

# Aquatic & Environmental Applications

PROTECTION

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April 1, 1999

**REF: 1004-1Q.99**

Mr. Barney Chan  
Environmental Health  
Alameda County  
1131 Harbor Bay Pkwy  
Alameda, CA 94502-6577

**SUBJECT: QUARTERLY MONITORING REPORT MOTOR PARTNERS,  
1234 40TH AVE., OAKLAND, CA**

Dear Barney:

I have enclosed a copy of the Quarterly Monitoring report prepared for the Motor Partners site, 1234 40th Ave., Oakland, California. Groundwater sampling results are presented for the 1<sup>st</sup> quarterly monitoring event in 1999.

The results of enhanced natural attenuation at this site are encouraging. It appears that Oxygen Release Compound (ORC<sup>®</sup>) is effectively reducing levels of hydrocarbons at the site.

Please note that the filter socks were removed from the wells after sampling and replaced with new filter socks. This decision was made, based on a recommendation from Regensis that filter socks be replaced every 6 to 9 months (the filter socks had been in place for 6 months).

It is believed that the decrease in total aerobic hydrocarbon degraders from levels reported from the previous quarter may have been the result of decreased nutrient levels. An evaluation is underway to determine if nutrient addition is needed.

If you have any questions or comments regarding the report, please give me a call.

Sincerely,



Gary Rogers, Ph.D.

cc: Bill Owens

# **QUARTERLY MONITORING REPORT**

1st Quarter, 1999

## **PROJECT SITE:**

**MOTOR PARTNERS  
1234 40TH AVE., OAKLAND, CALIFORNIA  
StID #3682**

## **PREPARED FOR:**

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## **SUBMITTED TO:**

Mr. Barney Chan  
Environmental Health  
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1131 Harbor Bay Pkwy  
Alameda, CA 94502-6577

## **PREPARED BY:**

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**PROJECT NO. 1004.95**

April 1, 1999

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## INTRODUCTION

### PROJECT DESCRIPTION

This report discusses the results of quarterly sampling for the first quarter in 1999 at the Motor Partners site, 1234 40th Ave., Oakland, California.

### SITE LOCATION AND DESCRIPTION

The project site is known as Motor Partners, 1234 40th Avenue, Oakland, California (Figure 1), located in a commercial/light industrial area. The elevation of the site is approximately 30 feet above mean sea level.

Motor Partners is located at 1234 40th Avenue near Nimitz Highway (880) in the Fruitvale District of Oakland, California (Figure 1). The BART rail tracks are about 500 feet west of the site and San Leandro Bay is less than one mile to the southwest.

Motor Partners utilized the site for auto repair shops. Two underground storage tanks were maintained outside the 1234 40th Avenue building. A 1,000-gallon underground gasoline tank and a 500-gallon underground waste oil tank were located below the sidewalk (Figure 2). No reliable records exist to determine if inventory was lost.

### Previous Subsurface Investigations

On Oct. 12, 1990, Semco, Inc. of Modesto, California removed both the 1,000-gallon gasoline tank and the 500-gallon waste oil tank. The concentration of total petroleum hydrocarbons in the gasoline range (TPH-G) below the 1,000-gallon tank was 1,600 mg/Kg. The TPH-G and TPH-D concentrations below the 500-gallon tank were 570 mg/Kg and 650 mg/Kg, respectively. There was no record of groundwater in the excavations. The excavations were backfilled to grade with original spoils.

In January, 1994, SEMCO re-excavated the area to remove contaminated soil, and dispose of the contaminated backfill. During the course of over excavation, it was noted that contamination extended beneath the building and into the street. Utilities prevented further excavation. The over excavation was halted and samples taken from the sidewalls of each excavation. An extraction well casing was installed in each excavation. Clean imported soil was used to backfill the two areas and the sidewalk was resurfaced with Christy boxes housing the two extraction casings.

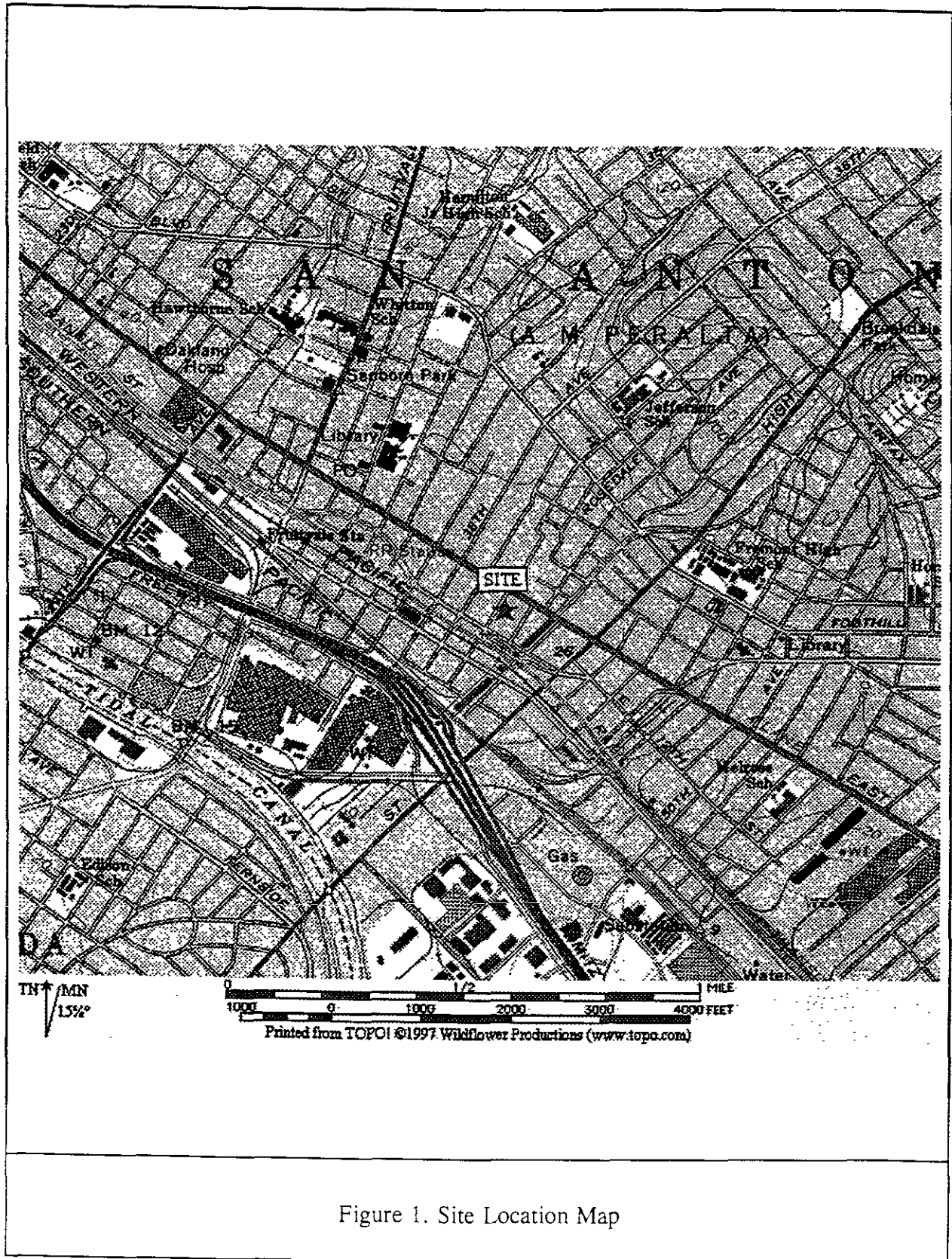
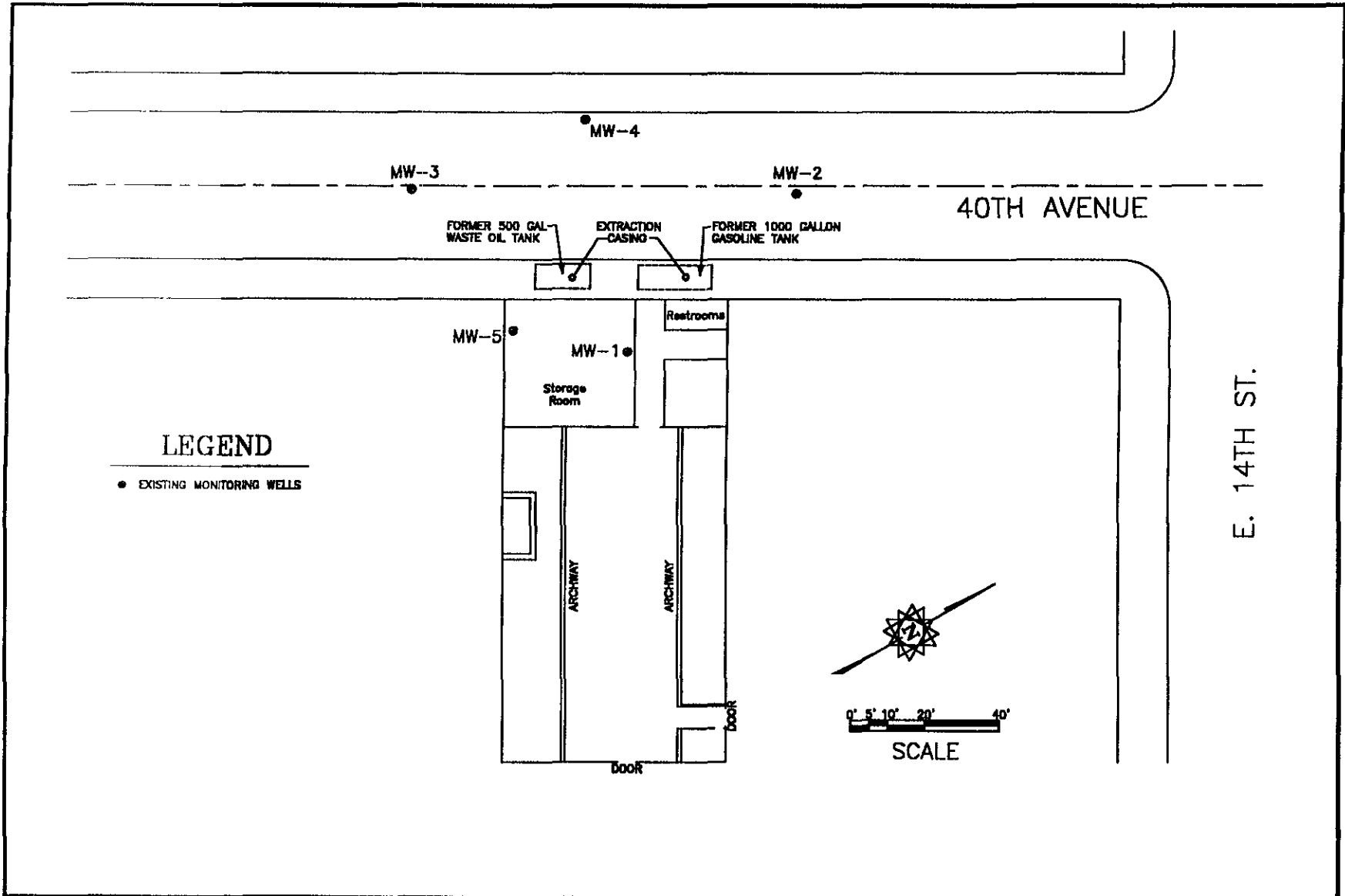


