PACIFIC
ENVIRONMENTAL
GROUP, INC.

Draft

Non-Attainment Area Management Plan

Site 0746
Oakland, California

Prepared for

Unocal

November 7, 1994

Prepared by

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Project 310-0863A

(v 1.1)

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PROFESSIONAL CERTIFICATION
Non-Attainment Area Management Plan

Site 0746
Oakland, California

Pacific Environmental Group, Inc. (PACIFIC) has prepared this Non-Attainment Area (NAA) Plan for the referenced site. This plan has been prepared according to the guidelines Groundwater Amendment to the Water Quality Control Plan, San Francisco Bay Region.

This NAA Plan has been prepared by the staff of PACIFIC under the professional supervision of the Senior Geologist whose seal and signature appears hereon.

Erin Garner
Senior Geologist
RG 4750

1. INTRODUCTION

Unocal is submitting this Non-Attainment Area (NAA) Plan for implementation at the Site 0746. The plan provides for management and containment of the remaining human health and environmental risks at the referenced facility. Upon acceptance of the management plan by the RWQCB and the LOP, Unocal requests issuance of a no further action letter [NFA] that would identify no further requirements at the site beyond those stipulated within the management plan.

This plan is designed to fulfill the intent of State Water Resources Control Board (State Board) Resolution 68-16, which mandates protection of present and potential beneficial uses of groundwater, by maintaining protection of all groundwater beyond the compliance points. The plan is also designed to fulfill the intent of State Board Resolution 88-63, which mandates that all groundwater be suitable (or be restored to suitability) for municipal supply, by specifying deed and land use restriction such that natural processes are allowed to restore groundwater over the long term.

This document is composed of five parts with appendices. Following is a brief description of each part.

- Part 1 is an introduction.
- Part 2 of this NAA plan is a summary of site characterization data accomplished through the use of pre-formatted tables and figures..
- Part 3 is an description of the NAA plan for the site. This description identifies the NAA, the containment monitoring locations, risk management measures to protect human health and the environment, and the compliance monitoring program. This part incorporates a qualitative risk assessment of the NAA. The qualitative risk assessment delineates the critical exposure pathways and receptors. Based upon the selection of the critical exposure pathway and receptor, the most sensitive beneficial use of the groundwater is selected, and clean-up levels for groundwater are determined to protect the beneficial use.

- Part 4 is an evaluation of the NAA plan to demonstrate the completeness of the site characterization and the NAA plan measures for the protection of human health and the environment. This evaluation is facilitated by utilization of RWQCB staff guideline for interpretation of the Groundwater Basin Plan Amendment for NAA.
- Part 5 offers conclusions and recommendations for consideration of the site as a NAA.

The document is completed by incorporating a summary of references and relevant appendices.

2. SITE CHARACTERIZATION DATA

This part of the NAA Plan for Site 0746 presents a summary of existing site conditions, including investigative results to date, potential beneficial uses of land, groundwater, surface water, and the suitability of implementing NAA at this site. The site characterization data has been summarized in a pre-formatted tabular format consistent with the guidance within ASTM ES 38. Where appropriate, such for appending groundwater and soil analytical data, appendices have been incorporated. A brief forecast of the contents of each table is summarized below:

- Table 2-1
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- Table 2-2
  Site Ownership & Activity Record
- Table 2-3
  Summary of Current & Completed Site Activities
- Table 2-4
  Hydrogeologic Conditions
- Table 2-5
  Analytic Summary Sheets

Table 2-1
Site Description

Site 0746
Oakland, California

Information Requirement	Discussion	Reference
Site Address	3943 Broadway, Oakland, California	2Q94 Report, MPDS
Site Owner/Contact	Unocal Corporation / Mr. Edward Ralston Station Operator: Clem Leung	2Q94 Report, MPDS UST Leak Report, 8/10/89
Agency Contacts	Alameda County Health Care Services Agency, Eva Chu RWQCB: Mr. Kevin Graves	6/16/94 Letter, KEI 3Q93 Report, KEI
Local Land Use	The station is located at the corner of Broadway and 40th Street. A car dealership is located to the southeast. Retail shops and a temple are located to the north and to the southwest. There is parking lots to the east and to the north.	2Q94 Report, MPDS
Topography	The site is situated on gently sloping, south-southwest trending topography.	9/25/92 Report, KEI
Surface Water Characterization	Pacific Environmental Group, Inc. knows of no surface water on the site	
Climatic	Climatic conditions are presently unknown to Pacific Environmental Group, Inc..	

Table 2-2
Site Ownership & Activity Record

Site 0746
Oakland, California

Information Requirement	Discussion	Reference
Past Production And Materials Handling Activities	No known production of useable materials. Waste oil produced by service station activities was stored in a waste oil tank. Gasoline products were stored in underground fuel storage tanks. The site is presently used as a gasoline station.	2Q94 Report, MPDS
Waste Disposal Practices	Waste oil was put into a waste oil tank until it was removed 8/89. Other waste disposal practices are presently unknown to Pacific Environmental Group, Inc..	2Q94 Report, MPDS
Chemicals Used	Chemicals used are unknown to Pacific Environmental Group, Inc..	
Site Ownership	Unocal Corporation	2Q94 Report, MPDS
Potential Sources and Spill Events including: location, type and volume of materials released, time and duration of release, and affected media (soil, groundwater, surface water, etc.)	Underground storage tank leak: 8/16/89, unknown volume, gasoline and waste oil, unknown when leak began, source of leak unknown, unknown affect on environment	UST Leak Report, 8/28/89
Potential Off-site Sources	A dry cleaning store called Glovatorium, located at 3815 Broadway, was charged by the Oakland police department with dumping dry cleaning solvent onto the ground at a worker's home, regularly disposing of waste contaminated water into the sewer drain, and knowingly allowing underground storage tanks on the site to leak solvent into the groundwater.	6/25/93 Report, Oakland Police Department

Table 2-3
Summary of Current & Completed Site Activities

Site 0746
Oakland, California

Corrective Action Activities	Description	Reference
Twelve Monitoring Wells One Recovery Well	Three monitoring wells were installed in November of 1989, six in 1990, and three in 1992. The recovery wells were installed in April of 1989. All wells have been monitored since installation. Currently, all are being monitored quarterly. Sampling parameters include Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), and TPH-Gas.	2Q94 Report, MPDS
Waste Oil Tank Removed	One 280 gallon tank was removed in 8/89 and replaced. No holes or cracks were observed in the tank. Forty cubic yards of contaminated soil was excavated and disposed of in a class I landfill.	11/18/92 Report Unocal 9/25/92 Report, Unocal 8/30/89 Report, Unocal
Two Underground Storage Tanks Removed	One 10,000 gallon unleaded gasoline tank and one 10,000 gallon super unleaded gasoline were removed in 8/89 and replaced. One hundred and thirty cubic yards of contaminated soil was aerated on-site then disposed of at a class III landfill. Ninety cubic yards of contaminated soil was disposed of at an approved facility. Fourteen thousand gallons of contaminated groundwater was pumped out of the tank pit.	11/18/92 Report Unocal 9/25/92 Report, Unocal 8/30/89 Report, Unocal
Pilot Vapor Extraction Test	Five day test from 4/12/93 to 4/16/93. System could not operate continuously due to site geological conditions. Maximum rate of hydrocarbon extraction was 0.0049 lbs/hour.	5/18/93 Report, KEI

