Aquatic & Environmental Applications

98 FEB 25 AM 10:10

February 16, 1998

REF: 1004-BIO.RPT

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

#3682

SUBJECT: ENHANCING ON-SITE BIOREMEDIATION AT MOTOR PARTNERS, 1234 40TH AVE., OAKLAND, CA

Dear Barney:

The attached report presents the results of sampling completed for various bio-parameters at the Motor Partners site, 1234 40th Ave., Oakland, California. This work was conducted in conjunction with the 4th quarterly monitoring period in 1997. In addition, recommendations are given for enhancing natural bioremediation at the site.

Samples from the four monitoring wells were analyzed for dissolved oxygen, redox, nitrate, sulfate, iron, total phosphorus, and ammonia in addition to the petroleum hydrocarbon parameters of previous quarterly monitoring events. The results suggest that levels of hydrocarbon contamination may be reduced by increasing dissolved oxygen levels in the groundwater. It is recommended that filter socks containing an oxygen compound be placed in two of the monitoring wells and one extraction well at the site. A program of post-treatment monitoring is suggested.

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

Sincerely,

Gary Rogers

Gary Rogers, Ph.D.

cc: Bill Owens

38053 Davy Ct. ❖ Fremont, CA 94536 ❖ 510-791-7157 ❖ E-mail: rogers1@ix.netcom.com

ENHANCING ON-SITE BIOREMEDIATION

PROJECT SITE:

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

PREPARED FOR:

Mr. Bill Owens
2221 Olympic Blvd.
Walnut Creek, CA 94595
510-935-3840

SUBMITTED TO:

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

PREPARED BY:

Gary Rogers, Ph.D.
Aquatic & Environmental Applications
38053 Davy Ct.
Fremont, CA 94536
(510) 791-7157

PROJECT NO. 1004.95

February 16, 1998

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INTRODUCTION

PROJECT DESCRIPTION

This report discusses the results of additional data collected during quarterly sampling for the fourth quarter in 1997 at the Motor Partners site, 1234 40th Ave., Oakland, California. Data was collected to determine if bioremediation could be enhanced at the site.

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.

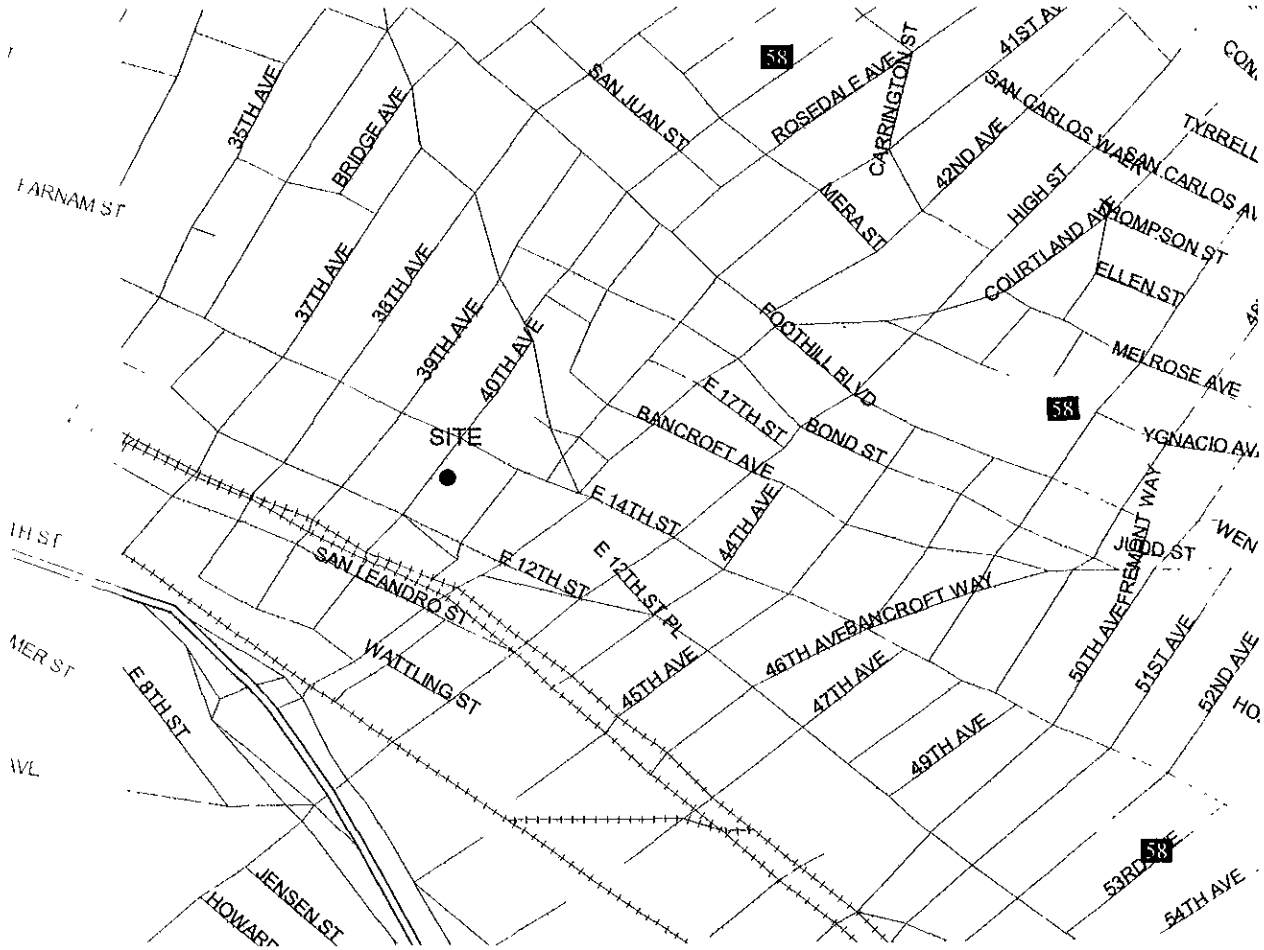
Motor Partners is located at 1234 40th Avenue near Nimitz Highway (880) in the Fruitvale District of Oakland, California (Figure 1). The BART rail tracks are about 500 feet west of the site and San Leandro Bay is less than one mile to the southwest.

