GETTLER-RYAN INC.

TRANSMITTAL

TO: Ms. Juliet Shin
Alameda County Health Services Agency
Division of Environmental Protection
1131 Harbor Bay Parkway, 2nd Floor
Alameda, California 94502

DATE: February 25, 1999
PROJ. #: 140165.05
SUBJECT: RBCA Evaluation
Unocal Station No. 1871
Oakland, California

CC: David B. DeWitt, Tosco
Barbara Bee, Property Owner

FROM:
David J. Vossler
Project Manager
Gettler-Ryan Inc.
7100 Redwood Blvd., Suite 104
Novato, California 94945

WE ARE SENDING YOU:

COPIES	DATED	DESCRIPTION
1	February 25, 1999	RBCA Evaluation
1	February 25, 1999	Site Status Report

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

[X] For Your Files

COMMENTS:

As requested, we are forwarding you a copy of RBCA Evaluation for the Tosco SS No. 1871 located at 96 MacAurthur Blvd, in Oakland California. This evaluation is based on the current site conditions and subsurface data collected to date. Also attached is a Site Status Report on the progress of the proposed off-site investigation. If you have any questions, please call me at (415) 893-1515.

GETTLER-RYAN INC.

February 25, 1999

Ms. Juliet Shin
Alameda County Health Agency
Division of Environmental Protections
1131 Harbor Bay Parkway, 2nd Floor
Alameda, California 94502

Re: Status Report for Former Tosco/76 Products Service Station No. 1871
96 MacArthur Boulevard, Oakland.

Dear Ms. Shin:

This letter is written to update you on the status of planned environmental work to be conducted at the site. In May 1998, all underground tanks and surface improvements were removed from the site. Additional contaminated soil was removed to the limits feasible. Four monitor wells (MW-2 through MW-5) were destroyed for the purposes of anticipated redevelopment of the property, but these wells will be replaced by three ACHCS approved wells in the City of Oakland right-of-way along MacArthur Boulevard. These wells are part of the approved Work Plan, which call for additional off-site wells/geoprobe locations as well as a Risk-Based Corrective Action (RBCA) evaluation of the site.

At the present time, Tosco, through its consultant, Gettler-Ryan, Inc. (GR) is in the process of completing the off-site access process and obtaining encroachment permits for the offsite work. At your suggestion, we propose to complete the tasks in phases in the following manner:

- The initial RBCA evaluation dated February 25, 1999 has been completed and submitted for your review. This evaluation includes several "scenarios" intended to test the sensitivity of input parameters.
- Installation of the replacement wells and geoprobe test borings in those areas under the jurisdiction of the City of Oakland. At present, the encroachment permit applications have been filed and the fees paid. We are in the process of obtaining the additional required information (Owner's permission, insurance and legal description of property) for the City of Oakland. Tosco requested the required information from Ms. Barbara Bee, which her attorney completed and sent to the Office of Public Works. We anticipate securing the remaining required information within a month, to be followed by the actual well installation and summary report. Target completion date: May 30, 1999.

- Installation of GeoProbe installation in areas administered by California Department of Transportation (CalTrans). Although GR received information that our application has been accepted, we have not received a permit. We intend to complete this process and install the necessary wells, Geoprobes and prepare reports within three months of obtaining the necessary encroachment permits. Target completion date: May 30, 1999.

In the event these off-site access processes take longer than planned, we will request your help in expediting the necessary permits. If you have any questions or need further details on the site status, please call me at (415) 893-1515.

Sincerely,
Gettler-Ryan Inc.

David J. Vossler
Project Manager

Cc: Mr. David B. DeWitt, Tosco marketing Company, San Ramon, Ca.
Ms. Barbara Bee, Property Owner, Piedmont, California

GETTLER-RYAN INC.

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RISK-BASED CORRECTIVE ACTION EVALUATION

at
Former Tosco 76 Branded Facility No. 1871
96 MacArthur Boulevard
Oakland, California

Report No. 140165.05-01

Prepared for:

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San Ramon, California 94583

Prepared by:

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7100 Redwood Boulevard, Suite 104
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David J. Vossler
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Senior Geologist
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February 25, 1999

TABLE OF CONTENTS

FIGURES

APPENDICES

RISK-BASED CORRECTIVE ACTION EVALUATION

at
Former Tosco 76 Branded Facility No. 1871
96 MacArthur Boulevard
Oakland, California

Report No. 140165.05-01

1.0 INTRODUCTION

At the request of Tosco Marketing Company (Tosco), Gettler-Ryan Inc. (GR) is submitting this report to document the results of implementation of the Risk-Based Corrective Action (RBCA) planning process, as described in ASTM E-1739 "Standard Guide for Risk-Based Corrective Action Applied at Petroleum Sites". This RBCA was conducted on the Tosco/76 Branded site located at 96 MacArthur Boulevard, Oakland, California. The purpose of this work was evaluate whether the known petroleum impacted groundwater and soil poses a risk to human health and to complete the required evaluation for the construction of the planned service station by the property owner at the site. Based on Risk-Based Screening Levels (RBSL) as remediation target levels, the implementation of further environmental investigation and/or remediation related to soil and groundwater may be applied. This report describes site conditions and the RBCA model results for the site.

2.0 SITE DESCRIPTION

2.1 General

The subject site (formerly a service station with two gasoline USTs and one waste oil UST) is located on the north corner of the intersection of MacArthur Boulevard and Harrison Street in Oakland, California (Figure 1). The underground and above ground facilities, including the station building and two product dispenser islands, were demolished and removed from the site. The site is currently a vacant lot. Pertinent site features and the existing groundwater monitoring well are shown on Figure 2. The topography in the vicinity of the site is sloping to the west-southwest at an elevation of approximately 100 feet above mean sea level (MSL). The nearest surface water down gradient is Lake Merit located approximately 1 mile south-southwest of the site.

2.2 Geology and Hydrogeology

The site is located on the western flank of the Oakland Hills. This area is underlain by Late Pleistocene age alluvium. These deposits are composed of weakly consolidated slightly weathered poorly

sorted irregularly interbedded clay, silt, sand, and gravel. The northwest-southeast trending Hayward Fault is located approximately 2.3 miles northeast of the site (Helley, 1979).

Based on subsurface investigations at the site (KEI, 1996), the site is underlain by clay to approximately 5 to 7 feet below ground surface (bgs). The clay is underlain by silt, silty sand, and poorly graded fine sand to 16 feet bgs. Clay was encountered beneath these sediments to a total explored depth of 25.5 feet bgs. Groundwater was measured at approximately 10 to 15 feet bgs during the July 1998 groundwater monitoring event (GR, 1998). This shallow groundwater at the site appears to be unconfined. Historical monitoring data indicate the groundwater flow direction has ranged from southwest to south-southwest with an average gradient of 0.03 (Gettler-Ryan Inc. 1998).

2.3 Previous Environmental Work

A dispenser and product piping modification project was performed at the site in May 1992. Four soil samples were collected from beneath the dispensers by Roux Associates (Roux) at depths ranging from 2 to 5 feet bgs. Petroleum hydrocarbon concentrations reported in the samples ranged from not detected to 58 parts per million (ppm) of Total Petroleum Hydrocarbons as Gasoline (TPHg), and not detected to 0.20 ppm of benzene. An additional sample was collected below the south end of the east island at 8 feet bgs. The sample contained 1,700 ppm of TPHg and 3.1 ppm of benzene (KEI, 1996). A sample location map and analytical results are presented in Appendix A.

Three 4-inch diameter on-site groundwater monitoring wells designated MW-1, MW-2, and MW-3 were installed by Roux in October 1992 (Figure 2). The wells were completed to total depths of 24 to 25 feet bgs. Groundwater was encountered at depths of 14 to 15 feet bgs. Soil samples collected from well borings MW-1 and MW-2 were reported as not detected for TPHg and benzene, toluene, ethylbenzene, and xylenes (BTEX). Soil samples collected from MW-3 at depths of 12-13.5 feet bgs and 13.5-15 feet bgs contained 4.2 ppm of TPHg and 0.079 ppm of benzene, and 10 ppm of TPHg and 0.040 ppm of benzene, respectively. Groundwater samples collected from the wells contained petroleum hydrocarbon concentrations ranging from 140 to 260,000 parts per billion (ppb) of TPHg and 2.2 to 2,300 ppb of benzene. Quarterly groundwater monitoring and sampling was initiated upon receipt of the initial groundwater sample results. In February 1996, Alameda County Health Care Services Agency (ACHCSA) approved Unocal's request to reduce the groundwater monitoring and sampling program from quarterly to semiannually (KEI, 1996). Analytical results and a well boring location map from this investigation is presented in Appendix B.

A 280-gallon single-wall steel waste oil UST was replaced with a 550-gallon double-wall fiberglass UST in August 1994. One soil sample was collected from below the UST at a depth of 9 feet bgs by KEI. The excavation was deepened to 14 feet bgs and another soil sample was collected due to

the obvious presence of petroleum hydrocarbons in the soil. Four sidewall soil samples were also collected at 9 feet bgs.

The bottom sample collected at 9 feet bgs contained 46 ppm of TPHg, 0.12 ppm of benzene, 97 ppm of Total Petroleum Hydrocarbons as Diesel (TPHd), 1,400 ppm of Oil and Grease (O&G), and elevated concentrations of various semi-volatile organic (EPA Method 8270) compounds. One sidewall sample contained 960 ppm of TPHg, 2.2 ppm of benzene, 1,400 ppm of TPHg, 17,000 ppm of TOG, and elevated concentrations of semi-volatile compounds. The three other sidewall samples contained O&G concentrations ranging from 160 to 2,400 ppm. The soil sample collected at the bottom of the excavation at 14 feet bgs was reported as not detected for O&G and semi-volatile compounds (KEI, 1994). A sample location map and analytical results are presented in Appendix A.

In March 1996, KEI drilled two soil borings (EB-1, EB-2) and installation of two additional monitoring wells (MW-4, MW-5) at the site (Figure 2). Soil borings EB-1 and EB-2 were advanced to depths of 13.5 and 14 feet bgs, respectively. Wells MW-4 and MW-5 were installed to a total depth of 20 feet bgs. Soil samples collected from boring EB-1 were reported as not detected for TPHg, BTEX, TPHd, O&G, semi-volatile compounds, and volatile organic (EPA Method 8010) compounds, except for 6.6 ppb of 1,1-dichloroethene detected in the sample collected at 5 feet bgs. The soil sample collected at 5 feet bgs in boring EB-2 was reported as not detected for all analytes. The soil sample collected at 10 feet bgs in boring EB-2 contained 5.7 ppm of TPHg, 73 ppm of TPHd, 540 ppm of O&G, and elevated concentrations of semi-volatile compounds, and was reported as not detected for benzene and volatile organic compounds. The soil sample collected at 5 feet bgs from well boring MW-4 was reported as not detected for TPHg, benzene, O&G, and semi-volatile compounds and contained 1.1 ppm of TPHd and elevated concentrations of volatile organic compounds. The soil sample collected at 9.5 feet bgs from well boring MW-4 contained 24 ppm of TPHg, 350 ppm of TPHd, 1,000 ppm of O&G, and elevated concentrations of semi-volatile and volatile organic compounds, but was reported as not detected for benzene. The soil samples collected from well boring MW-5 were reported as not detected for TPHg and BTEX, except for 0.023 ppm of benzene detected in the sample collected at 9 feet bgs (KEI, 1996). Analytical results and a boring location map is presented in Appendix B.

Grab groundwater samples were collected from both soil borings. Groundwater sample EB-1 was reported as not detected for all analytes except for 1.3 ppb xylenes and 0.54 ppb 1,1-dichloroethane. Groundwater EB-2 was reported as not detected for O&G and volatile organic compounds, but contained 1,400 ppb of TPHg, 690 ppb of benzene, 410 ppb of TPHd, and elevated concentrations of semi-volatile compounds. A groundwater sample collected from well MW-4 was reported as not detected for TPHg and contained 630 ppb of benzene, 110 ppb of TPHd and 18,000 ppb of methyl tertiary butyl ether (MTBE). A groundwater sample collected from MW-5 contained 31,000 ppb of TPHg, 5,500 ppb of benzene, and 66,000 ppb MTBE (KEI, 1996). Analytical results are presented in Appendix C.

