SOMA
ENVIRONMENTAL ENGINEERING, INC
2680 Bishop Drive, Suite 203, San Ramon, CA 94583
TEL (510) 244-6600 • FAX (510) 244-6601

December 11, 1997

Ms. Susan Hugo
Senior Hazardous Material Specialist
1131 Harbor Bay Parkway
Alameda, California 94502

Re: Workplan for Mobil Oil Corporation and Draft Removal Action Workplan for Shellmound Parcels I, II, and III.

Dear Susan:

Per your request the following reports are attached for your review and comment:

1. Final Cleanup Objectives and Action Plan for Former Mobil Terminal Facility, 909 Ferry Street, Oakland, California; and

2. Draft Removal Action workplan, Shellmound Parcels I, II, and III, Emeryville, California.

Please call me at (510) 244-6600 if you have any questions or comments.

Sincerely;

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

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Removal Action Workplan
Shellmound Parcels I, II and III
Emeryville, California

Project 97-2181

November 19, 1997

Prepared for
City of Emeryville, Redevelopment Agency
Emeryville, California

Prepared by
SOMA Environmental Engineering, Inc.
2680 Bishop Drive, Suite 203
San Ramon, CA 94583

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List of Abbreviations

ACDEH	Alameda County Health Care Services Agency, Department of Environmental Health
AGI	AGI Technology, an environmental consulting firm
ARARs	Applicable or Relevant and Appropriate Requirements
Cal/EPA	California Environmental Protection Agency
CAPWA	County of Alameda Public Works Agency
CalTrans	California Department of Transportation
CEQA	California Environmental Quality Act
CKD	Cement Kiln Dust
COPCs	Chemicals of Potential Concern
DTSC	Department of Toxic Substances Control
EBMUD	East Bay Municipal Utility District
EIR	Environmental Impact Report
EM	Earth Matrics, Inc. an environmental consulting firm
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
HHRA	Human Health Risk Assessment
HSP	Health and Safety Plan
JMC	Judson Manufacturing Company
NCP	National Contingency Plan
OSHA	Federal and California Occupational Safety and Health Administration
PCE	Perchloroethylene
PCBs	Polychlorinated Biphenyls
PES	PES Environmental, an environmental firm
P.I.E.	Pacific Intermountain Express
ppb	parts per billion (i.e., (ug/kg or (ug/l)
ppm	parts per million (i.e., mg/kg or mg/l)
PRG	Preliminary Remedial Goals
QAPP	Quality Assurance Project Plan
RAW	Removal Action Workplan

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List of Abbreviations Continued

RAOs	Remedial Action Objectives
SARA	Superfund Amendment and Reauthorization Act
SOMA	SOMA Environmental Engineering, Inc., an environmental firm
STLC	Soluble Threshold Limit Concentration
SVOCs	Semi-Volatile Organic Chemicals
TBCs	To Be Considered
TCE	Trichloroethylene
TDS	Total Dissolved Solids
Tenera	Tenera Environmental Services, an environmental consulting firm
TPH	Total Petroleum Hydrocarbons
TPH-D	Total Petroleum Hydrocarbons as Diesel
TPH-G	Total Petroleum Hydrocarbons as Gasoline
TPH-OG	Total Petroleum Hydrocarbons as Oil and grease
95% UCL	95% Upper Confidence Limit
VCA	Voluntary Cleanup Agreement
VOCs	Volatile Organic Chemicals

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Executive Summary

This draft Removal Action Workplan (RAW) has been prepared by SOMA Environmental Engineering, Inc. (SOMA) on behalf of City of Emeryville Redevelopment Agency. The draft RAW is a requirement of the Voluntary Cleanup Agreement entered into by the City of Emeryville Redevelopment Agency and the Department of Toxic Substances Control (DTSC) in November, 1993. The project site is located between Interstate 80 and Shellmound Street, south of the Powell Street Plaza in Emeryville, California (the "Site"), see Figures 1-1 and 1-2. The Site consists of three contiguous parcels known as Parcels I, II and III. The Site was originally 10.5 acres, but has been reduced to 7.5 acres due to the extension of Shellmound Street, and the purchase of the western portion of the property by CalTrans for the Interstate 80 widening project and the relocation of the East Bay Municipal Utility District north interceptor line. Significant adjacent sites include Barbary Coast Steel (formerly Judson Steel) to the south, the Powell Street Plaza Shopping Center (formerly Pacific Intermountain Express (P.I.E.) to the north of the Site, and Myers Container Corporation and Harcros Pigments (formerly Pfizer Pigments) to the east. The Site is bound from the west by Interstate 80. At the present time, the Site and the surrounding land are zoned for industrial/commercial use (see Figure 1-3). In the future the property is expected to remain industrial/commercial.

The Site was originally a portion of a larger property called the Judson Manufacturing Company (JMC). JMC was founded in 1882 as an outgrowth of a tack and a horseshoe nail manufacturing plant owned by Mr. Egbert Judson. The original facility occupied approximately nine acres located between the Southern Pacific Railway and the San Francisco Bay (the "Bay"). Over time, the facility was expanded to 27 acres. The company manufactured iron bars, foundry castings, agricultural implements, spikes, bolts, rivets, nuts, tacks, and latching machines. In August 1986, after 104 years of operation, Judson Steel was sold to Peko-Wallsend. Shortly after, Peko-Wallsend sold the 10.5 acres Site to the Shellmound Partners in November 1986. For two and a half years, the remaining plant operated under the name of Barbary Coast, and made reinforcing bars from scrap metal. These historic activities resulted in the contamination of soil on the Site. In 1993, the City of Emeryville Redevelopment Agency purchased the Site from the Shellmound Partners.

The topography of the Site is relatively flat and slopes gently towards the Bay. Slag material intermixed with metallic debris are mixed with historic imported fill over the majority of the Site. The slag materials are believed to have been generated due to the operations conducted by JMC.

Other site features include Temescal Creek, a surface water body located between Parcels II and III. Based on hydrogeological investigations performed by PES Environmental in December 1993, the groundwater during low tides discharges into Temescal Creek. The results of surface water sampling from the Temescal Creek at upstream and downstream locations have revealed that no site related chemicals are discharging into the Creek. In addition, a model was developed to evaluate the transport of on-Site chemicals from groundwater into Temescal Creek. The estimated maximum estimated chemical concentrations that could reach Temescal Creek were then compared to different available marine/freshwater quality standards (see Table 3-1). None of the maximum predicted concentrations of VOCs, SVOCs or metals in Temescal Creek exceeds their respective marine/freshwater quality standard.

Extensive remediation and construction was conducted on the CalTrans property and during construction of the Shellmound Street extension. As a part of the EBMUD sewer line relocation process, a trench approximately 25-foot wide by 25-foot deep, and 3,500 feet long was excavated. During the relocation process, a slurry wall was constructed around the relocated sewer line. Under the Cal/EPA's oversight, a great portion of the excavated soil from the EBMUD trench was removed and transported to class I and class III landfills and replaced with clean fill material. The excavated soils that were not classified as "California Hazardous Waste", were used as backfill material. Other portions classified as California Hazardous Waste were off-hauled and disposed at Forward Landfill, in Stockton, California and Roosevelt Landfill, a Class I landfill in the State of Washington (personal communication with Ms. Lisa Toth, Assistant Construction Engineer of EBMUD).

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Additionally, in the summer of 1996, the City of Emeryville was involved in the construction of the Shellmound Street extension, traversing through the Site. It involved the construction and realignment of approximately 1,100 linear feet of new roadway and excavation of utility trenches. The utility trenches included storm drains, sanitary sewer lines, electrical conduits and EBMUD drinking water lines, manholes, gas and irrigation lines. As part of this installation process, approximately 5,500 cubic yards of soil was excavated from the trench beneath Shellmound Street.

According to Stratus Environmental Services (1996) laboratory analysis of soil samples collected from the excavated soils from the Shellmound Street extension project exceeded the Soluble Threshold Limit Concentration (STLC) of 5 mg/l for lead. Petroleum hydrocarbons, SVOCs, VOCs, and metals were detected below regulatory levels and therefore did not require remediation or off-Site disposal. To reduce the solubility of lead in the excavated soils, the soils were treated with pozzolanic material (cement kiln dust or CKD). The treated soils were transported for use in construction at the Highway 4 and the Interstate 80 project sites. The soil treatment work was completed on May 7, 1996. The excavated areas were restored and confirmatory soil samples were collected to establish post-removal conditions. The analytical results revealed that the STLC concentration of lead in the remaining soils is about 5.9 mg/l. The soil excavation and the remediation of the chemically impacted soils were conducted under the Cal/EPA's oversight and approval.

Floating petroleum product in groundwater has been reported beneath Parcel III, located at the northern portion of the Site. The petroleum product in the groundwater has been identified as diesel fuel, and is believed to be originating from the former P.I.E. site. The extent of the diesel fuel found beneath Parcel III and the former P.I.E. site is shown in Figure 1-4. Geomatrix Consultants, Inc. (Geomatrix) previously assessed the health risk associated with the floating product beneath Parcel III. The Geomatrix report concluded that the presence of diesel fuel in groundwater does not impact water quality in Temescal Creek and did not pose a risk to human health or the environment. This RAW does not address the TPH-related contamination on Shellmound Parcel III because the responsible party for the adjacent P.I.E. site is remediating the problem under the oversight of the Alameda County Health Agency, Department of Environmental Health.

A Baseline Human Health Risk Assessment (HHRA) was prepared in July 1997 to evaluate the potential adverse health effects of on-Site chemicals to current and future on- and off-Site occupants. The results of the HHRA indicated that the potential carcinogenic health risks associated with the chemicals found in soil and groundwater to the current and the future on- and off-Site occupants are within the target risk range defined by U.S. EPA "as safe and protective of public health" (SOMA July 30, 1997). However, the calculated non-carcinogenic risk, or Hazard Index (HI) for the future construction worker is above the acceptable limit of 1 and is almost entirely attributable to PCBs from dermal contact. The estimated hazard is based on a single sample location.

The objective of this draft RAW is to describe the proposed alternatives to ensure the health of future Site's occupants. The draft RAW will discuss implementability, cost and effectiveness of each alternative. The draft RAW also provides an opportunity for the public to be involved in the decision-making process during the selection of the removal action alternative.

Two alternatives were evaluated in this draft RAW; the first alternative was the "No-Action" Alternative, the second alternative was the use of "Institutional Control" Alternative.

As it implies, the No-Action Alternative does not require any remediation or action to reduce the exposure point concentrations or eliminate exposure pathways. The Institutional Control Alternative legally restricts use of the Site for industrial/commercial purposes and prohibits the Site from single family residential development, school and hospital use. Furthermore, the Institutional Control Alternative requires decommissioning of the existing groundwater monitoring wells at the Site. No operation and maintenance requirements are anticipated at this time.

After comparing the two alternatives, it was concluded that the second alternative that recommends a deed restriction and restricts the Site to industrial/commercial uses is the preferred alternative. This alternative was determined to be the most protective of human health and the environment and is easily implementable.

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Administrative Record

The Administrative Record (the "Record") for the Site contains all documents, including public notices, that were relied on or considered when selecting the removal action alternative. The Administrative Record is in the Appendix to the Executive Summary.

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Appendix to the Executive Summary

Administrative Record List

The Record contains the following documents:

DOCDATE	August 8, 1997
DOCTYPE	Letter
TITLE/SUMM	Approval of Site Characterization Report, Shellmound Parcels I, II, III
AUTHOR/AFF	Barbara Cook/DTSC
RECIP/AFF	Ron Gerber/City of Emeryville
FILELOC	Shellmound Properties/C2

DOCDATE	July 30, 1997
DOCTYPE	Risk Assessment Report
TITLE/SUMM	Human Health Risk Assessment, Shellmound Parcels I, II, and III
AUTHOR/AFF	William Bosan and Mansour Sepehr/SOMA
RECIP./AFF	Lynn Nakashima/Cal/EPA
FILELOC	Shellmound Properties/C

DOCDATE	May 21, 1997
DOCTYPE	Letter
TITLE/SUMM	Comments to Human Health and Risk Assessments, Shellmound Ventures Parcels I, II, III
AUTHOR/AFF	Barbara Cook/DTSC
RECIP/AFF	Ron Gerber/City of Emeryville
FILELOC	Shellmound Properties/C2

DOCDATE	1997
DOCTYPE	Site Characterization Report
TITLE/SUMM	Site Characterization Report, Shellmound Property Parcels I, II, and
III,	Emeryville, California

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AUTHOR/AFF	John B. Adams and Christina J. Kennedy/Kleinfelder, Inc.
RECIP./AFF	Lynn Nakashima/Cal/EPA
FILELOC	Shellmound Properties/C
DOCDATE	1996
DOCTYPE	Project Completion Report
TITLE/SUMM	Shellmound Street Extension Project Phase II
AUTHOR/AFF	Stratus Environmental Services
RECIP/AFF	Cal/EPA and City of Emeryville, Redevelopment Agency
FILELOC	Shellmound Properties/C
DOCDATE	December 16, 1996
DOCTYPE	Letter
TITLE/SUMM	Comments to Human Health Risk Assessments, Shellmound Venture Properties
AUTHOR/AFF	Barbara Cook/DTSC
RECIP/AFF	Ron Gerber/City of Emeryville
FILELOC	Shellmound Properties/C2
DOCDATE	November 18, 1996
DOCTYPE	Letter
TITLE/SUMM	Proposed Response to Comments Regarding April 21, 1995 Site Characterization Report by AGI Technologies for Shellmound Property
AUTHOR/AFF	John Adams/Kleinfelder
RECIP/AFF	Lynn Nakashima/DTSC
FILELOC	Shellmound Properties/C2
DOCDATE	January 29, 1996
DOCTYPE	Letter
TITLE/SUMM	Workplan for Conducting a Human Risk Assessment at the Shellmound Parcels I, II, III
AUTHOR/AFF	Mansour Sepehr/SOMA Environmental Engineering, Inc.

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RECIP/AFF	Calvin Whillhite/DTSC
FILELOC	Shellmound Properties/C2
DOCDATE	1995
DOCTYPE	Technical Report
TITLE/SUMM	Development of Risk Based Levels for San Francisco International Airport
AUTHOR/AFF	Versar-Sierra Envirogroup
RECIP/AFF	Diane Mims/RWQCB
FILELOC	
DOCDATE	1995
DOCTYPE	Data Report
TITLE/SUMM	Characterization of Petroleum Hydrocarbons in Soil and Groundwater at Powell Street Plaza and Shellmound III.
AUTHOR/AFF	PES Environmental
RECIP/AFF	
FILELOC	Shellmound Properties/C
DOCDATE	1995
DOCTYPE	Data Report
TITLE/SUMM	Environmental Site Characterization, Shellmound Parcels I, II and III, Emeryville, California
AUTHOR/AFF	John Adams/Kleinfelder
RECIP/AFF	Lynn Nakashima/Cal/EPA
FILELOC	Shellmound Properties/C
DOCDATE	June 5, 1995
DOCTYPE	Letter
TITLE/SUMM	DTSC Review of Revised Work Plan, Environmental Site Characterization, Shellmound Parcels I, II, III
AUTHOR/AFF	Barbara Cook/DTSC
RECIP/AFF	Kofi Bonner/City of Emeryville
FILELOC	Shellmound Properties/C2

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DOCDATE	June 7, 1994
DOCTYPE	Letter
TITLE/SUMM	DTSC Review of Revised Work Plan, Environmental Site Characterization, Shellmound Parcels I, II, III
AUTHOR/AFF	Barbara Cook/DTSC
RECIP/AFF	Kofi Bonner/City of Emeryville
FILELOC	Shellmound Properties/C2

DOCDATE	March 25, 1994
DOCTYPE	Letter
TITLE/SUMM	Comments to Draft Workplan, Environmental Site Characterization, Shellmound Parcels I, II, III
AUTHOR/AFF	Barbara Cook/DTSC
RECIP/AFF	Kofi Bonner/City of Emeryville
FILELOC	Shellmound Properties/C2

DOCDATE	November 19,1993
DOCTYPE	Agreement
TITLE/SUM	Voluntary Cleanup Agreement
AUTHOR/AFF	Department of Toxic Substances Control
RECIP/AFF	City of Emeryville;
FILELOC	Shellmound Properties/B1

DOCDATE	September 21, 1993
DOCTYPE	Letter
TITLE/SUMM	Review of Laboratory Data for the Shellmound I, II, III Properties
AUTHOR/AFF	Julie Menack/McLaren Hart
RECIP/AFF	Ron Gerber/City of Emeryville
FILELOC	Shellmound Properties/C2

DOCDATE	September 15, 1993
DOCTYPE	Letter
TITLE/SUMM	Review of Existing Data for Shellmound I, II, III Properties

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AUTHOR/AFF	Lynn Nakashima/DTSC
RECIP/AFF	Ron Gerber/City of Emeryville
FILELOC	Shellmound Properties/C2
DOCDATE	September 10, 1993
DOCTYPE	Memorandum
TITLE/SUM	Review of August 25 and September 9, 1993 Transmittal of Tables and Figures Regarding Shellmound I, II, III Properties
AUTHOR/AFF	Calvin Whillhite/DTSC
RECIP/AFF	Lynn Nakashima/DTSC
FILELOC	Shellmound Properties/C1
DOCDATE	August 25, 1993
DOCTYPE	Report
TITLE/SUMM	Transmittal of Reports, 1992 Documentation Review and Tables and Figures for Meeting with CAL-EPA DTSC Regarding Shellmound I; II, and III Properties
AUTHOR/AFF	Julie Menack/McLaren Hart
RECIP/AFF	Ron Gerber/City of Emeryville
FILELOC	Shellmound Properties/C
DOCDATE	1991
DOCTYPE	Preliminary Endangerment Assessment
TITLE/SUMM	Preliminary Endangerment Assessment, Shellmound Parcel III Site.
AUTHOR/AFF	PES Environmental
RECIP/AFF	
FILELOC	Shellmound Properties/C
DOCDATE	1990
DOCTYPE	Letter Report
TITLE/SUMM	4300 Eastshore Highway, North of Temescal Creek
AUTHOR/AFF	Mark Papineau/Earth Matrix
RECIP/AFF	Mr. Don Cox/Cal/EPA
FILELOC	Shellmound Properties/C

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DOCDATE	1990
DOCTYPE	Hydrogeologic Investigation
TITLE/SUMM	Hydrogeologic Investigation, 4300 Eastshore Highway, Emeryville
AUTHOR/AFF	PES Environmental
RECIP/AFF	
FILELOC	Shellmound Properties/C

DOCDATE	1989
DOCTYPE	Phase II Environmental Site Assessment
TITLE/SUMM	Phase II Environmental Site Assessment of Certain Property in Emeryville, California, Marriott Project No. C943
AUTHOR/AFF	Tenera Environmental Services
RECIP/AFF	
FILELOC	Shellmound Properties/C

DOCDATE	1989
DOCTYPE	Remediation Plan
TITLE/SUMM	Plan of Remediation for Development of the Marriott Hotel
AUTHOR/AFF	Tenera Environmental Services
RECIP/AFF	
FILELOC	Shellmound Properties/C

DOCDATE	January 1988
DOCTYPE	Risk Assessment Document
TITLE/SUMM	Environmental Risk Assessment for the Judson Steel Site
AUTHOR/AFF	Earth Matrix
RECIP/AFF	--
FILELOC	Barbary Coast Steel/C

DOCDATE	1988
DOCTYPE	Site Characterization Report
TITLE/SUMM	Additional Site Characterization Studies at P.I.E. Property
AUTHOR/AFF	Alton Geosciences
FILELOC	Shellmound Properties/C

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Guidance, Regulations, Statutes:

DOCDATE	1997
DOCTYPE	Guideline
TITLE/SUMM	Region IX Preliminary Remediation Goals (PRGs)
AUTHOR/AFF	U.S. EPA
RECIP/AFF	
FILELOC	

DOCDATE	1997
DOCTYPE	Regulation
TITLE/SUMM	California Code of Regulations, Title 22, Division 4.5, Volume 29A
AUTHOR/AFF	State of Califomia
RECIP/AFF	
FILELOC	

DOCDATE	1996/1997
DOCTYPE	Statute
TITLE/SUMM	California Health and safety Code, Division 20, Chapter 6.5 and 6.8
AUTHOR/AFF	State of California
RECIP/AFF	
FILELOC	

DOCDATE	March 14, 1995
DOCTYPE	Memorandum
TITLE/SUMM	Removal Action Workplans Senate Bill 1706
AUTHOR/AFF	Barbara Coler/DTSC
RECIP/AFF	Tjosvold et. al./DTSC
FILELOC	

DOCDATE	1994/1995
DOCTYPE	Statutes
TITLE/SUMM	California Environmental Quality Act, Statutes and Guidelines
AUTHOR/AFF	Governors Office of Planning and Research

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RECIP/AFF
FILELOC

DOCDATE	July 1993
DOCTYPE	Regulations
TITLE/SUMM	40 Code of Federal Regulations, Parts 300 to 399, National Oil and Hazardous Substance Pollution Contingency Plan
AUTHOR/AFF	US Government
RECIP/AFF	
FILELOC	

DOCDATE	July 1992, reprinted September 1993
DOCTYPE	Guidance
TITLE/SUMM	Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities
AUTHOR/AFF	State of California Environmental Protection Agency
FILELOC	

DOCDATE	December 1989
DOCTYPE	Guidance
TITLE/SUMM	Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A), Interim Final
AUTHOR/AFF	US Environmental Protection Agency
RECIP/AFF	
FILELOC	

DOCDATE	October 1988
DOCTYPE	Guidance
TITLE/SUMM	Guidance for conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final
AUTHOR/AFF	US EPA

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RECIP/AFF
FILELOC

DOCDATE	December 1986
DOCTYPE	Statutes
TITLE/SUMM	The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as Amended by the Superfund Amendments and Reauthorization Act of 1986
AUTHOR/AFF	US Congress
RECIP/AFF	
FILELOC	

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1.0 Introduction

SOMA Environmental Engineering, Inc. (SOMA) has prepared this draft Removal Action Workplan ("RAW") on behalf of the City of Emeryville Redevelopment Agency at the request of the California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC). The draft RAW was prepared pursuant to Section 3.5 of the Voluntary Cleanup Agreement entered into by the City of Emeryville Redevelopment Agency and DTSC in November, 1993. The project site is located between Interstate 80 and Shellmound Street, south of the Powell Street Plaza in Emeryville, California (the "Site"), see Figures 1-1 and 1-2. The Site consists of three contiguous parcels known as Parcels I, II and III. Adjacent sites include Barbary Coast Steel (formerly Judson Steel) to the south, the Powell Street Plaza formerly Pacific Intermountain Express (P.I.E.) to the north, and Myers Container Corporation and Harcros Pigments (formerly Pfizer Pigments) to the east. The Site is bound from the west by Interstate 80. At the present time, the Site and the surrounding land are zoned for industrial/commercial use. In the future the property is expected to remain industrial/commercial, see Figure 1-3.

