Chevron

August 14, 1996

Mr. Scott O. Seery, CHMM
Alameda County Health Agency
1131 Harbor Bay Parkway, 2nd Floor
Alameda, California 94502

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

Toxicology & Health Risk Assessment

RE: Revised Worksheet 5.1 and Output Table 1
Revised Draft Final Tier 2 RBCA Summary Report
Former Chevron Service Station No. 9-4930
Castro Valley, California

Dear Scott,

Attached are copies of revised Worksheet 5.1 and Output Table 1 for incorporation into the Revised Draft Final Tier 2 Risk-Based Corrective Action Site Evaluation for the Former Service Station No. 9-4930 located in Castro Valley, California. As we discussed in our conversation today, the only change made to Worksheet 5.1 was to correct a typographical error for soil porosity, from 0.48 to 0.45. The value of 0.45 was used in the RBCA calculations, therefore revisions to the results are not necessary. In addition, Output Table 1 was revised to reflect the selection of both residential and commercial/industrial exposure pathways evaluated. As I mentioned to you, we ran two separate runs of the RBCA model: one for a potential resident receptor and another for a potential worker receptor. Only the exposure pathways considered for a potential resident receptor were presented in the evaluation. The revised Output Table 1 now shows the exposure pathways evaluated for both potential resident and worker receptors.

Finally, for your information, I ran the RBCA model using all of the same input parameters, with the exception of changing the fraction organic carbon in vadose-zone soil from 0.001 to 0.0001. The estimated risks and site-specific target level values remained unchanged.

If you have any questions or would like additional information, please do not hesitate to call me at (510) 242-3365.

Sincerely,

Michele Emerson

Michele Emerson

attachment
cc: P. R. Briggs
C. A. Peck
R. I. Magaw
THRA Files

Site Name: Former Service Station No.9-4930 | Date Completed: August 14, 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.**

Soil Parameters		Default Value Used		Site-Specific Value Used		
	soil type	❑	sandy soil	■	silty sand soil	*§
Θ_T	Soil porosity	❑	0.38 (dim)	■	0.45	§
Θ_{ws}	water content - vadose zone	❑	0.12 (dim)	■	0.14	§
Θ_{as}	air content - vadose zone ($= \Theta_T - \Theta_{ws}$)	❑	0.26 (dim)	■	0.31	
Θ_{wcap}	water content - capillary fringe	❑	0.342 (dim)	■	0.392	
Θ_{acap}	air content - capillary fringe ($= \Theta_T - \Theta_{wcap}$)	❑	0.038 (dim)	■	0.058	
ρ_s	Soil density	■	1.7 g/cm^3	❑		§
foc	mass fraction of organic carbon in soil	❑	0.01 (dim)	■	0.001	§
Ls	Depth to contaminated soil	❑	100 cm	■	140 cm	§
Lgw	Depth to groundwater	❑	300 cm	■	200 cm	§
h_{cap}	capillary zone thickness	❑	5 cm	■	15 cm	
hv	vadose zone thickness (= Lgw - hc)	❑	295 cm	■	180 cm	
pH	Soil/water pH	■	6.5	❑		
Groundwater Parameters						
I	Water infiltration rate	■	30 cm/yr	❑		§
V_{gw}	groundwater velocity	❑	82.0 ft/yr	■	24 cm/yr	*§
δ_{gw}	groundwater mixing zone depth	■	200 cm	❑		*§
DF	aquifer dilution factor ($= 1 + V_{gw}\,\delta_{gw} / (IW)$)	❑	12.1	■	1.06	
Surface Parameters						
U_{air}	Amb. air velocity in mixing zone	■	225 cm/s	❑		*§
δ_{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	❑		
η	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)

RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

Site Name: Former Service Station No. 9-48b Identification: YWTT12641
Site Location: Castro Valley, California Date Completed: 8/14/96
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	FALSE	TRUE	
GW.v	Volatilization to Outdoor Air	FALSE	FALSE	
GW.b	Vapor Intrusion to Buildings	TRUE	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	TRUE	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)		FALSE		TRUE
S	Inhalation receptor (cm)		TRUE		TRUE

Matrix of Target Risks		Individual	Cumulative	Individual	Cumulative
TRab	Target Risk (class A&B carcinogens)	***1.0E-05***		***1.0E-04***	
TRc	Target Risk (class C carcinogens)	1.0E-05		1.0E-04	
THQ	Target Hazard Quotient	1 0E+00		1.0E+00	
Opt	Calculation Option (1, 2, or 3)	2		2	
Tier	RBCA Tier	2		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)	2.2E+06		1 0E+06
W	Length of affected soil parallel to wind (cm)	1.5E+03		1 0E+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)	***5.2E+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)	2.3E+02
BC	Biodegradation Capacity (mg/L)	
BIO?	Is Bioattenuation Considered	TRUE
phi.eff	Effective Porosity in Water-Bearing Unit	4.5E-01
foc.sat	Fraction organic carbon in water-bearing unit	1.0E-03

Soil	Definition (Units)	Value		
hc	Capillary zone thickness (cm)	***1.5E+01***		
hv	Vadose zone thickness (cm)	***1.8E+02***		
rho	Soil density (g/cm^3)	1.7		
foc	Fraction of organic carbon in vadose zone	***0.001***		
phi	Soil porosity in vadose zone	***0.45***		
Lgw	Depth to groundwater (cm)	***2.0E+02***		
Ls	Depth to top of affected soil (cm)	***1.4E+02***		
Lsubs	Thickness of affected subsurface soils (cm)	***2.3E+02***		
pH	Soil/groundwater pH	6.5		
		capillary	vadose	foundation
phi.w	Volumetric water content	***0.392***	***0.14***	***0.14***
phi.a	Volumetric air content	***0.058***	***0.31***	***0.31***

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)		
ay	Transverse dispersion coefficient (cm)		
az	Vertical dispersion coefficient (cm)		
Vapor			
dcy	Transverse dispersion coefficient (cm)		
dcz	Vertical dispersion coefficient (cm)		

July 16, 1996

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Richmond, CA 94804-0054

Toxicology & Health Risk Assessment

RE: Revised Draft Final Tier 2 RBCA Summary Report
Former Chevron Service Station No. 9-4930
Castro Valley, California

Dear Scott,

Attached is a copy of the Revised Draft Final Tier 2 Risk-Based Corrective Action Site Evaluation for the Former Service Station No. 9-4930 located in Castro Valley, California. The previous version of this evaluation, prepared on June 21, 1996, was revised based on your comments discussed during a meeting attended by you, Curt Peck, and myself on July 9. Baseline risks and site-specific target levels (SSTLs) were estimated for potential exposures to onsite workers and residents. Risks to potential future residents were estimated by conservatively assuming that they will be located onsite. Per our discussion, SSTLs for potential onsite workers and residents were derived based on 1×10^{-4} and 1×10^{-5} excess cancer risks, respectively.

Additional significant changes made to the previous evaluation include:

- Data from the most recent groundwater sampling (May 8, 1996) were included in the data base.
- Data from an additional subsurface soil sample (P-10) was added to the subsurface soil data base.
- The analytical data used in the evaluation was included as Appendix C.
- 95th upper confidence limit concentrations were selected as representative concentrations.
- Potential resident receptor ingestion of groundwater exposure pathway was not evaluated.
- Minor changes were made to soil parameters including: soil porosity and fraction organic carbon.
- Several of the worksheets were duplicated and renumbered to show potential worker and resident risks separately (For example, see Worksheets 8.3a and 8.3b).

Estimated risks for potential future onsite workers and residents are within the acceptable excess risk limit range of 1×10^{-6} to 1×10^{-4}, and the representative concentrations for the chemicals of concern are all less than the estimated SSTL values, with the exception of benzene in subsurface soil potentially exposed to future onsite residents in indoor air.

If you have any questions or would like additional information, please do not hesitate to call me at (510) 242-3365.

Sincerely,

Michele Emerson

Michele Emerson

attachment
cc: P. R. Briggs
C. A. Peck
R. I. Magaw
THRA Files

SUMMARY REPORT

❑ TIER 1 / ■ TIER 2 RBCA SITE EVALUATION

REVISED DRAFT 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

July 16, 1996
DATE ISSUED

Site Name: Former Service Station No. 9-4930 Date Completed: July 16, 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: July 16, 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 Model Input Parameters		❑	■ *(u)*
Appendix B Figures		❑	■ *(u)*
Appendix C Analytical Data		❑	■ *(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: July 16, 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^{-5}
• Groundwater	☐	■	10^{-4}				10^{-5}

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: July 16, 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 inhalation of indoor air (This pathway was evaluated assuming that future residents are located onsite and are exposed to indoor air vapors from both subsurface soils and 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.