In May 1998, all underground and aboveground equipment and facilities were removed by John's Excavating of Santa Rosa, California. Removed from the site were two 12,000-gallon double-wall steel gasoline USTs, one 550-gallon double-wall steel waste oil UST, two hydraulic lifts, two dispenser islands and related single-wall product piping, and one service station building. GR personnel performed soil and groundwater sampling activities in conjunction with the station demolition.

Soil samples were collected beneath or near the USTs, hydraulic lifts, and dispenser islands/product piping. Four soil samples were collected from the sidewalls of the gasoline UST excavation at a depth of 11.5 feet bgs. Petroleum hydrocarbon concentrations in the samples ranged between not detected to 2,000 ppm of TPHg, not detected to 9.7 ppm of benzene, and 1.9 to 16 ppm of MTBE. The areas south and west of the excavation were over excavated to groundwater and two confirmation samples were collected at 11 feet bgs. Three samples contained petroleum hydrocarbon concentrations of not detected and 5.0 ppm of TPHg, 0.049 and 0.080 ppm of benzene, and 6.6 and 12 ppm of MTBE.

One soil sample was collected beneath each of the dispenser islands at a depth of 4 feet bgs. The sample collected beneath the north dispenser island was reported as not detected for TPHg and BTEX and contained 0.74 ppm of MTBE. The sample collected from beneath the south dispenser island was reported as not detected for benzene and MTBE and contained 15 ppm of TPHg. One soil sample was collected from the bottom of the waste oil UST excavation at a depth of 11 feet bgs The sample was reported as not detected for all analytes except for 140 ppm of O&G. One soil sample was collected beneath each of the hydraulic lifts at a depth of 8 feet bgs. Both of these samples were reported as not detected for Total Petroleum Hydrocarbons as hydraulic fluid (TPHhf). A sample location map and analytical results are presented in Appendix A.

Grab groundwater samples were collected from the gasoline and waste oil UST excavations. The sample collected from the gasoline UST excavation was reported as not detected for benzene and MTBE and contained 620,000 ppb of TPHg. The groundwater sample collected from the waste oil UST excavation was reported as not detected for BTEX, MTBE, O&G and semi-volatile compounds, and contained 90 ppb of TPHg, 890 ppb of TPHd, and elevated concentrations of volatile organic compounds.

A total of 1,252.78 tons of soil was removed from the site during demolition activities and transported to Forward Landfill for disposal (GR, 1998A).

Groundwater monitoring and sampling has been performed at the site since January 1993. Depth to groundwater has ranged from 7.70 to 15.50 feet from top of casing. Groundwater flow direction has ranged from southwest to south-southwest with an average hydraulic gradient of 0.03.

Petroleum hydrocarbon concentrations have ranged from not detected to 260,000 ppb of TPHg, not detected to 8,700 ppb of benzene, and 270 to 120,000 ppb of MTBE (GR, 1998). Historical groundwater data is presented in Appendix C.

The tops of casings on monitoring wells MW-2 through MW-5 were damaged during site demolition activities. On September 14, 1998, these wells were drilled out and the borehole backfilled with neat cement to grade. In addition, one soil boring (EB-3) was advanced on-site to a total depth of 16.5 feet bgs (Figure 2). Groundwater was encountered at approximately 10.5 feet bgs. Soil and groundwater samples were collected for use in this RBCA analysis. Documentation of the well destruction will be included with the findings of the off-site subsurface investigation described in the GR Work Plan dated October 30, 1998.

3.0 RISK-BASED CORRECTIVE ACTION (RBCA)

Tier 1 of the RBCA process involves comparison of the site constituent concentrations to generic Risk-Based Screening Levels (RBSL) to evaluate whether further evaluation and/or active remediation is warranted. RBSL values are derived from standard exposure equations and reasonable maximum exposure (RME) estimates per U.S. EPA guidelines. RBSL concentrations are designed to be protective of human health even if exposure occurs directly within the on-site area of affective soil or groundwater and inherently provide conservative estimates of potential threats to human health and the environment. According to the RBCA process, if Tier 1 limits are not exceeded, the user may proceed directly to compliance monitoring and/or no further action. However, if these generic screening levels are exceeded, the affected media may be addressed by 1) remediating to the generic Tier 1 limits, if practicable, 2) conducting Tier 2 evaluation to develop site-specific remediation goals, or 3) implement an interim action to abate risk "hot spots".

3.1 Site Parameters

Complete exposure pathways are those that could pose a reasonable potential for contaminant contact with a human or environmental receptor. Under Tier 1 RBCA, only on-site receptors apply. Based on the current and future site usage (a petroleum fuel dispensing facility), a commercial type of exposure pathway was evaluated for the site. There are no water supply wells within the dissolved groundwater plume, therefore, groundwater ingestion or subsurface soil leaching to groundwater (ingestion) exposure pathways are not complete. Surface soils (<3 feet bgs) at the site are not impacted, therefore, are not a risk factor. The only complete exposure pathways identified for the subject site are volatilization to outdoor and indoor air from subsurface soils (>3 feet bgs) and from groundwater, and these exposure pathways were evaluated during this RBCA analysis.

Site specific physical data was used in this RBCA evaluation. These parameters included soil pH (6.93), contaminated soil area (400 ft^2), depth to top of affected soil (9 ft), length of affected soil

parallel to wind (20ft), length of affected soil parallel to groundwater (20 ft), and most conservative values for groundwater mixing zone depth (11.25 ft), hydraulic conductivity (0.00174 ft/day), gradient (0.03), vadose zone thickness (11.086 ft), depth to groundwater (11.25 ft), and thickness of affected subsurface soils (6 ft). Where appropriate and consistent with site conditions, default values were used. Maximum contaminant constituent concentrations (BTEX and MTBE) detected in soil and groundwater at the subject site were used for this RBCA analysis. Since the planned site use is for the construction and operation of a new gasoline facility, provisions for construction worker were also evaluated.

GR also prepared and evaluated additional RBCA "scenarios" with various changes to the input parameters to test the sensitivity of the results. These additional "scenarios" included Tier 2 evaluations with respect to residential air exposure pathways at 40 feet and at 100 feet from the source and no groundwater receptor; and, residential air Exposure pathways of 40 and 100 feet from the source with a groundwater receptor (groundwater pathway) within 1,250 feet down-gradient of the source.

3.2 Results of RBCA Analysis

Based on the current information from the previous site investigations, GR evaluated the complete exposure pathways identified at the site; subsurface soil and groundwater volatilization to outdoor air, and indoor air exposures. With the planned land use and commercial risk factor, the RBSLs, site conditions were determined to be below generic Tier 1 screening levels and, according to the RBCA decision making process, no further work is warranted to protect against exposure via these pathways. The individual risk for indoor air exposure was identified for the Chemical of Concern (COC) benzene at an individual carcinogenic risk of 3.2E-6, just above the acceptable 1.0E-6 risk factor. In most cases, a risk factor of 1.0E-5 has been excepted for a commercial site. Since the planned land use is for the construction and operation of a new gasoline station, the 1.0E-5 risk factor seems appropriate for the site. Pertinent input and output data including site specific parameters used in the analysis are presented in Appendix D. OK

The additional "scenarios" of the RBCA program evaluating Tier 2 scenarios, also indicated that the complete pathways were primarily indoor air exposure (on-site) with respect to Tier 2 evaluations with no groundwater receptor. A Tier 2 evaluation with a groundwater receptor 1,250-feet from the source also identified an indoor air exposure (on-site) and in addition, a dissolved benzene concentration (2.1E-1 ppm) above the Site Specific Target Level (SSTL) of 7.2E-2 ppm. The exposure risk (indoor air exposure on site) remained the same as the Tier 1 evaluation presented in this report.

The planned land use for the subject property, as mentioned, is for the construction and operation of a new service station dispensing gasoline products. Construction workers most likely will be in contact with impacted soils and possibly groundwater during the excavation and installation of the

new UST's and related site work. These construction workers associated with the UST installations are required to be OSHA 40-hour safety trained and are experienced working in these conditions. The exposure will be minimal. Site Safety Plans for the site should include provisions for soil and groundwater exposure during the construction activities, and a plan for containment of any groundwater removed from the subsurface, prior to its' appropriate disposal. As a precautionary measure, it is recommended that a vapor barrier be installed beneath any buildings planned for the site.

4.0 DISCUSSION AND CONCLUSIONS

GR performed the RBCA evaluation for the assessment and response to petroleum hydrocarbons in the soil and groundwater beneath the subject site. Site conditions consist of petroleum impacted soil and groundwater. Hydrocarbon impacted soil extends from a depth of approximately 9 feet bgs to shallow groundwater at 11.25 feet bgs. The lateral extents of hydrocarbon impacted soil and groundwater have not been delineated off-site. Off-site delineation of the impacted groundwater is currently in the permitting stage. Analytical data used in this RBCA evaluation is limited to the boundaries of the subject site. The gradient of the dissolved groundwater plume appears to be stable at 0.03 to the south-southwest. There are no water supply wells within ¼-mile radius of the site, therefore, impacted groundwater present beneath the subject site is not a concern for groundwater ingestion.

Impacted subsurface soils remaining in-place are a concern for dermal contact for the construction workers that will install the new UST's at the site. Low permeability asphalt and concrete cover the surface area over the hydrocarbon plume limiting the infiltration of precipitation and release of volatile compounds to outdoor and indoor air. The planned land use will also have the site covered with asphalt and concrete. Concentrations of hydrocarbons volatilizing to outdoor air and into enclosed spaces (3.2E-6) do not exceed RBSLs based on a risk factor of 1.0E-5. Planned future use for the subject site is for a new service station. With the current understanding of the site conditions, the primary and secondary source areas removed and no groundwater receptors with in ¼-mile radius of the site (GR 1999, unreleased information), the potential threat to public health and environment is not of significant concern. Therefore, no remediation related to soil and groundwater on the subject site is warranted at this time. Tosco will however, proceed with an off-site investigation to delineate the impacted groundwater.

What site cone were used.

How come construction workers scenario not evaluated

5.0 REFERENCES

ROUX Associates 1992; Soil Sampling Below Removed Fuel Dispensers, Unocal , 96 MacArthur Boulevard, Oakland, California; dated June 18, 1992.

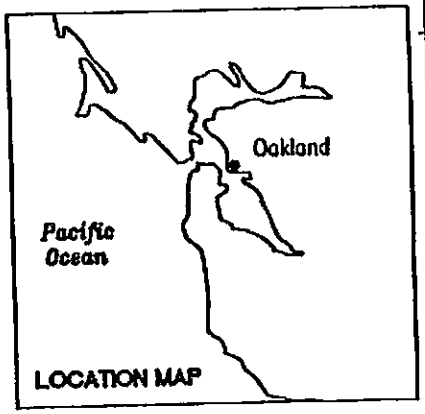
ROUX Associates 1992; Site Assessment Report, Unocal , 96 MacArthur Boulevard, Oakland, California; dated December 17, 1992.

Kapreailian Engineering Inc., 1994; Soil Sampling Report, Unocal Corporation, 96 MacArthur Boulevard, California, dated September 13, 1994.

Kapreailian Engineering Inc., 1996; Continuing Soil and Groundwater Investigation, Unocal Corporation, 96 MacArthur Boulevard, California, dated May 17, 1996.

Gettler-Ryan Inc., 1998; Soil Sampling During Underground Storage Tank and Piping Removal, Tosco Marketing Company, 96 MacArthur Boulevard, California;, dated August 10, 1998.

Gettler-Ryan Inc., 1998; Semi-Annual 1998 Groundwater & Sampling Report, Tosco Marketing Company, 96 MacArthur Boulevard, California;, dated August 31, 1998.



