ENVIRONMENTAL RESOLUTIONS, INC.

ENVIRONMENTAL PROTECTION
00 MAY 19 PM 4:43

TRANSMITTAL

#1068

TO: Mr. Barney Chan
Alameda County Health Care Services Agency
Environmental Health Division
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

DATE: May 18, 2000
PROJECT NUMBER: 200914X
SUBJECT: Former Exxon Service Station 7-0236
6600 East 14th Street
Oakland, California

FROM: James F. Chappell
TITLE: Senior Staff Scientist

WE ARE SENDING YOU:

COPIES	DATED	DESCRIPTION
1	March 22, 2000	Response to Comments for Former Exxon Service Station 7-0236

THESE ARE TRANSMITTED as checked below:

[X] For review and comment	[ ] Approved as submitted	[ ] Resubmit __ copies for approval
[X] As requested	[ ] Approved as noted	[ ] Submit__ copies for distribution
[ ] For approval	[ ] Return for corrections	[ ] Return __ corrected prints
[X] For your files	[ ] For distribution to regulatory agencies	

REMARKS: At the request of ExxonMobil Refining and Supply, ERI is forwarding 1 copy of the above referenced reports. Please call James Chappell at (415) 382-4323 with any questions regarding this project.

James F. Chappell, Senior Staff Scientist

cc: Mr. Darin L. Rouse – ExxonMobil Refining and Supply
1 to ERI project file 200914X

ENVIRONMENTAL RESOLUTIONS, INC.

March 22, 2000
ERI 200914DR.L01

Mr. Darin L. Rouse
Exxon Company, U.S.A.
P.O. Box 4032
Concord, California 94524-4032

Subject: Response to Comments for Former Exxon Service Station 7-0236, 6600 East 14th Street, Oakland, California.

Mr. Rouse:

At the request of Exxon Company, U.S.A. (Exxon), Environmental Resolutions, Inc. (ERI) performs environmental activities at the subject site. ERI is submitting this response to comments made during the March 2, 2000 meeting with Mr. Barney Chan of the Alameda County Environmental Health Services Department (the County). The purpose of this letter is to address issues that were presented during the meeting. ERI understands that the case closure process will continue once these issues are addressed. The issues are:

- The status of groundwater monitoring wells MW7A, MW7B, and MW7C.
- Corrections/additions to the risk based corrective action analysis (RBCA) for the site.

Groundwater monitoring wells MW7A, MW7B, and MW7C were installed by Texaco on June 14, 1988. The approximate locations of the wells are shown on a site plan in Attachment A. Well Construction logs are provided in Attachment B. A copy of the well installation permit is included in Attachment C. According to a well destruction permit, the wells were scheduled to be destroyed on September 27, 1988. A copy of the well destruction permit is included as Attachment D.

In ERI's *Request for Case Closure* dated December 13, 1999, ERI reported the results of a RBCA analysis for the subject site for BTEX constituents. The RBCA was performed to evaluate residential exposure standards based on the estimated future use of the property. The maximum soil and groundwater concentrations did not exceed the regulatory site-specific target levels (SSTLs) for the evaluated exposure pathways for BTEX based on the permissible exposure limit (PEL). Surface soil (less than 3 feet below ground surface) exposure pathways were not analyzed because analytical data for surface soils were not available at that time.

ERI has made the following additions/corrections to the RBCA. The surface soil analytical results reported in Clayton Group Services (Clayton's) *Phase II Environmental Assessment at 6600 International Boulevard in Oakland, California* (February 21, 2000) were included in the RBCA. The results for soil sample S-9-D6 (benzene at 0.62 parts per million) were also entered into the subsurface soil data of the RBCA. The slope factors were changed to from 0.029 (the Federal standard) to 0.10 (the California standard). Because future use of the site will involve newly constructed facilities, a slab

COPY

crack ~~thickness~~ factor of 0.000001 was used. The RBCA was then rerun using the maximum soil and groundwater concentrations. The SSTLs were not exceeded for the evaluated exposure pathways. The additional RBCA output files are presented in Attachment E.

ERI recommends forwarding copies of this letter to:

Mr. Barney Chan
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harbor Bay Parkway, Room 250
Alameda, California 94502-6577

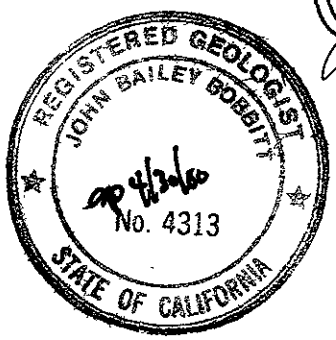
Mr. Stephen Hill
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, California 94612

Please call Mr. James F. Chappell at (415) 382-4323, with any questions regarding this project.

Sincerely,
Environmental Resolutions, Inc.

