Therefore, extended time frames would be required to attain benzene concentrations that meet corrective action goals in the dryer, shallow soils near the pump islands. Any microbial activity would also require extensive monitoring.

Implementation of this option would not change existing conditions. Ongoing minor disturbances of current operations of the facility would occur as monitoring or soil studies are conducted. This option would result in minimal disturbances to local residents near the Site and businesses adjacent to the Site.

In the event of new building construction on the Site, an air exchange system would be required to mitigate soil vapors migrating indoors from shallow soils; extra building construction measures may be necessary during the installation of this system. Construction workers and utility repair workers would have to be notified and appropriately trained regarding potential exposure to benzene vapors. In addition, there would be added costs to handle impacted soils which may be encountered during construction and repair activities.

7.2 Enhanced Bioremediation

Enhanced bioremediation may prove to be effective over the long term. Air sparging and vapor extraction wells installed at the Site would require maintenance during this time period, as would the vapor treatment system. As with the natural attenuation alternative, any microbial activity would require extensive monitoring in order to evaluate the effectiveness of the treatment alternative.

Implementation of this option would not significantly change existing conditions and therefore not interfere with current operations of the facility. However, future construction would be limited until benzene levels are reduced. The only major change would be the presence of the vapor treatment system, which must be located somewhere on-Site. This option may present minimal visual and noise disturbances to local residents near the Site and businesses adjacent to the Site due to the operation of the vapor treatment system.

7.3 Excavation

Excavation is an effective method to eliminate soil contamination and to reduce potential exposure to both construction workers and future building occupants. Remediation is comprised of removing benzene impacted soil and backfilling of the excavated area with clean, construction-grade fill. The installation of new monitoring wells would be required in the area of the backfilled excavation in order to conduct future monitoring activities. The timeframe to attain corrective action goals will likely be one year.

Implementation of this option may require shoring of the excavation to protect utility lines along MacArthur Boulevard and to preserve the integrity of the service building foundation. Less extensive shoring plans may be appropriate in the event that the service building is demolished prior to remediation activities. Facility operations on-Site would be terminated to implement this excavation option. A minor disruption to nearby business operations and blocking off of the sidewalk along MacArthur Boulevard would also occur.

8.0 SELECTION OF REMEDIAL ALTERNATIVE

Excavation of the benzene impacted soil is proposed as the most immediate and cost-effective means of remediating the Site in a timely manner. It is anticipated that the depth of excavation will be dictated by soil benzene concentrations in the vicinity of the pumping islands, which were measured to be above the commercial indoor SSTLs. The phases involved in excavation at the Site would be as followed:

- 1) Selection of a health and safety trained contractor with known experience with soil remediation projects,
- 2) Obtaining all necessary and applicable permits from city and county departments,
- 3) Removal of pump islands, overhangs, and other structures in the area of excavation,
- 4) Installation of a shoring system,
- 5) Excavation of soil to 15 feet bgs in the area shown in Plate 5,
- 6) Chemical analysis of soil samples from the sides and bottom of the 15-foot bgs excavation,
- 7) Continued excavation of "hot spot" areas where benzene concentrations are above the commercial indoor SSTL until remedial goals are met, and *@ 15' → 51 ppm benzene*
17.5' → 52 ppm
20.' → 54 ppm
- 8) Backfilling excavation with clean, construction grade fill.

It is anticipated that the only area in need of excavation beyond 15 feet bgs will be the area below and between the pump islands. If the service building at the Site is demolished, sheet piles would only be required along the sidewalk on MacArthur Boulevard to protect the street and utility lines. The rest of the excavation could be sloped back. If the service building is not demolished, sheet piling would also be required to shore the excavation on the side adjacent to the service building. The use of sheet piles would limit the ability to obtain sidewall samples for chemical analyses.

SCI has estimated that about 1,500 cy of soil would be excavated from the baseline excavation assuming that sheet piles are used along MacArthur Boulevard and all other sides of the excavation are sloped back as necessary to provide a safe working environment. Additional soil may need to be removed from hot spot areas.

The excavated soil will need to be pre-qualified for disposal at an appropriate landfill. Pre-qualification may require additional analytical testing.

9.0 LIMITATIONS

SCI has prepared this report in a professional manner, using that degree of skill and care exercised for similar projects under similar conditions by reputable and competent environmental consultants. SCI shall not be responsible for conditions or consequences arising from relevant facts that were concealed, withheld, or not fully disclosed at the time the report was prepared. SCI also notes that the facts and conditions referenced in this report may change over time and that the conclusions and recommendations set forth herein are applicable only to the facts and conditions as described at the time of this report. SCI believes the conclusions stated herein to be factual, but no guarantee is made or implied.

This report has been prepared for the benefit of the A.P.A Fund and its assigns. The information contained in this report, including all exhibits and attachments, may not be used by any other party without the express written consent of SCI.

10.0 REFERENCES

- 1) Riedel Environmental Services, Inc., *Report: Tank Removal*, report dated June 9, 1989.
- 2) Riedel Environmental Services, Inc., *Report: Remedial Investigation*, report dated December 9, 1989.
- 3) Streamborn, *Data Submittal – Groundwater Monitoring*, report dated April 6, 1991.
- 4) Streamborn, *Additional Soil and Groundwater Investigation*, report dated August 20, 1991.
- 5) Subsurface Consultants, Inc., *Supplemental Soil and Groundwater Investigation*, report dated July 14, 1993.
- 6) Subsurface Consultants, Inc., *Supplemental Soil and Groundwater Investigation, Monitoring Wells M-5 and M-6*, report dated March 30, 1995.
- 7) Subsurface Consultants, Inc., *Quarterly Groundwater Monitoring, Sampling Event – April 1995*, report dated June 28, 1995.
- 8) Subsurface Consultants, Inc., *Quarterly Monitoring, October 1995 and January 1996*, report dated February 8, 1996.

- 9) Subsurface Consultants, Inc., *Quarterly Monitoring, April 1996*, report dated June 10, 1996.
- 10) Subsurface Consultants, Inc., *Quarterly Monitoring, October 1996*, report dated January 9, 1997.
- 11) Subsurface Consultants, Inc., *Risk Assessment and Case closure Petition*, report dated January 9, 1997.
- 12) Subsurface Consultants, Inc., *Addendum, Risk Assessment and Case closure Petition*, letter dated October 28, 1997.
- 13) Subsurface Consultants, Inc., *Additional Investigation*, report dated February 1, 1999.
- 14) Lynn Spence and Mark Gomez, *Oakland Risk Based Corrective Action: Technical Background Document*, document dated May 17, 1999.
- 15) Subsurface Consultants, Inc., *Quarterly Monitoring, June 1999*, report dated July 23, 1999.

Table 1
 Petroleum Hydrocarbon and Volatile Organic Concentrations in Soil
 2801 MacArthur Boulevard
 Oakland, California

Sample Location	Sample		Sampler	Oil &				Ethyl-Benzene (mg/kg)	Total Xylenes (mg/kg)	MtBE (mg/kg)
	Depth (feet)	Sample Date		TVHg (mg/kg)	Grease (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)			
B1	20.0-20.5	6/12/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B1	25.0-25.5	6/12/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B1	30.0-30.5	6/12/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B2	5.0-5.5	7/13/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B2	10.0-10.5	7/13/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B2	15.0-15.5	7/13/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B2	20.0-20.5	7/14/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B2	25.0-25.5	7/14/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B2	30.0-30.5	7/14/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B2	5.0-358.5	7/14/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B3	5.0-5.5	7/13/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B3	10.0-10.5	7/13/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B3	15.0-15.5	7/13/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B3	20.0-20.5	7/14/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B3	25.0-25.5	7/14/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B3	30.0-30.5	7/14/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B3	35.0-35.5	7/14/89	Riedel	72	--	<0.05	<0.1	<0.1	<0.1	--
B3	38.0-38.5	7/14/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B3	39.5-40.0	7/13/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B3	41.0-41.5	7/13/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B3	42.0-42.5	7/13/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B4	5.0-5.5	7/14/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B4	10.0-10.5	7/14/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B4	15.0-15.5	7/14/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B4	20.0-20.5	7/14/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B4	25.0-25.5	7/14/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B4	30.0-30.5	7/14/89	Riedel	150	--	<0.25	<0.5	<0.5	<0.5	--
B4	35.0-35.5	7/14/89	Riedel	5,300	--	<5.0	<10.0	<10.0	<10.0	--
B4	36.5-37.0	7/14/89	Riedel	7.9	--	<0.05	<0.1	<0.1	<0.1	--
B4	38.0-38.5	7/14/89	Riedel	<1.0	--	<0.05	<0.1	<0.1	<0.1	--
B4	39.0-39.5	7/14/89	Riedel	71	--	<0.25	<0.5	<0.5	<0.5	--
B4	40.5-41.0	7/14/89	Riedel	15	--	<0.05	<0.1	<0.1	<0.1	--
B5	20.0-20.5	8/24/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B5	25.0-25.5	8/24/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B5	30.0-30.5	8/24/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B5	35.0-35.5	8/24/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B5	40.0-40.5	8/24/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B5	45.0-45.5	8/24/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B6	20.0-20.5	8/24/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B6	25.0-25.5	8/24/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--

Table 1
Petroleum Hydrocarbon and Volatile Organic Concentrations in Soil
2801 MacArthur Boulevard
Oakland, California