This draft RAW includes a brief summary of environmental conditions beneath the Site as well as the results of the human health risk assessment (HHRA) conducted by SOMA (1997).

This draft RAW describes the proposed alternatives to ensure the health of future Site's occupants. It also evaluates the implementability, cost and effectiveness of each proposed alternative. The draft RAW also provides an opportunity for the public to be involved in the decision-making process during the selection of the removal action alternative.

2.0 Site Description

The site is located between Interstate 80 and Shellmound Street, south of the Powell Street Plaza Shopping Center in Emeryville, California (the "Site"), see Figures 1-1 and 1-2. The Site consists of three contiguous Parcels known as Parcels I, II and III. Adjacent sites include Barbary Coast Steel (formerly Judson Steel) to the south, the Powell Street Plaza Shopping Center (formerly Pacific Intermountain Express (P.I.E.)) to the north, and Myers Container Corporation and Harcros Pigments (formerly Pfizer Pigments) to the east. The Site is bound from the west by the Interstate 80. The Site was originally 10.5 acres, but has been reduced to 7.5 acres due to the extension of Shellmound Street, and the purchase of the western portion of the property by CalTrans for the Interstate 80 widening project and the relocation of the East Bay Municipal Utility District (EBMUD) north interceptor line.

The existing Site is relatively flat and slopes gently towards San Francisco Bay. Shellmound Street traverses the Site from the north to the south, and Temescal Creek separates Parcel II from Parcel III. A concrete crushing operation is currently located on the eastern most portions of Parcels I and II. The remainder of the Site is vacant with sparse vegetation.

2.1 Site Background

The Shellmound Site originally was a portion of a larger property called the Judson Manufacturing Company (JMC). JMC was founded in 1882 as an outgrowth of a tack and a horseshoe nail manufacturing plant owned by Mr. Egbert Judson. The original facility occupied approximately nine acres located between the Southern Pacific Railway and the San Francisco Bay (the "Bay"). Over time, the facility was expanded to 27 acres. The company originally manufactured iron bars, foundry castings, agricultural implements, spikes, bolts, rivets, nuts, tacks, and latching machines. In August 1986, after 104 years of operation, Judson Steel was sold to Peko-Wallsend. Shortly after, Peko-Wallsend sold the Site to the Shellmound Partners in November 1986. For two and a half years, the plant operated under the name of Barbary Coast, and made reinforcing bars from scrap metal. In 1993, the City of Emeryville Redevelopment Agency purchased the Site from the Shellmound Partners.

Since the 1980s, numerous field investigations have revealed the presence of metals, petroleum hydrocarbons, PCBs and low levels of volatile and semi-volatile organic chemicals beneath the Site.

In November 1993, the California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC) entered into a Voluntary Cleanup Agreement (VCA) with the City of Emeryville Redevelopment Agency, pursuant to California Health and Safety Code Sections 25355(b) and 25355.5(a)(1)(C). As part of the VCA, the City of Emeryville Redevelopment Agency agreed to implement a Removal Action Workplan at the Site that is in compliance with all applicable laws and regulations.

2.2 Previous Site Investigations

Numerous subsurface investigations were performed on Parcel III in the late 1980s and early 1990s. Investigations were also performed in the early 1990s on Parcels I and II; the results of these investigations performed are highlighted below.

The extent of the Site characterization studies encompassed the original 10.5 acre property. As a consequence of the Site size reduction, the risk assessment was conducted within the present Site's boundaries that is currently about 7.5 acre. The soil and groundwater samples that have been collected outside the current site boundaries will not be discussed in the draft RAW.

An initial limited environmental assessment of the Site was conducted by Earth Metrics (EM) in September of 1987 (EM, 1988). EM's study found elevated concentrations of metals including lead, zinc, chromium, arsenic and copper in the slag and the Site's fill material.

As part of the investigation of the former P.I.E. trucking facility, further soil and groundwater investigations were performed in March 1988 on Parcel III (Alton

Geoscience, 1988). The investigation included drilling soil borings and installing monitoring wells on the former P.I.E. site (now, Powell Street Plaza) and Parcel III to estimate the lateral extent of hydrocarbon contamination due to the leaking fuel storage tanks on the former P.I.E. site. A TPH-D concentration of 240 parts per million (ppm) was detected in a soil sample collected at MW-17, at 9.5-ft below ground surface (bgs). A TPH-D concentration of 10 ppm was also detected in soil sample collected from 5.5-ft bgs, at MW-18. No TPH-D concentrations were detected in groundwater samples collected from MW-17 and MW-18. The detected TPH-D concentrations at these locations are considered to be isolated spots and cannot be associated with the presence of floating hydrocarbons beneath the Site. The results of the laboratory analysis from the groundwater beneath these two sampling locations did not reveal the presence of petroleum hydrocarbons in the groundwater.

As a part of a pre-acquisition Site assessment, additional Site characterizations were conducted on Parcel III by Environmental Services (Tenera). This work was performed on behalf of the Marriott Corporation and was completed in June of 1989 (Tenera, 1989a). The investigation included drilling and sampling of soil borings, and additional installation and sampling of monitoring wells. The results of the investigation found elevated concentrations of metals in soil (i.e. lead and zinc). Metals such as arsenic, barium, beryllium, molybdenum, selenium and other metals were found in the groundwater beneath Parcel III. Trace levels of petroleum hydrocarbon compounds such as benzene, toluene, ethylbenzene and xylene were also detected in the groundwater beneath Parcel III.

Based on the results of the Site investigation, Tenera submitted a plan of remediation (Tenera 1989b) to the Alameda County Health Care Services Agency, Department of Environmental Health (ACDEH). The plan called for: (1) covering the Site with buildings, structures and paving materials; and (2) placing 18 inches of clean fill in planted or other uncovered areas to limit potential exposure to the Site soil. The report was transferred to the Cal/EPA, Site Mitigation Unit, who requested additional soil and groundwater monitoring, and hydrogeological characterizations (PES, 1991).

In April 1990, EM performed an additional characterization of the Site soils. The investigations were performed to address the outstanding issues regarding (1) metal concentrations in soil, (2) concentrations of metals and hydrocarbons in groundwater; and (3) the potential for the contaminants from the Site to enter Temescal Creek. Elevated concentrations of metals such as lead and zinc were found in the soil samples collected on Parcel III. No area-specific trends were found with regards to metal concentrations across the site. Concentrations of the dissolved-phase hydrocarbons were highest near the northern portion of Parcel III, adjacent to the former P.I.E. Site, and decreased towards Temescal Creek. Two samples from upstream and the downstream points of Temescal Creek across the Shellmound property were also collected. Results of the creek sampling showed detectable concentrations of TPH as diesel fuel, arsenic, lead, zinc and total chromium. Concentrations decreased between "upstream" and "downstream" sampling points, with the exception of TPH as diesel, which remained unchanged at 140 parts per billion (ppb).

In May 1990, PES Environmental (PES) performed a hydrogeological characterization study of the Site to estimate the direction of groundwater flow beneath the Site and evaluate the distribution of hydrocarbon contaminants present in the groundwater. The PES authors concluded that the direction of groundwater movement was south to southwest towards Temescal Creek. PES concluded that the source of hydrocarbons in the groundwater beneath the Site was the adjacent former P.I.E. site (Powell Street Plaza). PES re-sampled two of the Site wells, namely MG-2 and MG-3 for dissolved metals in June of 1990. The groundwater samples did not show detectable concentrations of lead, zinc or total chromium.

In July 1990, PES conducted an additional characterization of soil and groundwater beneath Parcel III. Elevated concentrations of lead, zinc, chromium, arsenic, nickel, copper, barium, and vanadium were detected in surface and subsurface soils to 7-8 feet bgs (PES, 1991) at Parcel III. Observations from exploration test pits (T-1 through T-13) indicated that metals are widespread throughout the Site and are not limited to specific locations. Only trace levels of metals such as lead, zinc, arsenic, barium and copper were detected in the groundwater beneath Parcel III.

In March 1991, PES further investigated the extent of hydrocarbons in groundwater by installing one new groundwater monitoring well (MG-1) and a piezometer (PZ-1) on Parcel III and sampling the new well, piezometer and existing wells (MG-2, MG-3 and

MG4). The results indicated that the extent of hydrocarbons migrating from the former P.I.E. site (Powell Street Plaza) were limited to the northern portion of Parcel III.

In April 1992, Wahler Associates drilled one soil boring; HW-5 to collect three soil samples from depths of 3, 8 and 11 ft bgs. TPH-OG (oil and grease) with concentrations of 16 and 23 ppm were detected in the soil samples collected at 3 and 8-ft bgs, respectively. The concentrations of TPH-OG and TPH-D in a soil sample collected at 11-ft bgs were 87 ppm and 8.4 ppm, respectively. This sample also contained TCE and PCE in the low parts per billion range. Concentrations in the low parts per million ranges of TPH-OG and TPH-D were also detected in a grab groundwater sample. Benzene, TCE and PCE were also detected in the low parts per billion range in the groundwater sample.

In December 1993, PES performed a tidal influence study. The purpose of this study was to assess the influence of tidal fluctuations in the San Francisco Bay (located approximately 500 feet west of the Site) on water levels in the monitoring wells and Temescal Creek. The results indicated that the flux of the groundwater into Temescal Creek was significant during low (ebb) tides, and that the flow reversed during high (flood) tide.

In April 1994, AGI Technologies (AGI) drilled borings at 18 locations, HP1 through HP18, on the Site. Soil and grab groundwater samples were collected at these locations; Figure 2-1 presents the soil and groundwater sampling locations. AGI also collected groundwater samples from eight wells on or adjacent to Parcel III. The results indicated that the presence of metals such as lead, arsenic, zinc, chromium, nickel, copper, beryllium, barium, vanadium, silver and cadmium in the slag and fill was site-wide on all three parcels. Polychlorinated biphenyls (PCBs) were detected in both the surface and subsurface soils on Parcel I. Total petroleum hydrocarbons (TPH) quantified as TPH-diesel and TPH-oil and grease were detected in the subsurface soils on all three parcels. The highest concentrations of TPH were observed in the northern portion of Parcel III. TPH concentrations (both as gasoline and oil and grease) were in the low parts per million range on all three parcels. Concentrations of TPH-D in groundwater samples were also found in the low parts per million range collected from Parcels I and II; TPH-D concentrations in the groundwater samples were higher in the northern portion of Parcel III. The data collected by AGI confirm the results of the earlier investigations on Parcel III, that the source of the diesel contamination is the former P.I.E. site. The concentrations of the metals dissolved in the groundwater were found to be in the low parts per million range.

2.3 Site Hydrogeology

The topography of the Site is relatively flat and slopes gently towards the Bay. Slag fill material intermixed with metallic debris comprises the surface soils for the majority of the Site. The metallic slag/debris are believed to have been generated due to the operations conducted by JMC which formerly operated on the Site. The slag is mainly composed of relatively inert vitreous silicate. The slag contains metals such as lead, arsenic, copper, and zinc. Results of focused studies have shown that the metals present in vitreous forms are typically encapsulated in the slag or materials similar to rock (Dames & Moore, 1992).

Based on the soil borings drilled by AGI (1995), the fill extends approximately 10 feet below the ground surface (bgs). Review of boring logs indicated that the fill material is mainly composed of dark brown gravelly, coarse sand with fragments of metals that are considered to be slag material (Kleinfelder, 1997). Soils beneath the fill material are predominantly Bay Mud interbedded with fine grained silt and sand lenses which extends approximately 30 ft bgs. The Bay Mud is comprised of low permeability clays and clayey sands, and appears to be continuous across the Site. The hydraulic conductivity of Bay Mud ranges between 3.3×10^{-8} to 3.6×10^{-6} centimeter per second (Versar-Sierra Envirogroup, 1995).

Groundwater is encountered at depths ranging from 5 to 11 ft bgs. Based on readings taken on March 7, 1995 by AGI, the groundwater flow direction appears to be toward the southwest. In order to confirm the groundwater flow direction, SOMA collected groundwater elevation data from three piezometers P1 through P3 and groundwater monitoring well of MG-7 in June and July 1996. The readings collected by SOMA indicated that the predominant groundwater flow direction is toward the northeast. The Bay is located to the west of the Site. Therefore, the most current groundwater flow direction indicates that there is no direct communication between the groundwater beneath the Site and the Bay, see Figure 2-1.

Groundwater chemical analyses were also performed by AGI (April 1994). The total dissolved solid (TDS) concentrations in groundwater ranged between 710.4 and 11,700 mg/liter with a 95% UCL of 3,329 mg/liter, see Table 2-1. Using the criteria of Todd (1980) for categorizing groundwater type based on the TDS, the groundwater beneath the Site can be classified as brackish. On the basis of the State Water Resources Control Board Resolution 88-63, the groundwater beneath the Site is not useable for drinking water purposes as the 95% UCL of the TDS concentrations is above the 3,000 mg/liter criteria.

Temescal Creek is a surface water body located between Parcels II and III, Figure 1-2. Based on a hydrogeological investigation performed by PES in December 1993, the groundwater flow from the Shellmound Parcels into Temescal Creek depends on the tidal activity of San Francisco Bay. The rate of groundwater flow into Temescal Creek is dependent upon the elevation difference between the water level in Temescal Creek and the groundwater elevation and the hydraulic conductivity of the creek bed material. The flux of the groundwater into Temescal Creek will be the highest during low tide when the water level in the creek is at its lowest level. The flux of groundwater into the Creek is reversed during high tide periods when the water level in the creek exceeds the groundwater level.

The surface water in Temescal Creek eventually discharges into the San Francisco Bay. As described earlier, there is no direct communication between the groundwater beneath the Site and the San Francisco Bay. However, during low tide periods, groundwater discharges into Temescal Creek and eventually reaches the San Francisco Bay. Therefore, there is only an indirect communication between the groundwater beneath the Site and the San Francisco Bay.

As described earlier, EM collected two samples at the upstream and the downstream locations of the Temescal Creek in April 1990. Results of the Creek sampling showed detectable concentrations of TPH -D, arsenic, lead, zinc and total chromium, see Table 2-2. Concentrations decreased between the upstream and the downstream sampling points, with the exception of TPH-D which remained unchanged at 140 ppb. Therefore, it appears that the impact of potential discharge from site groundwater, between the upstream and downstream sampling points is not significant.

2.4 Nature of Soil and Groundwater Contamination

The Site characterization was started in the 1980s when the entire site was comprised of a total of 10.5 acres. However, the description of chemicals found in the western portions of the Site which is presently owned by CalTrans is not included in the following discussion. Therefore, this evaluation is limited to the remaining 7.5 acre of the Site that is owned by the City of Emeryville Redevelopment Agency.

2.4.1 Extent of Soil Contamination

Since the 1980s, large-scale soil investigations have been performed on the Site. Soil samples have been analyzed for the presence of metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and petroleum hydrocarbon compounds. The metals and the hydrocarbon compounds detected in soil during the subsurface investigations have been tabulated in Tables 2-3 and 2-4. The tables also present the maximum, average, and 95% UCL concentrations of the different contaminants in soil. Figure 2-2 shows the soil sampling locations.

Elevated concentrations of metals such as lead, zinc, chromium (mainly composed of trivalent chromium), arsenic, cadmium, nickel, barium, silver, copper, beryllium, cobalt, molybdenum, vanadium and mercury were detected in the soil beneath the Site. A comparison between the metals in on-Site soils with their typical East Bay background and U.S. Environmental Protection Agency (U.S. EPA) Preliminary Remediation Goals (PRGs) concentrations is presented in Table 2-5. The background concentration of each metal was then compared with its maximum and 95% UCL concentration in the soil beneath the Site. Table 2-5 shows that the concentrations of all the metals, except selenium, were above their typical background concentrations, but the reported soil concentrations of metals are generally below the US EPA PRG concentrations except lead, arsenic, chromium and beryllium. However, most of the metals detected in soils beneath the Site were present in slag fill. The slag was presumably generated during JMC's 104-years of operation.

PCBs were exclusively detected in soil samples collected from Parcel I. PCBs were not detected in any of the soil samples collected on Parcels II and III. PCB as Arochlor 1242 was detected at P-22 (2.7 ppm at 3 feet bgs). PCB as Arochlor 1254 was detected at N-10 (2.3 ppm at 9 feet bgs), P-22 (5.3 ppm at 3 feet bgs), SS-11 (4.5 ppm at 0 to 0.5 feet bgs) and SS-12 (15 ppm at 0 to 0.5 feet bgs). PCBs were not detected in soil samples collected at N-8/N-9, P-13, P-16 and HW-2. Figure 2-2 shows the soil sampling locations. Presently, the Shellmound Street Extension has capped all of the soil sampling locations (except SS-11 where PCBs detected at 4.5 ppm).

Among the Volatile Organic Compounds (VOCs) analyzed only trichloroethylene (0.0064 ppm) and tetrachloroethylene (0.013 ppm), were detected at HW-5 in a soil sample collected at 11 ft. bgs on Parcel III, see Table 2-4.

2.4.2 Extent of Groundwater Contamination

Sporadic groundwater monitoring has been performed on the Site since the 1980s. The different chemicals detected in the groundwater beneath the Site are presented in Tables 2-6 and 2-7. The maximum, average and 95% UCL concentrations of the contaminants detected in groundwater are also presented in these tables. Total petroleum hydrocarbons (TPH) in the form of diesel, gasoline and oil and grease have been detected in the groundwater beneath the Site. The maximum concentration of TPH as gasoline (TPH-G) of 1.5 ppm was detected in a groundwater sample collected at MG-1/B5 on Parcel III. The maximum concentration of TPH as diesel (TPH-D) of 410 ppm was also detected in the groundwater sample collected at MG-1/B5. The maximum concentration of TPH as oil and grease (TPH-OG) was 40 ppm in a groundwater sample collected at HP-18 on Parcel III. TPH-G, TPH-D and TPH-OG were also detected in the low parts per million range on Parcels I and II. The concentrations of TPH-D were found to be consistently higher on Parcel III than on Parcels I and II. The source of petroleum hydrocarbons beneath Parcel III is believed to originate from the underground storage tanks at the former P.I.E. site located to the north of Parcel III, (PES (1990), Geomatrix (1997)).