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.

2. **Tier 2 Worksheet 9.2a** - SSTL value for worker inhalation of benzene in indoor air from subsurface soil (> 3 ft bgs) is **1.2 mg/kg**. The representative onsite subsurface soil concentratration of benzene is **0.6 mg/kg**.
3. **Tier 2 Worksheet 9.2b** - SSTL value for resident inhalation of benzene in indoor air from subsurface soil is **0.27 mg/kg**. The representative onsite subsurface soil concentratration of benzene is **0.6 mg/kg**.
3. **Tier 2 Worksheet 9.3a** - SSTL value for worker exposure to benzene in groundwater is **0.99 mg/L**. The representative onsite groundwater concentratration of benzene is **0.073 mg/L**.
4. **Tier 2 Worksheet 9.3b** - SSTL value for resident exposure to benzene in groundwater is **0.26 mg/L**. The representative onsite groundwater concentratration of benzene is **0.073 mg/L**.

multipathway – inhalation of indoor air

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.

SSTL values for potential residential receptors were calculated assuming that residents are located onsite in the future. This assumption is conservative and, given the past and present onsite and offsite land uses, this scenario is expected to be unlikely.

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 this evaluation, the 95th UCL concentrations of benzene in groundwater and subsurface soils do not exceed SSTLs for potential exposures to onsite workers and residents, with the exception of onsite resident exposure to benzene in subsurface soil. The estimated excess cancer risks for potential onsite workers, 6×10^{-5}, and residents, 3×10^{-5}, exposed to benzene in groundwater and subsurface soil are within the acceptable excess cancer risk range from 10^{-6} to 10^{-4}. The hazard indices for potential onsite workers, 6×10^{-3}, and residents, 1×10^{-3}, exposed to ethylbenzene, toluene and xylenes in subsurface soil and groundwater, are less than the acceptable noncancer limit of 1.0. Additionally, groundwater at the site is currently not used as a drinking water source, is not expected to be used as a drinking water source in the future, and is likely to be supplied from a municipal drinking water source. Moreover, 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. Finally, 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. 2nd Quarter.
- 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: July 16, 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 ❑ Piping / Distribution ❑ Operations ❑ Waste Management Unit ❑ Other: __	❑ Affected Surface Soils (≤3 ft depth)	❑ Wind Erosion and Atmospheric Dispersion	❑ Soil — Dermal Contact/ Ingestion	**Exposed Receptors** *On-Site:* ❑ Residential ❑ Non-Resid. ■ N/A ❑ Sensitive Habitat ❑ Recreation *Off-Site:* ❑ Residential ❑ Non-Resid. ■ N/A ❑ Sensitive Habitat ❑ Recreation	■ No ❑ Yes ○ Current ○ Potential ■ No ❑ Yes ○ Current ○ Potential
■ Affected Subsurface Soils (> 3 ft depth)	❑ Volatilization and Atmospheric Dispersion	■ Air — Inhalation of Vapor or Dust	**Exposed Persons** *On-Site:* ■ Residential ■ Non-Resid. ❑ N/A *Off-Site:* ■ Residential ■ Non-Resid. ❑ N/A	❑ No ■ Yes ○ Current ● Potential ■ No ❑ Yes ○ Current ○ Potential
■ Dissolved Groundwater Plume	■ Volatilization and Enclosed-Space Accumulation				
	■ Leaching and Groundwater Transport	■ Groundwater — Potable Water Use	**Groundwater Users** *On-Site:* ❑ Residential ■ Non-Resid ❑ N/A *Off-Site:* ■ Residential ■ Non-Resid ❑ N/A	❑ No ■ Yes ○ Current ● Potential ■ 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** *On-Site:* ❑ Residential ❑ Non-Resid. ■ N/A ❑ Sensitive Habitat ❑ Recreation *Off-Site:* ❑ Residential ❑ Non-Resid. ■ N/A ❑ Sensitive Habitat ❑ Recreation	■ No ❑ Yes ○ Current ○ Potential ■ No ❑ Yes ○ Current ○ Potential

(■ OR ● TO SELECT)

Site Name: Former Service Station No. 9-4930 | Date Completed: July 16, 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	A) SOURCE MEDIUM: Pathway Tier 1 RBSL Exceeded?	B) TRANSPORT MECHANISM: Type	B) TRANSPORT MECHANISM: Active at Site?	C) EXPOSURE MEDIUM: Type	C) EXPOSURE MEDIUM: 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	A) SOURCE MEDIUM: Pathway Tier 1 RBSL Exceeded?	B) TRANSPORT MECHANISM: Type	B) TRANSPORT MECHANISM: Active at Site?	C) EXPOSURE MEDIUM: Type	C) EXPOSURE MEDIUM: 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: July 16, 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^{-5}, 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	10^{-5}, 10^{-4}	1.0			❑ MCL
❑ Off-Site POE:	ft	❑ Residential ❑ Commercial /Industrial					❑ 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)*					❑

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. 9-9430 | Date Completed: July 16, 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 REPRESENTATIVE CONC. (mg/kg)
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 95%CL Conc. (mg/kg)	
71-43-2	Benzene	8020	0.005	25	25	3.9	0.33	0.6	0.6
100-41-4	Ethylbenzene	8020	0.005	25	25	77	2.1	4.5	4.5
108-88-3	Toluene	8020	0.005	25	25	17	0.46	0.93	0.93
1330-20-7	Xylene (mixed isomers)	8020	0.005	25	25	360	7.1	16	16

See Appendix C for analytical data.

Site Name: Former Service Station No. 9-4930 Date Completed: July 16, 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 95%CL Conc. (mg/L)	
71-43-2	Benzene	8020	0.005	28	28	0.18	0.057	0.073	0.073
100-41-4	Ethylbenzene	8020	0.005	28	28	0.14	0.039	0.051	0.051
108-88-3	Toluene	8020	0.005	28	28	0.0095	0.0021	0.003	0.003
1330-20-7	Xylene (mixed isomers)	8020	0.005	28	28	0.19	0.006	0.009	0.009

See Appendix C for analytical data.

Site Name: Former Service Station No.9-4930 Date Completed: July 16, 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			
δ_{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
σ_y	Transverse air dispersion coeff. (m)		■ 100
σ_z	Vertical air dispersion coeff. (m)		■ 10
GROUNDWATER PARAMETERS			
δ_{gw}	Groundwater mixing zone depth (cm)		■ 200
I	Water infiltration rate (cm/yr)		■ 30
V_{gw}	Groundwater Darcy velocity (ft/yr)	24 cm/yr = 0.79 ft/yr	
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	
α_x	Longitudinal groundwater dispersion coeff. (cm)		■ 10% of x
α_y	Transverse groundwater dispersion coeff. (cm)		■ 33% of α_x
α_z	Vertical groundwater dispersion coeff. (cm)		■ 5% of α_z
SOIL PARAMETERS			
h_{cap}	Capillary zone thickness (cm)	15	❑ 5
h_v	Vadose zone thickness (cm)	180	
ρ_s	Soil bulk density (g/cm^3)		■ 1.7
foc_s	Fraction organic carbon in soil leaching zone (dim)	0.001	❑ 0.01
foc_{gw}	Fraction organic carbon in water-bearing unit (dim)		■ 0.001
Lgw	Depth to groundwater (cm)	200	
Θ_T	Soil porosity (dim)	0.45	❑ 0.38
	Soil volumetric water content (dim)		
Θ_{wcap}	• Capillary zone	0.392	❑ 0.342
Θ_{ws}	• Vadose zone	0.14	❑ 0.12
Θ_{wcrack}	• Foundation crack	0.14	❑ 0.12

$\Theta_T = \Theta_{wcap} + \Theta_{wvad}$
$= \Theta_{ws} + \Theta_{wc}$

Site Name: Former Service Station No.9-4930 Date Completed: July 16, 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)			
Θ_{acap}	•Capillary zone	0.058	❑ 0.038	
Θ_{as}	•Vadose zone	0.31	❑ 0.26	
Θ_{acrack}	•Foundation crack	0.31	❑ 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	
η	Foundation crack fraction		■ 0.01	

(6)

3'

Additional Information:

RBCA SITE ASSESSMENT | **Tier 2 Worksheet 6.1a**

Site Name: Former Service Station No. 9-4930 | Site Location: Castro Valley, California | Completed By: CRTC | Date Completed: 7/16/1996

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

AIR EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAY IS ACTIVE)