Table 2-4
Hydrogeologic Conditions

Site 0746
Oakland,California

Information Requirement	Discussion	Reference
Regional Geologic Framework through depth of principal aquifer and any other potentially impacted units	The region is underlain by Quaternary-age alluvium fan deposits, which typically consist of lenses of clayey gravel, sandy silty clay, and sand-clay-silt mixtures.	9/25/92 Report, KEI
Site Geologic Framework Through Depth Of Principal Aquifer And Any Other Potentially Impacted Units	The site is underlain by artificial fill materials from 2 to 6 feet (') thick. These materials are in turn underlain by clay materials that extend from 5' to 11.5' deep below ground surface. This is underlain by a coarse-grained zone which extends 10' to 15.5' below grade. Groundwater is within the coarse-grained zone or below. At MW1, MW10, and MW11, a second coarse-grained zone composed of clayey gravel or clayey to silty sand extends 19' to 20' below ground surface	9/25/92 Report, KEI
Vadose Zone Thickness And Geology	The vadose zone thickness ranges from 2' to 6' below ground surface. The geology consists of the fill materials as described above.	9/25/92 Report, KEI
Depth To Groundwater	Depth to groundwater ranges from 7.40' to 13.28' below ground surface.	2Q94 Report, MPDS
Thickness Of Aquifer	The aquifer extends from 10' to 15.5' below ground surface. Its total vertical extent is presently unknown.	9/25/92 Report, KEI
Maximum Well Yield	The maxiumum well yield is 22.03' at recovery well RW1.	2Q94 Report, MPDS
Flow Direction And Gradient	Groundwater flow direction is southwesterly with a gradient of 0.03.	2Q94 Report, MPDS
Description Of Any Confining Units	A layer of clayey materials is found below the fill materials, which are found directly below grade, and above the coarse-grained materials layer..	9/25/92 Report, KEI
Current Groundwater Quality (TDS)	The current groundwater quality is presently unknown to Pacific Environmental Group, Inc..	

Table 2-5
Analytic Summary Sheets

Site 0746
Oakland, California

Information Requirement	Media (Soil/ Groundwater)	Compounds Detected					
		Benzene	Toluene	Xylenes	Ethylbenzene	TPH-Gas	Other: None
Analytic Method Used	Soil	EPA Method 5030/8015/8020	EPA Method 5030/8015/8020	EPA Method 5030/8015/8020	EPA Method 5030/8015/8020	EPA Method 5030/8015/8020	N/A
	Groundwater	EPA Method 5030/8015/8020	EPA Method 5030/8015/8020	EPA Method 5030/8015/8020	EPA Method 5030/8015/8020	EPA Method 5030/8015/8020	N/A
Practical Quantification Limit	Soil	0.05 ppm (mg/kg)	0.1 ppm	0.1 ppm	0.1 ppm	1.0 ppm	N/A
	Groundwater	0.5 ug/L	0.5 ug/L	0.5 ug/L	0.5 ug/L	50 ug/L	N/A
Number of Samples Analyzed	Soil	11	11	11	11	11	N/A
	Groundwater	12	12	12	12	12	N/A
Summary of Analytic Data:	Soil: Maximum Residual:	0.52 ppm Boring: P2 Depth: 6.5' Date: 8/89	4.4 ppm Boring: P2 Depth: 6.5' Date: 8/89	8.0 ppm Boring: P2 Depth: 6.5' Date: 8/89	1.4 ppm Boring: P2 Depth: 6.5' Date: 8/89	36 ppm Boring: P2 Depth: 6.5' Date: 8/89	N/A
Identify Boring, Depth (if applicable), Concentration, and Date	Groundwater (Maximum)	2,300 ug/L Well: MW5 Date: 11/20/92	6,400 ug/L Well: MW3 Date: 11/20/92	15,000 ug/L Well: MW3 Date: 11/20/92	3,000 ug/L Well: MW3 Date: 11/20/92	1,100,000 ug/L Well: MW3 Date: 11/20/92	N/A
	Groundwater (Current)	1,500 ug/L Well: MW5 Date: 5/31/94	1,200 ug/L Well: MW5 Date: 5/31/94	6,700 ug/L Well: MW5 Date: 5/31/94	1,600 ug/L Well: MW5 Date: 5/31/94	43,000 ug/L Well: MW5 Date: 5/31/94	N/A
	Groundwater (Minimum)	None Detected Date: 5/31/94	None Detected Date: 5/31/94	None Detected Date: 5/31/94	None Detected Date: 5/31/94	None Detected Date: 5/31/94	N/A
Background Concentrations	Presently Unknown	Presently Unknown	Presently Unknown	Presently Unknown	Presently Unknown	Presently Unknown	N/A
Trend	Groundwater	Stable	Stable	Stable	Stable	Stable	N/A

Figure 2-1
Site Location Map

Site 0746
Oakland, California

HOLD FOR FIGURE

Figure 2-2
Extended Site Map

Site 0746
Oakland, California

HOLD FOR FIGURE

Figure 2-3
Site Plan View

Site 0746
Oakland, California

HOLD FOR FIGURE

Figure 2-4
Groundwater Elevation Map

Site 0746
Oakland, California

HOLD FOR FIGURE

Figure 2-5
Geologic Cross-Section

Site 0746
Oakland, California

HOLD FOR FIGURE

Figure 2-6
Dissolved Contaminant Plume Map

Site 0746
Oakland, California

HOLD FOR FIGURE

3. NON-ATTAINMENT AREA MANAGEMENT PLAN

This part provides the description of the NAA, the management measures for residual environmental and human health risks, the containment monitoring program, and the contingency measures. The part begins with a description of NAA including the delineation of the NAA and identification of the containment monitoring points. In conjunction with this description of the NAA, management plan elements are incorporated for containing and managing remaining human health, water quality and groundwater pollution. This section is constructed consistent with the guidelines within Criteria D for Category I NAAs, and includes an assessment of human health and environmental risks, management measures for the NAA, contingency options, a commitment to mitigating measures, and a compliance monitoring plan.

3.1 Description of Non-Attainment Area

The NAA is a limited zone of groundwater pollution where concentrations above water quality objectives are permissible. At a minimum, the zone should encompass the pollutant plume in both the vadose soils and saturated groundwater regime. The downgradient extent of the NAA is bounded by containment monitoring points.

For Site 0746, the NAA encompasses the area which contains the hydrocarbon plume. This area includes MW-2, MW-3, MW-4, MW-5, MW-8, MW-9. The NAA is represented on Figure 3-1.

The containment monitoring points for Site 0746 coincide with the downgradient extent of the NAA. The containment monitoring points are existing monitoring wells MW11 and MW12 and are represented on Figure 3-1.

3.2 Assessment Of Human Health And Environmental Risks

The goal of this risk assessment process is to qualitatively assess the current and potential human health and environmental impacts of the proposed NAA for Site 0746. The intent is to identify obvious environmental impacts (if any), potentially affected sensitive receptors (schools, homes, waterbodies, etc.), and significant exposure pathways (drinking water wells, recreation use of streams, vapor transport, etc.). Given that this risk assessment is submitted

in conjunction with the NAA plan that manages groundwater quality, this potential exposure pathway of constituents within the groundwater system deserves special management. This qualitative risk assessment intent is to consider risk posed by other potential exposure pathways, such as volatilization.

