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SUMMARY OF NON-ATTAINMENT AREA MANAGEMENT PLAN

Site 5484
Castro Valley, California

- **Site 5484:**
  UNOCAL service station located in Castro Valley, California.

- **Primary and Secondary Sources Removed:**
  Seven monitoring wells were installed, the contaminated soil was overexcavated and disposed of properly, and the underground storage tanks (two gasoline tanks and one waste oil tank) were removed and replaced in 1989.

- **Soil and Groundwater Hydrocarbon Concentrations:**
  Soil: The soil concentrations had a maximum concentration of 0.51 ppm benzene, 0.25 ppm toluene, 3.6 ppm xylenes, 1.9 ppm ethylbenzene, 9.1 ppm TPH-d, and 130 ppm TPH-gas following excavation. All of these soil samples were collected in May 1991.

  Groundwater: Groundwater has been and continues to be monitored and sampled quarterly since 1988. The maximum groundwater concentrations for BTEX and TPH are as follows; 980 ppb benzene, 673 ppb toluene, 2,258 ppb xylenes, 990 ppb ethylbenzene, 3,200 TPH-d, and 11,000 ppb TPH-gas. These maximum concentrations were collected in March 1992 for benzene, ethylbenzene, and TPH-d. Toluene was collected in January 1989, July 1988 for xylenes, and September 1991 for TPH-gas.

- **Soil Type & Depth to Water:**
  The site geology consists of silt and/or clay soil to depths of 3 feet below ground surface. This is underlain by bedrock materials, sheared shale. The depth to groundwater is from 5 feet to 8 feet below ground surface. The overall groundwater flow direction is south-southwest. The nearest surface water, an un-named creek, is located approximately 600 yards southwest of the site.

- **Plume Stability & Concentration Trends:**
  The extent of the hydrocarbons in groundwater appears to be centered around monitoring well MW-7. The groundwater flow in the area is to the south-southwest and MW-4 and MW-5 are downgradient from MW-7. Therefore monitoring wells MW-4 and MW-5 indicates the plume concentration's stability. Monitoring

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Well MW-4 has been ND for all constituents since 1992 and monitoring well MW-5 has been ND for all constituents, except TPH-diesel, for four years.

- **Contaminant Pathway Analysis:**
  Human Health: A qualitative risk assessment was performed on Site 5484 to determine if any potential pathways pose a risk to human health. These potential routes can be seen on the enclosed flow chart in Figure 6. There is little potential for humans to contact the plume because no drinking water wells are in the NAA zone and all impacted soil has been removed. Plus the site is capped with asphalt and cement.

  Environment: A qualitative risk assessment was performed on Site 5484 to determine if any potential pathways pose a risk to the environment. The potential routes can be seen in Figure 6. There is little risk to the environment due to limited interaction of wildlife with the NAA zone and since the impacted soil has been removed and the site is capped. Also no surface water is located within the proposed NAA.

- **Nearby Beneficial Uses:**
  The nearest surface water is an un-named creek, located 600 yards southwest from site. No known water supply wells are within the proposed NAA.

- **Compliance Monitoring Plan:**
  In order to be certain that the groundwater plume is not migrating, a compliance monitoring program will be implemented. This program will reveal if water quality objectives for the previously listed contaminants are being achieved. Monitoring wells located near or downgradient from the groundwater plume (MW-4, MW-5, and MW-7) will be monitored and sampled annually for three years, while the other monitoring wells will be dropped from the program.

- **Contingency Plan:**
  A contingency plan has been established in the event that contaminant levels are found to be increasing through the compliance monitoring system of sampling and analysis. The contingency plan response will be proportional to the increase in contaminant concentration.

- **Description of the Non-Attainment Area:**
  The eastern boundary of the NAA is the site property boundary. Monitoring wells MW-4 and MW-5 are the southern and western boundaries of the proposed NAA. The NAA is defined in Figure 5.

- **Water Quality Goals for the Containment Monitoring Locations:**
  The water quality goals for the NAA are as follows:
  BTEX - Non Detectable Levels
  TPH as gasoline - 100 ppb
  TPH as diesel - 100 ppb
  Napthalene - Non Detectable Levels
  MTBE - Non Detectable Levels
  2-methylnapthalene - Non Detectable Levels

- **Dissolved-Phase Cleanup is Not Appropriate or Cost Effective:**
  Contaminants' concentrations are declining naturally over time, thus it is not cost effective to perform active remediation processes.

Site 5484 proposes to meet the requirements for a Category 1 Non-Attainment Area, using RWQCB guidance. With this evaluation of past, present, and future actions at Site 5484, it is clear that this Non-Attainment Management Plan satisfies all the requirements designated by the Category 1 NAA and should be granted.

NON-ATTAINMENT AREA MANAGEMENT PLAN

SITE 5484
CASTRO VALLEY, CALIFORNIA

PREPARED FOR
UNOCAL

SEPTEMBER 20, 1995

PREPARED BY

PACIFIC ENVIRONMENTAL GROUP, INC.
2025 GATEWAY PLACE, SUITE 440
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PROJECT 310-090.3A

PACIFIC
ENVIRONMENTAL
GROUP, INC.

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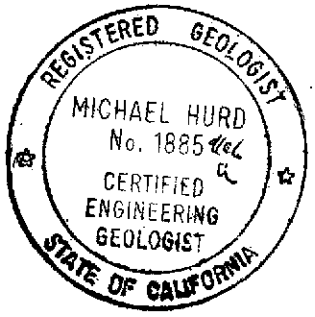
NON-ATTAINMENT AREA MANAGEMENT PLAN
SITE 5484
CASTRO VALLEY, CALIFORNIA

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 of the 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 Certified Engineer Geologist whose seal and signature appears hereon.

Michael Hurd
Senior Geologist
CEG 1885



1.0 INTRODUCTION

Unocal is submitting this Non-Attainment Area (NAA) Plan for implementation at Site 5484. The plan provides for management and containment of the remaining human health and environmental risks at the referenced facility. Upon acceptance and completion of the management plan by the RWQCB and the LOP, Unocal requests the issuance of a No Further Action letter (NFA) that would confirm 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 or 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:

- PART 1 as introduction.
- PART 2 is a summary of the site characterization data presented in tables and figures.
- PART 3 identifies the NAA, containment monitoring locations, risk management measures to protect human health and the environment, the compliance monitoring program, and incorporates a qualitative risk assessment of the NAA.
- PART 4 is an evaluation of the NAA plan to demonstrate the completeness of the site characterization and NAA measures for the protection of human health and the environment.
- PART 5 offers recommendations and conclusions for the site as a NAA.

The document is completed with references and appendices.

