RO 455

Alameda County

GETTLER-RYAN INC. FEB 24 2003 1364 North McDowell Blvd. Suite B2
Petaluma, CA 94954
Phone (707) 789-3255, Fax (707) 789-3218

Environmental Health

TRANSMITTAL

TO:	Mr. Dave DeWitt ConocoPhillips 2000 Crow Canyon Place, Suite 400 San Ramon, CA 94583	DATE: PROJECT NO. SUBJECT:	February 19, 2003 140165.12 Tosco (76) Station 1871 Oakland, California

From: Jeremy Smith

WE ARE SENDING YOU:

COPIES	DATED	DESCRIPTION
1	2/19/03	Ozone Microsparge System First Semi-Annual Status Report

THESE ARE TRANSMITTED as checked below:

- ☐ For review and comment
- ☐ As Requested
- ☐ For Approval
- ☐ Approved as submitted
- ☐ Approved as noted
- ☐ Returned for corrections
- ☒ For your files
- ☐ For your use
- ☐ As noted below

COMMENTS:
Dave- Here is the System Status Report for Station 1871.

Signed: _____

COPIES TO:

Mr. Don Hwang, Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Alameda, CA 94502

Mr. Mike Karvelot, Quik Stop Markets, Inc.
4567 Enterprise Street, Fremont, CA 94538

GETTLER-RYAN INC.

February 19, 2003

Mr. Dave DeWitt
ConocoPhillips
2000 Crow Canyon Place, Suite 400
San Ramon, CA 94583

RE: Ozone Microsparge System First Semi-Annual Status Report
Tosco (76) Service Station No. 1871
96 MacArthur Boulevard, Oakland, California

At the request of ConocoPhillips, Gettler-Ryan Inc. (GR), has prepared this report documenting the status of the previous six months of operation of an ozone microsparge remedial system, installed at the site to address hydrocarbon impacted groundwater (Figure 1). The remedial system was placed into operation on April 8, 2002. The system cycles ozone/air injection between the ten sparge points (Figure 2). The schedule is currently set to cycle through each point 16 times per day, for 8 minutes per point per cycle. The schedule can be varied as part of the system evaluation process. A description of the installation and startup of the remedial system can be found in GR's report *Ozone Microsparge Well and System Installation Report*, dated May 20, 2002.

The primary concerns at this site are Total Petroleum Hydrocarbons as gasoline (TPHg), benzene, and methyl tertiary butyl ether (MtBE). Groundwater monitoring and sampling has been performed quarterly or semiannually at the site since November 1992 following the October 1992 installation of three 4-inch diameter groundwater monitoring wells designated MW-1, MW-2, and MW-3. In March 1996, Kaprealian Engineering Incorporated personnel witnessed the installation of two additional monitoring wells (MW-4, MW-5) at the site. The top of casing on monitoring wells MW-2 through MW-5 was damaged during site demolition activities, subsequently, on September 14, 1998, these wells were drilled out and the boreholes backfilled with neat cement to grade. In June 1999, three off-site groundwater monitoring wells (MW-6, MW-7, MW-8) were installed adjacent to the site. Three off-site downgradient groundwater monitoring wells (MW-9, MW-10, MW-11) were installed in CalTrans right-of-way by GR in December 2001. The quarterly sampling event before beginning the ozone sparge system was in January 2002, while the last quarterly sampling event used in this evaluation was in October 2002. The original laboratory data reports for the quarterly/semi-annual sampling events are included in the quarterly/semi-annual groundwater monitoring and sampling reports previously submitted under separate cover, and are not included in this report. A summary table of historical analytical results is presented in Appendix A.

Ozone Micro Sparging

The ozone sparge system, manufactured by KVA, was placed into operation on April 8, 2002, and is designed to cycle the ozone/oxygen injection between the 10-points. A typical injection schedule through each point is 18 times a day, for between 5 and 15 minutes per point per cycle.

In order to evaluate system effectiveness, quarterly sampling of the groundwater monitoring wells (MW-1 and MW-6 through MW-11) has been performed at the site. Groundwater samples from the wells were analyzed for TPHg by either EPA Method 8015 modified or Method 8260, benzene, toluene, ethylbenzene, and total xylenes (BTEX) and MtBE by EPA Method 8260 or Method 8021. Groundwater analytical results for the wells are presented in Table 1. Charts of groundwater concentrations for select wells over time are presented on Figures 3, 4, 5, and 6. If an analyte was reported as not detected, a value of one half the detection limit was utilized during chart preparation.

OBSERVATIONS

Sampling Results

Collecting quarterly groundwater samples from wells MW-1 and MW-6 through MW-11 monitored the progress of the system. Wells MW-1, MW-6, MW-7, and MW-8 are located within the treatment area and the zone of influence of one or more sparge points.

TPHg

Figures 3, 4, 5, and 6 illustrate the TPHg concentrations from quarterly sampling from select wells (MW-1, MW-6, MW-8, and MW-9) from January 2002 through October 2002. The TPHg concentration in MW-1 on the January 31, 2002 was 42,000 ppb and 470 ppb on October 15, 2002. This represents a 98% decrease in concentration over the 10 month period. The TPHg concentration on January 31, 2002 in MW-6 was 12,000 ppb and 1,300 ppb on October 15, 2002. This represents an 89% decrease in concentration over the 10 month period. Laboratory notes indicated that the majority of reported TPHg values for well MW-6 are either weathered gasolines or that the hydrocarbon pattern, while present in the fuel quantification range, did not resemble the pattern of TPHg. The TPHg concentration in MW-8 on January 31, 2002 was 5,900 ppb and below laboratory detection limits on October 15, 2002. This is a greater than 99% decrease in concentration over the 10 month period. Well MW-9 was reported to have a TPHg concentration below detection limits during the January and April 2002 sampling events. The TPHg concentration increased to 580 and 570 ppb during the July and October 2002 sampling events, respectively. These concentrations are suspect because while the hydrocarbon pattern was present

in the fuel quantification range, it did not resemble the pattern of TPHg. GR will continue to sample well MW-9 for the TPHg concentration.

Benzene

Figures 3, 4, 5, and 6 illustrate the benzene concentrations from quarterly sampling from select wells (MW-1, MW-6, MW-8, and MW-9) from January 2002 through October 2002. The benzene concentration reported in MW-1 on January 31, 2002 was 5,800 ppb, and as 16 ppb on October 15, 2002. This represents a decrease of 99%. The benzene concentration in MW-6 has declined from 250 ppb on January 31, 2002 to below laboratory detection limits (10 ppb) on October 15, 2002. This represents a decrease of over 96%. The benzene concentration in MW-8 has declined from 86 ppb on January 31, 2002 to below laboratory detection limits (0.50 ppb) on October 15, 2002. This represents a decrease of over 99% during the 10 month period. Benzene has historically not been detected in MW-9.

MtBE

Figures 3, 4, 5, and 6 illustrate the MtBE concentrations from quarterly sampling from select wells (MW-1, MW-6, MW-8, and MW-9) from January 2002 through October 2002. The MtBE concentration reported in MW-1 on January 31, 2002 was 26,000 ppb and 390 ppb on October 15, 2002. The MtBE concentration has decreased by 98% over the time period for MW-1. The MtBE concentration in MW-6 was reported as 31,000 ppb on January 31, 2002, and 3,200 ppb on October 15, 2002. This represents a decrease of 89%. The MtBE concentration in MW-8 was reported as 700 ppb on January 31, 2002 and 21 ppb on October 15, 2002. This represents a decrease of 97%. The MtBE concentration in MW-9 has increased from as 910 ppb on January 31, 2002, to 1,400 ppb on October 15, 2002.