The VOCs and SVOCs were also detected in groundwater at all three parcels; most notably Parcel III. The range of benzene concentrations on Parcel III was found to be between 0.5 and 190 ppb with the maximum concentration detected in the groundwater sample collected at MG-1/B 5. The maximum concentrations, 4 ppb and 1 ppb of toluene and ethylbenzene were detected in the groundwater sample collected at MG-1/B5. The maximum concentration of xylene (8.9 ppb) was detected in the groundwater sample collected at MG-3/B8. PCE was detected at one location on Parcel III with a concentration of 9.0 ppb at HW-5. A TCE concentration of 6.8 ppb was detected at HW-5 on Parcel III. Chloroform (5.1 ppb at HW-5, Parcel III), vinyl chloride (2.7 ppb at HP-18, Parcel III) and methylene chloride (20 ppb at HP-11, Parcel II) were also detected in the groundwater beneath the Site. The groundwater samples were also analyzed for the presence of metals. Metals in the low parts per million range were detected on all three parcels on the Site. The concentrations of the heavy metals detected in groundwater beneath the Site are presented in Table 2-6. Figure 2-3 shows the groundwater sampling locations.

2.5 Recent Site Activities

As stated earlier, currently the property is approximately 7.5 acres as CalTrans purchased the western portion of the property for the Interstate 80 (I-80) reconstruction project. CalTrans conducted extensive remediation and construction on the western portion of the property, widening I-80 and relocating the 80-inch diameter interceptor sewer line for the East Bay Municipal Utility District (EBMUD). As a part of the sewer line relocation process, a 3,500-foot long trench was excavated. The approximate dimensions of the trench were 25-feet wide by 25-feet deep. During the relocation process, a slurry wall was constructed around the relocated sewer line. Under the Cal/EPA's oversight, a great portion of the excavated soil from the trench was removed and transported to Class I and Class III landfills and replaced by clean fill material.

The results of laboratory analysis on soil samples collected from the excavated trench soils revealed the presence of metals and petroleum hydrocarbons. The excavated soils were from the EBMUD trench for the interceptor line. Those portions of the excavated soils that were not classified as "California Hazardous Waste", were used as a backfill material. The soils which were classified as "California Hazardous Waste" were off-hauled and disposed at Forward Landfill, in Stockton, California and Roosevelt Landfill, a Class I landfill in the State of Washington (personal communication with Ms. Lisa Toth, Assistant Construction Engineer of EBMUD).

Additionally, in the summer of 1996, the City of Emeryville was involved in the construction of the Shellmound Street Extension, traversing through the Site. The construction involved realignment of approximately 1,100 linear feet of new roadway and excavation of utility trenches. The utility trenches included storm drains, sanitary sewer lines, electrical conduits and EBMUD drinking water lines, manholes, gas and irrigation lines. As part of this installation process, approximately 5,500 cubic yards of soil was excavated from the trench beneath the Shellmound Street. According to Stratus Environmental Services (1996) the results of the laboratory analysis on soil samples collected from the excavated soils indicated that the soluble lead concentrations exceeded the Soluble Threshold Limit Concentration (STLC) of 5 mg/l. The soil was treated to reduce its solubility to below 5 mg/l, and was transported off-Site. Petroleum hydrocarbons, SVOCs, VOCs, and metals were detected below regulatory levels and therefore did not require remediation or off-Site disposal.

Confirmation soil samples were collected from the excavated areas to establish post-removal conditions, and the area was subsequently backfilled. Soil samples were analyzed using the EPA method 6010. The analytical results revealed that the STLC concentration of lead in the remaining soils is about 5.9 mg/l. The soil excavation and the remediation of the chemically impacted soils were conducted under the Cal/EPA's oversight and approval.

Based on the current land use plans, the property will be developed for commercial use in the near future. The existing zoning at the Site and the surrounding land is shown in Figure 1-3. A hotel building, commercial and office buildings, and parking lots will be constructed over portions of Parcels I, II and III; while portions of Parcels I and II east of Shellmound Street are a part of another future, commercial construction plan.

Floating petroleum product in groundwater has been reported beneath Parcel III, located at the northern portion of the Site. The petroleum product in the groundwater, was identified by chromatograph as diesel fuel, and is believed to be originating from the former P.I.E. site. The extent of the diesel fuel found beneath Parcel III and the former P.I.E. site is shown in Figure 1-4. Geomatrix Consultants, Inc. (Geomatrix) previously assessed the health risk associated with the floating product beneath Parcel III. The Geomatrix report concluded that the presence of diesel fuel in groundwater does not impact water quality in the Temescal Creek and will not pose a significant risk to human health or the environment. This RAW does not address the TPH-related contamination on Shellmound Parcel III because the responsible party for the adjacent P.I.E. site is remediating the problem under oversight of the Alameda County Health Agency, Department of Environmental Health.

3.0 Human Health Risk Assessment

The purpose of the human health risk assessment (HHRA) was to quantitatively evaluate potential human health impacts which might result from exposure to chemical contaminants in soil and groundwater at the Site. The HHRA results provide a basis for deciding whether further investigation and/or remedial action is warranted. The key objectives of the HHRA included:

- identification of chemicals of potential concern (COPCs);
- identification of potential human receptors and potential exposure pathways;
- defining reasonable maximum exposure scenarios for each complete potential exposure pathways; and
- quantitative evaluation of carcinogenic and noncarcinogenic health risks associated with each exposure scenario.

The COPCs in the soil were determined by comparing the soil industrial/commercial preliminary remediation goals (PRGs) values published by the US EPA (US/EPA, 1995) and background metals in surrounding soils reported by Lawrence Berkeley National Laboratory (1995) with maximum on-Site soil concentrations collected from unpaved areas (see Table 2-5). Since exposure pathways were eliminated in areas were the paved road now exists, chemicals found in these areas were not considered in the HHRA. Figure 1-2 shows those portions of Parcels I, II and III on the Site that are covered by the Shellmound Street Extension. Based on this method, the COPCs that were identified in soil were PCBs, lead, chromium, arsenic and beryllium. All volatile organic chemicals and metals detected in groundwater were retained as COPCs.

Based on the Site Conceptual model (Figure 3-1), the potential exposure pathways identified in the HHRA are dermal contact, inhalation of soil particulates or volatile emissions from soil and groundwater and incidental ingestion of soil. The following exposure scenarios were evaluated quantitatively.

Current Use Potential Exposure Scenarios

- Current off-Site outdoor office/retail worker
- Current trespasser

Future Use Potential Exposure Scenarios

- Future on-Site, indoor and outdoor office/retail worker
- Future construction worker

Currently, the Site and the surrounding lands are zoned for industrial/commercial use, see Figure 1-3. The land use plan for the Site is expected to remain industrial/commercial in the future. Therefore, the risk associated with unrestricted residential land use (e.g., single family house) was not evaluated.

3.1 Quantification of Carcinogenic Risks and Non-Carcinogenic Health Hazards

The HHRA quantified both noncarcinogenic health hazards and carcinogenic health risks. Noncarcinogenic health hazards were evaluated using a hazard index (HI) approach. The HI is defined as the sum of the hazard quotients for each COPC, for each route of exposure. The hazard quotient is defined as the ratio of the predicted dose to a reference dose for each COPC. A total HI less than or equal to unity suggests that the adverse health effects would not be expected following a lifetime of exposure, even in sensitive members of the population. Carcinogenic health risks were quantified for each COPC as the probability of developing cancer as a result of the exposure evaluated for each scenario (excess cancer risk). The following section presents the estimated carcinogenic and noncarcinogenic health hazards for the following receptors:

1. Hypothetical on-Site outdoor office/retail worker;
2. Hypothetical on-Site indoor office/retail worker;
3. Off-Site office/retail worker;
4. Hypothetical construction worker; and
5. Hypothetical trespasser.

<u>On-Site Outdoor Office/Retail Worker</u>

The total theoretical excess cancer risk for an on-Site outdoor office/retail worker assumed to be exposed to Site contaminants from ingestion of soil, dermal contact with soil, inhalation of soil particulates and inhalation of volatile emissions is 3.79×10^{-5} using the maximum reported concentrations, and 2.16×10^{-5} using the 95% UCL concentrations. This estimated cancer risk is primarily attributable to PCBs and arsenic from ingestion, dermal contact, and inhalation of soil particulates. The estimated risk for maximum concentrations is within the target risk range defined by the USEPA (1×10^{-6} to 1×10^{-4}) "as safe and protective of the public health" [Federal Register 56 (20): 3535, Wednesday, January 30, 1991].

The total non-carcinogenic hazard for an on-Site outdoor office/retail worker from ingestion of soil, dermal contact with soil, and inhalation of soil particles and volatile emissions is 0.38 using maximum concentrations and 0.30 using the 95% UCL concentrations. This estimate is below the hazard index of 1 and would be considered negligible.

The maximum reported concentration of lead (7,200 mg/kg) exceeds both the PRG-95 and PRG-99 values for on-Site outdoor workers. The PRG-95 and PRG-99 values of lead for an outdoor worker are 5,079 mg/kg and 3,417 mg/kg, respectively. However the more representative 95% UCL soil concentration for lead (1,093.6 mg/kg) is well below the more stringent PRG-99, indicating that lead in soil would not be expected to pose a health threat for on-Site outdoor office/retail workers at the Site.

On-Site Indoor Office/Retail Worker

This scenario assumed that a commercial building was placed directly over the groundwater plume "hot-spot", thereby maximizing the emission of volatile chemicals from groundwater into the indoor air. The total excess cancer risk from inhalation of volatile emissions in indoors is 7.33×10^{-7}. This total risk from volatile emissions is below the target risk range defined by the U.S. EPA (1×10^{-6} to 1×10^{-4}) [Federal Register 56 (20): 3535, Wednesday, January 30, 1991].

The total noncarcinogenic health hazard for an indoor on-Site office/retail worker is 8.35 x 10^{-3}. This hazard index is well below 1.0, and would be considered negligible.

Off-Site Office/Retail Workers (Nearest Downwind Workers)

Under both current and future uses of the Site, off-Site receptors could only be exposed to Site-related contaminants through inhalation of wind-blown soil particulates and volatile emissions from soil and groundwater. For the on-Site office/retail worker, the total excess cancer risk only from inhalation of volatile emissions, based on maximum concentrations, is 6.92 x 10^{-9}. Since this risk is negligible, the risk associated with inhalation of volatile chemicals for off-Site office/retail workers was not calculated. However, the carcinogenic risk associated with inhalation of particulate emissions for off-Site office/retail workers was calculated. The total carcinogenic risk from inhalation of suspended soil particulates was 4.84 x 10^{-6} using the maximum concentrations and 2.66 x 10^{-6} using the 95% UCL concentrations. Both risk estimates are well within the target range of risk defined by the U.S. EPA "as safe and protective of public health" (1 x 10^{-6} to 1 x 10^{-4}) [Federal Register 56 (20): 3535, Wednesday, January 30, 1991].

The total noncarcinogenic health hazard from inhalation of soil particulates is 9.78x10^{-4}, which would be considered negligible. Consequently, off-Site office/retail workers are not of concern for potential noncarcinogenic health effects from Site-related emissions.

Construction Worker Scenario

For a construction worker assumed to be exposed to Site contaminants through ingestion of soil, dermal contact with soil, and inhalation of volatile emissions and soil particulates, the total theoretical excess cancer risk is 5.40 x 10^{-7}. This estimated risk is primarily attributable to PCBs and arsenic. The estimated risk is below the lower end of the risk management range as defined by the U.S. EPA.

The total noncarcinogenic health hazard was 1.27 and is almost entirely attributable (70%) to PCBs from dermal contact . This estimated hazard is above the threshold criterion of 1.0 and is based on a single sample location (SS-11) at Parcel I with a reported PCB concentration of 4.5 mg/kg.

The maximum reported concentration of lead (7,200 mg/kg) exceeds both the PRG -95 and PRG-99 acceptable soil concentrations for construction workers (2,725 mg/kg and 1,833 mg/kg, respectively). However, the more representative 95% UCL soil concentration for lead (1,093.6 mg/kg) is well below the more stringent PRG-99.

Trespasser Scenario

This scenario assumed that a child would gain access to the Site once a week for 2 hours/day (Silvers, et. al., 1994) for a 6-year duration. The total theoretical excess cancer risk for a child trespasser from ingestion of soil, dermal contact with soil, inhalation of soil particulates and inhalation of volatile emissions is 1.29×10^{-6} using maximum concentrations and 7.20×10^{-7} using 95% UCL concentrations. This risk is primarily attributable to PCBs (from ingestion and dermal contact) and arsenic (from inhalation of soil particulates).

The total noncarcinogenic health hazard is 0.066 using maximum concentrations and 0.055 using 95% UCL concentrations. These hazards are below the threshold criterion of 1.0.

The maximum reported concentration of lead (7,200 mg/kg) exceeds both the PRG -95 and PRG-99 acceptable soil concentrations for a child (1,249 mg/kg and 654 mg/kg, respectively). The more representative 95% UCL soil concentration for lead (1,093.6 mg/kg) is above the PRG-99, but below the PRG-95. Since Site construction and development activities will begin in the near future (which includes the import of 2 to 3 feet of clean fill material across the Site), a potential child trespasser would not be exposed for the duration of 6 years, as assumed to evaluate this scenario. Under these conservative assumptions, the 95% UCL lead concentration is below the PRG-95.

The U.S. EPA, through its Memorandum on the Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions (OSWER Directive 9355.0-30) states the following:

"Where the cumulative carcinogenic Site risk to an individual based on reasonable maximum exposure for both current and future land use is less than 10^{-4}, and the noncarcinogenic hazard quotient is less than 1, action generally is not warranted unless there are adverse environmental impacts".

Based on the U.S. EPA's conclusion:

"A target risk range of 10^{-4} and 10^{-6} is considered by the EPA to be safe and protective of public health". (Federal Register 56(20):3535, Wednesday, January 30, 1991).

Consequently, the range of risk between 1×10^{-6} and 1×10^{-4} is generally considered acceptable to state and federal regulatory agencies depending upon Site-specific and surrounding area considerations.

3.2 Results of HHRA

The results of the HHRA indicate that:

- The excess carcinogenic risks for all the receptors of concern are within or below the acceptable limits as defined by the U.S. EPA (10^{-4} to 10^{-6}).

- The non-carcinogenic health hazard for a construction worker, using the 95% UCL concentrations, is equal to 1.27. This value was based on a single sample location (SS-11) at Parcel 1 with a reported PCB concentration of 4.5 mg/kg. The non-carcinogenic health hazard for all other receptors of concern using both maximum and 95% UCL concentrations is below the acceptable criterion of 1.0.

3.3 Qualitative Ecological Evaluation

SOMA (1997) developed a model to evaluate the transport of on-Site chemicals from groundwater to the Temescal Creek (Creek). This task included estimating the maximum concentrations of chemicals in the Creek. It also included the calculation of the maximum mass fluxes of chemicals migrating into the Creek. In order to evaluate

the potential impact of chemicals on the water quality in the Creek and the San Francisco Bay, the maximum estimated chemical concentrations in the Creek were compared to different available marine/freshwater quality standards, see footnotes of Table 3-1. Table 3-1 summarizes the maximum groundwater concentrations at the Site, simulated maximum concentrations of the chemicals in the Creek, and
the ratios of the simulated concentrations in the Creek to their respective marine water quality standards. As Table 3-1 indicates none of the maximum predicted concentrations of VOCs, SVOCs or metals in the Temescal Creek exceeds their respective marine water quality standards.

Laboratory analysis of surface water samples collected from the Temescal Creek by EM in April 1990, indicate that concentrations decreased between "upstream" and "downstream" sampling points, with the exception of TPH as diesel, which remained unchanged at 140 ppb (see Table 2-2). The chemicals from the groundwater beneath the Site are discharged between the "upstream" and the "downstream" ends of the Temescal Creek. Since the laboratory analysis on the samples collected from the Temescal Creek shows a reduction in concentration between the "upstream" and "downstream" sampling points, the contribution of the Site related chemicals to the total chemical concentrations in the Temescal Creek is negligible.

4.0 Removal Action Objectives

Removal Action Objectives (RAOs) are goals developed for medium-specific or area-specific protection for human health and the environment. RAOs for protecting public health address both chemical concentrations and potential exposure routes. Protection can be achieved by either reducing concentrations and/or reducing potential exposures. RAOs for protecting the environment typically seek to minimize impacts on resources by addressing the medium of concern and the target cleanup levels.

4.1 Applicable or Relevant and Appropriate Requirements and To Be Considered Criteria

Removal action objectives should, to the extent practicable considering the exigencies of the situation, be consistent with Applicable or Relevant and Appropriate Requirements ("ARARs")(40 CFR Section 300.415 (j)). The definition of Applicable or Relevant and Appropriate Requirements is derived from the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Section 300.5):

Applicable Requirements:

Cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, remedial action, location, or other circumstance at the Site.

Relevant and Appropriate Requirements:

Cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a Site, address problems or situations sufficiently similar to those encountered at the Site that their use is well-suited to the particular site.

ARARs typically are separated into these categories:

Chemical-specific ARARs:

These are health-based or risk-based standards, which define the allowable limits of specific chemical compounds, found in or discharged to the environment. They can provide cleanup and discharge levels, governing the extent of Site remediation. Maximum contaminant levels (MCLs) for drinking water are examples of chemical specific ARARs.

Location-specific ARARs:

These requirements apply to natural Site features (e.g., wetlands, flood plains, endangered species) and man-made features (e.g., landfills, city zoning, and places of historical or archaeological significance). Location-specific ARARs restrict the types of remedial actions, which can be implemented, based on the characteristics or location of the Site.

Action-specific ARARs:

These ARARs are technology-based or activity-based limitations which set performance and design restrictions. They specify permit requirements and engineering controls which must be instituted during Site activities, and restrict particular activities.

Federal and state non-promulgated standards, policies, or guidance documents, and local requirements, are not ARARs. However, according to the NCP guidance, these criteria are also to be considered when evaluating and selecting removal actions necessary to protect human health and the environment. These non-promulgated, non-binding criteria are designated "To Be Considered", or "TBCs".

Potential chemical and action specific ARARs and TBCs are discussed below:

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4.1.1 Potential Chemical-Specific ARARs and TBC

PCB Spill Cleanup Policy Under the Toxic Substances Control Act:

The PCB Spill Cleanup Policy was published in 40 CFR 761.120-761.139 on 2 April 1987 and describes the level of cleanup required for PCB spills occurring after 4 May 1987 (the effective date). Although the Spill Policy is not an ARAR, as a published policy representing substantial scientific and technical evaluation, the PCB Spill Cleanup Policy is a TBC in development of cleanup levels for PCB-impacted soil (EPA, 1987).

The PCB Spill Cleanup Policy requires that:

1. for spills of low concentration PCBs (50 ppm to 500 ppm) involving less than one pound of PCBs, excavation of all soil within the spill area plus a 1-foot lateral boundary of soil and other ground media.

2. for spills of 500 ppm or greater PCBs and spills of low-concentration PCBs of more than 1 lb PCBs by weight:

a. In non-restricted access areas soil and other similar materials in residential/commercial areas must be cleaned up to 10 ppm PCBs, and a cap of clean materials containing less than 1 ppm PCBs (the average background level of PCBs in soil) equal to a minimum of 10 inches must be placed on top of the excavated area.

b. In industrial and other restricted access spills EPA believes that clean up of soil, sand, gravel and other similar materials to 25 ppm would not present unreasonable risks to public health or the environment.

EPA Guidance on Remedial Actions for Superfund Sites with PCB Contamination (EPA, 1990)

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This document was prepared by the Office of Emergency and Remedial Response of the U.S. Environmental Protection Agency in 1990 (EPA, 1990). It describes the recommended approach for evaluating and remediating Superfund Sites with PCB contamination. It is a guide in the investigation and remedy selection process for PCB-contaminated Superfund Sites and is a TBC in development of cleanup levels for PCB-impacted soil.

