Chevron

June 26, 1996

**Chevron U.S.A. Products Company**
6001 Bollinger Canyon Road
Building L
San Ramon, CA 94583
P.O. Box 5004
San Ramon, CA 94583-0804

**Marketing – Northwest Region**
Phone 510 842 9500

Mr. Scott Seery
Alameda County Health Care Services
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Re: **Former Chevron Service Station #9-4930**
**3369 Castro Valley Blvd., Castro Valley, California**

Dear Mr. Seery:

I am enclosing a copy of the Tier 2 Risk-Based Corrective Action Site Evaluation that was prepared by Chevron Research and Technology Company for the above noted site. The results of the evaluation was based on available soil and groundwater data for benzene, ethylbenzene, toluene and xylene constituents.

Baseline risks and site-specific target levels (SSTL's) were estimated for potential exposures to on site workers and off site residents. These potentially exposure pathways are:

- On site worker inhalation of indoor air (i.e. vapor intrusion to buildings from subsurface soils).
- On site worker inhalation of indoor air ( i.e. vapor intrusion to buildings from groundwater ).
- On site worker ingestion of groundwater.
- Off site resident ingestion of groundwater.

The Tier 2 RBCA Worksheet was used to evaluate for risk at this site, with site specific parameters used as appropriate in the calculations. Based on these calculations, the potential for human or ecological exposure to hydrocarbon impacted soil, air and groundwater is minimal. Using the 90th % upper confidence limit concentration for benzene in groundwater, 0.068mg/l; this amount does not exceed the groundwater SSTL of 0.99mg/l. Also, the estimated excess cancer risk for the detected concentrations of benzene in groundwater and subsurface soil is 6.9x10-6, which is within the acceptable excess risk limit range from 10-6 to 10-4.

The groundwater at the site is not currently being used as a drinking water source, and is not expected to be used as a source in the future. There is no continuing source for hydrocarbon emissions as the site was excavated extensively in the northerly portion. Natural attenuation of the hydrocarbon constituents is expected to continue and this will lower the concentrations than currently detected.

Therefore, the recommend corrective action at this site is closure. It appears that the dissolved hydrocarbons in the groundwater will not adversely effect the operation of the restaurant proposed on the site, and that no special remedial actions will need to be taken.

Due to the findings of this report, I believe it may be appropriate to reconsider installing the two additional monitoring wells that was proposed further downgradient of the site. Additional data that would have been secured from the monitoring wells for the risk evaluation is not now needed. The geoprobe GP-2, crossgradient of monitoring well MW-4 showed a lower concentration of benzene which could indicate that

the extent of the hydrocarbon plume is along the west side of Willbeam Avenue. Chevron now proposes to continue to monitor the site for the next year to confirm that natural attenuation is occurring, at which time we will review the data and determine if the site is ready for closer.

Your early and timely review of this information, and more particularly that pertaining to the risk evaluation and its effect on the construction proposed at the site, will be appreciated.

Sincerely,
CHEVRON PRODUCTS COMPANY

Philip R. Briggs
Site Assessment and Remediation Project Manager

Enclosure

cc. Mr. Kevin Graves, RWQCB-San Francisco Bay Region
2101 Webster St., Suite 500, Oakland, CA 94612

Anna Counelis & Tula Gallanes
109 Casa Vieja Place, Orinda, CA 94563

Mr. Mark Sullivan, Pacific Environmental Group, Inc.
2025 Gateway Place, Suite 440, San Jose, CA 95110

Mr. Peder Kruger
Director of Construction
BC Golden Gate
411 Borel Ave., Suite 550
San Mateo, CA 94402

Ms. Bette Owen, Chevron Products Co.

Chevron

**Chevron Research and Technology Company**
1003 West Cutting Boulevard
P.O. Box 4054
Richmond, CA 94804-0054

**Toxicology & Health Risk Assessment**

June 21, 1996

Mr. Phil R. Briggs
Chevron Products Company
6001 Bollinger Canyon Road
San Ramon, California 94583-0804

RE: FINAL TIER 2 RBCA SUMMARY REPORT
FORMER CHEVRON SERVICE STATION NO. 9-4930
CASTRO VALLEY, CALIFORNIA

Dear Phil,

Attached are five copies of the Final Tier 2 Risk-Based Corrective Action Site Evaluation for the Former Service Station No. 9-4930 located in Castro Valley, California. Based on the available soil and groundwater data for benzene, ethylbenzene, toluene and xylenes, baseline risks and site-specific target levels (SSTLs) were estimated for potential exposures to onsite workers and offsite residents. The estimated risks were within the acceptable excess risk limit range of $1 \times 10^{-6}$ to $1 \times 10^{-4}$. In addition, the representative concentrations for the chemicals of concern were all less than the estimated SSTL values.

If you have any questions or would like additional information, please do not hesitate to call me at CTN 2-3365.

Sincerely,

Michele Emerson

Michele Emerson

attachment

cc: C. A. Peck
R. I. Magaw
THRA Files

# SUMMARY REPORT

☐ TIER 1 / ■ TIER 2 RBCA SITE EVALUATION

FINAL

PREPARED FOR

Former Chevron Service Station No. 9-4930
SITE NAME

3369 Castro Valley Boulevard
Castro Valley, California
LOCATION

Chevron Research and Technology Company
PREPARED BY

June 20, 1996
DATE ISSUED

Site Name: Former Service Station No. 9-4930 | Date Completed: June 20, 1996

Site Location: Castro Valley, California | Completed By: CRTC



## TIER 1 / TIER 2 RBCA REPORT INDEX

| | | ■ = ENCLOSED | |
|---|---|---|---|
| | | Tier 1 | Tier 2 |
| **1.0 EXECUTIVE SUMMARY** | | | |
| 1.1 Tier 1 Executive Summary Checklist | | ❑ | |
| 1.2 Tier 2 Executive Summary Checklist | * | | ■ |
| 1.3 Executive Summary Discussion | | ❑ | ■ *(u)* |
| 1.4 Baseline Exposure/Control Strategy Flowchart | | ❑ | ❑ *(u)* |
| **2.0 SITE HISTORY** | | | |
| 2.1 Site Description | | ❑ | ❑ *(u)* |
| 2.2 Site Ownership & Activity Record | | ❑ | ❑ *(u)* |
| 2.3 Past Releases or Source Areas | | ❑ | ❑ *(u)* |
| 2.4 Summary of Current & Completed Site Activities | | ❑ | ❑ *(u)* |
| 2.5 Summary of Potential Near-Term Site Activities | | ❑ | ❑ *(u)* |
| **3.0 SITE ASSESSMENT INFORMATION** | | | |
| 3.1 Regional Hydrogeologic Conditions | | ❑ | ❑ *(u)* |
| 3.2 Hydrogeologic Site Conditions | | ❑ | ❑ *(u)* |
| 3.3 Beneficial Use Summary | | ❑ | ❑ *(u)* |
| 3.4 Well Inventory Survey | | ❑ | ❑ *(u)* |
| 3.5 Ecological Assessment Summary | | ❑ | ❑ *(u)* |
| **4.0 BASELINE EXPOSURE ASSESSMENT** | | | |
| 4.1 Site Classification Summary | | ❑ | ❑ *(u)* |
| 4.2 Baseline Exposure Flowchart | | ❑ | ■ *(u)* |
| 4.3 Tier 2 Exposure Factor Checklist | | ❑ | ❑ *(u)* |
| 4.4 Tier 2 Exposure Pathway Screening | * | | ■ |
| 4.5 Tier 2 Exposure Scenarios & Risk Goals | * | | ■ |
| **5.0 SITE PARAMETERS** | | | |
| 5.1 Site Parameter Checklist for RBSLs | | ❑ | ■ *(u)* |
| 5.2 Summary of Media Investigation and Chemical Analyses | | ❑ | ❑ *(u)* |
| 5.3 Summary of Source Zone Characteristics | | ❑ | ❑ *(u)* |
| 5.4 Surface Soil Concentration Data Summary | | ❑ | ❑ *(u)* |
| 5.5 Subsurface Soil Concentration Data Summary | | ❑ | ■ *(u)* |
| 5.6 Groundwater Concentration Data Summary | | ❑ | ■ *(u)* |
| 5.7 Tier 2 Exposure Pathway Transport Parameters | * | | ■ |
| **6.0 TIER 1 RISK-BASED SCREENING LEVEL EVALUATION** | | | |
| 6.1 Tier 1 RBSL Evaluation: Surface Soil | | ❑ | |
| 6.2 Tier 1 RBSL Evaluation: Subsurface Soil | | ❑ | |
| 6.3 Tier 1 RBSL Evaluation: Groundwater | | ❑ | |

** = Required for Tier 2 Evaluation only* *(u) = For Tier 2, update Tier 1 version as needed.*

Site Name: Former Service Station No. 9-4930 Date Completed: June 20, 1996

Site Location: Castro Valley, California Completed By: CRTC



## TIER 1 / TIER 2 REPORT INDEX *continued*

■ = ENCLOSED

| | | Tier 1 | Tier 2 |
|---|---|---|---|
| **7.0** | **NATURAL ATTENUATION FACTORS** | | |
| 7.1 | Tier 2 NAF Calculation Methods & Results | * | ■ |
| **8.0** | **TIER 2 BASELINE RISK CALCULATION** | | |
| 8.1 | Tier 2 Exposure Concentration & Intake Calculation | * | ■ |
| 8.2 | Tier 2 Pathway Risk Calculation | * | ■ |
| 8.3 | Tier 2 Baseline Risk Summary Table | * | ■ |
| **9.0** | **TIER 2 SSTL EVALUATION** | | |
| 9.1 | Surface Soil SSTL Values | * | ☐ |
| 9.2 | Subsurface Soil SSTL Values | * | ■ |
| 9.3 | Groundwater SSTL Values | * | ■ |
| **10.0** | **TIER 1 / TIER 2 CORRECTIVE ACTION ASSESSMENT** | | |
| 10.1 | Exposure Control Flowchart | ☐ | ☐ *(u)* |
| 10.2 | Soil Remediation Technology Screening Matrix | ☐ | ☐ *(u)* |
| 10.3 | Groundwater Remediation Technology Screening Matrix | ☐ | ☐ *(u)* |
| | **ATTACHMENTS** | | |
| Figure 1 | Site Location Map | ☐ | ■ *(u)* |
| Figure 2 | Extended Site Map | ☐ | ■ *(u)* |
| Figure 3 | Site Plan View | ☐ | ■ *(u)* |
| Figure 4 | Site Photos | ☐ | ☐ *(u)* |
| Figure 5 | Groundwater Elevation Map | ☐ | ■ *(u)* |
| Figure 6 | Geological Cross-Section(s) | ☐ | ☐ *(u)* |
| Figure 7 | Groundwater Plume Maps | * | ■ |
| Figure 8 | Time Series Groundwater Data | * | ■ |
| | **APPENDICES** | | |
| Appendix A | Chemical Analysis Data Tables | ☐ | ☐ *(u)* |
| Appendix B | | ☐ | ☐ *(u)* |
| | (SPECIFY) | | |

* = ***Required for Tier 2 Evaluation only*** ***(u) = For Tier 2, update Tier 1 version as needed.***

Site Name: Former Service Station No. 9-4930 | Date Completed: June 20, 1996

Site Location: Castro Valley, California | Completed By: CRTC



# TIER 2 EXECUTIVE SUMMARY CHECKLIST

## TIER 2 SSTL CALCULATION METHOD ( ■ OR ● TO SELECT )

**SSTL Calculation Option**

- ☐ Option 1: Site-Specific Screening Levels
- ■ Option 2: Individual Constituent SSTL Values
- ☐ Option 3: Cumulative Constituent SSTL Values

**NAF Calculation Method**

- ☐ Fate and Transport Modeling:
  - ● RBCA Spreadsheet System
  - ○ Other Model(s)
- ☐ Empirical NAF Calculation

## SITE DATA INVENTORY

**Source Zone Investigation Complete:**

- ☐ Surface Soil (e.g., ≤ 3 ft BGS)
- ■ Subsurface Soil (e.g., > 3 ft BGS)
- ■ Groundwater

**Exposure Pathway Information Compiled:**

- ■ Air Pathway
- ■ Groundwater Pathway
- ☐ Soil Pathway
- ☐ Surface Water Pathway
- ☐ Land Use Classification (on-site and off-site)

*TIER 1 WORKSHEETS 1.3 - 4.2 AND 5.2 - 5.6 HAVE BEEN UPDATED TO INCLUDE NEW TIER 2 INFORMATION.*

## TASKS COMPLETED

- ☐ Tier 1 Evaluation
- ☐ Tier 1 Interim Corrective Action
- ■ Tier 2 Evaluation
- ☐ Tier 2 Interim Corrective Action
- ☐ Tier 2 Final Corrective Action
- ☐ Tier 3 Evaluation

## CURRENT SITE CLASSIFICATION

| Classification No. | Scenario Description | Prescribed Interim Action | Date Implemented |
|---|---|---|---|
| | | | |

## TIER 2 CORRECTIVE ACTION CRITERIA

| Affected Medium | Tier 2 SSTL Exceeded ? | | Applicable Excess Risk Limits (specify value) | | | | Other Applicable Exposure Limit |
|---|---|---|---|---|---|---|---|
| | Yes | No | Indiv. Risk | Total Risk | Hazard Index | Hazard Quotent | *(specify, if any)* |
| • Surface Soil (≤ 3ft BGS) | ☐ | ☐ | | | | | |
| • Subsurface Soil (>3ft BGS) | ☐ | ■ | $10^{-4}$ | | | | $10^{-6}$ |
| • Groundwater | ☐ | ■ | $10^{-4}$ | | | | $10^{-6}$ |

## PROPOSED ACTION

- ■ ***No Action:*** Tier 2 SSTLs not exceeded. Apply for closure.
- ☐ ***Interim Corrective Action:*** Address principal, near-term risks sources.
- ☐ ***Final Corrective Action:*** Remediate/control site to meet Tier 2 criteria.
- ☐ ***Tier 3 Evaluation:*** Improve baseline risk and SSTL estimates.

*NOTE:*

*Rationale for proposed action documented on Worksheets 1.3 and 10.1-10.3.*

*ALL WORKSHEETS ENCLOSED IN THIS REPORT ARE IDENTIFIED ON THE TABLE OF CONTENTS FORM*

Site Name: Former Service Station No. 9-4930 Date Completed: June 20, 1996

Site Location: Castro Valley, California Completed By: CRTC



# EXECUTIVE SUMMARY DISCUSSION

**Instructions:** ***Provide brief description of site history, hydrogeologic conditions, ecological assessment, possible exposure pathways, RBSL / SSTL results, and the scope of work for proposed corrective action activity. Address proposed methods, implementation schedule, cost, and anticipated risk reduction at or near the site.***

## SITE DESCRIPTION AND HISTORY

• **Worksheets 2.1 - 2.5** • **Figures 1 - 4**

*Briefly discuss site chronology, operations, features of potential concern, and future plans for site use.*

In February 1993, the former service station No. 9-4930 and adjacent car wash buildings were demolished. In March 1993, the three underground fuel storage tanks and associated underground piping, product dispenser islands, and car wash wastewater reclamation tanks were removed. As a result of an apparent release from the underground fuel tank system, the entire northern portion of the site was excavated down to depths from 8 to 15 feet below ground surface (bgs). Approximately, 7,500 cubic yards ($yd^3$) of soil were excavated and removed from the site. Subsequent to excavation activities, four groundwater monitoring wells were installed onsite, and quarterly monitoring and sampling have been performed since October 1993. Historically, contamination has been detected in 3 of the 4 wells. The expected future land use of the site is commercial (specifically, a Boston Market restaurant, Noah's Bagal Shop, and parking lot with landscaping). Current offsite land uses are commerical and residential.