DISCUSSION OF RESULTS

Initially, there were increases in petroleum hydrocarbon concentrations in the groundwater in well MW-6. This is believed to be due to the desorption of hydrocarbons from soil caused by the aggressive mechanical scrubbing action of the microbubbles. In terms of overall treatment, this desorption is necessary to achieve effective, long-term treatment. However, there must be sufficient treatment capacity and downgradient containment to prevent off site migration. Well MW-9, located approximately 150 feet downgradient of the site, has also shown an increase in hydrocarbon concentration.

The ozone treatment appears to be effective at decreasing TPHg, benzene and MtBE concentrations in the groundwater beneath the site. All three constituents have decreased in MW-1, MW-6, and MW-8 by over 89% in these wells. TPHg concentrations have increased and stabilized in MW-9,

but may represent detections of weathered gasoline or other hydrocarbons. MtBE concentrations have increased in MW-9 over the evaluation period. The cause of the increase is not clear, but future sampling events will be utilized to evaluate the changing concentrations.

There is not enough data available from well MW-7 to determine if the system is effective in reducing hydrocarbons in the vicinity of this well. A car has been parked over the well during two of the four sampling events. Future sampling data will be collected to evaluate the system effectiveness in this well.

CONCLUSIONS AND RECOMMENDATIONS

The results of the concentration versus time charts show that hydrocarbon concentrations have declined in the immediate site vicinity during the past 6 months remedial system operation. The ozone sparging system is demonstrating to be successful in reducing petroleum concentrations in the groundwater at this site. This includes TPHg, benzene, and MtBE, which are the compounds of primary concern. The initial increases in petroleum concentrations which have been observed, primarily in impacted soil areas, have been and are expected to be short term followed by continuous concentration decreases. It is believed that these increases are due to accelerated desorption caused by the aggressive mechanical scrubbing action of the microbubbles. Although contaminant concentrations initially increase, overall this process will accelerate the long term remediation of the site.

The current ozone injection addresses the dissolved impact onsite and will also act as a barrier to mitigate any continuing migration of dissolved hydrocarbons offsite. Treatment directly offsite is not feasible due to the proximity of several intersecting streets, however, three offsite wells (MW-9, MW-10, and MW-11) exist offsite downgradient across MacArthur Boulevard and Santa Clara Avenue and will continue to be sampled. Well MW-10 has been below detection limits for all constituents with the exception of MtBE on January 31, 2002 and July 11, 2002 at concentrations of 1.2 and 1.1 ppb, respectively. MW-11 has historically been below laboratory detection limits for all constituents.

The ozone microsparge system will continue to operate for at least the next year, and wells MW-1 and MW-6 through MW-11 will continue to be sampled on a quarterly basis. An additional annual status report will be prepared after receipt and review of the additional groundwater data.

System Information

Startup Date:	April 8, 2002
Months of Operation:	6

Number of ozone injection points: 10 (SP-A, SP-BS/BD, SP-C, SP-DS/DD, SP-E, SP-F, SP-G, and SP-H)

Quarterly groundwater sampling: MW-1 and MW-6 through MW-11

If you have any questions or comments concerning the contents of the report, please feel free to contact either of us at 707.789.3255.

Sincerely,
Gettler-Ryan Inc.

Jeremy A. Smith
Staff Geologist

Jed A. Douglas
Senior Geologist
R.E.A. 06321

Attachments:

Table 1:	Groundwater Chemical Analytical Data
Figure 1:	Vicinity Map
Figure 2:	Site Plan
Figure 3:	Chart of Groundwater Concentration versus Time, MW-1
Figure 4:	Chart of Groundwater Concentration versus Time, MW-6
Figure 5:	Chart of Groundwater Concentration versus Time, MW-8
Figure 6:	Chart of Groundwater Concentration versus Time, MW-9
Appendix A:	Historical Groundwater Monitoring and Sampling Data

TABLE 1 - GROUNDWATER SAMPLE CHEMICAL ANALYTICAL DATA

Tosco (76) Service Station No. 1871
96 MacArthur Boulevard
Oakland, California

Sample No.	Sample Date	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	MTBE (ppb)
MW-1	1/31/2002	42,000 [1]	5,800	1,800	2,000	8,200	26,000 [2]
MW-1	4/11/2002	58,000	2,900	1,200	1,800	10,000	19,000
MW-1	7/11/2002[2]	5,900	330	<10	230	600	3,400
MW-1	10/15/2002[2]	470	16	<2.5	14	16	390
MW-6	1/31/2002	12,000 [3]	250	92	500	1,500	31,000 [2]
MW-6	4/11/2002	3,600	42	32	39	280	120,000
MW-6	7/11/2002[2]	12,000 [4]	<100	<100	<100	<200	15,000
MW-6	10/15/2002[2]	1,300 [4]	<10	<10	<10	<20	3,200
MW-8	1/31/2002	5,900 [3]	86	<10	630	390	700 [2]
MW-8	4/11/2002	250	2.0	<0.50	38	2.2	410
MW-8	7/11/2002[2]	110 [4]	<0.50	<0.50	<0.50	<1.0	120
MW-8	10/15/2002[2]	<50	<0.50	<0.50	<0.50	<1.0	21
MW-9	1/31/2002	<50	<0.50	<0.50	<0.50	<0.50	910 [2]
MW-9	4/11/2002	<50	<0.50	<0.50	<0.50	<0.50	620
MW-9	7/11/2002[2]	580 [4]	<5.0	<5.0	<5.0	<10	580
MW-9	10/15/2002[2]	570 [4]	<5.0	<5.0	<5.0	<10	1,400

EXPLANATION:

ppb = parts per billion

[1] = Laboratory report indicates gasoline C6-C12

[2] = Samples analyzed using EPA Method 8260B

[3] = Laboratory report indicates weathered gasoline C6-C12

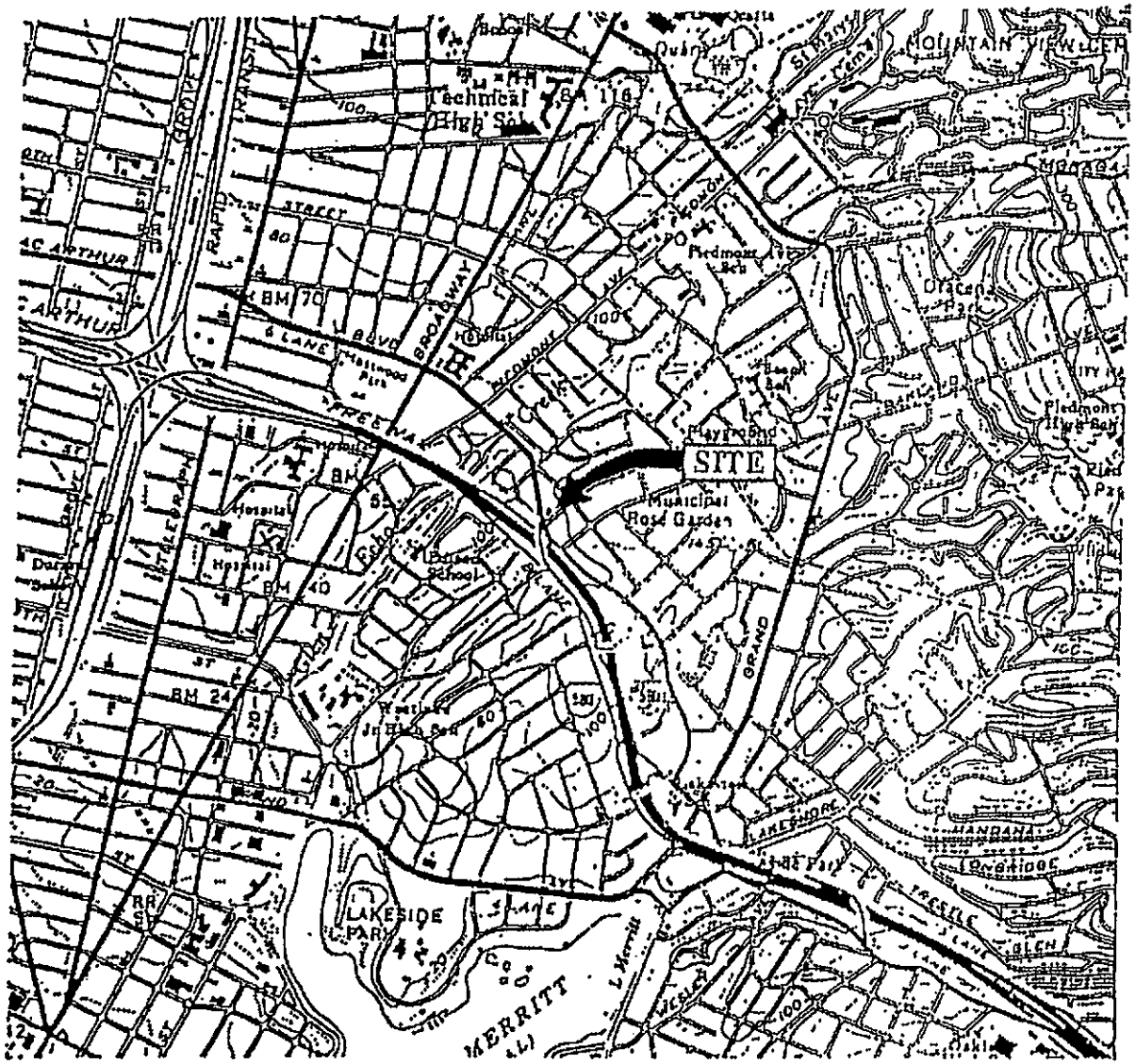
[4] = Laboratory report indicates hydrocarbon pattern is present in the requested fuel quantitation range but does not resemble the pattern of the requested fuel.

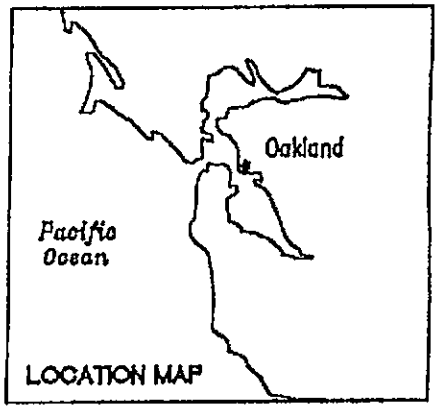
ANALYTICAL LABORATORY:

Sequoia Analytical Walnut Creek California (ELAP #1271)
Severn Trent Laboratory, Pleasanton, California (ELAP #2496)

ANALYTICAL METHOD:

TPHg = Total Petroleum Hydrocarbons as gasoline by EPA Method 8015 modified
Benzene, Toluene, Ethylbenzene and Total Xylenes by EPA method 8021B
MTBE = Methyl tert-butyl ether by EPA Method 8021B or 8260B





N

0 2000

Scale In Feet

Base Map: USGS Topographic Map

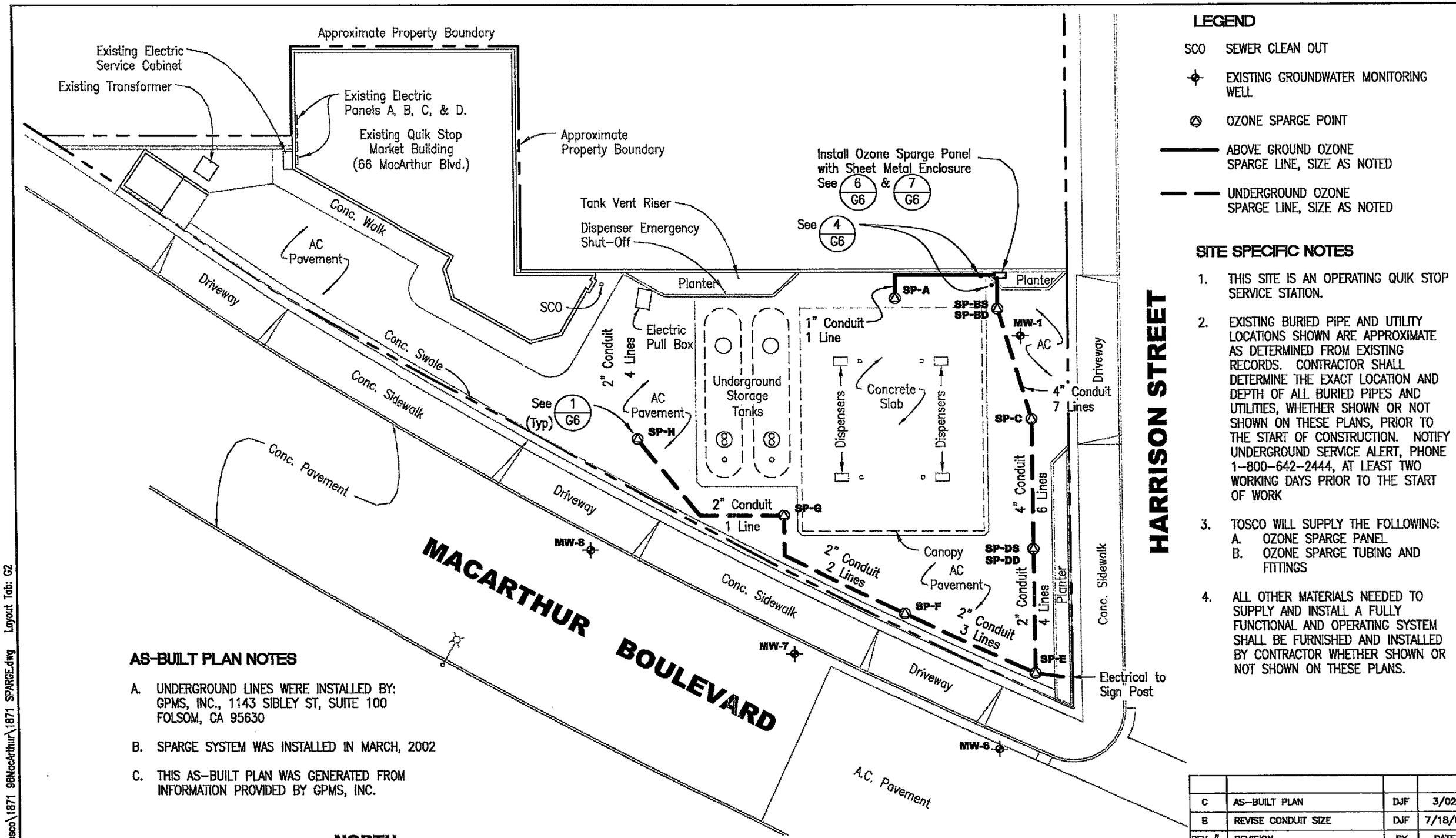
Gettler - Ryan Inc.