COPY

James F. Chappell
Senior Staff Scientist



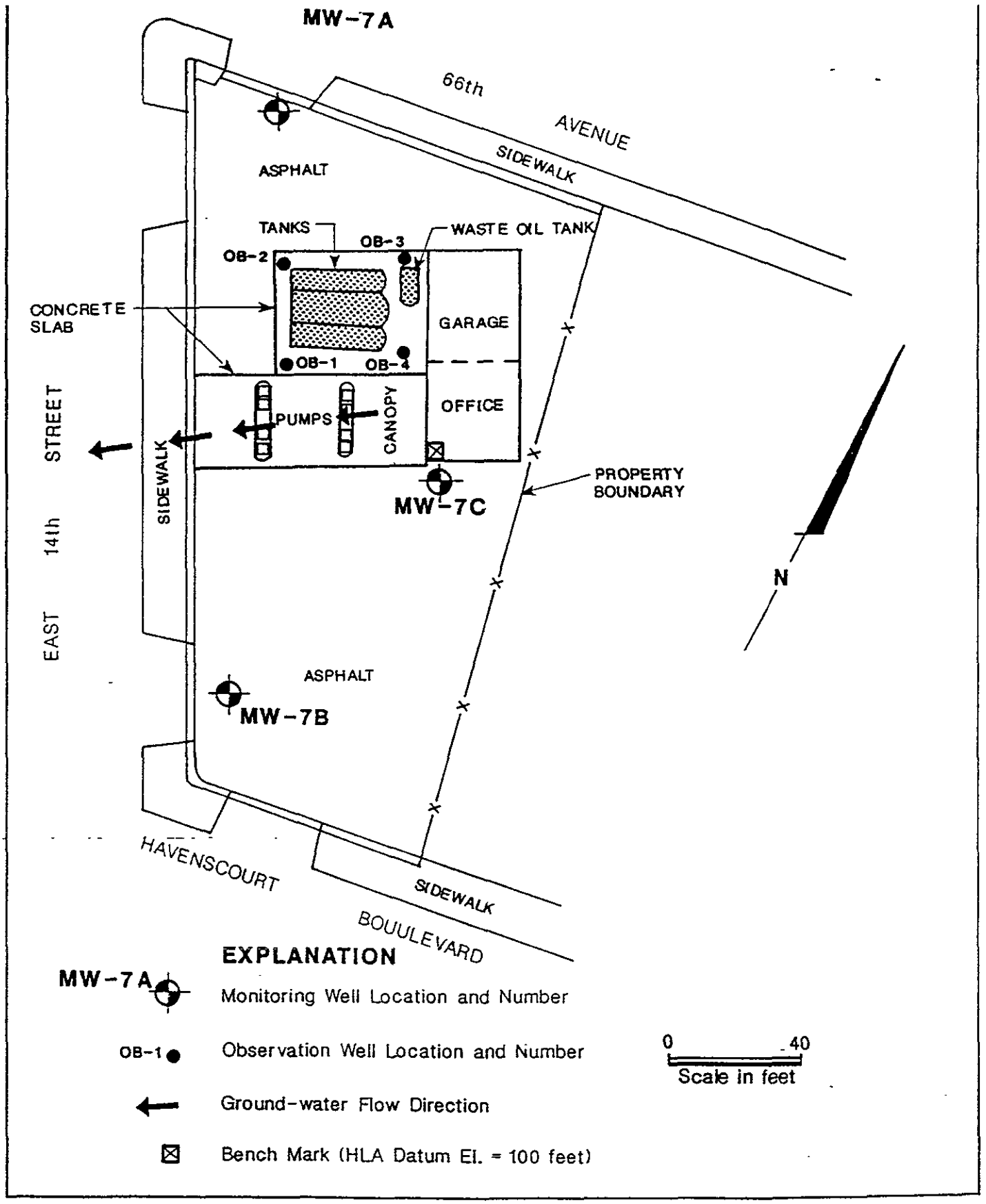
COPY

John B. Bobbitt
Senior Project Manager

Attachments:
Attachment A: Vicinity Map (Harding Lawson Associates)
Attachment B: Well Construction Logs
Attachment C: Well Installation Permit
Attachment D: Well Destruction Permit
Attachment E: RBCA Output Files

ATTACHMENT A

VICINITY MAP
(HARDING LAWSON ASSOCIATES)



Harding Lawson Associates
Engineers and Geoscientists

Site Plan

Texaco Station-62488000220
6630 E. 14th Street
Oakland, California

PLATE
2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
AG	2251,053.04	JO	5/88		

ATTACHMENT B

WELL CONSTRUCTION LOGS

Equipment 8-inch Hollow Stem Auger

Elevation **98.1 feet Date 6/14/88

Laboratory Tests	Blows	PID * Reading (ppm)	Depth (ft)	Sample
			0	
				asphaltic concrete pavement
				aggregate baserock
				BLACK SILTY CLAY WITH SAND (CH) medium stiff, moist
	11	<1	5	
				SILTY CLAY TRACE SAND (CH) stiff, moist
				BROWNISH GRAY SILTY CLAY WITH SAND (CL) very stiff, moist
	17	1	10	
				GRAY CLAYEY SAND (SC) medium dense, wet, slight petroleum odor
	13	7	15	
		1		BROWN SILTY CLAY WITH SAND (CL) stiff, moist
				BROWN CLAYEY SAND (SC) medium dense, moist
				becomes saturated
	15	<1	20	
				BROWN SILTY CLAY WITH SAND (CL) very stiff, moist
				bottom of boring 20 feet
				boring cleaned out to 19 feet
				stabilized water level at a depth of 10 feet on 6/22/88
			25	
			30	
			35	
			40	

*PID = photo ionization detector, HNU PI 101
ppm = parts per million

**Reference Elevation (arbitrary datum)

Harding Lawson Associates
Engineers, Geologists & Geophysicists

Log of Boring MW-7A

Texaco Station - 62488000220
6630 E. 14th Street
Oakland, California

PLATE 3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RS	2251,053.04	JO	7/88		

Equipr. ..t 8-inch Hollow Stem Auger

Elevation ** 98.5 feet Date 6/14/88

Laboratory Tests	Blows.	PID * Reading (ppm)	Depth (ft)	Sample
			0	
				asphaltic concrete pavement
				aggregate baserock
				BLACK SILTY CLAY (CH) soft, wet becomes stiff
	23	<1	5	
				DARK GRAY MOTTLED BROWN SILTY CLAY WITH SAND (CL) very stiff, moist
				BROWN SILTY CLAY TRACE SAND (CL) medium stiff, moist
	29	<1	10	
				DARK BROWN SILTY CLAY WITH SAND (CL) stiff, moist becomes brown
				SANDY CLAY (SC)
				BROWN SAND WITH CLAY (SC) medium dense, saturated
	26	1	15	
				BROWN SANDY CLAY (CL) very stiff, moist
	27	1.5	20	
				bottom of boring 20.5 feet
				boring cleaned out to 19.5 feet
				stabilized water level at 11 feet on 6/22/88
			25	
			30	
			35	
			40	

*PID = photo ionization detector, HNU PI 101
ppm = parts per million

**Reference Elevation (arbitrary datum)

Harding Lawson Associates
Engineers, Geologists & Geophysicists

Log of Boring MW-7B

Texaco Station - 62488000220
6630 E. 14th Street
Oakland, California

PLATE 4

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RS	2251,053.04	JO	7/88		

Equipment 8-inch Hollow Stem Auger

Elevation ** 99.4 feet Date 6/14/88

Laboratory Tests	Blows	PID* Reading (ppm)	Depth (ft)	Sample	
			0		asphaltic concrete pavement aggregate baserock BLACK SILTY CLAY TRACE SAND (CH) soft, wet decrease in moisture content and becomes stiff
	15	<1	5		BROWNISH GRAY SILTY CLAY WITH SAND (CL-CH) stiff, moist
	26	<1	▽ 10		BROWN SANDY CLAY (CL) very stiff, moist GRAYISH BROWN SILTY CLAY WITH SAND (CL) medium stiff, moist
	29	<1	15		BROWN CLAYEY SAND (SC) medium dense, wet
	27	<1	20		BROWN SILTY CLAY WITH SAND (CL) stiff, moist BROWN SAND WITH CLAY (SC) dense, saturated clay layer
	13	1	25		BROWN SAND WITH CLAY (SC) medium dense, saturated BROWN SILTY CLAY (CL) stiff, moist bottom of boring 26 feet boring cleaned out to 24.5 feet stabilized water level at 10.5 feet on 6/22/88
			30		
			35		
			40		