2.0 SITE CHARACTERIZATION DATA

This part of the NAA Plan for Site 5484 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 a NAA at this site. The site characterization data has been summarized in a pre-formatted table consistent with the guidelines given in ASTM ES 38. Where appropriate, appendices have been incorporated.

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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
  Analytical Summary Sheets

Table 2-1
Site Description

Site 5484
Castro Valley, California

Information Requirement	Discussion	Reference
Site Address	18950 Lake Chabot Road Castro Valley, California	MPDS 7/05/94
Site Owner/Contact	Unocal Corporation, Tina Berry (510)277-2321	MPDS 7/05/94
Agency Contacts	Alameda County Health Care Services Scott Seery	MPDS 7/05/94
Local Land Use	Residential / Commercial/Governmental	AGS 6/14/88
Topography	Located on the east side of a slightly to moderately sloping valley	AGS 6/14/88
Surface Water Characterization	Creek 600 yards southwest of site	KEI 1/09/91

Table 2-2
Site Ownership & Activity Record

Site 5484
Castro Valley, California

Information Requirement	Discussion	Reference
Materials Handling Activities	Two underground storage tanks on site for unleaded gasoline. Leaded gasoline used to be dispensed from these tanks	KEI 1/09/91 Unocal 8/31/89
Waste Disposal Practices	One underground waste oil tank	KEI 1/09/91
Site Ownership/Active?	Unocal / Active	MPDS 7/05/94
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.)	Leaded gasoline leaking from tanks for approximately 6 years. Groundwater and soil impacted. An estimated 2,195 gallons of unleaded gasoline were also released. → where did it all go?	Unocal 8/28/89 Unocal 8/31/89
Potential Off-Site Sources	NA	

Table 2-3
Summary of Current & Completed Site Activities

Site 5484
Castro Valley, California

Corrective Action Activities	Description	Reference
Underground tanks removed	Two gasoline tanks and one waste oil tank removed in June 1989. Condition of tanks not noted.	KEI 1/09/91
Overexcavation Performed	Approximately 2,000 cubic yards was excavated in the area of the former tanks. Overexcavation completed in August 1989.	KEI 3Q92
New tanks installed	Two new 12,000 gallon tanks and one 520 gallon tank were installed in June 1989.	KEI 1/09/91
Monitoring wells installed on site.	MW-1, MW-2, and MW-3 in July 1988 MW-4, MW-5, and MW-6 in June 1989 MW-7 in May 1991 Wells MW-1 and MW-3 were destroyed during tank removal and replacement.	KEI 1/09/91 2/07/92 AGS 11/21/90
Monitoring and sampling of wells.	Most wells are monitored and sampled quarterly except for MW-6 which is sampled and monitored bi-annually	MPDS 6/01/95

Table 2-4
Hydrogeologic Conditions

Site 5484
Castro Valley, California

Information Requirement	Discussion	Reference
Regional Geologic Framework through depth of principal aquifer and any other potentially impacted units	Underlain by Quaternary alluvium. However the site is situated closely adjacent to a geologic contact separating the alluvium materials from bedrock materials of the Upper Cretaceous marine Panoche formation. The site is also 1600 feet northeast of the East Chabot Fault and 1.2 miles from the active Hayward Fault.	KEI 2/07/92
Site Geologic Framework Through Depth Of Principal Aquifer And Any Other Potentially Impacted Units	Site is underlain by silt and/or clay soil to depths of about 3 feet below ground surface. These are underlain by bedrock materials that consist of sheared shale which is highly to moderately weathered.	KEI 2/07/92
Unsaturated Zone Thickness And Geology	Approximately 4-8 feet in thickness	
Depth To Groundwater	Approximately 4.65 feet to 7.92 feet below grade.	MPDS 6/01/95
Thickness Of Aquifer	Unknown	
Flow Direction And Gradient	South-Southwest Gradient approximately 0.077 ft./ft. to 0.131 ft./ft.	KEI 4/27/92
Description Of Any Confining Units	None Known	
Current Groundwater Quality (TDS)	Unknown	

Table 2-5
Analytic Summary Sheets

Site 5484
Castro Valley, California

Information Requirement	Media Soil/ Groundwater	Compounds Detected					
		Benzene	Toluene	Xylenes	Ethylbenzene	TPH-gas TPH-diesel	Other
Analytic Method Used	Soil	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8015	
	Groundwater	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 8015	Semi-vol org EPA 8270, Halogenated Vol Org EPA 8010 TOG 413.2
Practical Quantification Limit	Soil (ppm)	.05	.05	.05	.05	2.0	
	Groundwater (ppb)	.05	.05	.05	.05	.50	SVO 2.0 HVO 1.0 TOG 5.0
Number of Samples Analyzed	Soil	49	49	49	49	49	
	Groundwater	111	111	111	111	111	TOG = 6 EPA 8010 = 18 MTBE = 6

Table 2-5 (cont.)
Analytic Summary Sheets

Site 5484
Castro Valley, California

Information Requirement	Media Soil/ Groundwater	Compounds Detected					
		Benzene	Toluene	Xylenes	Ethylbenzene	TPH-gas TPH-diesel	Other
Summary of analytic data	**Soil: Max** Residual: ppm date & depth location	.51 5/91 MW-7	.25 5/91 MW-7 13'	3.6 5/91 EB1 6.5'	1.9 5/91 MW-7 13'	**TPH-g=130** 5/91 MW-7 13' TPH-d=9.1 5/91 MW-7 13'	
	Groundwater Max ppb date & location	980 3/92 MW-7	673 1/89 MW-2	2258 7/88 MW-3	990 3/92 MW-7	TPH-g=11000 9/91 MW-7 TPH-d=3200 3/92 MW-7	Napthalene=130 MW-7 3/94 Bis(2-ethylhexyl) phthalate=13 MW-7 6/93 2Methylnaptha-lene=34 MW-7 3/94 1,2 Dichloro ethane=3.4 MW-7 5/91
	Groundwater Max as of 6/95 ppb	170 MW-7	0.78 MW-4	430 MW-7	400 MW-7	TPH-g=3900 MW-7 TPH-d=1600 MW-7	Napth.=83 Bis=ND 2Methyl=13 1,2 Dicloro=1.4
	Groundwater Minimum as of 6/95 ppb	ND	ND	ND	ND	TPH-g=ND TPH-d=57	ND

Table 2-5 (cont.)
Analytic Summary Sheets

Site 5484
Castro Valley, California

Information Requirement	Media Soil/ Groundwater	Compounds Detected					
		Benzene	Toluene	Xylenes	Ethylbenzene	TPH-gas TPH-diesel	Other
Background Concentrations	Groundwater ppb	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Trend	Groundwater	Stable	Stable	Stable	Stable	Stable	Decreasing

3.0 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 plan. The section begins with a description of a 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 concerns. This section is constructed consistent with the guidelines within Criteria D for Category 1 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 soil and saturated groundwater region.