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

FIGURE
1

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
10165		July, 1998	



LEGEND

- SCO — SEWER CLEAN OUT
- EXISTING GROUNDWATER MONITORING WELL
- OZONE SPARGE POINT
- ABOVE GROUND OZONE SPARGE LINE, SIZE AS NOTED
- UNDERGROUND OZONE SPARGE LINE, SIZE AS NOTED

SITE SPECIFIC NOTES

1. THIS SITE IS AN OPERATING QUIK STOP SERVICE STATION.
2. EXISTING BURIED PIPE AND UTILITY LOCATIONS SHOWN ARE APPROXIMATE AS DETERMINED FROM EXISTING RECORDS. CONTRACTOR SHALL DETERMINE THE EXACT LOCATION AND DEPTH OF ALL BURIED PIPES AND UTILITIES, WHETHER SHOWN OR NOT SHOWN ON THESE PLANS, PRIOR TO THE START OF CONSTRUCTION. NOTIFY UNDERGROUND SERVICE ALERT, PHONE 1-800-642-2444, AT LEAST TWO WORKING DAYS PRIOR TO THE START OF WORK
3. TOSCO WILL SUPPLY THE FOLLOWING:
   A. OZONE SPARGE PANEL
   B. OZONE SPARGE TUBING AND FITTINGS
4. ALL OTHER MATERIALS NEEDED TO SUPPLY AND INSTALL A FULLY FUNCTIONAL AND OPERATING SYSTEM SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR WHETHER SHOWN OR NOT SHOWN ON THESE PLANS.

AS-BUILT PLAN NOTES

A. UNDERGROUND LINES WERE INSTALLED BY: GPMS, INC., 1143 SIBLEY ST, SUITE 100 FOLSOM, CA 95630

B. SPARGE SYSTEM WAS INSTALLED IN MARCH, 2002

C. THIS AS-BUILT PLAN WAS GENERATED FROM INFORMATION PROVIDED BY GPMS, INC.

NORTH

0 20' 40' 60'

1"= 20'

REV #	REVISION	BY	DATE
C	AS-BUILT PLAN	DJF	3/02
B	REVISE CONDUIT SIZE	DJF	7/18/01

Gettler - Ryan Inc.
1364 North McDowell Boulevard Suite B2
Petaluma, CA 94954 (707) 789-3255

TOSCO

1871-G2

PROJECT: 140165.09
FACILITY: FORMER TOSCO (76) STATION #1871
66 (Formerly 96) MACARTHUR BLVD.
OAKLAND, CALIFORNIA
DATE: 5-7-02 SHEET 3 of 8

TITLE: NEW CONSTRUCTION SITE PLAN (AS-BUILT)

DRAWING No. G2 C

File Name: E:\REMED\Tosco\1871 96MacArthur\1871 SPARGE.dwg Layout Tab: G2

Figure 3 - Tosco (76) Service Station No. 1871
Groundwater Concentrations vs. Time
MW-1

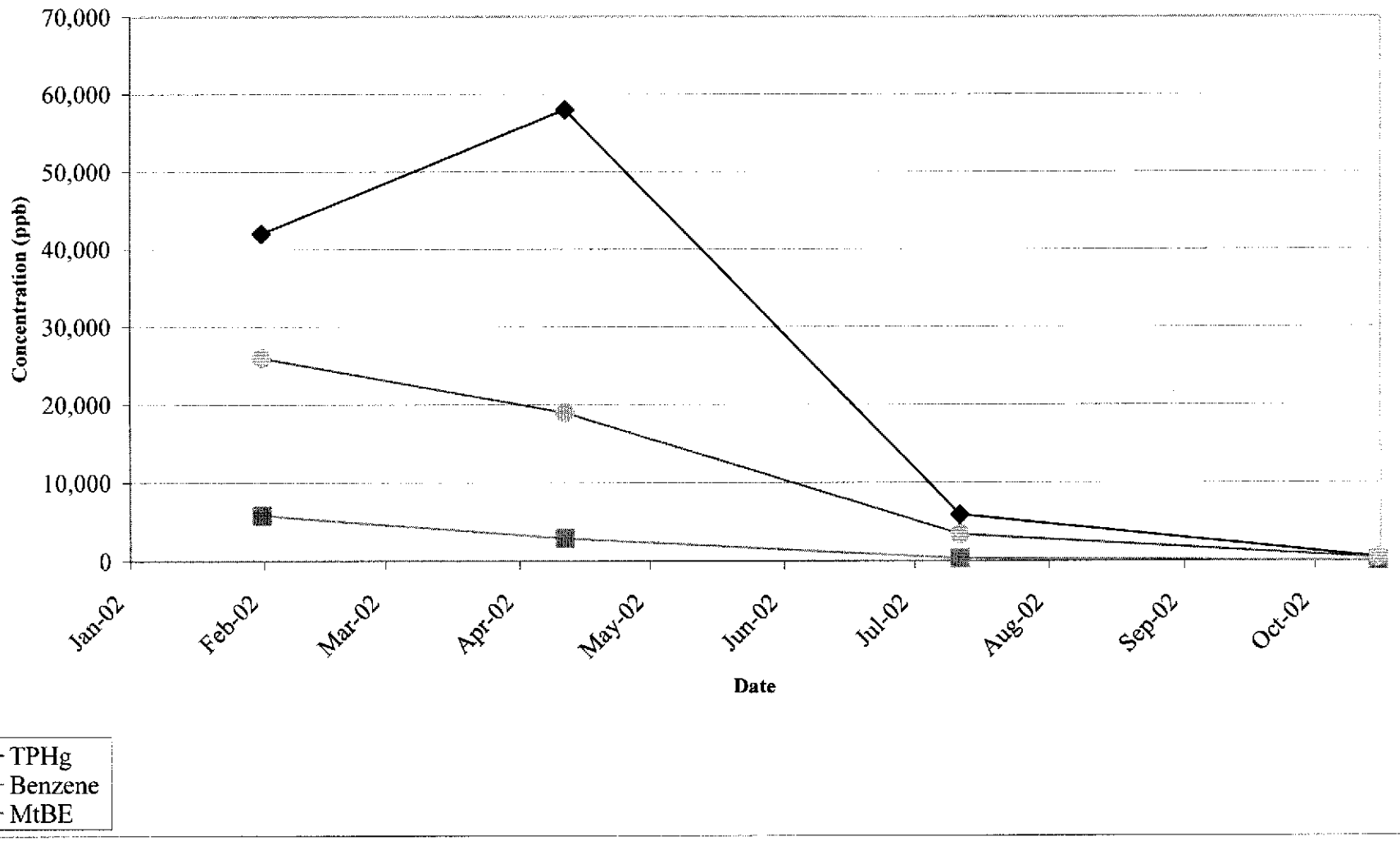


Figure 4 - Tosco (76) Service Station No. 1871
Groundwater Concentrations vs. Time
MW-6