## SITE ASSESSMENT INFORMATION

### GEOLOGIC AND HYDROGEOLOGIC SUMMARY

• **Worksheets 3.1 - 3.4** • **Figures 5 and 6**

*Briefly describe regional site features, climate, vadose zone soils, and groundwater depth, quality, and use.*

The site lies at an elevation of approximately 170 feet above mean sea level (MSL). Surface topography at the site slopes toward the south-southwest. Soils underlying the site consist primarily of silty to gravely clay to depths of approximately 8 to 12 feet bgs. Surficial soils are clay underlain by clayey silts. In areas of the 1993 overexcavation activities, the site is underlain by a combination of 2-inch drain rock, geotextile fabric, and Class II aggregate base rock. The depth to groundwater varies from 4.8 to 8 feet bgs, with flow to the south-southwest. The hydraulic gradient ranges from approximately 0.005 to 0.010. No groundwater quality or use data are available. In the area of the site the average mean temperature is about 57°F, and the mean annual precipitation is approximately 19 inches.

## BASELINE EXPOSURE ASSESSMENT

### COMPLETE EXPOSURE PATHWAYS AND APPLICABLE RECEPTORS

• **Worksheets 4.1 - 4.5**

*Discuss current or potentially complete pathways for human or ecological exposure to site constituents.*

There are no current complete exposure pathways. Potentially complete future exposure pathways include:

- Onsite worker inhalation of indoor air (i.e., vapor intrusion to buildings from subsurface soils).
- Onsite worker inhalation of indoor air (i.e., vapor intrusion to buildings from groundwater).
- Onsite worker ingestion of groundwater.
- Offsite resident ingestion of groundwater.

There are no identified complete ecological exposure pathways.

### ECOLOGICAL ASSESSMENT SUMMARY

• **Worksheet 3.5**

*Discuss potentially sensitive ecological receptors and habitat in the vicinity of site, if any.*

Areas surrounding the site do not contain wetlands, streams or springs. The nearest surface water to the site is an unnamed tributary of San Lorenzo Creek which flows south-southwest to the San Francisco Bay. The unnamed tributary is located approximately 1,500 feet to the east of the site. Potentially sensitive ecological receptors are not known.

Site Name: Former Service Station No. 9-4930 Date Completed: June 20, 1996

Site Location: Castro Valley, California Completed By: CRTC



## EXECUTIVE SUMMARY DISCUSSION Continued

### TIER 1 RBSL OR TIER 2 SSTL EVALUATION

**COMPARISON TO SOURCE MEDIA CONCENTRATIONS**

• **Worksheets 5.1 - 5.7** • **Figures 7 and 8**

*For complete pathways, compare representative source concentrations to applicable RBSL or SSTL values.*

The subsurface soil (> 3 ft bgs) SSTL value for inhalation of benzene in indoor air is 1.5 mg/kg. (See Tier 2 Worksheet 9.2).

- The representative (point of exposure) onsite subsurface soil concentratration of benzene is 0.43 mg/kg.

The groundwater SSTL value for inhalation of benzene in indoor air is 0.99 mg/L. (See Tier 2 Worksheet 9.3).

- The representative (point of exposure) onsite groundwater concentratration of benzene is 0.068 mg/L.

**QUALITATIVE UNCERTAINTY ASSESSMENT**

• **Worksheets 4.2, 4.4, and 5.1 - 5.7**

*Discuss uncertainty / conservatism of the site data and calculation methods used in deriving RBSL or SSTL values.*

The potential for human or ecological exposure to hydrocarbon impacted soil, air and groundwater is minimal because SSTL values maintain a degree of conservativism that would be protective of human health and the environment. Estimation of SSTL values tend to err on the side of conservativism and likely results in risks below the acceptable excess risk limit range.

### PROPOSED CORRECTIVE ACTION

• **Worksheets 10.1 - 10.3**

*Describe rationale for proposed action (i.e., no action, interim action, final action, or tier upgrade), considering site classification and land use. Discuss basis for remedy selection, if applicable.*

The recommended final corrective action for the site is closure. Based on the results of the Tier 2 evaluation, the 90th percent upper confidence limit concentration of benzene in groundwater, 0.068 mg/L, which does not exceed the groundwater SSTL of 0.99 mg/L. In addition, the estimated excess cancer risk for the detected concentrations of benzene in groundwater and subsurface soil is $6.9 \times 10^{-6}$, which is within the acceptable excess risk limit range from $10^{-6}$ to $10^{-4}$. In addition, it should be noted that the hazard index for ethylbenzene, toluene, and xylenes detected in subsurface soil and groundwater is $2.5 \times 10^{-3}$, which is less than the acceptable excess risk limit of 1.0. Moreover, groundwater at the site is currently not used as a drinking water source, and is not expected to be used as a drinking water source in the future. Future potential receptors are likely to receive groundwater from a municipal drinking water source. Finally, there is no continuing source of hydrocarbon emissions. The UST system and associated piplines have been removed, and in the northern portion of the site 7,500 $yd^3$ of soil have been excavated and removed down to 15 ft bgs. Through natural attenuation, concentrations of chemicals are expected to decrease to lower concentrations than currently detected.

### REFERENCE DOCUMENTS

• **Appendices**

*List the document sources for the data cited in this report.*


- Blaine Tech Services. 1996. Groundwater Monitoring and Sampling Results. Former Chevron Service Station 9-4930. Project No. 96016-T-1. May 21.
- Pacific Environmental Group, Inc. 1996. Soil and Groundwater Investigation. Former Chevron Service Station 9-4930. Project No. 320-156.1A. April 18.
- Touchstone Developments. 1993. Tank/Line Removal and Over-Excavation Report. Former Chevron Service Station 9-4930. Project No. 4930. June 5.

Site Name: Former Service Station No. 9-4930 | Date Completed: June 20, 1996

Site Location: Castro Valley, California | Completed by: CRTC



# BASELINE EXPOSURE FLOWCHART

**Instructions:** *To characterize baseline exposure conditions, check boxes to identify applicable primary sources, secondary sources (affected media), potential transport mechanisms, and current or potential exposure pathways and receptors ( ■ = applicable to site). Identify types(s) of both on-site and off-site receptors, if applicable. Provide detailed information on complete pathways, exposure factors, and risk goals on Worksheets 4.3 - 4.5.*

| PRIMARY SOURCES | SECONDARY SOURCES | TRANSPORT MECHANISMS | EXPOSURE PATHWAY | POTENTIAL RECEPTORS | COMPLETE PATHWAY? |
|---|---|---|---|---|---|
| ❑ Product Storage<br>❑ Piping / Distribution<br>❑ Operations<br>❑ Waste Management Unit<br>❑ Other: __ | ❑ Affected Surface Soils (≤3 ft depth) | ❑ Wind Erosion and Atmospheric Dispersion | ❑ Soil — Dermal Contact/ Ingestion | Exposed Receptors<br>On-Site: ❑ Residential ❑ Non-Resid. ■ N/A ❑ Sensitive Habitat ❑ Recreation<br>Off-Site: ❑ Residential ❑ Non-Resid. ■ N/A ❑ Sensitive Habitat ❑ Recreation | ■ No ❑ Yes ○ Current ○ Potential<br>■ No ❑ Yes ○ Current ○ Potential |
| | ■ Affected Subsurface Soils (> 3 ft depth) | ❑ Volatilization and Atmospheric Dispersion | ■ Air — Inhalation of Vapor or Dust | Exposed Persons<br>On-Site: ❑ Residential ■ Non-Resid. ❑ N/A<br>Off-Site: ■ Residential ■ Non-Resid. ❑ N/A | ❑ No ■ Yes ○ Current ● Potential<br>❑ No ■ Yes ○ Current ● Potential |
| | ■ Dissolved Groundwater Plume | ■ Volatilization and Enclosed-Space Accumulation | | | |
| | | ■ Leaching and Groundwater Transport | ■ Groundwater — Potable Water Use | Groundwater Users<br>On-Site: ❑ Residential ■ Non-Resid. ❑ N/A<br>Off-Site: ■ Residential ■ Non-Resid. ❑ N/A | ❑ No ■ Yes ○ Current ● Potential<br>❑ No ■ Yes ○ Current ● Potential |
| | ❑ Free-Phase Liquid Plume | ❑ Mobile Free-Liquid Migration | | | |
| | ❑ Affected Surface Soils, Sediments, or Surface Water | ❑ Stormwater/ Surface Water Transport | ❑ Surface Water — Recreational Use / Sensitive Habitat | Surface Water Users<br>On-Site: ❑ Residential ❑ Non-Resid. ■ N/A ❑ Sensitive Habitat ❑ Recreation<br>Off-Site: ❑ Residential ❑ Non-Resid. ■ N/A ❑ Sensitive Habitat ❑ Recreation | ■ No ❑ Yes ○ Current ○ Potential<br>■ No ❑ Yes ○ Current ○ Potential |

*( ■ OR ● TO SELECT )*

Site Name: Former Service Station No. 9-4930 Date Completed: June 20, 1996

Site Location: Castro Valley, California Completed By: CRTC



# TIER 2 EXPOSURE PATHWAY SCREENING

**Instructions:** *Exposure pathways screening involves the following steps:*

1) *Source Medium: Compare maximum constituent concentration in relevant source medium to applicable Tier 1 RBSL value for designated pathway.*

2) *Transport Mechanism: Transport is active at site if: a) relevant source medium is affected, b) exposure medium or receptor exists, and c) constituent transport from source to receptor could occur under current or anticipated future use.*

3) *Exposure Medium: For pathways under steady-state transport conditions (e.g., air), compare measured COC concentration at POE to applicable Tier 1 exposure limit for air, groundwater, or soil. Surface water concentrations should be compared to applicable state or federal water quality criteria.*

4) *Complete Pathway: For screening, pathway considered complete if "Yes" reported in Column A and either Column B or C.*

*Notes:*
*RBSL = Risk-Based Screening Level*
*POE = Point of Exposure*
*COC = Constituent of Concern*
*NM = Not Measured*

| PATHWAY | A) SOURCE MEDIUM Type | Pathway Tier 1 RBSL Exceeded? | B) TRANSPORT MECHANISM Type | Active at Site? | C) EXPOSURE MEDIUM Type | Exposure Limit Exceeded at POE? | COMPLETE PATHWAY? (Check if yes & specify status) |
|---|---|---|---|---|---|---|---|
| **AIR EXPOSURE PATHWAYS** | ( ■ TO SELECT ) | | | | | | |
| 1) *Surface Soils:* Vapor Inhalation and Dust Ingestion | Surface Soil | ☐ Yes ■ No | Volatilization /Dust Transport | ■ No ☐ Yes - Current ☐ Yes - Future | Ambient Air | ■ NM ☐ No ☐ Yes | ☐ Current ☐ Potential |
| 2) *Subsurface Soils:* Volatilization to Ambient Air | Subsurface Soil | ☐ Yes ■ No | Volatilization | ■ No ☐ Yes - Current ☐ Yes - Future | Ambient Air | ■ NM ☐ No ☐ Yes | ☐ Current ☐ Potential |
| 3) *Subsurface Soils:* Volatilization to Enclosed Space | Subsurface Soil | ■ Yes ☐ No | Volatilization | ☐ No ☐ Yes - Current ■ Yes - Future | Indoor Air | ■ NM ☐ No ☐ Yes | ☐ Current ■ Potential |
| 4) *Groundwater:* Volatilization to Ambient Air | Groundwater | ☐ Yes ■ No | Volatilization | ■ No ☐ Yes - Current ☐ Yes - Future | Ambient Air | ■ NM ☐ No ☐ Yes | ☐ Current ☐ Potential |
| 5) *Groundwater:* Volatilization to Enclosed Space | Groundwater | ■ Yes ☐ No | Volatilization | ☐ No ☐ Yes - Current ■ Yes - Future | Indoor Air | ■ NM ☐ No ☐ Yes | ☐ Current ■ Potential |
| **GROUNDWATER EXPOSURE PATHWAYS** | | | | | | | |
| 6) *Soil:* Leaching to Groundwater: Ingestion | Surface or Subsurface Soils | ☐ Yes ■ No | Leaching /Groundwater Flow | ■ No ☐ Yes - Current ☐ Yes - Future | Groundwater | ☐ NM ☐ No ■ Yes | ☐ Current ☐ Potential |
| 7) *Dissolved or Free-Phase Groundwater Plume:* Ingestion | Groundwater | ■ Yes ☐ No | Groundwater Flow | ☐ No ☐ Yes - Current ■ Yes - Future | Groundwater | ☐ NM ☐ No ■ Yes | ☐ Current ■ Potential |
| **SOIL EXPOSURE PATHWAY** | | | | | | | |
| 8) *Surface Soils:* Dermal Contact /Ingestion | Surface Soil | ☐ Yes ■ No | Direct Contact | ■ No ☐ Yes - Current ☐ Yes - Future | Soil | ■ NM ☐ No ☐ Yes | ☐ Current ☐ Potential |

Site Name: Former Service Station No. 9-4930 Date Completed: June 20, 1996

Site Location: Castro Valley, California Completed By: CRTC



## TIER 2 EXPOSURE PATHWAY SCREENING *CONTINUED*

| PATHWAY | A) SOURCE MEDIUM: Type | Pathway Tier 1 RBSL Exceeded? | B) TRANSPORT MECHANISM: Type | Active at Site? | C) EXPOSURE MEDIUM: Type | Exposure Limit Exceeded at POE? | COMPLETE PATHWAY? (Check if yes & specify status) |
|---|---|---|---|---|---|---|---|
| ***SURFACE WATER PATHWAYS*** | | | | | | | |
| 9) *Soil:* Leaching to Groundwater /Discharge to Surface Water: Recreation or Fish | Surface or Subsurface Soils | ☐ Yes ■ No | Leaching /Groundwater Flow | ■ No ☐ Yes - Current ☐ Yes - Future | Surface Water | ■ NM ☐ No ☐ Yes | ☐ Current ☐ Potential |
| 10) *Groundwater Plume:* Discharge to Surface Water: Recreation or Fish | Groundwater | ☐ Yes ■ No | Groundwater Flow | ■ No ☐ Yes - Current ☐ Yes - Future | Surface Water | ■ NM ☐ No ☐ Yes | ☐ Current ☐ Potential |
| 11) *Soil :* Leaching to Stormwater / Discharge to Surface Water: Recreation or Fish | Surface Soils | ☐ Yes ■ No | Overland Flow | ■ No ☐ Yes - Current ☐ Yes - Future | Surface Water | ■ NM ☐ No ☐ Yes | ☐ Current ☐ Potential |