For Site 5484, the eastern boundary of the NAA coincides with the site property boundary. The southern boundary of the NAA is marked by monitoring wells MW-4 and MW-5. The NAA is represented on Figure 5.

The containment monitoring points for Site 5484 are the existing monitoring wells MW-4 and MW-5. The containment monitoring wells are shown on Figure 5.

3.2 Assessment of Human Health and Environmental Risks

The goal of the risk assessment process is to qualitatively assess the current and potential human health and environmental impacts of the proposed NAA for Site 5484. The intent is to identify obvious environmental impacts, potentially affected sensitive receptors (schools, homes, waterbodies, etc.), and any significant exposure pathways (drinking water wells, recreational use of streams, vapor transport, etc.). Given that this risk assessment is submitted in conjunction with the NAA plan that manages groundwater quality, the potential exposure pathway of constituents within the groundwater deserves special management. The purpose of the qualitative risk assessment is to consider the risks posed by other potential exposure pathways, such as volatilization.

The qualitative risk assessment was accomplished in several steps. The contaminants addressed in the risk assessment were identified, then a site specific exposure pathway was

analyzed for each chemical. The intent of the pathway assessment was to determine whether other pathways, aside from groundwater, could pose a human health or environmental risk that would require management. The pathway analysis was performed consistent with ASTM Emergency Standard ES 38, *Guide for Risk-Based Corrective Action at Petroleum Release Sites.*

To manage the risks associated with a NAA, groundwater cleanup levels were determined for application at the containment monitoring location. The groundwater cleanup levels conformed with the methodology prescribed by ASTM ES 38 and the San Francisco Bay Groundwater Amendment to the Water Quality Control Plan.

3.2.1 Selection of Constituents of Concern

The constituents of concern for NAA Site 5484 are TPH-gas, Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX), 1,2, dichloroethane, napthalene, and 2-methylnapthalene. All of these constituents have been monitored and analyzed since 1988 and are currently found in detectable levels in monitoring wells MW-2, MW-5, and MW-7.

3.2.2 Risk Assessment: Exposure Pathway Analysis

Contamination at NAA Site 5484 has three possible source areas: (1) the former underground gasoline storage tanks, (2) the fuel lines and pump islands, and (3) the waste oil tank. Within these areas, contamination may have occurred during failure of either product and/or waste storage piping or overfilling of tanks. The impacted soil should not be a significant pathway however, because it has been overexcavated and disposed of properly. The groundwater plume has been monitored and sampled as was necessary, and there appears to be little groundwater transport and/or leaching occurring. No drinking water or irrigation wells are located within the proposed NAA. Also, inhalation is not a significant pathway since the site is capped with cement and asphalt.

3.2.3 Water Quality Objectives for Containment Monitoring Locations

Water quality objectives for NAA Site 5484 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 non detectable for BTEX, 1,2 dichloroethane, napthalene, 2-methylnapthalene, MTBE, and 100 ppb for TPH-gas and TPH-diesel.

3.3 Management Measures for the NAA

- Property transaction disclosure
- Indemnification Agreements
- Site Operation, Maintenance, Health and Safety Plans

- Utility Worker Notification

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 to participate in a regional program because the program requirements have not yet been defined.

3.5 Compliance Monitoring Program

The intent of the compliance monitoring program is to demonstrate that water quality objectives are being achieved at the containment monitoring points. A monitoring program is presented in Table 3-2 and identifies the monitoring frequency and analytic parameters for the containment monitoring points. The containment monitoring locations will be monitoring wells MW-4 and MW-5. Monitoring wells MW-4, MW-5, and MW-7 will be monitored and sampled annually for three years. The other wells will be dropped from the monitoring program. The reports would include a table and summary of the analytical data.

3.6 Contingency Plan

Contingency plan activities would be invoked in the event that the water quality objectives were exceeded at the compliance monitoring location. If an increase in hydrocarbon concentrations is observed within the compliance monitoring program, the corresponding monitoring well would be sampled again. If the event was validated, then the RWQCB and the LOP would be notified of the increase. The response to the increase would be proportional to the amount. For example, if separate-phase hydrocarbons were discovered, a bailing program would be immediately initiated. Conversely, if the measured groundwater hydrocarbon concentration is slightly above the water quality objective, increased frequency of groundwater monitoring could be recommended.

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

Table 3-1
Groundwater Quality Goals for Containment Monitoring

Site 5484
Castro Valley, California

Constituent	Numerical Limitation (µg/L)	Reference
BTEX	ND	Res 68-16
Napthalene	ND	
MTBE	ND	
2-methylnapthalene	ND	
Total Petroleum Hydrocarbons as Diesel	100	
Total Petroleum Hydrocarbons as Gas	100	

- MTBE: Methyl Tert Butyl Ether
- BTEX: Benzene, Toluene, Ethylbenzene, and Xylenes

Table 3-2
Compliance Monitoring Program

Site 5484
Castro Valley, California

Monitoring Well Designation	Monitoring Frequency	Analytic Parameters (See Notes)	Comment
MW-4, MW-5, & MW-7	Annually for 3 years	BTEX, TPH-g, MTBE, and EPA 8010 and 8270	

Reference to Analytic Parameters:

- BTEX: Benzene, Toluene, Ethylbenzene, and Xylenes
- TPH-Gas: Total Petroleum Hydrocarbons as Gasoline
- EPA 8010: Halogenated Volatile Organics
- EPA 8270 Semi-Volatile Organics

4.0 EVALUATION AS A CATEGORY 1 NON-ATTAINMENT AREA

RWQCB guidance is applied in this section to demonstrate the adequacy of the site characterization work and the completeness of the NAA Management Plan. The qualifying criteria for a Category 1 NAA appear in the Groundwater Basin Plan Amendment and the RWQCB Staff Guidelines. The Basin Plan Amendment provides both general requirements and specific criteria.

4.1 General Category 1 NAA Requirements

Within the introductory discussion for Category 1 NAA, two general conditions are established for consideration as a NAA. These general conditions are reiterated and the consistency of the site conditions at Site 5484 to these requirement 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 professionals.
- *Lateral and Vertical Definition of Soil and Groundwater Pollution Have Been Adequately Defined:* A review of existing soil and groundwater analytical data indicates that the soil and groundwater have been adequately defined.

4.2 Specific Category 1 NAA Criteria

Four specific criteria must be adequately addressed for RWQCB consideration of Site 5484 as a NAA. 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. PACIFIC has evaluated the conditions at Site 5484 applying the staff guidelines. The summary of the evaluation is provided in the subsequent text and tables.