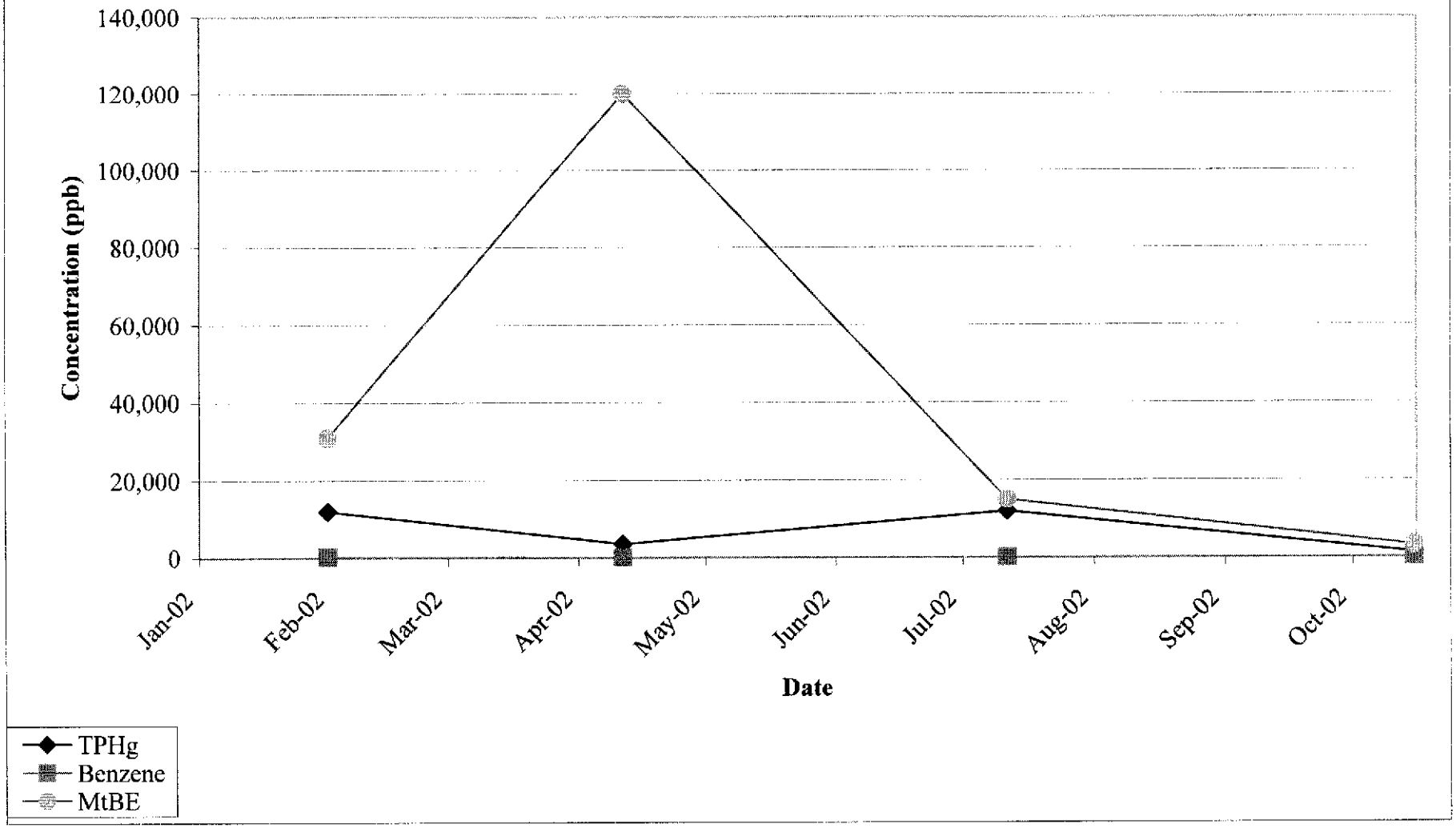


Figure 5 - Tosco (76) Service Station No. 1871
Groundwater Concentrations vs. Time
MW-8