This qualitative risk assessment is accomplished by in several steps. First, we establish the constituents of concern, those constituents where the risks will be the subject of the risk assessment. For the constituents of concern, a site specific exposure pathway assessment is performed. The intent of the pathway assessment is to determine whether other pathways aside from the groundwater pathway pose a human or environmental health risk requiring management. The pathway analysis is conducted consistent with ASTM Emergency Standard ES 38, Guide for Risk-Based Corrective Action at Petroleum Release Sites.

To manage the risk associated with a NAA, groundwater cleanup levels are determined for application at the containment monitoring location. The determination of the groundwater cleanup level is conducted consistent with methodology ASTM ES 38 and the Groundwater Amendment to the Water Quality Control Plan.

3.2.1 Selection of Constituents of Concern

The constituents of concern for NAA Site 0746 are TPH-Gas, Benzene, Toluene, Ethylbenzene, and Xylene (BTEX). These consituents have been monitored and analyzed since February of 1989 and are presently found in detectable levels only at monitoring well MW3. All monitoring wells will continue to be monitored for these consituents to determine any changes in concentration values.

3.2.2 Exposure Pathway Analysis

Contamination at NAA Site 0746 has two possible source areas: (1) the former underground fuel storage tanks and (2) the former waste oil tank. Within these areas, contamination may have occured during failure of either product and/or waste storage or piping. All contamination occuring at ground surface to a depth of at least two feet below ground surface has been contained to soil which was overexcavated then disposed of.

3.2.3 Water Quality Objectives for Containment Monitoring Locations

Water quality objectives for NAA Site 0746 are consistent with the State Water Resources Control Board Resolution 88-63. For this site, water quality objectives for the containment monitoring locations are and will remain to be not detectable (ND) concentrations of all consitutents of concern.

3.3 Management Measures For The NAA

Groundwater Quality Objectives for the Containment Monitoring Location

- Deed notifications/restrictions
- Indemnification Agreements
- Site operation, maintenance, health and safety plans
- Utility worker notice

3.4 Commitment to Mitigating Measures

The Groundwater Basin Plan Amendment solicits a commitment to mitigating measures such as participation in a regional groundwater monitoring or protection program. While this commitment is sought, there is not a need for this site for participation in such a regional program as no such program requirements have been defined.

3.5 Contingency Plan

A contingency planning activities would be invoked in the event that the water quality objectives are exceeded at the compliance monitoring location. If an exceedance is observed within the compliance monitoring program, the corresponding monitoring well would be resampled. If the exceedance is validated, then the RWQCB and the LOP would be notified of the exceedance. The response to the contingent event would be proportioned to the extent of the exceedance. For example, if separate-phase hydrocarbon were discovered, a bailing program would be immediately initiated. Conversely, if the measured groundwater concentration is just above the water quality objective, and increased groundwater monitoring frequency may be recommended.

In the event of a validated contingent event, the RWQCB and the LOP would be notified in writing within fifteen days of confirmation of the data, and provided with a corrective action plan within 60 days of confirmation.

3.6 Compliance Monitoring Program

The intent of the compliance monitoring program is demonstrate that water quality objectives are being achieved at the containment monitoring point. A monitoring program is represented on Table 3-2, and identifies the monitoring frequency and analytic parameters for the containment monitoring points. Reporting would be provided within 45 days of the monitoring event. The letter reports would include a summary of table of analytic results and an evaluation of the results to the water quality objects.

Table 3-1
Groundwater Quality Goals for Containment Monitoring

Site 0746
Oakland, California

Constituent	Numerical Limitation (mg/L)	Reference
Benzene	ND (Below detectable limits)	State Water Resources Control Board Resolution 88-63
Ethlybenzene	ND (Below detectable limits)	State Water Resources Control Board Resolution 88-63
Toluene	ND (Below detectable limits)	State Water Resources Control Board Resolution 88-63
Xylenes	ND (Below detectable limits)	State Water Resources Control Board Resolution 88-63
Total Petroleum Hydrocarbons as Gas	ND (Below detectable limits)	State Water Resources Control Board Resolution 88-63
Total Petroleum Hydrocarbons as Diesel	ND (Below detectable limits)	State Water Resources Control Board Resolution 88-63

Table 3-2
Compliance Monitoring Program

Site 0746
Oakland, California

Monitoring Well Designation	Monitoring Frequency	Analytic Parameters (See Notes)	Comment
MW1	Annually	BTEX, TPH-Gas	2Q94 Report, MPDS Monitored since 11/1/89
MW2	Annually	BTEX, TPH-Gas	2Q94 Report, MPDS Monitored since 11/1/89
MW3	Annually	BTEX, TPH-Gas	2Q94 Report, MPDS Monitored since 11/1/89
MW4	Annually	BTEX, TPH-Gas	2Q94 Report, MPDS Monitored since 2/15/90
MW5	Annually	BTEX, TPH-Gas	2Q94 Report, MPDS Monitored since 2/15/90
MW6	Annually	BTEX, TPH-Gas	2Q94 Report, MPDS Monitored since 11/7/90
MW7	Annually	BTEX, TPH-Gas	2Q94 Report, MPDS Monitored since 11/7/90
MW8	Annually	BTEX, TPH-Gas	2Q94 Report, MPDS Monitored since 11/7/90
MW9	Annually	BTEX, TPH-Gas	2Q94 Report, MPDS Monitored since 11/7/90
MW10	Annually	BTEX, TPH-Gas	2Q94 Report, MPDS Monitored since 8/26/92
MW11	Quarterly for 1 year, Semi-annual for 2 yrs, Annual thereafter	BTEX, TPH-Gas	2Q94 Report, MPDS Monitored since 8/26/92
MW12	Quarterly for 1 year, Semi-annual for 2 yrs, Annual thereafter	BTEX, TPH-Gas	2Q94 Report, MPDS Monitored since 8/26/92

Reference to Analytic Parameters:

- BTEX: Benzene, Toluene, Ethylbenzene, and Total Xylenes
- TPH-Gas: Total Petroleum Hydrocarbons Measured as Gasoline

Figure 3-1
Non-Attainment Area and Containment Monitoring Locations

Site 0746
Oakland, California

HOLD FOR FIGURE

Figure 3-2
Exposure Pathway Analysis

Site 0746
Oakland, California

HOLD FOR FIGURE

4. EVALUATION AS A CATEGORY I NON-ATTAINMENT AREA USING RWQCB GUIDANCE

RWQCB guidance is applied in this section to demonstrate the adequacy of site characterization work summarized in Part 2, and the adequacy of the completeness of the NAA Management Plan represented in Part 3. The qualifying criteria for a Category I NAA are represented with the Groundwater Basin Plan Amendment and within RWQCB Staff Guidelines. The Basin Plan Amendment provides both general requirements and specific criteria. These criteria are evaluated in turn, respectfully.

4.1 General Category I NAA Requirements

Within the introductory discussion for Category I NAA, two general conditions are established for consideration as a NAA. These general conditions are reiterated, and consistency of the site conditions at Site 0746 to these requirements is presented.