- *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 appraisal is presented 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 appraisal is presented within Table 4-2.

- *Criteria : 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 5484 has been evaluated consistent with the RWQCB guidance, and has been found to not be cost effective. This appraisal is presented 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 an 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 presented in Part 3 of this document has been written to specifically satisfy these guidelines and requirements. This appraisal is presented 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.	The pollution plume has been shown to be stable.	Figure 5 Table 2-5
No significant potential horizontal migration pathways exist.	NA	
The pollution plume shall be of limited horizontal extent [generally less than 500 feet] and limited to the upper water-bearing zones.	The horizontal extent of the pollution plume is approximately 120 feet.	Figure 5
No significant vertical conduits shall exist within the plume area or the area between the plume and the compliance points.	NA	

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.	No separate-phase hydrocarbons since January 1989.	KEI 4/27/92
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.	Overexcavation was done to minimize continued leaching to groundwater.	KEI 3Q92
For deeper groundwater conditions, hot spot or highly polluted soil removal or treatment shall be accomplished to the maximum extent feasible.	NA	
Vapor extraction and air sparging technology should be considered for source removal, as an alternative to soil removal, where soil conditions are appropriate.	NA	
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.		

RWQCB Guidance for Evaluation of Criteria A	Evaluation of Guidance	Reference
Unsaturated zone pollutant removal or treatment must also be to a level that adequately protects public health.	Overexcavation performed to remove impacted soils.	KEI 3Q92
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.	NA	

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.	The limited benefits and low concentrations do not justify the cost and time of cleanup.	
The discharger shall provide qualitative risk and impact information including the type of factors contained in the discussion under the heading Category 1.	A qualitative risk assessment is provided.	Table 3-2 Figure 6

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
The term "assessment of human health and environmental risks" means a qualitative assessment for most sites.	A qualitative risk assessment has been performed consistent with this guidance.	Part 3.2. Figure 6
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 Figure 6
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.	NA	

RWQCB Guidance for Evaluation of Criteria A	*Evaluation of Guidance*	*Reference*
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.	NA	
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 3.5 Table 3-2

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon the evaluation performed in Part 4, Site 5484 adequately satisfies the requirements to be designated a Category 1 NAA. Upon acceptance of this NAA application, Unocal would implement the NAA Management Plan described in Part 3. Beyond fulfilling the activities described in the management plan, Unocal requests the issuance of a No Further Action letter that would confirm 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 reflect the water quality objectives and containment monitoring program described on Tables 3-1 and 3-2.

6.0 REFERENCES

Applied GeoSystems. *Work Plan Subsurface Environmental Investigation.* June 14, 1988.

Applied GeoSystems. *Letter Report Ground Water Monitoring for Third Quarter 1990.* November 21, 1990.

Kaprealian Engineering, Inc. *Quarterly Report.* February 7, 1992.

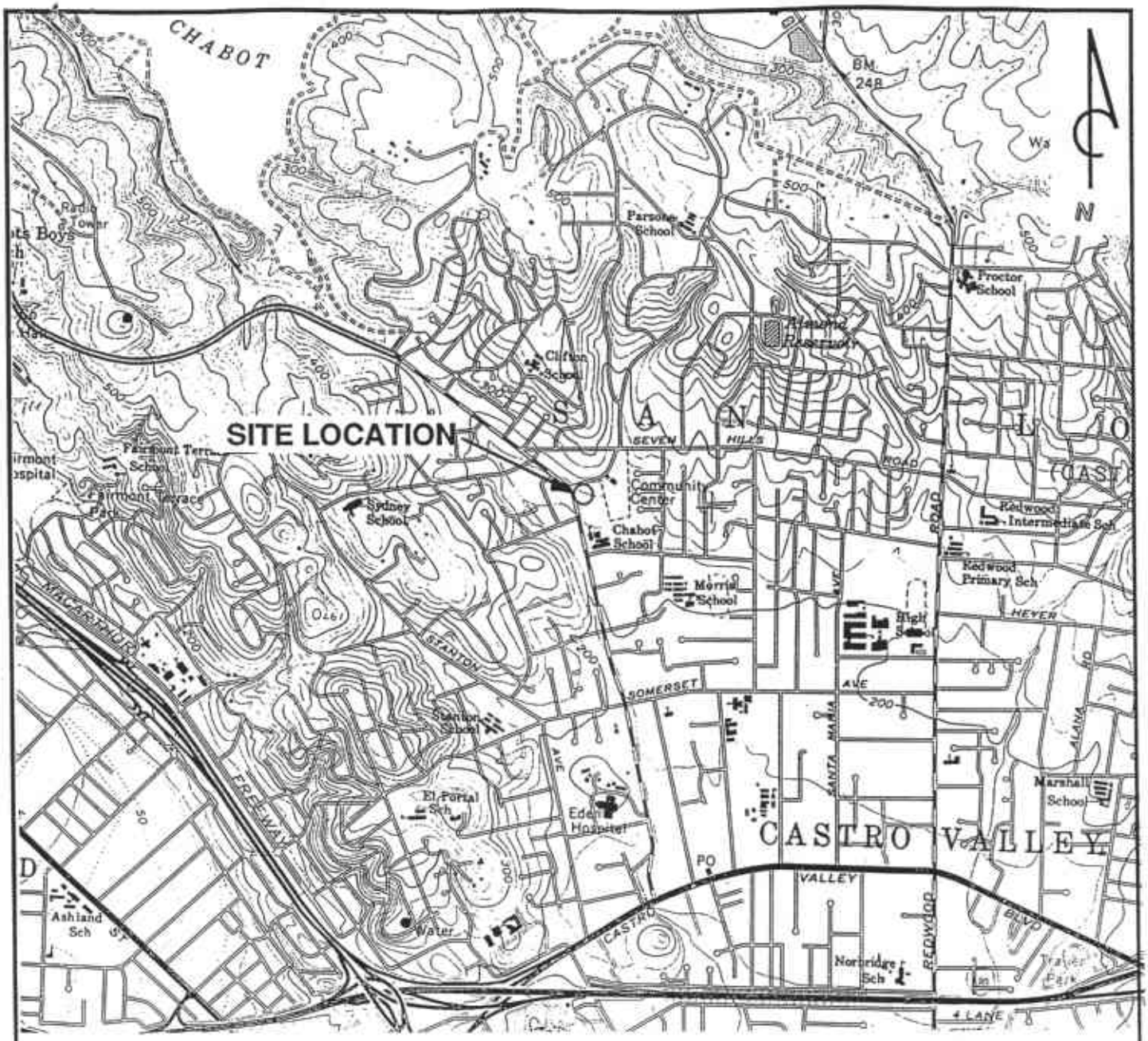
Kaprealian Engineering, Inc. *Quarterly Report.* April 27, 1992.