Sample Location	Sample Depth (feet)	Sample Date	Sampler	TVHg (mg/kg)	Oil & Grease (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-Benzene (mg/kg)	Total Xylenes (mg/kg)	MtBE (mg/kg)
B6	30.0-30.5	8/24/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B6	35.0-35.5	8/24/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B6	40.0-40.5	8/24/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B7	15.0-15.5	8/24/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B7	20.0-20.5	8/25/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B7	25.0-25.5	8/25/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B7	30.0-30.5	8/25/89	Riedel	<10	--	0.13	<0.025	<0.075	<0.075	--
B7	33.0-33.5	8/25/89	Riedel	380	--	<0.025	3	1	3.5	--
B7	36.0-36.5	8/25/89	Riedel	65	--	<0.025	0.12	0.19	0.44	--
B7	41.0-41.5	8/25/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B7	45.5-46.0	8/25/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B7	51.0-51.5	8/28/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B8	15.0-15.5	8/28/89	Riedel	<10	--	<0.025	0.097	<0.075	<0.075	--
B8	20.0-20.5	8/28/89	Riedel	21	--	<0.025	0.19	0.36	0.63	--
B8	25.0-25.5	8/28/89	Riedel	<10	--	<0.025	0.05	<0.075	<0.075	--
B8	30.0-30.5	8/30/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B8	35.5-36.0	8/30/89	Riedel	<10	--	<0.025	0.13	0.15	0.26	--
B8	40.5-41.0	8/30/89	Riedel	<10	--	<0.025	0.056	<0.075	<0.075	--
B8	45.0-45.5	8/30/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B8	50.0-50.5	8/30/89	Riedel	<10	--	<0.025	0.222	<0.075	<0.075	--
B9	6.5-7.0	8/30/89	Riedel	20	--	0.026	0.46	<0.075	0.2	--
B9	9.5-10.0	8/30/89	Riedel	<10	--	<0.025	<0.025	<0.075	<0.075	--
B9	16.5-17.0	8/30/89	Riedel	490	--	0.7	0.61	2	15	--
B9	21.0-21.5	8/30/89	Riedel	1,500	--	4.1	3.4	14	62	--
B9	26.5-27.0	8/30/89	Riedel	1,100	--	3	28	13	68	--
B9	31.5-32.0	8/30/89	Riedel	79	--	0.35	0.8	0.61	2	--
B9	35.0-35.5	8/30/89	Riedel	<10	--	0.39	0.13	<0.075	0.2	--
B9	40.5-41.0	8/30/89	Riedel	<10	--	<0.025	0.043	<0.075	<0.075	--
B9	45.5-46.0	8/30/89	Riedel	<10	--	<0.025	0.066	<0.075	<0.075	--
B9	51.0-51.5	8/30/89	Riedel	<10	--	0.31	0.046	<0.075	<0.075	--
B10	15.5-16	10/18/90	Streamborn	<2.5	<10	<0.005	<0.005	<0.005	<0.075	--
B10	21-21.5	10/18/90	Streamborn	<2.5	<10	<0.005	<0.005	<0.005	<0.005	--
B10	30.5-31	10/18/90	Streamborn	<2.5	<10	<0.005	<0.005	<0.005	<0.005	--
B10	45.5-46	10/18/90	Streamborn	<2.5	<10	<0.005	<0.005	<0.005	<0.005	--
B11	21-21.5	10/18/90	Streamborn	<2.5	<10	<0.005	<0.005	<0.005	<0.005	--
B11	31-31.5	10/18/90	Streamborn	230	<10	0.15	0.47	0.88	1.6	--
B11	36-36.5	10/18/90	Streamborn	<2.5	<10	<0.005	<0.005	<0.005	<0.005	--
B11	46-46.5	10/18/90	Streamborn	<2.5	<10	<0.005	<0.005	<0.005	<0.005	--
B12	28.5-29	4/28/93	SCI	<1	--	<0.005	<0.005	<0.005	<0.005	--

Table 1
Petroleum Hydrocarbon and Volatile Organic Concentrations in Soil
2801 MacArthur Boulevard
Oakland, California

Sample Location	Sample Depth (feet)	Sample Date	Sampler	TVHg (mg/kg)	Oil & Grease (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-Benzene (mg/kg)	Total Xylenes (mg/kg)	MtBE (mg/kg)
B12	30.5-31	4/28/93	SCI	<1	--	<0.005	<0.005	<0.005	<0.005	--
B12	34.5-35	4/28/93	SCI	<1	--	<0.005	<0.005	<0.005	<0.005	--
P1	25.5-26	10/19/90	Streamborn	<2.5	--	<0.005	<0.005	<0.005	<0.005	--
P1	35-35.5	10/19/90	Streamborn	7.4	--	0.011	<0.005	<0.005	<0.005	--
P1	40.5-41	10/19/90	Streamborn	<2.5	--	<0.005	<0.005	<0.005	<0.005	--
P1	49.7-50.3	10/19/90	Streamborn	<2.5	--	<0.005	<0.005	<0.005	<0.005	--
P2	20.5-21	10/19/90	Streamborn	<2.5	<10	<0.005	<0.005	<0.005	<0.005	--
P2	30-30.5	10/19/90	Streamborn	20	<10	0.018	<0.005	<0.005	0.013	--
P2	35.5-36	10/19/90	Streamborn	95	<10	0.21	0.2	14	0.33	--
P2	55.5-56	10/19/90	Streamborn	<2.5	<10	<0.005	<0.005	<0.005	<0.005	--
P3	35.5-36	3/18/91	Streamborn	990	--	5.8	24	11	20	--
P3	40.5-41	3/18/91	Streamborn	<1	--	<0.005	<0.005	<0.005	<0.005	--
M1	20.5-21	10/20/90	Streamborn	<2.5	<10	<0.005	<0.005	<0.005	<0.005	--
M1	25.5-26	10/20/90	Streamborn	<2.5	<10	<0.005	<0.005	<0.005	<0.005	--
M1	35.5-36	10/20/90	Streamborn	82	<10	<0.005	0.019	0.028	0.026	--
M1	45.5-46	10/20/90	Streamborn	<2.5	<10	<0.005	<0.005	<0.005	<0.005	--
M2	26-26.5	4/18/91	Streamborn	1.3	--	0.32	<0.005	0.04	0.036	--
M2	31-31.5	4/18/91	Streamborn	490	--	<0.005	0.41	3.4	7.5	--
M2	36-36.5	4/18/91	Streamborn	33	--	<0.005	0.072	0.099	0.094	--
M2	41-41.5	4/18/91	Streamborn	25	--	0.17	0.079	0.13	0.12	--
M2	46-46.5	4/18/91	Streamborn	<1	--	<0.005	<0.005	<0.005	<0.005	--
M3	22-22.5	4/28/93	SCI	<1	--	<0.005	<0.005	<0.005	<0.005	--
M3	27-27.5	4/28/93	SCI	<1	--	<0.005	<0.005	<0.005	<0.005	--
M3	30.5-31	4/28/93	SCI	<1	--	<0.005	<0.005	<0.005	<0.005	--
M4	31-31.5	4/27/93	SCI	<1	--	<0.005	<0.005	<0.005	<0.005	--
M4	33-33.5	4/27/93	SCI	130	--	0.43	0.49	2	4.5	--
M4	36-36.5	4/27/93	SCI	120	--	0.54	0.9	1.1	4.4	--
M4	39-39.5	4/27/93	SCI	<1	--	<0.005	<0.005	<0.005	<0.005	--
M5	29-29.5	7/26/94	SCI	<1	--	<0.005	<0.005	<0.005	<0.005	--
M6	36.5-37	7/28/94	SCI	330	--	<0.070	1.1	2.7	3	--
M6	39.5-40	7/28/94	SCI	300	--	0.66	0.78	4	5.8	--
SG-1	6	12/1/98	SCI	<1	--	<0.005	<0.005	<0.005	<0.005	<0.020
SG-1	10	12/1/98	SCI	<1	--	<0.005	<0.005	<0.005	<0.005	<0.020
SG-1	15	12/1/98	SCI	<1	--	<0.005	<0.005	<0.005	<0.005	<0.020

Table 1
Petroleum Hydrocarbon and Volatile Organic Concentrations in Soil
2801 MacArthur Boulevard
Oakland, California

Sample Location	Sample Depth (feet)	Sample Date	Sampler	TVHg (mg/kg)	Oil & Grease (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-Benzene (mg/kg)	Total Xylenes (mg/kg)	MtBE (mg/kg)
SG-2	7	12/1/98	SCI	400h	--	1.2	0.38c	5.2	23	<0.40
SG-2	10	12/1/98	SCI	480h	--	1.1	2.0	6.3	32	<0.40
SG-2	15	12/1/98	SCI	480h	--	0.17	2.0	4.2	22	<0.40
SG-3	7	12/1/98	SCI	1,300	--	4.5	18	16	81	<2.0
SG-3	10	12/1/98	SCI	4,200	--	33	100	63	31	4.5
SG-3	15	12/1/98	SCI	13,000	--	76	280	150	790	<10

Notes:

mg/kg = milligrams per kilogram

Riedel = Riedel Environmental Services, Inc.

SCI = Subsurface Consultants, Inc.