SUBSURFACE SOILS: VAPOR INHALATION

Constituents of Concern	Exposure Concentration: 1) Source Medium — Subsurface Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor — On-Site Commercial	2) NAF Value (m^3/kg) Receptor — Off-Site Commercial	3) Exposure Medium Air: POE Conc. (mg/m^3) (1) / (2) — On-Site Commercial	3) Exposure Medium Air: POE Conc. (mg/m^3) (1) / (2) — Off-Site Commercial	4) Exposure Multiplier (IRxETxEFxEDy/BWxAT) (m^3/kg-day) — On-Site Commercial	4) Exposure Multiplier (IRxETxEFxEDy/BWxAT) (m^3/kg-day) — Off-Site Commercial	5) Average Daily Intake Rate (mg/kg-day) (3) X (4) — On-Site Commercial	5) Average Daily Intake Rate (mg/kg-day) (3) X (4) — Off-Site Commercial	TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from surface & subsurface routes.) — On-Site Commercial	TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from surface & subsurface routes.) — Off-Site Commercial
Benzene	6.0E-1	6.1E+4		9.9E-6						0.0E+0	0.0E+0
Ethylbenzene	4.5E+0	6.1E+4		7.5E-5						0.0E+0	0.0E+0
Toluene	9.3E-1	6.1E+4		1.5E-5						0.0E+0	0.0E+0
Xylene (mixed isomers)	1.6E+1	6.1E+4		2.6E-4						0.0E+0	0.0E+0

NOTE: ABS = Dermal absorption factor (dim); AF = Adherance factor; AT = Averaging time (days); BW = Body Weight (kg); CF = Units conversion factor; ED = Exp. duration (yrs); EF = Exposure frequency (days/yr); ET = Exposure time (hrs/day); IR = Intake rate (L/day or mg/day); POE = Point of exposure; SA = Skin surface area (cm^2)

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

RBCA SITE ASSESSMENT | **Tier 2 Worksheet 8.1a**

Site Name: Former Service Station No. 9-4930 | Site Location: Castro Valley, California | Completed By: CRTC | Date Completed: 7/16/1996

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 Commercial	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 Commercial	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day): On-Site Commercial	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day): Off-Site Commercial	5) Average Daily Intake Rate (mg/kg-day): On-Site Commercial	5) Average Daily Intake Rate (mg/kg-day): Off-Site Commercial	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 Commercial
Benzene	7.3E-2	1.0E+0	1.0E+0	7.3E-2	7.3E-2	3.5E-3	3.5E-3	2.5E-4	2.5E-4	2.5E-4	2.5E-4
Ethylbenzene	5.1E-2	1.0E+0	1.0E+0	5.1E-2	5.1E-2	9.8E-3	9.8E-3	5.0E-4	5.0E-4	5.0E-4	5.0E-4
Toluene	2.8E-3	1.0E+0	1.0E+0	2.8E-3	2.8E-3	9.8E-3	9.8E-3	2.7E-5	2.7E-5	2.7E-5	2.7E-5
Xylene (mixed isomers)	9.4E-3	1.0E+0	1.0E+0	9.4E-3	9.4E-3	9.8E-3	9.8E-3	9.2E-5	9.2E-5	9.2E-5	9.2E-5

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

Site Name: Former Service Station No. 9-4930 | Site Location: Castro Valley, California | Completed By: CRTC | Date Completed: 7/15/1996 | 2 OF 6

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

AIR EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAY IS ACTIVE)

SUBSURFACE SOILS: VAPOR INHALATION

Constituents of Concern	Exposure Concentration: 1) Source Medium — Subsurface Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor: On-Site Residential	2) NAF Value (m^3/kg) Receptor: Off-Site Residential	3) Exposure Medium Air: POE Conc. (mg/m^3) (1) / (2): On-Site Residential	3) Exposure Medium Air: POE Conc. (mg/m^3) (1) / (2): Off-Site Residential	4) Exposure Multiplier (IRxETxEFxED)/(BWxAT) (m^3/kg-day): On-Site Residential	4) Exposure Multiplier (IRxETxEFxED)/(BWxAT) (m^3/kg-day): Off-Site Residential	5) Average Daily Intake Rate (mg/kg-day) (3) X (4): On-Site Residential	5) Average Daily Intake Rate (mg/kg-day) (3) X (4): Off-Site Residential	TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from surface & subsurface routes.): On-Site Residential	TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from surface & subsurface routes.): Off-Site Residential
Benzene	6.0E-1	7.3E+4		8.3E-6						0.0E+0	0.0E+0
Ethylbenzene	4.5E+0	7.3E+4		6.2E-5						0.0E+0	0.0E+0
Toluene	9.3E-1	7.3E+4		1.3E-5						0.0E+0	0.0E+0
Xylene (mixed isomers)	1.6E+1	7.3E+4		2.2E-4						0.0E+0	0.0E+0

NOTE: ABS = Dermal absorption factor (dim); AF = Adherance factor; AT = Averaging time (days); BW = Body Weight (kg); CF = Units conversion factor; ED = Exp. duration (yrs); EF = Exposure frequency (days/yr); ET = Exposure time (hrs/day); IR = Intake rate (L/day or mg/day); POE = Point of exposure; SA = Skin surface area (cm^2)

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

Site Name: Former Service Station No. 9-4930 Site Location: Castro Valley, California Completed By: CRTC Date Completed: 7/16/1996

TIER 2 PATHWAY RISK CALCULATION

AIR EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAYS ARE ACTIVE)

		CARCINOGENIC RISK					TOXIC EFFECTS				
	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Intake Rate (mg/kg/day) On-Site Commercial	(2) Total Carcinogenic Intake Rate (mg/kg/day) Off-Site Commercial	(3) Inhalation Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3) On-Site Commercial	(4) Individual COC Risk (2) x (3) Off-Site Commercial	(5) Total Toxicant Intake Rate (mg/kg/day) On-Site Commercial	(5) Total Toxicant Intake Rate (mg/kg/day) Off-Site Commercial	(6) Inhalation Reference Dose (mg/kg-day)	(7) Individual COC Hazard Quotient (5) / (6) On-Site Commercial	(7) Individual COC Hazard Quotient (5) / (6) Off-Site Commercial
Constituents of Concern											
Benzene	A	0.0E+0	0.0E+0	2.9E-2	0.0E+0	0.0E+0	1.9E-6	0.0E+0	1.7E-3	1.1E-3	0.0E+0
Ethylbenzene	D						0.0E+0	0.0E+0	2.9E-1	0.0E+0	0.0E+0
Toluene	D						0.0E+0	0.0E+0	1.1E-1	0.0E+0	0.0E+0
Xylene (mixed isomers)	D						0.0E+0	0.0E+0	2.0E+0	0.0E+0	0.0E+0
Total Pathway Carcinogenic Risk =					**0.0E+0**	**0.0E+0**	***Total Pathway Hazard Index =***			**1.1E-3**	**0.0E+0**

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

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

Site Name: Former Service Station No. 9-4930 Site Location: Castro Valley, California Completed By: CRTC Date Completed: 7/16/1996

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 Commercial	(mg/kg-day)^-1	On-Site Commercial	Off-Site Commercial	On-Site Commercial	Off-Site Commercial	(mg/kg-day)	On-Site Commercial	Off-Site Commercial
Benzene	A	2.5E-4	2.5E-4	2.9E-2	7.4E-6	7.4E-6					
Ethylbenzene	D						5.0E-4	5.0E-4	1.0E-1	5.0E-3	5.0E-3
Toluene	D						2.7E-5	2.7E-5	2.0E-1	1.4E-4	1.4E-4
Xylene (mixed isomers)	D						9.2E-5	9.2E-5	2.0E+0	4.6E-5	4.6E-5
Total Pathway Carcinogenic Risk =					**7.4E-6**	**7.4E-6**	***Total Pathway Hazard Index =***			**5.2E-3**	**5.2E-3**

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

Site Name: Former Service Station No. 9-4930 Site Location: Castro Valley, California Completed By: CRTC Date Completed: 7/15/1996

TIER 2 PATHWAY RISK CALCULATION

AIR EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAYS ARE ACTIVE)

		CARCINOGENIC RISK					TOXIC EFFECTS				
	(1) EPA	(2) Total Carcinogenic Intake Rate (mg/kg/day)		(3) Inhalation Slope Factor	(4) Individual COC Risk (2) x (3)		(5) Total Toxicant Intake Rate (mg/kg/day)		(6) Inhalation Reference Dose	(7) Individual COC Hazard Quotient (5) / (6)	
Constituents of Concern	Carcinogenic Classification	On-Site Residential	Off-Site Residential	(mg/kg-day)^-1	On-Site Residential	Off-Site Residential	On-Site Residential	Off-Site Residential	(mg/kg-day)	On-Site Residential	Off-Site Residential
Benzene	A	0.0E+0	0.0E+0	2.9E-2	0.0E+0	0.0E+0	2.3E-6	0.0E+0	1.7E-3	1.3E-3	0.0E+0
Ethylbenzene	D						0.0E+0	0.0E+0	2.9E-1	0.0E+0	0.0E+0
Toluene	D						0.0E+0	0.0E+0	1.1E-1	0.0E+0	0.0E+0
Xylene (mixed isomers)	D						0.0E+0	0.0E+0	2.0E+0	0.0E+0	0.0E+0
Total Pathway Carcinogenic Risk =					0.0E+0	0.0E+0	***Total Pathway Hazard Index =***			1.3E-3	0.0E+0