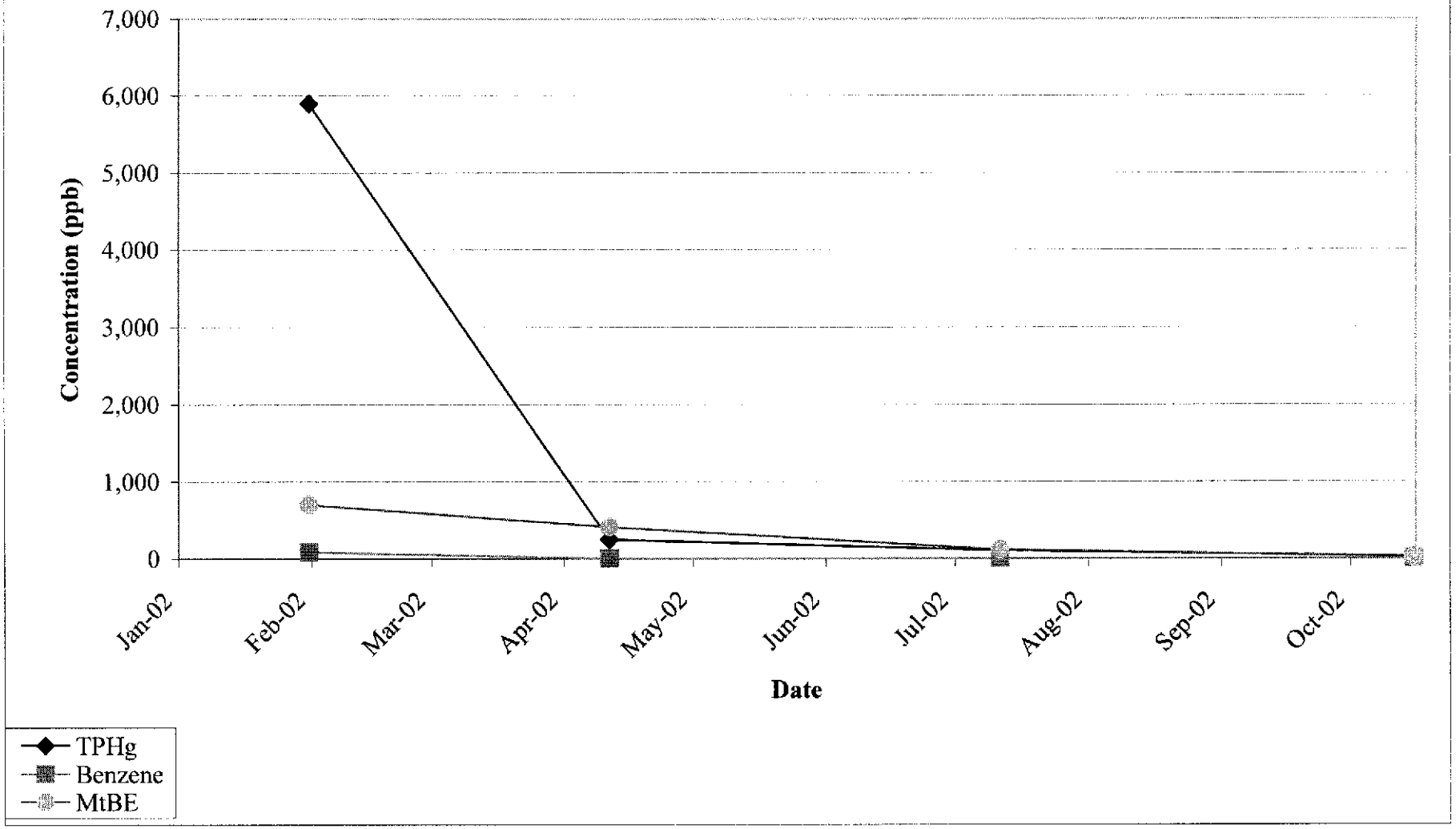
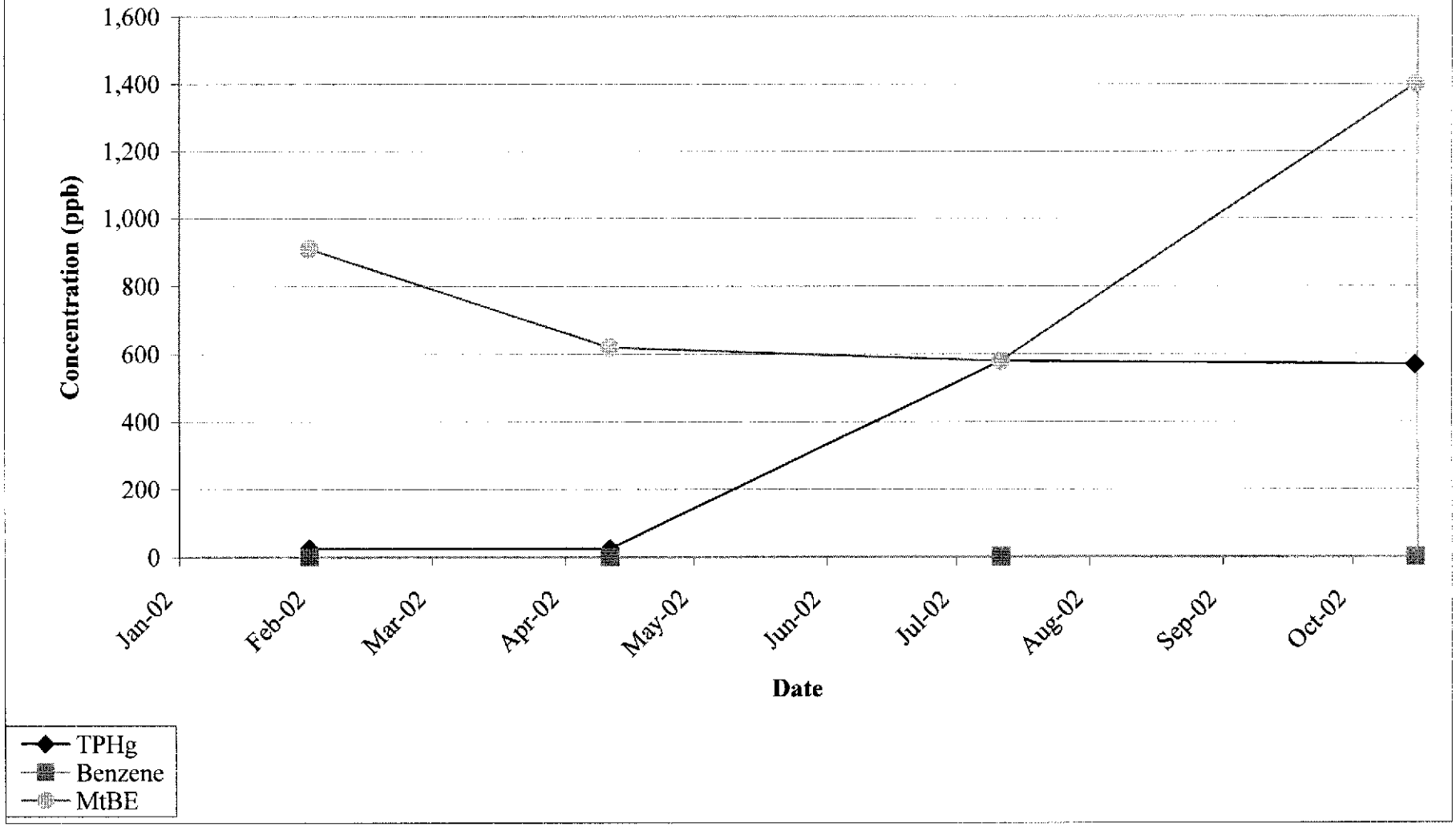


Figure 6 - Tosco (76) Service Station No. 1871
Groundwater Concentrations vs. Time
MW-9



APPENDIX A

HISTORICAL GROUNDWATER MONITORING AND SAMPLING DATA

Table 1

Groundwater Monitoring Data and Analytical Results

Tosco (Former Unocal) Service Station #1871

96 MacArthur Boulevard

Oakland, California

WELL ID/ TOC*(ft.)		DATE	DTW (ft.)	S.I. (ft. bgs.)	GWE (msl)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	MTBE (ppb)
MW-1		11/03/92	--	9.5-24.5	--	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
		06/18/99	13.93		72.31	49,000	6,900	6,500	380	12,000	72,000/47,000[4]
		01/21/00	15.05		71.19	63,700[5]	5,520	2,000	2,640	13,100	57,100
		07/10/00	13.97		72.27	67,800[5]	9,910	4,120	3,330	16,100	67,400/54,000[4]
		01/04/01	14.92		71.32	63,900[5]	6,270	784	2,670	12,900	--/38,100[4]
		07/16/01	14.32		71.92	66,000[5]	7,100	330	2,300	9,800	36,000/41,000[4]
86.99	♦	01/31/02	13.54		73.45	42,000[5]	5,800	1,800	2,000	8,200	26,000/26,000[4]
		04/11/02	13.64		73.35	58,000	2,900	1,200	1,800	10,000	19,000
		07/11/02[8]	13.96		73.03	5,900	330	<10	230	600	3,400
		10/15/02[8]	**14.71**		**72.28**	**470**	**16**	**<2.5**	**14**	**16**	**390**

Table 1

Groundwater Monitoring Data and Analytical Results

Tosco (Former Unocal) Service Station #1871

96 MacArthur Boulevard

Oakland, California

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	S.I. (ft. bgs.)	GWE (msl)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	MTBE (ppb)
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	--
	10/23/95	10.70		65.91	ND	ND	ND	ND	ND	19
	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
	DESTROYED									
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	--

Table 1

Groundwater Monitoring Data and Analytical Results

Tosco (Former Unocal) Service Station #1871

96 MacArthur Boulevard

Oakland, California

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	S.I. (ft. bgs.)	GWE (msl)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	MTBE (ppb)
MW-3	10/10/94	12.98	--	64.50	4,300	11	ND	12	ND	--
(cont)	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
	DESTROYED									
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
	DESTROYED									
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