Figure 1. Site Location Map



<b>AQUATIC &amp; ENVIRONMENTAL APPLICATIONS</b> 38053 DAVY CT. FREMONT, CA 94536 (510) 791-7157	DRAWN BY GLR	PROJECT NUMBER 1004	DESCRIPTION Site Layout	FIGURE 2	
	DRAWING DATE 3/29/99	FILE NAME 1004-199.DWG			
	REVISION BY	PROJECT MANAGER GLR	PROJECT LOCATION Motor Partners 1234 40th Ave., Oakland		
	REVISION BY	CHECKED BY			

Sampling conducted on January 11, 1994 indicated levels of TPH-gasoline for the former waste oil tank area between 100 and 700 ppm. Levels of TPH-gasoline for the former gasoline tank area ranged from 150 to 1,200 ppm.

GROWTH Environmental completed soil borings at the property between May and June of 1994. Eleven borings were drilled and three monitoring wells were installed. Both soil and groundwater samples were collected from the borings. Soil and groundwater contamination was found in nearly every boring. Levels of TPH-D up to 2,700 ppm were observed on the west side of the building. A sample from inside the building had a TPH-D level of 520 ppm.

Groundwater samples had highest concentrations near the former tank excavations. The highest level of TPH-G was 64,000 ppb. BTEX compounds were found in groundwater samples from all the borings.

The monitoring wells were sampled on June 17, 1994 and December 7, 1994. Contamination was reported in all three wells. Levels of TPH-G were up to 17,000 ppb and Benzene levels were up to 1,200 ppb in MW-1.

A quarterly monitoring sampling event was completed on November 29, 1995. All of the wells showed increased TPH-G and BTEX levels when compared to the previous sampling event. TPH-G levels were up to 67,000 ppb in MW-1. The groundwater gradient was calculated to be in a southwesterly direction.

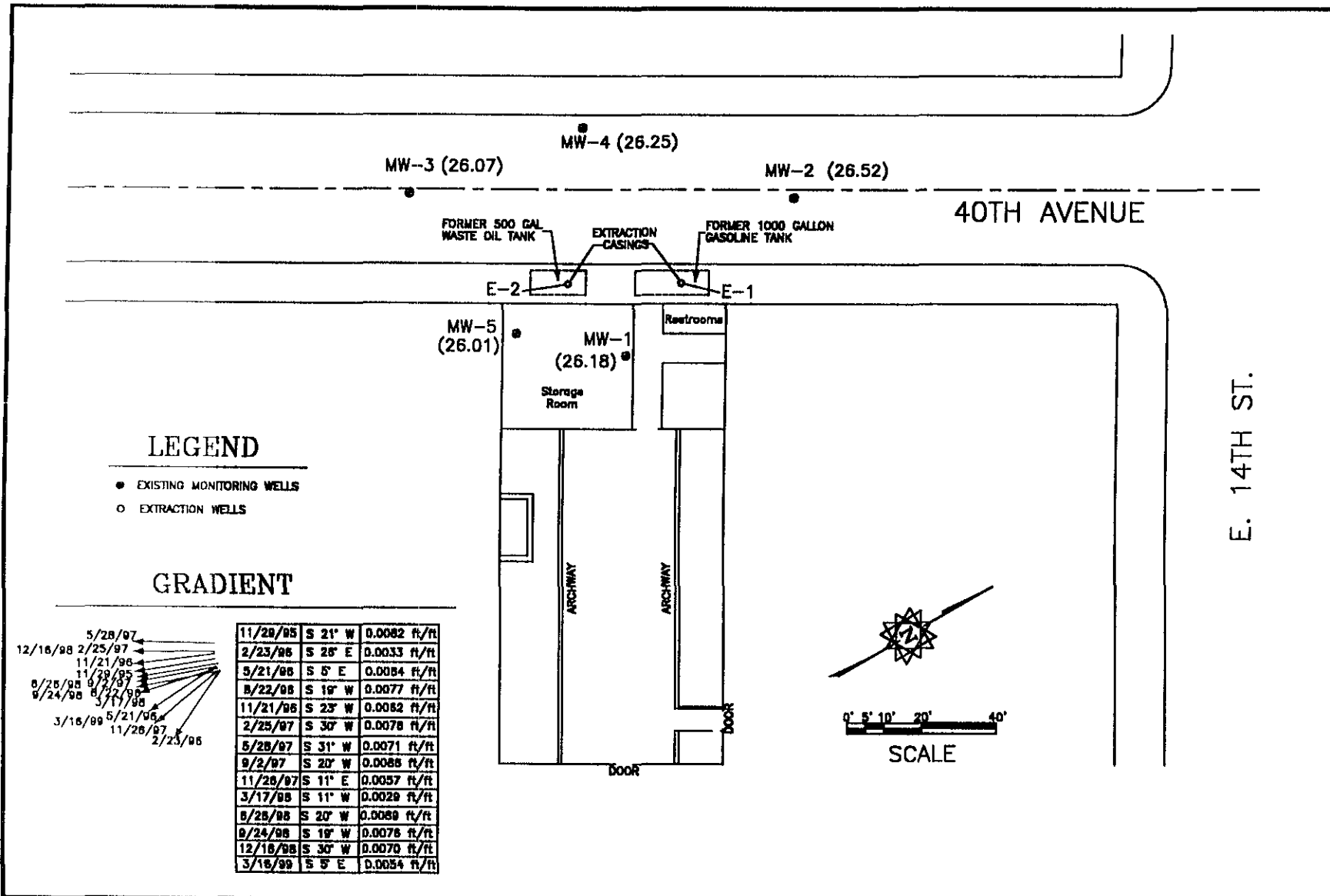
Additional geoprobe borings were completed along 40th Avenue between November, 1995 and February, 1996 to determine the extent of contamination.

On February 1, 1996, Bay Area Exploration drilled a soil boring across the street from the former underground storage tank excavations at the Motor Partners site (location shown in Figure 3 ). A two-inch groundwater monitoring well (MW-4) was installed in the boring. The monitoring well was installed according to State of California Water Resource Control Board standards to a depth of 25 feet below grade surface (bgs) and screened from 5 to 25 feet bgs.

On February 11, 1998, HK2, Inc./SEMCO drilled a soil boring inside the building and down gradient from the former underground storage tank excavations (location shown in Figure 3). A two-inch groundwater monitoring well (MW-5) was installed in the boring. The monitoring well was installed to a depth of 21 feet below grade surface (bgs) and screened from 6 to 21 feet bgs.