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

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

Completed By: CRTC
Date Completed: 7/16/1996

Future Onsite Worker Scenario

TIER 2 BASELINE RISK SUMMARY TABLE

	BASELINE CARCINOGENIC RISK					BASELINE TOXIC EFFECTS				
	Individual COC Risk		Cumulative COC Risk		Risk Limit(s) Exceeded?	Hazard Quotient		Hazard Index		Toxicity Limit(s) Exceeded?
EXPOSURE PATHWAY	Maximum Value	Target Risk	Total Value	Target Risk		Maximum Value	Applicable Limit	Total Value	Applicable Limit	
AIR EXPOSURE PATHWAYS										
Complete:	5.5E-5	1.0E-4	5.5E-5	N/A	☐	1.1E-3	1.0E+0	1.1E-3	N/A	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	7.4E-6	1.0E-4	7.4E-6	N/A	☐	5.2E-3	1.0E+0	5.2E-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	☐
MULTI EXPOSURE PATHWAY										
	6.2E-5	1.0E-4	6.2E-5	N/A	☐	6.3E-3	1.0E+0	6.3E-3	N/A	☐

Serial: G-411-ZHX-

Software: GSI RBCA Spreadsheet
Version: v 1.0

6.2×10^{-5}

Site Name: Former Service Station No. 9-4930 | Completed By: CRTC | Future Onsite Resident Scenario
Site Location: Castro Valley, California | Date Completed: 7/15/1996

TIER 2 BASELINE RISK SUMMARY TABLE

	BASELINE CARCINOGENIC RISK					BASELINE TOXIC EFFECTS				
	Individual COC Risk		Cumulative COC Risk		Risk Limit(s) Exceeded?	Hazard Quotient		Hazard Index		Toxicity Limit(s) Exceeded?
EXPOSURE PATHWAY	Maximum Value	Target Risk	Total Value	Target Risk		Maximum Value	Applicable Limit	Total Value	Applicable Limit	
AIR EXPOSURE PATHWAYS										
Complete:	2.5E-5	1.0E-5	2.5E-5	N/A	■	1.3E-3	1.0E+0	1.3E-3	N/A	☐
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	0.0E+0	1.0E-5	0.0E+0	N/A	☐	0.0E+0	1.0E+0	0.0E+0	N/A	☐
SOIL EXPOSURE PATHWAYS										
Complete:	0.0E+0	1.0E-5	0.0E+0	N/A	☐	0.0E+0	1.0E+0	0.0E+0	N/A	☐
MULTI EXPOSURE PATHWAY										
	2.5E-5	1.0E-5	2.5E-5	N/A	■	1.3E-3	1.0E+0	1.3E-3	N/A	☐

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

2.5×10^{-5}

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.2a

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

Completed By: CRTC
Date Completed: 7/16/1996

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 0 feet	(mg/kg)	"■" If yes	Only if "yes" left
71-43-2	Benzene	6.0E-1	NA	NA	NA		NA	1.2E+0		NA	NA	1.2E+0	☐	<1
100-41-4	Ethylbenzene	4.5E+0	NA	NA	NA		NA	>Res		NA	NA	>Res	☐	<1
108-88-3	Toluene	9.3E-1	NA	NA	NA		NA	8.2E+1		NA	NA	8.2E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	1.6E+1	NA	NA	NA		NA	>Res		NA	NA	>Res	☐	<1

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

Volatilization

0.6 mg/kg < 1.2 mg/kg

1.2 = 10^{-4} risk

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.2b

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

Completed By: CRTC
Date Completed: 7/15/1996

SUBSURFACE SOIL SSTL VALUES (> 3 FT BGS)

Target Risk (Class A & B) [illegible]
Target Risk (Class C) 1.0E-5
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 0 feet	Commercial (on-site)	(mg/kg)	"■" If yes	Only if "yes" left
71-43-2	Benzene	6.0E-1	NA	NA	NA	2.7E-1	NA	NA	NA	2.7E-1	■	2.0E+00
100-41-4	Ethylbenzene	4.5E+0	NA	NA	NA	>Res	NA	NA	NA	>Res	☐	<1
108-88-3	Toluene	9.3E-1	NA	NA	NA	3.8E+1	NA	NA	NA	3.8E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	1.6E+1	NA	NA	NA	>Res	NA	NA	NA	>Res	☐	<1

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

Volatilization

0.6 mg/kg > 0.27 mg/kg

∴ risk > 10^{-5}

0.27 = 10^{-5} risk

0.6 mg/kg

Risk ≈ 2×10^{-5}

Via soil not into underair

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.3a

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

Completed By: CRTC
Date Completed: 7/16/1996

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: (on-site)	Commercial: 0 feet	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	7.3E-2	NA	9.9E-1	NA	NA	1.4E+0	NA	NA	9.9E-1	☐	<1
100-41-4	Ethylbenzene	5.1E-2	NA	1.0E+1	NA	NA	>Sol	NA	NA	1.0E+1	☐	<1
108-88-3	Toluene	2.8E-3	NA	2.0E+1	NA	NA	9.0E+1	NA	NA	2.0E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	9.4E-3	NA	>Sol	NA	NA	>Sol	NA	NA	>Sol	☐	<1

Software: GSI RBCA Spreadsheet
Version: v 1.0

Serial: G-411-ZHX-574

GW ingestion

0.073 mg/l < 0.99 mg/l

Volatilization

0.073 mg/l < 1.4 mg/l

Ingestion

0.99 = 10^{-4} risk, $0.073 \frac{mg}{l} \simeq 0.8 \times 10^{-5} \simeq 8 \times 10^{-6}$

Volatilization

1.4 = 10^{-4} risk

Applicable SSTL

- reflects most conservative (lowest) value of all pathways

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.3b

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

Completed By: CRTC
Date Completed: 7/15/1996

GROUNDWATER SSTL VALUES

Target Risk (Class A & B): [redacted]
Target Risk (Class C) 1.0E-5
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	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: 0 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	7.3E-2	NA	NA	NA	2.6E-1	NA	NA	NA	2.6E-1	☐	<1
100-41-4	Ethylbenzene	5.1E-2	NA	NA	NA	8.1E+1	NA	NA	NA	8.1E+1	☐	<1
108-88-3	Toluene	2.8E-3	NA	NA	NA	3.5E+1	NA	NA	NA	3.5E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	9.4E-3	NA	NA	NA	>Sol	NA	NA	NA	>Sol	☐	<1

Software: GSI RBCA Spreadsheet
Version: v 1.0

Serial: G-411-ZHX-574

Volatilization

0.073 mg/l < 0.26 mg/l

0.26 = 10^{-5} risk

0.073 mg/l < 0.26 mg/l

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.3a

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

Completed By: CRTC
Date Completed: 7/16/1996

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: (on-site)	Commercial: 0 feet	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	7.3E-2	NA	9.9E-1	NA	NA	1.4E+0	NA	NA	9.9E-1	☐	<1
100-41-4	Ethylbenzene	5.1E-2	NA	1.0E+1	NA	NA	>Sol	NA	NA	1.0E+1	☐	<1
108-88-3	Toluene	2.8E-3	NA	2.0E+1	NA	NA	9.0E+1	NA	NA	2.0E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	9.4E-3	NA	>Sol	NA	NA	>Sol	NA	NA	>Sol	☐	<1

Software: GSI RBCA Spreadsheet
Version: v 1.0

Serial: G-411-ZHX-574

GW ingestion

0.073 mg/ℓ < 0.99 mg/ℓ

Volatilization

0.073 mg/ℓ < 1.4 mg/ℓ

Ingestion

0.99 = 10^{-4} risk, $.073 \frac{mg}{\ell} \simeq 0.8 \times 10^{-5} \simeq 8 \times 10^{-6}$