Kaprealian Engineering, Inc. *Quarterly Summary Report.* Third Quarter 1992.

Kaprealian Engineering, Inc. *Work Plan / Proposal.* January 9, 1991.

MPDS, Inc. *Quarterly Data Report.* July 5, 1994.

Unocal Memorandum. M.J. Fischer. August 31, 1989.



QUADRANGLE LOCATION

REFERENCES:
USGS 7.5 MIN. TOPOGRAPHIC MAP
TITLED: HAYWARD, CALIFORNIA
DATED: 1959 REVISED: 1980

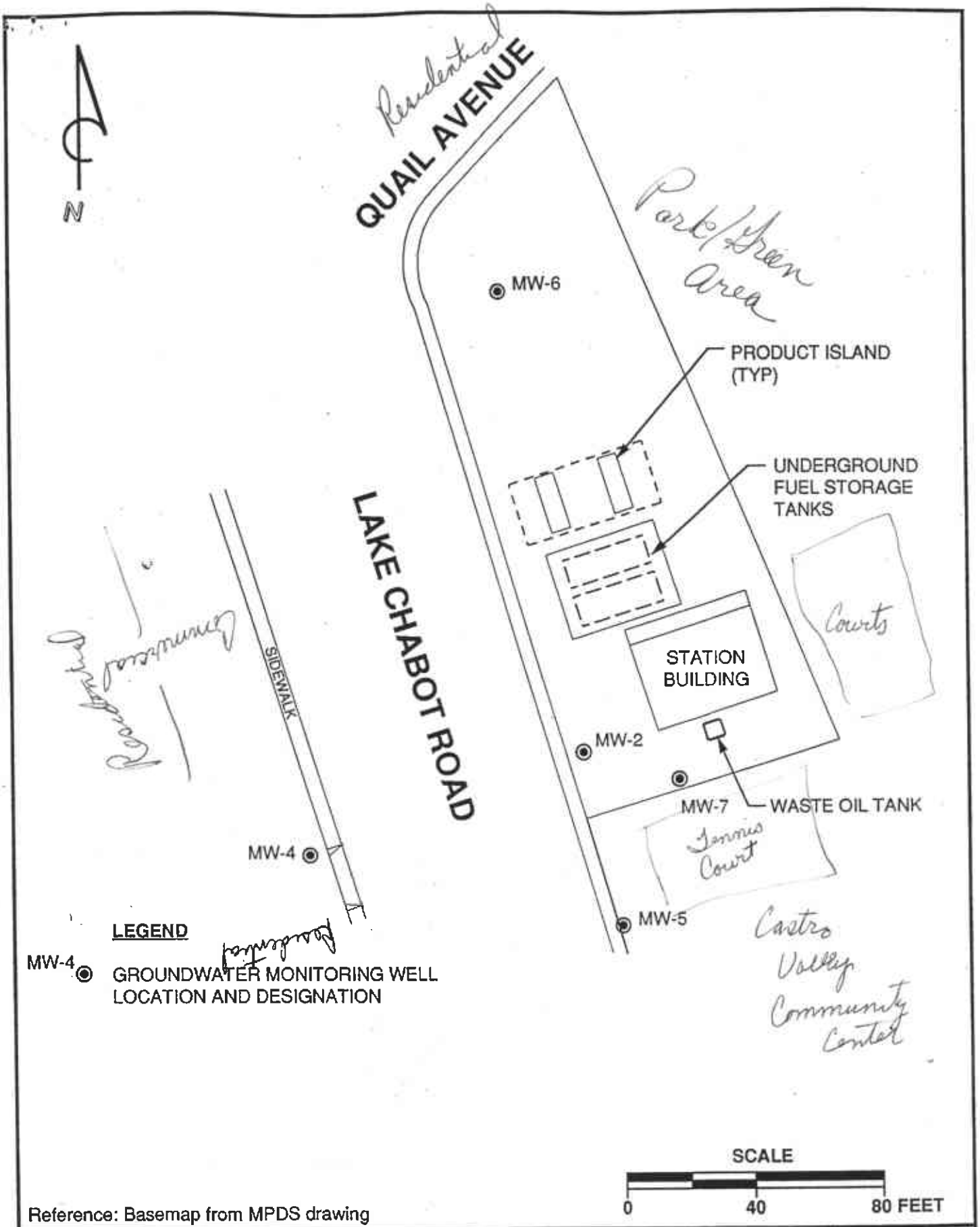
SCALE IN FEET
2000 0 2000

PACIFIC ENVIRONMENTAL GROUP, INC.

UNOCAL SERVICE STATION 5484
18950 Lake Chabot Road at Quail Avenue
Castro Valley, California

SITE LOCATION MAP

FIGURE: 1
PROJECT: 310-090.3A



Reference: Basemap from MPDS drawing

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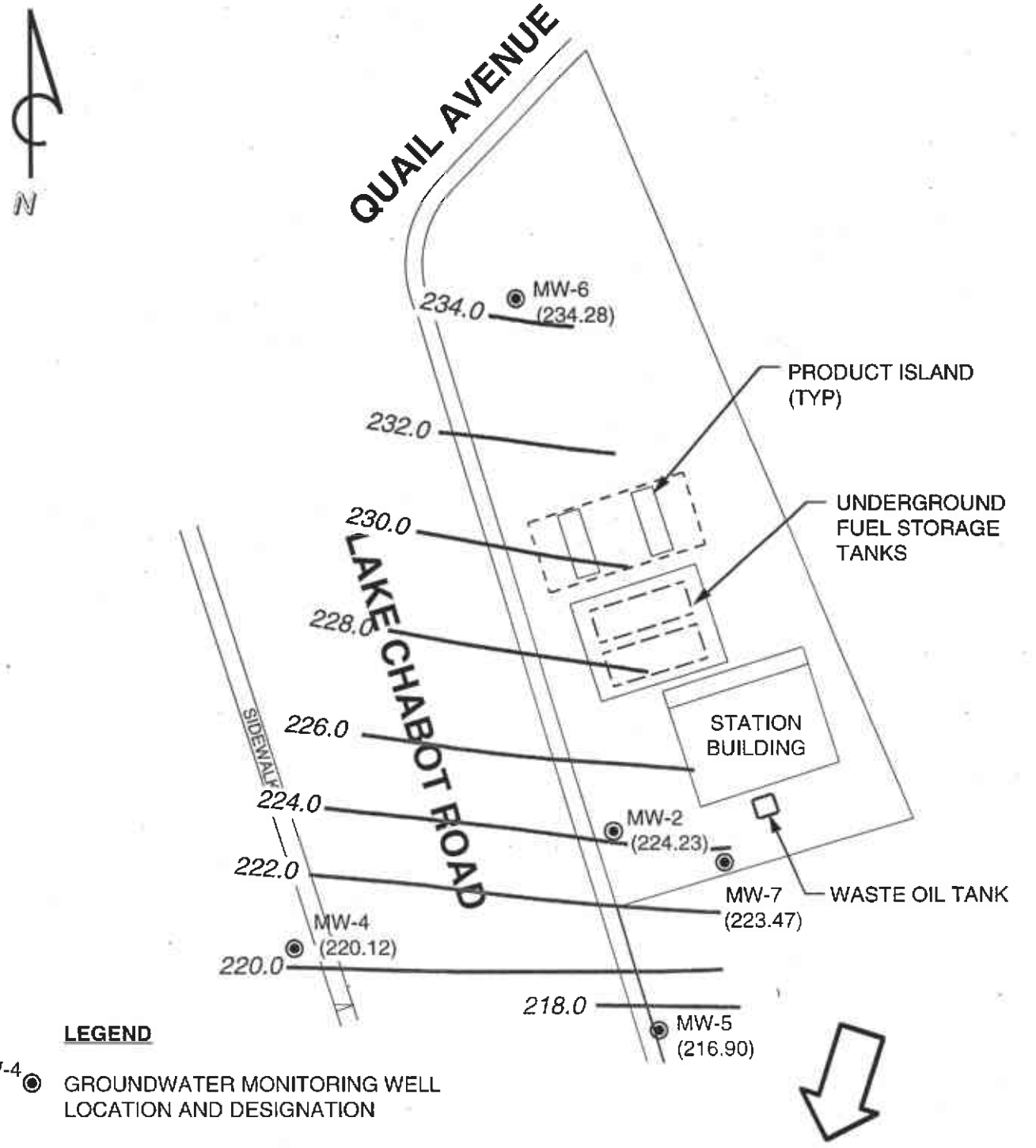
SITE MAP