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.

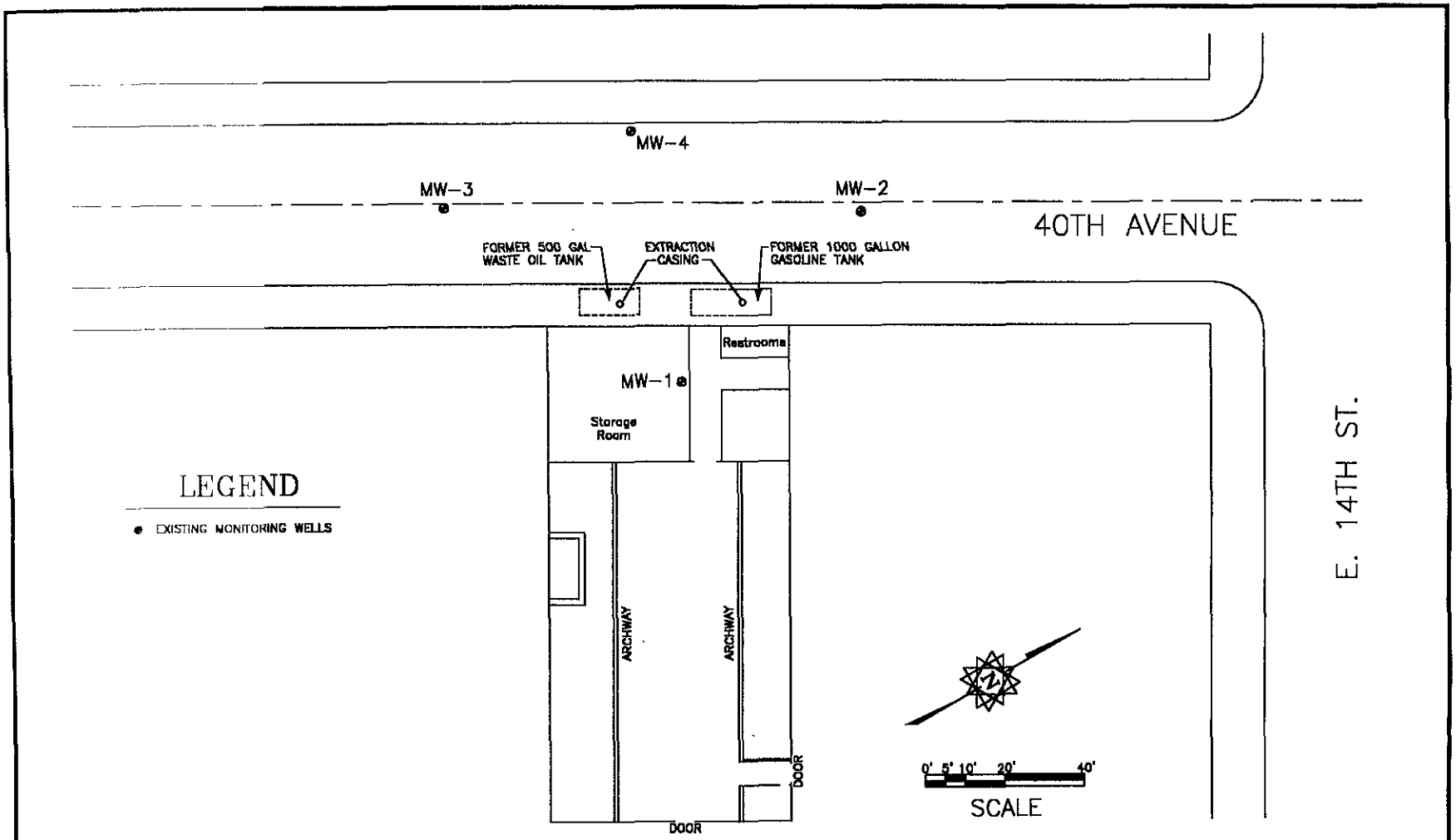
Previous Subsurface Investigations

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.



AQUATIC & ENVIRONMENTAL APPLICATIONS 38053 DAVY CT. FREMONT, CA 94536 (510) 791-7157	DRAWN BY: GLR	PROJECT NUMBER: 1004	DESCRIPTION: Site Location	FIGURE: 1
	DRAWING DATE: 2/16/98	FILE NAME: 1004-BIO.DWG		
	REVISION BY	PROJECT MANAGER: GLR	PROJECT/LOCATION: Motor Partners 1234 40th Ave., Oakland	