Volatilization

1.4 = 10^{-4} risk

Applicable SSTL

- reflects most conservative (lowest) value of all pathways

RBCA SITE ASSESSMENT

Tier 2 Worksheet 9.3b

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

Completed By: CRTC
Date Completed: 7/15/1996

GROUNDWATER SSTL VALUES

Target Risk (Class A & B): [redacted]
Target Risk (Class C): 1.0E-5
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	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: 0 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	7.3E-2	NA	NA	NA	2.6E-1	NA	NA	NA	2.6E-1	☐	<1
100-41-4	Ethylbenzene	5.1E-2	NA	NA	NA	8.1E+1	NA	NA	NA	8.1E+1	☐	<1
108-88-3	Toluene	2.8E-3	NA	NA	NA	3.5E+1	NA	NA	NA	3.5E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	9.4E-3	NA	NA	NA	>Sol	NA	NA	NA	>Sol	☐	<1

Software: GSI RBCA Spreadsheet
Version: v 1.0

Serial: G-411-ZHX-574

Volatilization

0.073 mg/l < 0.26 mg/l

0.26 = 10^{-5} risk

0.073 mg/l < 0.26 mg/l

Appendix A

RBCA Tier 2 Evaluation Model Input Parameters

RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

Site Name: Former Service Station No. 9-486 Identification: YWTT12541
Site Location: Castro Valley, California Date Completed: 7/15/96
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	FALSE	FALSE	
GW.v	Volatilization to Outdoor Air	FALSE	FALSE	
GW.b	Vapor Intrusion to Buildings	TRUE	FALSE	
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	TRUE	FALSE	

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)		FALSE		FALSE
S	Inhalation receptor (cm)		FALSE		FALSE

Matrix of Target Risks		Individual	Cumulative
TRab	Target Risk (class A&B carcinogens)	***1.0E-05***	
TRc	Target Risk (class C carcinogens)	1.0E-05	
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)	[redacted]		1.0E+06
W	Length of affected soil parallel to wind (cm)	[redacted]		1.0E+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)	***5.2E+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)	2.3E+02
BC	Biodegradation Capacity (mg/L)	
BIO?	Is Bioattenuation Considered	TRUE
phi.eff	Effective Porosity in Water-Bearing Unit	4.5E-01
foc.sat	Fraction organic carbon in water-bearing unit	1.0E-03

Soil	Definition (Units)	Value		
hc	Capillary zone thickness (cm)	***1.5E+01***		
hv	Vadose zone thickness (cm)	***1.8E+02***		
rho	Soil density (g/cm^3)	1.7		
foc	Fraction of organic carbon in vadose zone	***0.001***		
phi	Soil porosity in vadose zone	***0.45***		
Lgw	Depth to groundwater (cm)	***2.0E+02***		
Ls	Depth to top of affected soil (cm)	***1.4E+02***		
Lsubs	Thickness of affected subsurface soils (cm)	***2.3E+02***		
pH	Soil/groundwater pH	6.5		
		capillary	vadose	foundation
phi.w	Volumetric water content	***0.392***	***0.14***	***0.14***
phi.a	Volumetric air content	***0.058***	***0.31***	***0.31***

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)		
ay	Transverse dispersion coefficient (cm)		
az	Vertical dispersion coefficient (cm)		
Vapor			
dcy	Transverse dispersion coefficient (cm)		
dcz	Vertical dispersion coefficient (cm)		

= "incorrect"

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: 7/15/1996

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: 7/15/1996

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: 7/15/1996

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	7.3E-2	UCL			6.0E-1	UCL
Ethylbenzene	5.1E-2	UCL			4.5E+0	UCL
Toluene	2.8E-3	UCL			9.3E-1	UCL
Xylene (mixed isomers)	9.4E-3	UCL			1.6E+1	UCL

95% UCL

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

Completed By: CRTC
Date Completed: 7/15/1996

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	1.0E+0	1.0E+0
Ethylbenzene	1.0E+0	1.0E+0
Toluene	1.0E+0	1.0E+0
Xylene (mixed isomers)	1.0E+0	1.0E+0

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

Completed By: CRTC
Date Completed: 7/15/1996

RBCA SITE ASSESSMENT | Input Screen 9.1

CONSTITUENT HALF-LIFE VALUES

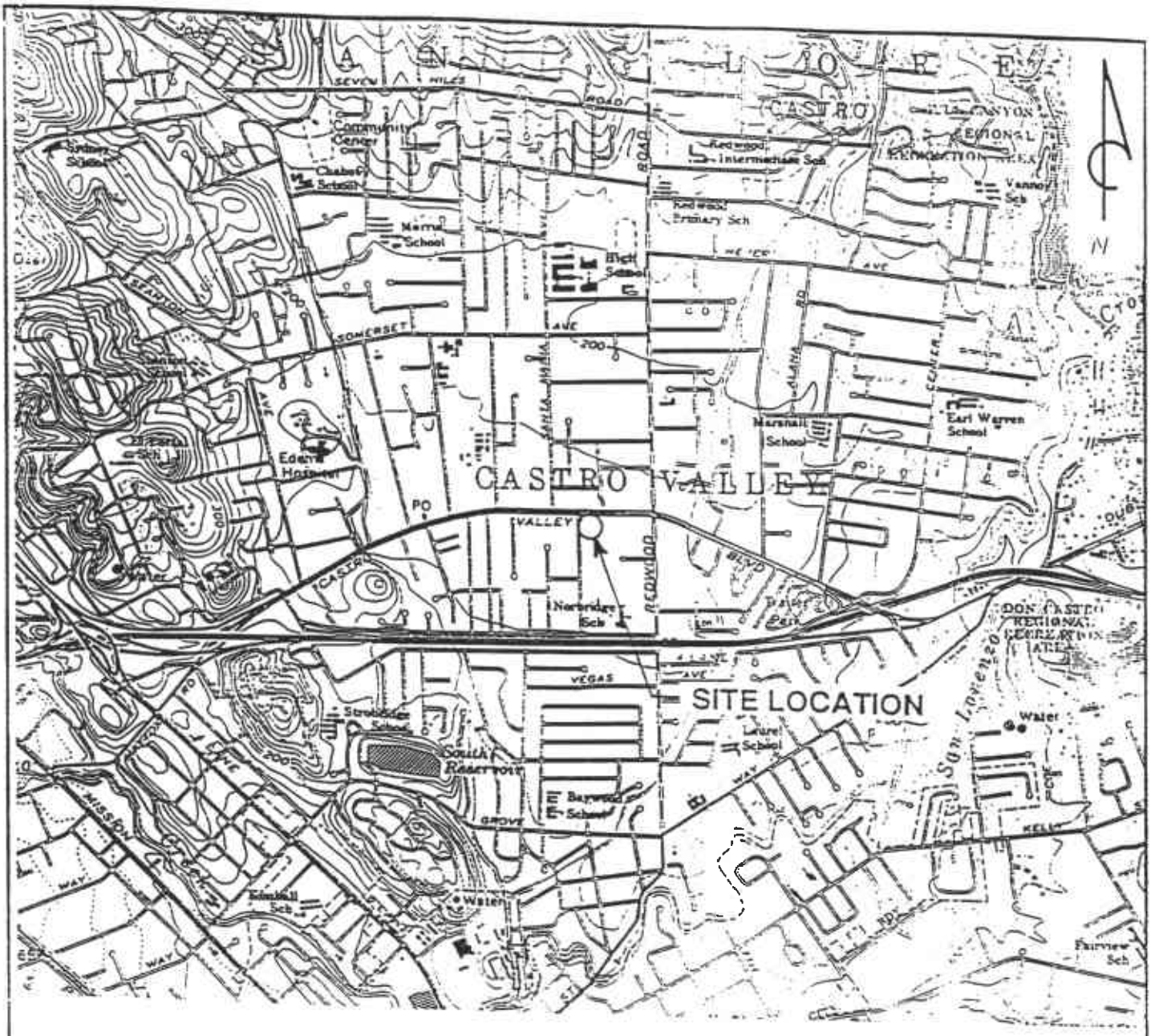
(Complete the following table)