N

0 2000

Scale in Feet

Base Map: USGS Topographic Map

FIGURE 1

Gettler - Ryan Inc.
6747 Sierra Ct., Suite J (925) 551-7555
Dublin, CA 94568

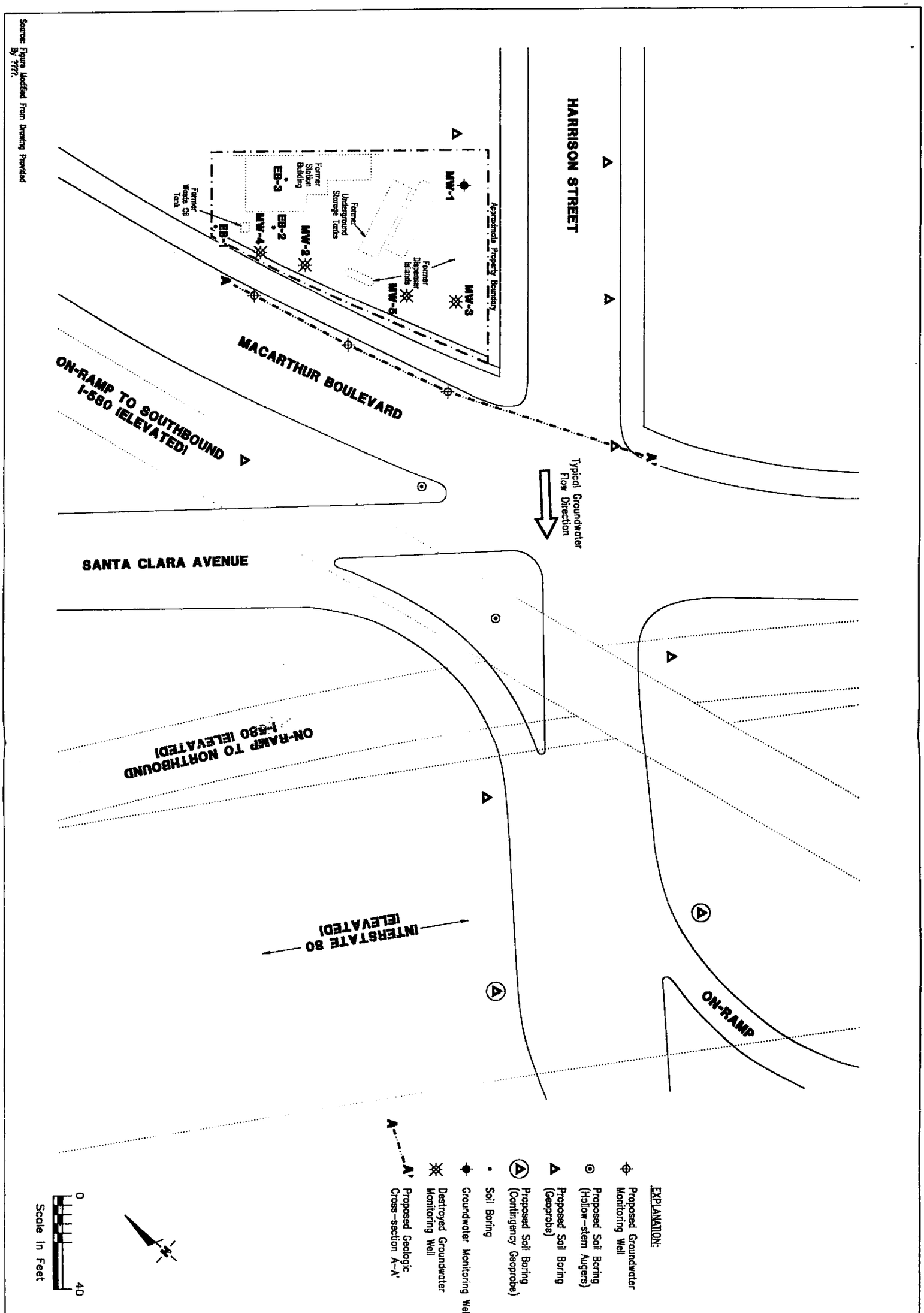
VICINITY MAP
Former Tosco 76 Branded Facility No. 1871
96 MacArthur Boulevard
Oakland, California

JOB NUMBER 140165

REVIEWED BY

DATE July, 1998

REVISED DATE



Gettler - Ryan Inc.
6747 Sierra Ct., Suite J (925) 551-7555
Dublin, CA 94568

SITE PLAN
Former Tosco 76 Branded Facility No. 1871
96 MacArthur Boulevard
Oakland, California

FIGURE
2

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
140165		10/98	

APPENDIX A

UST SOIL SAMPLE LOCATION MAPS AND ANALYTICAL RESULTS

TABLE 1: Summary of Soil Analyses: Below Removed Fuel Dispensers
UNOCAL Service Station No. 1871, Oakland, California

Sample Designation	Date	Depth (feet bgs)	TPH-G (1)	BTEX Distinction (1)				Lead (1)
				Benzene	Toluene	Ethylbenzene	Xylenes	
D1	5/13/92	2	ND	ND	ND	ND	ND	2.4
D2	5/13/92	2	ND	ND	ND	ND	ND	2.6
D3	5/13/92	4	58	0.20	0.087	0.52	0.97	23
D4	5/13/92	5	2.9	ND	ND	ND	0.0070	4.8
D3-A	5/18/92	8	1,700	3.1	1.0	11	5.4	18

FOOTNOTES

(1) = Concentrations reported in mg/kg (ppm)

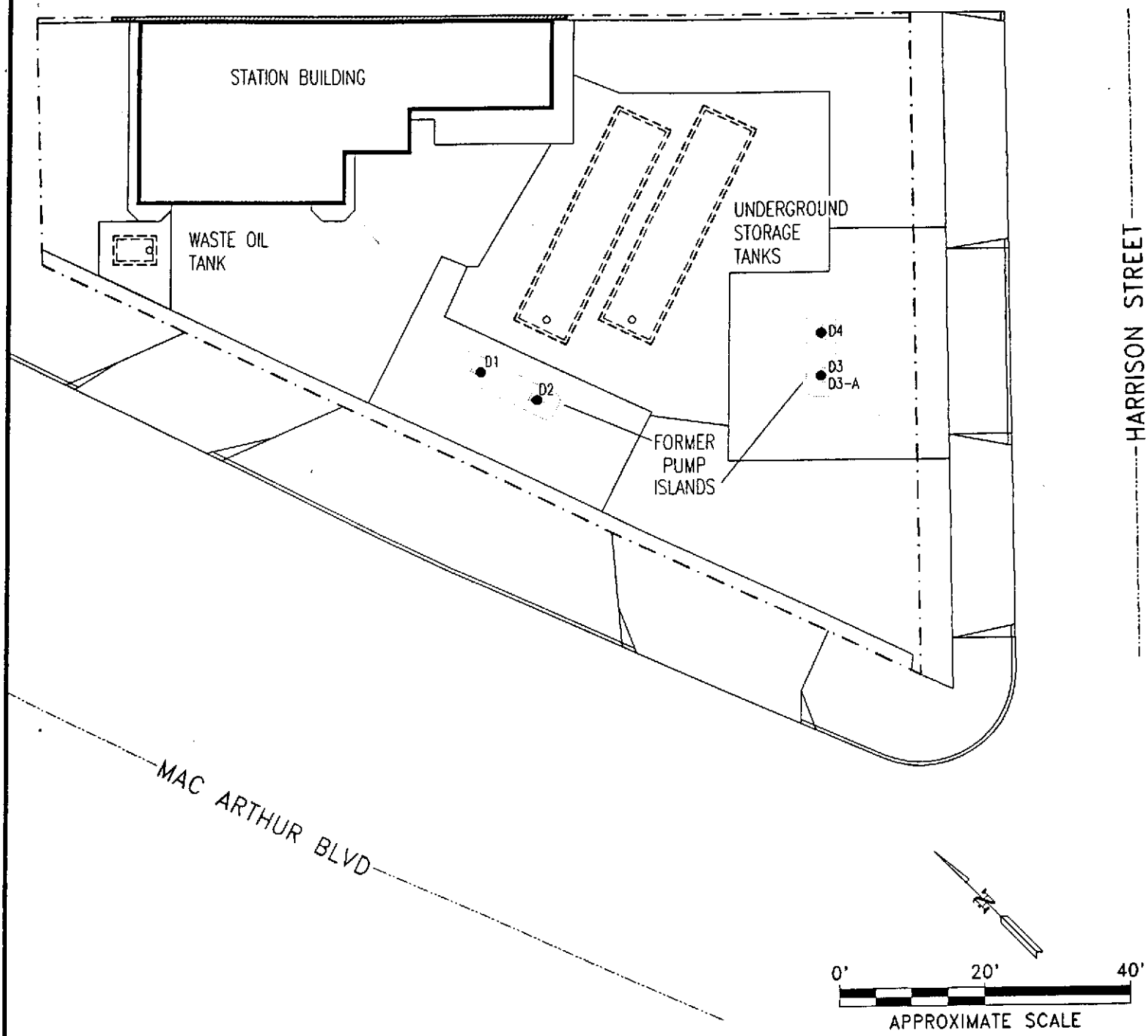
TPH-G = Total Petroleum Fuel Hydrocarbons As Low/Medium Boiling Point Hydrocarbons (USEPA Method 8015)

BTEX Distinction (USEPA Method 8020)

Lead = Total Lead (USEPA Method 7421)

ND = None Detected

bgs = Below ground surface



EXPLANATION:

- UNDERGROUND STORAGE TANK
- PROPERTY BOUNDARY LINE
- ●D1 SOIL SAMPLE LOCATION AND DESIGNATION.

SOURCE:

MAP MODIFIED FROM BLUEPRINT PROVIDED BY, UNOCAL 76, 04/92.

ROUX ASSOCIATES, INC.
ENVIRONMENTAL CONSULTING & MANAGEMENT

COMPILED BY:	P.S.
PREPARED BY:	R.P.
PROJECT MNGR.	P.S.
DATE:	05/92
SCALE:	AS SHOWN
PROJECT NO.	27001W
FILE NAME:	UN1871XX

PREPARED FOR: UNOCAL

TITLE: SOIL SAMPLE LOCATIONS

UNOCAL FACILITY NO. 1871

FIGURE 3

KEI-P94-0601.R1
September 13, 1994

TABLE 1

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes	TOG
8/03/94	WO1(9)	9	97♦	46	0.12	0.11	0.12	0.47	1,400
	WO1(14)*	14	--	--	--	--	--	--	ND
	WOSW1	9	--	--	--	--	--	--	160
	WOSW2	9	1,400♦	960	2.2	2.6	9.5	22	17,000
	WOSW3	9	--	--	--	--	--	--	2,200
	WOSW4	9	--	--	--	--	--	--	2,400

Date	Sample	Bromoform	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-dichlorobenzene
8/03/94	WO1(9)**	ND	22	ND	ND
	WOSW2**	220	1,800	63	540

Sample	Acenaphthene	Anthracene	Benzo(a)anthracene	Benzo(b)fluoranthene
WO1(9)	6,500	9,900	5,300	5,000
WOSW2	3,300	6,100	4,000	3,300

Sample	Benzo(a)pyrene	Chrysene	Dibenzofuran	Fluoranthene	Fluorene
WO1(9)	4,300	7,500	3,400	25,000	6,600
WOSW2	2,900	4,800	ND	15,000	3,800

Sample	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene
WO1(9)	8,500	4,700	38,000	24,000
WOSW2	28,000	10,000	22,000	14,000

TABLE 1 (Continued)

SUMMARY OF LABORATORY ANALYSES
SOIL

Date	Sample	Cadmium	Chromium	Lead	Nickel	Zinc
8/03/94	WO1(9)	ND	28	21	31	34
	WOSW2	1.2	33	39	35	42

* All EPA method 8270 constituents were non-detectable.

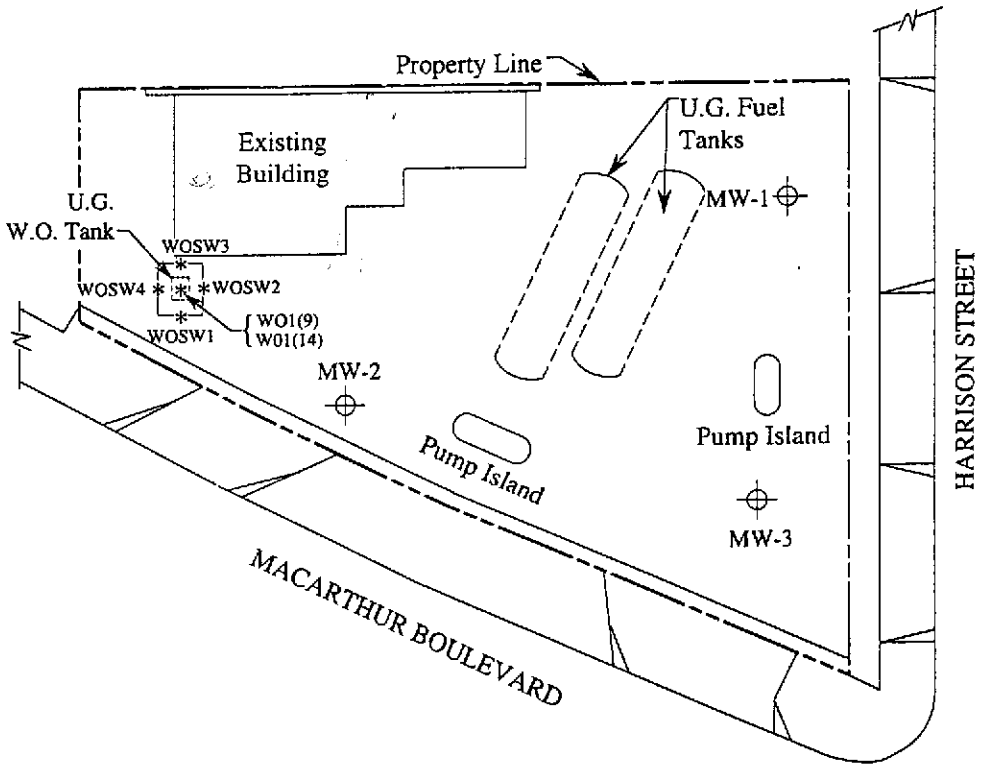
** All other EPA methods 8010 and 8270 constituents were non-detectable.