**Additional Information:** ***Provide necessary background discussion for data provided above. Also, if ecological exposure pathway identified on Worksheet 3.5, identify relevant source medium, transport mechanism, exposure medium, and receptor type below.***

Site Name: Former Service Station No. 9-4930 | Date Completed: June 20, 1996

Site Location: Castro Valley, California | Completed By: CRTC



## TIER 2 EXPOSURE SCENARIOS AND RISK GOALS

**Instructions:** ***For each exposure pathway, indicate i) Point of Exposure (POE) location (on-site, off-site, or both), ii) applicable exposure scenario at each POE (residential or commercial / industrial), and iii) applicable risk goals. Distance from source corresponds to shortest lateral distance to applicable POE from point of maximum COC concentration in source medium along possible migration pathway. Provide exposure limit information if applicable (e.g., OSHA Limits, MCLs, etc.).*** ( ■ *TO SELECT* )

| EXPOSURE PATHWAY | DISTANCE FROM SOURCE | EXPOSURE SCENARIO AT POE | TARGET RKSKS AT POE: Individual Constituent Effects — Indiv. Risk | Individual Constituent Effects — HQ | Cumulative Constituent Effects — Additive Risk | Cumulative Constituent Effects — HI | Other Exposure Limit (specify if applicable) |
|---|---|---|---|---|---|---|---|
| **AIR EXPOSURE PATHWAYS** | | ■ COMPLETE (provide data) ❑ NOT COMPLETE (skip to next pathway) | | | | | |
| ■ On-Site POE | 0 ft | ❑ Residential ■ Commercial /Industrial | $10^{-6}$, $10^{-4}$ | 1.0 | | | ❑ PEL/TLV |
| ❑ Off-Site POE | ____ ft | ❑ Residential ❑ Commercial /Industrial | | | | | ❑ PEL/TLV |
| **GROUNDWATER EXPOSURE PATHWAYS** | | ■ COMPLETE (provide data) ❑ NOT COMPLETE (skip to next pathway) | | | | | |
| ■ On-Site POE | 0 ft | ❑ Residential ■ Commercial /Industrial | | | | | ❑ MCL |
| ■ Off-Site POE | 50 ft | ■ Residential ❑ Commercial /Industrial | $10^{-6}$, $10^{-4}$ | 1.0 | | | ❑ MCL |
| **SOIL EXPOSURE PATHWAY** | | ❑ COMPLETE (provide data) ■ NOT COMPLETE (skip to next pathway) | | | | | |
| ❑ On-Site POE: (at source) | | ❑ Residential ❑ Commercial /Industrial | | | | | ❑ ____ |
| ❑ Off-Site POE: (at source) | | ❑ Residential ❑ Commercial /Industrial | | | | | ❑ ____ |
| **SURFACE WATER EXPOSURE PATHWAYS** | | ❑ COMPLETE (provide data) ■ NOT COMPLETE (skip to next pathway) | | | | | |
| ❑ On-Site POE | ____ ft | ❑ Recreational ❑ Ecological *(specify exp. limit only)* | | | | | ❑ ____ |
| ❑ Off-Site POE | ____ ft | ❑ Recreational ❑ Ecological *(specify exp. limit only)* | | | | | ❑ ____ |

why not POE off-site?

**ADDITIONAL INFORMATION:**

If exposure limit is specified, provide reference for concentration limits to be applied to each COC (e.g., OSHA limits, water quality criteria, etc.):

Site Name: Former Service Station No.9-4930 | Date Completed: June 20, 1996

Site Location: Castro Valley, California | Completed By: CRTC



# SITE PARAMETER CHECKLIST FOR RISK-BASED SCREENING LEVELS

**Instructions:** *For Tier 1 evaluation (generic screening levels), review specified default parameters (*) to ensure values are conservative for site. For Tier 2 Option 1 SSTL calculation (site-specific screening levels), provide site-specific values for sensitive parameters (§). Indicate parameter value used in evaluation by completing check box ( ■ ).*

**Note:** * **Confirm conservatism of these values for Tier 1 evaluation.**

§ **Provide site-specific measurement or estimate for Tier 2 evaluation.**

| | | Default Value Used | | Site-Specific Value Used | | |
|---|---|---|---|---|---|---|
| **Soil Parameters** | | | | | | |
| soil type | | ☐ | sandy soil | ■ silty sand soil | *§ | |
| $\Theta_T$ | Soil porosity | ■ | 0.38 (dim) | ☐ | § | |
| $\Theta_{ws}$ | water content - vadose zone | ■ | 0.12 (dim) | ☐ | § | |
| $\Theta_{as}$ | air content - vadose zone ( $= \Theta_T - \Theta_{ws}$ ) | ■ | 0.26 (dim) | ☐ | | |
| $\Theta_{wcap}$ | water content - capillary fringe | ■ | 0.342 (dim) | ☐ | | |
| $\Theta_{acap}$ | air content - capillary fringe ( $= \Theta_T - \Theta_{wcap}$ ) | ■ | 0.038 (dim) | ☐ | | |
| $\rho_s$ | Soil density | ■ | 1.7 g/cm$^3$ | ☐ | § | |
| foc | mass fraction of organic carbon in soil | ■ | 0.01 (dim) | ☐ | § | |
| Ls | Depth to contaminated soil | ☐ | 100 cm | ■ 182.88 cm | § | |
| Lgw | Depth to groundwater | ☐ | 300 cm | ■ 198.12 cm | § | |
| $h_{cap}$ | capillary zone thickness | ☐ | 5 cm | ■ 3.3 cm | | |
| hv | vadose zone thickness ( = Lgw - hc ) | ☐ | 295 cm | ■ 194.8 cm | | |
| pH | Soil/water pH | ■ | 6.5 | ☐ | | |
| **Groundwater Parameters** | | | | | | |
| I | Water infiltration rate | ■ | 30 cm/yr | ☐ | § | |
| $V_{gw}$ | groundwater velocity | ☐ | 82.0 ft/yr | ■ 0.79 ft/yr | *§ | |
| $\delta_{gw}$ | groundwater mixing zone depth | ☐ | 200 cm | ■ 198.12 cm | *§ | |
| DF | aquifer dilution factor ( $= 1 + V_{gw}\,\delta_{gw}/(IW)$ ) | ■ | 12.1 | ☐ | | |
| **Surface Parameters** | | | | | | |
| $U_{air}$ | Amb. air velocity in mixing zone | ■ | 225 cm/s | ☐ | *§ | |
| $\delta_{air}$ | Mixing zone height | ■ | 200 cm | ☐ | *§ | |
| A | Contaminated Area | ☐ | 2250000 cm$^2$ | ■ 8,000,000 cm$^2$ | | |
| W | Width of Contaminated Area | ☐ | 1500 cm | ■ 2,828 cm | § | |
| d | Thickness of Surficial Soils | ☐ | 100 cm | ■ 91.44 cm | § | |
| Pe | Particulate areal emission rate | ■ | 2.17E-10 g/cm$^2$-s | ☐ | § | |
| **Building Parameters** | | | | | | |
| $L_{crack}$ | Foundation crack thickness | ■ | 15 cm | ☐ | | |
| $\eta$ | Foundation crack fraction | ■ | 0.01 (dim) | ☐ | | |
| $Lb_r$ | Building Volume/Foundation Area Ratio (res.) | ■ | 200 cm | ☐ | | |
| $Lb_c$ | Building Volume/Foundation Area Ratio (com./ind.) | ■ | 300 cm | ☐ | | |
| $ER_r$ | Building vapor volume exchange rate (res.) | ■ | 12 dy$^{-1}$ | ☐ | | |
| $ER_c$ | Building vapor volume exchange rate (com./ind.) | ■ | 20 dy$^{-1}$ | ☐ | | |

**Discussion:** *Provide rationale for default parameter revision; discuss additional site-specific features of note; etc.*

Ls, Depth to contaminated soil = Sample location NE-6 with benzene concentration of 0.056 mg/kg.

*(continue on next page if needed)*

Site Name: Former Service Station No. 9-9430 | Date Completed: June 20, 1996

Site Location: Castro Valley, California | Completed By: CRTC



## SUBSURFACE SOIL CONCENTRATION DATA SUMMARY (>3 FT BGS)

**Instructions:** ***Indicate type and concentrations of hazardous constituents detected in subsurface soil. Provide statistical data (maximum value, mean value, upper 90% confidence limit on mean) on detectable concentrations only. Do not include non-detects from outside of source zone. Select "representative concentration" value for comparison to cleanup standard (SSTL or RBSL) and calculation of baseline risk. Provide detailed lab data table(s) as Appendix A to this report.***

| CONSTITUENTS DETECTED | | ANALYTICAL METHOD | | SAMPLE POPULATION | | DETECTED CONCENTRATIONS | | | SELECTED REPRESEN- |
|---|---|---|---|---|---|---|---|---|---|
| CAS No. | Name | Method No. | Typical Detection Limit (mg/kg) | No. of Samples | No. of Detects | Max Conc. (mg/kg) | Mean Conc. (mg/kg) | Upper 90%CL Conc. (mg/kg) | TATIVE CONC. (mg/kg) |
| 71-43-2 | Benzene | 8020 | 0.005 | 24 | 24 | 3.9 | 0.27 | 0.43 | 0.43 |
| 100-41-4 | Ethylbenzene | 8020 | 0.005 | 24 | 24 | 77 | 2 | 3.6 | 3.6 |
| 108-88-3 | Toluene | 8020 | 0.005 | 24 | 24 | 14 | 0.39 | 0.66 | 0.66 |
| 1330-20-7 | Xylene (mixed isomers) | 8020 | 0.005 | 24 | 24 | 360 | 6.5 | 12 | 12 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

which sample pts used ?

I used 13 pts w/ 3 ? ppm max and mean of 0.9 ppm

Site Name: Former Service Station No. 9-4930 Date Completed: June 20, 1996

Site Location: Castro Valley, California Completed By: CRTC



## GROUNDWATER CONCENTRATION DATA SUMMARY

**Instructions:** *Indicate type and concentrations of hazardous constituents detected in groundwater. Provide statistical data (maximum value, mean value, upper 90% confidence limit on mean) on detectable concentrations only. Do not include non-detects from outside of source zone. Select "representative concentration" value for comparison to cleanup standard (SSTL or RBSL) and calculation of baseline risk. Provide detailed lab data table(s) as Appendix A to this report.*

| CONSTITUENTS DETECTED | | ANALYTICAL METHOD | | SAMPLE POPULATION | | DETECTED CONCENTRATIONS | | | SELECTED REPRESENTATIVE CONC. (mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| CAS No. | Name | Method No. | Typical Detection Limit (mg/L) | No. of Samples | No. of Detects | Max Conc. (mg/L) | Mean Conc. (mg/L) | Upper 90%CL Conc. (mg/L) | |
| 71-43-2 | Benzene | 8020 | 0.005 | 31 | 31 | 0.18 | 0.056 | 0.068 | 0.068 |
| 100-41-4 | Ethylbenzene | 8020 | 0.005 | 31 | 31 | 0.14 | 0.019 | 0.026 | 0.026 |
| 108-88-3 | Toluene | 8020 | 0.005 | 31 | 31 | 0.017 | 0.0024 | 0.003 | 0.003 |
| 1330-20-7 | Xylene (mixed isomers) | 8020 | 0.005 | 31 | 31 | 0.33 | 0.009 | 0.014 | 0.014 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
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| | | | | | | | | | |

Site Name: Former Service Station No 9-4930 | Date Completed: June 20, 1996

Site Location: Castro Valley, California | Completed By: CRTC



## TIER 2 EXPOSURE PATHWAY TRANSPORT PARAMETERS

**Instructions:** ***For complete exposure pathways, provide site-specific values for transport parameters. In absence of direct measurements, default values may be selected for some parameters, as shown below. If no default value shown, site-specific value must be provided.***

| | TRANSPORT PARAMETER | SITE-SPECIFIC VALUE (INPUT VALUE BELOW) | DEFAULT VALUE (■ TO SELECT) |
|---|---|---|---|
| **AIR PARAMETERS** | | | |
| $\delta_{air}$ | Air mixing zone height (cm) | | ■ 200 |
| $U_{air}$ | Ambient air velocity in mixing zone (cm/sec) | | ■ 225 |
| Pe | Soil particulate areal emission rate ($g/cm^2$-sec) | | ■ 2.17E-10 |
| $\sigma_y$ | Transverse air dispersion coeff. (m) | | ■ 100 |
| $\sigma_z$ | Vertical air dispersion coeff. (m) | | ■ 10 |
| **GROUNDWATER PARAMETERS** | | | |
| $\delta_{gw}$ | Groundwater mixing zone depth (cm) | 198.12 | ❑ 200 |
| I | Water infiltration rate (cm/yr) | | ■ 30 |
| $V_{gw}$ | Groundwater Darcy velocity (ft/yr) | 0.79 | |
| K | Saturated hydraulic conductivity (cm/sec) | 0.0001 | |
| $i_{grad}$ | Lateral groundwater flow gradient (dim) | 0.0075 | |
| $(BC)_i$ | Available biodegradation capacity of electron acceptors for constituent *I* | | |
| x | Distance to POE from point of maximum COC concentration in groundwater (ft) | 0 and 50 | |
| $\alpha_x$ | Longitudinal groundwater dispersion coeff. (cm) | | ■ 10% of x |
| $\alpha_y$ | Transverse groundwater dispersion coeff. (cm) | | ■ 33% of $\alpha_x$ |
| $\alpha_z$ | Vertical groundwater dispersion coeff. (cm) | | ■ 5% of $\alpha_z$ |
| **SOIL PARAMETERS** | | | |
| $h_{cap}$ | Capillary zone thickness (cm) | 3.3 | ❑ 5 |
| $h_v$ | Vadose zone thickness (cm) | 194.8 | |
| $\rho_s$ | Soil bulk density ($g/cm^3$) | | ■ 1.7 |
| $foc_s$ | Fraction organic carbon in soil leaching zone (dim) | | ■ 0.01 |
| $foc_{gw}$ | Fraction organic carbon in water-bearing unit (dim) | | ■ 0.001 |
| Lgw | Depth to groundwater (cm) | 198.12 | |
| $\Theta_T$ | Soil porosity (dim) | | ■ 0.38 |
| | Soil volumetric water content (dim) | | |
| $\Theta_{wcap}$ | • Capillary zone | | ■ 0.342 |
| $\Theta_{ws}$ | • Vadose zone | | ■ 0.12 |
| $\Theta_{wcrack}$ | • Foundation crack | | ■ 0.12 |