This document identifies starting point concentrations (preliminary cleanup goals) to identify areas for which response actions should be considered. These concentrations represent the level above which unrestricted exposure may result in risks exceeding protective levels. The document concludes that preliminary remediation goals should be:

a. 1 mg/kg for sites in or expected to be residential areas, and

b. 10 to 25 mg/kg for sites where non-residential land use is anticipated.

As starting point concentrations, the final cleanup levels must reflect all relevant exposure pathways and be defensible on a site-specific basis.

This document also concludes that:

a. for contaminated material that is contained and managed in place over the long term, appropriate engineering and institutional controls should be used to ensure protection is maintained over time;

b. principal threats at the site should be treated, whenever practicable, and that consideration should be given to containment of low threat material. Principal threats generally include material contaminated at concentrations exceeding 100 ppm for sites in residential areas and concentrations exceeding 500 ppm for sites in industrial areas.

c. Where concentrations are below 100 ppm, treatment is less likely to be practicable unless the volume of contaminated material is relatively low.

4.1.2 Potential Action-Specific ARARs and TBC

Potential action-specific ARARs and TBCs include:

CEQA Compliance: According to DTSC guidance, the California Environmental Quality Act ("CEQA") requires completion of an Environmental Impact Report ("EIR"), a Negative Declaration or a Notice of Exemption prior to implementation of removal actions. A Mitigated Negative Declaration was prepared and certified on July 24, 1997 by the City of Emeryville for the Orient and Western (Holdings) Corporation's proposed development. The proposed commercial development encompasses a majority of the Site and the removal actions contained herein were contemplated and evaluated in the Mitigated Negative Declaration. DTSC will prepare a Notice of Exemption for the project Site.

California Superfund Statutes

Health and Safety Code Section 25359.7 et seq. requires disclosure provisions by any owner, lessee, or renter of a property who knows or has reasonable cause to believe that a "release of hazardous substance" has occurred on or beneath a property to give written notice of the condition to each buyer prior to the sale of the property.

Health and Safety Code Section 25355.5 states that protective provisions, covenants, restrictions and conditions may be imposed upon a property. These restrictions run with the land from the date of recordation and apply to and bind the respective successors.

County of Alameda Public Works Agency: This agency requires a permit be obtained prior to installation or decommissioning of groundwater monitoring wells. This requirement was identified as a TBC.

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4.2 Removal Action Objective

The RAOs developed focus on PCBs, lead, chromium, arsenic and beryllium in soil, and metals, VOCs and SVOCs in groundwater. The recommended RAO for the PCB and metal-impacted soil, and VOC and SVOC impacted groundwater is to mitigate the threat to human health and the environment in a manner consistent with planned and potential activities and future users of the property. This RAO can be achieved by reducing potential exposures to impacted soil and groundwater through institutional constraints.

5.0 Removal Action Alternatives

This section evaluates two removal action alternatives for mitigating the potential threat to human health and the environment posed by the chemicals of concern taking into account planned and potential activities at and future uses of the Site. The two removal action alternatives that were considered during this study were:

- No Action; and
- Institution Control

5.1 Remedial Technologies Evaluation Criteria

Remedial options are screened using three criteria: effectiveness, implementability and cost.

5.1.1 Effectiveness

Effectiveness is the ability of each alternative to provide protection to public health and the environment. The evaluation of each option is based on the effectiveness of the alternative to handle the estimated volume of media and to meet the RAOs; the potential impacts to human health and the environment during and following implementation; and the reliability and proven history of the alternative with respect to the chemicals and the conditions found at the Site.

5.1.2 Implementability

Implementability of an alternative is based on the technical and institutional feasibility of implementing a particular option. Technical feasibility includes the availability of treatment, storage and disposal services. It also includes the availability of necessary equipment and skilled workers to implement the process. Institutional feasibility includes obtaining the necessary permits or regulatory concurrence.

5.1.3 Cost

Costs used during the analysis are the estimated amounts to implement each alternative. The focus was to make comparative estimates for alternatives with relative accuracy so that cost decisions among alternatives would be sustained.

5.2 Alternative 1: No - Action Alternative

Alternative 1, the "no-action" alternative, as required by the National Contingency Plan (NCP) and Superfund Amendments and Reauthorization Act (SARA), provides a baseline from which to analyze and assess other alternatives. Under this alternative, no remedial alternatives or groundwater monitoring will be implemented at the Site.

5.2.1 Effectiveness:

Based on the results of the HHRA, as long as the existing land use type (industrial/commercial) is not changed, no adverse health effects to on- and off-Site office/retail workers will be anticipated. The HHRA indicates the non-carcinogenic risk for construction workers of 1.27 is slightly over the acceptable value of 1. However, the health and safety plan during the construction period will require the workers to use protective clothing in order to reduce or eliminate the exposure routes. This alternative is not effective since it does not meet the remedial action objective. There would be no reduction of potential exposures to soils and groundwater.

5.2.2 Implementability:

This alternative does not have any technical concerns, therefore, no barrier or obstacle exist that would impede the implementability of this alternative.

5.2.3 Costs:

No capital costs will be associated with this alternative. However, the future owner of the Site will be responsible for the continuing costs such as preparation and implementation of the Sites Health and Safety Plan during excavation/construction period.

5.3 Alternative 2: Institutional Control

Alternative 2, the "institutional control", is similar to the "no-action alternative" in which no physical action will be required to reduce the exposure point concentration. However, this alternative will require necessary filing and legal services to draft a deed restriction document. The deed restriction document will legally restrict the current/future zoning of the Site to industrial/commercial use only. Based on the provisions set forth in the HHRA document, the deed restriction document will prohibit use of the Site for single family residential development, school and hospital uses. Under this alternative some/all of the existing groundwater monitoring wells will be decommissioned. This determination will be made in consultation with Alameda County Health Agency, Department of Environmental Health, and will be based on the remediation plan developed for the P.I.E. site.

5.3.1 Effectiveness:

This alternative is effective since potential exposures to soil and groundwater will be reduced and the removal action objectives will be met. Institutional control would be used to eliminate, in perpetuity, future sensitive receptors living in single family residences.

5.3.2 Implementability:

No technical or administrative difficulties are expected in implementing this alternative. Decommissioning of monitoring wells and piezometers would require the use of conventional technology. A permit for this activity would be required from the County of Alameda Public Works Agency. A deed restriction that limits future uses of the property is easily implemented.

5.3.3 Costs:

The associated costs with implementing this alternative would include decommissioning of the existing groundwater monitoring wells, review and filing of the deed notification and continuing costs. Per Mr. Ron Gerber, Projects Coordinator of City of Emeryville Redevelopment Agency, the legal services for drafting and finalizing the deed restriction documents will be performed by the City Attorney and their legal staff, with no out-of-pocket cost.

Based on the Kleinfelder (1997) report, there are seven groundwater-monitoring wells and one piezometer on Parcel III. No groundwater monitoring well has been installed in Parcel I or Parcel II. In 1996, the City of Emeryville Redevelopment Agency installed three additional piezometers to monitor groundwater elevations beneath the Site. Piezometers P1 and P2 are located in Parcel II, while P3 has been installed in Parcel I. During the recent groundwater elevation survey, only groundwater monitoring well MG-7 in Parcel III was located by SOMA. It is believed that the rest of the groundwater monitoring wells/piezometers have been damaged or covered under the construction material at the Site. Additional effort and expenses are needed to relocate all of the monitoring wells and piezometers at the Site and have them appropriately decomissioned, which will be carried out by the City of Emeryville Redevelopment Agency.

Continuing Costs:

Continuing costs would be incurred as a result of the imposition of the deed restriction and/or notices. It is assumed that these costs would likely be incurred during earthwork "events" and result in increased long-term expenses to the future property owner. Such events might include building construction or underground utility installation and maintenance in areas covered by the deed restriction or notices. These events would likely require:

- Notifying Cal/EPA in advance of performing earthwork;
- Preparing appropriate plans for submittal to and approval by Cal/EPA including: soil management plans, health and safety plans, dust control plans, and surface water control plans;
- Cal/EPA document review;
- Using contractors with 40 hour health and safety training to perform earthwork;
- Cal/EPA oversight during the earthwork event;
- Preparing reports summarizing earthwork event;
- Proper management of contaminant-impacted soil; and

- Reimbursing Cal/EPA for review and oversight costs.

Since the City of Emeryville Redevelopment Agency, the present owner of the Site, is in the process of selling the property to the Orient and Western (Holding) Corporation, and due to the unknown nature of the construction activities, the present worth of costs associated with the above items cannot be determined at this time. However, the future owner of the property will be responsible to deal with the above issues and continuing costs associated with future excavation/construction activities at the Site.

Capital Costs:

Assuming that all of the groundwater monitoring wells and piezometers will be decommissioned and the City's legal staff will be involved in preparing the legal documents for implementation of the deed restriction, the cost will be as follows:

1)	Locating groundwater monitoring wells: $100 per well/piezometer (only 7 wells need to located (7 x $100)	$700
2)	Decommission (pressure grouting) of the existing wells and piezometers: $900 per well/piezometer (7 wells and 4 piezometer 11 x $900)	$9,900
3)	Preparing deed notification document by City	$1,500
4)	Regulatory agency's review and comment:	$1,500
		$13,600

5.4 Summary of Remedial Analysis and Proposed Removal Action

A summary of the results of the alternative evaluation for Alternative 1 and 2, a recommended removal action alternative for implementation are presented in this section.

A synopsis of the screening for each alternative is presented below:

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Alternative 1: No Action

- Not effective (does not prohibit future single family residential dwellings)
- Easiest to implement
- Least expensive

Alternative 2: Institutional Control

- Effectively restricts the Site's zoning to commercial/industrial use only
- Can be easily implemented
- Cost associated with this alternative is only $13,600

5.4.1 Effectiveness

Alternative 1, "No Action", is not effective since it does not meet the RAOs. Alternative 2, "Institutional Control" is effective as it meets the RAOs. The alternative is consistent with planned and potential activities and future uses of the Site.

5.4.2 Implementability

Implementability of both alternatives would be feasible.

5.4.3 Costs

The preliminary cost estimates for Alternative I is $ 0.00 and for Alternative II is $13,600.

5.5 Recommended Removal Action Alternative

Alternative II, "Institutional Control" is recommended as the proposed removal action alternative. Implementing institutional controls would be effective in protecting human health and the environment, and is easily implementable.

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6.0 Site Preparation

Prior to any on-Site activities associated with monitoring well and piezometer decommissioning, all necessary permits will be obtained. The permit for decommissioning of groundwater monitoring wells will be obtained from the County of Alameda Public Works Agency (CAPWA).

A work zone will be designated to store equipment and material such as cement, sand or gravel for pressure grouting. A subcontractor will be hired to decommission groundwater monitoring wells under the supervision of SOMA Environmental.

6.1 Public Participation Activities

This removal action workplan will also provide an opportunity for the public to be involved in the decision-making during the process of selecting a removal alternative. A fact sheet describing the environmental conditions and the summary of the public health risk assessment and the selected removal action alternative will be prepared. The fact sheet will be distributed to the interested communities, the City officials, and environmental groups. In addition, a notice will be prepared and placed in the local newspaper announcing the draft RAW and selected removal alternative. The public will have a 30 day time period in which to comment on the draft RAW.

6.2 Implementation Schedule

The proposed schedule to implement the activities associated with Site preparation is presented below. The schedule was prepared in consultation with the City of Emeryville Redevelopment Agency. The field work for decommissioning of the groundwater monitoring wells and piezometers will take only 2-3 days depending upon their identification and accessibility.

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6.2.1 Probable Completion Dates

The probable completion dates are as follows:

	ACTIVITY	ESTIMATED COMPLETION DATES
1.	Contractor secure permits	September 1997
2.	Locate groundwater monitoring wells and piezometers	October l997
3.	Decommission groundwater monitoring wells and piezometers	November 1997
4.	Prepare implementation report	November 1997
5.	Record deed restriction	December 1997

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TABLES

Table 2-1

Specific Conductivity and Total Dissolved Solids in Groundwater at the Site

Sample Number	Date Sampled	Parcel	Specific Conductivity (umhos/cm)	Total Dissolved Solids (mg/liter)
HP-1	4/18/94	I	1500.0	960.0
HP-2	4/18/94	I	5760.0	3686.4
HP-3	4/19/94	I	2670.0	1708.8
HP-4	4/19/94	I	3330.0	2131.2
HP-19*	4/19/94	I	3550.0	2272.0
HP-5	4/20/94	I	13500.0	8640.0
HP-6	4/20/94	I	2690.0	1721.6
HP-7	4/20/94	II	7610.0	4870.4
HP-8	4/25/94	II	1220.0	780.8
HP-9	4/25/94	II	1220.0	780.8
HP-10	4/25/94	II	1110.0	710.4
HP-11	4/27/94	II	1330.0	851.2
HP-12	4/27/94	II	2100.0	1344.0
HP-13	4/27/94	II	2320.0	1484.8
HP-14	4/27/94	II	1660.0	1062.4
HP-15	4/28/94	III	3980.0	2547.2
HP-20**	4/28/94	III	3990.0	2553.6
HP-16	4/28/94	III	6870.0	4396.8
HP-17	4/28/94	III	3990.0	2553.6
HP-18	4/28/94	III	2220.0	1420.8
MG-1	4/29/94	III	NA	1510.0
MG-2	4/29/94	III	NA	1730.0
MG-3	4/29/94	III	NA	800.0
MG-4	4/29/94	III	NA	2070.0
MG-7	4/29/94	III	NA	1370.0
MW-16	4/29/94	III	NA	11700.0
MW-18	4/29/94	III	NA	2090.0
PZ-1	4/29/94	III	NA	3480.0
			Max	11700.0
			Average	2543.8
			Count	28.0
			Standard Dev	2443.4
			t	1.7
			95% UCL	3328.8

*) HP-19 is a duplicate of HP-4

**) HP-20 is a duplicate of HP-15

If the laboratory analysis of TDS was not available, TDS was calculated as
TDS in mg/liter = 0.64 x Specific Conductivity in umhos/cm (Hem, John.D,1959)

Table 2-2

Summary of Laboratory Analysis for Surface Water Samples from Temescal Creek

Name of the Chemical	Detection Limit (ppb)	Upstream End Sample Results (ppb)	Downstream End Sample Results (ppb)
Metals			
Arsenic	5.0	22.0	12.0
Chromium	5.0	12.0	ND
Lead	5.0	230.0	160.0
Zinc	10.0	140.0	25.0
VOCs			
Benzene	0.3	ND	ND
Toleune	0.3	ND	ND
Ethyl Benzene	0.3	ND	ND
Xylene	0.3	ND	ND
TPH as Diesel	50.0	140.0	140.0

Table 2-3: Soil Chemical Concentration (ppm)

(PCBs and Metals)

Parcel I

Name	Status	PCBs		Pb		Zn		Cr		H-Cr		As	
		Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average
N-8,N-9	Unpaved	ND	ND	51.8	44.0	162.1	129.3	66.1	61.9	NA	NA	32.4	32.4
N-10	Paved	2.3	2.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-13	Unpaved	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-16	Unpaved	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-22	Paved	8.0	8.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HW-2	Paved	ND	ND	21.0	9.2	55.0	24.2	160.0	82.8	NA	NA	ND	ND
SS-11	Unpaved	4.5	4.5	490.0	490.0	1100.0	1100.0	170.0	170.0	0.1	0.1	29.0	29.0
SS-12	Paved	15.0	15.0	20.0	20.0	100.0	100.0	28.0	28.0	ND	ND	3.9	3.9
Average		7.5	7.5	145.7	140.8	354.3	338.4	106.0	85.7	0.1	0.1	21.8	21.8
Max		15.0	15.0	490.0	490.0	1100.0	1100.0	170.0	170.0	0.1	0.1	32.4	29.0

Parcel II

Name	Status	PCBs		Pb		Zn		Cr		H-Cr		As	
		Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average
P-10	Unpaved	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HW-3	Unpaved	ND	ND	300.0	190.5	600.0	380.0	57.0	28.5	NA	NA	6.2	3.4
HW-4	Unpaved	ND	ND	240.0	71.9	634.0	247.0	180.0	100.6	NA	NA	1.2	0.6
N1,N2	Unpaved	NA	NA	98.2	96.4	2138.2	1209.4	124.1	95.5	NA	NA	19.3	19.3
N5	Unpaved	NA	NA	241.8	241.8	2316.4	2316.4	2228.1	2228.1	NA	NA	ND	ND
EBM-B5	Unpaved	ND	ND	650.0	164.2	2800.0	643.0	460.0	141.2	NA	NA	39.0	18.3
SS-7	Unpaved	NA	NA	290.0	290.0	460.0	460.0	110.0	110.0	ND	ND	6.3	6.3
SS-8	Unpaved	NA	NA	53.0	53.0	140.0	140.0	16.0	16.0	0.4	0.4	ND	ND
SS-9/SSDUP1	Unpaved	NA	NA	580.0	580.0	1700.0	1700.0	290.0	290.0	ND	ND	29.0	29.0
SS-10	Unpaved	NA	NA	2100.0	2100.0	830.0	830.0	36.0	36.0	ND	ND	3.6	3.6
Average		NA	NA	505.9	420.9	1291.0	880.6	389.0	338.4	0.4	0.4	14.9	11.5
St. Deviation		NA	NA	629.3	649.6	958.6	731.2	703.8	713.4	NA	NA	14.5	10.7
n		NA	NA	9	9	9	9	9	9	NA	NA	7	7
t(.95,n-1)		NA	NA	1.9	1.9	1.9	1.9	1.9	1.9	NA	NA	2.0	2.0
UCL 95%		NA	NA	904.2	832.0	1897.7	1343.5	834.5	790.0	NA	NA	26.0	19.7
Max		NA	NA	2100.0	2100.0	2800.0	2316.4	2228.1	2228.1	0.4	0.4	39.0	23.0

Table 2-3: Soil Chemical Conncentration (ppm)
(PCBs and Metals)