- *Site Investigations Have Been Conducted Pursuant To Resolution 92-49:* [Based on PACIFIC's review of existing information on the site, the investigation was performed in a phased approach following the initial discovery of hydrocarbons in soil and/or groundwater. Work was performed pursuant to workplans that were submitted to the regulatory agencies, including the Regional Water Quality Control Board. Reports submitted were signed (where appropriate) by qualified preofessionals.
- *Lateral And Vertical Definition Of Soil And Groundwater Pollution Have Been Adequately Defined:* A review of existing soil and groundwater analytical data indicate that soil and groundwater have been adequately defined See Figure 2-6.

4.2 Specific Category I NAA Criteria

Four specific criteria must be adequately addressed for RWQCB consideration of Site 0746 as a NAA site. While the Groundwater Basin Plan Amendments offer the regulatory wording for these criteria, the RWQCB and LOPs have been provided additional guidance within a RWQCB staff memorandum from Steven Ritchie dated June 29, 1994. We have evaluated

conditions at Site 0746 applying the staff guidance. The summary of the evaluation is provided in the subsequent text, with consideration of the staff guidance within tables that correspond to each criteria.

- *Criteria A: The discharger has demonstrated (e.g., pump tests, groundwater monitoring, transport modeling), and will verify (e.g., groundwater monitoring) that no significant pollutant migration will occur due to hydrogeologic or chemical characteristics.*

  Based upon analysis of site conditions, no significant pollutant migration will occur due to hydrogeologic or chemical characteristics. This evaluation is represented within Table 4-1.

- *Criteria B: Adequate source removal and/or isolation is undertaken to limit future migration of pollutants to groundwater.*

  Based upon evaluation of source removal activities, sufficient removal actions have been conducted to limit future migration of pollutants to groundwater. This evaluation is represented within Table 4-2.

- *Criteria C Dissolved-phase cleanup is not appropriate or cost effective due to limited water quality impacts or human health risks.*

  Consideration of the feasibility of dissolved-phase clean-up at Site 0746 has been evaluated consistent with the RWQCB guidance, and has been found to be not cost effective. This evaluation is represented within Table 4-3.

- *Criteria D: An acceptable plan is submitted for containing and managing the remaining human health and environmental risks, if any, posed by residual soil and groundwater pollution. This plan should include as assessment of human health and environmental risks; management measures (e.g. deed notification or restrictions; indemnification agreements; site operation, maintenance, health and safety plans; utility worker notice; etc.) contingency options and a commitment to mitigating measures such as participation in a regional groundwater monitoring or protection program.*

  The Non-attainment Area Management Plan represented in Part 3 of this document has been written to specifically satisfy these guidelines, and as such inherently satisfies the requirements. This evaluation is represented within Table 4-4.

Table 4-1
Evaluation of Criteria A for Category I Non-Attainment Areas

Criteria A. The discharger has demonstrated (e.g., pump tests, groundwater monitoring, transport modeling), and will verify (e.g., groundwater monitoring) that no significant pollutant migration will occur due to hydrogeologic or chemical characteristics.

RWQCB Guidance for Evaluation of Criteria A	Evaluation of Guidance	Reference
The pollution plume is slow-moving or stable due to low permeability geologic materials or such factors as adsorption and biodegradation.	Analysis has been performed to demonstrate a stable plume.	Table 2-5
No significant potential horizontal migration pathways exist.	Site Hydrogeologic Conditions represent that no significant horizontal pathways exists.	Table 2-4
The pollution plume shall be of limited horizontal extent [generally less than 500 feet] and limited to the upper water-bearing zones.	The plume is approximately **150 feet** and thus is less than 500 foot guidance.	Figure 2-5 Figure 2-6
No significant vertical conduits shall exist within the plume area or the area between the plume and the compliance points.	Based on well and exploratory soil borings, there are no known evident vertical conduits within the plume area.	Figure 2-5 Figure 2-6 2Q94 Report, MPDS

Table 4-2
Evaluation of Criteria B for Category I Non-Attainment

Criteria B. Adequate source removal and/or isolation is undertaken to limit future migration of pollutants to groundwater.

RWQCB Guidance for Evaluation of Criteria A	Evaluation of Guidance	Reference
Separate-phase hydrocarbons floating on the water table must be removed to the maximum extent feasible.	Free product is found only in MW3 and MW5. MW3, MW5, and MW8 are purged on a bi-weekly basis. A continuous surface skimmer free product recovery system is installed in both MW3 and MW5.	2Q94 Report, MDPS
For shallow water table conditions, highly polluted soils in the vadose zone and the capillary fringe should be removed or treated to the maximum extent feasible to minimize continued leaching to groundwater.	All highly contaminated soils have been removed from the area of source pollution and disposed of in the proper facility. Remaining soils have low or no concentration levels of contamination.	9/25/92 Report, KEI
For deeper groundwater conditions, hot spot or highly polluted soil removal or treatment shall be accomplished to the maximum extent feasible.	All highly contaminated soils have been removed from the area of source pollution and disposed of in the proper facility. Remaining soils have low or no concentration levels of contamination.	9/25/92 Report, KEI
Vapor extraction and air sparging technology should be considered for source removal, as an alternative to soil removal, where soil conditions are appropriate.	A pilot vapor extraction test was performed from 4/12/93 to 4/16/93. Due to the high water table and low soil permeability, the vapor extraction system could not operate continuously. The maximum rate of hydrocarbon removal was 0.00049 lbs/hour. Therefore, vapor extraction technology is not feasible due to the flow extraction rate the non-continuous operation.	5/18/93 Report, KEI
After highly polluted source areas are removed or treated, further pollutant removal shall be considered by the discharger based upon an analysis of the degree of cleanup required to prevent plume migration to the containment monitoring point(s) above the agreed upon level.	Soil contamination at the site is at none or very low concentrations. Groundwater contamination has been "None Detected" at the monitoring wells, MW10, MW11, and MW12, since 1992. Groundwater contamination on-site is also at low levels.	2Q94 Report, MDPS
Unsaturated zone pollutant removal or treatment must also be to level that adequately protects public health.	All highly contaminated soils have been removed from the area of source pollution and disposed of in the proper facility. Remaining soils have low or no concentration levels of contamination.	2Q94 Report, MDPS

RWQCB Guidance for Evaluation of Criteria A	Evaluation of Guidance	Reference
Capping, slurry walls, or other engineered methods may be proposed by the discharger to isolate the pollution and limit migration. A demonstration of effectiveness must be submitted.	Pollution seems to be isolated and migration already limited. Capping, slurry walls, or other engineered methods are not necessary to isolate contaminant migration.	2Q94 Report, MDPS

Table 4-3
Evaluation of Criteria C for Category I Non-Attainment

Criteria C. Dissolved-phase cleanup is not appropriate or cost effective due to limited water quality impacts or human health risks.

RWQCB Guidance for Evaluation of Criteria A	Evaluation of Guidance	Reference
"Do the limited benefits justify the likely cost and time of cleanup." It may be cost effective in some cases to apply short-term dissolved cleanup measures to achieve a significant reduction in maximum residual concentrations.	Soil and groundwater contamination at the site is at low concentrations. Further cleanup of the site will not be cost effective.	2Q94 Report, MDPS
The discharger shall provide qualitative risk and impact information including the type of factors contained in the discussion under the heading Category I.	A qualitative risk assessment has been performed consistence with this guidance.	Part 3.2

Table 4-4
Evaluation of Criteria D for Category I Non-Attainment

Criteria D. An acceptable plan is submitted for containing and managing the remaining human health and environmental risks, if any, posed by residual soil and groundwater pollution. This plan should include as assessment of human health and environmental risks; management measures (e.g. deed notification or restrictions; indemnification agreements; site operation, maintenance, health and safety plans; utility worker notice; etc.) contingency options and a commitment to mitigating measures such as participation in a regional groundwater monitoring or protection program.