<1.0 = Analyte not present at a concentration above the stated detection limit

h = heavier hydrocarbons than standard

c = presence of this compound confirmed by a second column, however the confirmation concentration differed from the reported results by more than a factor of two

Table 2
 Petroleum Hydrocarbon and Volatile Organic Concentrations in Groundwater
 2801 MacArthur Boulevard
 Oakland, California

Sample Location	Groundwater			TVHg (ug/l)	Benzene (ug/l)	Toluene (ug/l)	Ethyl-benzene (ug/l)	Total Xylenes (ug/l)	MTBE (ug/l)
	Sample Date	Elevation (feet)							
P-1	1/16/92	963.00		6,700	500	4.4	80	40	--
	3/9/93	966.80		5,600	1,100	29	63	120	--
P-2	11/6/90	960.40		33,000	4,700	2,100	380	630	--
	1/16/92	964.10		99,000	6,500	12,000	2,000	16,000	--
	3/9/93	974.20		70,000	5,900	11,000	2,100	12,000	--
	5/17/93	974.10		87,000	6,600	13,000	2,200	13,000	--
	8/17/93	969.50		80,000	5,800	12,000	2,000	12,000	--
	12/13/93	966.80		100,000	5,600	12,000	2,200	14,000	--
	3/7/94	972.40		77,000	5,100	11,000	2,000	12,000	--
	8/23/94	967.50		70,000	3,800	8,700	1,500	9,900	--
	4/27/95	977.50		44,000	3,600	8,500	1,500	9,300	--
	10/30/95	968.20		66,000	4,600	11,000	2,100	13,600	--
	4/17/96	976.50		58,000	4,800	9,900	1,900	12,900	--
	6/23/99	973.00		57,000	1,800	4,700	1,300	9,300	<25
P-3	8/17/93	970.60		900	180	65	10	93	--
	10/30/95	971.30		2000	650	45	31	156	--
	6/23/99	974.60		14,000	3,300	190	140	756	<10
M-2	5/7/91	968.30		16,000	1,300	950	170	890	--
	1/16/92	964.50		22,000	960	570	370	1,800	--
	3/9/93	966.00		27,000	1,100	970	490	1,400	--
	5/17/93	972.40		17,000	1,200	770	480	1,300	--
	8/17/93	969.20		20,000	1,700	910	540	1,400	--
	12/13/93	965.60		51,000	2,200	1,400	700	2,600	--
	3/7/94	969.50		28,000	1,400	900	640	1,800	--
	8/23/94	967.30		21,000	1,600	540	520	1,100	--
	4/26/95	975.20		14,000	1,200	510	490	870	--
	10/30/95	968.20		16,000	1,700	830	470	1,120	--
	4/17/96	974.00		10,000	1,300	610	380	810	--
6/23/99	972.40		1,900	150	19	32	24.8	410	
M-3	5/17/93	970.60		<50	<0.5	<0.5	<0.5	<0.5	--
	8/17/93	967.80		<50	<0.5	<0.5	<0.5	<0.5	--
	12/13/93	967.00		<50	<0.5	<0.5	<0.5	<0.5	--
	3/7/94	969.70		<50	<0.5	<0.5	<0.5	<0.5	--
	8/23/94	967.00		<50	<0.5	<0.5	<0.5	<0.5	--
	4/27/95	973.20		<50	<0.5	<0.5	<0.5	<0.5	--
M-4	5/17/93	965.80		7,500	1,200	230	11	350	--
	8/17/93	--		13,000	3,000	330	130	700	--
	12/13/93	962.80		11,000	2,700	190	90	360	--
	3/7/94	966.60		3,800	980	33	49	140	--
	8/23/94	964.20		19,000	5,800	200	460	630	--
	4/27/95	969.80		2,300	510	40	69	120	--
	11/1/95	965.40		1,100	470	14	23	26	--

Table 2
Petroleum Hydrocarbon and Volatile Organic Concentrations in Groundwater
2801 MacArthur Boulevard
Oakland, California

Sample Location	Sample Date	Groundwater				Toluene (ug/l)	Ethyl-benzene (ug/l)	Total Xylenes (ug/l)	MTBE (ug/l)
		Elevation (feet)	TVHg (ug/l)	Benzene (ug/l)					
M-4	4/17/96	969.50	550*	330	<2.5	5.9	16.1	--	
	6/23/99	967.80	4,000	<0.5	69	190	195	<0.5	
M-5	8/23/94	961.10	<50	<0.5	<0.5	<0.5	<0.5	--	
	4/27/95	972.40	<50	<0.5	<0.5	<0.5	<0.5	--	
	11/1/95	961.40	<50	<0.5	<0.5	<0.5	<0.5	--	
	4/17/96	971.20	<50	<0.5	<0.5	<0.5	<0.5	--	
	6/23/99	966.40	<50	<0.5	<0.5	<0.5	<0.5	<0.5	
M-6	10/11/94	959.50	3,600	340	27	65	240	--	
	4/26/95	969.90	150	9.3	<0.5	5.6	1.7	--	
	11/1/95	962.80	170	0.6	<0.5	<0.5	0.6	--	
	1/22/96	975.70	<50	<0.5	<0.5	<0.5	<0.5	--	
	4/17/96	969.20	<50	<0.5	<0.5	<0.5	1	--	
	7/12/96	965.10	<50	<0.5	<0.5	<0.5	<0.5	--	
	11/7/96	--	<50	<0.5	<0.5	<0.5	<0.5	--	
	6/23/99	966.00	340	14	<0.5	19	<0.5	<0.5	

TVH = Total volatile hydrocarbons in the gasoline range.

ug/l = Micrograms per liter = parts per billion.

<50 = Analyte not present at a concentration above the stated detection limit.

* = Sample exhibits a fuel pattern which does not resemble the standard.

-- = Sample not analyzed for analyte.

Table 3
Bio-parameters in Groundwater
2801 MacArthur Boulevard
Oakland, California

Sample ID Number	Sample Date	Dissolved				pH	Hydrocarbon Degraders (cfu/mL)
		Oxygen (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Phosphate (mg/L)		
P-2	11/1/95	8.2-8.4	0.40	<0.01	0.40	8.7	1.3x10 ³
M-4	11/1/95	3.0-4.0	0.25	<0.01	0.25	6.9	1.2x10 ⁵
	11/7/96	3.4	0.4	0.0	0.0	7.09	<1.5x10 ²
M-6	11/7/96	6.3	0.2	0.0	0.4	7.14	<1.5x10 ²

Notes:

mg/L = milligrams per liter

cfu/mL = colony forming units per milliliter

<0.01 = Not detected above reporting limit stated

Table 4
Petroleum Hydrocarbon and Volatile Organic Compound Concentrations
in Soil Vapor Samples
2801 MacArthur Boulevard
Oakland, California

Sample ID @ Depth (feet)	TVHg (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethylbenzene (ppmv)	Total Xylenes (ppmv)
SG-1 @ 3'	0.49 B	0.010 J	0.023	0.0049 J	0.022 J
SG-1 @ 6'	0.26 B	0.0025 J	0.014	<0.0024	0.013 J
SG-2 @ 3'	280 B	24	0.58 J	6.9	22
SG-2 @ 6'	490 B	63	2.2	18	64
SG-3 @ 3'	7.9 B	0.42	0.43	0.066	0.24
SG-3 @ 6'	3600 B	310	320	64	260
<hr/>					
Average SG Concentrations at 3		8.14	0.34	2.32	7.42
Average SG Concentrations at 6		124	107	27	108
<hr/>					
RBSLs @ 3'	--	0.384	140	358	2,604

Notes:

ppmv = parts per million by volume

RBSLs = Risk Based Screening Levels for commercial receptors assuming no building slab and a carcinogenic risk of 1 in 100,000, as calculated by Weiss Associates in conjunction with the RWQCB-SFB

J = Estimated value

B = Compound present in laboratory blank, background subtraction not performed.

<0.0024 = compound not detected above laboratory detection limit

Table 5
 Summary of Groundwater Elevation Data
 2801 MacArthur Boulevard
 Oakland, California

Well	TOC ¹ Elevation (feet)	Date	Groundwater Depth (feet)	Groundwater Elevation (feet)
M-1	1000	10/24/90	36.1	963.9
		10/25/90	36.1	963.9
		11/2/90	36.4	963.6
		11/6/90	36.8	963.2
		11/16/90	36.8	963.2
		11/23/90	36.9	963.1
		11/28/90	37.0	963.0
		12/5/90	37.2	962.8
		3/18/91	35.8	964.2
		3/29/91	32.4	967.6
		4/3/91	31.9	968.1
		4/9/91	31.6	968.4
		4/16/91	31.2	968.8
		1/23/92	35.5	964.5
		3/9/93	29.1	970.9
		6/1/93	27.5	972.5
		12/13/93	33.9	966.1
		3/7/94	32.3	967.7
		8/23/94	32.3	967.7
		10/11/94	34.1	965.9
		4/26/95	24.4	975.6
10/27/95	31.3	968.7		
1/22/96	31.1	968.9		
4/15/96	25.6	974.4		
7/10/96	27.7	972.3		
12/1/98	--	paved over		
M-2	999.6	4/30/91	31.1	968.5
		5/7/91	31.3	968.3
		1/16/92	35.1	964.5
		3/9/93	33.6	966.0
		5/17/93	27.2	972.4
		6/1/93	27.6	972.0
		8/17/93	30.4	969.2
		12/13/93	34.0	965.6
		3/7/94	30.1	969.5
		8/23/94	32.3	967.3
		10/11/94	34.2	965.4
		4/26/95	24.4	975.2
		10/27/95	31.4	968.2
		1/22/96	31.2	968.4
		4/15/96	25.6	974.0
		7/10/96	27.8	971.8
		12/1/98	30.9	968.7
6/23/99	27.3	972.4		

Table 5
 Summary of Groundwater Elevation Data
 2801 MacArthur Boulevard
 Oakland, California