After purging and sampling the wells on September 24, 1998, Aquatic & Environmental Applications implemented a program of enhanced natural attenuation at the site by installing Oxygen Release Compound (ORC<sup>®</sup>) filter packs in three of the five wells. Monitoring of microbiological and chemical parameters is on-going at the site.





<b>AQUATIC &amp; ENVIRONMENTAL APPLICATIONS</b> 38053 DAVY CT. FREMONT, CA 94536 (510) 791-7157	DRAWN BY <b>GLR</b>	PROJECT NUMBER <b>1004</b>	DESCRIPTION <b>Ground Water Gradient</b>	FIGURE <b>3</b>	
	DRAWING DATE <b>3/29/99</b>	FILE NAME <b>1004-199.DWG</b>			
	REVISION BY	PROJECT MANAGER <b>GLR</b>	PROJECT LOCATION <b>Motor Partners                  1234 40th Ave., Oakland</b>		
	REVISION BY	CHECKED BY			

## GEOLOGY AND HYDROGEOLOGY

### Regional Geology.

The site is located on the East Bay Plain about 1.0 mile west of the Oakland Hills, about 1.0 mile east of the San Francisco Bay, and about 0.5 miles north of San Leandro Bay. The nearest cross street is 14th Street.

The site rests on Quaternary Deposits of various physical and compositional properties. The predominant formation is the Temescal Formation consisting of contemporaneous alluvial units of different origin, lithology, and physical properties. The material ranges from irregularly bedded clay, silt, sand and gravel to lenses of clay, silt, sand, and gravel with Claremont Chert.

The Hayward Fault is approximately 1.5 miles East of the site and is an active historic Fault. The Hayward Fault is the only active fault in the Oakland East Quadrangle.

### Regional Hydrogeology.

The site is located within the East Bay Plain which makes up the ground water reservoir in the area. The water bearing capacity varies within the area due to the juxtaposed positions of the various types of soils and strata encountered underneath the East Bay Plain.

In General the water bearing capacities of the Younger Alluvium range from moderately permeable to low permeable soils. Below the Younger Alluvium at a depth of approximately 70 feet lies the Older Alluvium, which yields large to small quantities of well water.

**Site Geology.** The site soils were characterized using the United Soil Classification System (USCS). During on-site subsurface drilling, CEC (GROWTH) encountered up to two feet of baserock (fill) followed by a 4 to 5 foot layer of dark sandy clay (CL). Below the dark clay to a depth between 7 and 15 feet, a grey sandy gravel was found. Below the sandy gravel the soil varied between a clayey sand to a sandy silty clay (SC). The gravels are poorly sorted, angular to rounded clasts ranging in size from 0.2 cm to 3.0 cm.

**Site Hydrogeology.** The depth of first water ranged from 8 to 10 feet below the ground surface (bgs) in the borings. Groundwater was encountered within the grey clayey sandy gravel layers.

**Table 1**  
**Monitoring Well Construction Data for Motor Partners Site**  
**1234 40th Ave., Oakland, California**

	MW-1	MW-2	MW-3	MW-4	MW-5
Date Drilled	6/15/94	6/14/94	6/14/94	2/1/96	2/11/98
Total Depth	22.5 ft.	22.0 ft.	23.0 ft.	23.0 ft.	21.0 ft.
Bore Diameter	10 inches	10 inches	10 inches	10 inches	6 inches
Casing Diameter	2 inch	2 inch	2 inch	2 inch	2 inch
Well Seal Type	Bentonite Pellets	Bentonite Pellets	Bentonite Pellets	Bentonite Pellets	Bentonite Pellets
Well Seal Interval	5.0 - 6.0 bgs	5.0 - 6.0 bgs	5.0 - 6.0 bgs	3.0 - 4.0 bgs	4.0 - 5.0 bgs
Filter Pack Material	2/14 Lonestar Sand	2/14 Lonestar Sand	2/14 Lonestar Sand	2/14 Lonestar Sand	2/14 Lonestar Sand
Filter Pack Interval	6.0 - 17.0 bgs	9.0 - 20.0 bgs	6.5 - 20.0 bgs	4.0 - 25.0 bgs	5.0 - 21.0 bgs
Screen Slot Size	0.020 in.	0.020 in.	0.020 in.	0.010 in.	0.020 in.
Screened Interval	7.0 - 17.0 bgs	10.0 - 20.0 bgs	7.0 - 20.0 bgs	5.0 - 25.0 bgs	6.0 - 21.0 bgs
Well Elevation <sup>1</sup>	31.44 ft.	31.06 ft.	31.43 ft.	31.37 ft.	31.15 ft.

<sup>1</sup>TOC -Top of Casing Elevations for MW-1, MW-2, MW-3, and MW-4 were surveyed on 8/22/96 by Kier & Wright Civil Engineers & Surveyors, Inc. TOC. Elevation for MW-5 surveyed on 3/20/98 by AEA.

## GROUNDWATER MONITORING

### GROUNDWATER ELEVATION MEASUREMENTS

The static water level was measured in all five monitoring wells (MW-1, MW-2, MW-3, MW-4 and MW-5) on March 16, 1999 and the depths were recorded to the nearest 0.01 foot using an electronic water level sounder. All of the results were recorded on Quarterly Monitoring Data Sheets presented in Appendix B.

### MONITORING WELL SAMPLING

The monitoring wells were not purged since three of the wells have Oxygen Release Compound (ORC) filter packs. A peristaltic pump was used to withdraw samples through a 5/16" diameter tubing. The turbidity, temperature, electric conductivity, dissolved oxygen and ORP levels were recorded for each well sample.

Groundwater samples were collected using the peristaltic pump into 40-ml VOA's, 500 ml plastic containers, and a one-liter amber bottle. The samples were labeled and stored on ice until delivered under a chain of custody to the state certified laboratory. Samples from all five wells (MW-1, MW-2, MW-3, MW-4, and MW-5) were analyzed for total petroleum hydrocarbons as diesel (TPH-D), using EPA methods modified 8015; as gasoline (TPH-G) using EPA methods 8015/5030; benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA methods 8020; and methyl t-butyl ether (MTBE) using EPA method 8020.

In addition to the petroleum hydrocarbon parameters, groundwater samples from each of the wells were also submitted to a state certified laboratory for analysis of nitrate, sulfate, iron, total phosphorus, and ammonia.

## ANALYTICAL RESULTS

### GROUNDWATER HYDRAULIC CONDITIONS

**Groundwater Elevation.** The groundwater elevation data for the monitoring wells is presented in Table 2. Based on groundwater level measurements collected on March 16, 1999, the depth to groundwater in the wells ranged from 4.1 to 5.3 feet below the top of the casing. The groundwater elevations for the wells were as follows; MW-1 was 26.18 feet above mean sea level (msl), MW-2 was 26.52 feet above msl, MW-3 was 26.07 feet above msl, MW-4 was 26.25 feet above msl, and MW-5 was 26.01 feet above msl.

**Groundwater Flow Direction and Gradient.** Groundwater flow direction was calculated using three wells (MW-1, MW-2, and MW-3). Groundwater flow direction trended to the southwest (S 5°E) at a gradient of 0.0054 ft/ft. The flow direction and gradient are shown in Figure 3.

### LABORATORY DATA

A summary of the hydrocarbon analytical results for the quarterly sampling is presented in Table 3. Table 4 presents the results of on-site sampling for dissolved oxygen and redox potential. A summary of the other bio-parameters is presented in Table 5. The additional bio-parameters included the following; nitrate, sulfate, iron, total phosphorus, and ammonia. Copies of all the analytical data sheets from McCampbell Analytical Lab are presented in Appendix A.

In addition, microbiological analyses were completed in conjunction with enhanced natural attenuation activities for the site. Total aerobic hydrocarbon degraders and total anaerobic degraders were enumerated in groundwater samples collected from each of the 5 monitoring wells. The results are summarized in Table 6. Copies of the microbiological analytical data sheets from CytoCulture are presented in Appendix A.

TPH-Gasoline and Benzene contamination exists in groundwater on the property with the highest concentrations reported for groundwater samples collected at MW-1 and MW-3. Groundwater flow direction for this sampling period was shown to be in a southeasterly direction.

The filter socks were removed from the wells after sampling and replaced with new filter socks even though dissolved oxygen and ORP levels were similar to those of the last quarter. This decision was made, based on recommendations from Regensis that filter socks be replaced every 6 to 9 months.

Total aerobic hydrocarbon degraders decreased from levels reported for the previous quarter in all samples except MW-3. This may have resulted from a decrease in nutrient levels. The nutrient concentrations appear to be down from the previous sampling period. An evaluation is underway to determine if nutrient addition is needed.