*PID = photo ionization detector, HNU PI 101
ppm = parts per million

**Reference Elevation (arbitrary datum)

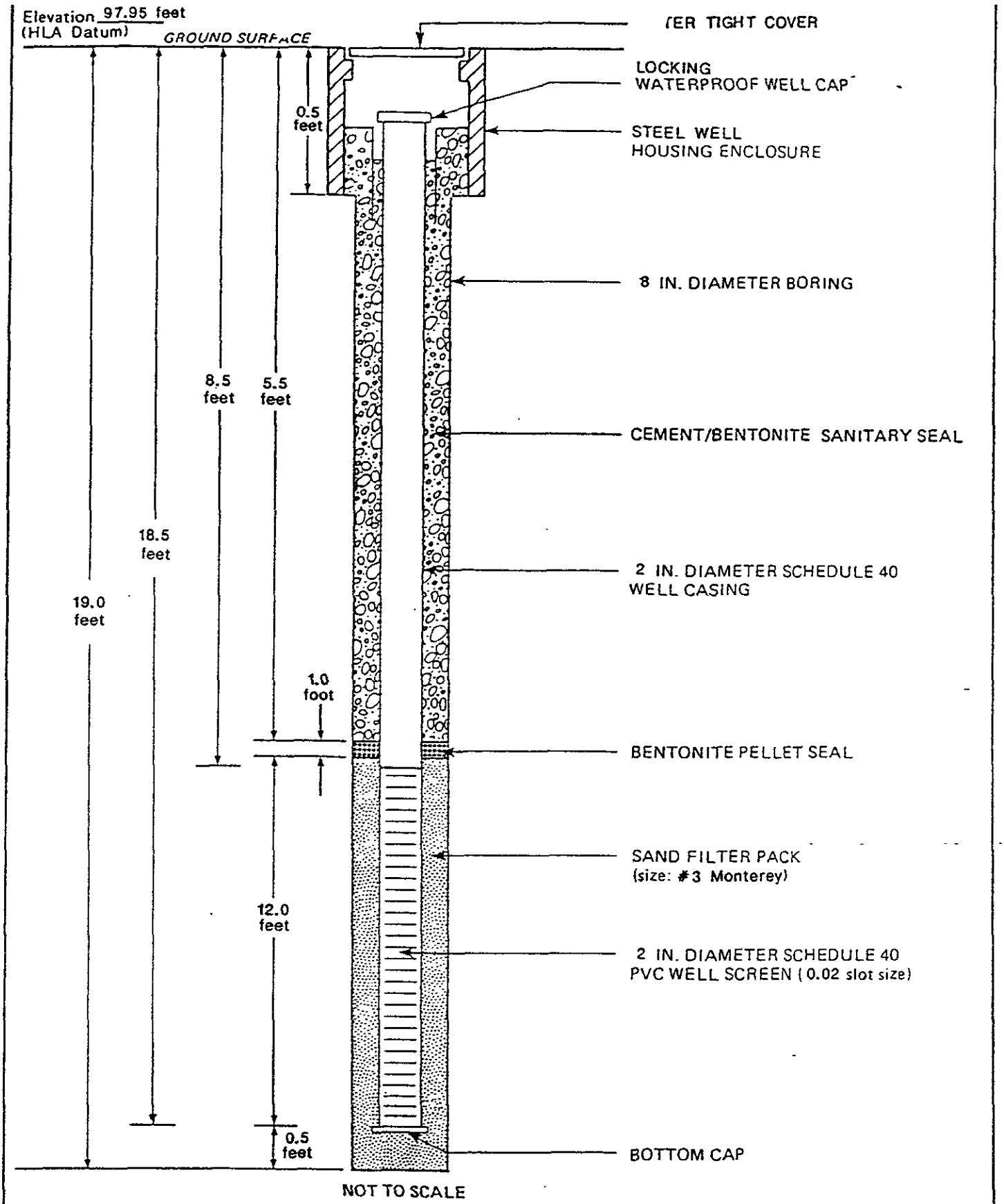
Harding Lawson Associates
Engineers, Geologists & Geophysicists

Log of Boring MW-7C

Texaco Station - 62488000220
6630 E. 14th Street
Oakland, California

PLATE 5

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
RS	2251.053.04	JO	7/88		

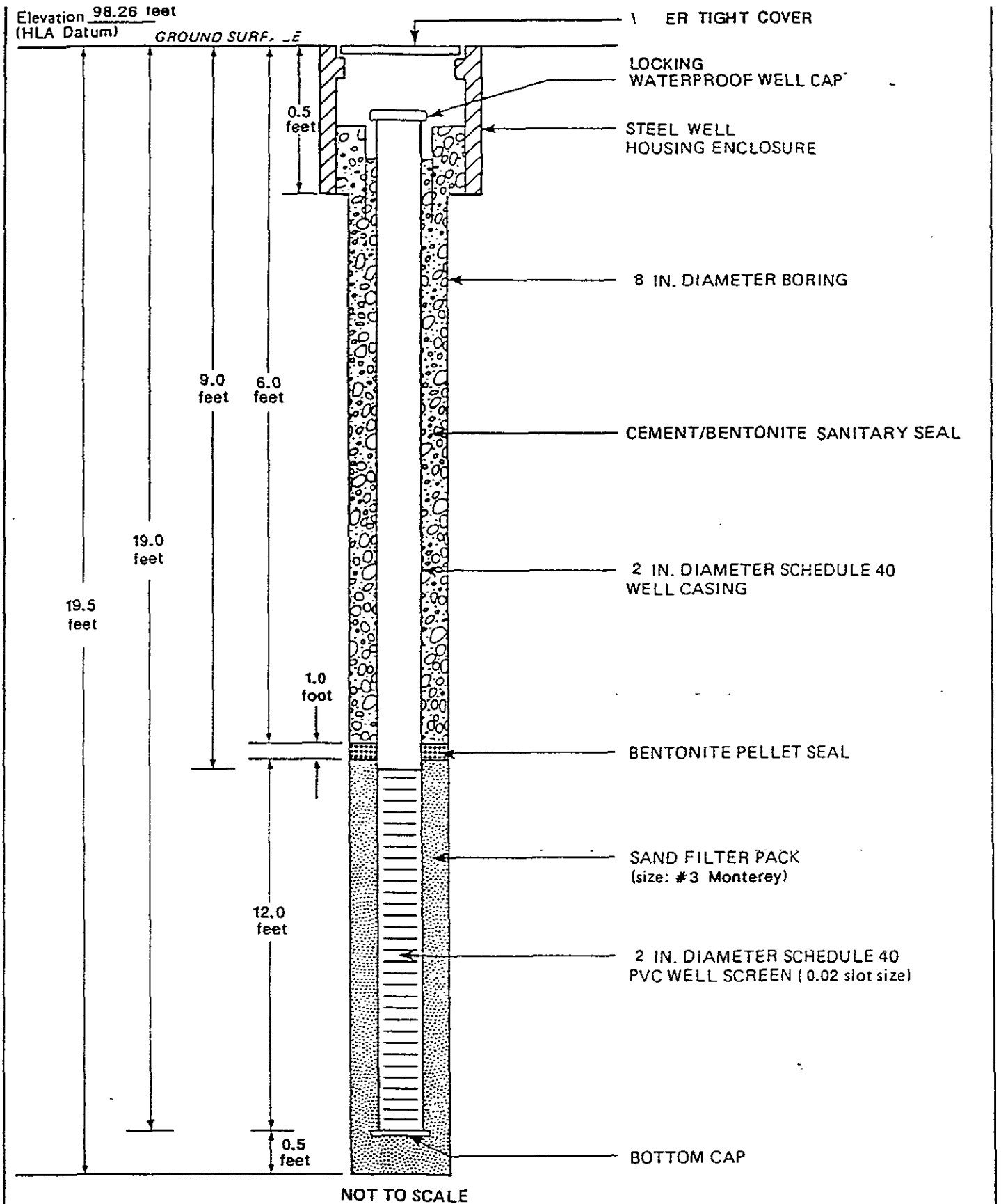


Harding Lawson Associates
Engineers, Geologists
& Geophysicists

Monitoring Well MW-7A
Completion Detail
Texaco Station - 62488000220
6630 E. 14th Street
Oakland, California