Parcel III

Name	Status	PCBs Maximum	PCBs Average	Pb Maximum	Pb Average	Zn Maximum	Zn Average	Cr Maximum	Cr Average	H-Cr Maximum	H-Cr Average	As Maximum	As Average
B-1	Unpaved	NA	NA	1000.0	1000.0	810.0	810.0	92.0	92.0	NA	NA	23.0	23.0
B-2	Unpaved	NA	NA	400.0	400.0	2300.0	2300.0	1500.0	1500.0	NA	NA	7.3	7.3
B-3	Unpaved	NA	NA	690.0	690.0	1800.0	1800.0	290.0	290.0	NA	NA	38.0	38.0
B-4	Paved	NA	NA	20000.0	20000.0	850.0	850.0	590.0	590.0	NA	NA	8.2	8.2
MG-1/B-5	Unpaved	NA	NA	1200.0	1200.0	5700.0	5700.0	1500.0	1500.0	NA	NA	9.0	9.0
MG-2/B-7	Unpaved	NA	NA	6100.0	6100.0	12300.0	12300.0	560.0	560.0	NA	NA	28.0	28.0
MG-3/B-8	Unpaved	NA	NA	860.0	860.0	4100.0	4100.0	1000.0	1000.0	NA	NA	12.0	12.0
MG-4/B-9	Unpaved	NA	NA	120.0	120.0	680.0	680.0	310.0	310.0	NA	NA	8.7	8.7
MG-7/B-6	Unpaved	NA	NA	1300.0	1300.0	2200.0	2200.0	1100.0	1100.0	NA	NA	36.0	36.0
B-10	Paved	NA	NA	11.0	7.5	110.0	79.7	NA	NA	NA	NA	NA	NA
B-11	Unpaved	NA	NA	1500.0	816.7	5000.0	2233.3	NA	NA	NA	NA	NA	NA
N6	Paved	NA	NA	160.4	160.4	998.8	998.8	319.6	319.6	NA	NA	ND	ND
T-1	Paved	NA	NA	240.0	167.7	290.0	290.0	32.0	32.0	NA	NA	60.0	60.0
T-2	Paved	NA	NA	1200.0	815.0	NA	NA	NA	NA	NA	NA	NA	NA
T-3	Unpaved	NA	NA	720.0	410.0	NA	NA	NA	NA	NA	NA	NA	NA
T-4	Unpaved	NA	NA	800.0	800.0	NA	NA	NA	NA	NA	NA	NA	NA
T-6	Unpaved	NA	NA	430.0	238.7	NA	NA	NA	NA	NA	NA	NA	NA
T-7	Unpaved	NA	NA	340.0	340.0	2000.0	2000.0	110.0	110.0	NA	NA	20.0	20.0
T-8	Unpaved	NA	NA	4200.0	4200.0	8400.0	8400.0	380.0	380.0	NA	NA	7.5	7.5
T-9	Unpaved	NA	NA	860.0	860.0	NA	NA	NA	NA	NA	NA	NA	NA
T-10	Unpaved	NA	NA	630.0	630.0	2200.0	2200.0	490.0	490.0	NA	NA	6.4	6.4
T-12	Unpaved	NA	NA	7200.0	7200.0	NA	NA	NA	NA	NA	NA	NA	NA
T-13	Unpaved	NA	NA	1400.0	1400.0	10000.0	10000.0	430.0	430.0	NA	NA	9.4	9.4
Surface	Unpaved	NA	NA	37.0	37.0	150.0	150.0	18.0	18.0	NA	NA	24.0	24.0
HW-5	Unpaved	ND	ND	80.0	39.6	95.0	39.5	229.0	99.8	NA	NA	NA	NA
SS-1	Paved	NA	NA	2200.0	2200.0	1300.0	1300.0	190.0	190.0	ND	ND	22.0	22.0
SS-2	Unpaved	NA	NA	77.0	77.0	370.0	370.0	150.0	150.0	ND	ND	21.0	21.0
SS-3	Unpaved	NA	NA	910.0	910.0	2000.0	2000.0	540.0	540.0	ND	ND	18.0	18.0
SS-4	Unpaved	NA	NA	880.0	880.0	2100.0	2100.0	280.0	280.0	ND	ND	4.1	4.1
SS-5	Unpaved	NA	NA	1300.0	1300.0	4200.0	4200.0	1400.0	1400.0	ND	ND	7.0	7.0
SS-6	Unpaved	NA	NA	990.0	990.0	1500.0	1500.0	360.0	360.0	ND	ND	11.0	11.0
Average		NA	NA	1865.7	1811.3	2858.2	2744.1	516.1	510.5	NA	NA	18.1	18.1
St. Deviation		NA	NA	3749.5	3764.3	3209.5	3183.2	461.7	466.1	NA	NA	13.7	13.7
n		NA	NA	31	31	25	25	23	23	NA	NA	21	21
t(.95,n-1)		NA	NA	1.7	1.7	1.7	1.7	1.7	1.7	NA	NA	1.7	1.7
UCL 95%		NA	NA	3017.9	2968.1	3956.5	3826.3	680.8	676.8	NA	NA	23.1	23.3
Max		NA	NA	20000.0	20000.0	12300.0	12300.0	1500.0	1500.0	NA	NA	60.0	60.0
SITE WIDE													
Average		7.5	7.5	1431.2	1375.0	2223.4	2049.5	438.8	420.3	0.3	0.3	17.6	17.0
St. Deviation		NA	NA	3217.9	3230.7	2786.1	2772.0	514.6	522.6	NA	NA	13.6	13.2
n		NA	NA	44	44	38	38	36	36	NA	NA	31	31
t(.95,n-1)		NA	NA	1.7	1.7	1.7	1.7	1.7	1.7	NA	NA	1.7	1.7
UCL 95%		NA	NA	2275.3	2222.5	3009.8	2831.9	588.0	571.8	NA	NA	21.7	21.1
MAX		15.0	15.0	20000.0	20000.0	12300.0	12300.0	2228.1	2228.1	0.4	0.4	60.0	60.0

Table 2-3: Soil Chemical Concentration (ppm)

(Metals)

Parcel I

me	Status	Cd Maximum	Cd Average	Ni Maximum	Ni Average	Ba Maximum	Ba Average	Ag Maximum	Ag Average	Cu Maximum	Cu Average
3,N-9	Unpaved	4.5	4.4	47.3	47.3	219.9	206.9	ND	ND	38.1	33.4
10	Paved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
16	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
22	Paved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
V-2	Paved	2.0	1.4	17.0	6.2	NA	NA	NA	NA	NA	NA
-11	Unpaved	5.4	5.4	99.0	99.0	260.0	260.0	0.6	0.6	540.0	540.0
-12	Paved	0.5	0.5	39.0	39.0	54.0	54.0	ND	ND	49.0	49.0
erage		3.1	2.9	50.6	47.9	178.0	173.6	0.6	0.6	209.0	207.5
ax		5.4	5.4	99.0	99.0	260.0	260.0	0.6	0.6	540.0	540.0

Parcel II

me	Status	Cd Maximum	Cd Average	Ni Maximum	Ni Average	Ba Maximum	Ba Average	Ag Maximum	Ag Average	Cu Maximum	Cu Average
10	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-3	Unpaved	5.9	3.7	58.0	32.3	NA	NA	NA	NA	NA	NA
N-4	Unpaved	9.3	4.7	57.0	22.3	NA	NA	NA	NA	NA	NA
1,N2	Unpaved	4.3	4.3	33.5	31.3	176.2	169.6	NA	NA	59.3	52.2
5	Unpaved	14.5	14.5	29.3	29.3	264.5	264.5	ND	ND	166.4	166.4
3M-B5	Unpaved	15.0	3.4	95.0	60.2	210.0	157.0	2.2	0.9	230.0	76.4
S-7	Unpaved	2.8	2.8	61.0	61.0	92.0	92.0	1.8	1.8	190.0	190.0
S-8	Unpaved	0.9	0.9	38.0	38.0	150.0	150.0	ND	ND	100.0	100.0
S-9/SSDUP1	Unpaved	9.1	9.1	280.0	280.0	260.0	260.0	1.7	1.7	2000.0	2000.0
S-10	Unpaved	1.6	1.6	38.0	38.0	130.0	130.0	13.0	13.0	2800.0	2800.0
verage		7.0	5.0	76.6	65.8	183.2	174.7	4.7	4.4	792.2	769.3
t. Deviation		5.3	4.3	78.9	81.4	NA	NA	NA	NA	NA	NA
		9	9	9	9	NA	NA	NA	NA	NA	NA
.95,n-1)		1.9	1.9	1.9	1.9	NA	NA	NA	NA	NA	NA
CL 95%		10.4	7.7	126.6	117.3	NA	NA	NA	NA	NA	NA
ax		15.0	15.0	210.0	210.0	264.5	264.5	13.0	13.0	2800.0	2800.0

Table 2-3: Soil Chemical Concentration (ppm) (Metals)
Parcel III

me	Status	Cd Maximum	Cd Average	Ni Maximum	Ni Average	Ba Maximum	Ba Average	Ag Maximum	Ag Average	Cu Maximum	Cu Average
i	Unpaved	12.0	12.0	29.0	29.0	950.0	950.0	ND	ND	96.0	96.0
2	Unpaved	36.0	36.0	130.0	130.0	350.0	350.0	0.9	0.9	400.0	400.0
3	Unpaved	32.0	32.0	150.0	150.0	230.0	230.0	1.0	1.0	490.0	490.0
4	Paved	36.0	36.0	58.0	58.0	330.0	330.0	6.3	6.3	220.0	220.0
3-1/B-5	Unpaved	30.0	30.0	67.0	67.0	710.0	710.0	3.0	3.0	320.0	320.0
3-2/B-7	Unpaved	210.0	210.0	130.0	130.0	400.0	400.0	8.5	8.5	730.0	730.0
3-3/B-8	Unpaved	71.0	71.0	88.0	88.0	350.0	350.0	2.4	2.4	330.0	330.0
3-4/B-9	Unpaved	20.0	20.0	84.0	84.0	310.0	310.0	2.5	2.5	220.0	220.0
3-7/B-6	Unpaved	47.0	47.0	210.0	210.0	370.0	370.0	4.2	4.2	910.0	910.0
10	Paved	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
11	Unpaved	3.4	1.8	NA	NA	NA	NA	NA	NA	NA	NA
;	Paved	6.8	6.8	44.2	44.2	221.9	221.9	ND	ND	137.4	137.4
1	Paved	4.0	4.0	36.0	36.0	92.0	92.0	ND	ND	63.0	63.0
2	Paved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7	Unpaved	7.5	7.5	110.0	110.0	190.0	190.0	2.0	2.0	720.0	720.0
8	Unpaved	46.0	46.0	44.0	44.0	330.0	330.0	8.6	8.6	310.0	310.0
9	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10	Unpaved	12.0	12.0	26.0	26.0	300.0	300.0	1.0	1.0	220.0	220.0
12	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13	Unpaved	46.0	46.0	25.0	25.0	150.0	150.0	3.2	3.2	210.0	210.0
irface	Unpaved	1.7	1.7	91.0	91.0	12.0	12.0	4.8	4.8	810.0	810.0
N-5	Unpaved	5.9	2.9	47.0	19.0	NA	NA	NA	NA	NA	NA
3-1	Paved	12.0	12.0	190.0	190.0	170.0	170.0	1.1	1.1	840.0	840.0
3-2	Unpaved	ND	ND	240.0	240.0	74.0	74.0	ND	ND	1200.0	1200.0
3-3	Unpaved	15.0	15.0	130.0	130.0	280.0	280.0	1.2	1.2	630.0	630.0
3-4	Unpaved	11.0	11.0	33.0	33.0	210.0	210.0	1.0	1.0	220.0	220.0
3-5	Unpaved	9.0	9.0	40.0	40.0	340.0	340.0	ND	ND	250.0	250.0
3-6	Unpaved	12.0	12.0	57.0	57.0	240.0	240.0	0.9	0.9	320.0	320.0
verage		29.8	29.6	89.5	88.3	300.5	300.5	3.1	3.1	438.5	438.5
. Deviation		43.3	43.4	62.2	63.3	203.1	203.1	2.6	2.6	307.9	307.9
		23	23	23	23	22	22	17	17	22	22
95,n-1)		1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
CL 95%		45.5	45.4	112.1	111.3	375.8	375.8	4.2	4.2	552.7	552.7
ax		210.0	210.0	240.0	240.0	950.0	950.0	8.6	8.6	1200.0	1200.0
TE WIDE											
verage		21.2	20.5	82.0	78.2	283.3	281.1	3.3	3.2	494.4	489.2
. Deviation		36.4	36.6	64.2	66.1	180.7	181.7	3.2	3.2	586.6	589.7
		36	36	36	36	32	32	22	22	32	32
95,n-1)		1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
CL 95%		31.5	30.9	100.2	96.9	317.6	315.7	4.4	4.4	670.6	666.4
ax		210.0	210.0	240.0	240.0	950.0	950.0	13.0	13.0	2800.0	2800.0

Table 2-3: Soil Chemical Concentration (ppm)

(Metals)

Parcel I

Name	Status	Sb Maximum	Sb Average	Be Maximum	Be Average	Co Maximum	Co Average	Hg Maximum	Hg Average	Mo Maximum	Mo Average
N-8,N-9	Unpaved	ND	ND	1.5	1.3	11.1	10.3	ND	ND	ND	ND
N-10	Paved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-13	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-16	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
P-22	Paved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HW-2	Paved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-11	Unpaved	6.5	6.5	0.6	0.6	13.0	13.0	0.8	0.8	13.0	13.0
SS-12	Paved	ND	ND	0.3	0.3	9.6	9.6	1.3	1.3	ND	ND
Average		6.5	6.5	0.8	0.7	11.2	11.0	1.1	1.1	13.0	13.0
Max		6.5	6.5	1.1	1.1	13.0	13.0	1.3	1.3	13.0	13.0

Parcel II

Name	Status	Sb Maximum	Sb Average	Be Maximum	Be Average	Co Maximum	Co Average	Hg Maximum	Hg Average	Mo Maximum	Mo Average
P-10	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HW-3	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HW-4	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N1,N2	Unpaved	ND	ND	1.2	1.0	6.0	6.0	ND	ND	ND	ND
N5	Unpaved	ND	ND	1.7	1.7	3.6	3.6	ND	ND	6.0	6.0
EBM-B5	Unpaved	8.0	4.7	0.9	0.5	13.0	10.1	2.1	0.9	6.9	2.7
SS-7	Unpaved	ND	ND	0.3	0.3	10.0	10.0	6.3	6.3	4.0	4.0
SS-8	Unpaved	ND	ND	0.4	0.4	5.7	5.7	2.2	2.2	2.5	2.5
SS-9/SSDUP1	Unpaved	12.0	12.0	0.3	0.3	32.0	32.0	0.6	0.6	57.0	57.0
SS10	Unpaved	ND	ND	0.2	0.2	11.0	11.0	1.0	1.0	1.5	1.5
Average		10.0	8.4	0.7	0.6	11.6	11.2	2.4	2.2	13.0	12.3
st dev		NA	NA	0.6	0.5	9.6	9.6	NA	NA	NA	NA
n		NA	NA	7	7	7	7	NA	NA	NA	NA
t		NA	NA	2.0	2.0	2.0	2.0	NA	NA	NA	NA
95% UCL		NA	NA	1.1	1.0	18.9	18.5	NA	NA	NA	NA
Max		12.0	12.0	1.7	1.7	24.0	24.0	6.3	6.3	31.0	31.0

Table 2-3: Soil Chemical Concentration (ppm)

(Metals)

Parcel III

Name #	Status	Sb Maximum	Sb Average	Be Maximum	Be Average	Co Maximum	Co Average	Hg Maximum	Hg Average	Mo Maximum	Mo Average
B-1	Unpaved	ND	ND	ND	ND	14.0	14.0	0.6	0.6	3.7	3.7
B-2	Unpaved	8.1	8.1	ND	ND	13.0	13.0	ND	ND	14.0	14.0
B-3	Unpaved	1.3	1.3	ND	ND	18.0	18.0	0.2	0.2	11.0	11.0
B-4	Paved	NA	NA	NA	NA	6.2	6.2	0.6	0.6	4.5	4.5
MG-1/B-5	Unpaved	NA	NA	NA	NA	7.8	7.8	NA	NA	9.0	9.0
MG-2/B-7	Unpaved	ND	ND	ND	ND	65.0	65.0	0.1	0.1	13.0	13.0
MG-3/B-8	Unpaved	ND	ND	ND	ND	8.8	8.8	0.3	0.3	16.0	16.0
MG-4/B-9	Unpaved	ND	ND	ND	ND	13.0	13.0	0.1	0.1	7.1	7.1
MG-7/B-6	Unpaved	NA	NA	NA	NA	20.0	20.0	0.3	0.3	19.0	19.0
B-10	Paved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-11	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N6	Paved	ND	ND	2.3	2.3	5.3	5.3	ND	ND	6.4	6.4
T-1	Paved	ND	ND	ND	ND	8.8	8.8	3.2	3.2	ND	ND
T-2	Paved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
T-3	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
T-4	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
T-6	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
T-7	Unpaved	ND	ND	ND	ND	7.1	7.1	0.2	0.2	5.5	5.5
T-8	Unpaved	ND	ND	ND	ND	7.6	7.6	0.1	0.1	ND	ND
T-9	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
T-10	Unpaved	ND	ND	ND	ND	6.6	6.6	0.2	0.2	ND	ND
T-12	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
T-13	Unpaved	ND	ND	ND	ND	4.6	4.6	ND	ND	4.4	4.4
Surface	Unpaved	ND	ND	ND	ND	5.8	5.8	ND	ND	12.0	12.0
HW-5	Unpaved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-1	Paved	6.7	6.7	0.1	0.1	19.0	19.0	1.0	1.0	13.0	13.0
SS-2	Unpaved	ND	ND	ND	ND	21.0	21.0	ND	ND	37.0	37.0
SS-3	Unpaved	3.4	3.4	0.1	0.1	14.0	14.0	ND	ND	14.0	14.0
SS-4	Unpaved	ND	ND	0.14	0.14	8.8	8.8	0.2	0.2	3.9	3.9
SS-5	Unpaved	ND	ND	ND	ND	9.3	9.3	ND	ND	11.0	11.0
SS-6	Unpaved	8.4	8.4	0.2	0.2	11.0	11.0	0.2	0.2	6.4	6.4
Average		5.6	5.6	0.6	0.6	13.4	13.4	0.5	0.5	11.1	11.1
St. Deviation		NA	NA	NA	NA	12.5	12.5	0.8	0.8	7.7	7.7
n		NA	NA	NA	NA	22	22	14	14	19	19
t(.95,n-1)		NA	NA	NA	NA	1.7	1.7	1.8	1.8	1.7	1.7
UCL 95%		NA	NA	NA	NA	17.9	17.9	0.9	0.9	14.1	14.1
Max		8.4	8.4	2.3	2.3	65.0	65.0	3.2	3.2	37.0	37.0
SITE WIDE											
Average		6.8	6.4	0.7	0.6	12.8	12.7	1.0	1.0	11.6	11.4
St. Deviation		3.3	3.3	0.8	0.7	11.2	11.2	1.5	1.4	11.7	11.8
n		8	8	15	15	32	32	21	21	26	26
t(.95,n-1)		1.9	1.9	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7
UCL 95%		9.0	8.6	1.2	0.9	16.2	16.1	1.6	1.5	15.6	15.5
Max		12.0	12.0	2.3	2.3	65.0	65.0	6.3	6.3	37.0	37.0

Table 2-3: Soil Chemical Concentration (ppm)

(Metals)

Parcel I

Name	Status	Se Maximum	Se Average	Tl Maximum	Tl Average	V Maximum	V Average
N-8,N-9	Unpaved	ND	ND	ND	ND	50.2	47.2
N-10	Paved	NA	NA	NA	NA	NA	NA
P-13	Unpaved	NA	NA	NA	NA	NA	NA
P-16	Unpaved	NA	NA	NA	NA	NA	NA
P-22	Paved	NA	NA	NA	NA	NA	NA
HW-2	Paved	NA	NA	NA	NA	NA	NA
SS-11	Unpaved	ND	ND	ND	ND	53.0	53.0
SS-12	Paved	ND	ND	ND	ND	27.0	27.0
Average		NA	NA	NA	NA	43.4	42.4
Max		NA	NA	NA	NA	53.0	53.0

Parcel II

Name	Status	Se Maximum	Se Average	Tl Maximum	Tl Average	V Maximum	V Average
P-10	Unpaved	NA	NA	NA	NA	NA	NA
HW-3	Unpaved	NA	NA	NA	NA	NA	NA
HW-4	Unpaved	NA	NA	NA	NA	NA	NA
N1,N2	Unpaved	ND	ND	ND	ND	46.3	39.0
N5	Unpaved	ND	ND	ND	ND	81.3	81.3
EBM-B5	Unpaved	ND	ND	10.0	6.0	74.0	47.2
SS-7	Unpaved	ND	ND	ND	ND	30.0	30.0
SS-8	Unpaved	ND	ND	ND	ND	13.0	13.0
SS-9/SSDUP1	Unpaved	ND	ND	ND	ND	78.0	78.0
SS10	Unpaved	ND	ND	ND	ND	31.0	31.0
Average		NA	NA	NA	NA	50.5	45.6
St. Deviation		NA	NA	NA	NA	27.3	25.5
n		NA	NA	NA	NA	6	6
t(.95,n-1)		NA	NA	NA	NA	2.0	2.0
UCL 95%		NA	NA	NA	NA	73.0	66.6
Max		NA	NA	10.0	6.0	81.3	81.3

Table 2-3: Soil Chemical Concentration (ppm)
(Metals)