Well	TOC ¹ Elevation (feet)	Date	Groundwater Depth (feet)	Groundwater Elevation (feet)
M-3	992.8	5/17/93	22.2	970.6
		6/1/93	23.3	969.5
		8/17/93	25.0	967.8
		12/13/93	25.8	967.0
		3/7/94	23.1	969.7
		8/23/94	25.8	967.0
		10/11/94	27.4	965.4
		4/26/95	19.6	973.2
		10/27/95	25.4	967.4
		1/22/96	24.2	968.6
		4/15/96	20.9	971.9
		7/10/96	22.9	969.9
		12/1/98	23.5	969.3
M-4	999.6	5/17/93	33.8	965.8
		6/1/93	32.5	967.1
		12/13/93	36.8	962.8
		3/7/94	33.0	966.6
		8/23/94	35.4	964.2
		10/11/94	37.1	962.5
		4/26/95	29.8	969.8
		10/27/95	34.2	965.4
		1/22/96	30.1	969.5
		4/15/96	30.1	969.5
		7/10/96	32.0	967.6
		12/1/98	34.5	965.1
		6/23/99	31.8	967.8
M-5	992.9	8/23/94	31.8	961.1
		10/11/94	33.6	959.3
		4/26/95	20.5	972.4
		10/27/95	31.5	961.4
		1/22/96	25.6	967.3
		4/15/96	21.7	971.2
		7/10/96	26.8	966.1
		12/1/98	28.8	964.1
		6/23/99	26.5	966.4
M-6	997.7	8/23/94	41.2	956.5
		10/11/94	38.2	959.5
		4/26/95	27.8	969.9
		10/27/95	34.9	962.8
		1/22/96	22.0	975.7
		4/15/96	28.5	969.2
		7/10/96	32.6	965.1
		12/1/98	--	inaccessible
		6/23/99	31.7	966.0

Table 5
Summary of Groundwater Elevation Data
2801 MacArthur Boulevard
Oakland, California

Well	TOC ¹ Elevation (feet)	Date	Groundwater Depth (feet)	Groundwater Elevation (feet)
P-1	999.6	10/24/90	37.9	961.7
		10/25/90	38.0	961.6
		11/2/90	38.4	961.2
		11/6/90	38.7	960.9
		11/16/90	38.3	961.3
		11/23/90	38.1	961.5
		11/28/90	38.3	961.3
		12/5/90	38.2	961.4
		3/18/91	37.8	961.8
		3/29/91	36.9	962.7
		4/3/91	36.8	962.8
		4/9/91	36.9	962.7
		4/16/91	36.7	962.9
		4/18/91	36.8	962.8
		4/30/91	36.3	963.3
		5/7/91	36.2	963.4
		1/16/92	36.6	963.0
		3/9/93	32.8	966.8
		6/1/93	30.0	969.6
		12/13/93	33.7	965.9
		3/7/94	32.6	967.0
		8/23/94	32.7	966.9
		10/11/94	33.5	966.1
4/26/95	27.6	972.0		
10/27/95	31.8	967.8		
1/22/96	33.3	966.3		
4/15/96	28.2	971.4		
7/10/96	29.3	970.3		
12/1/98	31.9	967.7		
P-2	997.8	10/24/90	41.1	956.7
		10/25/90	40.6	957.2
		11/2/90	38.4	959.4
		11/6/90	37.0	960.8
		11/16/90	37.4	960.4
		11/23/90	35.9	961.9
		11/28/90	35.4	962.4
		2/5/90	35.0	962.8
		3/18/91	31.4	966.4
		3/29/91	28.2	969.6
		4/3/91	26.8	971.0
		4/9/91	26.5	971.3
		4/16/91	26.5	971.3
		4/18/91	26.5	971.3
		4/30/91	26.7	971.1
		5/7/91	27.0	970.8
1/16/92	33.7	964.1		

Table 5
 Summary of Groundwater Elevation Data
 2801 MacArthur Boulevard
 Oakland, California

Well	TOC ¹ Elevation (feet)	Date	Groundwater Depth (feet)	Groundwater Elevation (feet)
P-2 (cont'd)		3/9/93	23.6	974.2
		5/17/93	23.7	974.1
		6/1/93	24.4	973.4
		8/17/93	28.3	969.5
		12/13/93	31.0	966.8
		3/7/94	25.4	972.4
		8/23/94	30.3	967.5
		10/11/94	32.3	965.5
		4/26/95	19.9	977.9
		10/27/95	29.6	968.2
		1/22/96	27.4	970.4
		4/15/96	21.3	976.5
		7/10/96	25.0	972.8
		12/1/98	28.2	969.6
	6/23/99	24.8	973.0	
P-3	999.1	3/29/91	24.7	974.4
		4/3/91	25.1	974.0
		4/9/91	25.9	973.2
		4/16/91	26.2	972.9
		4/18/91	26.2	972.9
		4/30/91	26.8	972.3
		5/7/91	27.4	971.7
		1/23/92	32.5	966.6
		3/9/93	24.8	974.3
		6/4/93	23.9	975.2
		8/17/93	28.5	970.6
		12/13/93	29.3	969.8
		3/7/94	25.0	974.1
		8/23/94	30.1	969.0
		10/11/94	32.0	967.1
		4/26/95	20.5	978.6
		10/27/95	27.8	971.3
		1/22/96	26.7	972.4
4/15/96	21.4	977.7		
7/10/96	25.1	974.0		
12/1/98	27.2	971.9		
6/23/99	24.5	974.6		

25.34' avg.

24.98' avg.

pecific datum. Temporary Bench Mark No. 1,
 of northernmost pump island. Assumed elevation
 = 1,000.0 feet.

Table 6
Tier 3 Input Parameters
(Sandy Silt)

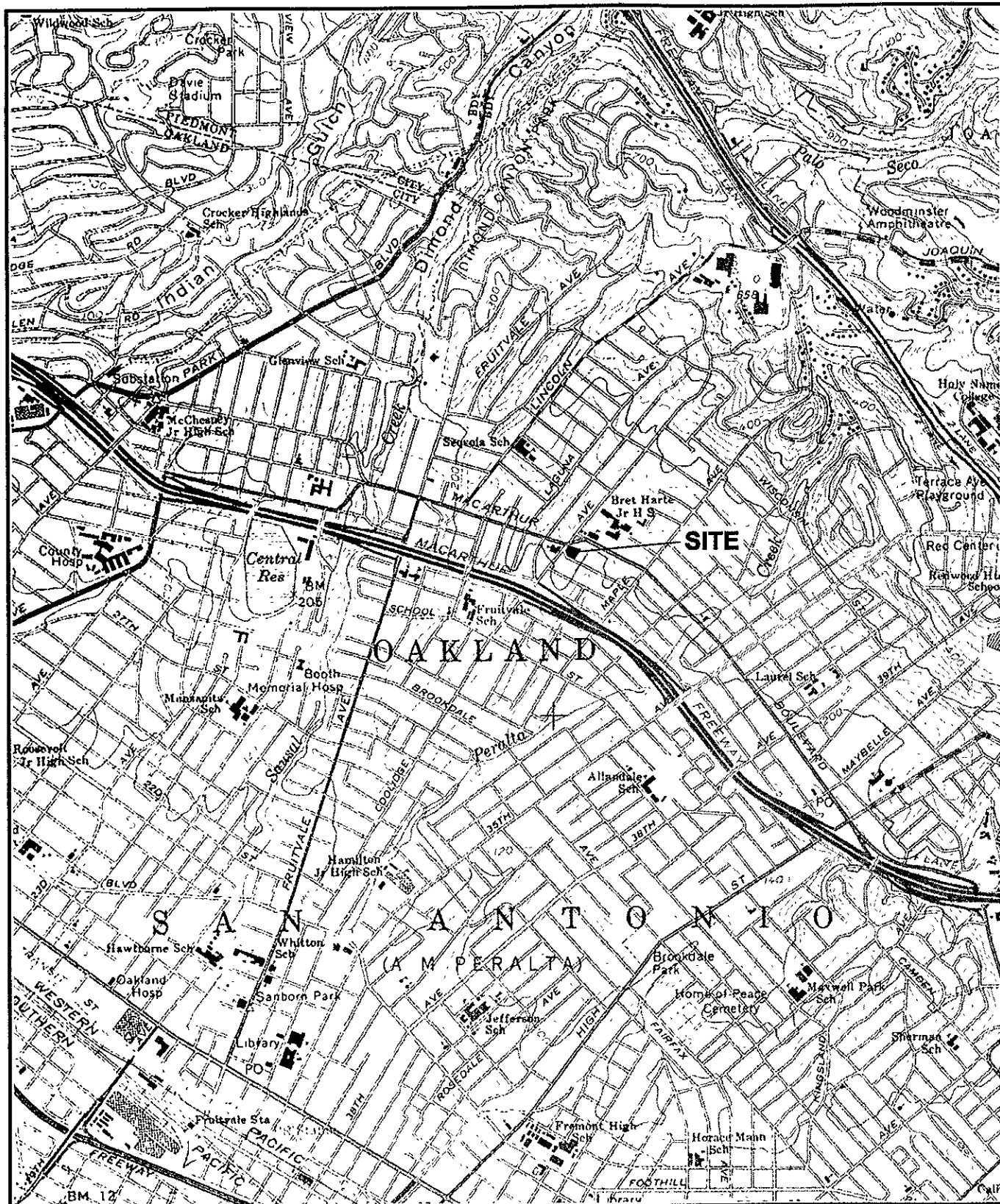
		Risk Scenario		
		Residential		Commercial
TARGET RISK LEVELS	Units	Value for ADULT	Value for CHILD	Value for Industrial
Target cancer risk (IHL OR)	unitless	1.0E-05	= adult res.	1.0E-05
Target hazard quotient	unitless	1.0	= adult res.	1.0
		Residential		Commercial
EXPOSURE PARAMETERS	Units	Value for ADULT	Value for CHILD	Value for Industrial
Average time for carcinogens	yr	70	= adult res.	= adult res.
Average time for non-carcinogens	yr	24	6	24
Body weight	kg	70	15	70
Exposure duration	yr	24	6	24
Exposure frequency	d/yr	350	350	250
Exposure time to indoor air	hr/d	24	24	8
Exposure time to outdoor air	hr/d	16	16	8
Soil ingestion rate	mg/d	100	200	50
Indoor inhalation rate	m ³ /d	15	10	11
Outdoor inhalation rate	m ³ /d	20	10	20
Groundwater ingestion rate	L/d	2	1	1
Soil to skin adherence factor	mg/cm ²	0.5	0.5	0.5
Skin surface area exposed to soil	cm ²	5000	2000	5000
Exp. freq. to water used for recreation	d/yr	120	120	0
Exp. time to water used for recreation	hr/d	1.0	2	0
Skin surface area exposed to water used for recreation	cm ²	20000	8000	0
Ingestion rate of water used for recreation	L/hr	0.05	0.05	0