**Table 2**  
**Groundwater Elevation Results at Motor Partners Site**  
**1234 40th Ave., Oakland, California**

	DATE	MW-1	MW-2	MW-3	MW-4	GRADIENT
TOC		31.44 ft	31.06 ft	30.43 ft.	30. 37 ft.	
SWL	11/29/95	10.13	9.31	9.53		S 21° W
GSE		21.31	21.75	20.90		0.0082 ft/ft
SWL	2/23/96	4.59	3.77	3.56	3.17	S 26° E
GSE		26.85	27.29	26.87	27.20	0.0033 ft/ft
SWL	5/21/96	6.04	5.24	5.29	4.68	S 5° E
GSE		25.40	25.82	25.14	25.69	0.0064 ft/ft
SWL	8/22/96	8.46	7.66	7.88	7.10	S 19° W
GSE		22.98	23.40	22.55	23.27	0.0077 ft/ft
SWL	11/21/96	8.44	7.73	7.76	7.31	S 23° W
GSE		23.00	23.33	22.67	23.06	0.0062 ft/ft
SWL	2/25/97	6.53	5.78	5.97	5.06	S 30° W
GSE		24.91	25.28	24.46	25.31	0.0076 ft/ft
SWL	5/28/97	8.08	7.38	7.53	6.94	S 31° W
GSE		23.36	23.68	22.90	23.43	0.0071 ft/ft
SWL	9/2/97	9.08	8.24	9.26	7.84	S 20° W
GSE		22.36	22.82	21.17	22.53	0.0086 ft/ft
SWL	11/26/97	7.98	7.24	7.06	6.64	S 11° E
GSE		23.46	23.82	23.37	23.73	0.0057 ft/ft

TOC - Top of Casing Elevations for MW-1, MW-2, MW-3, and MW-4 were surveyed on 8/22/96 by Kier & Wright Civil Engineers & Surveyors, Inc.  
 SWL - Static Water Level (ft)  
 GSE - Groundwater Surface Elevation (feet relative to mean sea level)

**Table 2 (Continued)**  
**Groundwater Elevation Results at Motor Partners Site**  
**1234 40th Ave., Oakland, California**

	DATE	MW-1	MW-2	MW-3	MW-4	MW-5	GRADIENT
TOC		31.44 ft	31.06 ft	30.43 ft.	30. 37 ft.	31.15 ft.	
SWL	3/17/98	5.84	5.05	5.11	4.52	5.80	S 11° W
GSE		25.60	26.01	25.32	25.85	25.35	0.0029 ft/ft
SWL	6/26/98	7.09	6.24	6.52	5.52	7.07	S 20° W
GSE		24.35	24.82	23.91	24.85	24.08	0.0089 ft/ft
SWL	9/24/98	8.74	7.94	8.13	7.23	8.76	S 19° W
GSE		22.70	23.12	22.30	23.14	22.39	0.0076 ft/ft
SWL	12/16/98	7.11	6.42	6.52	5.92	7.19	S 30° W
GSE		24.33	24.64	23.91	24.45	23.96	0.0070 ft/ft
SWL	3/16/99	5.26	4.54	4.36	4.12	5.14	S 5° E
GSE		26.18	26.52	26.07	26.25	26.01	0.0054 ft/ft
SWL							
GSE							
SWL							
GSE							
SWL							
GSE							
SWL							
GSE							

TOC - Top of Casing Elevations for MW-1, MW-2, MW-3, and MW-4 were surveyed on 8/22/96 by Kier & Wright Civil Engineers & Surveyors, Inc. Elevation for MW-5 surveyed on 3/20/98 by AEA.  
 SWL - Static Water Level (ft)  
 GSE - Groundwater Surface Elevation (feet relative to mean sea level)

**Table 3**  
**Quarterly Groundwater Sampling Results at Motor Partners**  
**1234 40th Ave., Oakland, California**

Sample LD. Number	Date Collected	TPH-D ( $\mu\text{g/L}$ )	TPH-G ( $\mu\text{g/L}$ )	MTBE ( $\mu\text{g/L}$ )	Benzene ( $\mu\text{g/L}$ )	Toluene ( $\mu\text{g/L}$ )	Ethyl Benzene ( $\mu\text{g/L}$ )	Total Xylenes ( $\mu\text{g/L}$ )
MW-1	6/17/94	2,400	17,000		1,200	220	1,000	2,600
	11/29/95	53,000	67,000		860	180	1,300	3,100
	2/23/96	25,000	16,000		360	ND	370	740
	5/21/96	650	11,000		290	37	600	1,300
	8/22/96	ND	13,000		270	51	540	1,400
	11/21/96	5,500	15,000		810	79	680	1,700
	2/25/97	3,900	15,000		430	36	760	1,200
	5/28/97	3,700	7,600		110	15	370	870
	9/2/97	8,200	18,000	ND	1,300	81	1,300	2,800
	11/26/97	14,000	24,000	81	760	75	660	2,100
	3/17/98	5,000	14,000	150	360	120	650	1,200
	6/26/98	1,200	2,500	ND	60	5.6	76	110
	9/24/98	2,200	5,100	310	220	27	300	590
<b>ORC Filter Socks Installed 9/24/98 in MW-1, MW-3, and MW-5</b>								
	12/16/98	450	1,400	ND	57	3.7	42	80
	3/16/99	270	580	ND	11	1.4	8.3	11
California Drinking Water MCL		None Listed	None Listed	None Listed	1.0	1,000	680	1,750
Reporting Limit		50	50	5	0.5	0.5	0.5	1.0

Notes: All results in  $\mu\text{g/l}$  (ppb)  
 ND = Not Detected  
 NA = Not Analyzed



**Table 3 Continued**  
**Quarterly Groundwater Sampling Results at Motor Partners**  
**1234 40th Ave., Oakland, California**

Sample I.D. Number	Date Collected	TPH-D ( $\mu\text{g/L}$ )	TPH-G ( $\mu\text{g/L}$ )	MTBE ( $\mu\text{g/L}$ )	Benzene ( $\mu\text{g/L}$ )	Toluene ( $\mu\text{g/L}$ )	Ethyl Benzene ( $\mu\text{g/L}$ )	Total Xylenes ( $\mu\text{g/L}$ )
MW-2	6/17/94	370	990		ND	1.3	2.3	4.4
	12/07/94	ND	170		2.1	0.70	0.60	1.7
	11/29/95	200	400		ND	ND	ND	3
	2/23/96	ND	500		ND	ND	ND	ND
	5/21/96	ND	62		ND	ND	ND	1
	8/22/96	ND	120		0.58	0.62	ND	0.62
	11/21/96	89	89		0.60	0.78	ND	ND
	2/25/97	ND	250		1.2	1.0	ND	ND
	5/28/97	ND	ND		ND	ND	ND	ND
	9/2/97	ND	220	ND	ND	1.2	0.80	1.7
	11/26/97	ND	ND	ND	ND	ND	ND	ND
	3/17/98	ND	ND	ND	ND	ND	ND	ND
	6/26/98	170	260	ND	ND	0.86	ND	0.63
	9/24/98	130	240	ND	0.73	1.2	0.8	0.61
<b>ORC Filter Socks Installed 9/24/98 in MW-1, MW-3, and MW-5</b>								
	12/16/98	ND	ND	ND	ND	ND	ND	ND
	3/16/99	ND	ND	ND	ND	ND	ND	ND
California Drinking Water MCL		None Listed	None Listed	None Listed	1.0	1,000	680	1,750
Reporting Limit		50	50	5	0.5	0.5	0.5	1.0

Notes: All results in  $\mu\text{g/l}$  (ppb)  
 ND = Not Detected  
 NA = Not Analyzed

**Table 3 Continued**  
**Quarterly Groundwater Sampling Results at Motor Partners**  
**1234 40th Ave., Oakland, California**

Sample I.D. Number	Date Collected	TPH-D ( $\mu\text{g/L}$ )	TPH-G ( $\mu\text{g/L}$ )	MTBE ( $\mu\text{g/L}$ )	Benzene ( $\mu\text{g/L}$ )	Toluene ( $\mu\text{g/L}$ )	Ethyl Benzene ( $\mu\text{g/L}$ )	Total Xylenes ( $\mu\text{g/L}$ )
MW-3	6/17/95	2,200	9,500		330	40	100	74
	12/07/94	1,700	7,500		380	42	130	72
	11/29/95	14,000	9,000		300	49	300	16
	2/23/96	14,000	13,000		270	83	260	67
	5/21/96	350	6,600		220	48	160	66
	8/22/96	ND	4,800		120	34	44	44
	11/21/96	3,300	8,700		220	51	150	68
	2/25/97	ND	8,200		260	57	200	72
	5/28/97	1,800	7,000		140	22	44	31
	9/2/97	ND	8,100	65	240	50	170	72
	11/26/97	4,100	5,600	44	140	22	9.6	31
	3/17/98	2,100	10,000	330	270	67	260	96
	6/26/98	2,400	7,600	ND	280	56	160	73
	9/24/98	2,800	6,300	ND	260	65	130	80
	<b>ORC Filter Socks Installed 9/24/98 in MW-1, MW-3, and MW-5</b>							
	12/16/98	1,600	4,500	ND	160	22	17	30
	3/16/99	1,900	8,000	ND	370	51	220	110
California Drinking Water MCL		None Listed	None Listed	None Listed	1.0	1,000	680	1,750
Reporting Limit		50	50	5	0.5	0.5	0.5	1.0