Parcel III

Name	Status	Se Maximum	Se Average	Tl Maximum	Tl Average	V Maximum	V Average
B-1	Unpaved	0.2	0.2	ND	ND	24.0	24.0
B-2	Unpaved	0.4	0.4	ND	ND	100.0	100.0
B-3	Unpaved	0.2	0.2	ND	ND	54.0	54.0
B-4	Paved	0.2	0.2	NA	NA	47.0	47.0
MG-1/B-5	Unpaved	0.8	0.8	NA	NA	110.0	110.0
MG-2/B-7	Unpaved	ND	ND	ND	ND	76.0	76.0
MG-3/B-8	Unpaved	ND	ND	ND	ND	100.0	100.0
MG-4/B-9	Unpaved	ND	ND	ND	ND	120.0	120.0
MG-7/B-6	Unpaved	0.2	0.2	NA	NA	93.0	93.0
B-10	Paved	NA	NA	NA	NA	NA	NA
B-11	Unpaved	NA	NA	NA	NA	NA	NA
N6	Paved	ND	ND	ND	ND	61.9	61.9
T-1	Paved	ND	ND	ND	ND	19.0	19.0
T-2	Paved	NA	NA	NA	NA	NA	NA
T-3	Unpaved	NA	NA	NA	NA	NA	NA
T-4	Unpaved	NA	NA	NA	NA	NA	NA
T-6	Unpaved	NA	NA	NA	NA	NA	NA
T-7	Unpaved	ND	ND	ND	ND	49.0	49.0
T-8	Unpaved	ND	ND	ND	ND	72.0	72.0
T-9	Unpaved	NA	NA	NA	NA	NA	NA
T-10	Unpaved	ND	ND	19.0	19.0	63.0	63.0
T-12	Unpaved	NA	NA	NA	NA	NA	NA
T-13	Unpaved	ND	ND	ND	ND	82.0	82.0
Surface	Unpaved	ND	ND	ND	ND	40.0	40.0
HW-5	Unpaved	NA	NA	NA	NA	NA	NA
SS-1	Paved	ND	ND	ND	ND	33.00	33.00
SS-2	Unpaved	ND	ND	ND	ND	38.00	38.00
SS-3	Unpaved	ND	ND	ND	ND	56.00	56.00
SS-4	Unpaved	ND	ND	ND	ND	49.00	49.00
SS-5	Unpaved	ND	ND	ND	ND	110.00	110.00
SS-6	Unpaved	ND	ND	ND	ND	47.00	47.00
Average		0.3	0.3	19.0	19.0	65.6	65.6
St. Deviation		0.2	0.2	NA	NA	29.5	29.5
n		6	6	NA	NA	22	22
t(.95,n-1)		2.0	2.0	NA	NA	1.7	1.7
UCL 95%		0.5	0.5	NA	NA	76.3	76.3
Max		0.8	0.8	19.0	19.0	120.0	120.0

SITE WIDE		Se Maximum	Se Average	Tl Maximum	Tl Average	V Maximum	V Average
Average		0.3	0.3	14.5	12.5	60.2	[illegible]
St. Deviation		0.2	0.2	NA	NA	[illegible]	[illegible]
n		6	6	NA	NA	32	32
t(.95,n-1)		2.0	2.0	NA	NA	1.7	[illegible]
UCL 95%		0.5	0.5	NA	NA	68.9	67.8
MAX		0.8	0.8	19.0	19.0	120.0	120.0

Table 2-4: Soil Chemical Concentrations (ppb)

(Volatile and Semi Volatile Organic Compounds)

Parcel I

Name	Status	Toluene	Ethyl Benzene	Trichloroethylene	Tetrachloroethylene	Total Xylenes
N-8,N-9	Unpaved	NA	NA	NA	NA	NA
N-10	Paved	NA	NA	NA	NA	NA
P-13	Unpaved	NA	NA	ND	ND	NA
P-16	Unpaved	NA	NA	ND	ND	NA
P-22	Paved	NA	NA	NA	NA	NA
HW-2	Paved	NA	NA	ND	ND	NA
SS-11	Unpaved	NA	NA	NA	NA	NA
SS-12	Paved	NA	NA	NA	NA	NA
Average		NA	NA	NA	NA	NA
Max		NA	NA	NA	NA	NA

Parcel II

Name	Status	Toluene	Ethyl Benzene	Trichloroethylene	Tetrachloroethylene	Total Xylenes
P-10	Unpaved	NA	NA	NA	NA	NA
HW-3	Unpaved	NA	NA	ND	ND	NA
HW-4	Unpaved	NA	NA	ND	ND	NA
N1,N2	Unpaved	NA	NA	NA	NA	NA
N5	Unpaved	NA	NA	NA	NA	NA
EBM-B5	Unpaved	ND	ND	ND	ND	ND
SS-7	Unpaved	NA	NA	NA	NA	NA
SS-8	Unpaved	NA	NA	NA	NA	NA
SS-9	Unpaved	NA	NA	NA	NA	NA
SS10	Unpaved	NA	NA	NA	NA	NA
Average		NA	NA	NA	NA	NA
Max		NA	NA	NA	NA	NA

Table 2-4: Soil Chemical Concentrations (ppb)

(Volatile and Semi Volatile Organic Compounds)

Parcel III

Name	Status	Toluene	Ethyl Benzene	Trichloroethylene	Tetrachloroethylene	Total Xylenes
B-1	Unpaved	NA	NA	NA	NA	NA
B-2	Unpaved	NA	NA	NA	NA	NA
B-3	Unpaved	NA	NA	NA	NA	NA
B-4	Paved	NA	NA	NA	NA	NA
MG-1/B-5	Unpaved	NA	NA	NA	NA	NA
MG-2/B-7	Unpaved	ND	ND	NA	NA	ND
MG-3/B-8	Unpaved	NA	NA	NA	NA	NA
MG-4/B-9	Unpaved	ND	ND	NA	NA	ND
MG-7/B-6	Unpaved	NA	NA	NA	NA	NA
B-10	Paved	NA	NA	NA	NA	NA
B-11	Unpaved	28.0	ND	NA	NA	84.0
N6	Paved	NA	NA	NA	NA	NA
T-1	Paved	NA	NA	NA	NA	NA
T-2	Paved	NA	NA	NA	NA	NA
T-3	Unpaved	NA	NA	NA	NA	NA
T-4	Unpaved	NA	NA	NA	NA	NA
T-6	Unpaved	NA	NA	NA	NA	NA
T-7	Unpaved	NA	NA	NA	NA	NA
T-8	Unpaved	NA	NA	NA	NA	NA
T-9	Unpaved	NA	NA	NA	NA	NA
T-10	Unpaved	NA	NA	NA	NA	NA
T-12	Unpaved	NA	NA	NA	NA	NA
T-13	Unpaved	NA	NA	NA	NA	NA
Surface	Unpaved	NA	NA	NA	NA	NA
HW-5	Unpaved	NA	NA	6.4	13.0	NA
SS-1	Paved	NA	NA	NA	NA	NA
SS-2	Unpaved	NA	NA	NA	NA	NA
SS-3	Unpaved	NA	NA	NA	NA	NA
SS-4	Unpaved	NA	NA	NA	NA	NA
SS-5	Unpaved	NA	NA	NA	NA	NA
SS-6	Unpaved	NA	NA	NA	NA	NA
Average		28.0	NA	6.4	13.0	84.0
Max		28.0	NA	6.4	13.0	84.0
SITE WIDE						
Average		28.0	NA	6.4	13.0	84.0
Max		28.0	NA	6.4	13.0	84.0

Table 2-4: Soil Chemical Concentrations (ppb)

(Volatile and Semi Volatile Organic Compounds)

Parcel I

Name	Status	Benzene	1,2,4-Trimethyl Benzene	1,2,6-Trimethyl Benzene	P-Isopropy Toluene	Napthaline
N-8,N-9	Unpaved	NA	NA	NA	NA	NA
N-10	Paved	NA	NA	NA	NA	NA
P-13	Unpaved	NA	ND	ND	ND	ND
P-16	Unpaved	NA	ND	ND	ND	ND
P-22	Paved	NA	NA	NA	NA	NA
HW-2	Paved	NA	ND	ND	ND	ND
SS-11	Unpaved	NA	NA	NA	NA	NA
SS-12	Paved	NA	NA	NA	NA	NA
Average		NA	NA	NA	NA	NA
Max		NA	NA	NA	NA	NA

Parcel II

Name	Status	Benzene	1,2,4-Trimethyl Benzene	1,2,6-Trimethyl Benzene	P-Isopropy Toluene	Napthaline
P-10	Unpaved	NA	NA	NA	NA	NA
HW-3	Unpaved	NA	ND	ND	ND	ND
HW-4	Unpaved	NA	ND	ND	ND	ND
N1,N2	Unpaved	NA	NA	NA	NA	NA
N5	Unpaved	NA	NA	NA	NA	NA
EBM-B5	Unpaved	ND	ND	ND	ND	ND
SS-7	Unpaved	NA	NA	NA	NA	NA
SS-8	Unpaved	NA	NA	NA	NA	NA
SS-9	Unpaved	NA	NA	NA	NA	NA
SS10	Unpaved	NA	NA	NA	NA	NA
Average		NA	NA	NA	NA	NA
Max		NA	NA	NA	NA	NA

Table 2-4: Soil Chemical Concentrations (ppb)

(Volatile and Semi Volatile Organic Compounds)

Parcel III

Name	Status	Benzene	1,2,4-Trimethyl Benzene	1,2,5-Trimethyl Benzene	P-Isopropy Toluene	Napthaline
B-1	Unpaved	NA	NA	NA	NA	NA
B-2	Unpaved	NA	NA	NA	NA	NA
B-3	Unpaved	NA	NA	NA	NA	NA
B-4	Paved	NA	NA	NA	NA	NA
MG-1/B-5	Unpaved	NA	NA	NA	NA	NA
MG-2/B-7	Unpaved	ND	ND	ND	ND	ND
MG-3/B-8	Unpaved	NA	NA	NA	NA	NA
MG-4/B-9	Unpaved	ND	ND	ND	ND	ND
MG-7/B-6	Unpaved	NA	NA	NA	NA	NA
B-10	Paved	NA	NA	NA	NA	NA
B-11	Unpaved	ND	ND	ND	ND	ND
N6	Paved	NA	NA	NA	NA	NA
T-1	Paved	NA	NA	NA	NA	NA
T-2	Paved	NA	NA	NA	NA	NA
T-3	Unpaved	NA	NA	NA	NA	NA
T-4	Unpaved	NA	NA	NA	NA	NA
T-6	Unpaved	NA	NA	NA	NA	NA
T-7	Unpaved	NA	NA	NA	NA	NA
T-8	Unpaved	NA	NA	NA	NA	NA
T-9	Unpaved	NA	NA	NA	NA	NA
T-10	Unpaved	NA	NA	NA	NA	NA
T-12	Unpaved	NA	NA	NA	NA	NA
T-13	Unpaved	NA	NA	NA	NA	NA
Surface	Unpaved	NA	NA	NA	NA	NA
HW-5	Unpaved	NA	NA	NA	NA	NA
SS-1	Paved	NA	NA	NA	NA	NA
SS-2	Unpaved	NA	NA	NA	NA	NA
SS-3	Unpaved	NA	NA	NA	NA	NA
SS-4	Unpaved	NA	NA	NA	NA	NA
SS-5	Unpaved	NA	NA	NA	NA	NA
SS-6	Unpaved	NA	NA	NA	NA	NA
Average		NA	NA	NA	NA	NA
Max		NA	NA	NA	NA	NA
SITE WIDE						
Average		NA	NA	NA	NA	NA
Max		NA	NA	NA	NA	NA

Table 2-5

Comparison Between Concentrations of Chemicals in On-Site Soils and their Background Concentrations and Industrial PRG Values

Chemical Name	Maximum Conc in Unpaved Soils (ppm)	Background Concentrations in Soils*						PRG Industrial Conc (ppm)	> Background	COPC
		Colluvium and Fill (ppm)	Great Valley Group (ppm)	Moraga Formation (ppm)	Orinda Formation (ppm)	San Pablo Group (ppm)	Average Background Conc (ppm)			
Lead	7200.0	14.7	21.5	8.9	14.8	10.3	16.1	1000.0	yes	yes
Chromium	2228.1	91.4	59.0	142.2	95.2	78.6	99.6	450.0	yes	yes
Hexavalent-Chromium	0.4	NA	NA	NA	NA	NA	NA	64.0	NA	no
Arsenic	39.0	14.0	31.0	9.3	17.8	15.7	19.1	2.4	yes	yes
Cadmium	210.0	1.5	3.2	2.6	3.3	2.9	2.7	850.0	yes	no
Nickel	240.0	120.2	69.7	100.4	144.3	125.9	119.8	34000.0	yes	no
Zinc	12300	91.5	135.9	84.7	98.3	97.7	106.1	100000.0	yes	no
Barium	950.0	358.8	248.5	154.1	411.2	280.0	323.6	100000.0	yes	no
Silver	13.0	1.7	2.2	2.0	1.9	1.5	1.8	8500.0	yes	no
Copper	2800.0	59.6	99.7	54.1	66.9	40.9	69.4	63000.0	yes	no
Antimony	12.0	5.9	6.3	6.1	5.2	7.1	5.5	680.0	yes	no
Beryllium	1.7	0.9	1.0	0.8	1.1	0.8	1.0	1.1	yes	yes
Cobalt	65.0	22.0	25.5	23.1	20.6	22.0	22.2	97000.0	yes	no
Mercury	6.3	0.3	0.6	0.3	0.3	0.4	0.4	68.0	yes	no
Molybdenum	31.0	3.2	3.8	3.8	11.4	3.7	7.4	8500.0	yes	no
Selenium	0.8	5.6	4.8	4.7	7.0	4.9	5.6	8500.0	no	no
Thallium	19.0	42.5	8.7	38.9	19.8	10.9	27.1	120-150**	no	no
Vanadium	120.0	78.2	69.3	90.1	69.3	36.2	74.3	12000.0	yes	no
PCB's	4.5	NA	NA	NA	NA	NA	NA	0.3	NA	yes
Toluene	0.028	NA	NA	NA	NA	NA	NA	2800.0	NA	no
Ethyl Benzene	–	NA	NA	NA	NA	NA	NA	690.0	NA	no
Trichloroethylene	0.006	NA	NA	NA	NA	NA	NA	17.0	NA	no
Tetrachloroethylene	0.013	NA	NA	NA	NA	NA	NA	25.0	NA	no
Total Xylene	0.084	NA	NA	NA	NA	NA	NA	990.0	NA	no
Benzene	–	NA	NA	NA	NA	NA	NA	3.2	NA	no

Maximum Concentrations of the Chemicals in Unpaved Soilswere used to compare with the Background and the Industrial PRG Concentrations

A chemical was retained as a COPC if it's maximum concentration was greater than it's Industrial PRG Value.

*) Lawrence Berkeley National Laboratory , August 1995

NA = Not Available

**) Thallium was not speciated

Table 2-6 Groundwater Chemical Concentration (ppb)

(Metals)

Parcel I

Name	Pb	Zn	Cr	H-Cr	As	Cd	Ni	Ba	Ag
HW-2	ND	5.0	40.0	NA	NA	ND	ND	NA	NA
HP-1	ND	ND	ND	ND	10.0	ND	ND	94.0	ND
HP-3	3.9	25.0	ND	ND	7.4	ND	ND	62.0	ND
HP-4	ND	22.0	13.0	ND	98.0	ND	ND	31.0	ND
HP-5	ND	ND	ND	ND	54.0	ND	ND	62.0	ND
HP-6	ND	ND	ND	ND	52.0	ND	ND	210.0	ND
average	3.9	17.3	26.5	NA	44.3	NA	NA	91.8	NA
MAX	3.9	25.0	40.0	NA	98.0	NA	NA	210.0	NA

Parcel II

Name	Pb	Zn	Cr	H-Cr	As	Cd	Ni	Ba	Ag
HW-4	ND	20.0	60.0	NA	NA	ND	ND	NA	NA
EBM B-5	ND	3900.0	430.0	NA	ND	ND	1700.0	7200.0	ND
HP-7	ND	ND	ND	ND	30.0	ND	ND	46.0	ND
HP-8	5.7	ND	ND	ND	34.0	ND	27.0	23.0	ND
HP-9	ND	ND	ND	ND	11.0	ND	ND	39.0	ND
HP-10	ND	ND	ND	ND	18.0	ND	ND	39.0	ND
HP-11	ND	23.0	ND	ND	11.0	ND	23.0	300.0	ND
HP-12	4.3	96.0	ND	10.0	8.2	ND	110.0	120.0	ND
HP-13	ND	ND	ND	ND	210.0	ND	22.0	38.0	ND
HP-14	ND	45.0	ND	ND	200.0	ND	34.0	23.0	ND
average	5.0	816.8	245.0	10.0	65.3	NA	319.3	869.8	NA
st dev	NA	1723.8	NA	NA	86.8	NA	677.2	2375.5	NA
count	NA	5	NA	NA	8	NA	6	9	NA
t	NA	2.0	NA	NA	1.9	NA	2.0	1.9	NA
95% UCL	NA	2358.6	NA	NA	123.5	NA	876.4	2342.6	NA
MAX	5.7	3900.0	430.0	10.0	210.0	NA	1700.0	7200.0	NA

Table 2-6: Groundwater Chemical Concentration (ppb)
(Metals)

Parcel III

Name	Pb	Zn	Cr	H-Cr	As	Cd	Ni	Ba	Ag
B-1	ND	ND	ND	NA	1700.0	ND	ND	480.0	ND
B-2	ND	ND	ND	NA	3.0	ND	ND	330.0	ND
B-3	ND	40.0	ND	NA	5.0	ND	ND	120.0	ND
B-4	ND	60.0	ND	NA	18.0	ND	ND	60.0	ND
MG-1/B-5	ND	20.0	ND	NA	19.0	ND	10.0	7900.0	ND
MG-2/B-7	290.0	970.0	49.0	NA	400.0	ND	10.0	5200.0	ND
MG-3/B-8	590.0	270.0	14.0	NA	14.0	ND	20.0	1500.0	ND
MG-4/B-9	36.0	54.0	ND	NA	100.0	ND	20.0	270.0	ND
MG-7/B-6	11.0	49.0	ND	NA	35.0	ND	ND	ND	ND
MW-17	ND	ND	ND	NA	3.0	ND	ND	580.0	ND
MW-18	62.0	160.0	11.0	NA	29.0	ND	ND	1100.0	ND
PZ-1	ND	21.0	ND	NA	460.0	ND	20.0	2600.0	ND
HW-5	ND	ND	30.0	NA	NA	ND	ND	NA	ND
average	197.8	182.7	26.0	NA	232.2	NA	NA	1830.9	NA
st dev	NA	306.3	NA	NA	488.8	NA	NA	2521.2	NA
count	NA	9	NA	NA	12	NA	NA	11	NA
t	NA	1.8	NA	NA	1.8	NA	NA	1.8	NA
95% UCL	NA	366.0	NA	NA	482.0	NA	NA	3185.5	NA
Max.	590.0	970.0	49.0	NA	1700.0	NA	20.0	7900.0	NA

SITE WIDE									
average	125.4	340.0	80.9	10.0	141.2	NA	181.5	1137.1	NA
st dev	211.1	945.7	142.2	NA	346.3	NA	504.4	2237.2	NA
n	8	17	8	NA	25	NA	11	25	NA
t	1.8	1.7	1.8	NA	1.7	NA	1.8	1.7	NA
95% UCL	260.6	736.6	172.0	NA	259.3	NA	452.5	1901.3	NA
MAX	590.0	3900.0	430.0	10.0	1700.0	NA	1700.0	7900.0	NA

Table 2-6: Groundwater Chemical Concentration (ppb)

(Metals)

Parcel I

Name	Cu	Sb	Be	Co	Hg	Mo	Se	Tl	V
HW-2	NA	NA	NA	NA	NA	NA	NA	NA	NA
HP-1	9.2	ND	ND	ND	ND	58.0	ND	ND	42.0
HP-3	16.0	ND	ND	ND	ND	ND	ND	ND	ND
HP-4	12.0	ND	ND	ND	ND	ND	ND	ND	23.0
HP-5	ND	ND	ND	ND	ND	ND	ND	ND	ND
HP-6	ND	ND	ND	ND	ND	16.0	ND	ND	22.0
average	12.4	NA	NA	NA	NA	37.0	NA	NA	29.0
MAX	16.0	NA	NA	NA	NA	58.0	NA	NA	42.0