PLATE
7

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	2251,053.04	JO	7/88		



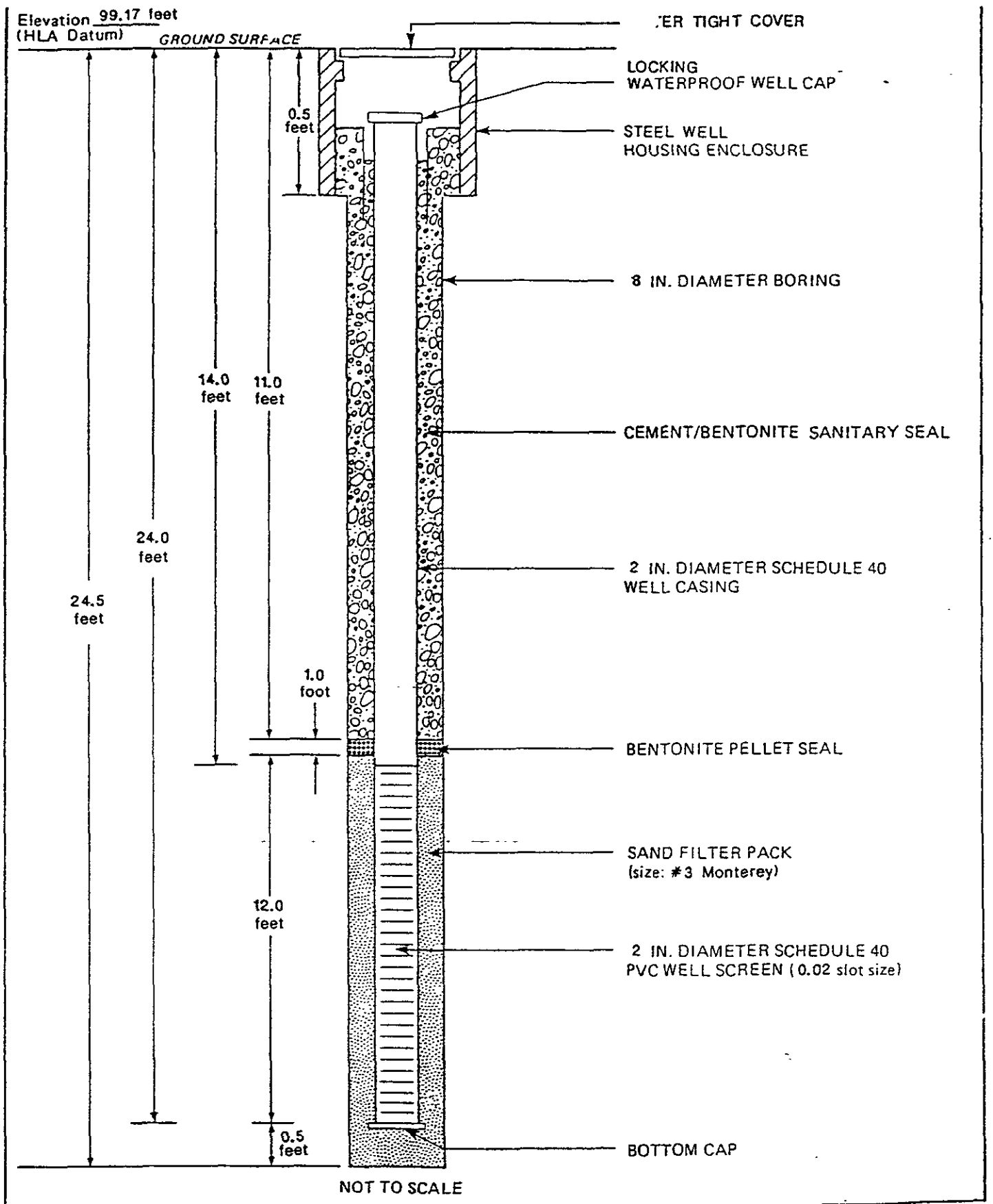
Harding Lawson Associates
Engineers, Geologists
& Geophysicists

Monitoring Well MW-7B
Completion Detail
Texaco Station - 62488000220
6630 E. 14th Street
Oakland, California

PLATE
8

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	2251.053.04	JO	7/88		

FORM GW2



Harding Lawson Associates
Engineers, Geologists
& Geophysicists

Monitoring Well MW-7C Completion Detail

Texaco Station - 62488000220
6630 E. 14th Street
Oakland, California

PLATE
9

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	2251,053.04	40	7/88		

ATTACHMENT C

WELL INSTALLATION PERMIT

ZONE 7

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94566 • (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

1) LOCATION OF PROJECT 6630 East 14th Street
Oakland, California

2) CLIENT
Name Texaco USA
Address 10 Universal City Plaza Phone: 818-505-2476
City Los Angeles Zip 91608

3) APPLICANT
Name Harding Lawson Associates
666 Howard Street, 3rd Floor
Address Phone 543-8422
City San Francisco Zip 94105

4) DESCRIPTION OF PROJECT
Water Well Construction X Geotechnical ___
Cathodic Protection ___ Well Destruction ___

5) PROPOSED WATER WELL USE
Domestic ___ Industrial ___ Irrigation ___
Municipal ___ Monitoring X Other ___

6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary ___ Air Rotary ___ Auger X
Cable ___ Other ___

WELL PROJECTS
Drill Hole Diameter 8 in. Depth(s) 20 ft.
Casing Diameter 2 in. Number
Surface Seal Depth 5-10 ft. of Wells 3
Driller's License No. C57-336582

GEOTECHNICAL PROJECTS
Number ___
Diameter ___ in. Maximum Depth ___ ft.

7) ESTIMATED STARTING DATE June 16, 1988
ESTIMATED COMPLETION DATE June 16, 1988

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE [signature] Date 6-3-88

FOR OFFICE USE

PERMIT NUMBER 88234
LOCATION NUMBER ___

Approved Wyman Hong Wyman Hong Date 2 Jun

PERMIT CONDITIONS

Circled Permit Requirements Apply

(A.) GENERAL
1. A permit application should be submitted so arrive at the Zone 7 office five days pri proposed starting date.
2. Notify this office (484-2600) at least on prior to starting work on permitted wor before placing well seals.
3. Submit to Zone 7 within 60 days after comp of permitted work the original Departmen Water Resources Water Well Drillers Repo equivalent for well projects, or bore hole and location sketch for geotechnical pro Permitted work is completed when the last s seal is placed or the last boring is complete
4. Permit is void if project not begun wi days of approval date.

(B.) WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inc cement grout placed by tremie, or equivalent
2. Minimum seal depth is 50 feet for municipa industrial wells or 20 feet for domestic, i tion, and monitoring wells unless a lesser is specially approved.

C. GEOTECHNICAL. Backfill bore hole with compacted tings or heavy bentonite and upper two feet wit pacted material.

D. CATHODIC. Fill hole above anode zone with co placed by tremie, or equivalent.

E. WELL DESTRUCTION. See attached.

ATTACHMENT D

WELL DESTRUCTION PERMIT

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94566 • (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

(1) LOCATION OF PROJECT 6630 EAST 14th ST.
OAKLAND, CA 94603

(2) CLIENT
Name TEXACO USA
Address 1670 S. AMPHLETT #215 Phone (415) 570-5075
City SAN MATEO, CA Zip 94402

(3) APPLICANT
Name MICHAEL R. MEYER
HARDING LAWSON ASSOCIATES
Address 1355 WILLOW WAY #104 Phone (415) 687-9660
City CONCORD, CA Zip 94520

(4) DESCRIPTION OF PROJECT
Water Well Construction ___ Geotechnical ___
Cathodic Protection ___ Well Destruction X

(5) PROPOSED WATER WELL USE
Domestic ___ Industrial ___ Irrigation ___
Municipal ___ Monitoring X Other ___

(6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary ___ Air Rotary ___ Auger X
Cable ___ Other ___

WELL PROJECTS
Drill Hole Diameter 8 in. Depth(s) 25 ft.
Casing Diameter 2 in. Number
Surface Seal Depth 2 ft. of Wells 3
Driller's License No. 24 9957

GEOTECHNICAL PROJECTS
Number ___
Diameter ___ in. Maximum Depth ___ ft.

(7) ESTIMATED STARTING DATE 9/27/88
ESTIMATED COMPLETION DATE 9/27/88

(8) I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE Michael R Meyer Date 9/22/88

Destruct Report.

FOR OFFICE USE

PERMIT NUMBER 88484
LOCATION NUMBER 2S/3W 16B80, 16B81, and 16B82

Approved Wyman Hong Date 19 Sep 88
Wyman Hong

PERMIT CONDITIONS

Circled Permit Requirements Apply

(A.) GENERAL
1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Notify this office (484-2600) at least one day prior to starting work on permitted work and before placing well seals.
3. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or bore hole logs and location sketch for geotechnical projects. Permitted work is completed when the last surface seal is placed or the last boring is completed.
4. Permit is void if project not begun within 90 days of approval date.

B. WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie, or equivalent.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic, irrigation, and monitoring wells unless a lesser depth is specially approved.

C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material.

D. CATHODIC. Fill hole above anode zone with concrete placed by tremie, or equivalent.

(E.) WELL DESTRUCTION. See attached.

91987

20 September 1988

ZONE 7
WATER RESOURCES ENGINEERING
GROUNDWATER PROTECTION ORDINANCE

TEXACO
6630 EAST 14TH STREET
OAKLAND
WELLS 2S/3W 16B80, 16B81, 16B82

Destruction Requirements

1. Drill out the well so that casing, seal, and gravel pack are removed to the bottom of the well.

2. Using a tremie pipe, fill the hole to 2 feet below the lower of finished grade or original ground with neat cement.

3. After seal has set, backfill the remaining hole with compacted material.

These destruction requirements as proposed by Mike Meyer of Harding Lawson Associates meet or exceed the Zone 7 minimum requirements.

ATTACHMENT E

RBCA OUTPUT FILES

RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

Site Name: Former Exxon Station 7-0236 | Job Identification: 2009RBCA | Software: GSI RBCA Spreadsheet
Site Location: 6600 East 14th Street | Date Completed: 11/10/99 | Version: 1.0 1
Completed By: Steve M Zigan

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

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
t	Averaging time for vapor flux (yr)	30			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
Outdoor Air Pathways:				
SS.v	Volatiles and Particulates from Surface Soils	FALSE	FALSE	TRUE
S.v	Volatilization from Subsurface Soils	TRUE	FALSE	
GW.v	Volatilization from Groundwater	TRUE	FALSE	
Indoor Air Pathways:				
S.b	Vapors from Subsurface Soils	TRUE	FALSE	
GW.b	Vapors from Groundwater	TRUE	FALSE	
Soil Pathways:				
SS.d	Direct Ingestion and Dermal Contact	FALSE	TRUE	TRUE
Groundwater Pathways:				
GW.i	Groundwater Ingestion	FALSE	FALSE	
S.l	Leaching to Groundwater from all Soils	FALSE	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)		TRUE		FALSE

Matrix of Target Risks		Individual	Cumulative
TRab	Target Risk (class A&B carcinogens)	1 0E-06	
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	Constrctn
A	Contaminated soil area (cm^2)	***8.0E+05***	***8.0E+05***
W	Length of affect. soil parallel to wind (cm)	***1.3E+03***	***1.3E+03***
W.gw	Length of affect. soil parallel to groundwater (cm	***6.4E+02***	
Uair	Ambient air velocity in mixing zone (cm/s)	2 3E+02	
delta	Air mixing zone height (cm)	2.0E+02	
Lss	Thickness of affected surface soils (cm)	***9.1E+01***	
Pe	Particulate areal emission rate (g/cm^2/s)	6.9E-14	

Groundwater	Definition (Units)	Value
delta gw	Groundwater mixing zone depth (cm)	***1.8E+02***
I	Groundwater infiltration rate (cm/yr)	3 0E+01
Ugw	Groundwater Darcy velocity (cm/yr)	
Ugw tr	Groundwater seepage velocity (cm/yr)	
Ks	Saturated hydraulic conductivity(cm/s)	
grad	Groundwater gradient (cm/cm)	
Sw	Width of groundwater source zone (cm)	9.8E+02
Sd	Depth of groundwater source zone (cm)	1.8E+02
phi.eff	Effective porosity in water-bearing unit	3 8E-01
foc.sat	Fraction organic carbon in water-bearing unit	1.0E-03
BIO?	Is bioattenuation considered?	FALSE
BC	Biodegradation Capacity (mg/L)	

Soil	Definition (Units)	Value	capillary	vadose	foundation
hc	Capillary zone thickness (cm)	5.0E+00			
hv	Vadose zone thickness (cm)	***2.8E+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	0.38			
Lgw	Depth to groundwater (cm)	***2.9E+02***			
Ls	Depth to top of affected subsurface soil (cm)	***9.1E+01***			
Lsubs	Thickness of affected subsurface soils (cm)	***4.0E+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	***0.000001***	

Transport Parameters	Definition (Units)	Residential	Commercial
Groundwater			
ax	Longitudinal dispersivity (cm)		
ay	Transverse dispersivity (cm)		
az	Vertical dispersivity (cm)		
Vapor			
dcy	Transverse dispersion coefficient (cm)		
dcz	Vertical dispersion coefficient (cm)		

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RBCA CHEMICAL DATABASE

Physical Property Data

CAS Number	Constituent	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	ref	in water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(l/kg)	ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3/mol)	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	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 Exxon Station 7-0236 Site Location: 6600 East 14th Street Completed By: Steve M. Zigan Date Completed: 11/10/1999

Software version: 1.0.1

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RBCA CHEMICAL DATABASE

Toxicity Data

CAS Number	Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	Inhalation RfD_inhal	ref	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	-		1.70E-03	R	1.00E-01	A	1.00E-01	A	A	TRUE
100-41-4	Ethylbenzene	1.00E-01	A	2.86E-01	A	-		-		D	FALSE
108-88-3	Toluene	2.00E-01	A,R	1.14E-01	A,R	-		-		D	FALSE
1330-20-7	Xylene (mixed isomers)	2.00E+00	A,R	2.00E+00	A	-		-		D	FALSE

Site Name: Former Exxon Station 7-0236 Site Location: 6600 East 14th Street Completed By: Steve M. Zigan Date Completed: 11/10/1999

Software version: 1.0.1

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RBCA CHEMICAL DATABASE

Miscellaneous Chemical Data

CAS Number	Constituent	Maximum Contaminant Level MCL (mg/L)	Maximum Contaminant Level reference	Permissible Exposure Limit PEL/TLV (mg/m3)	Permissible Exposure Limit PEL/TLV ref	Relative Absorption Factors Oral	Relative Absorption Factors Dermal	Detection Limits Groundwater (mg/L)	Groundwater ref	Detection Limits Soil (mg/kg)	Soil ref	Half Life (First-Order Decay) (days) Saturated	Half Life (First-Order Decay) (days) 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	56 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	56 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	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	1	0.5	0.005	C	0.005	S	360	360	H

Site Name: Former Exxon Station 7-0236 Site Location: 6600 East 14th Street Completed By: Steve M. Zigan Date Completed: 11/10/1999

Software version: 1.0.1

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RBCA SITE ASSESSMENT | Input Screen 6.3

CONSTITUENT MOLE FRACTIONS

(Complete the following table)

CONSTITUENT	Mole Fraction of Constituent in Source Material
Benzene	
Ethylbenzene	
Toluene	
Xylene (mixed isomers)	

Site Name: Former Exxon Station 7-0236 Completed By: Steve M. Zigan
Site Location: 6600 East 14th Street Date Completed: 11/10/1999

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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	1.0E-1	max		max	6.2E-1	max
Ethylbenzene	2.2E-2	max	3.4E-2	max	1.3E-1	max
Toluene	1.0E-2	max	1.2E-2	max	8.7E-2	max
Xylene (mixed isomers)	1.0E-2	max	1.1E-1	max	1.3E+0	max

Site Name: Former Exxon Station 7-0236
Site Location: 6600 East 14th Street

Completed By: Steve M. Zigan
Date Completed: 11/10/1999

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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

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Site Location: 6600 East 14th Street Date Completed: 11/10/1999

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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 Exxon Station 7-0236
Site Location: 6600 East 14th Street

Completed By: Steve M. Zigan
Date Completed: 11/10/1999

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Site Name: Former Exxon Station 7-0236
Site Location: 6600 East 14th Street

Completed By: Steve M. Zigan
Date Completed: 11/10/1999

TIER 2 SURFACE SOIL CONCENTRATION DATA SUMMARY

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		0	0	0.0E+00	#DIV/0!	#DIV/0!
100-41-4	Ethylbenzene		1	1	3.4E-02	#DIV/0!	#DIV/0!
108-88-3	Toluene		1	1	1.2E-02	#DIV/0!	#DIV/0!
1330-20-7	Xylene (mixed isomers)		1	1	1.1E-01	#DIV/0!	#DIV/0!