Notes: All results in  $\mu\text{g/l}$  (ppb)

ND = Not Detected

NA = Not Analyzed

**Table 3 Continued**  
**Quarterly Groundwater Sampling Results at Motor Partners**  
**1234 40th Ave., Oakland, California**

Sample I.D. Number	Date Collected	TPH-D ( $\mu\text{g/L}$ )	TPH-G ( $\mu\text{g/L}$ )	MTBE ( $\mu\text{g/L}$ )	Benzene ( $\mu\text{g/L}$ )	Toluene ( $\mu\text{g/L}$ )	Ethyl Benzene ( $\mu\text{g/L}$ )	Total Xylenes ( $\mu\text{g/L}$ )
MW-4	2/23/96	3,000	6,000		58	36	6	28
	5/21/96	78	1,200		18	2.5	6.2	12
	8/22/96	ND	400		8.6	3.4	1.8	2.6
	11/21/96	87	170		3.6	1.1	1.7	2.3
	2/25/97	ND	120		5.4	0.64	0.93	0.80
	5/28/97	55	150		5.6	0.64	4.4	8.8
	9/2/97	ND	100	ND	3.2	ND	ND	0.7
	11/26/97	ND	240	ND	6.8	ND	1.8	10
	3/17/98	200	300	8.9	4.4	5.1	5.1	20
	6/26/98	66	ND	ND	7.7	0.50	0.84	0.61
	9/24/98	84	66	ND	4.2	0.59	0.63	ND
<b>ORC Filter Socks Installed 9/24/98 in MW-1, MW-3, and MW-5</b>								
	12/16/98	ND	ND	ND	ND	ND	ND	ND
	3/16/99	ND	ND	ND	2.1	ND	ND	ND
California Drinking Water MCL		None Listed	None Listed	None Listed	1.0	1,000	680	1,750
Reporting Limit		50	50	5	0.5	0.5	0.5	1.0

Notes: All results in  $\mu\text{g/l}$  (ppb)  
 ND = Not Detected  
 NA = Not Analyzed

**Table 3 Continued**  
**Quarterly Groundwater Sampling Results at Motor Partners**  
**1234 40th Ave., Oakland, California**

Sample I.D. Number	Date Collected	TPH-D ( $\mu\text{g/L}$ )	TPH-G ( $\mu\text{g/L}$ )	MTBE ( $\mu\text{g/L}$ )	Benzene ( $\mu\text{g/L}$ )	Toluene ( $\mu\text{g/L}$ )	Ethyl Benzene ( $\mu\text{g/L}$ )	Total Xylenes ( $\mu\text{g/L}$ )
MW-5	3/17/98	22,000	58,000	ND	320	590	790	2,300
	6/26/98	7,000	2,300	ND	54	20	14	41
	9/24/98	2,500	1,600	ND	31	10	6.3	22
<b>ORC Filter Socks Installed 9/24/98 in MW-1, MW-3, and MW-5</b>								
	12/16/98	ND	ND	ND	ND	ND	ND	ND
	3/16/99	ND	180	ND	22	0.52	ND	1.9
California Drinking Water MCL		None Listed	None Listed	None Listed	1.0	1,000	680	1,750
Reporting Limit		50	50	5	0.5	0.5	0.5	1.0

Notes: All results in  $\mu\text{g/l}$  (ppb)  
 ND = Not Detected  
 NA = Not Analyzed

**Table 4. Dissolved Oxygen and Redox Results  
Motor Partners, 1234 40th Ave., Oakland, California**

Sample I.D. Number	Date Collected	Dissolved Oxygen (mg/L)	Redox Potential (mv)
MW-1	11/26/97	1.5	56
	3/17/98	0.9	-2.0
	6/26/98	1	-64
	9/24/98	1.1	-49
	12/16/98	1	-44
	3/16/99	3.2	155
	MW-2	11/26/97	3
3/17/98		2.7	90
6/26/98		4.3	144
9/24/98		4	175
12/16/98		6.5	205
3/16/99		2.7	156
MW-3		11/26/97	2
	3/17/98	1.5	18
	6/26/98	1.8	-72
	9/24/98	1.4	-10
	12/16/98	2.1	4
	3/16/99	1.6	-14

**Table 4 Continued**

**Dissolved Oxygen and Redox Results  
Motor Partners, 1234 40th Ave., Oakland, California**

<b>Sample I.D. Number</b>	<b>Date Collected</b>	<b>Dissolved Oxygen (mg/L)</b>	<b>Redox Potential (mv)</b>
<b>MW-4</b>	<b>11/26/97</b>	<b>2.4</b>	<b>114</b>
	<b>3/17/98</b>	<b>1.7</b>	<b>69</b>
	<b>6/26/98</b>	<b>2.8</b>	<b>99</b>
	<b>9/24/98</b>	<b>2.9</b>	<b>78</b>
	<b>12/16/98</b>	<b>9.2</b>	<b>265</b>
	<b>3/16/99</b>	<b>10.5</b>	<b>197</b>
<b>MW-5</b>	<b>3/17/98</b>	<b>1.5</b>	<b>40</b>
	<b>6/26/98</b>	<b>0.9</b>	<b>-33</b>
	<b>9/24/98</b>	<b>1.3</b>	<b>-9</b>
	<b>12/16/98</b>	<b>4</b>	<b>194</b>
	<b>3/16/99</b>	<b>2.4</b>	<b>144</b>

**Table 5. Results of Additional Bioremediation Parameters  
Motor Partners, 1234 40th Ave., Oakland, California**

Sample I.D. Number	Date Collected	Ferrous Iron (mg/L)	Ammonia-N (mg/L)	Nitrate-N (mg/L)	Sulfate (mg/L)	Total Phosphorus (mg/L)
MW-1	11/26/97	1.2	<0.05	<0.05	4200	0.06
	3/17/98	2.0	0.22	<0.05	97	0.14
	6/26/98	3.0	ND	ND	2000	ND
	9/24/98	0.25	ND	2	7	0.16
	12/16/98	3.2	ND	ND	17	0.07
	3/16/99	0.21	1.8	ND	36	ND
MW-2	11/26/97	ND	<0.05	1.1	3100	0.08
	3/17/98	0.21	0.08	11	41	0.13
	6/26/98	0.087	ND	7.2	33	ND
	9/24/98	ND	ND	37	38	0.08
	12/16/98	ND	ND	44	48	0.03
	3/16/99	ND	1.3	41	42	ND
MW-3	11/26/97	2.8	<0.05	<0.05	4100	0.45
	3/17/98	0.31	0.06	<0.05	<2.0	0.17
	6/26/98	3.0	ND	ND	ND	ND
	9/24/98	0.11	ND	ND	ND	0.24
	12/16/98	1.3	ND	ND	9	0.16
	3/16/99	2.5	1.2	ND	ND	0.23

**Table 5 continued. Results of Additional Bioremediation Parameters  
Motor Partners, 1234 40th Ave., Oakland, California**

<b>MW-4</b>	<b>11/26/97</b>	<b>ND</b>	<b>&lt;0.05</b>	<b>0.66</b>	<b>4900</b>	<b>0.16</b>
	<b>3/17/98</b>	<b>0.17</b>	<b>0.06</b>	<b>7.4</b>	<b>33</b>	<b>0.07</b>
	<b>6/26/98</b>	<b>0.21</b>	<b>ND</b>	<b>7.1</b>	<b>32</b>	<b>ND</b>
	<b>9/24/98</b>	<b>ND</b>	<b>ND</b>	<b>40</b>	<b>37</b>	<b>0.09</b>
	<b>12/16/98</b>	<b>ND</b>	<b>ND</b>	<b>44</b>	<b>45</b>	<b>0.11</b>
	<b>3/16/99</b>	<b>0.17</b>	<b>ND</b>	<b>40</b>	<b>37</b>	<b>ND</b>
<b>MW-5</b>	<b>3/17/98</b>	<b>0.49</b>	<b>0.06</b>	<b>0.83</b>	<b>40</b>	<b>0.13</b>
	<b>6/26/98</b>	<b>0.26</b>	<b>ND</b>	<b>1.7</b>	<b>22</b>	<b>ND</b>
	<b>9/24/98</b>	<b>ND</b>	<b>ND</b>	<b>5</b>	<b>24</b>	<b>0.29</b>
	<b>12/16/98</b>	<b>ND</b>	<b>ND</b>	<b>17</b>	<b>35</b>	<b>0.06</b>
	<b>3/16/99</b>	<b>ND</b>	<b>4.1</b>	<b>9</b>	<b>18</b>	<b>ND</b>