FIGURE: **2**

PROJECT: 310-090.3A



LEGEND

MW-4 ◉ GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION

(220.12) GROUNDWATER ELEVATION IN FEET - MSL, 6-1-95

220.0 — GROUNDWATER ELEVATION CONTOUR IN FEET - MSL, 6-1-95

APPROXIMATE DIRECTION OF GROUNDWATER FLOW

APPROXIMATE GRADIENT = 0.08

SCALE

0 40 80 FEET

Reference: Basemap from MPDS drawing

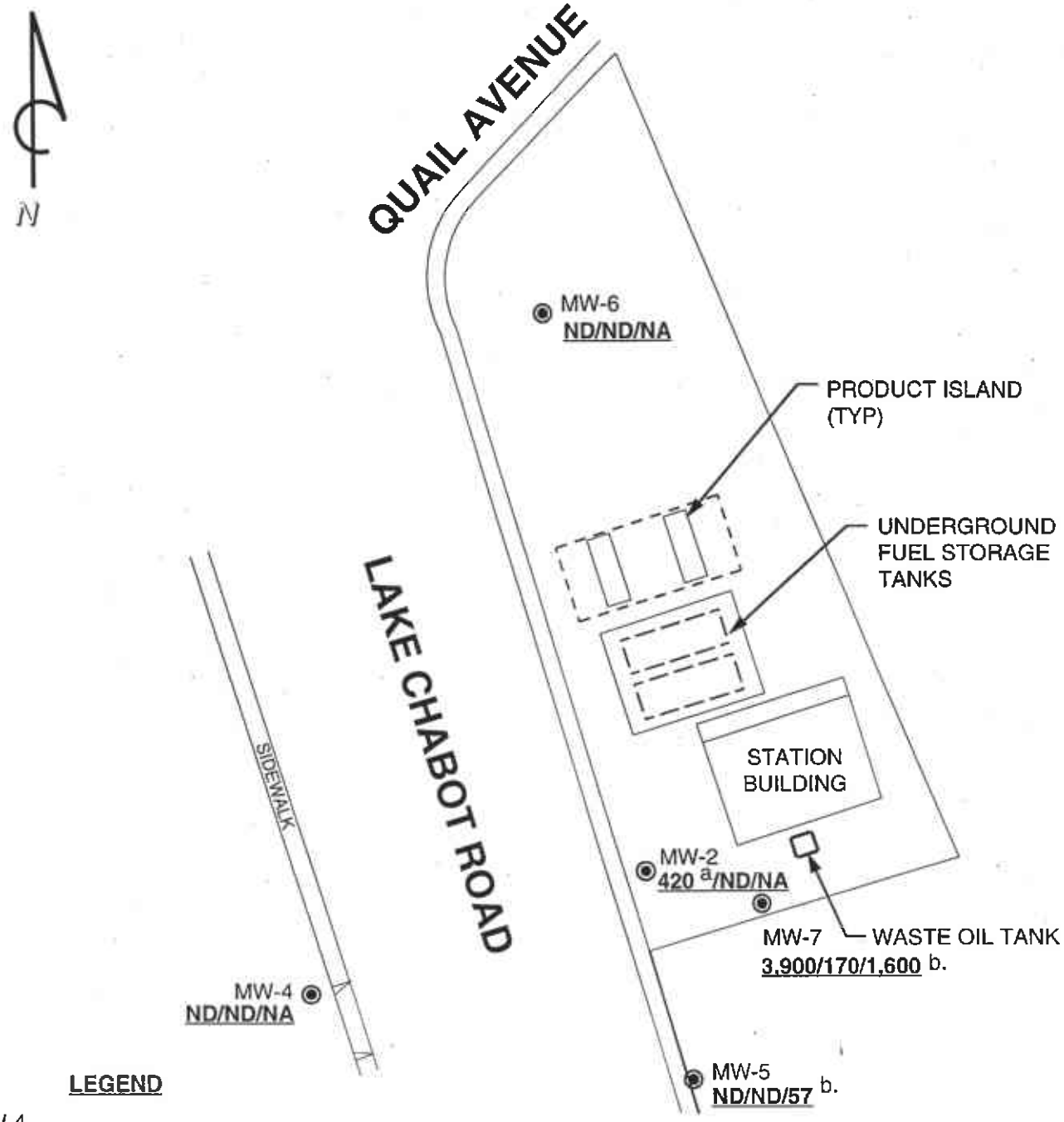
PACIFIC ENVIRONMENTAL GROUP, INC.