	REVISION BY	CHECKED BY		



AQUATIC & ENVIRONMENTAL APPLICATIONS 38053 DAVY CT. FREMONT, CA 94536 (510) 791-7157	DRAWN BY: GLR	PROJECT NUMBER: 1004	DESCRIPTION: Site Layout	FIGURE: 2
	DRAWING DATE: 2/16/98	FILE NAME: 1004-BIO.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.

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.

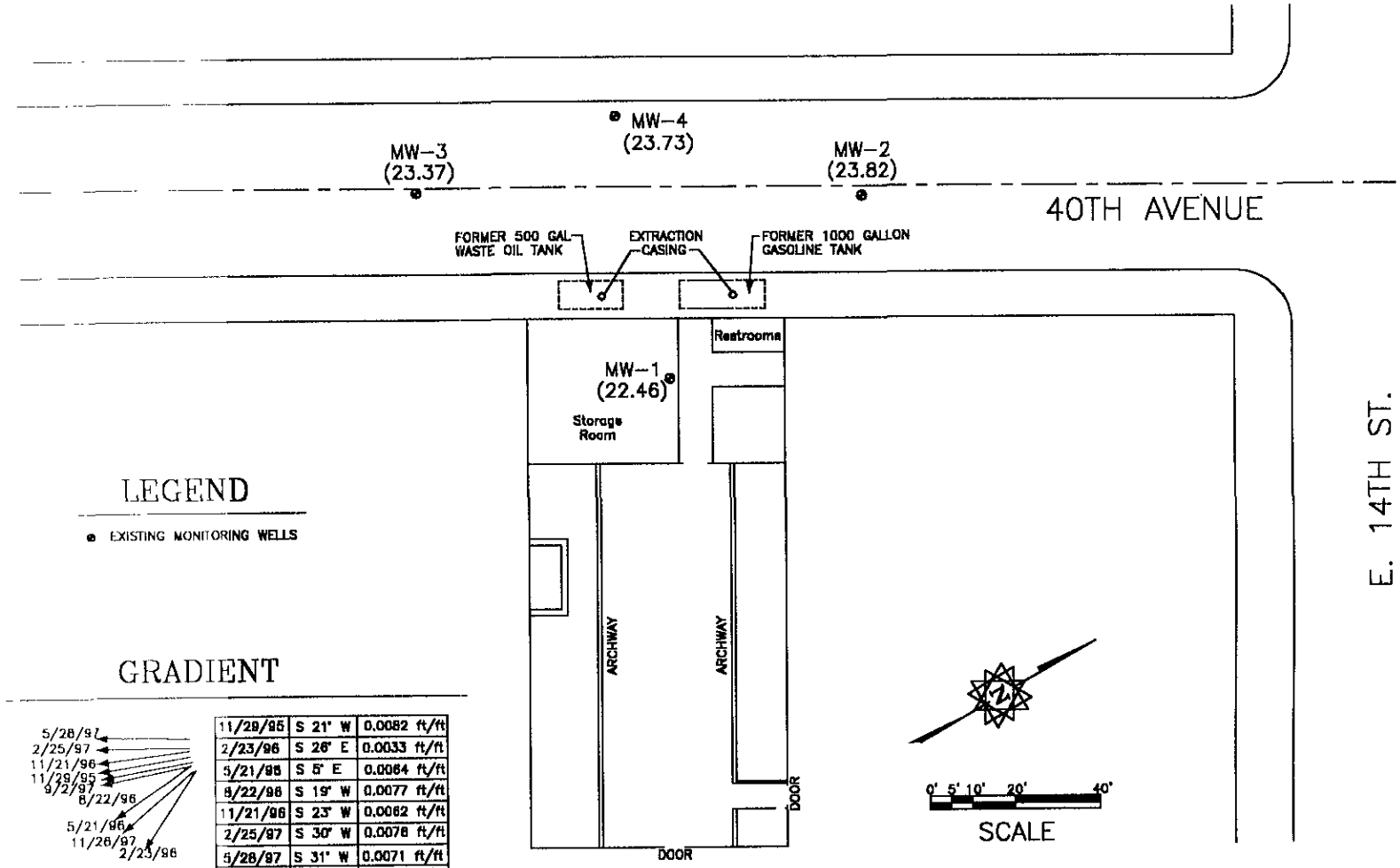
Regional Hydrogeology.