POE = pt. of exposure
COC = chem. of concern

Site Name: Former Service Station No.9-4930 Date Completed: June 20, 1996

Site Location: Castro Valley, California Completed By: CRTC



## TIER 2 EXPOSURE PATHWAY TRANSPORT PARAMETERS *CONTINUED*

| TRANSPORT PARAMETER | | SITE-SPECIFIC VALUE (INPUT VALUE BELOW) | DEFAULT VALUE (■ TO SELECT) | |
|---|---|---|---|---|
| ***SOIL PARAMETERS (Continued)*** | | | | |
| | **Soil volumetric air content (dim)** | | | |
| $\Theta_{acap}$ | •Capillary zone | | ■ 0.038 | ← 0.11 |
| $\Theta_{as}$ | •Vadose zone | | ■ 0.26 | ← 0.11 |
| $\Theta_{acrack}$ | •Foundation crack | | ■ 0.26 | |
| d | Thickness of surficial soil zone (cm) | 91.44 | ❑ 100 cm | |
| ***BUILDING PARAMETERS*** | | | | |
| | | | Resid. | Comm/ Ind. |
| $L_b$ | Building volume/area ratio (cm) | | ❑ 200 | ■ 300 ← |
| ER | Building air exchange rate (dy-1) | | ❑ 12 | ■ 20 ← |
| $L_{crack}$ | Foundation crack thickness (cm) | | ❑ 15 | ← |
| $\eta$ | Foundation crack fraction | | ❑ 0.01 | ← |

**Additional Information:**

Site Name: Former Service Station No. 9-4930 Date Completed: June 20, 1996

Site Location: Castro Valley, California Completed By: CRTC



# TIER 2 NATURAL ATTENUATION FACTOR CALCULATION METHODS AND RESULTS

**Instructions:** *For complete pathways involving constituent transport from source to receptor (e.g., air, groundwater, or surface water), specify method used to calculate Natural Attenuation Factor (NAF) and provide results for each constituent of concern (COC) at relevant POE location(s). "Distance to POE" represents lateral distance along transport pathway from point of maximum COC concentration in source medium to on-site or off-site POE. (Note: If the RBCA Spreadsheet System is used, NAF calculation results for all complete pathways can be found on the Excel "Calculations" worksheet.)*

**NOTE:**

1) Cpoe = Steady-state COC concentration in exposure medium at POE
2) $C_s$ = Representative COC concentration in source medium
3) POE = Point of exposure

## AIR EXPOSURE PATHWAYS

■ SURFACE SOILS: VAPOR INHALATION AND DUST INGESTION ☐ Complete: (provide data) ■ Not Complete: (skip)

### NAF CALCULATION METHOD

( ■ OR ● TO SELECT )

☐ Empirical Measurement:
- ○ Measured $C_s$ / $C_{poe}$ Ratio
- ○ RBCA Spreadsheet Calculation
- ○ Other (Describe below)

☐ Fate and Transport Modeling Used:
- ○ RBCA Spreadsheet Model
- ○ Other Model (Describe below)

☐ Bioattenuation Considered:
- ○ Yes ○ No

If yes, define method below.

### NAF CALCULATION RESULTS

| Constituents of Concern | Distance to POE: _____ ft NAF ($m^3$/kg) | _____ ft NAF ($m^3$/kg) | _____ ft NAF ($m^3$/kg) |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |

**Additional Information on NAF Calculation Method:**

Site Name: Former Service Station No. 9-4930 | Date Completed: June 20, 1996

Site Location: Castro Valley, California | Completed By: CRTC



TIER 2 NATURAL ATTENUATION FACTOR CALCULATION METHODS AND RESULTS Continued

**AIR EXPOSURE PATHWAYS *Continued***

■ **SUB-SURFACE SOILS: VAPOR INHALATION** ☐ Complete: (provide data) ■ Not Complete: (skip)

what about soil samples @ depths ranging from ~6-11' BG: do those not count?

**NAF CALCULATION METHOD**

( ■ OR ● TO SELECT )

☐ Empirical Measurement:

- ○ Measured $C_s$ / $C_{poe}$ Ratio
- ○ RBCA Spreadsheet Calculation
- ○ Other (Describe below)

☐ Fate and Transport Modeling Used:

- ○ RBCA Spreadsheet Model
- ○ Other Model (Describe below)

☐ Bioattenuation Considered:

○ Yes ○ No

If yes, define method below.

**NAF CALCULATION RESULTS**

| Constituents of Concern | Distance to POE: ____ ft NAF ($m^3$/kg) | ____ ft NAF ($m^3$/kg) | ____ ft NAF ($m^3$/kg) |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |

**Additional Information on NAF Calculation Method:**

Site Name: Former Service Station No. 9-4930 Date Completed: June 20, 1996

Site Location: Castro Valley, California Completed By: CRTC



TIER 2 NATURAL ATTENUATION FACTOR CALCULATION METHODS AND RESULTS Continued

## GROUNDWATER EXPOSURE PATHWAYS

■ SOIL: LEACHING TO GROUNDWATER / INGESTION ☐ Complete: (provide data) ■ Not Complete: (skip)

### NAF CALCULATION METHOD

( ■ OR ● TO SELECT )

☐ Empirical Measurement:
- ○ Measured $C_s / C_{poe}$ Ratio
- ○ RBCA Spreadsheet Calculation
- ○ Other (Describe below)

☐ Fate and Transport Modeling Used:
- ○ RBCA Spreadsheet Model
- ○ Other Model (Describe below)

☐ Bioattenuation Considered:
- ○ Yes ○ No

If yes, define method below.

### NAF CALCULATION RESULTS

| Constituents of Concern | Distance to POE _____ ft NAF (L/kg) | _____ ft NAF (L/kg) | _____ ft NAF (L/kg) |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |

**Additional Information on NAF Calculation Method:**

Site Name: Former Service Station No. 9-4930 | Date Completed: June 20, 1996

Site Location: Castro Valley, California | Completed By: CRTC



**TIER 2 NATURAL ATTENUATION FACTOR CALCULATION METHODS AND RESULTS Continued**

**GROUNDWATER EXPOSURE PATHWAYS *Continued***

■ **GROUNDWATER: INGESTION** ■ Complete: (provide data) ☐ Not Complete: (skip)

**NAF CALCULATION METHOD**

( ■ OR ● TO SELECT )

☐ **Empirical Measurement:**

- ○ Measured $C_s / C_{poe}$ Ratio
- ● RBCA Spreadsheet Calculation
- ○ Other (Describe below)

☐ **Fate and Transport Modeling Used:**

- ○ RBCA Spreadsheet Model
- ○ Other Model (Describe below)

☐ **Bioattenuation Considered:**

- ○ Yes ● No

If yes, define method below.

**NAF CALCULATION RESULTS**

| Constituents of Concern | Distance to POE: 0 ft NAF (dim) | 50 ft NAF (dim) | ____ ft NAF (dim) |
|---|---|---|---|
| 1 Benzene | 1.0 | 2300 | |
| 2 Ethylbenzene | 1.0 | 23,000,000 | |
| 3 Toluene | 1.0 | 4.8E+24 | |
| 4 Xylenes (mixed isomers) | 1.0 | 11,000,000 | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |

**Additional Information on NAF Calculation Method:**

Site Name: Former Service Station No. 9-4930 | Date Completed: June 20, 1996

Site Location: Castro Valley, California | Completed By: CRTC



TIER 2 NATURAL ATTENUATION FACTOR CALCULATION METHODS AND RESULTS Continued

## SURFACE WATER EXPOSURE PATHWAYS

■ SOIL: LEACHING TO GROUNDWATER / DISCHARGE TO SURFACE WATER: CONTACT RECREATION OR FISH CONSUMPTION ☐ Complete: (provide data) ■ Not Complete: (skip)

### NAF CALCULATION METHOD

( ■ OR ● TO SELECT )

☐ Empirical Measurement:
- ○ Measured $C_s$ / $C_{poe}$ Ratio
- ○ RBCA Spreadsheet Calculation
- ○ Other (Describe below)

☐ Fate and Transport Modeling Used:
- ○ RBCA Spreadsheet Model
- ○ Other Model (Describe below)

☐ Bioattenuation Considered:
- ○ Yes ○ No

If yes, define method below.

### NAF CALCULATION RESULTS

| Constituents of Concern | Distance to POE: _____ ft NAF (L/kg) | _____ ft NAF (L/kg) | _____ ft NAF (L/kg) |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 0 | | | |

Additional Information on NAF Calculation Method:

Site Name: Former Service Station No. 9-4930 | Date Completed: June 20, 1996

Site Location: Castro Valley, California | Completed By: CRTC



TIER 2 NATURAL ATTENUATION FACTOR CALCULATION METHODS AND RESULTS Continued

**SURFACE WATER EXPOSURE PATHWAYS** *Continued*

■ GROUNDWATER: DISCHARGE TO SURFACE WATER CONTACT RECREATION OR FISH CONSUMPTION ☐ Complete: (provide data) ■ Not Complete: (skip)

**NAF CALCULATION METHOD**

( ■ OR ● TO SELECT )

☐ Empirical Measurement:
- ○ Measured $C_s$ / $C_{poe}$ Ratio
- ○ RBCA Spreadsheet Calculation
- ○ Other (Describe below)

☐ Fate and Transport Modeling Used:
- ○ RBCA Spreadsheet Model
- ○ Other Model (Describe below)

☐ Bioattenuation Considered:
- ○ Yes ○ No

If yes, define method below.

**NAF CALCULATION RESULTS**

| Constituents of Concern | Distance to POE _____ ft NAF (dim) | _____ ft NAF (dim) | _____ ft NAF (dim) |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |

Additional Information on NAF Calculation Method:

Site Name: Former Service Station No. 9-4930 | Site Location: Castro Valley, California | Completed By: CRTC | Date Completed: 6/20/1996 | 5 OF 6

## TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

**GROUNDWATER EXPOSURE PATHWAYS** ☐ (CHECKED IF PATHWAY IS ACTIVE)

SOIL: LEACHING TO GROUNDWATER/
INGESTION

| Constituents of Concern | Exposure Concentration 1) Source Medium — Soil Concentration (mg/kg) | 2) NAF Value (L/kg) Receptor | | 3) Exposure Medium — Groundwater Concentration (mg/L) (1)/(2) | | 4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day) | | 5) Average Daily Intake Rate (mg/kg-day) | |
|---|---|---|---|---|---|---|---|---|---|
| Benzene | 4.3E-1 | | | | | | | | |
| Ethylbenzene | 3.6E+0 | | | | | | | | |
| Toluene | 6.6E-1 | | | | | | | | |
| Xylene (mixed isomers) | 1.2E+1 | | | | | | | | |

NOTE: AT = Averaging time (days)
BW = Body Weight (kg)
CF = Units conversion factor
ED = Exp. duration (yrs)
EF = Exposure frequency (days/yr)
IR = Intake rate (L/day)
POE = Point of exposure

Site Name: Former Service Station No. 9-4930 | Site Location: Castro Valley, California | Completed By: CRTC | Date Completed: 6/20/1996 | 6 OF 6

## TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

**GROUNDWATER EXPOSURE PATHWAYS** ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER INGESTION

| Constituents of Concern | Exposure Concentration: 1) Source Medium — Groundwater Concentration (mg/L) | 2) NAF Value (dim) — Receptor: On-Site Commercial | 2) NAF Value (dim) — Receptor: Off-Site Residential | 3) Exposure Medium — Groundwater: POE Conc. (mg/L) (1)/(2): On-Site Commercial | 3) Exposure Medium — Groundwater: POE Conc. (mg/L) (1)/(2): Off-Site Residential | 4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day): On-Site Commercial | 4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day): Off-Site Residential | 5) Average Daily Intake Rate (mg/kg-day): On-Site Commercial | 5) Average Daily Intake Rate (mg/kg-day): Off-Site Residential | MAX. PATHWAY INTAKE (mg/kg-day) (Maximum intake of active pathways soil leaching & groundwater routes.): On-Site Commercial | MAX. PATHWAY INTAKE (mg/kg-day) (Maximum intake of active pathways soil leaching & groundwater routes.): Off-Site Residential |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzene | 6.8E-2 | 1.0E+0 | 2.3E+3 | 6.8E-2 | 3.0E-5 | 3.5E-3 | 1.2E-2 | 2.4E-4 | 3.5E-7 | 2.4E-4 | 3.5E-7 |
| Ethylbenzene | 2.6E-2 | 1.0E+0 | 2.3E+7 | 2.6E-2 | 1.1E-9 | 9.8E-3 | 2.7E-2 | 2.5E-4 | 3.1E-11 | 2.5E-4 | 3.1E-11 |
| Toluene | 3.0E-3 | 1.0E+0 | 4.8E+24 | 3.0E-3 | 6.2E-28 | 9.8E-3 | 2.7E-2 | 2.9E-5 | 1.7E-29 | 2.9E-5 | 1.7E-29 |
| Xylene (mixed isomers) | 1.4E-2 | 1.0E+0 | 1.1E+7 | 1.4E-2 | 1.3E-9 | 9.8E-3 | 2.7E-2 | 1.3E-4 | 3.5E-11 | 1.3E-4 | 3.5E-11 |

NOTE: AT = Averaging time (days) | BW = Body Weight (kg) | CF = Units conversion factor | ED = Exp. duration (yrs) | EF = Exposure frequency (days/yr) | IR = Intake rate (L/day or mg/day) | POE = Point of exposure



Serial: G-411-ZHX-574 | Software: GSI RBCA Spreadsheet Version: v 1.0

pages 1 – 5 ?

Variables ?

EF – ?

ED – ?

~~IR~~ ?

IR – ?