♦ Sequoia Analytical Laboratory reported that the hydrocarbons detected appeared to be a diesel and non-diesel mixture.

-- Indicates analysis was not performed.

ND = Non-detectable.

Results are in milligrams per kilogram (mg/kg), except for EPA methods 8010 and 8270 constituents, which were reported in micrograms per kilogram (µg/kg).



LEGEND

⊕ Monitoring well

* Sample point location

0 30 60

Approx. scale feet

SITE PLAN

KAPREALIAN ENGINEERING INCORPORATED

UNOCAL SERVICE STATION # 1871
96 MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA

FIGURE 1

Table 1 - Chemical Analytical Data

Former Tosco 76 Branded Facility No. 1871
96 Mac Arthur Boulevard
Oakland, California

Sample ID	Date Collected	Sample Depth (feet)	TPHg (ppm)	Benzene (ppm)	Toluene (ppm)	Ethyl-Benzene (ppm)	Xylenes (ppm)	MTBE (ppm)	TPHd (ppm)	O&G (ppm)	HVOCs (ppm)	SVOCs (ppm)
GASOLINE UST PIT EXCAVATION (SOIL)												
SW1	5/11/98	11.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	1.9	NR	NR	NR	NR
SW2	5/11/98	11.5	<1.0	0.031	<0.0050	<0.0050	0.015	3.8	NR	NR	NR	NR
SW3	5/11/98	11.5	2,000	9.7	29	38	150	16	NR	NR	NR	NR
SW4	5/11/98	11.5	1,800	5.5	82	49	290	15	NR	NR	NR	NR
SW3-5	5/12/98	11.0	5.0[4]	0.049	0.051	0.050	0.20	6.6	NR	NR	NR	NR
SW4-5	5/12/98	11.0	<1.0	0.080	<0.0050	<0.0050	0.039	12	NR	NR	NR	NR
GASOLINE UST PIT EXCAVATION (WATER)												
Water-FT	5/11/98	NA	620	<0.0005	18	13	83	<0.0025	NR	NR	NR	NR
WASTE OIL UST PIT EXCAVATION (SOIL)												
WO1	5/11/98	11.0	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	<0.050	<1.0	140	ND	ND
WASTE OIL UST PIT EXCAVATION (WATER)												
Water-WO	5/11/98	NA	0.090[4]	<0.0005	<0.0005	<0.0005	<0.0005	<0.0025	0.890[7]	<1.0	ND[2]	ND
PRODUCT PUMP ISLANDS (SOIL)												
P1	5/11/98	4.0	<1.0	<0.0050	<0.0050	<0.0050	<0.0050	0.74	NR	NR	NR	NR
P2	5/11/98	4.0	15[3]	<0.0050	0.056	0.10	0.19	<0.050	NR	NR	NR	NR
HOIST EXCAVATIONS (SOIL)												
H-1[1]	5/12/98	8.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
H-2[1]	5/12/98	8.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
DISPOSAL CHARACTERIZATION SAMPLE (SOIL FROM WASTE OIL UST PIT)												
WO SP1	5/12/98	NA	<1.0	<0.0050	<0.0050	<0.0050	0.014	NR	6.8[5]	110	ND	ND[6]

Table 1 - Chemical Analytical Data

Former Tosco 76 Branded Facility No. 1871
96 Mac Arthur Boulevard
Oakland, California

Sample ID	Date Collected	TPHg (ppm)	Benzene (ppm)	Toluene (ppm)	Ethyl-Benzene (ppm)	Xylenes (ppm)	Total Lead (ppm)
DISPOSAL CHARACTERIZATION SAMPLES							
SP1 (A-D)	5/12/98	<1.0	<0.0050	<0.0050	<0.0050	0.015	19
SP1 (E-H)	5/12/98	170[3]	2.9	0.74	0.78	3.2	2.2
SP1 (I-L)	5/12/98	60	1.5	5.5	6.6	27	5.9
SP1 (M-P)	5/12/98	380	1.6	5.6	7.5	34	4.6
SP1 (Q-T)	5/12/98	50	0.32	0.90	0.81	3.5	4.9
SP1 (U-X)	5/12/98	1,200	9.0	26	28	100	2.1
SP1 (Y,Z,1,2)	5/12/98	130	0.94	2.8	2.3	12	3.5
SP1 (3,4,5,6)	5/12/98	13[4]	0.36	0.57	0.22	0.92	1.9

Sample ID	Date Collected	Lead (ppm)	Chromium (ppm)	Nickel (ppm)	Zinc (ppm)	Cadmium (ppm)
WO1	5/11/98	1.0	18	21	61	<0.50
WO SP1	5/12/98	3.0	30	56	57	<0.50
Water-WO	5/11/98	<0.020	0.053	0.055	0.065	<0.010

EXPLANATION:

ND = none detected
NA = not applicable
ppm = parts per million
NR = analysis not requested
MTBE = methyl tert-butyl ether

ANALYTICAL LABORATORY;

Sequoia Analytical (ELAP # 1271)

Table 1 - Chemical Analytical Data

Former Tosco 76 Branded Facility No. 1871
96 Mac Arthur Boulevard
Oakland, California

NOTES:

[1] = TPH as hydraulic fluid was non-detectable.

[2] = None of the analytes detected except bromodichloromethane (0.0058 ppm), chloroform (0.014 ppm), dibromochloromethane (0.0019 ppm), 1,4-dichlorobenzene (0.00089 ppm 1,2-dichlorobenzene (0.0028 ppm), and tetrachloroethene (0.0017 ppm).

[3] = Laboratory reports indicates gasoline and unidentified hydrocarbons >C8

[4] = Laboratory reports indicates gasoline and discrete peaks

[5] = Laboratory reports indicates unidentified hydrocarbons >C16

[6] = Non of the analytes detected except for phenanthrene (0.350 ppm), pyrene (0.380 ppm), and fluoranthene (0380 ppm).

[7] = Laboratory reports indicates unidentified hydrocarbons <C14

ANALYTICAL METHODS;

TPHg = Total Petroleum Hydrocarbons as gasoline according to EPA Method 8015 Modified.

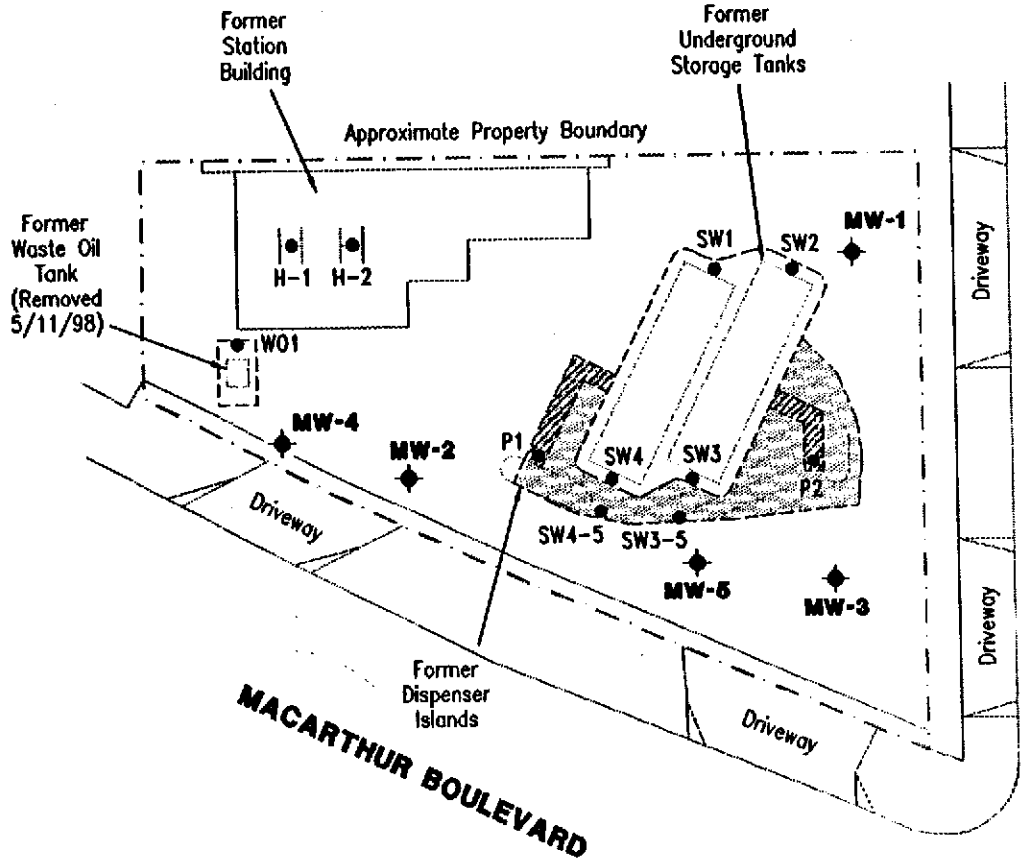
TPHd = Total Petroleum Hydrocarbons as diesel according to EPA Method 8015 Modified.

O&G = Total recoverable petroleum oil according to Standard Methods 5520 E&F(Gravimetric).

HVOCs = Halogenated volatile organic compounds according to EPA Method 8010.

SVOCs = Semi-volatile organic compounds according to EPA Method 8270.

Metals = EPA Method 6010.



EXPLANATION

- Groundwater monitoring well
- Soil sample location
- Product piping trench
- Tank excavation
- Over excavation

N

0 30

Scale in Feet

Source: Figure Modified From Drawing Provided By MPDS Services, Inc.