**Table 6
Tier 3 Input Parameters
(Sandy Silt)**

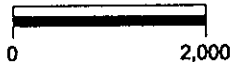
		Residential		Commercial
SATURATED ZONE PARAMETERS		Value for ADULT	Value for CHILD	Value for Industrial
	Units			
Groundwater plume velocity	cm/yr	60	=adult res.	=adult res.
Groundwater mixing zone thickness	cm	300	=adult res.	=adult res.
		Residential		Commercial
VADOSE ZONE PARAMETERS		Value for ADULT	Value for CHILD	Value for Industrial
	Units			
Lower depth of surficial soil zone	cm	100.0	=adult res.	=adult res.
Fraction organic carbon (f _{OC})	g oc/g soil	0.015	=adult res.	=adult res.
Vadose zone thickness	cm	759.8	=adult res.	=adult res.
Infiltration rate through the vadose zone	cm/yr	6	=adult res.	=adult res.
Depth to groundwater	cm	820	=adult res.	=adult res.
Depth to subsurface soil surface	cm	457.2	=adult res.	=adult res.
Vadose zone air content	cm ³ /cm ³	0.15	=adult res.	=adult res.
Total soil porosity	cm ³ /cm ³	0.4	=adult res.	=adult res.
Vadose zone water content	cm ³ /cm ³	0.25	=adult res.	=adult res.
Soil bulk density	g/cm ³	1.59	=adult res.	=adult res.
Capillary fringe thickness	cm	60.1	=adult res.	=adult res.
Capillary fringe air content	cm ³ /cm ³	0.020	=adult res.	=adult res.
Capillary fringe water content	cm ³ /cm ³	0.38	=adult res.	=adult res.

**Table 6
Tier 3 Input Parameters
(Sandy Silt)**

OUTDOOR AND INDOOR VOLATILIZATION/BUILDING PARAMETERS	Units	Residential		Commercial
		Value for ADULT	Value for CHILD	Value for Industrial
Indoor air exchange rate	1/s	5.60E-04	=adult res.	1.40E-03
Building air volume/floor area	cm ³ /cm ²	229	=adult res.	305
Foundation thickness	cm	15	=adult res.	15
Area fraction of cracks in building foundation	cm ² /cm ²	0.001	=adult res.	0.001
Foundation air content	cm ³ /cm ³	0.25	=adult res.	=adult res.
Foundation water content	cm ³ /cm ³	0	=adult res.	=adult res.
Particulate emission rate	g/cm ² -s	1.38E-11	=adult res.	1.38E-11
Wind speed above ground surface in outdoor air mixing zone	cm/s	322	=adult res.	=adult res.
Width of source area parallel to wind or groundwater flow direction	cm	1500	=adult res.	=adult res.
Outdoor air mixing zone height	cm	200	=adult res.	=adult res.
Averaging time for vapor flux	s	9.46E+08	=adult res.	7.88E+08



APPROXIMATE SCALE IN FEET



SITE LOCATION MAP

2801 MACARTHUR BLVD.
OAKLAND, CALIFORNIA

PLATE

1

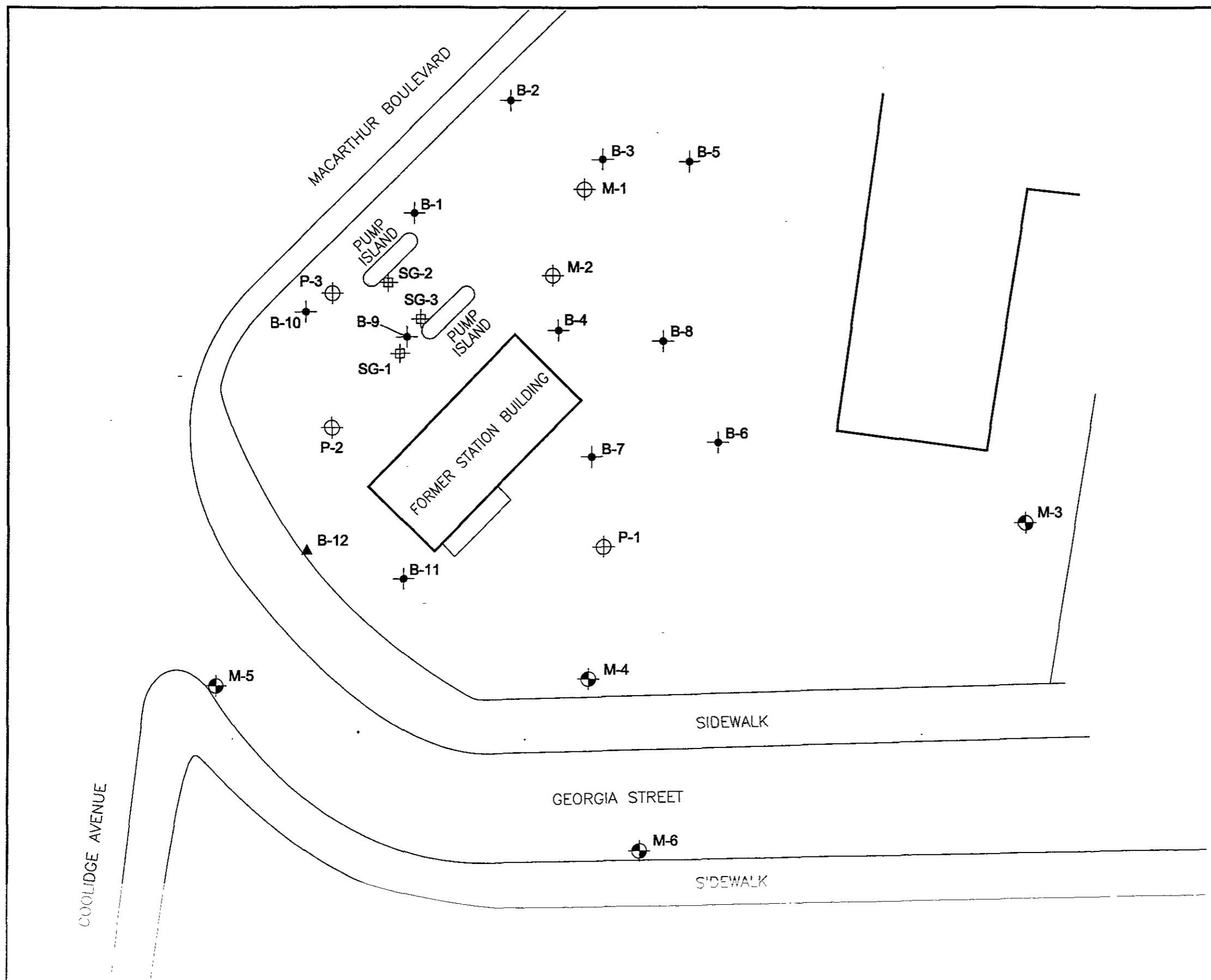


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Geotechnical & Environmental Engineers

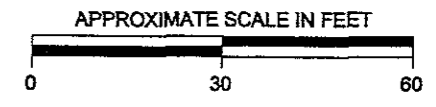
JOB NUMBER
838.006

DATE
08/99

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[Signature]










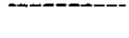

- Explanation:
- Monitoring Well by SCI
 - Test Boring by SCI
 - Monitoring Well by others
 - Test Boring by others
 - Soil Vapor and Soil Sampling Location
 - Former Tank Excavation (1989)