UNOCAL SERVICE STATION 5484
18950 Lake Chabot Road at Quail Avenue
Castro Valley, California

GROUNDWATER ELEVATION CONTOUR MAP

FIGURE: **3**

PROJECT: 310-090.3A



LEGEND

MW-4 ◉ GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION

ND/ND/57 b. TPH-g/BENZENE/TPH-d CONCENTRATION IN GROUNDWATER, IN PARTS PER BILLION, 6-1-95

ND NOT DETECTED

NA NOT ANALYZED

a. LABORATORY REPORTED THAT THE HYDROCARBON DETECTED DOES NOT APPEAR TO BE GASOLINE.

b. LABORATORY REPORTED THAT THE HYDROCARBON DETECTED DOES NOT APPEAR TO BE DIESEL.

SCALE

0 40 80 FEET

Reference: Basemap from MPDS drawing

PACIFIC ENVIRONMENTAL GROUP, INC.

UNOCAL SERVICE STATION 5484
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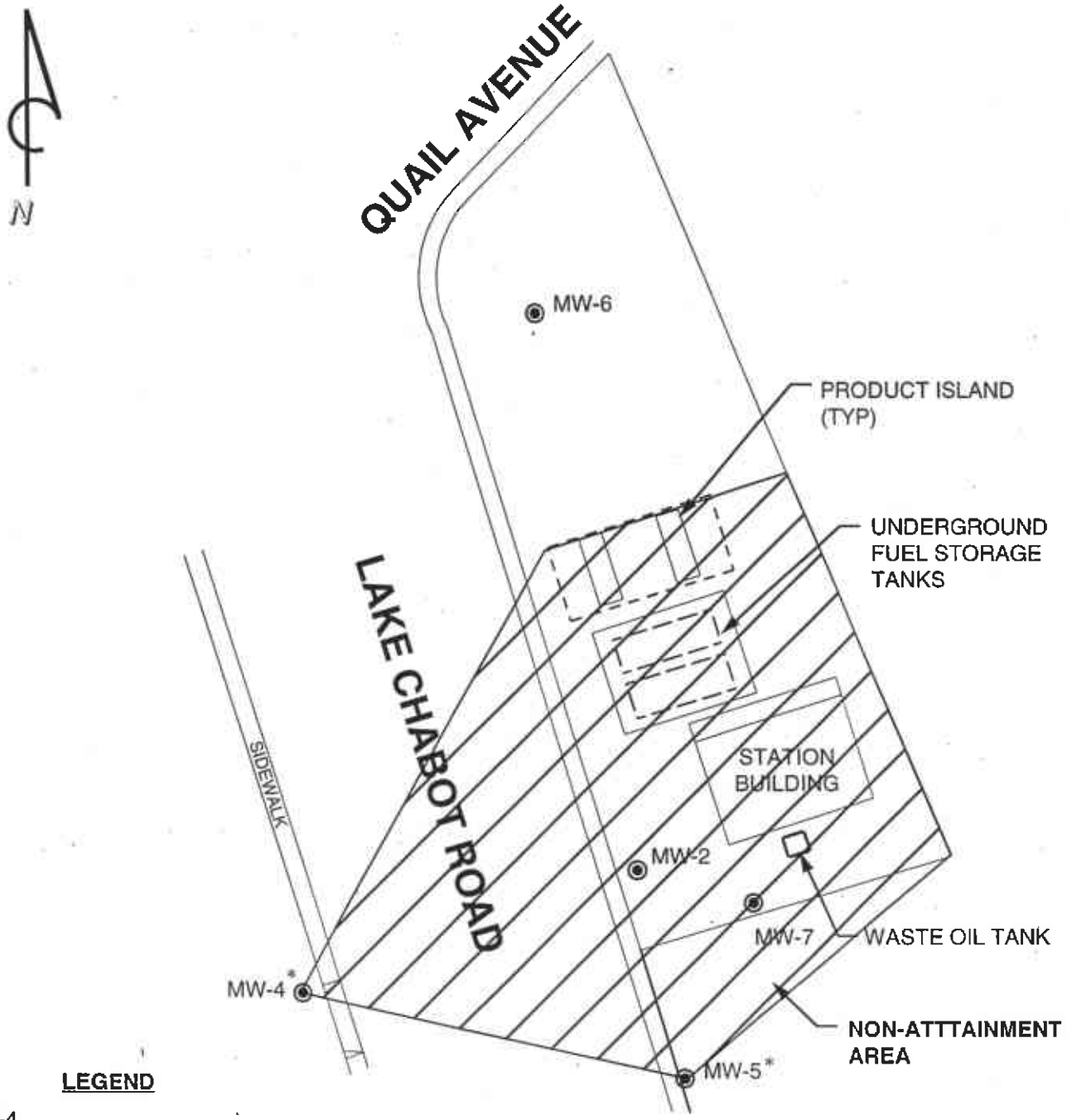
Castro Valley, California

TPH-g/BENZENE/TPH-d CONCENTRATION MAP

FIGURE: 4

PROJECT: 310-090.3A



LEGEND

MW-4 ◉ GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION

* CONTAINMENT MONITORING WELL LOCATIONS

SCALE

0 40 80 FEET

Reference: Basemap from MPDS drawing

PACIFIC ENVIRONMENTAL GROUP, INC.