Site Name: Former Service Station No. 9-4930 | Site Location: Castro Valley, California | Completed By: CRTC | Date Completed: 6/20/1996 | 5 OF 6

## TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

**GROUNDWATER EXPOSURE PATHWAYS** ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: INGESTION

Exposure Concentration

| Constituents of Concern | 1) Source Medium: Groundwater Concentration (mg/L) | 2) NAF Value (dim) Receptor: On-Site Commercial | 2) NAF Value (dim) Receptor: Off-Site Residential | 3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)(2): On-Site Commercial | 3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)(2): Off-Site Residential | 4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day): On-Site Commercial | 4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day): Off-Site Residential | 5) Average Daily Intake Rate (mg/kg-day): On-Site Commercial | 5) Average Daily Intake Rate (mg/kg-day): Off-Site Residential |
|---|---|---|---|---|---|---|---|---|---|
| Benzene | 6.8E-2 | 1.0E+0 | 2.3E+3 | 6.8E-2 | 3.0E-5 | 3.5E-3 | 1.2E-2 | 2.4E-4 | 3.5E-7 |
| Ethylbenzene | 2.6E-2 | 1.0E+0 | 2.3E+7 | 2.6E-2 | 1.1E-9 | 9.8E-3 | 2.7E-2 | 2.5E-4 | 3.1E-11 |
| Toluene | 3.0E-3 | 1.0E+0 | 4.8E+24 | 3.0E-3 | 6.2E-28 | 9.8E-3 | 2.7E-2 | 2.9E-5 | 1.7E-29 |
| Xylene (mixed isomers) | 1.4E-2 | 1.0E+0 | 1.1E+7 | 1.4E-2 | 1.3E-9 | 9.8E-3 | 2.7E-2 | 1.3E-4 | 3.5E-11 |

**MAX. PATHWAY INTAKE (mg/kg-day)**

*(Maximum intake of active pathways soil leaching & groundwater routes.)*

| On-Site Commercial | Off-Site Residential |
|---|---|
| 2.4E-4 | 3.5E-7 |
| 2.5E-4 | 3.1E-11 |
| 2.9E-5 | 1.7E-29 |
| 1.3E-4 | 3.5E-11 |

NOTE: AT = Averaging time (days)
BW = Body Weight (kg)
CF = Units conversion factor
ED = Exp. duration (yrs)
EF = Exposure frequency (days/yr)
IR = Intake rate (L/day or mg/day)
POE = Point of exposure



Serial: G-411-ZHX-574
Software: GSI RBCA Spreadsheet
Version: v 1.0

**RBCA SITE ASSESSMENT** | **Tier 2 Worksheet 8.2**

Site Name: Former Service Station No. 9-4930 Site Location: Castro Valley, California Completed By: CRTC Date Completed: 6/20/1996

## TIER 2 PATHWAY RISK CALCULATION

**GROUNDWATER EXPOSURE PATHWAYS** ■ (CHECKED IF PATHWAYS ARE ACTIVE)

| | | CARCINOGENIC RISK | | | | | TOXIC EFFECTS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) EPA Carcinogenic Classification | (2) Total Carcinogenic Intake Rate (mg/kg/day) | | (3) Oral Slope Factor | (4) Individual COC Risk (2) x (3) | | (5) Total Toxicant Intake Rate (mg/kg/day) | | (6) Oral Reference Dose | (7) Individual COC Hazard Quotient (5) / (6) | |
| Constituents of Concern | | On-Site Commercial | Off-Site Residential | (mg/kg-day)^-1 | On-Site Commercial | Off-Site Residential | On-Site Commercial | Off-Site Residential | (mg/kg-day) | On-Site Commercial | Off-Site Residential |
| Benzene | A | 2.4E-4 | 3.5E-7 | 2.9E-2 | 6.9E-6 | 1.0E-8 | | | | | |
| Ethylbenzene | D | | | | | | 2.5E-4 | 3.1E-11 | 1.0E-1 | 2.5E-3 | 3.1E-10 |
| Toluene | D | | | | | | 2.9E-5 | 1.7E-29 | 2.0E-1 | 1.5E-4 | 8.5E-29 |
| Xylene (mixed isomers) | D | | | | | | 1.3E-4 | 3.5E-11 | 2.0E+0 | 6.6E-5 | 1.8E-11 |
| *Total Pathway Carcinogenic Risk =* | | | | | 6.9E-6 | 1.0E-8 | *Total Pathway Hazard Index =* | | | 2.7E-3 | 3.2E-10 |

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pages 1 and 2 ?

Site Name: Former Service Station No. 9-4930 Site Location: Castro Valley, California Completed By: CRTC Date Completed: 6/20/1996 3 OF 3

## TIER 2 PATHWAY RISK CALCULATION

**GROUNDWATER EXPOSURE PATHWAYS** ■ (CHECKED IF PATHWAYS ARE ACTIVE)

| | | CARCINOGENIC RISK | | | | | TOXIC EFFECTS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) EPA Carcinogenic Classification | (2) Total Carcinogenic Intake Rate (mg/kg/day) | | (3) Oral Slope Factor | (4) Individual COC Risk (2) x (3) | | (5) Total Toxicant Intake Rate (mg/kg/day) | | (6) Oral Reference Dose | (7) Individual COC Hazard Quotient (5) / (6) | |
| Constituents of Concern | | On-Site Commercial | Off-Site Residential | (mg/kg-day)^-1 | On-Site Commercial | Off-Site Residential | On-Site Commercial | Off-Site Residential | (mg/kg-day) | On-Site Commercial | Off-Site Residential |
| Benzene | A | 2.4E-4 | 3.5E-7 | 2.9E-2 | 6.9E-6 | 1.0E-8 | | | | | |
| Ethylbenzene | D | | | | | | 2.5E-4 | 3.1E-11 | 1.0E-1 | 2.5E-3 | 3.1E-10 |
| Toluene | D | | | | | | 2.9E-5 | 1.7E-29 | 2.0E-1 | 1.5E-4 | 8.5E-29 |
| Xylene (mixed isomers) | D | | | | | | 1.3E-4 | 3.5E-11 | 2.0E+0 | 6.6E-5 | 1.8E-11 |
| ***Total Pathway Carcinogenic Risk =*** | | | | | 6.9E-6 | 1.0E-8 | ***Total Pathway Hazard Index =*** | | | 2.7E-3 | 3.2E-10 |

Site Name: Former Service Station No. 9-4930
Site Location: Castro Valley, California

Completed By: CRTC
Date Completed: 6/20/1996



## TIER 2 BASELINE RISK SUMMARY TABLE

| EXPOSURE PATHWAY | BASELINE CARCINOGENIC RISK | | | | | BASELINE TOXIC EFFECTS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Individual COC Risk | | Cumulative COC Risk | | Risk Limit(s) Exceeded? | Hazard Quotient | | Hazard Index | | Toxicity Limit(s) Exceeded? |
| | Maximum Value | Target Risk | Total Value | Target Risk | | Maximum Value | Applicable Limit | Total Value | Applicable Limit | |
| *AIR EXPOSURE PATHWAYS* | | | | | | | | | | |
| Complete: | 0.0E+0 | 1.0E-4 | 0.0E+0 | N/A | ☐ | 0.0E+0 | 1.0E+0 | 0.0E+0 | N/A | ☐ |
| *GROUNDWATER EXPOSURE PATHWAYS* | | | | | | | | | | |
| Complete: | 6.9E-6 | 1.0E-4 | 6.9E-6 | N/A | ☐ | 2.5E-3 | 1.0E+0 | 2.7E-3 | N/A | ☐ |
| *SOIL EXPOSURE PATHWAYS* | | | | | | | | | | |
| Complete: | 0.0E+0 | 1.0E-4 | 0.0E+0 | N/A | ☐ | 0.0E+0 | 1.0E+0 | 0.0E+0 | N/A | ☐ |
| CRITICAL EXPOSURE PATHWAY (Select Maximum Values From Complete Pathways) | | | | | | | | | | |
| | 6.9E-6 | 1.0E-4 | 6.9E-6 | N/A | ☐ | 2.5E-3 | 1.0E+0 | 2.7E-3 | N/A | ☐ |

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Software: GSI RBCA Spreadsheet
Version: v 1.0

## RBCA SITE ASSESSMENT

**Tier 2 Worksheet 9.2**

Site Name: Former Service Station No. 9-4930
Site Location: Castro Valley, California

Completed By: CRTC
Date Completed: 6/20/1996

Target Risk (Class A & B) 1.0E-4
Target Risk (Class C) 1.0E-4
Target Hazard Quotient 1.0E+0

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option: 2

## SUBSURFACE SOIL SSTL VALUES (> 3 FT BGS)

SSTL Results For Complete Exposure Pathways ("x" if Complete)

| CONSTITUENTS OF CONCERN | | Representative Concentration | | Soil Leaching to Groundwater | | | X | Soil Volatilization to Indoor Air | | Soil Volatilization to Outdoor Air | | Applicable SSTL | SSTL Exceeded ? | Required CRF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CAS No. | Name | (mg/kg) | Residential (on-site) | Commercial (on-site) | Regulatory(MCL) (on-site) | | Residential (on-site) | Commercial (on-site) | Residential (on-site) | Commercial (on-site) | (mg/kg) | "■" If yes | Only if "yes" left |
| 71-43-2 | Benzene | 4.3E-1 | NA | NA | NA | | NA | 1.5E+0 | NA | NA | 1.5E+0 | ☐ | <1 |
| 100-41-4 | Ethylbenzene | 3.6E+0 | NA | NA | NA | | NA | >Res | NA | NA | >Res | ☐ | <1 |
| 108-88-3 | Toluene | 6.6E-1 | NA | NA | NA | | NA | 1.0E+2 | NA | NA | 1.0E+2 | ☐ | <1 |
| 1330-20-7 | Xylene (mixed isomers) | 1.2E+1 | NA | NA | NA | | NA | >Res | NA | NA | >Res | ☐ | <1 |



Software: GSI RBCA Spreadsheet
Version: v 1.0

Serial: G-411-ZHX-574

where are the SSTLs being derived?

RBCA SITE ASSESSMENT | Tier 2 Worksheet 9.2

Site Name: Former Service Station No. 9-4930
Site Location: Castro Valley, California

Completed By: CRTC
Date Completed: 6/20/1996



## SUBSURFACE SOIL SSTL VALUES (> 3 FT BGS)

Target Risk (Class A & B) 1.0E-4
Target Risk (Class C) 1.0E-4
Target Hazard Quotient 1.0E+0

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option: 2

SSTL Results For Complete Exposure Pathways ("x" if Complete)

| CONSTITUENTS OF CONCERN | | Representative Concentration | Soil Leaching to Groundwater | | | X Soil Volatilization to Indoor Air | | Soil Volatilization to Outdoor Air | | Applicable SSTL | SSTL Exceeded ? | Required CRF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CAS No. | Name | (mg/kg) | Residential (on-site) | Commercial (on-site) | Regulatory(MCL) (on-site) | Residential (on-site) | Commercial (on-site) | Residential (on-site) | Commercial (on-site) | (mg/kg) | "■" If yes | Only if "yes" left |
| 71-43-2 | Benzene | 4.3E-1 | NA | NA | NA | NA | 1.5E+0 | NA | NA | 1.5E+0 | ☐ | <1 |
| 100-41-4 | Ethylbenzene | 3.6E+0 | NA | NA | NA | NA | >Res | NA | NA | >Res | ☐ | <1 |
| 108-88-3 | Toluene | 6.6E-1 | NA | NA | NA | NA | 1.0E+2 | NA | NA | 1.0E+2 | ☐ | <1 |
| 1330-20-7 | Xylene (mixed isomers) | 1.2E+1 | NA | NA | NA | NA | >Res | NA | NA | >Res | ☐ | <1 |



Software: GSI RBCA Spreadsheet
Version: v 1.0

Serial: G-411-ZHX-574

# RBCA SITE ASSESSMENT

**Tier 2 Worksheet 9.3**

Site Name: Former Service Station No. 9-4930
Site Location: Castro Valley, California

Completed By: CRTC
Date Completed: 6/20/1996



## GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-4
Target Risk (Class C) 1.0E-4
Target Hazard Quotient 1.0E+0

☐ MCL exposure limit?
☐ PEL exposure limit?

**Calculation Option: 2**

**SSTL Results For Complete Exposure Pathways ("x" if Complete)**

| CONSTITUENTS OF CONCERN | | Representative Concentration | X Groundwater Ingestion | | | X Groundwater Volatilization to Indoor Air | | Groundwater Volatilization to Outdoor Air | | Applicable SSTL | SSTL Exceeded ? | Required CRF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CAS No. | Name | (mg/L) | Residential: 50 feet | Commercial: (on-site) | Regulatory(MCL): (on-site) | Residential: (on-site) | Commercial: (on-site) | Residential (on-site) | Commercial: (on-site) | (mg/L | "■" If yes | Only if "yes" left |
| 71-43-2 | Benzene | 6.8E-2 | 6.8E+2 | 9.9E-1 | NA | NA | 1.1E+0 | NA | NA | 9.9E-1 | ☐ | <1 |
| 100-41-4 | Ethylbenzene | 2.6E-2 | >Sol | 1.0E+1 | NA | NA | >Sol | NA | NA | 1.0E+1 | ☐ | <1 |
| 108-88-3 | Toluene | 3.0E-3 | >Sol | 2.0E+1 | NA | NA | 6.8E+1 | NA | NA | 2.0E+1 | ☐ | <1 |
| 1330-20-7 | Xylene (mixed isomers) | 1.4E-2 | >Sol | >Sol | NA | NA | >Sol | NA | NA | >Sol | ☐ | <1 |



Software: GSI RBCA Spreadsheet
Version: v 1.0

Serial: G-411-ZHX-574

# RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.3

Site Name: Former Service Station No. 9-4930
Site Location: Castro Valley, California

Completed By: CRTC
Date Completed: 6/20/1996

## GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-4
Target Risk (Class C) 1.0E-4
Target Hazard Quotient 1.0E+0

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option: 2

SSTL Results For Complete Exposure Pathways ("x" if Complete)

| CONSTITUENTS OF CONCERN | | Representative Concentration | X Groundwater Ingestion | | | X Groundwater Volatilization to Indoor Air | | Groundwater Volatilization to Outdoor Air | | Applicable SSTL | SSTL Exceeded ? | Required CRF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CAS No. | Name | (mg/L) | Residential: 50 feet | Commercial: (on-site) | Regulatory(MCL): (on-site) | Residential: (on-site) | Commercial: (on-site) | Residential (on-site) | Commercial: (on-site) | (mg/L | "■" If yes | Only if "yes" left |
| 71-43-2 | Benzene | 6.8E-2 | 6.8E+2 | 9.9E-1 | NA | NA | 1.1E+0 | NA | NA | 9.9E-1 | ☐ | <1 |
| 100-41-4 | Ethylbenzene | 2.6E-2 | >Sol | 1.0E+1 | NA | NA | >Sol | NA | NA | 1.0E+1 | ☐ | <1 |
| 108-88-3 | Toluene | 3.0E-3 | >Sol | 2.0E+1 | NA | NA | 6.8E+1 | NA | NA | 2.0E+1 | ☐ | <1 |
| 1330-20-7 | Xylene (mixed isomers) | 1.4E-2 | >Sol | >Sol | NA | NA | >Sol | NA | NA | >Sol | ☐ | <1 |



Software: GSI RBCA Spreadsheet
Version: v 1.0

Serial: G-411-ZHX-574

# Appendix A

# RBCA Tier 2 Evaluation Model Input Parameters

# RBCA TIER 1/TIER 2 EVALUATION

**Output Table 1**

Site Name: Former Service Station No. 9-886 Identification: YWTT12641
Site Location: Castro Valley, California Date Completed 6/20/96
Completed By CRTC

Software: GSI RBCA Spreadsheet
Version: v 1.0

NOTE: values which differ from Tier 1 default values are shown in bold italics and underlined.