Parcel II

Name	Cu	Sb	Be	Co	Hg	Mo	Se	Tl	V
HW-4	NA	NA	NA	NA	NA	NA	NA	NA	NA
EBM B-5	ND	300.0	29.0	500.0	ND	40.0	ND	500.0	920.0
HP-7	ND	ND	ND	ND	ND	ND	ND	ND	11.0
HP-8	ND	ND	ND	ND	ND	58.0	ND	ND	100.0
HP-9	ND	ND	ND	ND	ND	290.0	ND	ND	84.0
HP-10	ND	ND	ND	ND	ND	88.0	ND	ND	110.0
HP-11	ND	ND	ND	ND	ND	10.0	ND	ND	14.0
HP-12	ND	ND	ND	ND	ND	ND	ND	ND	ND
HP-13	ND	61.0	ND	ND	ND	ND	ND	ND	ND
HP-14	ND	61.0	ND	ND	ND	110.0	ND	ND	25.0
average	NA	140.7	29.0	500.0	NA	99.3	NA	500.0	180.6
st dev	NA	NA	NA	NA	NA	99.8	NA	NA	328.7
count	NA	NA	NA	NA	NA	6	NA	NA	7
t	NA	NA	NA	NA	NA	2.0	NA	NA	1.9
95% UCL	NA	NA	NA	NA	NA	181.4	NA	NA	422.0
MAX	NA	300.0	29.0	500.0	NA	290.0	NA	500.0	920.0

Table 2-6: Groundwater Chemical Concentration (ppb)

(Metals)

Parcel III

Name	Cu	Sb	Be	Co	Hg	Mo	Se	Tl	V
B-1	ND	ND	ND	ND	ND	ND	ND	ND	ND
B-2	ND	ND	ND	ND	ND	120.0	ND	ND	ND
B-3	ND	70.0	ND	ND	ND	110.0	1.0	ND	40.0
B-4	ND	ND	ND	ND	ND	ND	1.0	ND	ND
MG-1/B-5	40.0	ND	ND	ND	ND	ND	7.0	ND	ND
MG-2/B-7	80.0	ND	ND	ND	ND	ND	ND	ND	ND
MG-3/B-8	ND	ND	ND	ND	ND	ND	ND	ND	ND
MG-4/B-9	ND	ND	ND	ND	ND	ND	ND	ND	ND
MG-7/B-6	ND	ND	ND	ND	ND	120.0	3.0	ND	ND
MW-17	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-18	40.0	ND	ND	ND	ND	ND	ND	ND	ND
PZ-1	ND	ND	ND	ND	ND	ND	ND	ND	ND
HW-5	NA	NA	NA	NA	NA	NA	NA	NA	NA
average	53.3	70.0	NA	NA	NA	116.7	3.0	NA	40.0
st dev	NA	NA	NA	NA	NA	NA	NA	NA	NA
count	NA	NA	NA	NA	NA	NA	NA	NA	NA
t	NA	NA	NA	NA	NA	NA	NA	NA	NA
95% UCL	NA	NA	NA	NA	NA	NA	NA	NA	NA
MAX	80.0	70.0	NA	NA	NA	120.0	7.0	NA	40.0
SITE WIDE									
average	32.9	123.0	29.0	500.0	NA	92.7	3.0	500.0	126.5
st dev	26.8	NA	NA	NA	NA	76.8	NA	NA	265.5
n	6	NA	NA	NA	NA	11	NA	NA	11
t	1.9	NA	NA	NA	NA	1.8	NA	NA	1.9
95% UCL	54.2	NA	NA	NA	NA	134.7	NA	NA	282.0
MAX	80.0	300.0	29.0	500.0	NA	290.0	7.0	500.0	920.0

Table 2-7: Ground Water Chemical Concentration (ppb)
(Volatile and Semi-Volatile Organic Compounds)

Parcel I

ame	Bis(2-ethylhexyl Phthalate	2-Methyl Phenol	Naphthalene	Benzo(a) Anthracene	Benzo(a) Pyrene	Benzo Fluoranthene	Phenanthrene	Chrysene	Di-n-Butyl phthalate	Methoxy chlor	Fluoranthene
W-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
P-1	60.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
P-3	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
P-4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
P-5	ND	ND	10.0	ND	ND	ND	ND	ND	ND	ND	ND
P-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
lax	60.0	NA	10.0	NA	NA	NA	NA	NA	NA	NA	NA
ve	60.0	NA	10.0	NA	NA	NA	NA	NA	NA	NA	NA

Parcel II

ame	Bis(2-ethylhexyl Phthalate	2-Methyl Phenol	Naphthalene	Benzo(a) Anthracene	Benzo(a) Pyrene	Benzo Fluoranthene	Phenanthrene	Chrysene	Di-n-Butyl phthalate	Methoxy chlor	Fluoranthene
IW-4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BM B-5	NA	ND	ND	4.0	2.0	4.0	4.0	5.0	ND	ND	5.0
IP-7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IP-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IP-9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IP-10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IP-11	10.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IP-12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IP-13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IP-14	ND	ND	ND	ND	ND	ND	ND	ND	60.0	ND	ND
Max	10.0	NA	NA	4.0	2.0	4.0	4.0	5.0	60.0	NA	5.0
Ave	10.0	NA	NA	4.0	2.0	4.0	4.0	5.0	60.0	NA	5.0

Table 2-7: Groundwater Chemical Concentration (ppb)

(Volatile and Semi-volatile Organic Compounds)

Parcel III

ame	Bis(2-ethylhexyl Phthalate	2-Methyl Phenol	Naphthalene	Benzo(a) Anthracene	Benzo(a) Pyrene	Benzo Fluoranthene	Phenanthrene	Chrysene	Di-n-Butyl phthalate	Methoxy chlor	Fluoranthene
-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
-3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
-4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IG-1/B-5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IG-2/B-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IG-3/B-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IG-4/B-9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IG-7/B-6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IW-17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IW-18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
'Z-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IW-5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IP-15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IP20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IP16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IP17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
IP18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
lax	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ve	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SITE WIDE											
verage	35.0	NA	10.0	4.0	2.0	4.0	4.0	5.0	60.0	NA	5.0
t dev	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MAX	10.0	NA	10.0	4.0	2.0	4.0	4.0	5.0	60.0	NA	5.0
95% UCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 3-1
Comparison Between Simulated Concentrations in Temescal Creek and Marine Water Quality Standards

Chemical of Potential Ecological Concern (COPEC)	Maximum Groundwater Concentration (mg/L)	Maximum Predicted Concentration in Temescal Creek (µg/L)	Marine Water Quality Standards (µg/L)	Source	Ratio of Max. Conc. to Marine Water Quality (unitless)
VOCs					
Acetone	0.071	2.40E-03	nd		n/a
Benzene	0.19	6.42E-03	2.10E+01	*a*	3.06E-04
Chloroform	0.0051	1.72E-04	4.70E+02	*b*	3.67E-07
Ethylbenzene	0.001	3.38E-05	4.30E+01	*c*	7.86E-07
Methylene chloride	0.02	6.76E-04	1.06E+03	*d*	6.38E-07
Tetrachloroethene (PCE)	0.009	3.04E-04	6.90E+00	*e*	4.41E-05
Toluene	0.004	1.35E-04	5.00E+03	*f*	2.70E-08
Trichloroethene (TCE)	0.0068	2.30E-04	8.10E+01	*b*	2.84E-06
Vinyl chloride	0.0027	9.12E-05	1.70E+01	*d*	5.37E-06
Xylenes	0.0089	3.01E-04	2.20E+03	*b*	1.37E-07
Napthalene	0.01	3.38E-04	1.00E+02	*h*	3.38E-06
Phenanthrene	0.004	1.35E-04	nd		n/a
SVOCs					
Phenol	0.004	1.35E-04	5.80E+03	*f*	2.33E-08
Pyrene	0.006	2.03E-04	nd		n/a
Benzo(a) Anthracene	0.004	1.35E-04	nd	*g*	n/a
Benzo(a) Pyrene	0.002	6.76E-05	3.10E-02	*a*	2.18E-03
Benzo-Flouranthene	0.004	1.35E-04	nd		n/a
Bis(2-ethylhexyl phthalate)	0.06	2.03E-03	3.6e+02 to 4.0e+02	*i*	5.63E-06
Total phthalates	34	1.15E+00	3.6e+02 to 4.0e+02	*j*	3.19E-03
Chrysene	0.005	1.69E-04	nd		n/a
Di-n-Butyl phthalate	0.06	2.03E-03	nd		n/a
Flouranthene	0.005	1.69E-04	1.60E+01	*f*	1.06E-05
Metals					
Antimony	0.3	1.01E-02	5.00E+02	*f*	2.03E-05
Arsenic	1.7	5.75E-02	1.40E-01	*g*	4.10E-01
Barium	7.9	2.67E-01	nd		n/a
Beryllium	0.029	9.80E-04	nd		n/a
Chromium (total)	0.43	1.45E-02	5.00E+01	*a*	2.91E-04
Cobalt	0.5	1.69E-02	nd		n/a
Copper	0.08	2.70E-03	2.40E+00	*g*	1.13E-03
Lead	0.59	1.99E-02	5.60E+00	*e*	3.56E-03
Molybdenum	0.29	9.80E-03	nd		n/a
Nickel	1.7	5.75E-02	7.10E+00	*a*	8.09E-03
Selenium	0.007	2.37E-04	7.10E+00	*f*	3.33E-05
Thallium	0.5	1.69E-02	4.00E+01	*k*	4.22E-04
Vanadium	0.92	3.11E-02	nd		n/a
Zinc	3.9	1.32E-01	5.80E+01	*a*	2.27E-03
Hexavalent chromium	0.01	3.38E-04	5.00E+01	*a*	6.76E-06

nd No available data
n/a Not applicable
a)Basin Plan Shallow Water
b)US EPA Water Quality Criteria
c)10% US EPA Marine Acute Criteria
d)Protection Substinence, Fisherman
e)California Water Quality Objective
f)US EPA Marine Chronic Criteria Limit
g) US. Toxic Law, Update of US EPA Marine Chronic Criteria Limit
h) Based on TPH-J EC-10
i) California Inland Surface Water Plan
j) Marine Water Quality Standards for Bis(2-ethylhexyl phthalate) was used for the Comparison
k) IRIS, 1995, no published criterion for marine water exists, therefore, freshwater criteria was used.

FIGURES

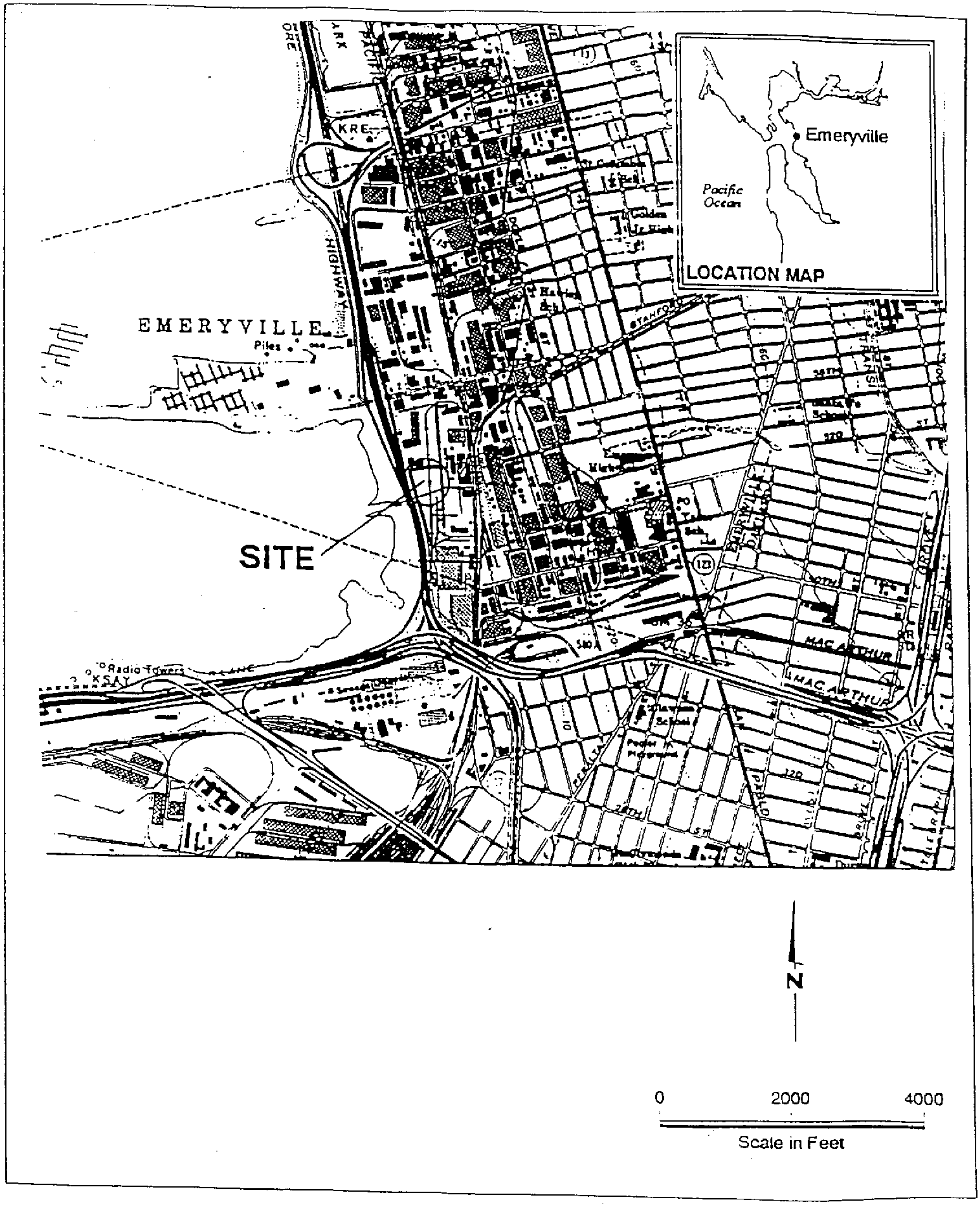

Figure 1-1: Location Map

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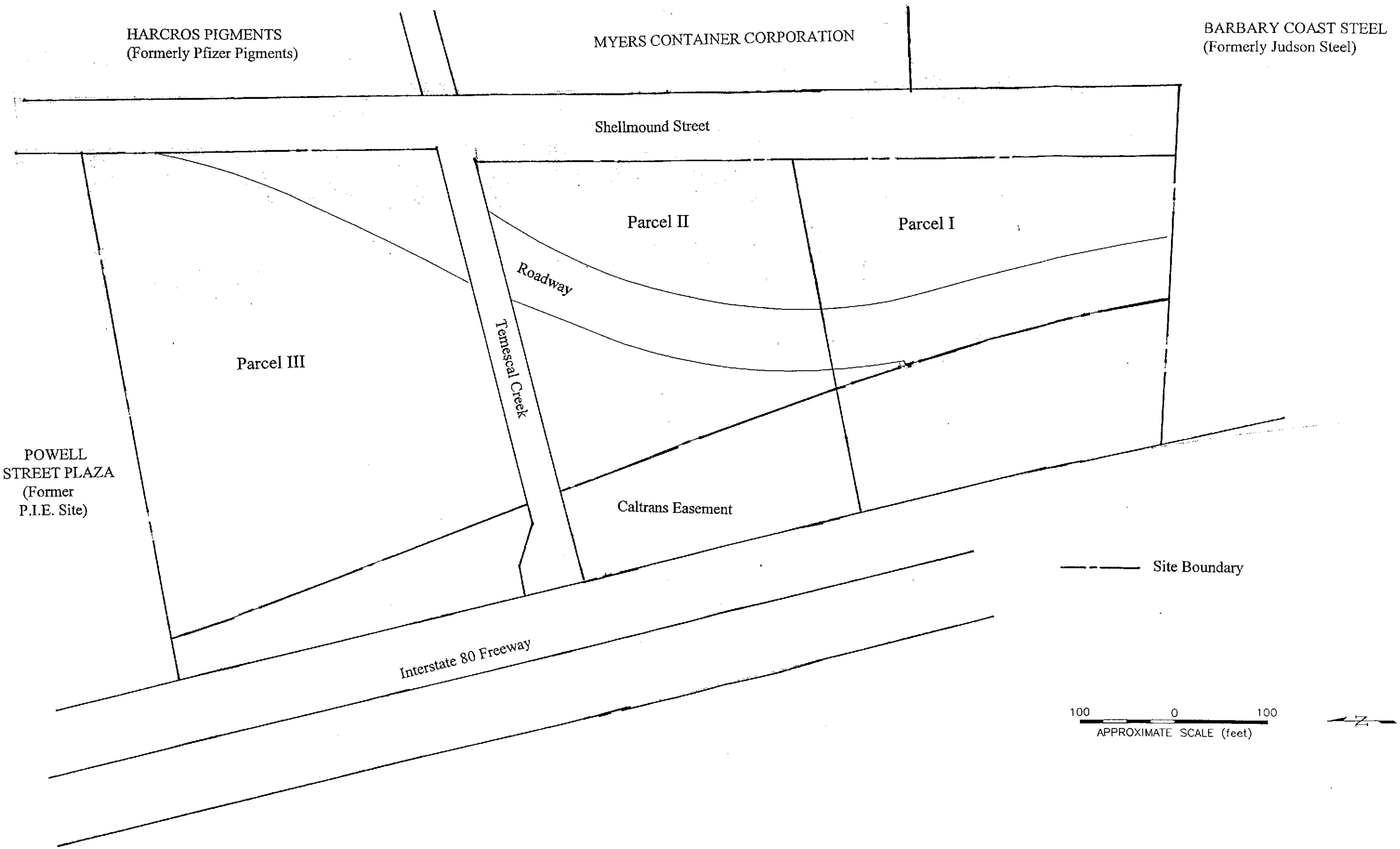

Figure 1-2: Site Plan Showing the Locations of the Three Shellmound Parcels

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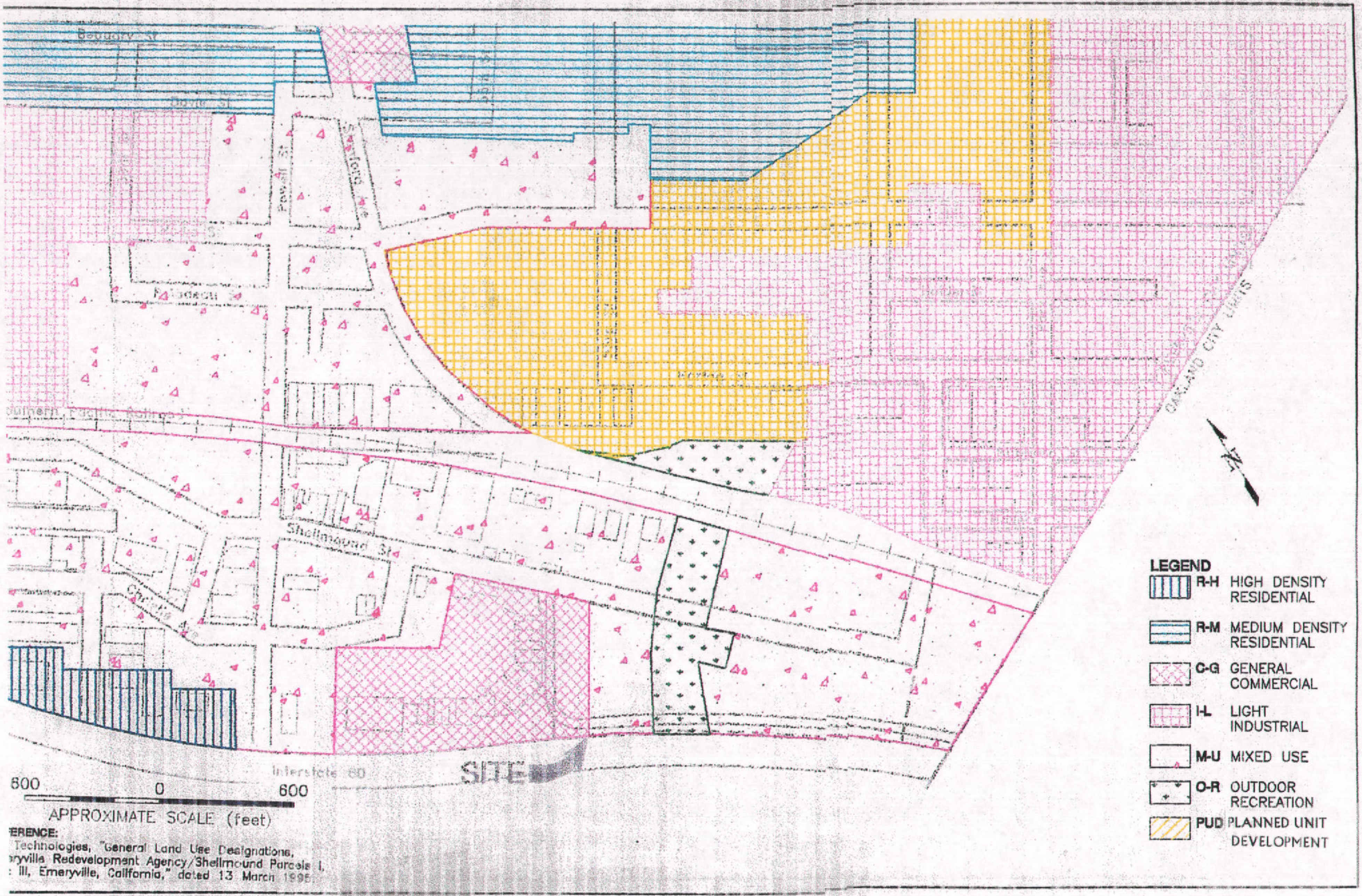