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: 7/15/1996

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

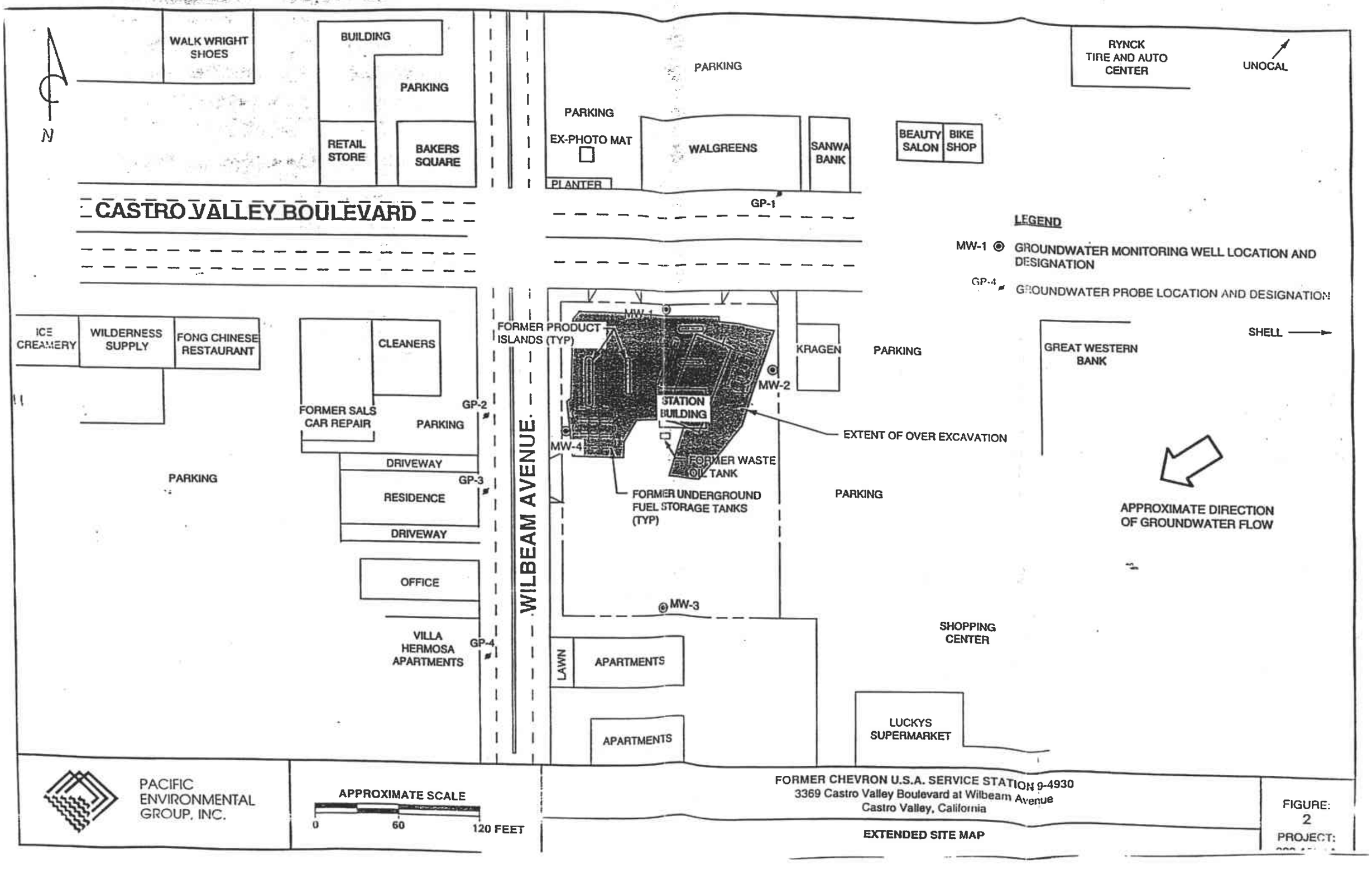
PACIFIC ENVIRONMENTAL GROUP, INC.

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

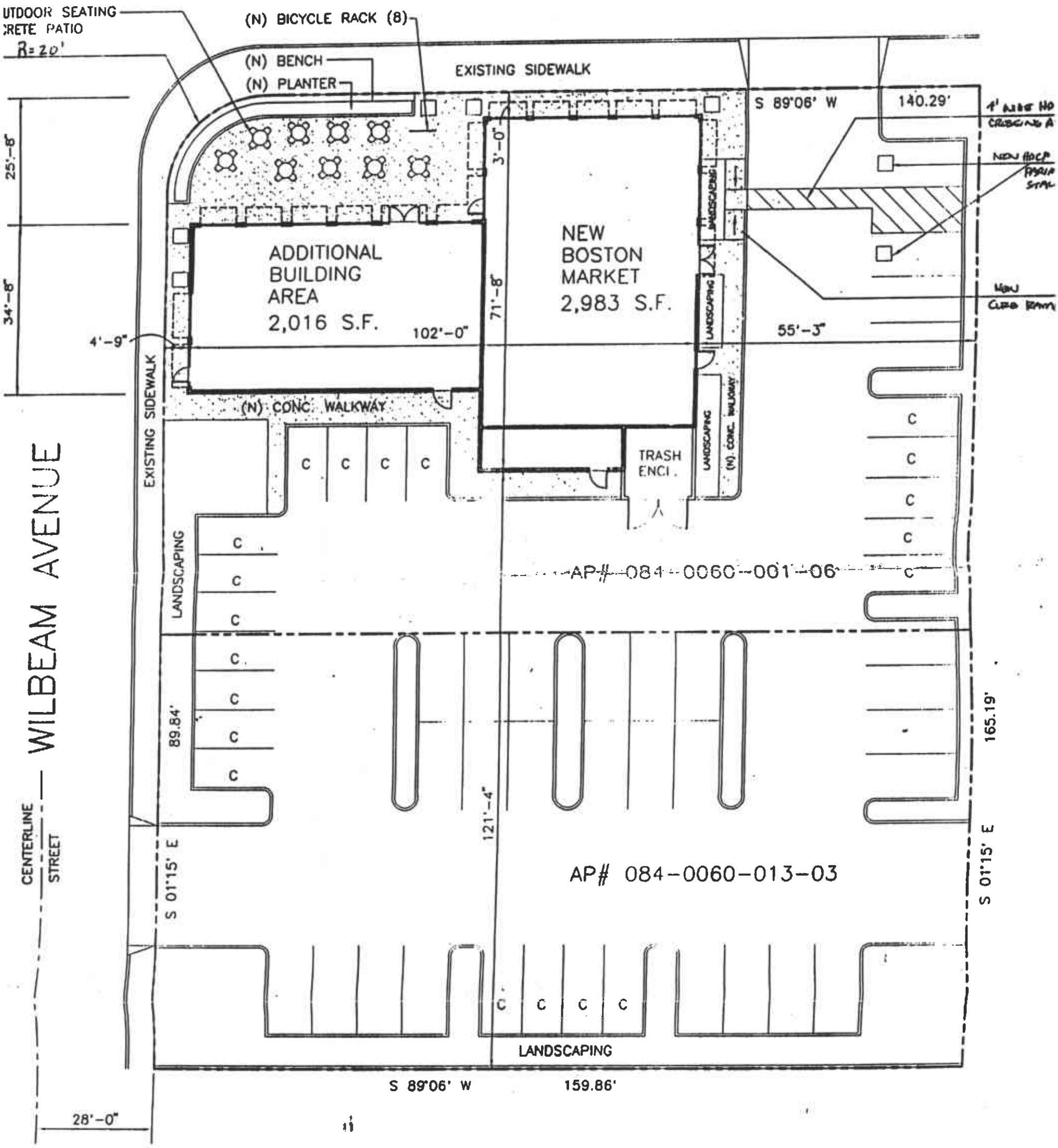
SITE LOCATION MAP

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
LEGEND
MW-1 GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
GP-4 GROUNDWATER PROBE LOCATION AND DESIGNATION
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
FORMER WASTE OIL TANK
EXTENT OF OVER EXCAVATION
FORMER UNDERGROUND FUEL STORAGE TANKS (TYP)
MW-3
LAWN
APARTMENTS
APARTMENTS
KRAGEN
PARKING
PARKING
GREAT WESTERN BANK
SHELL
APPROXIMATE DIRECTION OF GROUNDWATER FLOW
SHOPPING CENTER
LUCKYS SUPERMARKET
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:

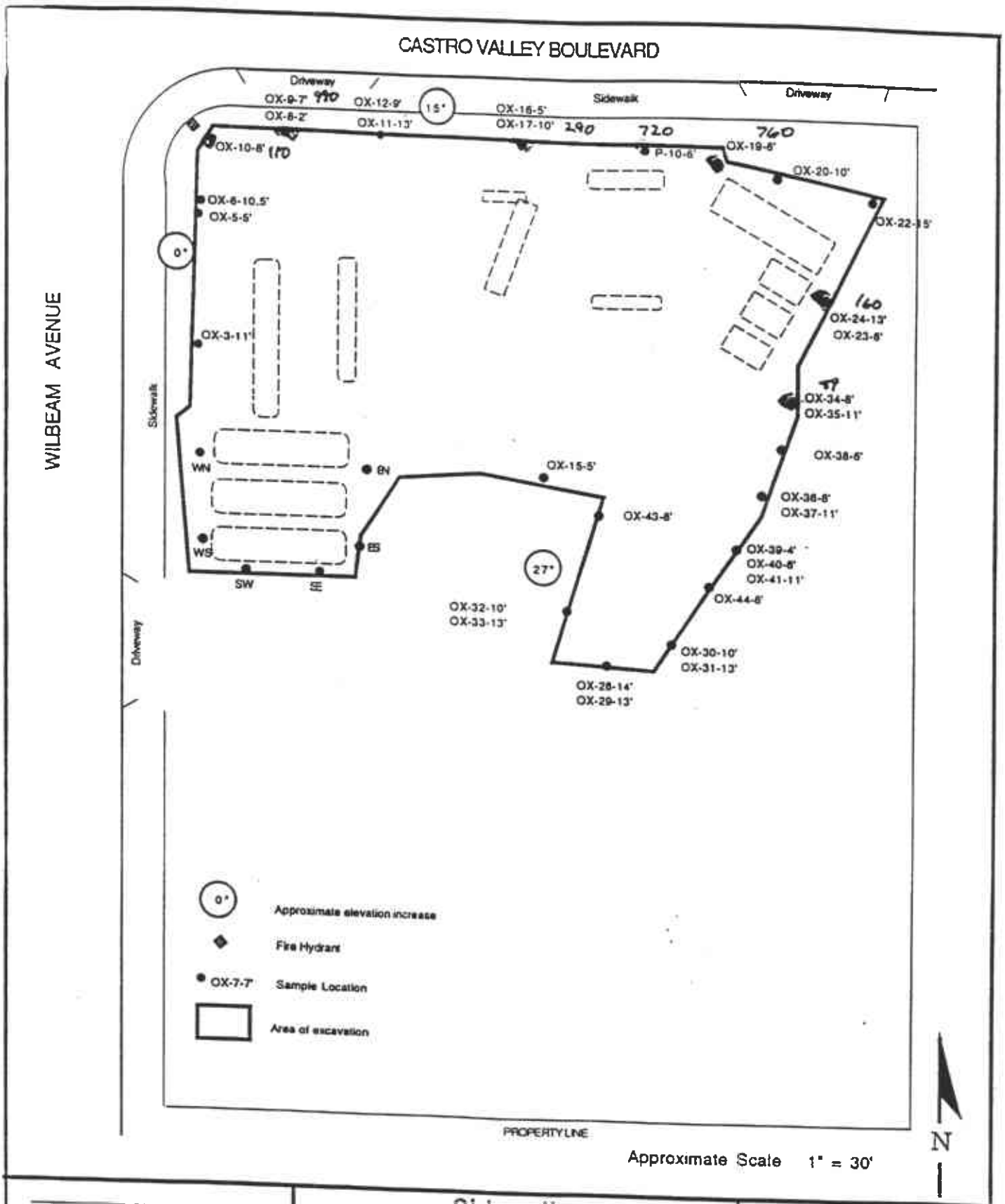
CASTRO VALLEY BOULEVARD



SITE PLAN

SCALE: 1"=20'-0"

NORTH



Touchstone Developments
Environmental Management

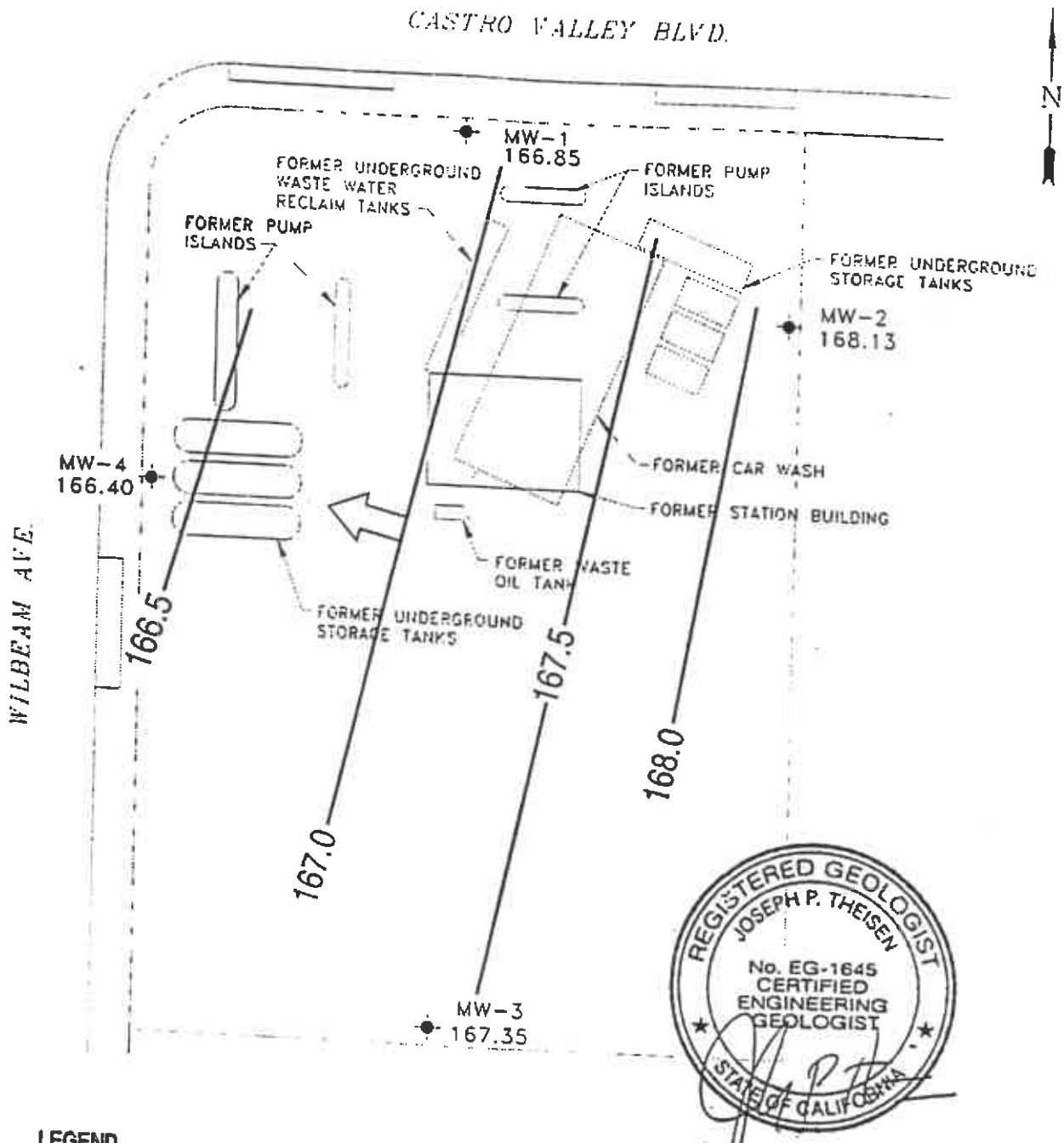
Sidewall
Sample Location Map

Chevron Service Station No. 9-4930
3369 Castro Valley Boulevard
Castro Valley, California

Figure 4

05-12-93 | mjt

Project # 4930-2



REGISTERED GEOLOGIST
JOSEPH P. THEISEN
No. EG-1645
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

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 Groundwater Technology, Inc.

CAMBRIA
Environmental Technology, Inc.