RWQCB Guidance for Evaluation of Criteria A	*Evaluation of Guidance*	*Reference*
The plan must contain information on site-specific conditions such as the current and anticipated land and water uses and the type of activity at the site and surrounding area.	This information is addressed in the Site Characterization Summary.	Table 2-1 Figure 2-2
The term "assessment of human health and environmental risks" means a qualitative assessment for most sites.	A qualitative risk assessment has been performed consistence with this guidance.	Part 3.2
The management measures should be selected to match the appropriate site-specific conditions.	Management measures were selected based upon site-specific conditions analyzed within the qualitative risk assessment.	Part 3.2
For areas zoned commercial or industrial with numerous contributing sources, an acceptable plan may consider containing the residual groundwater pollution at the perimeter of the area in accordance with this policy.	Not Applicable to this site.	
Management measures and mitigation for plume areas that cross property boundaries will require a more detailed evaluation by the discharger and shall involve notification and participation by all affected property owners.	Not Applicable to this site.	
The plan will include a compliance monitoring program. Based upon a demonstration of stable or decreasing trends in plume chemical concentration, the Board will review requests to discontinue compliance monitoring after 5 years of data, or less depending upon the site-specific conditions.	A compliance monitoring program is included.	Part 3.6 Table 3-2

5. CONCLUSIONS AND RECOMMENDATIONS

Based upon the evaluation performed in Part 4, the Site 0746 adequately satisfies the requirements to be designated a Category I NAA. Upon acceptance of this NAA application, Unocal would implement the the NAA Management Plan described in Part 3. Beyond fulfilling the activities described in the Management Plan, Unocal requests issuance of a no further action letter [NFA] that would identify no further requirements at the site beyond those identified within the management plan. Unocal further requests that the approval modifications to the current groundwater monitoring program to reflect the water quality objectives and containment monitoring program described on Table 3-1, Table 3-2 respectfully.

6. REFERENCES

"Continuing Ground Water Investigation and Quarterly Report", Kaprealian Engineering Incorporated, September 25, 1992

"Declaration in Support of Arrest and/or Issuance of Warrant of Arrest", Oakland Police Department, June 25, 1993

"Pilot Vapor Extraction Test Report", Kaprealian Engineering Incorporated, May 18, 1993.

"Proposed Next Phase of Work at the Unocal Service Station #0746", Kaprealian Engineering Incorporated, May 16, 1994

"Quarterly Data Report", MPDS Services, Incorporated, June 29, 1994

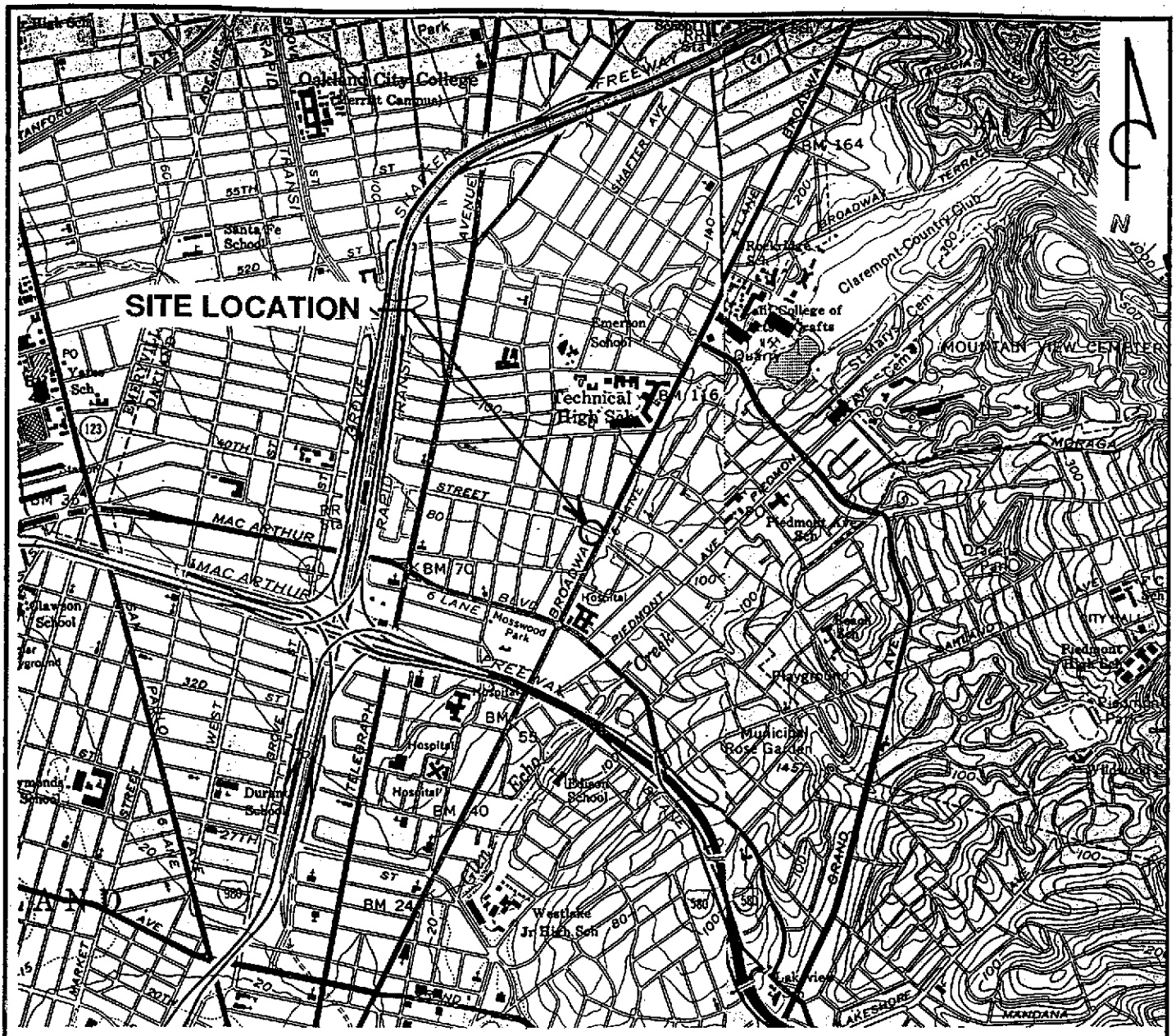
"Quarterly Data Report", Kaprealian Engineering Incorporated, September 24, 1993

"Soil Sampling Report, Kaprealian Engineering Incorporated, August 30, 1989

"Status Report on Environmental Project: Service Station #0746", Unocal, November 18, 1992

"Underground Storage Tank Unauthorized Release (Leak)/Contamination Site Report", August 28, 1989

7. APPENDICES



QUADRANGLE LOCATION

REFERENCES:

USGS 7.5 MIN. TOPOGRAPHIC MAP
TITLED: OAKLAND WEST, CALIFORNIA
DATED: 1959 REVISED: 1980
TITLED: OAKLAND EAST, CALIFORNIA
DATED: 1959 REVISED: 1980