Notes: All results in mg/L (ppm)  
ND = Not Detected



**Table 6. Results of Microbiological Analyses  
Motor Partners, 1234 40th Ave., Oakland, California**

<b>Sample I.D. Number</b>	<b>Date Collected</b>	<b>Aerobic Hydrocarbon Degraders (cfu/ml)</b>	<b>Anaerobic Hydrocarbon Degraders (cfu/ml)</b>
<b>MW-1</b>	<b>9/24/98</b>	<b>&lt;1 X 10<sup>1</sup></b>	<b>4.6 X 10<sup>2</sup></b>
	<b>12/16/98</b>	<b>2.3 X 10<sup>3</sup></b>	<b>3.8 X 10<sup>4</sup></b>
	<b>3/16/99</b>	<b>3.3 X 10<sup>1</sup></b>	<b>8.2 X 10<sup>2</sup></b>
<b>MW-2</b>	<b>9/24/98</b>	<b>5.4 X 10<sup>2</sup></b>	<b>3.4 X 10<sup>3</sup></b>
	<b>12/16/98</b>	<b>4.0 X 10<sup>2</sup></b>	<b>3.0 X 10<sup>3</sup></b>
	<b>3/16/99</b>	<b>8.0 X 10<sup>1</sup></b>	<b>2.9 X 10<sup>1</sup></b>
<b>MW-3</b>	<b>9/24/98</b>	<b>6.5 X 10<sup>2</sup></b>	<b>4.3 X 10<sup>3</sup></b>
	<b>12/16/98</b>	<b>6.1 X 10<sup>2</sup></b>	<b>3.5 X 10<sup>4</sup></b>
	<b>3/16/99</b>	<b>1.2 X 10<sup>3</sup></b>	<b>2.6 X 10<sup>3</sup></b>
<b>MW-4</b>	<b>9/24/98</b>	<b>3.6 X 10<sup>1</sup></b>	<b>5.1 X 10<sup>2</sup></b>
	<b>12/16/98</b>	<b>1.2 X 10<sup>3</sup></b>	<b>2.0 X 10<sup>3</sup></b>
	<b>3/16/99</b>	<b>5.5 X 10<sup>2</sup></b>	<b>2.2 X 10<sup>3</sup></b>
<b>MW-5</b>	<b>9/24/98</b>	<b>3.9 X 10<sup>1</sup></b>	<b>5.1 X 10<sup>3</sup></b>
	<b>12/16/98</b>	<b>6.2 X 10<sup>3</sup></b>	<b>1.1 X 10<sup>4</sup></b>
	<b>3/16/99</b>	<b>2.7 X 10<sup>2</sup></b>	<b>2.3 X 10<sup>3</sup></b>

cfu/ml = colony forming units per milliliter

## SUMMARY AND RECOMMENDATIONS

The five monitoring wells at Motor Partners were sampled on March 16, 1999 for the first quarter in 1999. This was the second sampling since ORC filter socks were installed (on September 24, 1998) in monitoring wells MW-1, MW-3, and MW-5. The results showed continued decreasing hydrocarbon contamination in groundwater samples from the wells.

TPH-Gasoline and Benzene contamination exists in groundwater on the property with the highest concentrations reported for groundwater samples collected at MW-1 and MW-3. Groundwater flow direction for this sampling period was shown to be in a southeasterly direction.

The filter socks were removed from the wells after sampling and replaced with new filter socks even though dissolved oxygen and ORP levels were similar to those of the last quarter. This decision was made, based on recommendations from Regensis that filter socks be replaced every 6 to 9 months.

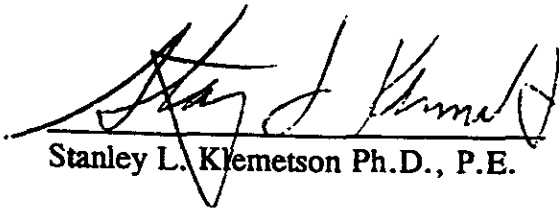
Total aerobic hydrocarbon degraders decreased from levels reported for the previous quarter in all samples except MW-3. This may have resulted from a decrease in nutrient levels. The nutrient concentrations appear to be down from the previous sampling period. An evaluation is underway to determine if nutrient addition is needed.

The results of this study continue to be encouraging. It appears that enhanced natural attenuation using Oxygen Release Compound (ORC<sup>®</sup>) is reducing levels of hydrocarbons at the site. It is recommended that quarterly groundwater sampling including evaluation of microbiological and chemical parameters continue at the site.

## LIMITATIONS

This report has been prepared in accordance with generally accepted environmental, geological and engineering practices. No warranty, either expressed or implied is made as to the professional advice presented herein. The analysis, conclusions, and recommendations contained in this report are based upon site conditions as they existed at the time of the investigation and they are subject to change.

The conclusions presented in this report are professional opinions based solely upon visual observations of the site and vicinity, and interpretation of available information as described in this report. The scope of services performed in execution of this investigation may not be appropriate to satisfy the needs of other users and any use or reuse of this document or its findings, conclusions or recommendations presented herein is at the sole risk of the said user.



Stanley L. Klemetson Ph.D., P.E.



**APPENDICES**

**APPENDIX A**


**Analytical Results**









 <b>MCCAMPBELL ANALYTICAL INC.</b>	110 2nd Ave. South, #D7, Pacheco, CA 94553-5560 Telephone : 925-798-1620 Fax : 925-798-1622 <a href="http://www.mccampbell.com">http://www.mccampbell.com</a> E-mail: <a href="mailto:main@mccampbell.com">main@mccampbell.com</a>
	38053 Davy Court Fremont, CA 94536


Aquatic & Environmental Applications 38053 Davy Court Fremont, CA 94536	Client Project ID: #1004; Motor Partners	Date Sampled: 03/16/99
	Client Contact: Gary Rogers	Date Received: 03/16/99
	Client P.O.:	Date Extracted: 03/16/99
		Date Analyzed: 03/16/99

**SM 3500-Fe D4c** **Ferrous Iron**

Lab ID	Client ID	Matrix	Fe <sup>2+</sup> *
05217	MW-5	W	ND
05218	MW-1	W	0.21
05219	MW-2	W	ND
05220	MW-4	W	0.17
05221	MW-3	W	2.5
Reporting Limit unless otherwise stated; ND means not detected above the reporting limit	W		0.08 mg/L
	S		5.0 mg/kg

\* water samples are reported in mg/L, soil and sludge samples in mg/kg and wipes in mg/wipe

DHS Certification No. 1644

 Edward Hamilton, Lab Director



**GeoAnalytical Laboratories, Inc.**  
 1405 Kansas Avenue Modesto, CA 95351 Phone (209) 572-0900 Fax (209) 572-0916

**CERTIFICATE OF ANALYSIS**

Report # K077-04

McCampbell Analytical  
110 2nd Avenue #D7

Pacheco

CA 94553-5560 PO#

Project: 14329 A.E.A.

Date: 3/23/99

Date Rec'd: 3/18/99

Date Started: 3/19/99

Date Completed: 3/22/99

Date Sampled: 3/16/99

Sampler:

Sample ID	Lab ID	Detection Limit	Method	Analyte	Results	Units
MW-5	K31432	1.0	300	Nitrate	9	mg/L
		1	300	Sulfate	18	
		0.2	350.2	Ammonia	4.1	
MW-1	K31433	1.0	300	Nitrate	ND	mg/L
		1	300	Sulfate	36	
		0.2	350.2	Ammonia	1.8	
MW-2	K31434	1.0	300	Nitrate	41	mg/L
		1	300	Sulfate	42	
		0.2	350.2	Ammonia	1.3	
MW-4	K31435	1.0	300	Nitrate	40	mg/L
		1	300	Sulfate	37	
		0.2	350.2	Ammonia	ND	
MW-3	K31436	1.0	300	Nitrate	ND	mg/L
		1	300	Sulfate	ND	
		0.2	350.2	Ammonia	1.2	