Table 1

Groundwater Monitoring Data and Analytical Results

Tosco (Former Unocal) Service Station #1871

96 MacArthur Boulevard

Oakland, California

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	S.I. (ft. bgs.)	GWE (msl)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	MTBE (ppb)
MW-5	07/29/97	11.58	--	70.22	ND	ND	ND	ND	ND	71,000
(cont)	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
	DESTROYED									
MW-6										
78.91	06/18/99	9.30	5.0-25.0	69.61	2,100	21	29	ND[3]	47	97,000/71,000[4]
	01/21/00	9.37		69.54	1,880[5]	143	31.2	106	196	41,200/48,800[4]
	07/10/00	8.94		69.97	5,710[5]	869	209	301	1,430	22,200/19,500[4]
	01/04/01	9.21		69.70	ND	ND	ND	ND	ND	--/9,510[4]
	07/16/01	9.42		69.49	4,800[5]	200	21	150	440	29,000/34,000[4]
	01/31/02	8.50		70.41	12,000[7]	250	92	500	1,500	26,000/31,000[4]
79.67	04/11/02	9.08		70.59	3,600	42	32	39	280	120,000
	07/11/02[8]	9.70		69.97	12,000[9]	<100	<100	<100	<200	15,000
	10/15/02[8]	**9.96**		**69.71**	**1,300[9]**	**<10**	**<10**	**<10**	**<20**	**3,200**
MW-7										
79.92	06/18/99	8.70	5.0-25.0	71.22	ND	ND	ND	ND	ND	16,000/13,000[4]
	01/21/00	9.30		70.62	ND[3]	ND[3]	ND[3]	ND[3]	ND[3]	12,300/18,200[4]
	07/10/00	8.72		71.20	ND[3]	ND[3]	ND[3]	ND[3]	ND[3]	16,900/13,800[4]
	01/04/01	9.17		70.75	ND	ND	ND	ND	0.719	--/37.3[4]
	07/16/01	9.02		70.90	ND	ND	ND	ND	ND	7,200/4,700[4]
	01/31/02	7.91		72.01	<50	<0.50	<0.50	<0.50	<0.50	8,900/9,900[4]
80.67	04/11/02	INACCESSIBLE - CAR PARKED OVER WELL				--	--	--	--	--
	07/11/02	INACCESSIBLE - TRUCK PARKED OVER WELL				--	--	--	--	--
	10/15/02[8]	**9.81**		**70.86**	**<5,000[9]**	**<50**	**<50**	**<50**	**<100**	**12,000**

Table 1

Groundwater Monitoring Data and Analytical Results

Tosco (Former Unocal) Service Station #1871

96 MacArthur Boulevard

Oakland, California

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	S.I. (ft. bgs.)	GWE (msl)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	MTBE (ppb)
MW-8										
80.96	06/18/99	9.10	5.0-25.0	71.86	ND	ND	ND	ND	ND	290/160[4]
	01/21/00	10.00		70.96	ND	ND	ND	ND	1.09	224/221[4]
	07/10/00	7.94		73.02	ND	ND	ND	ND	ND	234/223[4]
	01/04/01	9.76		71.20	3,790[5]	141	8.92	128	375	--/34,200[4]
	07/16/01	9.15		71.81	ND	ND	ND	ND	ND	66/70[4]
	01/31/02	7.99		72.97	5,900[7]	86	<10	630	390	670/700[4]
81.71	04/11/02	9.00		72.71	250	2.0	<0.50	38	2.2	410
	07/11/02[8]	9.60		72.11	110[9]	<0.50	<0.50	<0.50	<1.0	120
	10/15/02[8]	**10.60**		**71.11**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<1.0**	**21**
MW-9										
82.07	01/31/02[6]	14.72	--	67.35	<50	<0.50	<0.50	<0.50	<0.50	680/910[4]
	04/11/02	14.85		67.22	<50	<0.50	<0.50	<0.50	<0.50	620
	07/11/02[8]	15.39		66.68	580[9]	<5.0	<5.0	<5.0	<10	580
	10/15/02[8]	**16.16**		**65.91**	**570[9]**	**<5.0**	**<5.0**	**<5.0**	**<10**	**1,400**
MW-10										
74.98	01/31/02[6]	8.02	--	66.96	<50	<0.50	<0.50	<0.50	<0.50	<5.0/1.2[4]
	04/11/02	7.60		67.38	<50	<0.50	<0.50	<0.50	<0.50	<2.5
	07/11/02[8]	8.91		66.07	<50	<0.50	<0.50	<0.50	<1.0	1.1
	10/15/02[8]	**11.49**		**63.49**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<1.0**	**<2.0**
MW-11										
77.31	01/31/02[6]	11.71	--	65.60	<50	<0.50	<0.50	<0.50	<0.50	<5.0/<1.0[4]
	04/11/02	11.95		65.36	<50	<0.50	<0.50	<0.50	<0.50	<2.5
	07/11/02[8]	12.79		64.52	<50	<0.50	<0.50	<0.50	<1.0	<0.50
	10/15/02[8]	**13.67**		**63.64**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<1.0**	**<2.0**

Table 1

Groundwater Monitoring Data and Analytical Results

Tosco (Former Unocal) Service Station #1871

96 MacArthur Boulevard

Oakland, California

WELL ID/ TOC*(ft.)	DATE	DTW (ft.)	S.I. (ft. bgs.)	GWE (msl)	TPH-G (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	MTBE (ppb)
Trip Blank										
TB-LB	01/14/98	--	--	--	ND	ND	ND	ND	ND	ND
	07/01/98	--		--	ND	ND	ND	ND	ND	ND
	06/18/99	--		--	ND	ND	ND	ND	ND	ND
	01/21/00	--		--	ND	ND	ND	ND	ND	14.6
	07/10/00	--		--	ND	ND	ND	ND	ND	ND
	01/04/01	--		--	ND	ND	ND	ND	ND	ND
	07/16/01	--		--	ND	ND	ND	ND	ND	ND
	01/31/02	--		--	<50	<0.50	<0.50	<0.50	<0.50	<5.0
	04/11/02	--		--	<50	<0.50	<0.50	<0.50	<0.50	<2.5
QA	07/11/02[8]	--		--	<50	<0.50	<0.50	<0.50	<1.0	<0.50
	10/15/02[8]	**--**		**--**	**<50**	**<0.50**	**<0.50**	**<0.50**	**<1.0**	**<2.0**

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
(ft.) = Feet
DTW = Depth to Water
S. I. = Screen Interval
(ft. bgs.) = Feet Below Ground Surface
GWE = Groundwater Elevation
(msl) = 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
QA = Quality Assurance

* TOC elevation were surveyed by Virgil Chaves Land Surveying on January 15, 2002. Elevations were based on a USGS bronze disc located near the north end of the curb return at the northwest corner of 38th Street and Broadway, Oakland, California, (Benchmark = 85.41 feet NGVD 29).
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).

♦ Well elevation has been adjusted up 0.75 feet based on Virgil Chavez Land Survey dated March 5, 2002.

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 reports.
4 MTBE by EPA Method 8260.
5 Laboratory report indicates gasoline C6-C12.
6 Well development performed.
7 Laboratory report indicates weathered gasoline C6-C12.
8 TPH-G, BTEX and MTBE by EPA Method 8260.
9 Laboratory report indicates hydrocarbon pattern is present in the requested fuel quantitation range but does not resemble the pattern of the requested fuel.