SCALE IN FEET

2000 0 2000

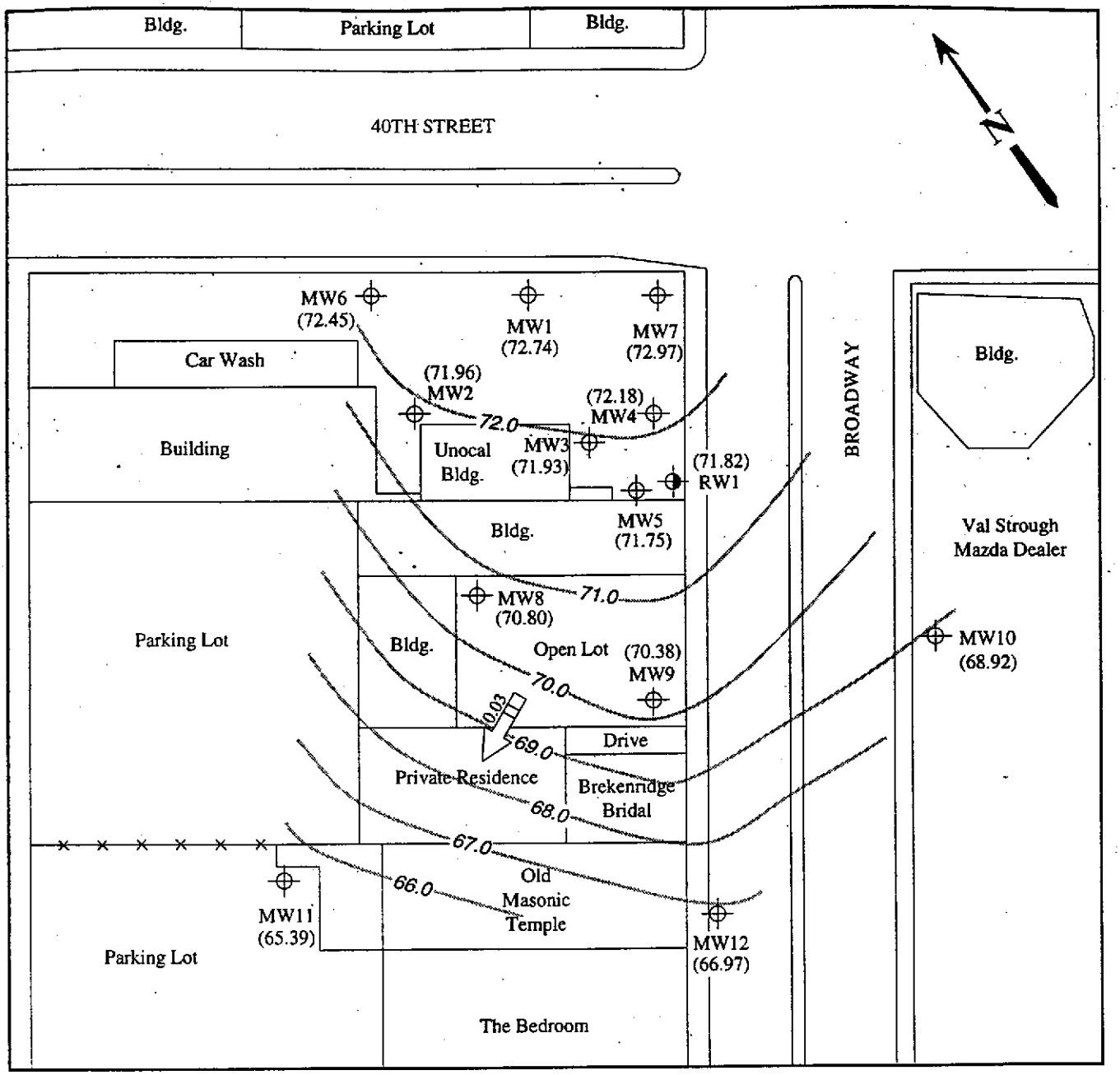
PACIFIC ENVIRONMENTAL GROUP, INC.

UNOCAL SERVICE STATION 0746
3943 Broadway at 40th Street
Oakland, California

SITE LOCATION MAP

FIGURE: 1

PROJECT: 310-086.3A



LEGEND

- Monitoring well
- 6-inch diameter recovery well
- ( ) Ground water elevation in feet above Mean Sea Level
- #.## Direction of ground water flow with approximate hydraulic gradient
- Contours of ground water elevation