*Ramiro Salgado*  
 Ramiro Salgado  
 Chemist

Certification # 1157

*Donna Keller*  
 Donna Keller  
 Laboratory Director

# GeoAnalytical Laboratories, Inc.

1405 Kansas Avenue Modesto, CA 95351

Phone (209) 572-0900 Fax (209) 572-0916

Report# K077-04

## QC REPORT

QC Batch # I00240

McCampbell Analytical  
110 2nd Avenue #D7  
Pacheco

CA 94553-5560

Dates Analyzed 3/19/99

Samples Analyzed: K31432-K31436

Sample Spiked: K31432

Analyte  
Ammonia

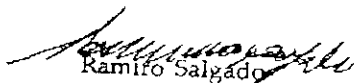
Method  
350.2

MS %  
Recovery  
87.4

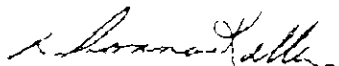
MSD %  
Recovery  
86.8

RPD  
0.7

Blank  
ND

  
Ramiro Salgado  
Chemist

Certification # 1157

  
Donna Keller  
Laboratory Director

**GeoAnalytical Laboratories, Inc.**  
 1405 Kansas Avenue Modesto, CA 95351 Phone (209) 572-0900 Fax (209) 572-0916

Report# K077-04

**QC REPORT**

QC Batch # 100311

McCampbell Analytical  
 110 2nd Avenue #D7  
 Pacheco CA 94553-5560

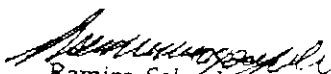
Dates Analyzed 3/22/99

Samples Analyzed: K31497-K31499

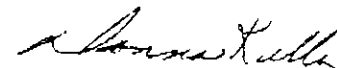
Sample Spiked: K31497

Analyte	Method	MS% Recovery	MSD % Recovery	RPD	Blank
Chloride	300	94.7	96.2	1.6	ND
Nirate		97.5	103.8	6.3	ND
Sulfate		98.2	104.3	6.1	ND

Comments:

  
 Ramiro Salgado  
 Chemist

Certification # 1157

  
 Donna Keller  
 Laboratory Director



**CytoCulture**  
ENVIRONMENTAL  
BIOTECHNOLOGY  
CytoCulture International, Inc. 1986

Gary Rogers  
Aquatic & Environmental Applications  
38053 Davy Ct.  
Fremont, CA 94536

Reporting Date: March 31, 1999  
Cyto ID#: 99-25  
Project Description: Motor Partners  
Project #: 1004  
Fax: (510) 791-7157

**SAMPLES:** 5 water samples were received on 3/16/99. The samples were assayed on 3/17/99, and stored at 4°C for any follow up work.

**AEROBIC  
Hydrocarbon-Degrading Bacteria Enumeration Assays**

**ANALYSIS REQUEST:** Bacterial enumeration for aerobic petroleum hydrocarbon-degraders (broad range petroleum hydrocarbons: diesel, gasoline and jet fuel).

**CARBON SOURCES:** Petroleum hydrocarbons were added as the sole carbon and energy sources for the growth of hydrocarbon-degrading aerobic bacteria on agar plates. Chevron #2 Diesel gasoline, and JP-4 Jet Fuel were blended into the agar to provide dissolved phase aliphatic and aromatic hydrocarbons in the growth matrix.

**PROTOCOLS:** *Hydrocarbon Degraders:* Sterile agar plates (100 x 15 mm) were prepared with with 1.0 ml of sample, or a log dilution of the sample, at dilutions of  $10^0$ ,  $10^{-1}$ ,  $10^{-2}$ , and  $10^{-3}$ . The hydrocarbon plates were poured on 3/17/99 and counted on 3/24/99. The plate count data are reported as colony forming units (cfu) per milliliter (ml) of sample. Each bacteria population value represents a statistical average of the plate count data obtained with inoculations for at least two of the three log dilutions tested.

**AEROBIC  
Hydrocarbon-Degrading and Heterotrophic Bacteria  
Enumeration Results**

CLIENT SAMPLE NUMBER	SAMPLE DATE	HYDROCARBON DEGRADERS (CFU/ML)	TOTAL HETEROTROPHS (CFU/ML)
MW-5	3/16/99	$2.7 \times 10^2$	NT
MW-1	3/16/99	$3.3 \times 10^1$	NT
MW-2	3/16/99	$8.0 \times 10^1$	NT
MW-4	3/16/99	$5.5 \times 10^2$	NT
MW-3	3/16/99	$1.2 \times 10^3$	NT

$1.0 \times 10^1$  cfu/ml is the lowest detection level for this assay

On 3/17/99, A positive control sample was run concurrently with these samples, and the plate count results obtained were  $5.4 \times 10^6$  CFU /ml. The positive control sample used was a previously characterized culture of hydrocarbon degrading bacteria from a Northern California groundwater site.



**ANAEROBIC  
Bacterial Plate Count Enumeration Assays**

**ANALYSIS REQUEST:** Anaerobic bacterial plate count enumerations for total petroleum hydrocarbon-degraders (broad range petroleum hydrocarbons: diesel, gasoline and jet fuel).

**PROTOCOLS:** *Anaerobic Hydrocarbon Degradors*

These assays are similar in principle to our aerobic assays, except that they are performed in the absence of oxygen. Alternate electron acceptors such as sulfate, nitrate, and ferric iron are added to the media to meet anaerobic respiration needs. A mixture of Chevron No. 2 diesel, gasoline and jet fuel is added to the media to provide the sole carbon sources. A minimal salts mixture and trace elements are added to meet growth requirements.

Triplicate plates were inoculated with sample log dilutions of  $10^0$ ,  $10^{-1}$ ,  $10^{-2}$ , and  $10^{-3}$ . The plates were poured on 3/17/99 and counted on 3/31/99. The plate count data are reported as colony forming units (cfu) per milliliter (ml) of sample. Each microbial population value represents a statistical average of the plate count data obtained with inoculations for two of the three log dilutions tested.

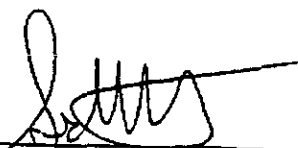
A positive control sample was run concurrently with these samples, and the data obtained from this is reported with your results. The positive control sample used was a composite of anaerobic slurries obtained from hydrocarbon-contaminated San Francisco Bay sediment and a Pt. Richmond, CA soil/wastewater mixture.

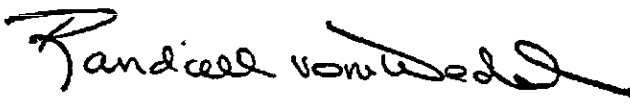
**Anaerobic  
Hydrocarbon-Degrading and Heterotrophic Bacteria Enumeration Results**

CLIENT SAMPLE NUMBER	SAMPLE DATE	HYDROCARBON DEGRADERS (CFU/ML)	TOTAL HETEROTROPHS (CFU/ML)
MW-5	3/16/99	$2.3 \times 10^3$	NT
MW-1	3/16/99	$8.2 \times 10^2$	NT
MW-2	3/16/99	$2.9 \times 10^1$	NT
MW-4	3/16/99	$2.2 \times 10^3$	NT
MW-3	3/16/99	$2.6 \times 10^3$	NT
+ Control	NA	$3.3 \times 10^6$	NT

$1.0 \times 10^1$  cfu/ml is the lowest detection level for this assay

Bacterial enumerations were performed by Dr. Sean P. Bushart. CytoCulture is available on a consulting basis to assist in the interpretation of these data and their application to field remediation protocols.

  
Sean P. Bushart, Ph.D.  
Environmental Microbiologist  
Laboratory Services

  
Randall von Wedel, Ph.D.  
Principal Biochemist and  
Director of Research

## Aquatic & Environmental Applications

Subcontracted Microbiology Assays  
performed by

### CytoCulture Environmental Biotechnology

#### CHAIN OF CUSTODY FORM

Project Name: <i>Motor Partners</i>	Project No. <i>1004</i>	Purchase Order / LOG IN #:
Client Organization: <i>Aquatic &amp; Environmental Apps</i>		Project Manager: <i>Gary Rogers</i>
Address to Send Results: <i>38053 Davy Ct. Fremont, CA</i>		
Client Fax for Sending Data: <i>510-791-7157</i>		Client Contact / Project Manager: <i>Gary Rogers</i>
Client Tel for Follow-up: <i>510-791-7157</i>		Client Sampler / Recorder: <i>Gary Rogers</i>

Sample I.D. Indicate target Hydrocarbon range	Sampling		Matrix		Analyses Requested								
	Date	Time	Soil	Water	Hydrocarbon Degrading Bacteria Plate Count	Total Heterotrophic Bacteria Plate Count	pH	DO	NH <sub>3</sub>	PO <sub>4</sub>	NO <sub>3</sub>	SO <sub>4</sub>	Other Tests or Comments
<i>MW-5</i>	<i>3-16-99</i>	<i>10:00</i>		<i>X</i>	<i>X</i>								<i>Aerobic &amp; Anaerobic</i>
<i>MW-1</i>	<i> </i>	<i>10:45</i>		<i>X</i>	<i>X</i>								
<i>MW-2</i>	<i> </i>	<i>11:30</i>		<i>X</i>	<i>X</i>								
<i>MW-4</i>	<i> </i>	<i>12:05</i>		<i>X</i>	<i>X</i>								
<i>MW-3</i>	<i>3-16-99</i>	<i>12:35</i>		<i>X</i>	<i>X</i>								

Chain of Custody Record		Signature of this form constitutes a firm Purchase Order for services.		Payment DUE on Reporting Date.	
Relinquished by: <i>Gary Rogers</i>	Date/Hr: <i>3-16-99 3:10 PM</i>	Received by: <i>[Signature]</i>	Date/Hr: <i>3-16-99 3:10 PM</i>	Please fax Chain of Custody form to CytoCulture prior to delivery.	
Received for CytoCulture Lab by:	Date/Hr:	CytoCulture Lab Services	Tel: 510-233-0102	Fax: 510-233-3777	