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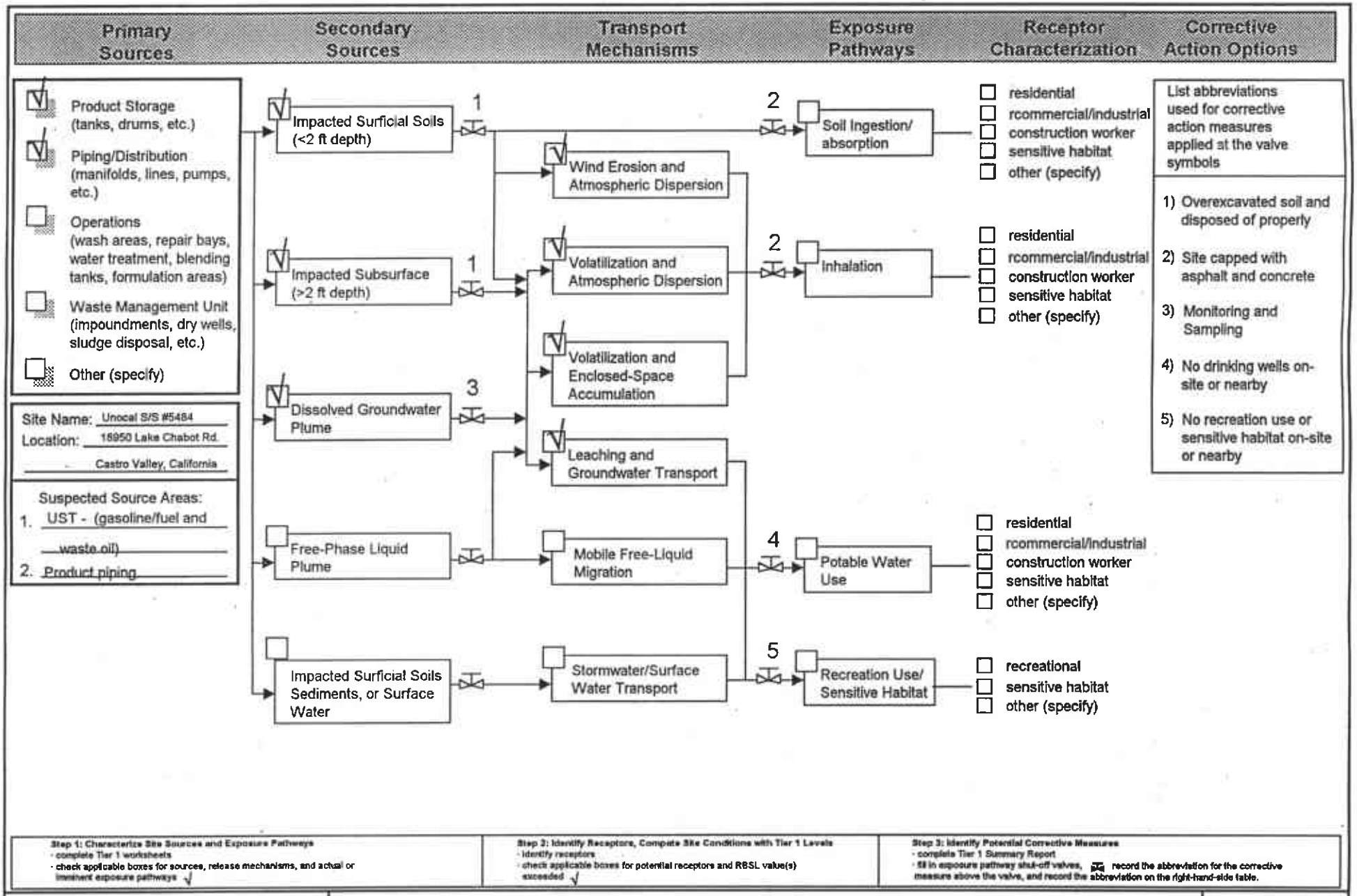
Castro Valley, California

NON-ATTAINMENT AREA AND CONTAINMENT MONITORING LOCATIONS

FIGURE: **5**

PROJECT: 310-090.3A



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Castro Valley, California

RISK ASSESSMENT: EXPOSURE PATHWAY ANALYSIS

FIGURE: 6
PROJECT: 310-090.3A

\310\090\3A\EVALFLOW.VSD

Figure 7: Summary Plot of Groundwater Elevation vs. Groundwater TPH-Gas and TPH-Diesel Concentrations at Site 5484, MW-7

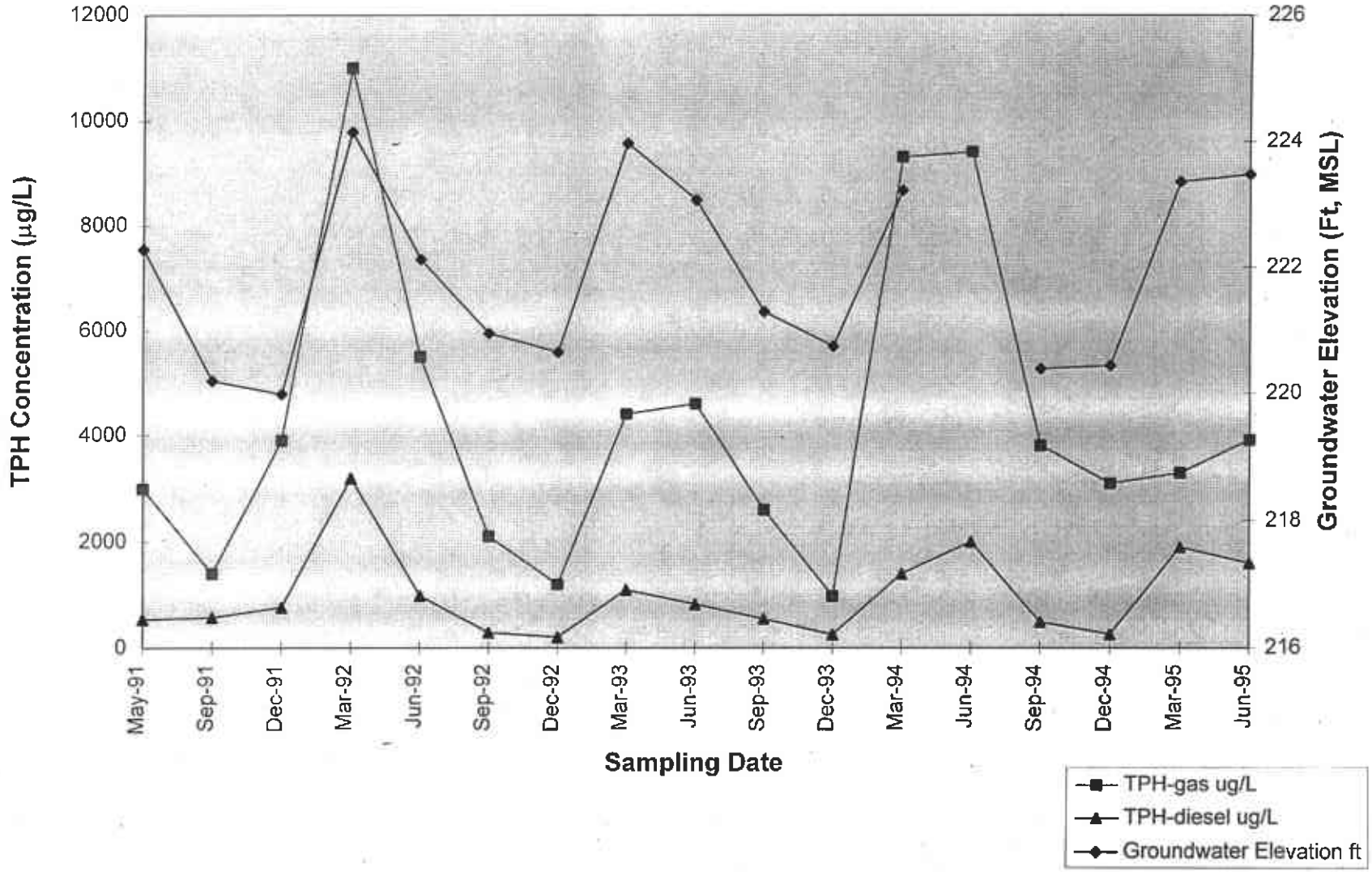

Figure 8: Summary Plot of Groundwater Elevation vs. Groundwater Benzene Concentration at Site 5484, MW-7