0 60 120

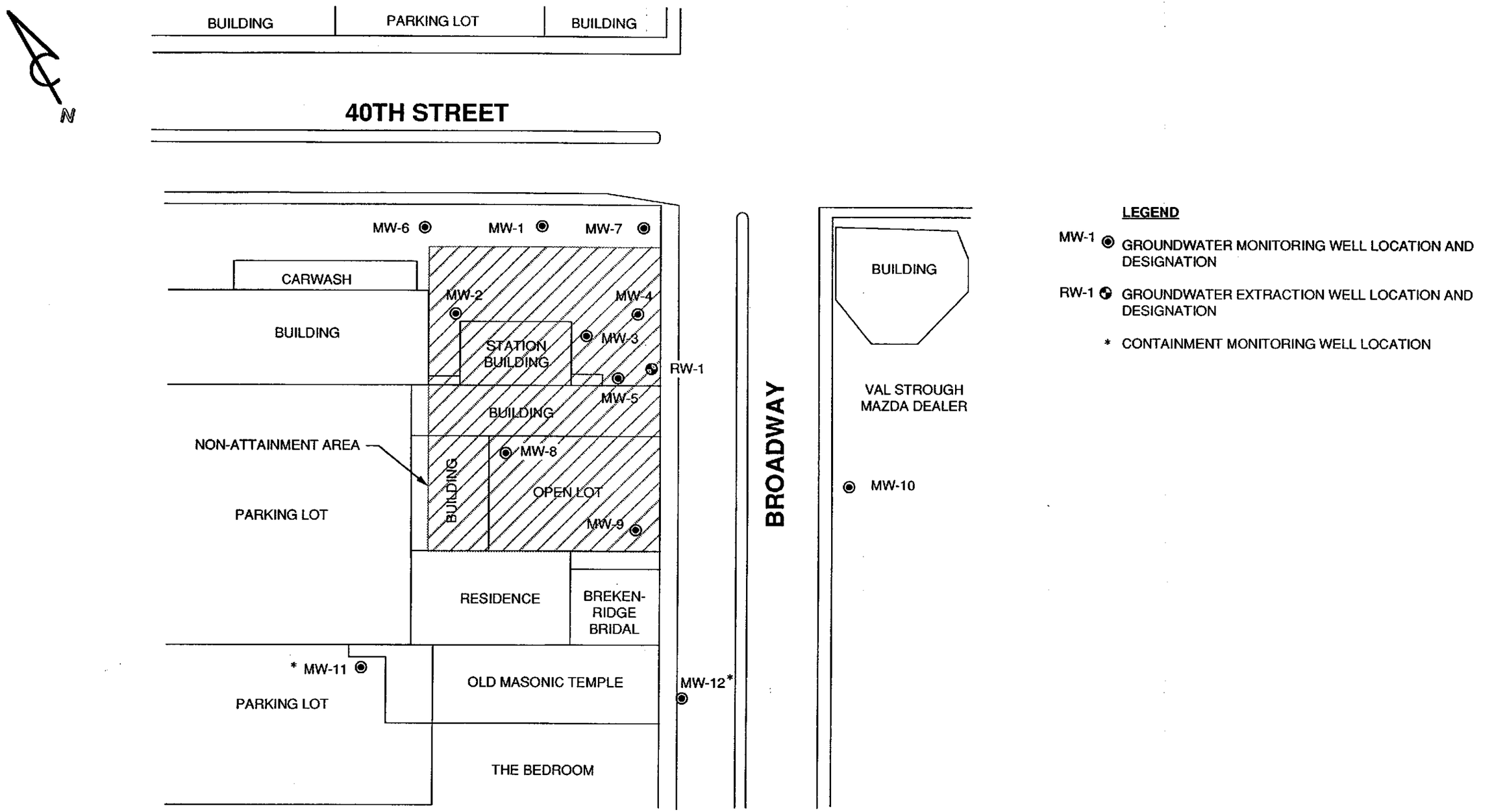
Approx. scale feet

POTENTIOMETRIC SURFACE MAP FOR THE MAY 31, 1994 MONITORING EVENT

mpds SERVICES, INCORPORATED

UNOCAL SERVICE STATION #0746
3943 BROADWAY
OAKLAND, CALIFORNIA

FIGURE
1



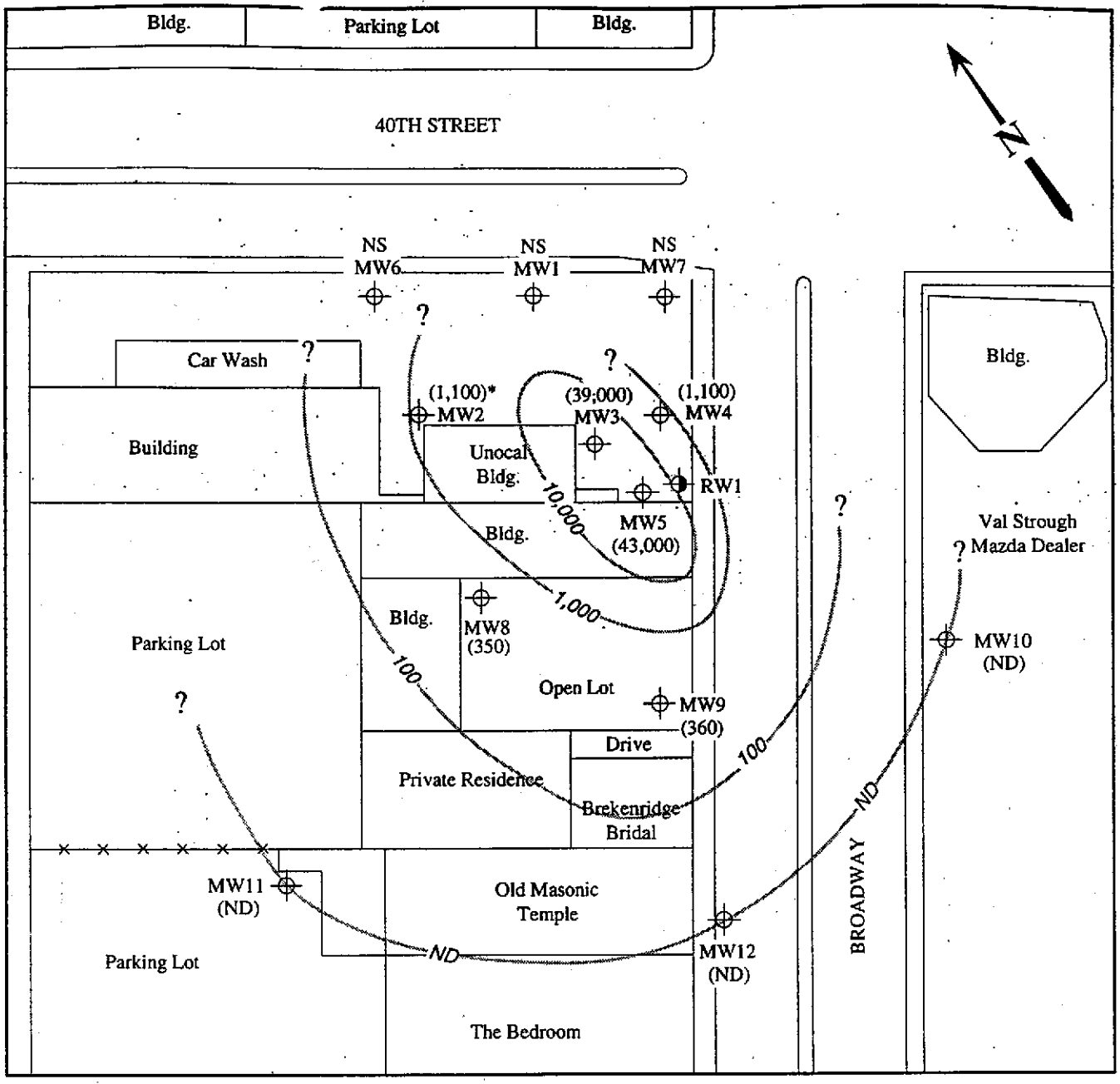
PACIFIC ENVIRONMENTAL GROUP, INC.

SCALE
0 50 100 FEET

UNOCAL SERVICE STATION 0746
3943 Broadway at 40th Street
Oakland, California

SITE MAP

FIGURE:
2
PROJECT:
310-086.3A



LEGEND

- Monitoring well
- 6-inch diameter recovery well
- ( ) Concentration of TPH as gasoline in µg/L
- Approximate iso-concentration contours of TPH as gasoline contamination in ground water in µg/L

ND = Non-detectable, NS = Not sampled

* The lab reported that the hydrocarbons detected do not appear to be gasoline.