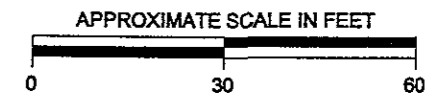
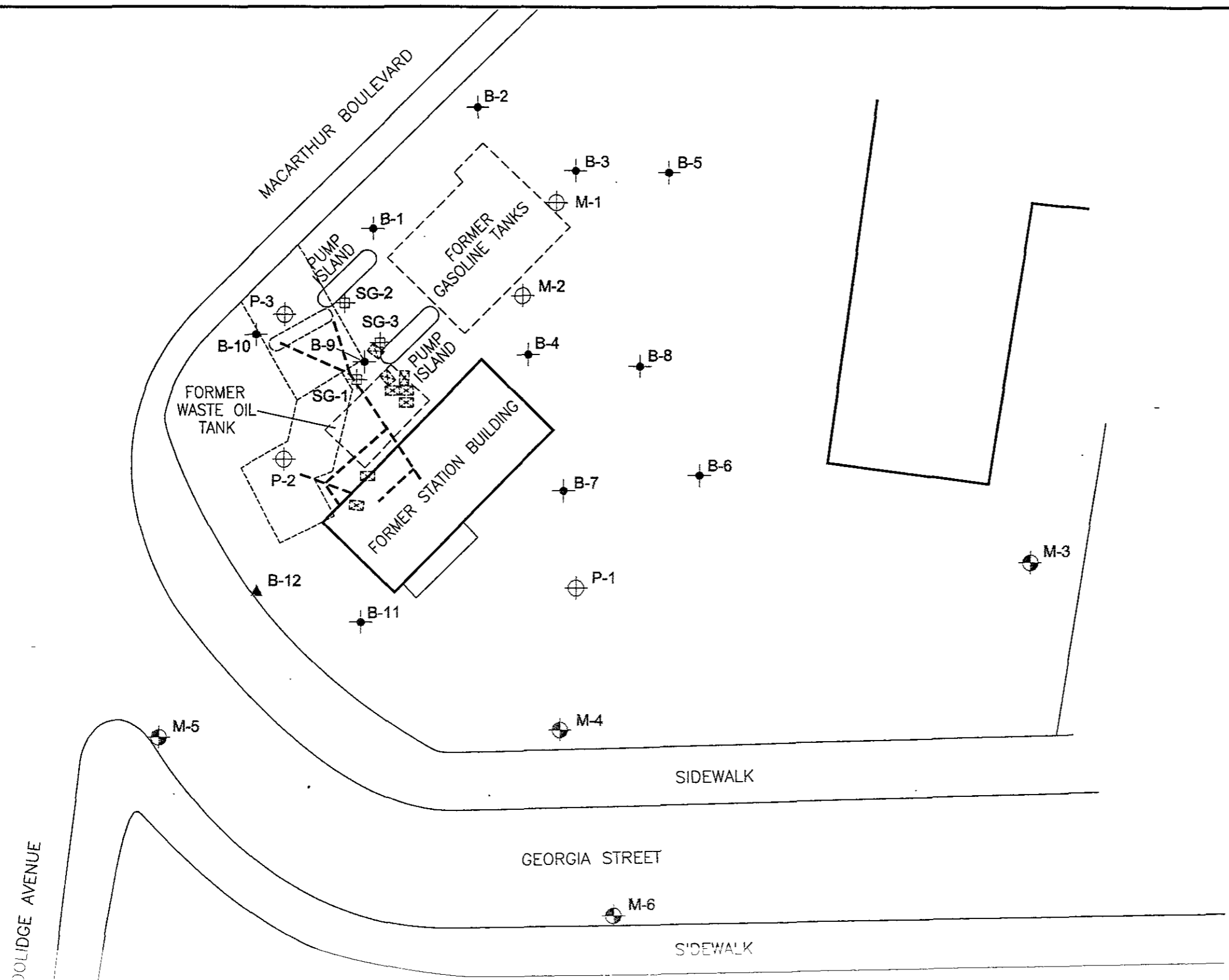


SITE PLAN CURRENT STATION IMPROVEMENTS		
2801 MACARTHUR BLVD. OAKLAND, CALIFORNIA		PLATE 2
JOB NUMBER 838.006	DATE 08/99	APPROVED

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Explanation:







-  Monitoring Well by SCI
-  Test Boring by SCI
-  Monitoring Well by others
-  Test Boring by others
-  Soil Vapor and Soil Sampling Location
-  Former Tank Excavation (1989)
-  Pipelines Removed in 1989
-  Station Improvements (circa 1930-1950)
-  Tanks (circa 1930-1950)

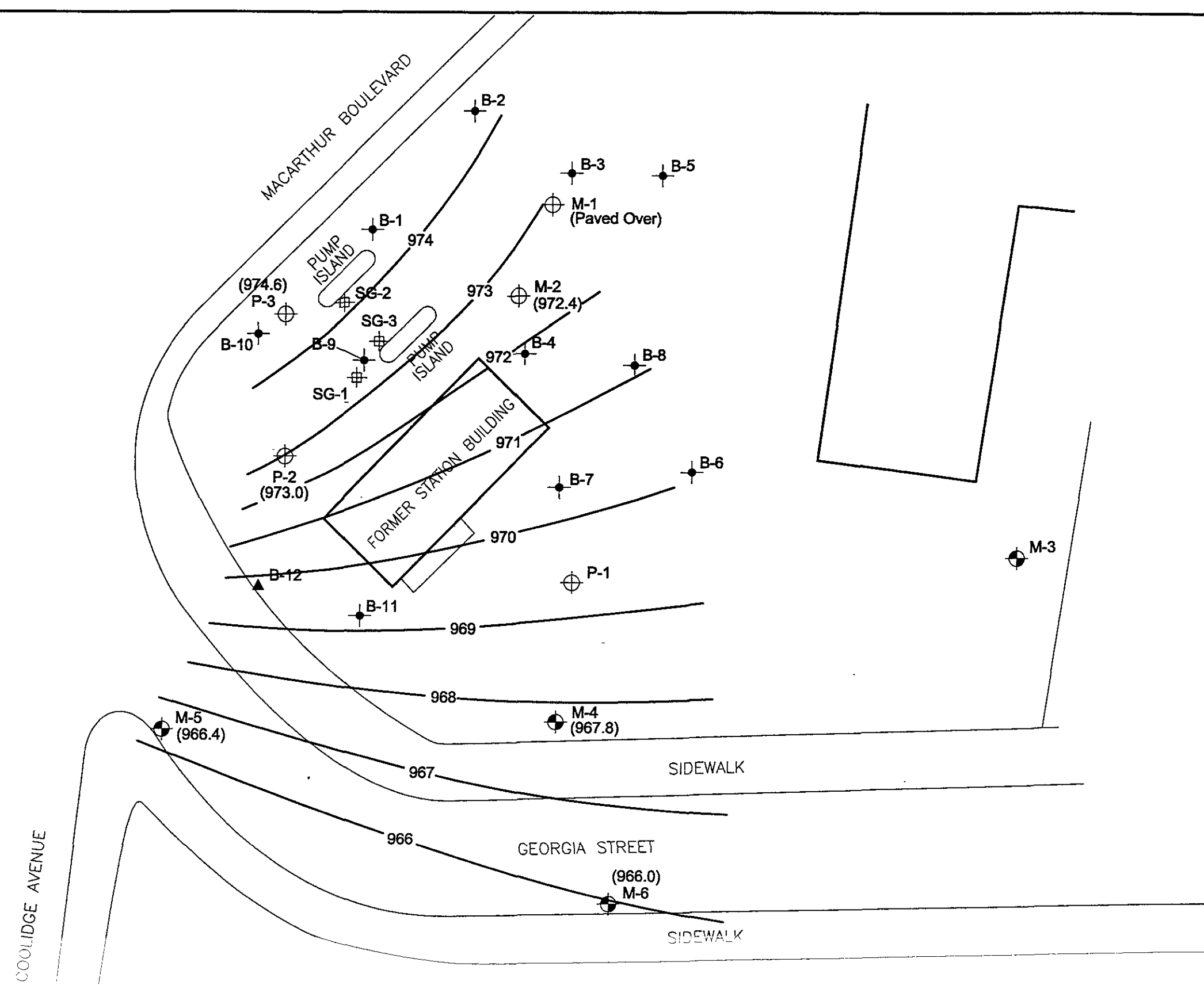


**SITE PLAN
FORMER STATION IMPROVEMENTS**

SCI Subsurface Consultants, Inc.
Geotechnical & Environmental Engineers

2801 MACARTHUR BLVD. OAKLAND, CALIFORNIA		PLATE
JOB NUMBER 838.006	DATE 08/99	APPROVED 
		3

- Explanation:
-  Monitoring Well by SCI
 -  Test Boring by SCI
 -  Monitoring Well by others
 -  Test Boring by others
 -  Soil Vapor and Soil Sampling Location
 -  Former Tank Excavation (1989)