Gettler - Ryan Inc.
6747 Sierra Ct., Suite J (925) 551-7555
Dublin, CA 94568

SITE PLAN/SOIL SAMPLE LOCATION MAP
Former Tosco 76 Branded Facility No. 1871
96 MacArthur Boulevard
Oakland, California

FIGURE
2

JOB NUMBER 140165.02
REVIEWED BY
DATE July, 1998
REVISED DATE

APPENDIX B

BORING AND WELL SOIL SAMPLE ANALYTICAL RESULTS AND LOCATION MAPS

TABLE 3: Summary of Soil Analyses: Monitoring Wells
UNOCAL Service Station No. 1871, Oakland, California

Sample Designation	Date Sampled	Depth (feet bgs)	TPH-G	BTEX Distinction			
				Benzene	Toluene	Ethylbenzene	Xylenes
MW-1(5-6.5')	10/5/92	5-6.5	ND	ND	ND	ND	ND
MW-1(8.5-10')	10/5/92	8.5-10	ND	ND	ND	ND	ND
MW-1(13.5-15')	10/5/92	13.5-15	ND	ND	ND	ND	ND
MW-2(3.5-5')	10/5/92	3.5-5	ND	ND	ND	ND	ND
MW-2(8.5-10')	10/5/92	8.5-10	ND	ND	ND	ND	ND
MW-3(4-5.5')	10/6/92	4-5.5	ND	ND	ND	ND	ND
MW-3(9-10.5')	10/6/92	9-10.5	ND	ND	0.0088	ND	0.0060
MW-3(12-13.5')	10/6/92	12-13.5	4.2	0.079	0.010	0.16	0.26
MW-3(13.5-15')	10/6/92	13.5-15	10	0.040	0.013	0.40	0.73

FOOTNOTES

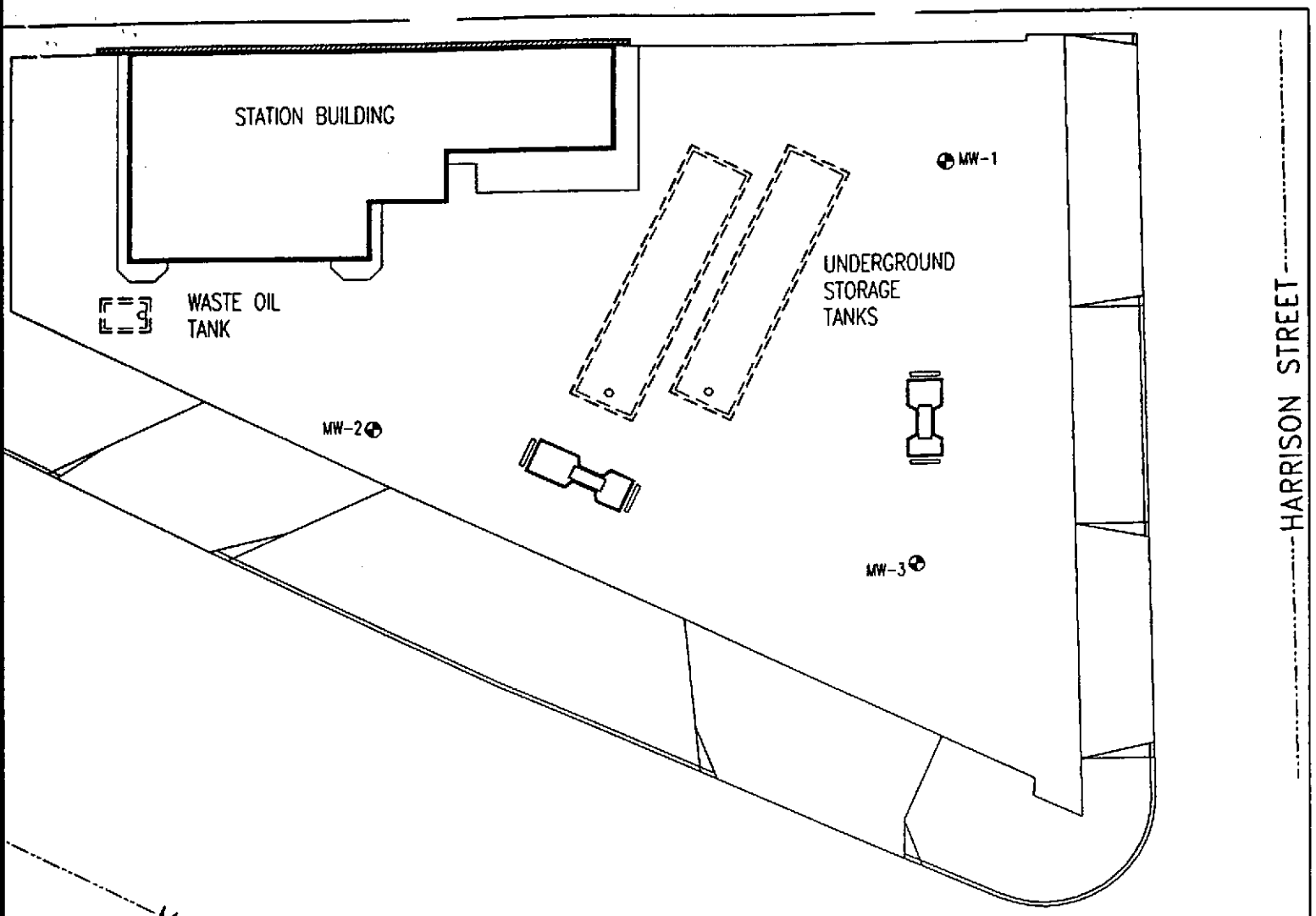
All concentrations reported in mg/kg (ppm)

TPH-G = Total Purgeable Petroleum Hydrocarbons (USEPA Method 8015)

BTEX Distinction (USEPA Method 8020)

ND = Not Detected (for detection limits see laboratory reports in Appendix C)

bgs = Below ground surface



EXPLANATION:

- MW-1 — MONITORING WELL LOCATION AND DESIGNATION
- UNDERGROUND STORAGE TANK
- FILL PORT
- EXISTING PUMP ISLAND

SOURCE:

MAP MODIFIED FROM BLUEPRINT PROVIDED BY UNOCAL 76, 04/92.

0' 20' 40'

APPROXIMATE SCALE

ROUX ASSOCIATES
ENVIRONMENTAL CONSULTING & MANAGEMENT

COMPILED BY:	P.S.
PREPARED BY:	R.P.
PROJECT MNGR.	P.S.
DATE:	12/92
SCALE:	AS SHOWN
PROJECT NO.	27003W
FILE NAME:	UN1871XX

PREPARED FOR: UNOCAL 76

TITLE: LOCATION OF MONITORING WELLS

UNOCAL SERVICE STATION NO. 1871

FIGURE 4

KEI-P94-0601.R4
May 17, 1996

TABLE 4

SUMMARY OF LABORATORY ANALYSES
SOIL

(Collected by KEI on March 20, 1996)

Sample Number	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Ethyl-benzene	Xylenes	TOG	EPA Method 8010 Constituents	EPA Method 8270 Constituents
EB1(5)	ND	ND	ND	ND	ND	ND	ND	ND[2]	ND
EB1(10)	ND	ND	ND	ND	ND	ND	ND	ND	ND
EB2(5)	ND	ND	ND	ND	ND	ND	ND	ND	ND
EB2(10)	73[1]	5.7	ND	0.0094	ND	0.035	540	ND	ND[5]
MW4(5)	1.1[1]	ND	ND	ND	0.0052	0.019	ND	ND[3]	ND
MW4(9.5)	350[1]	24	ND	0.74	0.15	0.48	1,000	ND[4]	ND[6]
MW5(5)	--	ND	ND	ND	ND	ND	--	--	--
MW5(9)	--	ND	0.023	ND	ND	ND	--	--	--

NOTE: The soil samples were collected at the depths below grade indicated in the ( ) of the respective sample number.

ND = Non-detectable.

-- Indicates analysis was not performed.

Results are in milligrams per kilogram (mg/kg), unless otherwise indicated.

TABLE 4 (Continued)

SUMMARY OF LABORATORY ANALYSES
SOIL

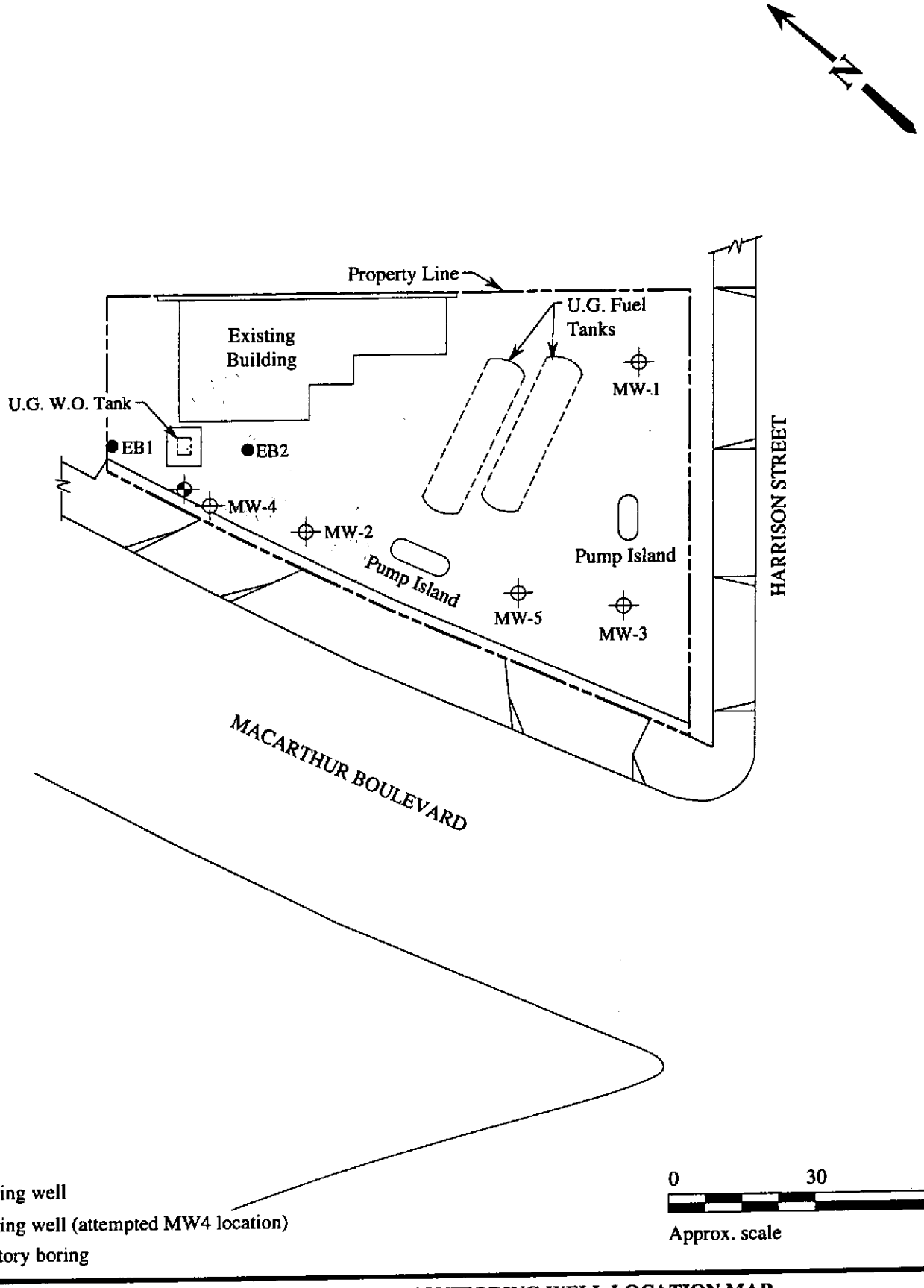
FOOTNOTES

(1) Sequoia Analytical Laboratory reported that the extractable hydrocarbons detected were "unidentified hydrocarbons."
(2) 1,1-dichloroethene was detected at a concentration of 6.0 micrograms per kilogram (µg/kg).
(3) 1,1-dichloroethene and tetrachloroethene were detected at concentrations of 11 and 8.7 µg/kg, respectively.
(4) 1,2-dichlorobenzene and 1,4-dichlorobenzene were detected at concentrations of 37 and 12 µg/kg, respectively.
(5) All EPA method 8270 constituents were non-detectable, except for the following five compounds:

Compound	Concentration (µg/kg)
Benzo(k)fluoranthene	190
Chrysene	180
Fluoranthene	610
Phenanthrene	100
Pyrene	690

(6) All EPA method 8270 constituents were non-detectable, except for the following 11 compounds:

Compound	Concentration (µg/kg)	Compound	Concentration (µg/kg)
Acenaphthene	170	Fluoranthene	860
Anthracene	350	Fluorene	190
Benzo(a)anthracene	260	Naphthalene	150
Benzo(b)fluoranthene	240	Phenanthrene	1,300
Benzo(a)pyrene	160	Pyrene	960
Chrysene	290		



LEGEND

- Monitoring well
- Monitoring well (attempted MW4 location)
- Exploratory boring