0 60 120

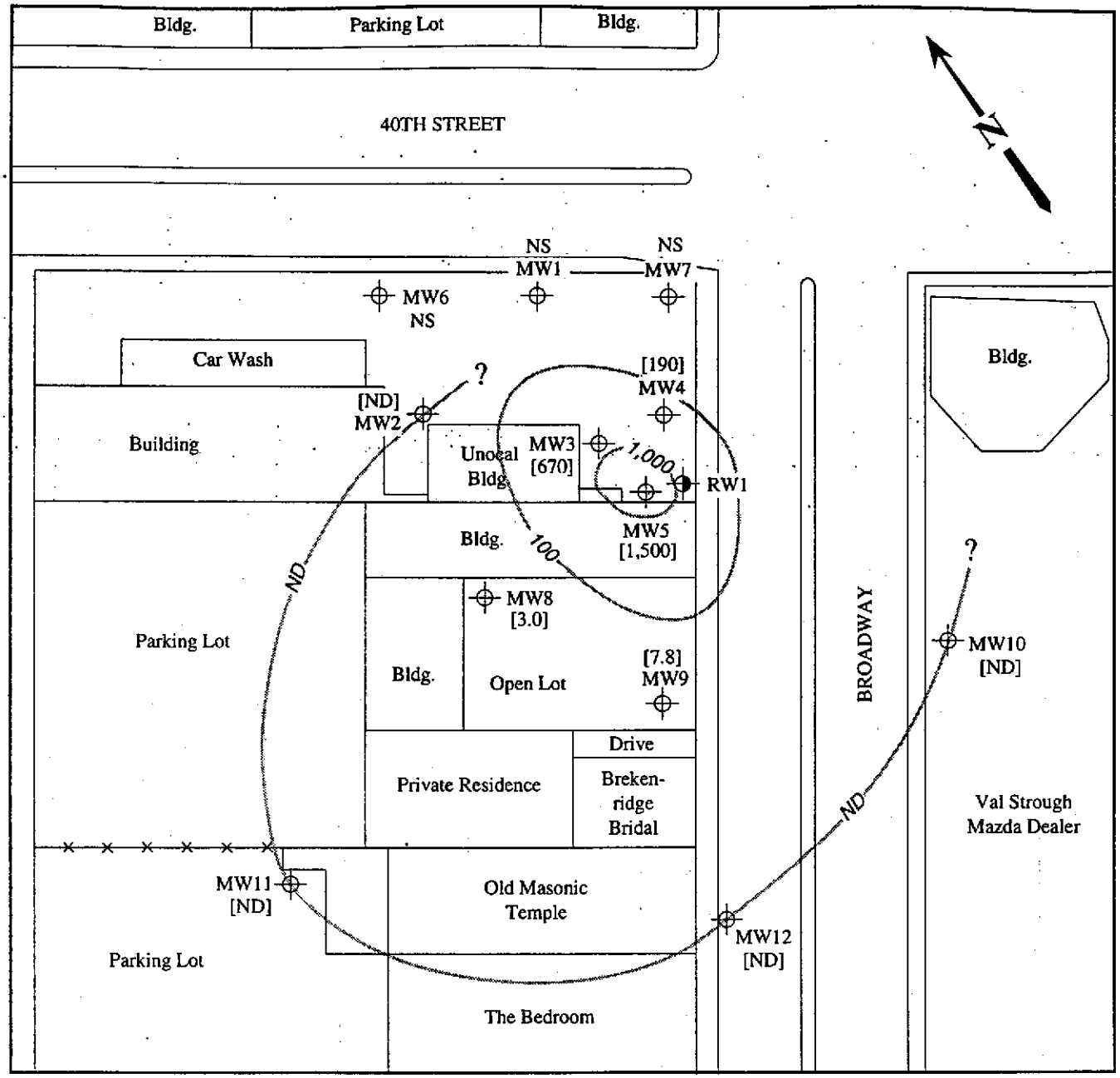
Approx. scale feet

CONCENTRATIONS OF TPH AS GASOLINE IN GROUND WATER ON MAY 31, 1994

mpds SERVICES, INCORPORATED

UNOCAL SERVICE STATION #0746
3943 BROADWAY
OAKLAND, CALIFORNIA

FIGURE
4



LEGEND

- Monitoring well
- 6-inch diameter recovery well
- [ ] Concentration of benzene in µg/L
- Approximate iso-concentration contours of benzene contamination in ground water in µg/L

ND = Non-detectable, NS = Not sampled

0 60 120

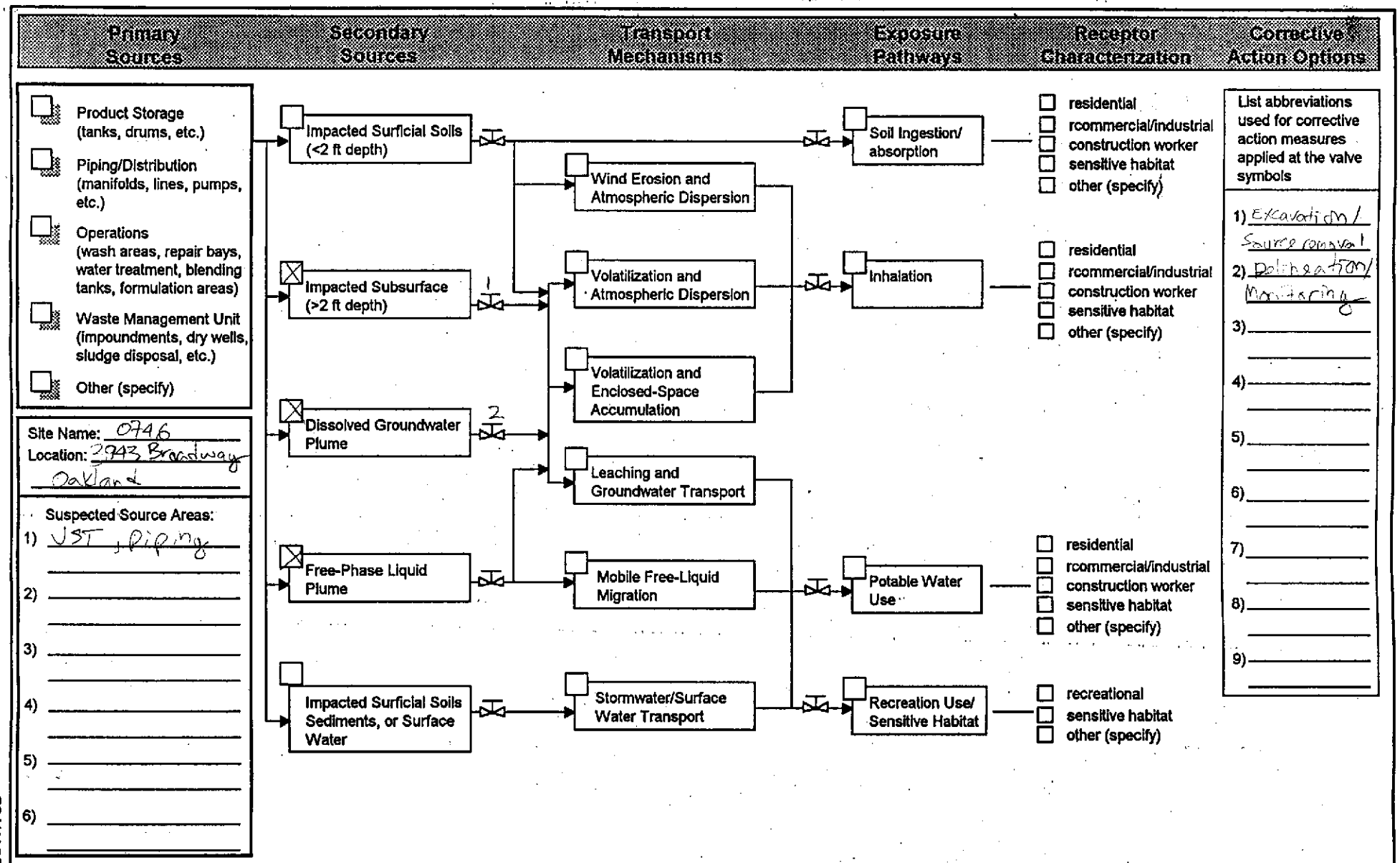
Approx. scale feet

CONCENTRATIONS OF BENZENE IN GROUND WATER ON MAY 31, 1994

MPDS SERVICES, INCORPORATED

UNOCAL SERVICE STATION #0746
3943 BROADWAY
OAKLAND, CALIFORNIA

FIGURE
5



PACIFIC ENVIRONMENTAL GROUP, INC.

UNOCAL
Address
City, State

EVALUATION FLOWCHART

FIGURE: 1
PROJECT: 310-077.9A

h:\project\310077\9A\EVALFLOW.VSD