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Site Name: Former Exxon Station 7-0236
Site Location: 6600 East 14th Street

Completed By: Steve M. Zigan
Date Completed: 11/10/1999

TIER 2 SUBSURFACE SOIL CONCENTRATION DATA SUMMARY

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		5	5	6.2E-01	5.3E-02	3.7E-01
100-41-4	Ethylbenzene		5	4	1.3E-01	1.3E-02	7.0E-02
108-88-3	Toluene		4	4	8.7E-02	4.7E-02	9.1E-02
1330-20-7	Xylene (mixed isomers)		4	4	1.3E+00	1.6E-01	9.6E-01

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Site Name: Former Exxon Station 7-0236
Site Location: 6600 East 14th Street

Completed By: Steve M. Zigan
Date Completed: 11/10/1999

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		8	8	1.0E-01	2.7E-03	1.1E-02
100-41-4	Ethylbenzene		8	8	2.2E-02	1.9E-03	5.1E-03
108-88-3	Toluene		8	8	1.0E-02	1.9E-03	3.8E-03
1330-20-7	Xylene (mixed isomers)		8	8	1.0E-02	1.3E-03	2.9E-03

Serial: G-311-YSX-9
Software: GSI RBCA Spreadsheet
Version: 1.0.1

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SCREEN 7.1
GROUNDWATER
CONCENTRATION
CALCULATOR

Choose UCL Percentile

95%

Analytical Data (Up to 50 Data Points)

	1	2	3	4	5	6	7	8
	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Well Name	MW2	MW2	MW2	MW2	MW8	MW8	MW8	MW8
Date Sampled	10/11/99	7/30/99	4/25/99	1/13/99	10/11/99	7/30/99	4/23/99	1/15/99
BETX	0.001	0.1	0.042	0.005	0.001	0.0005	0.0005	0.0005
	0.001	0.01	0.022	0.005	0.001	0.0005	0.0005	0.0005
	0.0025	0.01	0.001	0.005	0.001	0.0027	0.0025	0.00027
	0.001	0.01	0.001	0.0065	0.001	0.00052	0.0005	0.0005

Calculated Distribution of Data	Default Detection Limit (mg/L)
Lognormal	0.002
Lognormal	0.002
Lognormal	0.002
Lognormal	0.005

SCREEN 7.2
SURFACE SOILS
CONCENTRATION
CALCULATOR

UCL Percentile

90%

Analytical Data (Up to 50 Data Points)

	1	2	3	4	5	6	7	8
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Sample Name	B-12	B-11	B-10	B-14	B-3			
Date Sampled	12/1/99	12/1/99	12/1/99	12/1/99	12/1/99			
BENZENE	ND	ND	ND	ND	ND			
TOLUENE	0.004	ND	ND	ND	ND			
ETHYLBENZENE	0.012	ND	ND	ND	ND			
XYLENES	0.11	ND	ND	ND	ND			

Calculated Distribution of Data	Default Detection Limit (mg/kg)
#DIV/0!	0.005
#DIV/0!	0.005
#DIV/0!	0.005
#DIV/0!	0.005

SCREEN 7.3
SUBSURFACE SOILS
CONCENTRATION
CALCULATOR

UCL Percentile

95%

Analytical Data (Up to 50 Data Points)

	1	2	3	4	5	6	7	8
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Sample Name	MW2	MW3	VE1	MW5	S-8 Dup			
Date Sampled	3/1/91	3/1/91	11/26/93	11/10/94	12/4/97			
	0.043	0.005	0.0125	0.26	0.62			
	0.047	0.003	0.0006	0.13				
	0.087	0.003	0.031	0.067				
	0.074	0.0407	1.2615	0.19				

Calculated Distribution of Data	Default Detection Limit (mg/kg)
Lognormal	0.005
Lognormal	0.005
Normal	0.005
Lognormal	0.005

Site Name: Former Exxon Station 7-0236 | Site Location: 6600 East 14th Street | Completed By: Steve M. Zigan | Date Completed: 11/10/1999 |

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAY IS ACTIVE)

SURFACE SOILS: VAPOR AND DUST INHALATION

Constituents of Concern	Exposure Concentration 1) Source Medium: Surface Soil Conc (mg/kg)	2) NAF Value (m^3/kg) Receptor		3) Exposure Medium: Outdoor Air. POE Conc (mg/m^3) (1) / (2)		4) Exposure Multiplier: (IRxEFxED)/(BWxAT) (m^3/kg-day)		5) Average Daily Intake Rate: (mg/kg-day) (3) X (4)	
Benzene	0.0E+0								
Ethylbenzene	3.4E-2								
Toluene	1.2E-2								
Xylene (mixed isomers)	1.1E-1								

NOTE: ABS = Dermal absorption factor (dim); AF = Adherance factor (mg/cm^2); AT = Averaging time (days); BW = Body weight (kg); CF = Units conversion factor; ED = Exposure duration (yrs); EF = Exposure frequency (days/yr); ET = Exposure time (hrs/day); IR = Inhalation rate (m^3/day); POE = Point of exposure; SA = Skin exposure area (cm^2/day)

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Site Name: Former Exxon Station 7-0236 | Site Location: 6600 East 14th Street | Completed By: Steve M. Zigan | Date Completed: 11/10/1999 | 2 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SUBSURFACE SOILS: VAPOR INHALATION

Exposure Concentration

Constituents of Concern	1) Source Medium: Subsurface Soil Conc (mg/kg)	2) NAF Value (m^3/kg) Receptor: On-Site Residential		3) Exposure Medium: Outdoor Air: POE Conc (mg/m^3) (1) / (2) On-Site Residential		4) Exposure Multiplier: (IRxEFxED)/(BWxAT) (m^3/kg-day) On-Site Residential		5) Average Daily Intake Rate: (mg/kg-day) (3) X (4) On-Site Residential	
Benzene	6.2E-1	4.9E+4		1.3E-5		1.2E-1		1.5E-6	
Ethylbenzene	1.3E-1	4.9E+4		2.6E-6		2.7E-1		7.2E-7	
Toluene	8.7E-2	4.9E+4		1.8E-6		2.7E-1		4.8E-7	
Xylene (mixed isomers)	1.3E+0	4.9E+4		2.6E-5		2.7E-1		7.0E-6	

NOTE:
ABS = Dermal absorption factor (dim)
AF = Adherance factor (mg/cm^2)
AT = Averaging time (days)
BW = Body weight (kg)
CF = Units conversion factor
ED = Exposure duration (yrs)
EF = Exposure frequencey (days/yr)
ET = Exposure time (hrs/day)
IR = Inhalation rate (m^3/day)
POE = Point of exposure
SA = Skin exposue area (cm^2/day)

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Site Name: Former Exxon Station 7-0236 | Site Location: 6600 East 14th Street | Completed By: Steve M. Zigan | Date Completed: 11/10/1999 | 3 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: VAPOR INHALATION