0 30 60

Approx. scale feet

EXPLORATORY BORING AND MONITORING WELL LOCATION MAP

KAPREALIAN ENGINEERING INCORPORATED

UNOCAL SERVICE STATION # 1871
96 MACARTHUR BOULEVARD
OAKLAND, CALIFORNIA

FIGURE **3**

APPENDIX C

HISTORICAL GROUNDWATER DATA
POTENIOMETRIC MAP

Table 1

Groundwater Monitoring Data and Analytical Results

Tosco (Former Unocal) Service Station #1871

96 MacArthur Boulevard

Oakland, California

Well ID/ TOC*	Date	DTW (ft.)	GWE (msl)	TPH(G)	B	T	E	X	MTBE
				<----------ppb---------->					
MW-1	11/03/92	--	--	260,000	2,300	4,600	3,700	17,000	--
	01/25/93	--	--	120,000	2,100	4,600	4,900	22,000	--
81.18	04/29/93	13.71	67.47	100,000	850	2,000	4,300	19,000	--
	07/16/93	14.51	66.67	29,000	590	560	980	4,200	--
	10/19/93	15.20	65.98	67,000	1,400	2,600	2,900	5,000	--
	01/20/94	15.17	66.01	92,000	1,200	3,000	3,400	17,000	--
	04/13/94	14.44	66.74	51,000	1,000	2,600	3,200	15,000	--
	07/13/94	14.88	66.30	35,000	550	150	1,400	5,700	--
	10/10/94	15.55	65.63	52,000	1,000	810	3,300	12,000	--
	01/10/95	12.44	68.74	810	16	18	59	250	--
	04/17/95	12.68	68.50	48,000	880	530	2,500	11,000	--
	07/24/95	13.97	67.21	48,000	1,500	420	2,700	9,700	--
	10/23/95	14.85	66.33	47,000	780	210	2,100	11,000	270
	01/18/96	14.21	66.97	30,000	1,500	500	3,500	13,000	2,400
86.24	04/18/96	13.40	72.84	66,000	2,700	2,200	3,100	13,000	57,000
	07/24/96	14.15	72.09	5,600	2,100	ND	160	160	24,000
	10/24/96	14.85	71.39	110,000	7,500	8,000	3,300	14,000	58,000
	01/28/97	11.25	74.99	94,000	7,700	19,000	3,100	15,000	120,000
	07/29/97	14.67	71.57	ND	ND	ND	ND	ND	70,000
	01/14/98	12.27	73.97	85,000	6,100	10,000	3,000	17,000	110,000
	07/01/98	**14.32**	**71.92**	**110,000**	**8,700**	**12,000**	**2,700**	**15,000**	**110,000**
MW-2	11/03/92	--	--	140	2.2	ND	ND	2.0	--
	01/25/93	--	--	2,100	56	1.1	90	140	--
76.61	04/29/93	9.73	66.88	1,500	290	ND	33	11	--
	07/16/93	10.17	66.44	510[1]	17	0.60	3.2	2.5	--
	10/19/93	11.18	65.43	670	24	1.1	7.7	23	--
	01/20/94	11.12	65.49	820	97	ND	12	ND	--
	04/13/94	10.12	66.49	550	71	ND	5.1	1.3	--
	07/13/94	10.86	65.75	2,000	490	ND	17	13	--
	10/10/94	11.48	65.13	2,300	340	ND	25	ND	--
	01/10/95	8.71	67.90	850	3.8	ND	8.5	1.3	--
	04/17/95	8.90	67.71	1,300	4.7	ND	8.3	1.2	--
	07/24/95	9.94	66.67	960	20	ND	4.2	6.2	--

Table 1

Groundwater Monitoring Data and Analytical Results

Tosco (Former Unocal) Service Station #1871

96 MacArthur Boulevard

Oakland, California

Well ID/ TOC*	Date	DTW (ft.)	GWE (msl)	TPH(G)	B	T	E	X	MTBE
				<----------ppb---------->					
MW-2	10/23/95	10.70	65.91	ND	ND	ND	ND	ND	19
(cont)	01/18/96	10.11	66.50	900	300	86	7.6	18	4,300
81.66	04/18/96	9.27	72.39	18,000	3,600	680	890	4,100	19,000
	07/24/96	10.02	71.64	100,000	13,000	21,000	2,700	16,000	120,000
	10/24/96	10.78	70.88	800	110	17	11	20	20,000
	01/28/97	7.70	73.96	45,000	2,400	2,900	2,000	7,600	29,000
	07/29/97	10.28	71.38	ND	1.2	0.72	0.63	0.62	17,000
	01/14/98	8.63	73.03	14,000	1,000	150	790	3,300	23,000
	07/01/98	**9.53**	**72.13**	**2,700**	**100**	**ND[3]**	**180**	**78**	**7,100**
MW-3	11/03/92	--	--	2,100	120	15	38	200	--
	01/25/93	--	--	2,300	80	1	55	52	-
77.48	04/29/93	11.37	66.11	4,500	1,700	ND	200	140	--
	07/16/93	12.09	65.39	4,000[1]	1,100	28	52	70	--
	10/19/93	12.69	64.79	3,800	42	ND	50	56	--
	01/20/94	12.65	64.83	4,200	11	ND	21	15	--
	04/13/94	12.02	65.46	4,200	210	ND	36	53	--
	07/13/94	12.46	65.02	1,800[2]	16	16	ND	21	--
	10/10/94	12.98	64.50	4,300	11	ND	12	ND	--
	01/10/95	10.42	67.06	310	4.6	ND	3.5	2.1	--
	04/17/95	10.42	67.06	7,800	ND	4.6	300	450	--
	07/24/95	11.76	65.72	3,200	170	ND	22	16	--
	10/23/95	12.50	64.98	3,900	55	ND	19	11	4,500
	01/18/96	11.79	65.69	2,200	270	33	26	18	5,500
82.55	04/18/96	11.30	71.25	6,000	1,800	ND	100	230	48,000
	07/24/96	12.17	70.38	ND	2,500	ND	ND	ND	71,000
	10/24/96	12.65	69.90	3,800	660	ND	15	ND	65,000
	01/28/97	9.50	73.05	4,400	250	13	87	47	54,000
	07/29/97	11.99	70.56	ND	3,500	ND	220	ND	75,000
	01/14/98	10.30	72.25	ND[3]	430	ND[3]	100	380	37,000
	07/01/98	**11.70**	**70.85**	**ND[3]**	**430**	**ND[3]**	**ND[3]**	**ND[3]**	**45,000**

Table 1

Groundwater Monitoring Data and Analytical Results

Tosco (Former Unocal) Service Station #1871

96 MacArthur Boulevard

Oakland, California

Well ID/ TOC*	Date	DTW (ft.)	GWE (msl)	TPH(G)	B	T	E	X	MTBE
				<--------		ppb			-------->
MW-4									
82.04	04/18/96	9.83	72.21	ND	630	ND	ND	ND	18,000
	07/24/96	10.47	71.57	ND	ND	ND	ND	5.2	3,900
	10/24/96	11.14	70.90	ND	ND	ND	ND	ND	6,300
	01/28/97	7.94	74.10	1,200	490	ND	17	6.8	16,000
	07/29/97	10.86	71.18	50	1.5	0.61	0.73	0.78	15,000
	01/14/98	8.73	73.31	ND[3]	ND[3]	ND[3]	ND[3]	ND[3]	5,200
	07/01/98	**10.51**	**71.53**	**ND**	**ND**	**ND**	**ND**	**ND**	**640**
MW-5									
81.80	04/18/96	9.65	72.15	31,000	5,500	1,400	1,700	8,100	66,000
	07/24/96	10.80	71.00	32,000	6,400	ND	1,600	6,100	120,000
	10/24/96	11.40	70.40	17,000	6,900	ND	970	130	84,000
	01/28/97	7.76	74.04	19,000	6,100	62	82	310	160,000
	07/29/97	11.58	70.22	ND	ND	ND	ND	ND	71,000
	01/14/98	9.08	72.72	ND[3]	3,600	ND[3]	ND[3]	ND[3]	80,000
	07/01/98	**11.25**	**70.55**	**6,400**	**2,100**	**21**	**120**	**330**	**61,000**
Trip Blank									
TB-LB	01/14/98	--	--	ND	ND	ND	ND	ND	ND
	07/01/98	**--**	**--**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**

Table 1

Groundwater Monitoring Data and Analytical Results

Tosco (Former Unocal) Service Station #1871

96 MacArthur Boulevard

Oakland, California

EXPLANATIONS:

Groundwater monitoring data and laboratory analytical results prior to January 14, 1998, were compiled from reports prepared by MPDS Services, Inc.

TOC = Top of Casing elevation
DTW = Depth to Water
(ft.) = Feet
GWE = Groundwater Elevation
(msl) = Referenced relative to mean sea level
TPH(G) = Total Petroleum Hydrocarbons as Gasoline

B = Benzene
T = Toluene
E = Ethylbenzene
X = Xylenes
MTBE = Methyl tertiary butyl ether

ppb = Parts per billion
ND = Not Detected
-- = Not Measured/Not Analyzed

* TOC elevations were re-surveyed by Kier & Wright in May, 1996, per City of Oakland Benchmark No. 2310, a cut square in concrete curb at mid point of return at the northeast corner of El Dorado and Fairmont Street. (Elevation = 77.53 feet msl).

1 Laboratory report indicates the presence of discrete peaks not indicative of gasoline.

2 Laboratory report indicates the hydrocarbons detected appeared to be a gasoline and non-gasoline mixture.

3 Detection limit raised. Refer to analytical results.

Table 2

Groundwater Analytical Results

Tosco (Former Unocal) Service Station #1871

96 MacArthur Boulevard

Oakland, California

Well ID	Date	TPH(D)	TOG	VOC	SVOC
		<——— ppb ———>			
MW-4	04/18/96	110[1]	ND	ND	--
	07/24/96	ND	ND	ND	ND
	10/24/96	ND	ND	ND	ND[2]
	01/28/97	210[3]	ND	ND	ND[4]
	07/29/97	ND	ND	ND	ND
	01/14/98	ND	ND	ND	ND
	07/01/98	ND	ND	ND	ND

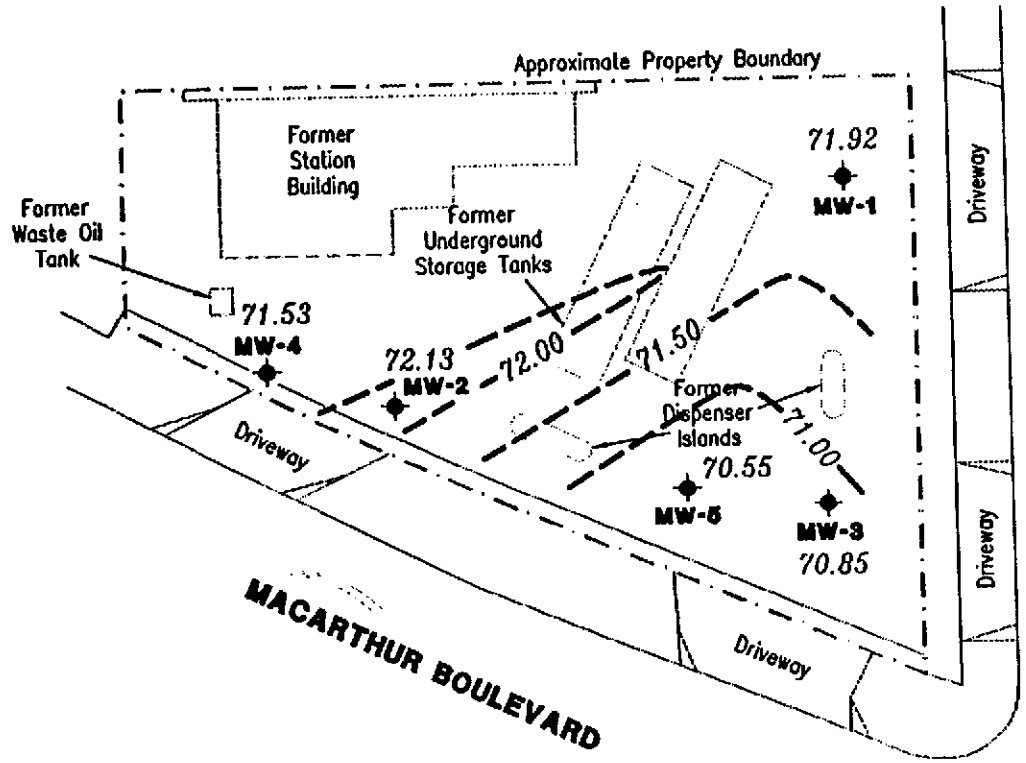
EXPLANATIONS:

Groundwater analytical results prior to January 14, 1998, were compiled from reports prepared by MPDS Services, Inc.

TPH(D) = Total Petroleum Hydrocarbons as Diesel
TOG = Total Oil and Grease
VOC = Volatile Organic Compounds by EPA Method 8010
SVOC = Semi-Volatile Organic Compounds by EPA Method 8270
ppb = Parts per billion
-- = Not Analyzed
ND = Not Detected

1 Laboratory report indicates the hydrocarbons detected did not appear to contain diesel.
2 Bis (2-ethylhexyl) phthalate was detected at a concentration of 14 ppb.
3 Laboratory report indicates the hydrocarbons detected appeared to be a diesel and non-diesel mixture.
4 Naphthalene was detected at a concentration of 17 ppb.