**GROUNDWATER ELEVATION
CONTOURS, JUNE 1999**

2801 MACARTHUR BLVD.
OAKLAND, CALIFORNIA

SCI Subsurface Consultants, Inc.
Geotechnical & Environmental Engineers

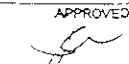
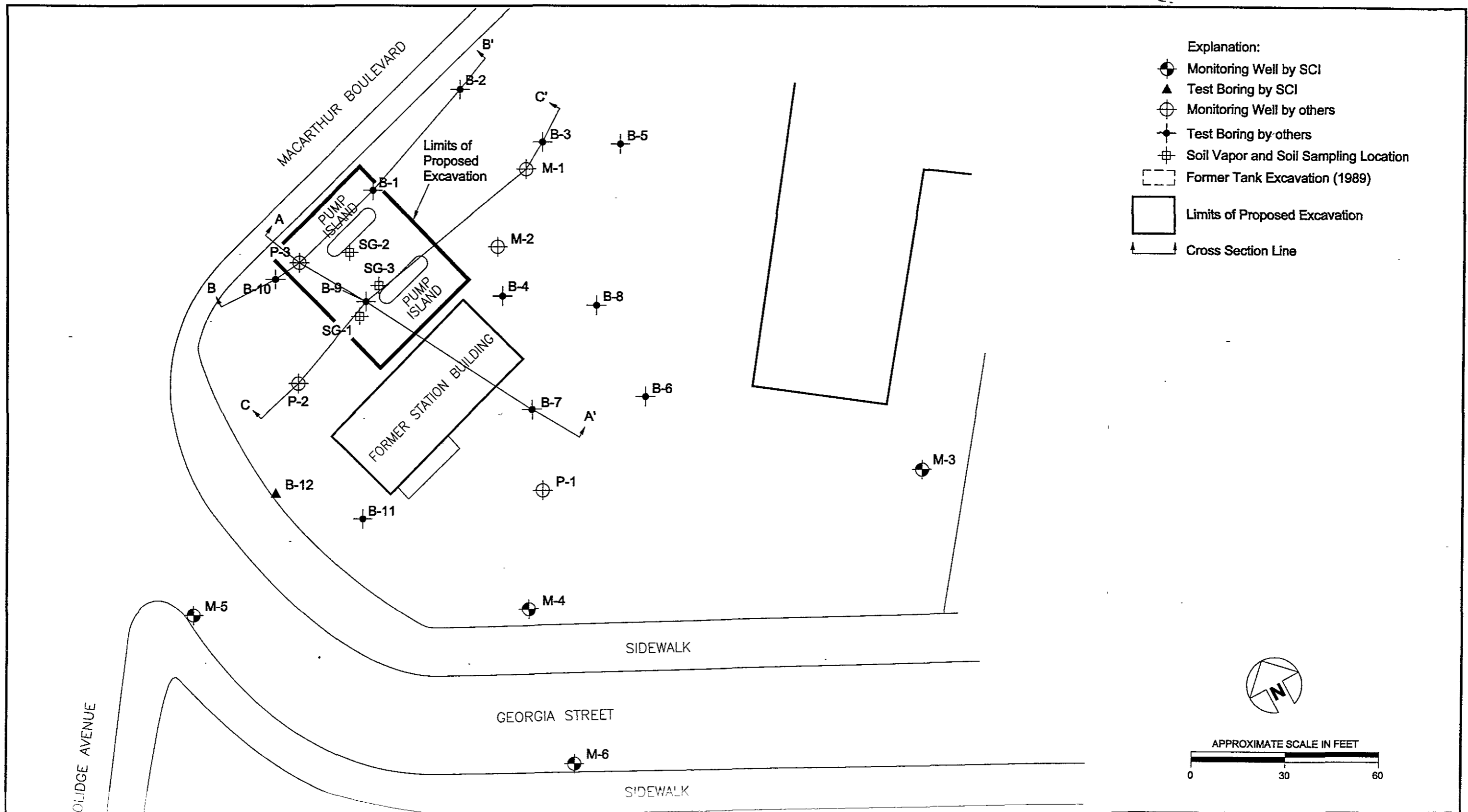
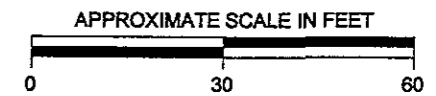
JOB NUMBER 838.006 DATE 08/99 APPROVED 

PLATE
4



- Explanation:
- Monitoring Well by SCI
 - Test Boring by SCI
 - Monitoring Well by others
 - Test Boring by others
 - Soil Vapor and Soil Sampling Location
 - Former Tank Excavation (1989)
 - Limits of Proposed Excavation
 - Cross Section Line



CROSS SECTION LOCATIONS

SCI Subsurface Consultants, Inc.
Geotechnical & Environmental Engineers

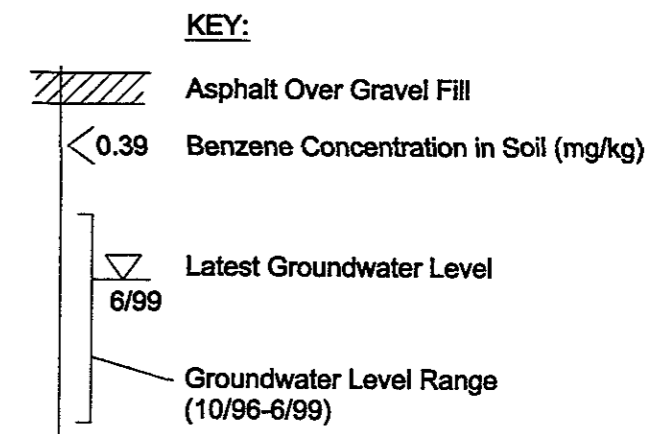
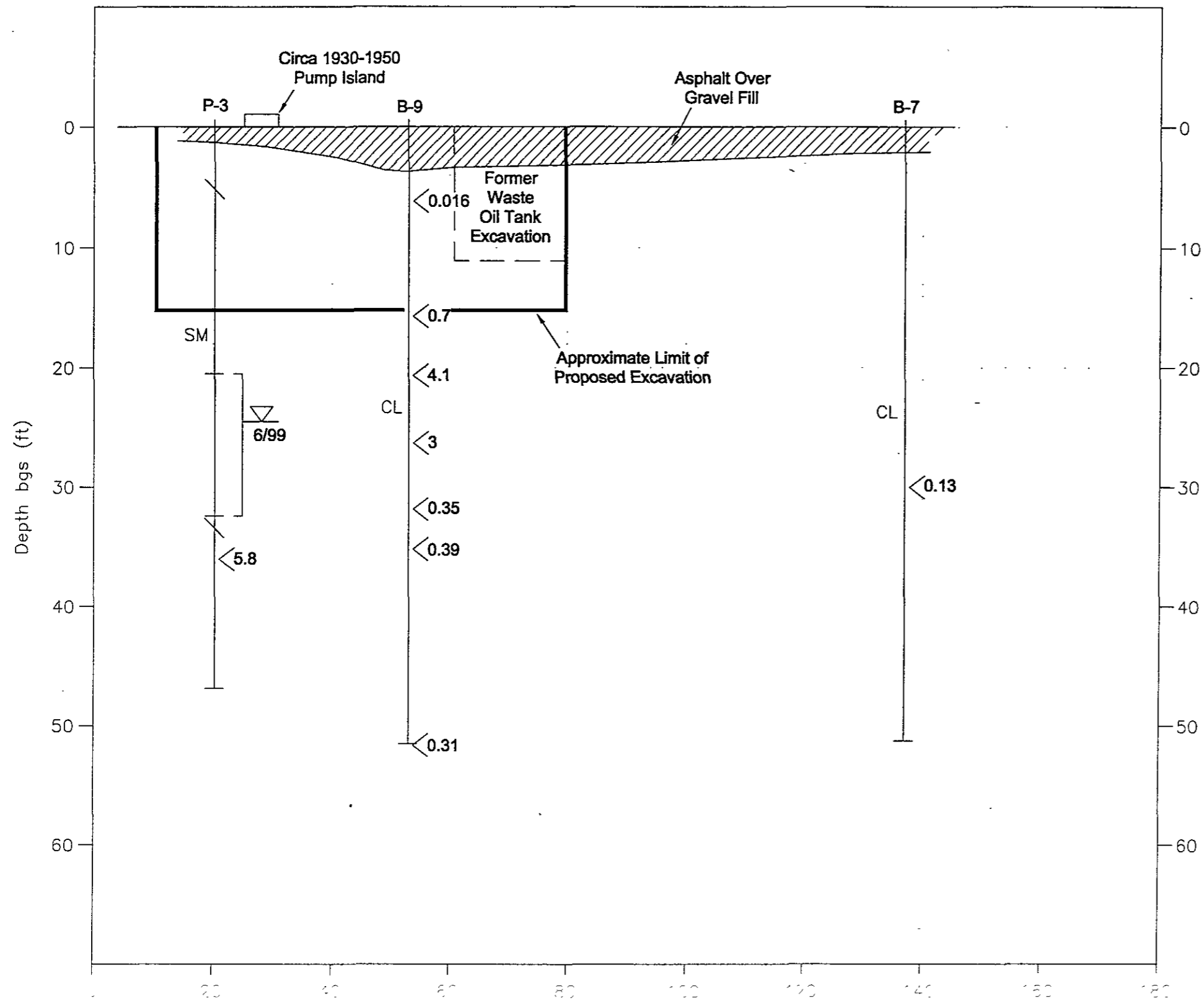
2801 MACARTHUR BLVD.
OAKLAND, CALIFORNIA

JOB NUMBER
838.006

DATE
08/99

APPROVED

PLATE
5



NOTE:
 Boring Log Obtained From:
 Reidel Environmental Services, Inc.,
 Remedial Investigation, 12/9/89
 Stream borne,
 Additional Soil and Groundwater
 Investigation, 8/20/91

CROSS-SECTION A-A'