Constituents of Concern	Exposure Concentration: 1) Source Medium — Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor — On-Site Residential		3) Exposure Medium — Outdoor Air POE Conc. (mg/m^3) (1) / (2) — On-Site Residential		4) Exposure Multiplier ((IRxEFxED)/(BWxAT) (m^3/kg-day)) — On-Site Residential		5) Average Daily Intake Rate (mg/kg-day) (3) X (4) — On-Site Residential		TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from surface, subsurface & groundwater routes.) — On-Site Residential	
Benzene	1.0E-1	4.3E+4		2.3E-6		1.2E-1		2.7E-7		1.7E-6	
Ethylbenzene	2.2E-2	4.2E+4		5.3E-7		2.7E-1		1.4E-7		8.7E-7	
Toluene	1.0E-2	4.3E+4		2.3E-7		2.7E-1		6.3E-8		5.5E-7	
Xylene (mixed isomers)	1.0E-2	4.6E+4		2.2E-7		2.7E-1		5.9E-8		7.1E-8	

NOTE:
ABS = Dermal absorption factor (dim)
AF = Adherance factor (mg/cm^2)
AT = Averaging time (days)
BW = Body weight (kg)
CF = Units conversion factor
ED = Exposure duration (yrs)
EF = Exposure frequencey (days/yr)
ET = Exposure time (hrs/day)
IR = Inhalation rate (m^3/day)
POE = Point of exposure
SA = Skin exposure area (cm^2/day)

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Site Name: Former Exxon Station 7-0236 Site Location: 6600 East 14th Street Completed By: Steve M. Zigan Date Completed: 11/10/1999

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SUBSURFACE SOILS:
VAPOR INTRUSION TO BUILDINGS

Constituents of Concern	Exposure Concentration 1) Source Medium: Subsurface Soil Conc (mg/kg)	2) NAF Value (m^3/kg) Receptor: On-Site Residential		3) Exposure Medium: Indoor Air POE Conc (mg/m^3) (1) / (2) On-Site Residential		4) Exposure Multiplier (IRxEFxED)/(BWxAT) (m^3/kg-day) On-Site Residential		5) Average Daily Intake Rate (mg/kg-day) (3) X (4) On-Site Residential	
Benzene	6.2E-1	3.7E+4		1.7E-5		8.8E-2		1.5E-6	
Ethylbenzene	1.3E-1	4.8E+4		2.7E-6		2.1E-1		5.6E-7	
Toluene	8.7E-2	6.0E+4		1.5E-6		2.1E-1		3.0E-7	
Xylene (mixed isomers)	1.3E+0	9.1E+4		1.4E-5		2.1E-1		2.8E-6	

NOTE ABS = Dermal absorption factor (dim) BW = Body weight (kg) EF = Exposure frequencey (days/yr) POE = Point of exposure
AF = Adherance factor (mg/cm^2) *CF = Units conversion factor* *ET = Exposure time (hrs/day)* *SA = Skin exposure area (cm^2/day)*
AT = Averaging time (days) ED = Exposure duration (yrs) IR = Inhalation rate (m^3/day)

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Site Name: Former Exxon Station 7-0236 | Site Location: 6600 East 14th Street | Completed By: Steve M. Zigan | Date Completed: 11/10/1999 | 5 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER:
VAPOR INTRUSION TO BUILDINGS

Constituents of Concern	Exposure Concentration 1) Source Medium: Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor: On-Site Residential		3) Exposure Medium: Indoor Air POE Conc. (mg/m^3) (1) / (2) On-Site Residential		4) Exposure Multiplier (IRxEFxED)/(BWxAT) (m^3/kg-day): On-Site Residential		5) Average Daily Intake Rate (mg/kg-day) (3) X (4): On-Site Residential		TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from subsurface & groundwater routes.): On-Site Residential	
Benzene	1.0E-1	2.6E+5		3.8E-7		8.8E-2		3.3E-8		1.5E-6	
Ethylbenzene	2.2E-2	2.2E+5		9.9E-8		2.1E-1		2.0E-8		5.8E-7	
Toluene	1.0E-2	2.4E+5		4.1E-8		2.1E-1		8.4E-9		3.1E-7	
Xylene (mixed isomers)	1.0E-2	2.6E+5		3.9E-8		2.1E-1		8.0E-9		2.8E-6	

NOTE:
ABS = Dermal absorption factor (dim)
AF = Adherance factor (mg/cm^2)
AT = Averaging time (days)
BW = Body weight (kg)
CF = Units conversion factor
ED = Exposure duration (yrs)
EF = Exposure frequencey (days/yr)
ET = Exposure time (hrs/day)
IR = Inhalation rate (m^3/day)
POE = Point of exposure
SA = Skin exposure area (cm^2/day)

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Site Name: Former Exxon Station Site Location: 6600 East 14th Street Completed By: Steve M. Zi Date Completed: 11/10/1999 *6 OF 9*

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

SOIL EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SURFACE SOILS OR SEDIMENTS: **Exposure Concentration**

DERMAL CONTACT

	1) Source Medium	2) Exposure Multiplier (SAxAFxABSxCFxEFxED)/(BWxAT) (kg/kg-day)		3) Average Daily Intake Rate (mg/kg-day) (1) x (2)	
Constituents of Concern	Surface Soil Conc. (mg/kg)	On-Site Residential	On-Site Commercial	On-Site Residential	On-Site Commercial
Benzene	0.0E+0		1.0E-5		0.0E+0
Ethylbenzene	3.4E-2		2.8E-5		9.6E-7
Toluene	1.2E-2		2.8E-5		3.4E-7
Xylene (mixed isomers)	1.1E-1		2.8E-5		3.1E-6

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

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Site Name: Former Exxon Station 7- Site Location. 6600 East 14th Street Completed By: Steve M. Zigan Date Completed: 11/10/1999 *7 OF 9*

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

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

SURFACE SOILS OR SEDIMENTS:

INGESTION

Exposure Concentration

Constituents of Concern	1) Source Medium: Surface Soil Conc (mg/kg)	2) Exposure Multiplier (IRxCFxEFxED)/(BWxAT) (kg/kg-day): On-Site Residential	2) Exposure Multiplier: On-Site Commercial	3) Average Daily Intake Rate (mg/kg-day) (1) x (2): On-Site Residential	3) Average Daily Intake Rate: On-Site Commercial	TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from dermal & ingestion routes): On-Site Residential	TOTAL PATHWAY INTAKE: On-Site Commercial
Benzene	0.0E+0		1.7E-7		0.0E+0		0.0E+0
Ethylbenzene	3.4E-2		4.9E-7		1.7E-8		9.8E-7
Toluene	1.2E-2		4.9E-7		5.9E-9		3.5E-7
Xylene (mixed isomers)	1.1E-1		4.9E-7		5.4E-8		3.2E-6

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

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Software. GSI RBCA Spreadsheet Serial G-311-YSX-926
Version 1 0 1

Site Name: Former Exxon Station 7- Site Location: 6600 East 14th Street Completed By: Steve M. Zigan Date Completed: 11/10/1999 *8 OF 9*

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAY IS ACTIVE)

SOIL: LEACHING TO GROUNDWATER/ GROUNDWATER INGESTION

Constituents of Concern	Exposure Concentration 1) Source Medium Soil Concentration (mg/kg)	2) NAF Value (L/kg) Receptor		3) Exposure Medium Groundwater POE Conc (mg/L) (1)/(2)		4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day)		5) Average Daily Intake Rate (mg/kg-day) (3) x (4)	
Benzene	6.2E-1								
Ethylbenzene	1.3E-1								
Toluene	8.7E-2								
Xylene (mixed isomers)	1.3E+0								

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

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Site Name: Former Exxon Station 7- Site Location: 6600 East 14th Street | Completed By: Steve M. Zigan | Date Completed: 11/10/1999 | 9 OF 9