All EPA Method 8010 and 8270 constituents were ND, unless noted.



EXPLANATION

- Groundwater monitoring well
- 99.99 — Groundwater elevation in feet referenced to Mean Sea Level (MSL)
- 99.99 — Groundwater elevation contour, dashed where inferred.

Approximate groundwater flow direction at a gradient of 0.03 Ft./Ft.

N

0 30

Scale in Feet

Source: Figure Modified From Drawing Provided By MPDS Services, Inc.

FIGURE 1

Gettler - Ryan Inc.

6747 Sierra Ct., Suite J (925) 551-7555
Dublin, CA 94568

POTENTIOMETRIC MAP
Tosco (Former Unocal) Service Station No. 1871
96 MacArthur Boulevard
Oakland, California

JOB NUMBER 180068

REVIEWED BY

DATE July 1, 1998

REVISED DATE

APPENDIX D

RBCA INPUT AND OUTPUT DATA FILES

RBCA

SUMMARY REPORT

■ TIER 1 / ❑ TIER 2 RBCA SITE EVALUATION

PREPARED FOR

Tosco Marketing Company
SITE NAME

96 MacArthur Boulevard, Oakland, California
LOCATION

Gettler-Ryan, Inc.
6747 Sierra Court, Suite J, Dublin, California
PREPARED BY

February 23, 1999
DATE ISSUED

REVIEWED BY Stephen J. Carter, RG 5577

DATE February 23, 1999

Site Name: Former Tosco SS No. 1871 | Date Completed: February 23, 1999

Site Location: 96 MacAurthur Blvd., Oakland, Ca. | Completed By: Gettler-Ryan Inc. | *Page 1 of 1*

TIER 1 EXECUTIVE SUMMARY CHECKLIST

VISUAL/HISTORICAL ASSESSMENT	(■ TO SELECT)		
Site size (acres)	■ <1	❑ <10	❑ >10
Site setting	❑ undeveloped	■ industrial	■ residential
Site access	■ capped	❑ fenced-in	❑ open
Visual evidence of environmental impact	■ none	❑ limited	❑ extensive
Current site land use	❑ undeveloped	■ indust./comm.	❑ residential
Contaminant sources	■ tanks/spills	❑ trench/drums	❑ ponds/pits
Affected environmental media	■ soil (>3 ft BGS)	■ groundwater	❑ surficial soil (≤3 ft BGS)
Types of compounds likely to be present	■ petroleum hydrocarbons	❑ metals	
	❑ inorganic (nitrates)	❑ other:(pesticides)	

BASELINE RECEPTOR IDENTIFICATION			
Reasonable potential receptors (greatest concern)	❑ none	❑ ecological	■ human
Distance from fenceline to nearest off-site receptor (ft)	❑ >500	❑ 100 - 500	■ <100
Travel time to closest groundwater receptor (yr)	■ >10	❑ 2 - 10	❑ <2
Depth to first encountered groundwater (ft)	❑ >150	❑ 50 - 150	■ <50
Complete exposure pathways	❑ none	❑ ingestion	■ inhalation
	❑ ecological	■ dermal	❑ absorption

TIER 1 TASKS COMPLETED

- ■ Visual / historical assessment
- ■ Initial (screening) site assessment
- ■ Site prioritization / classification
- ■ Detailed site characterization
- ■ RBSL comparison
- ❑ Initial ecological assessment
- ❑ Corrective action planned or implemented

TIER 1 CLASSIFICATION EVALUATION

Classification No.	Scenario Description	Prescribed Interim Action	Date Implemented
4	4.1 Non-potable aquifer w/no existing local use impacted	Monitor groundwater and evaluate effect of natural attenuation on dissolved plume. Require vapor barrierto be installed beneath any new structures on-site.	2/23/99

TIER 1 CORRECTIVE ACTION CRITERIA

Affected Medium	Screening Level Criteria Exceeded? (■ if yes)						
	Risk-Based	Other (MCL)	Others: (specify)	_____	_____	_____	None Exceeded
• Surface Soil (< 3ft BGS)	❑	❑	❑	❑	❑	❑	■
• Subsurface Soil (>3ft BGS)	❑	❑	❑	❑	❑	❑	■
• Groundwater (potable/nonpotable)	❑	❑	❑	❑	❑	❑	■
• Surface waters	❑	❑	❑	❑	❑	❑	■

NOTES: (List and discuss chemicals for which a Tier 1 exceedance is found.)

PROPOSED TIER 1 ACTION

- ■ ***No Action:*** Site does not exceed Tier 1 criteria. - Apply for closure.
- ❑ ***Interim Corrective Action:*** Site exceeds some Tier 1 criteria. - Propose interim corrective action and reprioritize site.
- ❑ ***Final Corrective Action:*** Site exceeds some Tier 1 criteria. - Propose corrective action to achieve Tier 1 criteria.
- ❑ ***Tier 2 Evaluation:*** Site exceeds some Tier 1 criteria. - Re-evaluate corrective action goals per Tier 2 risk assessment.

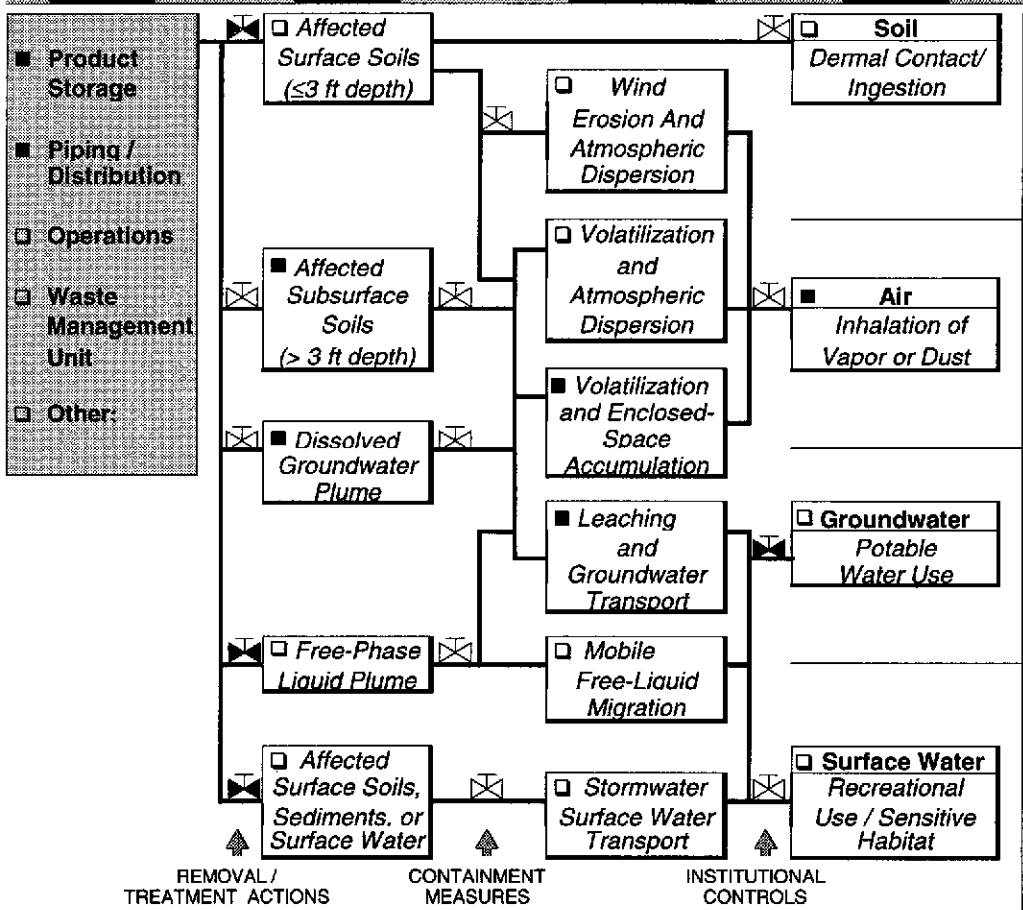
NOTE:
Rationale for proposed action documented on Worksheets 1.3 and 10.1-10.3.

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

Site Name: Former Tosco SS No. 1871 | Date Completed: February 23, 1999
Site Location: 96 MacArthur Blvd., Oakland, California | Completed By: Gettler-Ryan, Inc.

EXPOSURE CONTROL FLOWCHART

Instructions: *Identify remedial measures to be implemented to prevent exposure, as follows:* • Step 1 – *Baseline Exposure: Identify applicable sources, transport mechanisms, and receptors as shown on Worksheet 4.2 (■ = applicable to site).* • Step 2 – *Remedial Measures: Fill in shut-off valves (⋈) to indicate removal / treatment action, containment measure, or institutional controls to be used to "shut off" exposure pathway.* • Step 3 – *Remedial Technology Options: For each complete pathway, identify category of corrective measure to be applied and list possible technology options in space provided (see options list in RBCA Guidance Manual).*



Exposed Receptors

On-Site:	❑ Residential	❑ Non-Resid.	❑ N/A	
	❑ Sensitive Habitat	❑ Recreation		
Off-Site:	❑ Residential	❑ Non-Resid.	❑ N/A	
	❑ Sensitive Habitat	❑ Recreation		

❑ Complete Pathway: ○ *Current* ○ *Potential*
⋈ Action Required: ❑ Yes ❑ No
If yes, list technology options for ⋈

Exposed Persons

On-Site:	❑ Residential	■ Non-Resid.	❑ N/A
Off-Site:	❑ Residential	❑ Non-Resid.	■ N/A

■ Complete Pathway: ○ *Current* ○ *Potential*
⋈ Action Required: ■ Yes ❑ No
If yes, list technology options for ⋈
Install vapor barrier beneath all Human occupied structures.

Groundwater Users

On-Site:	❑ Residential	❑ Non-Resid.	❑ N/A
Off-Site:	❑ Residential	❑ Non-Resid.	❑ N/A

❑ Complete Pathway: ○ *Current* ○ *Potential*
⋈ Action Required: ❑ Yes ❑ No
If yes, list technology options for ⋈

Surface Water Users

On-Site:	❑ Residential	❑ Non-Resid.	❑ N/A
	❑ Sensitive Habitat	❑ Recreation	
Off-Site:	❑ Residential	❑ Non-Resid.	❑ N/A
	❑ Sensitive Habitat	❑ Recreation	

❑ Complete Pathway: ○ *Current* ○ *Potential*
⋈ Action Required: ❑ Yes ❑ No
If yes, list technology options for ⋈

(■ OR ● OR ⋈ TO SELECT)

RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

Site Name: Former Tosco (former Unocal) Site Identification: 140165.05
Site Location: 96 MacArthur Blvd., Oakland, CA Date Completed: 11/23/98
Completed By: David J. Vossler

Software: GSI RBCA Spreadsheet
Version: 1.0.1

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)?	***FALSE***				
gwMCL?	Use MCL as exposure limit in groundwater?	TRUE				

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	FALSE
S.v	Volatilization from Subsurface Soils	FALSE	TRUE	
GW.v	Volatilization from Groundwater	FALSE	TRUE	
Indoor Air Pathways:				
S.b	Vapors from Subsurface Soils	FALSE	TRUE	
GW.b	Vapors from Groundwater	FALSE	TRUE	
Soil Pathways:				
SS.d	Direct Ingestion and Dermal Contact	FALSE	FALSE	FALSE
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)		TRUE		TRUE
S	Inhalation receptor (cm)		TRUE		TRUE

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)	1	
Tier	RBCA Tier	1	

Surface Parameters	Definition (Units)	Residential	Constrctn
A	Contaminated soil area (cm^2)	***5.6E+05***	
W	Length of affect. soil parallel to wind (cm)	***6.1E+02***	
W.gw	Length of affect. soil parallel to groundwater (cm)	***6.1E+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)	1.0E+02	
Pe	Particulate areal emission rate (g/cm^2/s)	6.9E-14	

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)	***5.8E-01***
Ugw.tr	Groundwater seepage velocity (cm/yr)	***1.5E+00***
Ks	Saturated hydraulic conductivity(cm/s)	6.1E-07
grad	Groundwater gradient (cm/cm)	3.0E-02
Sw	Width of groundwater source zone (cm)	
Sd	Depth of groundwater source zone (cm)	
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?	TRUE
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)	***3.4E+02***			
rho	Soil density (g/cm^3)	1.7			
foc	Fraction of organic carbon in vadose zone	0.01			
phi	Soil porosity in vadose zone	***0.41***			
Lgw	Depth to groundwater (cm)	***3.4E+02***			
Ls	Depth to top of affected subsurface soil (cm)	***2.7E+02***			
Lsubs	Thickness of affected subsurface soils (cm)	***6.9E+01***			
pH	Soil/groundwater pH	***6.93***			
phi.w	Volumetric water content		***0.369***	0.13	0.12
phi.a	Volumetric air content		***0.041***	***0.28***	0.26