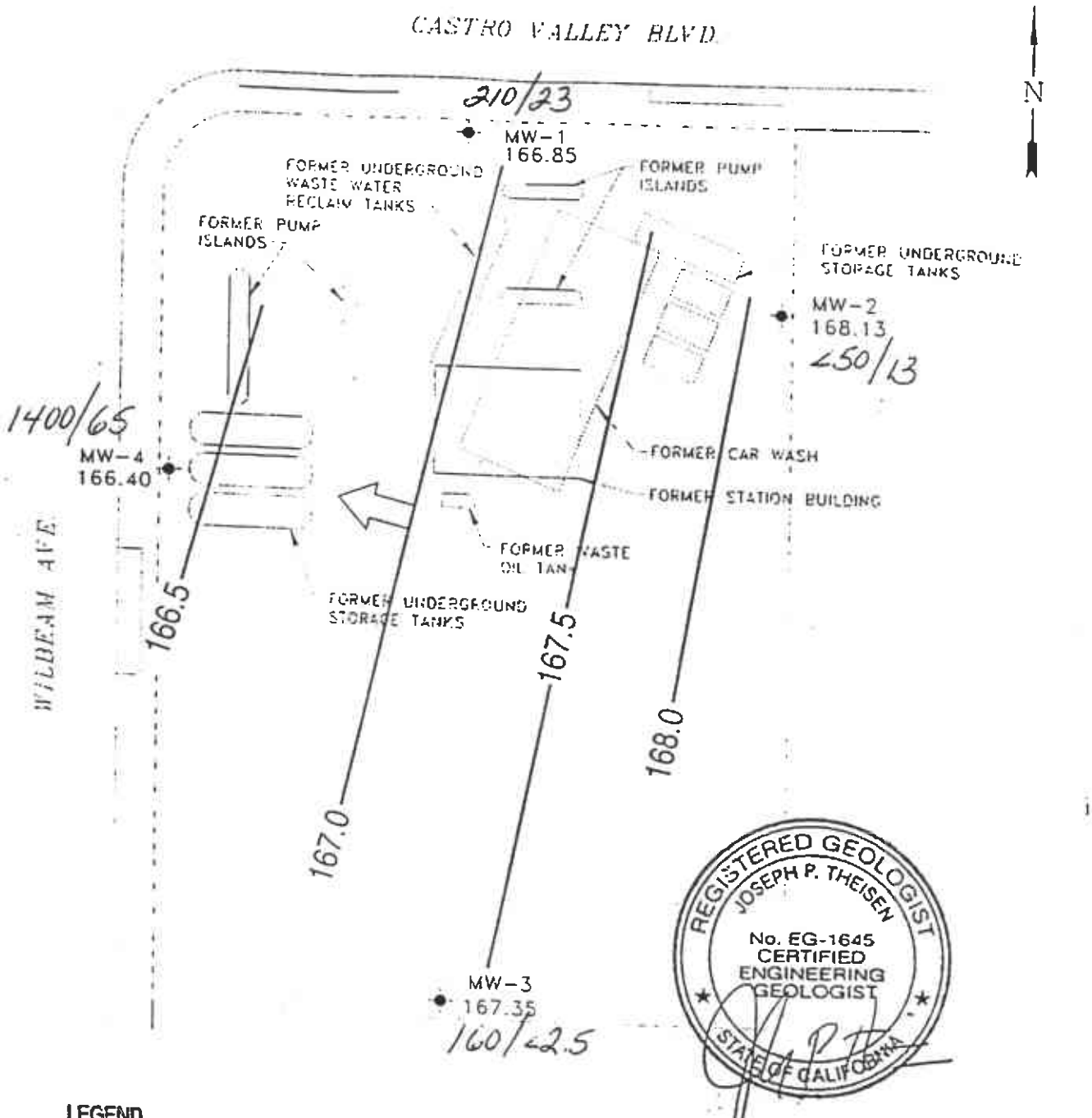
Chevron Facility 9-4930
3369 Castro Valley Blvd
Castro Valley, California

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

Ground Water Elevation
January 26, 1996

FIGURE
1

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 Groundwater Technology, Inc.

CAMBRIA
Environmental Technology, Inc.

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

\CHEVRON\9-4930\4930-QM.DWG

Ground Water Elevation
January 26, 1996

FIGURE
1

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
05/08/96	172.90	166.50	6.40	--	310	42	2.3	56	1.1	--	--	--	--	52
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
05/08/96	173.91	166.76	7.15	--	<50	4.5	<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
05/08/96	172.60	165.55	7.05	--	--	--	--	--	--	--	--	--	--	--
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
05/08/96	170.68	165.33	5.35	--	610	28	1.2	58	4.4	--	--	--	--	70

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
05/08/96	--	--	--	--	<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

Appendix C

Subsurface Soil and Groundwater Analytical Data

UCL Percentile

95% (must be 0.9 or 0.95)

Subsurface Soil Analytical Data

	1	2	3	4	5	6	7	8	9	10	11	12
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Sample Name	EN-9	NE-6	NW-8	WN-6	P-10	OX-1	OX-2	OX-3	OX-4	OX-7	OX-9	OX-10
Date Sampled	3/10/93	3/10/93	3/10/93	3/10/93	3/10/93	3/19/93	3/19/93	3/22/93	3/22/93	3/22/93	3/25/93	3/26/93
Benzene	0	0.056	0.15	0	2.3	0	0	0.026	0.38	0	0	0
Ethylbenzene	0.014	7.7	11	4.9	9	4.4	1.8	0.006	0.31	0	8	0.39
Toluene	0	0.64	0.75	0.57	17	0.33	0	0	0.3	0.045	2.1	0.14
Xylene (mixed isomers)	0.024	33	53	4	49	15	9	0	1	0.083	43	1.3

Subsurface Soil Analytical Data (continued)

13	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*
(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
OX-14	OX-15	OX-17	OX-19	OX-20	OX-21	OX-23	OX-25	OX-26	OX-27	OX-34	OX-35	OX-36
4/2/93	4/2/93	4/7/93	4/9/93	4/9/93	4/9/93	4/19/93	4/19/93	4/20/93	4/20/93	4/28/93	4/28/93	4/28/93
0	0	0	0.5	0.032	2.6	0	3.9	0.59	0.3	0	0	0
5.8	0	4.6	17	2.2	17	2.2	77	9.7	4.9	1.5	0.15	0.34
0.18	0.008	0.65	4	0.18	14	0.29	6.6	3.6	0.98	0.15	0.011	0.065
28	0	21	76	1.8	80	4.2	360	51	18	3.1	0.31	0.86

Site Name: Former Service Station No. 9-4930 Completed By: CRTC
Site Location: Castro Valley, California Date Completed: 7/16/1996 *1 of 1*

TIER 2 SUBSURFACE SOIL CONCENTRATION DATA SUMMA (e.g., >3 FT BGS)

CONSTITUENTS DETECTED		Analytical Method			Detected Concentrations		
CAS No.	Name	Typical Detection Limit (mg/kg)	No. of Samples	No. of Detects	Maximum Conc. (mg/kg)	Mean Conc. (mg/kg)	UCL on Mean Conc. (mg/kg)
71-43-2	Benzene		25	25	3.9E+00	3.3E-01	6.0E-01
100-41-4	Ethylbenzene		25	25	7.7E+01	2.1E+00	4.5E+00
108-88-3	Toluene		25	25	1.7E+01	4.6E-01	9.3E-01
1330-20-7	Xylene (mixed isomers)		25	25	3.6E+02	7.1E+00	1.6E+01

UCL Percentile

95% (must be 0.9 or 0.95)

Groundwater Analytical Data

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Well Name	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-2	MW-2	MW-2	MW-2	MW-2
Date Sampled	6/13/94	8/31/94	11/11/94	2/1/95	5/18/95	8/22/95	11/1/95	1/26/96	5/8/96	6/13/94	8/31/94	11/11/94	2/1/95	5/18/95
Benzene	0.035	0.043	0.053	0.025	0.042	0.073	0.036	0.023	0.042	0.16	0.0071	0.12	0.081	0.074
Ethylbenzene	0.043	0.025	0.05	0.004	0.053	0.11	0.03	0.012	0.056	0.064	0.0031	0.018	0	0.026
Toluene	0.0035	0.0095	0.004	0.0006	0.001	0.0012	0	0	0.0023	0.0008	0.0041	0	0	0
Xylene (mixed isomers)	0.0039	0.005	0.0034	0	0.0026	0.0016	0	0	0.0011	0.002	0.0012	0	0	0

Groundwater Analytical Data (continued)

15	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*
(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MW-2	MW-2	MW-2	MW-2	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	GP-2
8/22/95	11/1/95	1/26/96	5/8/96	6/13/94	8/31/94	11/11/94	2/1/95	5/18/95	8/22/95	11/1/95	1/26/96	5/8/96	1/25/96
0.084	0.046	0.013	0.0045	0.13	0.017	0.026	0.18	0.13	0.05	0.0033	0.065	0.028	0.0096
0.0021	0.0016	0	0	0.1	0.0093	0.03	0.031	0.14	0.075	0.0041	0.098	0.058	0.037
0	0	0	0	0.0014	0.0035	0	0	0	0	0	0	0.0012	0.0045
0	0	0	0	0.011	0.0044	0.0043	0.042	0.0055	0	0	0.071	0.0044	0.19

Site Name: Former Service Station No. 9-4930 Completed By: CRTC
Site Location: Castro Valley, California Date Completed: 7/15/1996 *1 of 1*

TIER 2 GROUNDWATER CONCENTRATION DATA SUMMARY

CONSTITUENTS DETECTED		Analytical Method			Detected Concentrations		
CAS No.	Name	Typical Detection Limit (mg/L)	No. of Samples	No. of Detects	Maximum Conc. (mg/L)	Mean Conc. (mg/L)	UCL on Mean Conc. (mg/L)
71-43-2	Benzene	5.0E-03	28	28	1.8E-01	5.7E-02	7.3E-02
100-41-4	Ethylbenzene		28	28	1.4E-01	3.9E-02	5.1E-02
108-88-3	Toluene		28	28	9.5E-03	2.1E-03	2.8E-03
1330-20-7	Xylene (mixed isomers)		28	28	1.9E-01	5.9E-03	9.4E-03