Table 2

Field Measurements

Tosco (Former Unocal) Service Station #1871
96 MacArthur Boulevard
Oakland, California

WELL ID	DATE	POST FIRST CASING VOLUME PURGE		POST SECOND CASING VOLUME PURGE		POST THIRD CASING VOLUME PURGE	
		D.O. *(mg/L)*	ORP *(mV)*	D.O. *(mg/L)*	ORP *(mV)*	D.O. *(mg/L)*	ORP *(mV)*
MW-1	07/11/02	5.0	122	3.1	118	2.9	116
	10/15/02	**6.65**	**132**	**5.76**	**147**	**5.35**	**152**
MW-6	07/11/02	0.7	-17	3.4	13	2.4	12
	10/15/02	**7.92**	**114**	**6.38**	**111**	**5.94**	**129**
MW-7	**10/15/02**	**3.88**	**121**	**3.90**	**156**	**4.04**	**152**
MW-8	07/11/02	1.1	26	1.6	10	2.4	13
	10/15/02	**4.65**	**218**	**4.53**	**241**	**4.57**	**231**
MW-9	07/11/02	1.1	10	1.0	11	1.2	15
	10/15/02	**2.95**	**154**	**2.89**	**161**	**3.08**	**166**
MW-10	07/11/02	1.1	36	1.0	31	1.2	24
	10/15/02	**6.80**	**158**	**6.70**	**161**	**6.73**	**148**
MW-11	07/11/02	1.8	419	1.4	400	1.1	391
	10/15/02	**4.39**	**98**	**4.20**	**110**	**4.27**	**96**

Table 2

Field Measurements

Tosco (Former Unocal) Service Station #1871

96 MacArthur Boulevard

Oakland, California

EXPLANATIONS:

D.O. = Dissolved Oxygen

(mg/L) = Milligrams per liter

ORP = Oxidation Reduction Potential

(mV) = Millivolts

Table 3

Groundwater Analytical Results - Oxygenate Compounds

Tosco (Former Unocal) Service Station #1871

96 MacArthur Boulevard

Oakland, California

WELL ID	DATE	ETHANOL *(ppb)*	TBA *(ppb)*	MTBE *(ppb)*	DIPE *(ppb)*	ETBE *(ppb)*	TAME *(ppb)*	EDB *(ppb)*	1,2-DCA *(ppb)*
MW-1	06/18/99	ND[1]	ND[1]	47,000	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]
	07/10/00	--	--	54,000	--	--	--	--	--
	01/04/01	--	--	38,100	--	--	--	--	--
	07/16/01	ND[1]	ND[1]	41,000	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]
	01/31/02	--	--	26,000	--	--	--	--	--
	07/11/02	--	--	3,400	--	--	--	--	--
	10/15/02	--	--	**390**	--	--	--	--	--
MW-6	06/18/99	ND[1]	ND[1]	71,000	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]
	01/21/00	--	--	48,800	--	--	--	--	--
	07/10/00	--	--	19,500	--	--	--	--	--
	01/04/01	--	--	9,510	--	--	--	--	--
	07/16/01	ND[1]	ND[1]	34,000	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]
	01/31/02	--	--	31,000	--	--	--	--	--
	07/11/02	<5,000	<1,000	15,000	<200	<100	<100	<100	<100
	10/15/02	--	--	**3,200**	--	--	--	--	--
MW-7	06/18/99	ND[1]	ND[1]	13,000	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]
	01/21/00	--	--	18,200	--	--	--	--	--
	07/10/00	--	--	13,800	--	--	--	--	--
	01/04/01	--	--	37.3	--	--	--	--	--
	07/16/01	ND[1]	ND[1]	4,700	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]
	01/31/02	--	--	9,900	--	--	--	--	--
	07/11/02	INACCESSIBLE - TRUCK PARKED OVER WELL				--	--	--	--
	10/15/02	--	--	**12,000**	--	--	--	--	--
MW-8	06/18/99	ND[1]	ND[1]	160	ND[1]	ND[1]	ND[1]	ND[1]	ND[1]
	01/21/00	--	--	221	--	--	--	--	--
	07/10/00	--	--	223	--	--	--	--	--

Table 3

Groundwater Analytical Results - Oxygenate Compounds

Tosco (Former Unocal) Service Station #1871

96 MacArthur Boulevard

Oakland, California

WELL ID	DATE	ETHANOL *(ppb)*	TBA *(ppb)*	MTBE *(ppb)*	DIPE *(ppb)*	ETBE *(ppb)*	TAME *(ppb)*	EDB *(ppb)*	1,2-DCA *(ppb)*
MW-8	01/04/01	--	--	34,200	--	--	--	--	--
(cont)	07/16/01	ND	ND	70	ND	ND	ND	ND	ND
	01/31/02	--	--	700	--	--	--	--	--
	07/11/02	--	--	120	--	--	--	--	--
	10/15/02	**--**	**--**	**21**	**--**	**--**	**--**	**--**	**--**
MW-9	01/31/02	<3,600	<140	910	<7.1	<7.1	<7.1	<7.1	<7.1
	07/11/02	--	--	580	--	--	--	--	--
	10/15/02	**--**	**--**	**1,400**	**--**	**--**	**--**	**--**	**--**
MW-10	01/31/02	<500	<20	1.2	<1.0	<1.0	<1.0	<1.0	<1.0
	07/11/02	--	--	1.1	--	--	--	--	--
	10/15/02	**--**	**--**	**<2.0**	**--**	**--**	**--**	**--**	**--**
MW-11	01/31/02	<500	<20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	07/11/02	--	--	<0.50	--	--	--	--	--
	10/15/02	**--**	**--**	**<2.0**	**--**	**--**	**--**	**--**	**--**

Table 3

Groundwater Analytical Results - Oxygenate Compounds

Tosco (Former Unocal) Service Station #1871

96 MacArthur Boulevard

Oakland, California

EXPLANATIONS:

TBA = Tertiary butyl alcohol
MTBE = Methyl tertiary butyl ether
DIPE = Di-isopropyl ether
ETBE = Ethyl tertiary butyl ether
TAME = Tertiary amyl methyl ether
EDB = 1,2-Dibromoethane
1,2-DCA = 1,2-Dichloroethane
(ppb) = Parts per billion
-- = Not Analyzed
ND = Not Detected

[1] Detection limit raised. Refer to analytical reports.

ANALYTICAL METHOD:

EPA Method 8260 for Oxygenate Compounds

Table 4

Groundwater Analytical Results

Tosco (Former Unocal) Service Station #1871
96 MacArthur Boulevard
Oakland, California

WELL ID	DATE	TPH-D (ppb)	TOG (ppb)	HVOC (ppb)	SVOC (ppb)
MW-1	06/18/99	--	--	ND	--
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
	DESTROYED				
MW-6	06/18/99	--	--	ND	--
MW-7	06/18/99	--	--	ND	--
MW-8	06/18/99	--	--	ND	ND[5]

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
HVOC = Halogenated 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.
5 All SVOCs were ND except for Bis(2-ethylhexy)phthalate at 11 ppb.

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