Figure 1-3 Existing Zoning at the Site and the Surrounding Land

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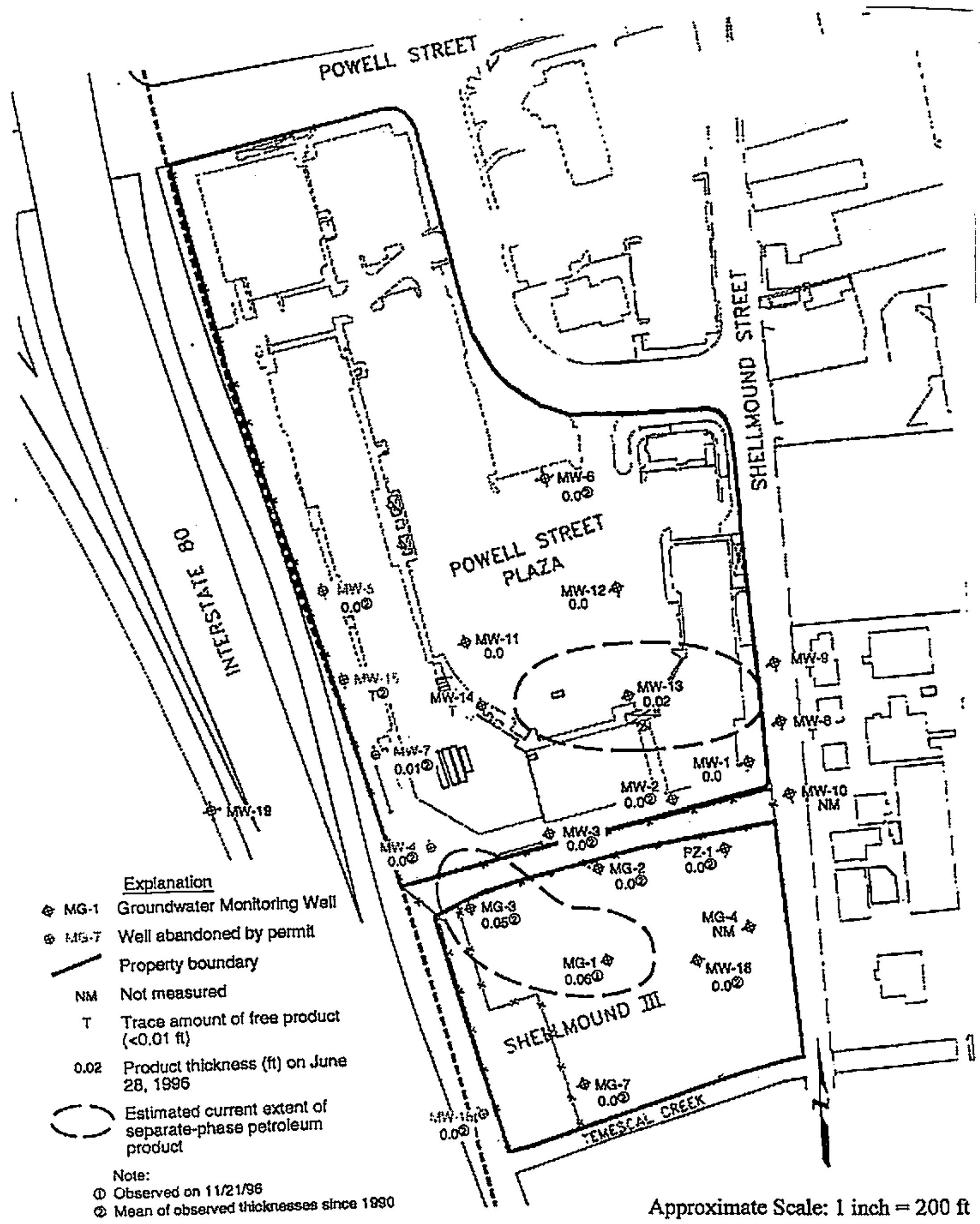

Figure 1-4: Extent of Floating Product Beneath Parcel III and P.I.E Site

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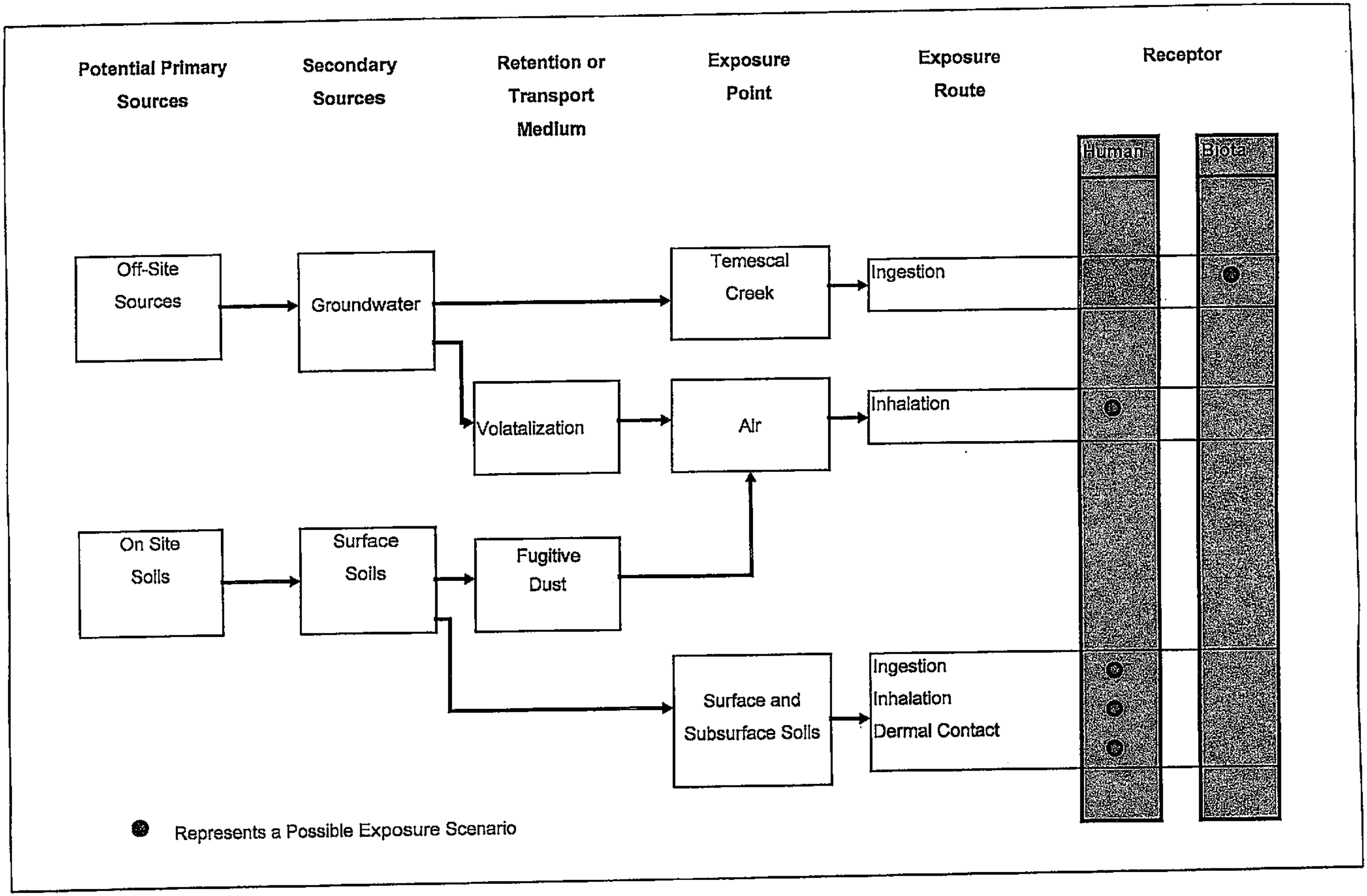

Figure 1-5: Conceptual Site Model (CSM)

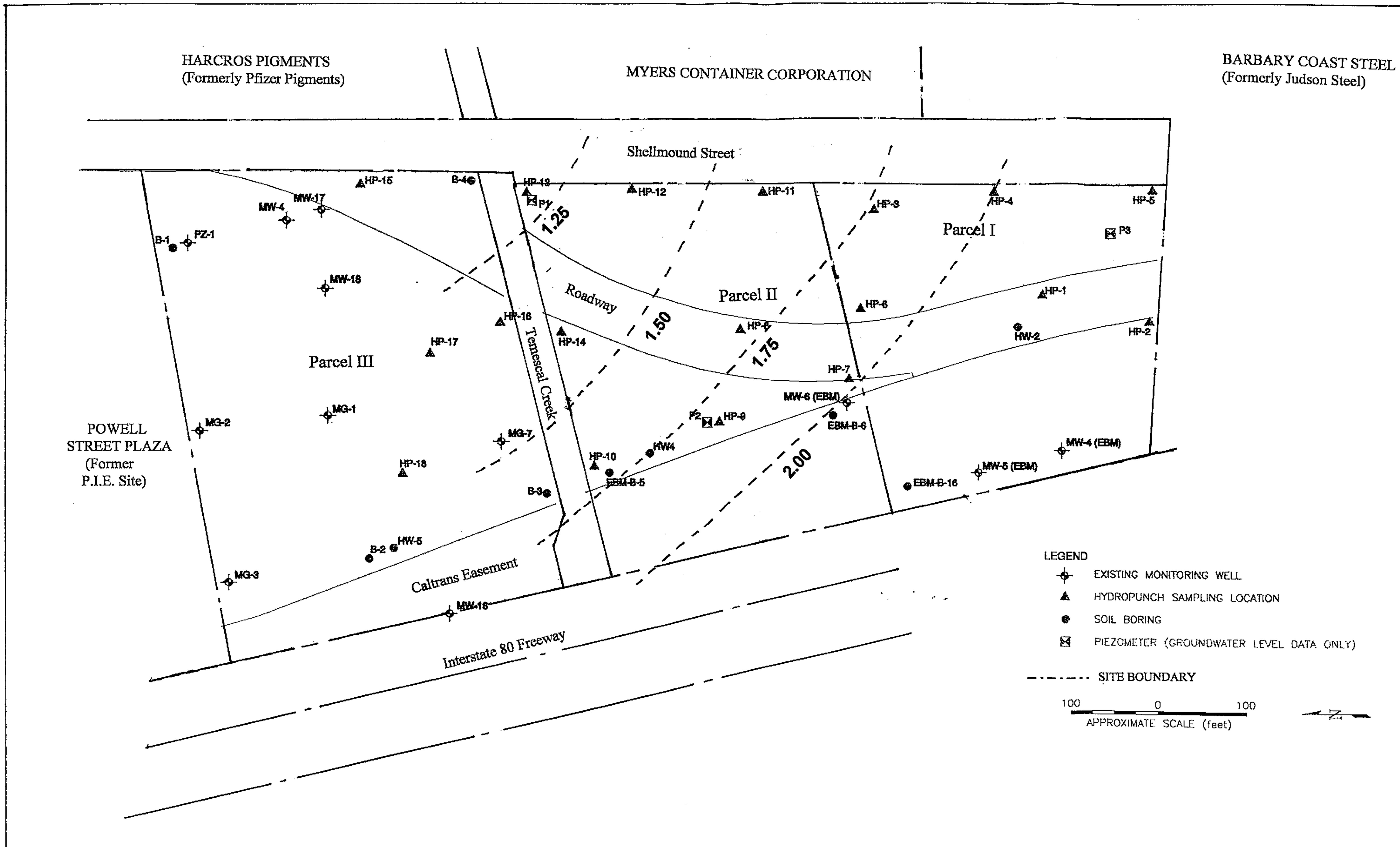

Figure 2-1 Groundwater Elevation Contour Map

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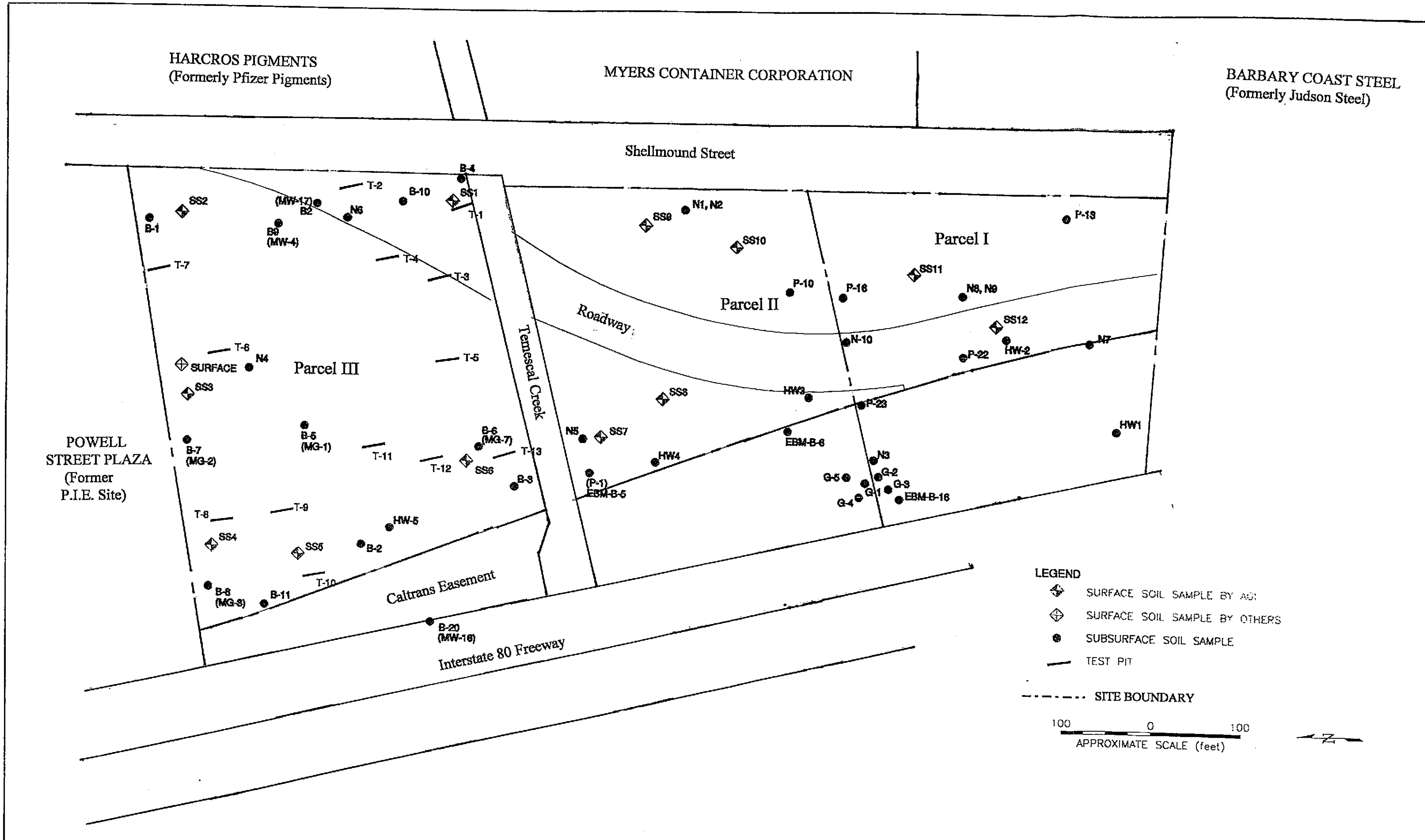

Figure 2-2: Soil Sample Location Map

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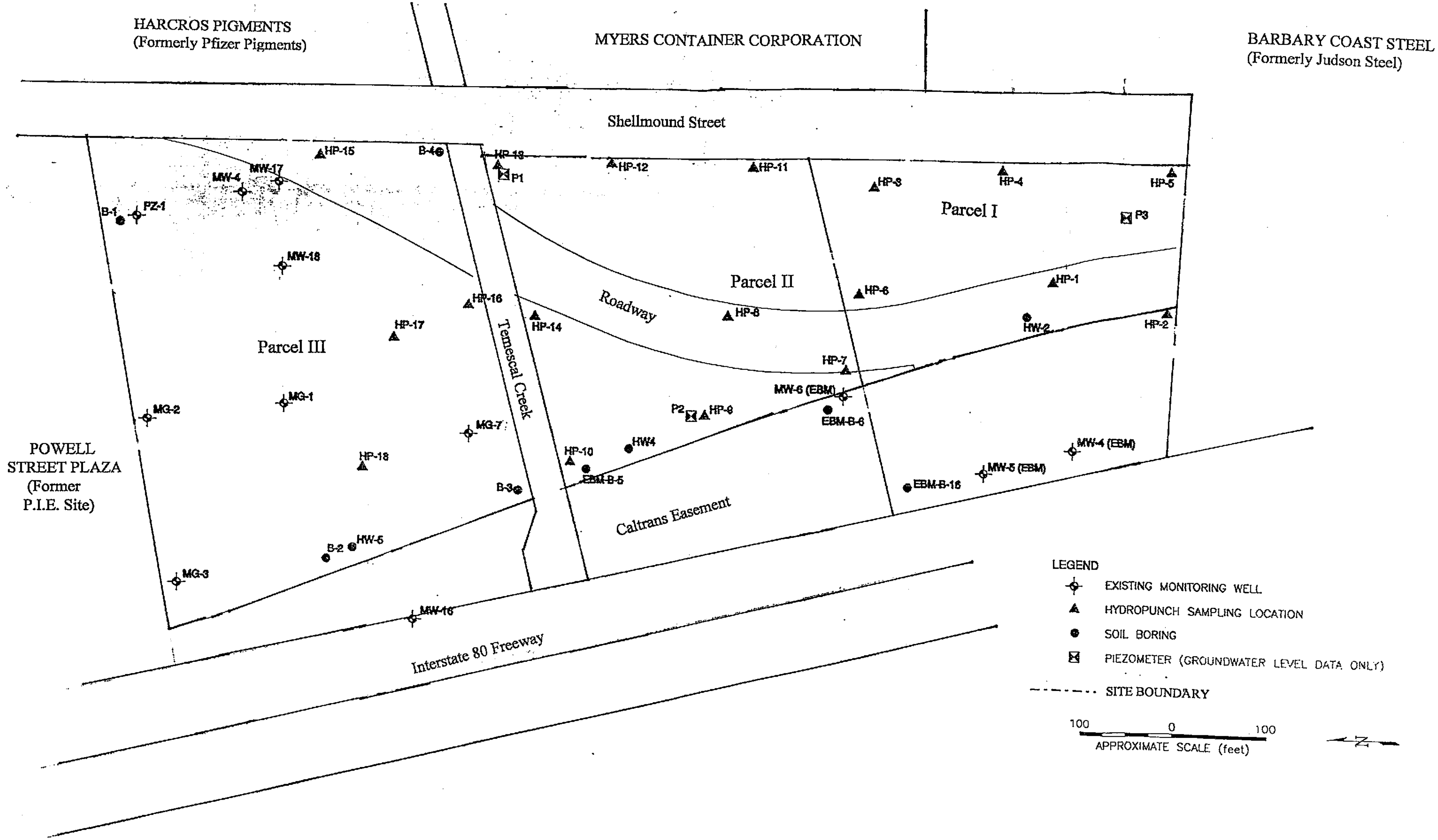

Figure 2-3 Groundwater Sample Location Map

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