## DEFAULT PARAMETERS

| Exposure Parameter | Definition (Units) | Residential Adult | Residential (1-6yrs) | Residential (1-16 yrs) | Commercial/Industrial Chronic | Commercial/Industrial Constrctn |
|---|---|---|---|---|---|---|
| ATc | Averaging time for carcinogens (yr) | 70 | | | | |
| ATn | Averaging time for non-carcinogens (yr) | 30 | 6 | 16 | 25 | 1 |
| BW | Body Weight (kg) | 70 | 15 | 35 | 70 | |
| ED | Exposure Duration (yr) | 30 | 6 | 16 | 25 | 1 |
| EF | Exposure Frequency (days/yr) | 350 | | | 250 | 180 |
| EF Derm | Exposure Frequency for dermal exposure | 350 | | | 250 | |
| IRgw | Ingestion Rate of Water (l/day) | 2 | | | 1 | |
| IRs | Ingestion Rate of Soil (mg/day) | 100 | 200 | | 50 | 100 |
| IRadj | Adjusted soil ing. rate (mg-yr/kg-d) | 1.1E+02 | | | 9.4E+01 | |
| IRa in | Inhalation rate indoor (m^3/day) | 15 | | | 20 | |
| IRa out | Inhalation rate outdoor (m^3/day) | 20 | | | 20 | 10 |
| SA | Skin surface area (dermal) (cm^2) | 5.8E+03 | | 2.0E+03 | 5.8E+03 | 5.8E+03 |
| SAadj | Adjusted dermal area (cm^2-yr/kg) | 2.1E+03 | | | 1.7E+03 | |
| M | Soil to Skin adherence factor | 1 | | | | |
| AAFs | Age adjustment on soil ingestion | FALSE | | | FALSE | |
| AAFd | Age adjustment on skin surface area | FALSE | | | FALSE | |
| tox | Use EPA tox data for air (or PEL based) | TRUE | | | | |
| gwMCL? | Use MCL as exposure limit in groundwater? | FALSE | | | | |

| Matrix of Exposed Persons to Complete Exposure Pathways | | Residential | Commercial/Industrial Chronic | Commercial/Industrial Constrctn |
|---|---|---|---|---|
| **Groundwater Pathways:** | | | | |
| GW i | Groundwater Ingestion | TRUE | TRUE | |
| GW v | Volatilization to Outdoor Air | FALSE | FALSE | |
| GW b | Vapor Intrusion to Buildings | FALSE | TRUE | |
| **Soil Pathways** | | | | |
| S v | Volatiles from Subsurface Soils | FALSE | FALSE | |
| SS v | Volatiles and Particulate Inhalation | FALSE | FALSE | FALSE |
| SS d | Direct Ingestion and Dermal Contact | FALSE | FALSE | FALSE |
| S l | Leaching to Groundwater from all Soils | FALSE | FALSE | |
| S b | Intrusion to Buildings - Subsurface Soils | FALSE | TRUE | |

| Matrix of Receptor Distance and Location on- or off-site | | Residential Distance | Residential On-Site | Commercial/Industrial Distance | Commercial/Industrial On-Site |
|---|---|---|---|---|---|
| GW | Groundwater receptor (cm) | 1.5E+03 | FALSE | | TRUE |
| S | Inhalation receptor (cm) | | FALSE | | FALSE |

| Matrix of Target Risks | | Individual | Cumulative |
|---|---|---|---|
| TRab | Target Risk (class A&B carcinogens) | ***1.0E-04*** | |
| TRc | Target Risk (class C carcinogens) | ***1.0E-04*** | |
| THQ | Target Hazard Quotient | 1.0E+00 | |
| Opt | Calculation Option (1, 2, or 3) | 2 | |
| Tier | RBCA Tier | 2 | |

| Surface Parameters | Definition (Units) | Residential | Commercial/Industrial Chronic | Commercial/Industrial Construction |
|---|---|---|---|---|
| t | Exposure duration (yr) | 30 | 25 | 1 |
| A | Contaminated soil area (cm^2) | ***8.0E+06*** | | ***8.0E+06*** |
| W | Length of affected soil parallel to wind (cm) | ***2.8E+03*** | | ***2.8E+03*** |
| W.gw | Length of affected soil parallel to groundwater (c | 1.5E+03 | | |
| Uair | Ambient air velocity in mixing zone (cm/s) | 2.3E+02 | | |
| delta | Air mixing zone height (cm) | 2.0E+02 | | |
| Lss | Definition of surficial soils (cm) | ***9.1E+01*** | | |
| Pe | Particulate areal emission rate (g/cm^2/s) | 2.2E-10 | | |

| Groundwater | Definition (Units) | Value |
|---|---|---|
| delta gw | Groundwater mixing zone depth (cm) | ***2.0E+02*** |
| I | Groundwater infiltration rate (cm/yr) | 3.0E+01 |
| Ugw | Groundwater Darcy velocity (cm/yr) | ***2.4E+01*** |
| Ugw.tr | Groundwater Transport velocity (cm/yr) | ***6.1E+01*** |
| Ks | Saturated Hydraulic Conductivity(cm/s) | 1.0E-04 |
| grad | Groundwater Gradient (cm/cm) | 7.5E-03 |
| Sw | Width of groundwater source zone (cm) | 1.5E+03 |
| Sd | Depth of groundwater source zone (cm) | 9.8E+01 |
| BC | Biodegradation Capacity (mg/L) | |
| BIO? | Is Bioattenuation Considered | TRUE |
| phi.eff | Effective Porosity in Water-Bearing Unit | 3.8E-01 |
| foc.sat | Fraction organic carbon in water-bearing unit | 1.0E-03 |

| Soil | Definition (Units) | Value | capillary | vadose | foundation |
|---|---|---|---|---|---|
| hc | Capillary zone thickness (cm) | ***3.3E+00*** | | | |
| hv | Vadose zone thickness (cm) | ***1.9E+02*** | | | |
| rho | Soil density (g/cm^3) | 1.7 | | | |
| foc | Fraction of organic carbon in vadose zone | 0.01 | | | |
| phi | Soil porosity in vadose zone | 0.38 | | | |
| Lgw | Depth to groundwater (cm) | ***2.0E+02*** | | | |
| Ls | Depth to top of affected soil (cm) | ***1.8E+02*** | | | |
| Lsubs | Thickness of affected subsurface soils (cm) | ***1.8E+02*** | | | |
| pH | Soil/groundwater pH | 6.5 | | | |
| phi.w | Volumetric water content | | 0.342 | 0.12 | 0.12 |
| phi.a | Volumetric air content | | 0.038 | 0.26 | 0.26 |

| Building | Definition (Units) | Residential | Commercial |
|---|---|---|---|
| Lb | Building volume/area ratio (cm) | 2.0E+02 | 3.0E+02 |
| ER | Building air exchange rate (s^-1) | 1.4E-04 | 2.3E-04 |
| Lcrk | Foundation crack thickness (cm) | 1.5E+01 | |
| eta | Foundation crack fraction | 0.01 | |

| Dispersive Transport Parameters | Definition (Units) | Residential | Commercial |
|---|---|---|---|
| **Groundwater** | | | |
| ax | Longitudinal dispersion coefficient (cm) | 1.5E+02 | |
| ay | Transverse dispersion coefficient (cm) | 5.0E+01 | |
| az | Vertical dispersion coefficient (cm) | 7.6E+00 | |
| **Vapor** | | | |
| dcy | Transverse dispersion coefficient (cm) | | |
| dcz | Vertical dispersion coefficient (cm) | | |



Residential should be: $10^{-6} - 10^{-5}$
Commercial " " : $10^{-5} - 10^{-4}$

Cap. zone thickness O.K.?

# RBCA CHEMICAL DATABASE

**Physical Property Data**

| CAS Number | Constituent | type | Molecular Weight (g/mole) MW | ref | Diffusion Coefficients in air (cm2/s) Dair | re | in water (cm2/s) Dwat | re | log (Koc) or log(Kd) (@ 20 - 25 C) (l/kg) Koc | ref | Henry's Law Constant (@ 20 - 25 C) (atm-m3/mol) | (unitless) | re | Vapor Pressure (@ 20 - 25 C) (mm Hg) Pure Component | ref | Solubility (@ 20 - 25 C) (mg/l) Pure Component | ref | acid pKa | base pKb | ref |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 71-43-2 | Benzene | A | 78.1 | 5 | 9.30E-02 | A | 1.10E-05 | A | 1.58 | A | 5.29E-03 | 2.20E-01 | A | 9.52E+01 | 4 | 1.75E+03 | A | | | |
| 100-41-4 | Ethylbenzene | A | 106.2 | 5 | 7.60E-02 | A | 8.50E-06 | A | 1.98 | A | 7.69E-03 | 3.20E-01 | A | 1.00E+01 | 4 | 1.52E+02 | 5 | | | |
| 108-88-3 | Toluene | A | 92.4 | 5 | 8.50E-02 | A | 9.40E-06 | A | 2.13 | A | 6.25E-03 | 2.60E-01 | A | 3.00E+01 | 4 | 5.15E+02 | 29 | | | |
| 1330-20-7 | Xylene (mixed isomers) | A | 106.2 | 5 | 7.20E-02 | A | 8.50E-06 | A | 2.38 | A | 6.97E-03 | 2.90E-01 | A | 7.00E+00 | 4 | 1.98E+02 | 5 | | | |

Site Name: Former Service Stati Site Location: Castro Valley, Calif Completed By: CRTC Date Completed: 6/20/1996

Software version: v 1.0

# RBCA CHEMICAL DATABASE

**Toxicity Data**

| CAS Number | Constituent | Reference Dose (mg/kg/day) Oral RfD_oral | ref | Inhalation RfD_inhal | re | Slope Factors 1/(mg/kg/day) Oral SF_oral | ref | Inhalation SF_inhal | ref | EPA Weight of Evidence | Is Constituent Carcinogenic ? |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 71-43-2 | Benzene | - | R | 1.70E-03 | R | 2.90E-02 | A | 2.90E-02 | A | A | TRUE |
| 100-41-4 | Ethylbenzene | 1.00E-01 | A | 2.86E-01 | A | - | R | - | R | D | FALSE |
| 108-88-3 | Toluene | 2.00E-01 | A,R | 1.14E-01 | , | - | R | - | R | D | FALSE |
| 1330-20-7 | Xylene (mixed isomers) | 2.00E+00 | A,R | 2.00E+00 | A | - | R | - | R | D | FALSE |

Site Name: Former Servic Site Location: Castro Valley, Californi Completed By: CRTC Date Completed: 6/20/1996

Software version: v 1.0

# RBCA CHEMICAL DATABASE

**Miscellaneous Chemical Data**

| CAS Number | Constituent | Maximum Contaminant Level MCL (mg/L) | reference | Permissible Exposure Limit PEL/TLV (mg/m3) | ref | Relative Absorption Factors Oral | Dermal | Detection Limits Groundwater (mg/L) | ref | Soil (mg/kg) | re | Half Life (First-Order Decay) (days) Saturated | Unsaturated | ref |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 71-43-2 | Benzene | 5.00E-03 | 52 FR 25690 | 3.20E+00 | OSHA | 1 | 0.5 | 0.002 | C | 0.005 | S | 720 | 720 | H |
| 100-41-4 | Ethylbenzene | 7.00E-01 | 6 FR 3526 (30 Jan 91 | 4.34E+02 | ACGIH | 1 | 0.5 | 0.002 | C | 0.005 | S | 228 | 228 | H |
| 108-88-3 | Toluene | 1.00E+00 | 6 FR 3526 (30 Jan 91 | 1.47E+02 | ACGIH | 1 | 0.5 | 0.002 | C | 0.005 | S | 28 | 28 | H |
| 1330-20-7 | Xylene (mixed isomers) | 1.00E+01 | 6 FR 3526 (30 Jan 91 | 4.34E+02 | ACGIH | 1 | 0.5 | 0.005 | C | 0.005 | S | 360 | 360 | H |

Site Name: Former Servic Site Location: Castro Valley, California  Completed By: CRTC  Date Completed: 6/20/1996

Software version: v 1.0

RBCA SITE ASSESSMENT | Input Screen 7

## REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

(Complete the following table)

| CONSTITUENT | Representative COC Concentration in Groundwater | | in Surface Soil | | in Subsurface Soil | |
|---|---|---|---|---|---|---|
| | value (mg/L) | note | value (mg/kg) | note | value (mg/kg | note |
| Benzene | 6.8E-2 | UCL | | | 4.3E-1 | UCL |
| Ethylbenzene | 2.6E-2 | UCL | | | 3.6E+0 | UCL |
| Toluene | 3.0E-3 | UCL | | | 6.6E-1 | UCL |
| Xylene (mixed isomers) | 1.4E-2 | UCL | | | 1.2E+1 | UCL |

Site Name: Former Service Station No. 9-4930
Site Location: Castro Valley, California

Completed By: CRTC
Date Completed: 6/20/1996



upper 90% CL values not correct

RBCA SITE ASSESSMENT | Input Screen 9.1

# CONSTITUENT HALF-LIFE VALUES

(Complete the following table)

| CONSTITUENT | Half-Life of Constituent (day) |
|---|---|
| Benzene | 720 |
| Ethylbenzene | 228 |
| Toluene | 28 |
| Xylene (mixed isomers) | 360 |

Site Name: Former Service Station No. 9- Completed By: CRTC
Site Location: Castro Valley, California Date Completed: 6/20/1996

RBCA SITE ASSESSMENT | Input Screen 9.4

# GROUNDWATER DAF VALUES

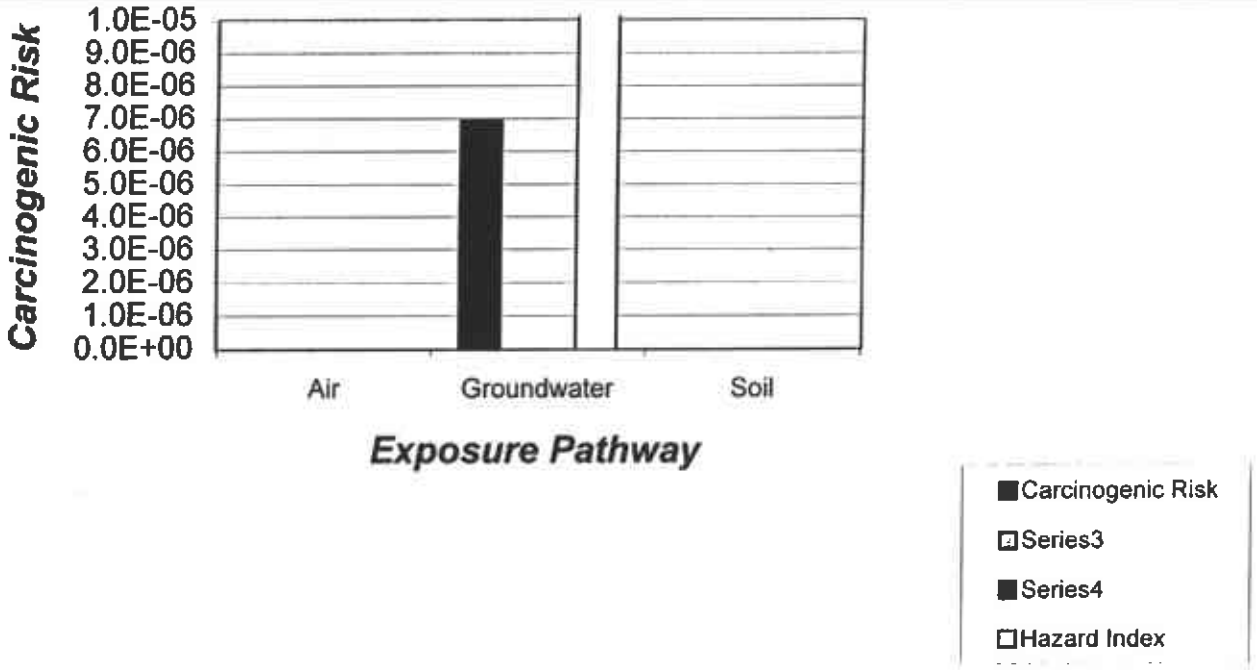
(Enter DAF values in the grey area of the following table)

| CONSTITUENT | Dilution Attenuation Factor (DAF) in Groundwater | |
|---|---|---|
| | Residential Receptor | Comm./Ind. Receptor |
| Benzene | 2.3E+3 | 1.0E+0 |
| Ethylbenzene | 2.3E+7 | 1.0E+0 |
| Toluene | 4.8E+24 | 1.0E+0 |
| Xylene (mixed isomers) | 1.1E+7 | 1.0E+0 |

Site Name: Former Service Station No. 9-4930
Site Location: Castro Valley, California

Completed By: CRTC
Date Completed: 6/20/1996

Total Risk for Each Pathway



# Appendix B

# RBCA Tier 2 Figures



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.