**APPENDIX B**

**Quarterly Monitoring Data Sheets**

**Quarterly Monitoring Data Sheet**

Date: <u>3/16/99</u> Project Location: <u>Motor Partners Site</u> <u>1234 40th Ave., Oakland</u> Sampler: <u>G. Rogers</u>	Well Diameter: <u>2 Inches</u> Well ID: <u>MW-1</u> Well Type: <u>Monitoring Well</u> Total Depth as Built: <u>19 ft</u> Screened Interval: <u>7 ft to 17 ft</u>
<b>Water Level Data</b>	<b>Purge Calculation (Min 3 Casing Volumes)</b>
Time Depth Sounded: <u>10:40 AM</u> Measured Depth to Water: <u>5.26 ft.</u> Measured Total Depth: _____	gal/ft X ft = gal X 3 = gal <u>0.163</u> X _____ = _____ X 3 = _____

**Purge Data**

Time	Flowrate (gpm)	Volume (gal)	Temp (°F)	EC (µs/cm)	pH	Turbidity (NTU)
10:45			63.2	809	7.46	13

**Observations/Comments:**

Inside Building

**Laboratory Analysis:**

Sample at 10:45

Water depth -

Analyze for TPH-D, TPH-G, BTEX, and MTBE; Nitrate, Ammonia, Total Phosphorus, Ferrous Iron, Sulfate, REDOX, and Dissolved Oxygen.

**Data for Volume Calculation:**

1 cu. ft. = 7.48 gal = 62.4 lbs (approx)

2" well = 0.163 gal/linear ft.

4" well = 0.653 gal/linear ft.

1 gal = 0.134 cu. ft. = 8.34 lbs (approx)

3" well = 0.367 gal/linear ft.

6" well = 1.469 gal/linear ft.

### Quarterly Monitoring Data Sheet

Date: <u>3/16/99</u>				Well Diameter: <u>2 Inches</u> Well ID: <u>MW-2</u>			
Project Location: <u>Motor Partners Site</u>				Well Type: <u>Monitoring Well</u>			
<u>1234 40th Ave., Oakland</u>				Total Depth as Built: <u>22 ft</u>			
Sampler: <u>G. Rogers</u>				Screened Interval: <u>10 ft to 20 ft</u>			
<b>Water Level Data</b>				<b>Purge Calculation (Min 3 Casing Volumes)</b>			
Time Depth Sounded: <u>11:25 AM</u>				gal/ft X ft = gal X 3 = gal			
Measured Depth to Water: <u>4.54 ft.</u>				<u>0.163</u> X <u>    </u> = <u>    </u> X 3 = <u>    </u>			
Measured Total Depth: <u>                    </u>							
Purge Data							
Time	Flowrate (gpm)	Volume (gal)	Temp (°F)	EC (μs/cm)	pH	Turbidity (NTU)	
11:30			63.4	682	7.39	1	
<b>Observations/Comments:</b>							
Partly Cloudy							
<b>Laboratory Analysis:</b>							
Sample at 11:30							
Water depth -							
Analyze for TPH-D, TPH-G, BTEX and MTBE; Nitrate, Ammonia, Total Phosphorus, Ferrous Iron, Sulfate, REDOX, and Dissolved Oxygen.							
<b>Data for Volume Calculation:</b>							
1 cu. ft. = 7.48 gal = 62.4 lbs (approx)				1 gal = 0.134 cu. ft. = 8.34 lbs (approx)			
2" well = 0.163 gal/linear ft.				3" well = 0.367 gal/linear ft.			
4" well = 0.653 gal/linear ft.				6" well = 1.469 gal/linear ft.			

### Quarterly Monitoring Data Sheet

Date: <u>3/16/99</u> Project Location: <u>Motor Partners Site</u> <u>1234 40th Ave., Oakland</u> Sampler: <u>G. Rogers</u>	Well Diameter: <u>2 Inches</u> Well ID: <u>MW-3</u> Well Type: <u>Monitoring Well</u> Total Depth as Built: <u>23 ft</u> Screened Interval: <u>7 ft to 20 ft</u>
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Water Level Data	Purge Calculation (Min 3 Casing Volumes)
Time Depth Sounded: <u>12:30 PM</u> Measured Depth to Water: <u>4.36 ft.</u> Measured Total Depth: _____	gal/ft X ft = gal X 3 = gal 0.163 X _____ = _____ X 3 = _____

Purge Data						
Time	Flowrate (gpm)	Volume (gal)	Temp (°F)	EC (µs/cm)	pH	Turbidity (NTU)
12:35			62.3	694	6.51	50

**Observations/Comments:**  
 Partly Cloudy, reddish brown clumps in water samples

**Laboratory Analysis:**  
 Sample at 12:35  
 Water depth -  
 Analyze for TPH-D, TPH-G, BTEX and MTBE; Nitrate, Ammonia, Total Phosphorus, Ferrous Iron, Sulfate, REDOX, and Dissolved Oxygen.

<b>Data for Volume Calculation:</b>	
1 cu. ft. = 7.48 gal = 62.4 lbs (approx)	1 gal = 0.134 cu. ft. = 8.34 lbs (approx)
2" well = 0.163 gal/linear ft.	3" well = 0.367 gal/linear ft.
4" well = 0.653 gal/linear ft.	6" well = 1.469 gal/linear ft.

**Quarterly Monitoring Data Sheet**

Date: <u>3/16/99</u> Project Location: <u>Motor Partners Site</u> <u>1234 40th Ave., Oakland</u> Sampler: <u>G. Rogers</u>	Well Diameter: <u>2 Inches</u> Well ID: <u>MW-4</u> Well Type: <u>Monitoring Well</u> Total Depth as Built: <u>25 ft</u> Screened Interval: <u>5 ft to 25 ft</u>
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**Water Level Data**

**Purge Calculation (Min 3 Casing Volumes)**

Time Depth Sounded: <u>12:00 N</u> Measured Depth to Water: <u>4.12 ft.</u> Measured Total Depth: _____	$\text{gal/ft} \times \text{ft} = \text{gal} \times 3 = \text{gal}$ $0.163 \times \text{ } = \text{ } \times 3 = \text{ }$
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**Purge Data**

Time	Flowrate (gpm)	Volume (gal)	Temp (°F)	EC (µs/cm)	pH	Turbidity (NTU)	
12:05			62.9	700	6.90	9	

**Observations/Comments:**

Partly Cloudy

**Laboratory Analysis:**

Sample at 12:05  
 Water depth -  
 Analyze for TPH-D, TPH-G, BTEX and MTBE; Nitrate, Ammonia, Total Phosphorus, Ferrous Iron, Sulfate, REDOX, and Dissolved Oxygen.

**Data for Volume Calculation:**

1 cu. ft. = 7.48 gal = 62.4 lbs (approx)	1 gal = 0.134 cu. ft. = 8.34 lbs (approx)
2" well = 0.163 gal/linear ft.	3" well = 0.367 gal/linear ft.
4" well = 0.653 gal/linear ft.	6" well = 1.469 gal/linear ft.



### Quarterly Monitoring Data Sheet

Date: <u>3/16/99</u> Project Location: <u>Motor Partners Site</u> <u>1234 40th Ave., Oakland</u> Sampler: <u>G. Rogers</u>	Well Diameter: <u>2 Inches</u> Well ID: <u>MW-5</u> Well Type: <u>Monitoring Well</u> Total Depth as Built: <u>21 ft</u> Screened Interval: <u>6 ft to 21 ft</u>
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<b>Water Level Data</b>	<b>Purge Calculation (Min 3 Casing Volumes)</b>
Time Depth Sounded: <u>9:40 AM</u> Measured Depth to Water: <u>5.14 ft.</u> Measured Total Depth: _____	gal/ft X ft = gal X 3 = gal 0.163 X _____ = _____ X 3 = _____

Purge Data						
Time	Flowrate (gpm)	Volume (gal)	Temp (°F)	EC (µs/cm)	pH	Turbidity (NTU)
10:00			63.3	851	7.30	3

**Observations/Comments:**

Inside Building

**Laboratory Analysis:**

Sample at 10:00  
 Water depth -  
 Analyze for TPH-D, TPH-G, BTEX and MTBE; Nitrate, Ammonia, Total Phosphorus, Ferrous Iron, Sulfate, REDOX, and Dissolved Oxygen.

**Data for Volume Calculation:**

1 cu. ft. = 7.48 gal = 62.4 lbs (approx)	1 gal = 0.134 cu. ft. = 8.34 lbs (approx)
2" well = 0.163 gal/linear ft.	3" well = 0.367 gal/linear ft.
4" well = 0.653 gal/linear ft.	6" well = 1.469 gal/linear ft.