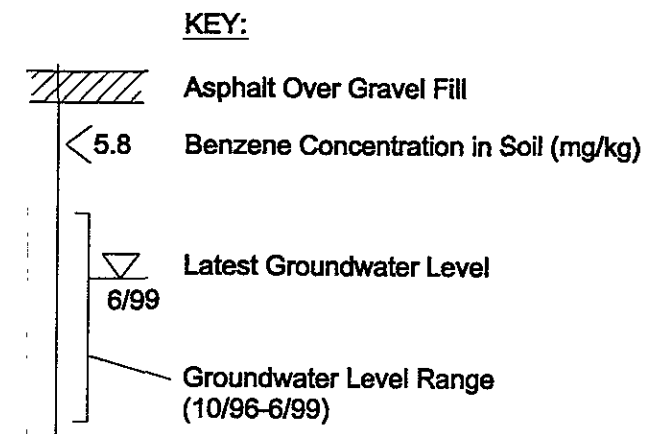
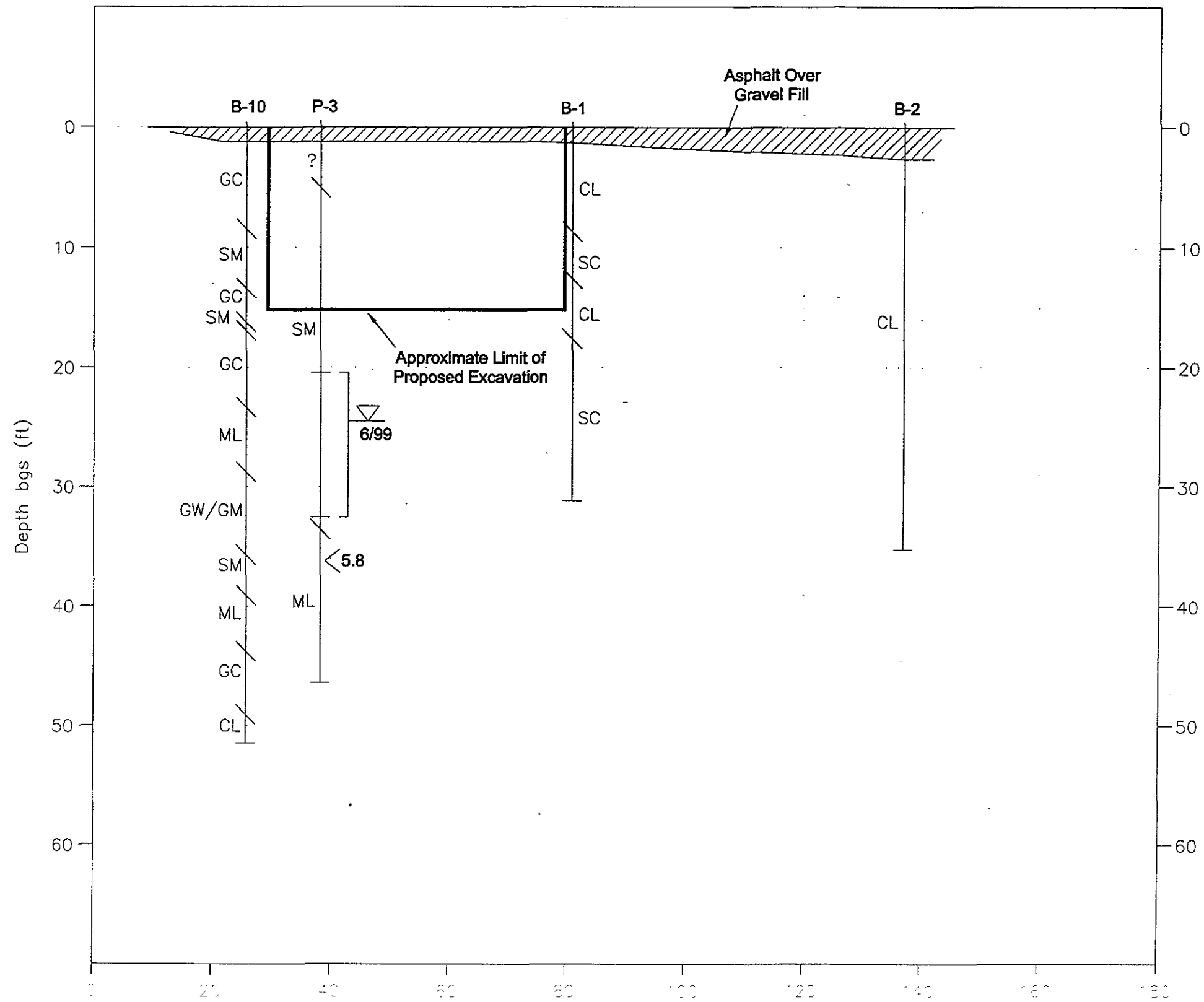
CROSS SECTION A-A'

SCI Subsurface Consultants, Inc.
 Geotechnical & Environmental Engineers

2801 MACARTHUR BLVD.
 OAKLAND, CALIFORNIA

JOB NUMBER: 838.006 DATE: 08/99 APPROVED:

PLATE
6



NOTE:
 Boring Log Obtained From:
 Reidel Environmental Services, Inc.,
 Remedial Investigation, 12/9/89
 Stream borne,
 Additional Soil and Groundwater
 Investigation, 8/20/91

CROSS-SECTION B-B'

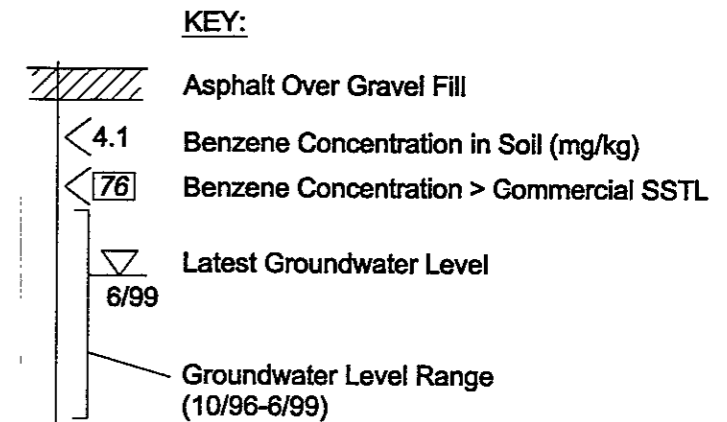
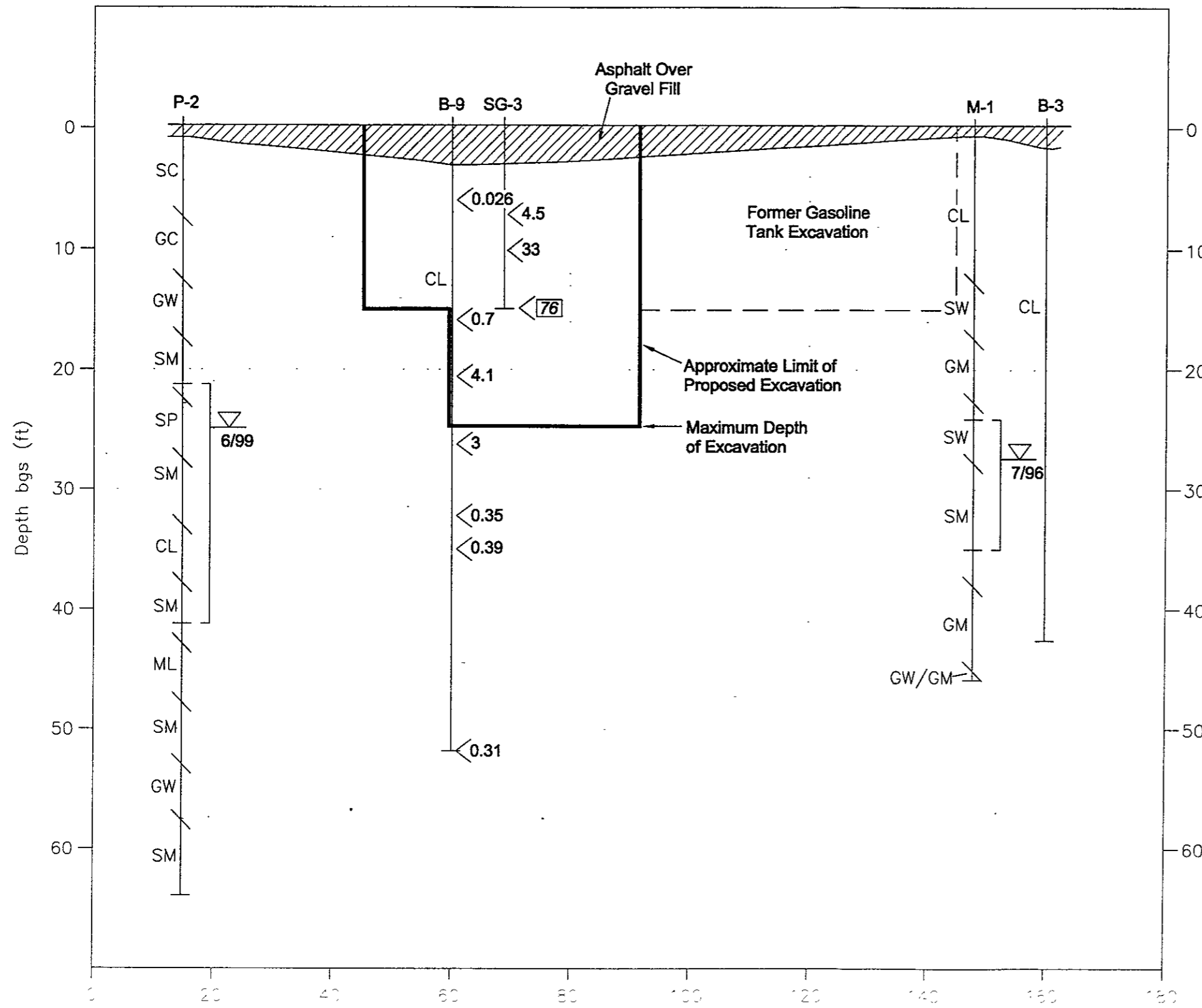
CROSS SECTION B-B'

SCI Subsurface Consultants, Inc.
 Geotechnical & Environmental Engineers

2801 MACARTHUR BLVD.
 OAKLAND, CALIFORNIA

JOB NUMBER: 838.006 DATE: 08/99 APPROVED:

PLATE
7



NOTE:
 Boring Log Obtained From:
 Reidel Environmental Services, Inc.,
 Remedial Investigation, 12/9/89
 Stream borne,
 Additional Soil and Groundwater
 Investigation, 8/20/91

CROSS-SECTION C-C'

CROSS SECTION C-C'

SCI Subsurface Consultants, Inc.
 Geotechnical & Environmental Engineers

2801 MACARTHUR BLVD OAKLAND, CALIFORNIA		PLATE
JOB NUMBER 838.006	DATE 08/99	APPROVED

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