FORMER CHEVRON U.S.A. SERVICE STATION 9-4930
3369 Castro Valley Boulevard at Wilbeam Avenue
Castro Valley, California

SITE LOCATION MAP

FIGURE: 1
PROJECT: 320-156.1A

N

WALK WRIGHT SHOES

BUILDING

PARKING

RETAIL STORE

BAKERS SQUARE

PARKING

EX-PHOTO MAT

PLANTER

WALGREENS

SANWA BANK

BEAUTY SALON

BIKE SHOP

RYNCK TIRE AND AUTO CENTER

UNOCAL

CASTRO VALLEY BOULEVARD

GP-1

ICE CREAMERY

WILDERNESS SUPPLY

FONG CHINESE RESTAURANT

CLEANERS

FORMER SALS CAR REPAIR

PARKING

GP-2

DRIVEWAY

PARKING

GP-3

RESIDENCE

DRIVEWAY

OFFICE

VILLA HERMOSA APARTMENTS

GP-4

WILBEAM AVENUE

FORMER PRODUCT ISLANDS (TYP)

MW-1

MW-2

MW-4

STATION BUILDING

EXTENT OF OVER EXCAVATION

FORMER WASTE OIL TANK

FORMER UNDERGROUND FUEL STORAGE TANKS (TYP)

MW-3

LAWN

APARTMENTS

APARTMENTS

KRAGEN

PARKING

PARKING

SHOPPING CENTER

LUCKYS SUPERMARKET

**LEGEND**

MW-1 ◉ GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION

GP-4 GROUNDWATER PROBE LOCATION AND DESIGNATION

SHELL

GREAT WESTERN BANK

APPROXIMATE DIRECTION OF GROUNDWATER FLOW

PACIFIC ENVIRONMENTAL GROUP, INC.

APPROXIMATE SCALE

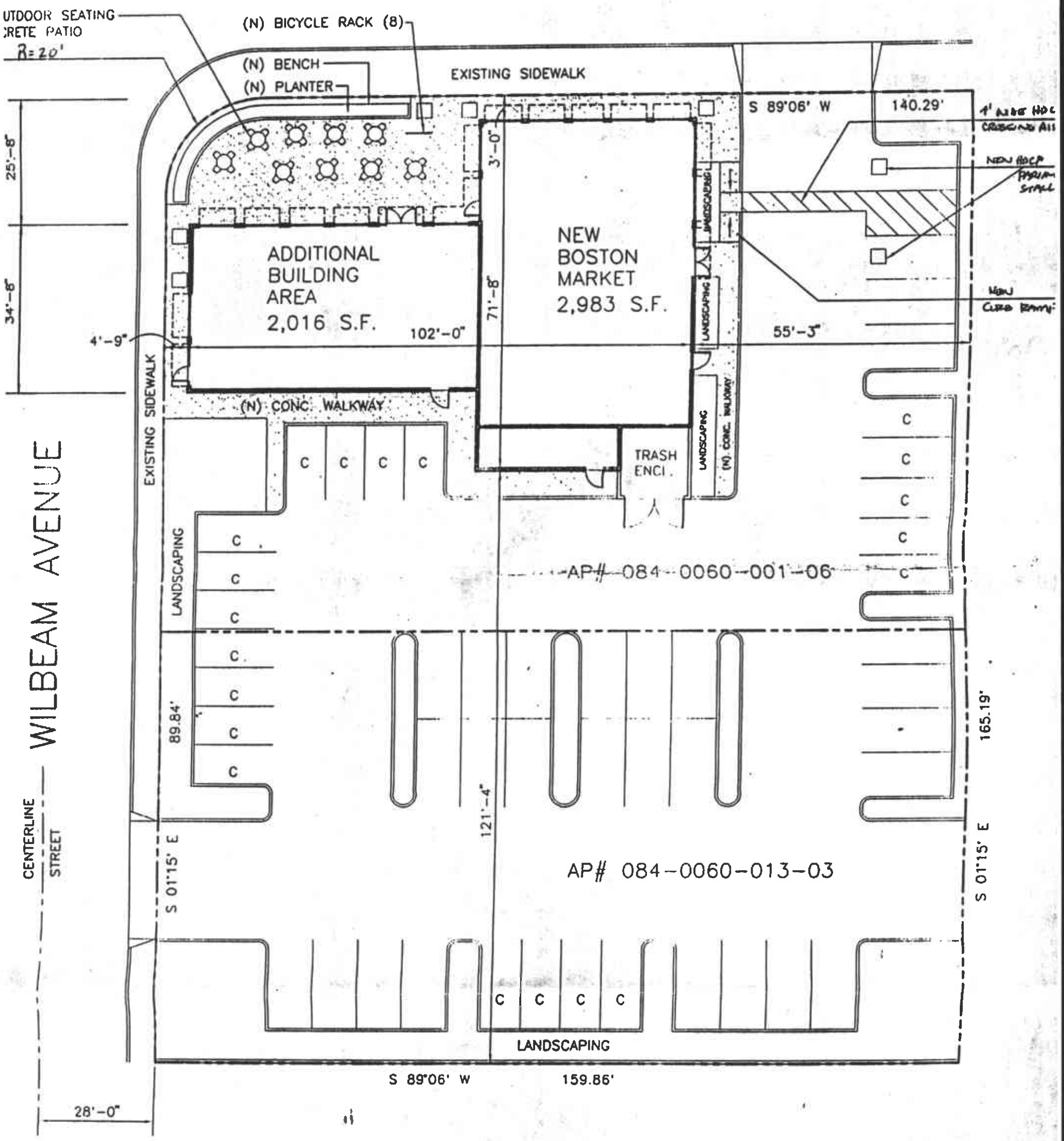
0 60 120 FEET

FORMER CHEVRON U.S.A. SERVICE STATION 9-4930
3369 Castro Valley Boulevard at Wilbeam Avenue
Castro Valley, California

EXTENDED SITE MAP

FIGURE: 2

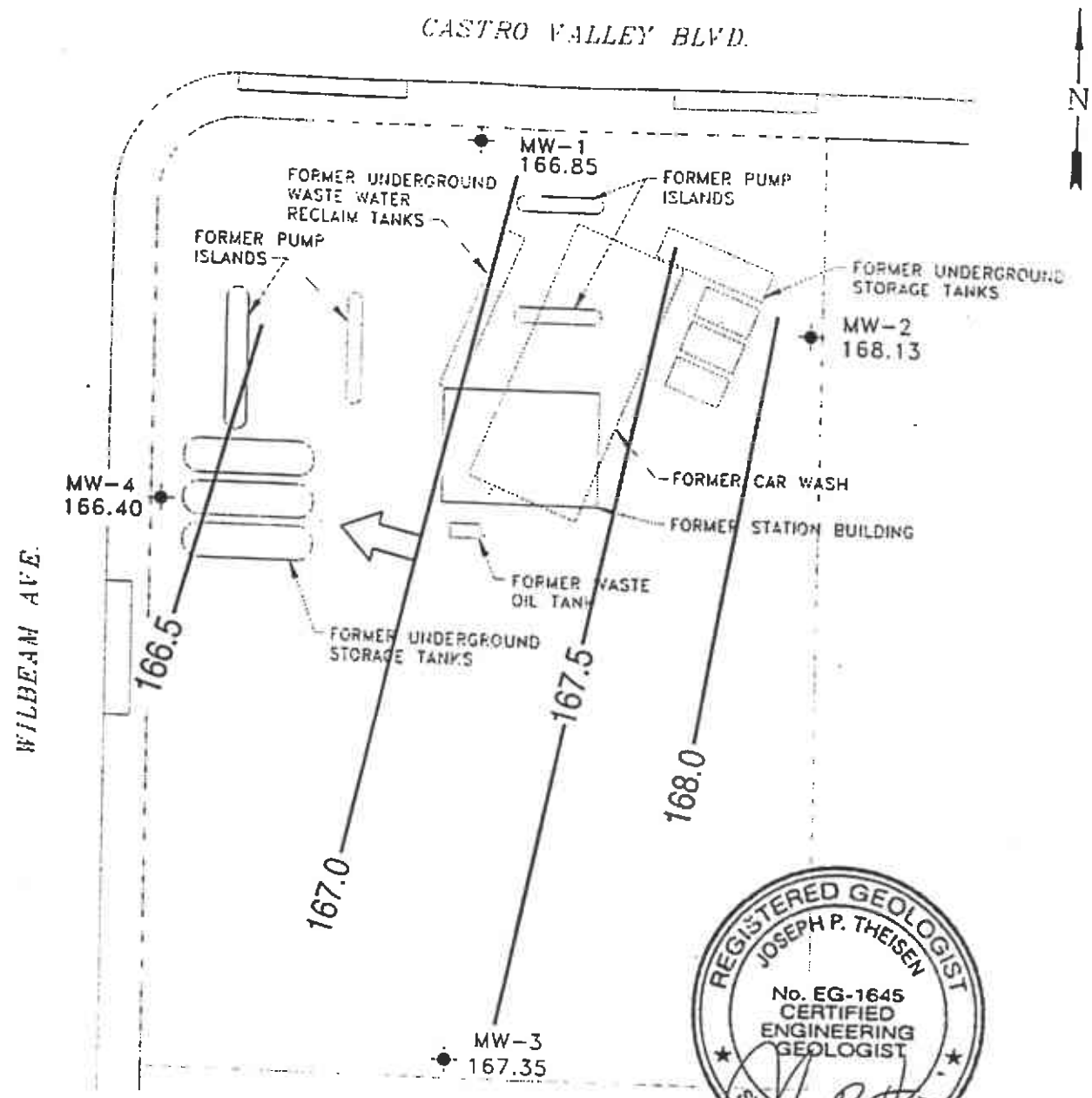
PROJECT:




# SITE PLAN

SCALE: 1"=20'-0"

NORTH




**LEGEND**

PROPERTY LINE

MONITORING WELL

X.XX POTENTIOMETRIC SURFACE ELEVATION (FT)

POTENTIOMETRIC SURFACE CONTOUR

GROUNDWATER FLOW DIRECTION

NOTE:

1. CONTOURS REPRESENT APPROXIMATE ELEVATIONS ABOVE MEAN SEA LEVEL.

0 FEET 40
SCALE

Base map from Geotracker Technology, Inc.

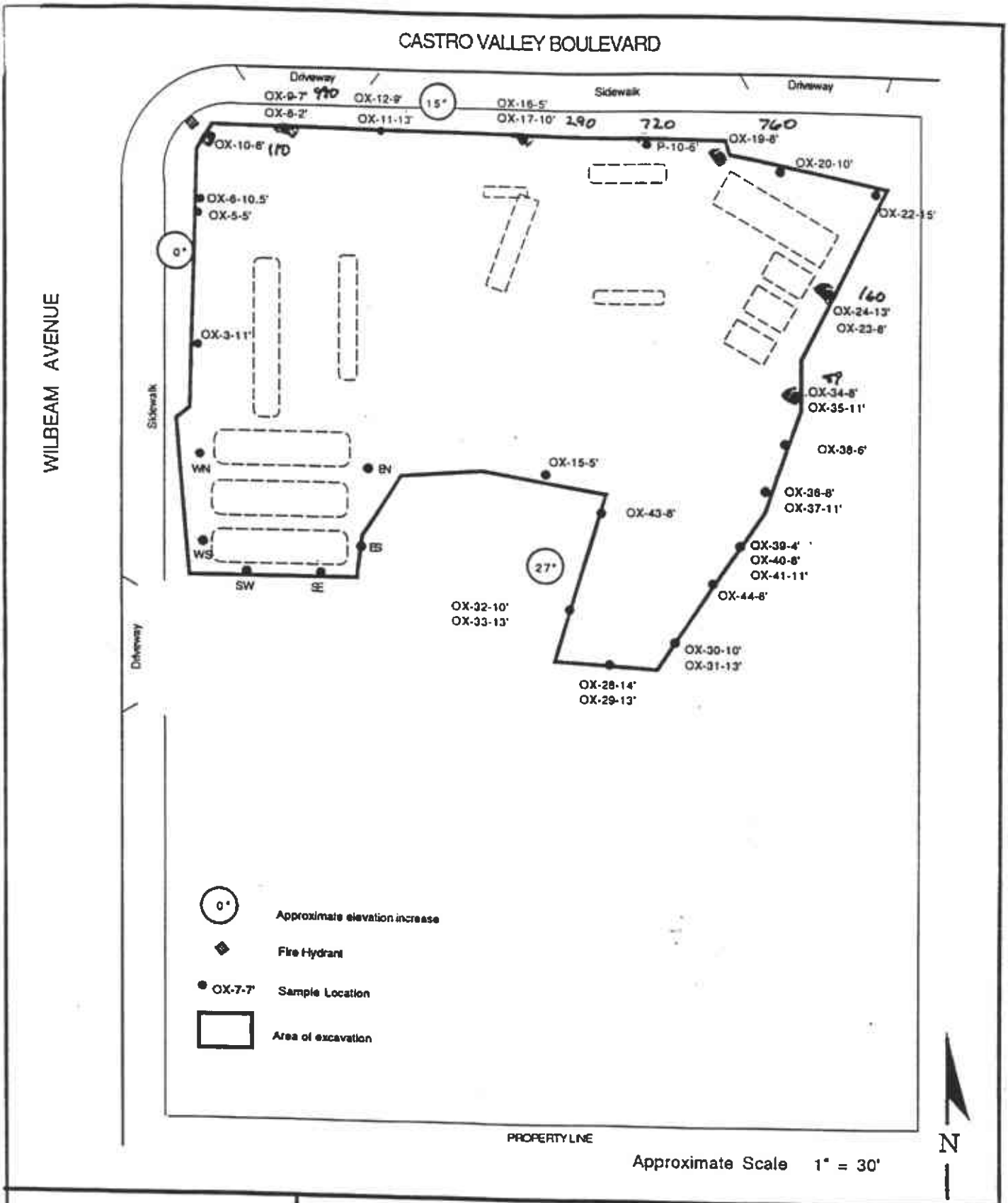
CAMBRIA
Environmental Technology, Inc.