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 Conc (mg/L)	2) NAF Value (dim) — Receptor		3) Exposure Medium — Groundwater POE Conc (mg/L) (1)/(2)		4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day)		5) Average Daily Intake Rate (mg/kg-day) (3) x (4)		MAX. PATHWAY INTAKE (mg/kg-day) *(Maximum intake of active pathways soil leaching & groundwater routes.)*	
Benzene	1.0E-1										
Ethylbenzene	2.2E-2										
Toluene	1.0E-2										
Xylene (mixed isomers)	1.0E-2										

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

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Site Name: Former Exxon Station 7-0236 Site Location: 6600 East 14th Street Completed By: Steve M. Zigan Date Completed: 11/10/1999 *1 OF 4*

TIER 2 PATHWAY RISK CALCULATION

OUTDOOR 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 Residential		(3) Inhalation Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3) On-Site Residential		(5) Total Toxicant Intake Rate (mg/kg/day) On-Site Residential		(6) Inhalation Reference Dose (mg/kg-day)	(7) Individual COC Hazard Quotient (5) / (6) On-Site Residential	
Constituents of Concern											
Benzene	A	1.7E-6		1.0E-1	1.7E-7		4.1E-6		1.7E-3	2.4E-3	
Ethylbenzene	D						8.7E-7		2.9E-1	3.0E-6	
Toluene	D						5.5E-7		1.1E-1	4.8E-6	
Xylene (mixed isomers)	D						7.1E-6		2.0E+0	3.5E-6	

Total Pathway Carcinogenic Risk = 1.7E-7 | 0.0E+0

Total Pathway Hazard Index = 2.4E-3 | 0.0E+0

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Site Name: Former Exxon Station 7-0236 Site Location: 6600 East 14th Street Completed By: Steve M. Zigan Date Completed: 11/10/1999 *2 OF 4*

TIER 2 PATHWAY RISK CALCULATION

INDOOR 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		(mg/kg-day)^-1	On-Site Residential		On-Site Residential		(mg/kg-day)	On-Site Residential	
Benzene	A	1.5E-6		1.0E-1	1.5E-7		3 5E-6		1.7E-3	2.0E-3	
Ethylbenzene	D						5.8E-7		2.9E-1	2.0E-6	
Toluene	D						3.1E-7		1.1E-1	2.7E-6	
Xylene (mixed Isomers)	D						2.8E-6		2.0E+0	1.4E-6	
Total Pathway Carcinogenic Risk =					**1.5E-7**	**0.0E+0**	***Total Pathway Hazard Index =***			**2.1E-3**	**0.0E+0**

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Site Name: Former Exxon Station 7-0236 Site Location: 6600 East 14th Street Completed By: Steve M. Zigan Date Completed: 11/10/1999 *3 OF 4*

TIER 2 PATHWAY RISK CALCULATION

SOIL EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAYS ARE ACTIVE)

	CARCINOGENIC RISK							TOXIC EFFECTS		
	(1) EPA	(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	Carcinogenic Classification	On-Site Residential	On-Site Commercial	(mg/kg-day)^-1	On-Site Residential	On-Site Commercial	On-Site Residential	On-Site Commercial	(mg/kg-day)	On-Site Residential	On-Site Commercial
Benzene	A		0.0E+0	1.0E-1		0.0E+0					
Ethylbenzene	D							9.8E-7	1.0E-1		9.8E-6
Toluene	D							3.5E-7	2.0E-1		1.7E-6
Xylene (mixed isomers)	D							3.2E-6	2.0E+0		1.6E-6
Total Pathway Carcinogenic Risk =					**0.0E+0**	**0.0E+0**	***Total Pathway Hazard Index =***			**0.0E+0**	**1.3E-5**

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Site Name: Former Exxon Station 7-0236 Site Location: 6600 East 14th Street Completed By: Steve M Zigan Date Completed: 11/10/1999 *4 OF 4*

TIER 2 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ☑ (CHECKED IF PATHWAYS ARE ACTIVE)

	CARCINOGENIC RISK					TOXIC EFFECTS			
Constituents of Concern	(1) EPA Classification	(2) Total Carcinogenic Intake Rate (mg/kg/day)		(3) Oral Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3)		(5) Total Toxicant Intake Rate (mg/kg/day)		(6) Oral Reference Dose (mg/kg-day)	(7) Individual COC Hazard Quotient (5) / (6)	
Benzene	A			1.0E-1							
Ethylbenzene	D								1.0E-1		
Toluene	D								2.0E-1		
Xylene (mixed isomers)	D								2.0E+0		
Total Pathway Carcinogenic Risk =					0.0E+0	0.0E+0	***Total Pathway Hazard Index =***			0.0E+0	0.0E+0

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RBCA SITE ASSESSMENT | Tier 2 Worksheet 9.1

Site Name: Former Exxon Station 7-0236
Site Location. 6600 East 14th Street

Completed By. Steve M Zigan
Date Completed 11/10/1999

SURFACE SOIL SSTL VALUES (< 3 FT BGS)

Target Risk (Class A & B) 1.0E-6
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	Ingestion and Dermal Contact		X	Construction Worker	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)		Commercial (on-site)	(mg/kg)	"■" If yes	Only if "yes" left
71-43-2	Benzene	0.0E+0		NA	NA	NA		NA	9.7E-1		2.3E+1	9.7E-1	☐	<1
100-41-4	Ethylbenzene	3.4E-2		NA	NA	NA		NA	>Res		>Res	>Res	☐	<1
108-88-3	Toluene	1.2E-2		NA	NA	NA		NA	>Res		>Res	>Res	☐	<1
1330-20-7	Xylene (mixed isomers)	1.1E-1		NA	NA	NA		NA	>Res		>Res	>Res	☐	<1

>Res indicates risk-based target concentration greater than constituent residual saturation value

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Software. GSI RBCA Spreadsheet
Version· 1 0 1

Serial G-311-YSX-926

Site Name Former Exxon Station 7-0236
Site Location. 6600 East 14th Street

Completed By. Steve M Zigan
Date Completed. 11/10/1999

SUBSURFACE SOIL SSTL VALUES (> 3 FT BGS)

Target Risk (Class A & B) 1 0E-6
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		X 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	6.2E-1	NA	NA	NA	4.2E+0	NA	4.2E+0	NA	4.2E+0	☐	<1
100-41-4	Ethylbenzene	1.3E-1	NA	NA	NA	>Res	NA	>Res	NA	>Res	☐	<1
108-88-3	Toluene	8.7E-2	NA	NA	NA	>Res	NA	>Res	NA	>Res	☐	<1
1330-20-7	Xylene (mixed isomers)	1.3E+0	NA	NA	NA	>Res	NA	>Res	NA	>Res	☐	<1

>Res Indicates risk-based target concentration *greater than constituent* residual saturation value

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Software GSI RBCA Spreadsheet Serial G-311-YSX-926
Version 1 0 1

Site Name: Former Exxon Station 7-0236
Site Location: 6600 East 14th Street

Completed By: Steve M Zigan
Date Completed: 11/10/1999

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-6
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		X Groundwater Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	Residential (on-site)	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	1.0E-1	NA	NA	NA	3.0E+1	NA	3.7E+0	NA	3.7E+0	☐	<1
100-41-4	Ethylbenzene	2.2E-2	NA	NA	NA	>Sol	NA	>Sol	NA	>Sol	☐	<1
108-88-3	Toluene	1.0E-2	NA	NA	NA	>Sol	NA	>Sol	NA	>Sol	☐	<1
1330-20-7	Xylene (mixed isomers)	1.0E-2	NA	NA	NA	>Sol	NA	>Sol	NA	>Sol	☐	<1

>Sol indicates risk-based target concentration greater than constituent solubility

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