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

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)		

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			
1634-04-4	Methyl t-Butyl Ether	O	88.146	5	7.92E-02	6	9.41E-05	7	1.08	A	5.77E-04	2.40E-02		2.49E+02		4.80E+04	A			
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 Tosco (former Unocal) SS Site Location: 96 MacArthur Blvd., Oakl Completed By: David J. Vossler Date Completed: 11/23/1998

Software version: 1.0.1

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	2.90E-02	A	2.90E-02	A	A	TRUE
100-41-4	Ethylbenzene	1.00E-01	A	2.86E-01	A	-		-		D	FALSE
1634-04-4	Methyl t-Butyl Ether	5.00E-03	R	8.57E-01	R	-		-			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 Tosco (former UnocaSite Location: 96 MacArthur Blvd., Oa Completed By: David J. Vossler Date Completed: 11/23/1998

Software version: 1.0.1

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)	ref	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	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	1	0.5	0.002	C	0.005	S	228	228	H
1634-04-4	Methyl t-Butyl Ether			1.44E+02	ACGIH	1	0.5					360	180	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 Tosco (former UnocaSite Location: 96 MacArthur Blvd., Oakland, Ca. Completed By: David J. Vossler Date Completed: 11/23/1998

Software version: 1.0.1

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	2.1E-1	mean			6.4E-2	UCL
Ethylbenzene	2.7E-2	mean			3.5E-2	UCL
Methyl t-Butyl Ether	4.5E+1	mean			1.1E+1	UCL
Toluene	9.5E-2	mean			2.7E-2	UCL
Xylene (mixed isomers)	8.4E-2	mean			8.7E-2	UCL

Site Name: Former Tosco (former Unocal) SS # 1871
Site Location: 96 MacArthur Blvd., Oakland, Ca.

Completed By: David J. Vossler
Date Completed: 11/23/1998

RBCA SITE ASSESSMENT

EXPOSURE LIMITS IN GROUNDWATER AND AIR

CONSTITUENT	Exposure Limits Applied to Receptors	
	Groundwater (MCL) (mg/L)	Air (Comm. only) (PEL/TLV) (mg/m^3)
Benzene	5.0E-3	3.2E+0
Ethylbenzene	7.0E-1	4.3E+2
Methyl t-Butyl Ether		1.4E+2
Toluene	1.0E+0	1.5E+2
Xylene (mixed isomers)	1.0E+1	4.3E+2

Site Name: Former Tosco (former Unocal) SS # 1871
Site Location: 96 MacArthur Blvd., Oakland, Ca.

Completed By: David J. Vossler
Date Completed: 11/23/1998

Site Name: Former Tosco (former Unocal) SS # 1871 Site Location: 96 MacArthur Blvd., Oakland, Ca. Completed By: David J. Vossler Date Completed: 11/23/1998

TIER 1 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

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

SUBSURFACE SOILS:
VAPOR INTRUSION TO BUILDINGS

Exposure Concentration

Constituents of Concern	1) Source Medium: Subsurface Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor: On-Site Commercial		3) Exposure Medium: Indoor Air: POE Conc. (mg/m^3) (1) / (2): On-Site Commercial		4) Exposure Multiplier: (IRxEFxED)/(BWxAT) (m^3/kg-day): On-Site Commercial		5) Average Daily Intake Rate: (mg/kg-day) (3) X (4): On-Site Commercial	
Benzene	6.4E-2		4.7E+2		1.4E-4		7.0E-2		9.6E-6
Ethylbenzene	3.5E-2		4.7E+2		7.5E-5		2.0E-1		1.5E-5
Methyl t-Butyl Ether	1.1E+1		4.7E+2		2.4E-2		2.0E-1		4.7E-3
Toluene	2.7E-2		4.7E+2		5.9E-5		2.0E-1		1.2E-5
Xylene (mixed isomers)	8.7E-2		4.7E+2		1.9E-4		2.0E-1		3.7E-5

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)

Site Name: Former Tosco (former Unocal) SS # 1871 Site Location: 96 MacArthur Blvd., Oakland, Completed By: David J. Vossler Date Completed: 11/23/1998

TIER 1 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 Commercial	3) Exposure Medium — Indoor Air: POE Conc. (mg/m^3) (1) / (2): On-Site Commercial	4) Exposure Multiplier — (IRxEFxED)/(BWxAT) (m^3/kg-day): On-Site Commercial	5) Average Daily Intake Rate — (mg/kg-day) (3) X (4): On-Site Commercial	TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from subsurface & groundwater routes.): On-Site Commercial
Benzene	2.1E-1	1.4E+2	1.5E-3	7.0E-2	1.0E-4	1.1E-4
Ethylbenzene	2.7E-2	1.3E+2	2.1E-4	2.0E-1	4.1E-5	5.5E-5
Methyl t-Butyl Ether	4.5E+1	8.5E+2	5.2E-2	2.0E-1	1.0E-2	1.5E-2
Toluene	9.5E-2	1.4E+2	6.9E-4	2.0E-1	1.3E-4	1.5E-4
Xylene (mixed isomers)	8.4E-2	1.5E+2	5.6E-4	2.0E-1	1.1E-4	1.5E-4

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)

Site Name: Former Tosco (former Unocal) SS Site Location: 96 MacArthur Blvd., Oakland, Ca. Completed By: David J. Vossler Date Completed: 11/23/1998 *2 OF 4*

TIER 1 PATHWAY RISK CALCULATION

INDOOR 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	(3) Inhalation Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3) On-Site	Commercial	(5) Total Toxicant Intake Rate (mg/kg/day) On-Site	Commercial	(6) Inhalation Reference Dose (mg/kg-day)	(7) Individual COC Hazard Quotient (5) / (6) On-Site	Commercial
Constituents of Concern											
Benzene	A		1.1E-4	2.9E-2		3.2E-6		3.1E-4	1.7E-3		1.8E-1
Ethylbenzene	D							5.5E-5	2.9E-1		1.9E-4
Methyl t-Butyl Ether								1.5E-2	8.6E-1		1.7E-2
Toluene	D							1.5E-4	1.1E-1		1.3E-3
Xylene (mixed isomers)	D							1.5E-4	2.0E+0		7.4E-5
Total Pathway Carcinogenic Risk =					**0.0E+0**	**3.2E-6**	***Total Pathway Hazard Index =***			**0.0E+0**	**2.0E-1**

RBCA SITE ASSESSMENT | **Tier 1 Worksheet 8.3**

Site Name: Former Tosco (former Unocal) SS # 1871 | Completed By: David J. Vossler
Site Location: 96 MacArthur Blvd., Oakland, Ca. | Date Completed: 11/23/1998

TIER 1 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	
OUTDOOR AIR EXPOSURE PATHWAYS										
Complete:	5.3E-9	1.0E-6	5.3E-9	N/A	☐	3.0E-4	1.0E+0	3.7E-4	N/A	☐
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	3.2E-6	1.0E-6	3.2E-6	N/A	■	1.8E-1	1.0E+0	2.0E-1	N/A	☐
SOIL EXPOSURE PATHWAYS										
Complete:	NC	1.0E-6	NC	N/A	■	NC	1.0E+0	NC	N/A	■
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	NC	1.0E-6	NC	N/A	■	NC	1.0E+0	NC	N/A	■
CRITICAL EXPOSURE PATHWAY (Select Maximum Values From Complete Pathways)										
	3.2E-6	1.0E-6	3.2E-6	N/A	■	1.8E-1	1.0E+0	2.0E-1	N/A	☐

RBCA SITE ASSESSMENT — Tier 1 Worksheet 6.1

Site Name: Former Tosco (former Unocal) SS # 1871
Site Location: 96 MacArthur Blvd., Oakland, Ca.

Completed By: David J. Vossler
Date Completed: 11/23/1998

SURFACE SOIL RBSL VALUES (< 3.3 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: 1

RBSL Results For Complete Exposure Pathways ("x" If Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	Soil Leaching to Groundwater			Ingestion, Inhalation and Dermal Contact		Construction Worker	Applicable RBSL	RBSL Exceeded ?	Required CRF
CAS No.	Name	(mg/kg)	Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial: (on-site)(PEL)	Commercial: (on-site) (PEL)	(mg/kg)	"■" If yes	Only if "yes" left
71-43-2	Benzene	0.0E+0	NA	NA	NA	NA	NA	NA	>Res	☐	<1
100-41-4	Ethylbenzene	0.0E+0	NA	NA	NA	NA	NA	NA	>Res	☐	<1
1634-04-4	Methyl t-Butyl Ether	0.0E+0	NA	NA	NA	NA	NA	NA	>Res	☐	<1
108-88-3	Toluene	0.0E+0	NA	NA	NA	NA	NA	NA	>Res	☐	<1
1330-20-7	Xylene (mixed isomers)	0.0E+0	NA	NA	NA	NA	NA	NA	>Res	☐	<1

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

Software: GSI RBCA Spreadsheet
Version: 1.0.1

Serial: G-225-ZRX-486

Site Name: Former Tosco (former Unocal) SS # 1871 | Completed By: David J. Vossler
Site Location: 96 MacArthur Blvd., Oakland, Ca. | Date Completed: 11/23/1998

SUBSURFACE SOIL RBSL VALUES (> 3.3 FT BGS)

Target Risk (Class A & B) 1.0E-6 | ■ MCL exposure limit? | Calculation Option: 1
Target Risk (Class C) 1.0E-5 | ■ PEL exposure limit?
Target Hazard Quotient 1.0E+0

RBSL 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 RBSL	RBSL Exceeded ?	Required CRF
CAS No.	Name	(mg/kg)	Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial: (on-site) (PEL)	Residential: (on-site)	Commercial: (on-site)(PEL)	(mg/kg)	"■" if yes	Only if "yes" left
71-43-2	Benzene	6.4E-2	NA	NA	NA	NA	>Res	NA	>Res	>Res	☐	<1
100-41-4	Ethylbenzene	3.5E-2	NA	NA	NA	NA	>Res	NA	>Res	>Res	☐	<1
1634-04-4	Methyl t-Butyl Ether	1.1E+1	NA	NA	NA	NA	>Res	NA	>Res	>Res	☐	<1
108-88-3	Toluene	2.7E-2	NA	NA	NA	NA	>Res	NA	>Res	>Res	☐	<1
1330-20-7	Xylene (mixed isomers)	8.7E-2	NA	NA	NA	NA	>Res	NA	>Res	>Res	☐	<1

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

Software: GSI RBCA Spreadsheet | Serial: G-225-ZRX-486
Version: 1.0.1

·0C Tier 1

·06

Site Name: Former Tosco (former Unocal) SS # 1871
Site Location: 98 MacArthur Blvd., Oakland, Ca.

Completed By: David J. Vossler
Date Completed: 11/23/1998

GROUNDWATER RBSL 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: 1

RBSL 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 RBSL	RBSL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	Residential: (on-site)	Commercial: (on-site)	Regulatory(MCL): (on-site)		Residential: (on-site)	Commercial: (on-site) (PEL)		Residential (on-site)	Commercial: (on-site) (PEL)	(mg/L	"■" If yes	Only if "yes" left
71-43-2	Benzene	2.1E-1	NA	NA	NA		NA	4.6E+2		NA	>Sol	4.6E+2	☐	<1
100-41-4	Ethylbenzene	2.7E-2	NA	NA	NA		NA	>Sol		NA	>Sol	>Sol	☐	<1
1634-04-4	Methyl t-Butyl Ether	4.5E+1	NA	NA	NA		NA	>Sol		NA	>Sol	>Sol	☐	<1
108-88-3	Toluene	9.5E-2	NA	NA	NA		NA	>Sol		NA	>Sol	>Sol	☐	<1
1330-20-7	Xylene (mixed isomers)	8.4E-2	NA	NA	NA		NA	>Sol		NA	>Sol	>Sol	☐	<1

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

Software: GSI RBCA Spreadsheet
Version: 1.0.1

Serial: G-225-ZRX-488

210 ppb