Chevron Facility 9-4930
3369 Castro Valley Blvd
Castro Valley, California

\CHEVRON\9-4930\4930-GM.DWG

Ground Water Elevation
January 26, 1996

FIGURE
1




Touchstone Developments
Environmental Management

# Sidewall
## Sample Location Map
Chevron Service Station No. 9-4930
3369 Castro Valley Boulevard
Castro Valley, California

Figure 4

05-12-93 | mjt

Project # 4930-2

# Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Analytical results are in parts per billion (ppb)

| DATE | Well Head Elev. | Ground Water Elev. | Depth To Water | Notes | TPH-Gasoline | Benzene | Toluene | Ethyl-Benzene | Xylene | 1,2-DCE | TCE | DCFM | PCE | MTBE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MW-1** | | | | | | | | | | | | | | |
| 10/29/93 | 172.90 | 166.15 | 6.75 | -- | 1000 | 11 | 17 | 32 | 110 | -- | -- | -- | -- | -- |
| 02/25/94 | 172.90 | 166.80 | 6.10 | -- | 250 | 6.0 | 1.0 | 5.0 | 3.0 | -- | -- | -- | -- | -- |
| 04/04/94 | 172.90 | 166.14 | 6.76 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 04/29/94 | 172.90 | 166.35 | 6.55 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 06/13/94 | 172.90 | 166.12 | 6.78 | -- | 670 | 35 | 3.5 | 43 | 3.9 | 0.8 | 16 | 14 | 47 | -- |
| 06/30/94 | 172.90 | 166.06 | 6.84 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 07/28/94 | 172.90 | 166.03 | 6.87 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 08/31/94 | 172.90 | 166.00 | 6.90 | -- | 560 | 43 | 9.5 | 25 | 5.0 | 1.3 | 19 | 13 | 65 | -- |
| 11/11/94 | 172.90 | 167.00 | 5.90 | -- | 460 | 53 | 4.0 | 50 | 3.4 | -- | -- | -- | -- | -- |
| 02/01/95 | 172.90 | 166.88 | 6.02 | -- | 240 | 25 | 0.60 | 4.0 | <0.5 | -- | -- | -- | -- | -- |
| 05/18/95 | 172.90 | 166.82 | 6.08 | -- | 580 | 42 | 1.0 | 53 | 2.6 | -- | -- | -- | -- | -- |
| 08/22/95 | 172.90 | 166.52 | 6.38 | -- | 840 | 73 | 1.2 | 110 | 1.6 | -- | -- | -- | -- | -- |
| 11/01/95 | 172.90 | 166.40 | 6.50 | -- | 350 | 36 | <0.5 | 30 | <0.5 | -- | -- | -- | -- | 15 |
| 01/26/96 | 172.90 | 166.85 | 6.05 | -- | 210 | 23 | <0.5 | 12 | <0.5 | -- | -- | -- | -- | 4.7 |
| **MW-2** | | | | | | | | | | | | | | |
| 10/29/93 | 173.91 | 166.05 | 7.86 | -- | 5600 | 140 | 3.2 | 17 | 330 | -- | -- | -- | -- | -- |
| 02/25/94 | 173.91 | 166.96 | 6.95 | -- | 820 | 41 | <0.5 | 17 | 5.0 | -- | -- | -- | -- | -- |
| 04/04/94 | 173.91 | 166.18 | 7.73 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 04/29/94 | 173.91 | 166.23 | 7.68 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 06/13/94 | 173.91 | 166.20 | 7.71 | -- | 1100 | 160 | 0.8 | 64 | 2.0 | <0.5 | 0.9 | <0.5 | 2.0 | -- |
| 06/30/94 | 173.91 | 165.87 | 8.04 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 07/28/94 | 173.91 | 165.99 | 7.92 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 08/31/94 | 173.91 | 165.98 | 7.93 | -- | 190 | 7.1 | 4.1 | 3.1 | 1.2 | <0.5 | 1.1 | <0.5 | 4.5 | -- |
| 11/11/94 | 173.91 | 167.08 | 6.83 | -- | 440 | 120 | <1.0 | 18 | <1.0 | -- | -- | -- | -- | -- |
| 02/01/95 | 173.91 | 167.77 | 6.14 | -- | 240 | 81 | <1.0 | <1.0 | <1.0 | -- | -- | -- | -- | -- |
| 05/18/95 | 173.91 | 166.91 | 7.00 | -- | 330 | 74 | <0.5 | 26 | 1.3 | -- | -- | -- | -- | -- |
| 08/22/95 | 173.91 | 166.58 | 7.33 | -- | 390 | 84 | <1.0 | 2.1 | <1.0 | -- | -- | -- | -- | -- |
| 11/01/95 | 173.91 | 166.54 | 7.37 | -- | 190 | 46 | <0.5 | 1.6 | <0.5 | -- | -- | -- | -- | <2.5 |
| 01/26/96 | 173.91 | 168.13 | 5.78 | -- | <50 | 13 | <0.5 | <0.5 | <0.5 | -- | -- | -- | -- | <2.5 |

# Cumulative Table of Well Data and Analytical Results

Vertical Measurements are in feet. Analytical results are in parts per billion (ppb)

| DATE | Well Head Elev. | Ground Water Elev. | Depth To Water | Notes | TPH-Gasoline | Benzene | Toluene | Ethyl-Benzene | Xylene | 1,2-DCE | TCE | DCFM | PCE | MTBE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MW-3** | | | | | | | | | | | | | | |
| 10/29/93 | 172.60 | 164.96 | 7.64 | -- | 110 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | -- | -- | -- |
| 02/25/94 | 172.60 | 166.22 | 6.38 | -- | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | -- | -- | -- |
| 04/04/94 | 172.60 | 165.21 | 7.39 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 04/29/94 | 172.60 | 165.62 | 6.98 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 06/13/94 | 172.60 | 165.15 | 7.45 | -- | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 2.0 | <0.5 | 220 | -- |
| 06/30/94 | 172.60 | 165.05 | 7.55 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 07/28/94 | 172.60 | 164.93 | 7.67 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 08/31/94 | 172.60 | 164.81 | 7.79 | -- | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | 1.6 | <0.5 | 320 | -- |
| 11/11/94 | 172.60 | 165.73 | 6.87 | Sampled biannually | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 02/01/95 | 172.60 | 167.03 | 5.57 | -- | 89 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | -- | -- | -- |
| 05/18/95 | 172.60 | 165.79 | 6.81 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 08/22/95 | 172.60 | 165.35 | 7.25 | -- | 190 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | -- | -- | -- |
| 11/01/95 | 172.60 | 165.70 | 6.90 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 01/26/96 | 172.60 | 167.35 | 5.25 | -- | 160 | <2.5 | <0.5 | <0.5 | <0.5 | -- | -- | -- | -- | <2.5 |
| **MW-4** | | | | | | | | | | | | | | |
| 10/29/93 | 170.68 | 165.18 | 5.50 | -- | 640 | 6.7 | 3.3 | 0.6 | 6.7 | -- | -- | -- | -- | -- |
| 02/25/94 | 170.68 | 165.86 | 4.82 | -- | 450 | 20 | 0.8 | 12 | 6.0 | -- | -- | -- | -- | -- |
| 04/04/94 | 170.68 | 165.23 | 5.45 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 04/29/94 | 170.68 | 165.45 | 5.23 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 06/13/94 | 170.68 | 165.14 | 5.54 | -- | 1700 | 130 | 1.4 | 100 | 11 | 22 | 59 | 13 | 180 | -- |
| 06/30/94 | 170.68 | 165.13 | 5.55 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 07/28/94 | 170.68 | 165.06 | 5.62 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 08/31/94 | 170.68 | 165.00 | 5.68 | -- | 800 | 17 | 3.5 | 9.3 | 4.4 | 25 | 53 | 22 | 510 | -- |
| 11/11/94 | 170.68 | 165.46 | 5.22 | -- | 500 | 26 | <0.5 | 30 | 4.3 | -- | -- | -- | -- | -- |
| 02/01/95 | 170.68 | 165.12 | 5.56 | -- | 1600 | 180 | <2.0 | 31 | 42 | -- | -- | -- | -- | -- |
| 05/18/95 | 170.68 | 165.70 | 4.98 | -- | 1300 | 130 | <2.0 | 140 | 5.5 | -- | -- | -- | -- | -- |
| 08/22/95 | 170.68 | 165.35 | 5.33 | -- | 970 | 50 | <1.2 | 75 | <1.2 | -- | -- | -- | -- | -- |
| 11/01/95 | 170.68 | 165.28 | 5.40 | -- | 320 | 3.3 | <0.5 | 4.1 | <0.5 | -- | -- | -- | -- | 27 |
| 01/26/96 | 170.68 | 166.40 | 4.28 | -- | 1400 | 65 | <2.5 | 98 | 71 | -- | -- | -- | -- | 100 |

# Cumulative Table of Well Data and Analytical Results

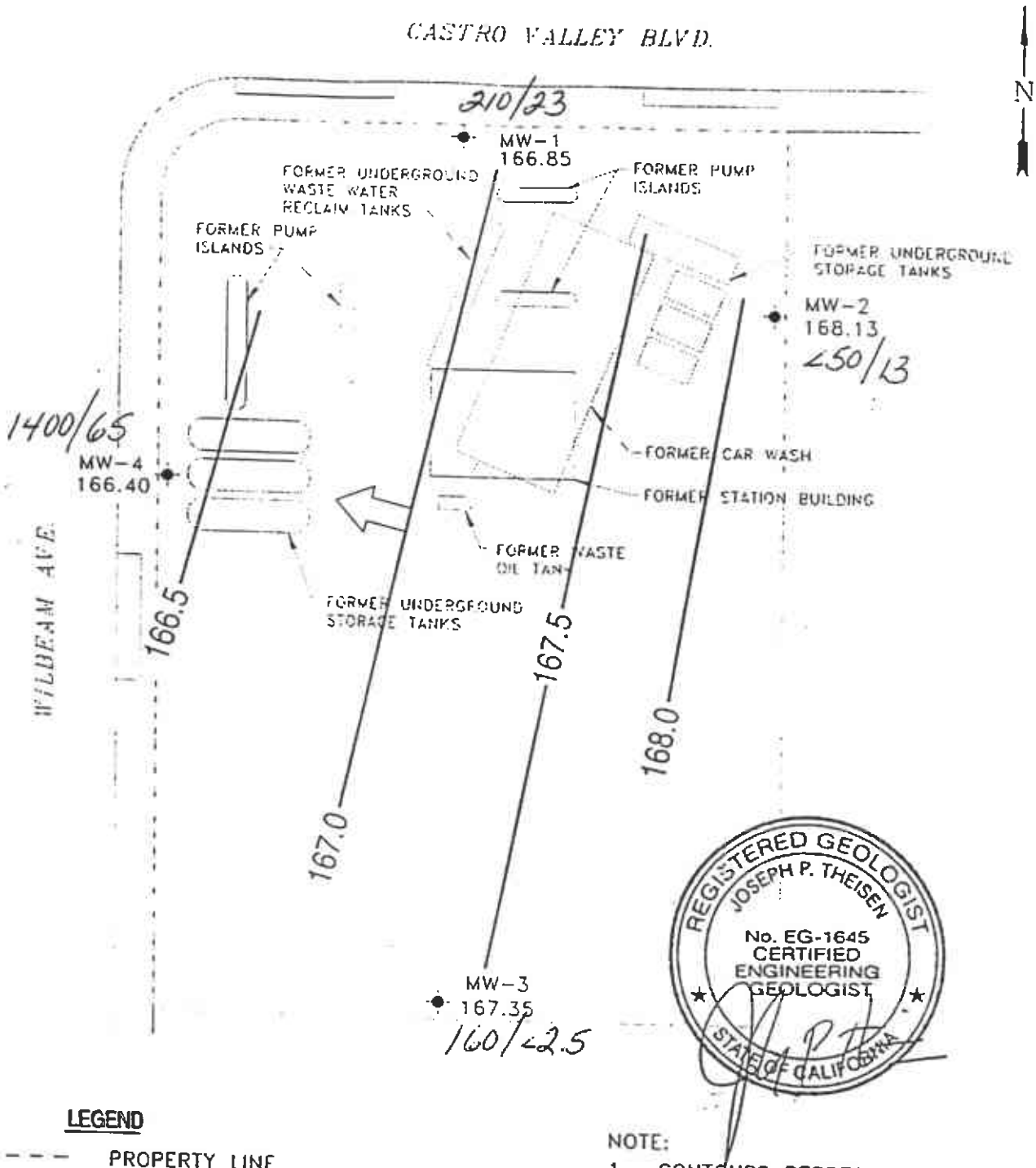
Vertical Measurements are in feet. Analytical results are in parts per billion (ppb)

| DATE | Well Head Elev. | Ground Water Elev. | Depth To Water | Notes | TPH-Gasoline | Benzene | Toluene | Ethyl-Benzene | Xylene | 1,2-DCE | TCE | DCFM | PCE | MTBE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TRIP BLANK** | | | | | | | | | | | | | | |
| 02/25/94 | -- | -- | -- | -- | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | -- | -- | -- |
| 06/13/94 | -- | -- | -- | -- | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | -- | -- | -- |
| 08/31/94 | -- | -- | -- | -- | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | -- | -- | -- |
| 11/11/94 | -- | -- | -- | -- | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | -- | -- | -- |
| 02/01/95 | -- | -- | -- | -- | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | -- | -- | -- |
| 05/18/95 | -- | -- | -- | -- | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | -- | -- | -- |
| 08/22/95 | -- | -- | -- | -- | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | -- | -- | -- |
| 11/01/95 | -- | -- | -- | -- | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | -- | -- | -- |
| 01/26/96 | -- | -- | -- | -- | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | -- | -- | -- | <2.5 |

Note: Blaine Tech Services, Inc. began routine monitoring of the groundwater wells at this site on November 1, 1994. Earlier field data and analytical results are drawn from the September 27, 1994 Groundwater Technology, Inc. report.

ABBREVIATIONS:
TPH = Total Petroleum Hydrocarbons
1,2-DCE = 1,2-Dichloroethene
TCE = Trichloroethene
DCFM = Dichlorodifluoromethane
PCE = Tetrachloroethene
MTBE = Methyl t-Butyl Ether

TPH-g / BENZENE (ug/L)




**LEGEND**

PROPERTY LINE

MONITORING WELL

X.XX — POTENTIOMETRIC SURFACE ELEVATION (FT)

POTENTIOMETRIC SURFACE CONTOUR

GROUNDWATER FLOW DIRECTION

NOTE:

1. CONTOURS REPRESENT APPROXIMATE ELEVATIONS ABOVE MEAN SEA LEVEL.

0 FEET 40
SCALE

Base map from Geotechnical Technology, Inc.

CAMBRIA
Environmental Technology, Inc.

Chevron Facility 9-4930
3369 Castro Valley Blvd
Castro Valley, California

\CHEVRON\9-4930\4930-GM.DWG

Ground Water Elevation
January 26, 1996

FIGURE
1