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.



11/29/95	S 21° W	0.0082 ft/ft
2/23/96	S 26° E	0.0033 ft/ft
5/21/96	S 5° E	0.0064 ft/ft
8/22/96	S 19° W	0.0077 ft/ft
11/21/96	S 23° W	0.0062 ft/ft
2/25/97	S 30° W	0.0078 ft/ft
5/28/97	S 31° W	0.0071 ft/ft
9/2/97	S 20° W	0.0086 ft/ft
11/26/97	S 11° E	0.0057 ft/ft

AQUATIC & ENVIRONMENTAL APPLICATIONS 38053 DAVY CT. FREMONT, CA 94536 (510) 791-7157	DRAWN BY: GLR	PROJECT NUMBER: 1004	DESCRIPTION: Groundwater Gradient	FIGURE: 3
	DRAWING DATE: 2/16/98	FILE NAME: 1004-BIO.DWG		
	REVISION BY:	PROJECT MANAGER: GLR	PROJECT/LOCATION: Motor Partners 1234 40th Ave., Oakland	
	REVISION BY:	CHECKED BY:		

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

	MW-1	MW-2	MW-3	MW-4
Date Drilled	6/15/94	6/14/94	6/14/94	2/1/96
Total Depth	22.5 ft.	22.0 ft.	23.0 ft.	23.0 ft.
Bore Diameter	10 inches	10 inches	10 inches	10 inches
Casing Diameter	2 inch	2 inch	2 inch	2 inch
Well Seal Type	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
Filter Pack Material	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
Screen Slot Size	0.020 in.	0.020 in.	0.020 in.	0.010 in.
Screened Interval	7.0 - 17.0 bgs	10.0 - 20.0 bgs	7.0 - 20.0 bgs	5.0 - 25.0 bgs
Well Elevation[1]	31.44 ft.	31.06 ft.	31.43 ft.	31.37 ft.

[1]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.

GROUNDWATER MONITORING

GROUNDWATER ELEVATION MEASUREMENTS

The static water level was measured in all four monitoring wells (MW-1, MW-2, MW-3, and MW-4) on November 26, 1997 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 purged by withdrawing a minimum of three casing volumes from each well using a 2" submersible pump. The purging continued until the turbidity was less than 100 NTU and the temperature, electric conductivity, and pH were relatively stable. Samples were collected when the water levels recovered to at least 80% of the original static level.

A groundwater sample was collected with a disposable Teflon bailer and placed in two 40-ml VOA's and one 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 four wells (MW-1, MW-2, MW-3, and MW-4) were analyzed for total petroleum hydrocarbons as diesel (TPH-D), using EPA methods modified 8015; as gasoline (TPH-G) using EPA methods 8015/5030; and benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA methods 8020.

In addition to the petroleum hydrocarbon parameters, samples from the four wells were analyzed on-site for dissolved oxygen and redox potential. 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 November 26, 1997, the depth to groundwater in the wells ranged from 6.64 to 7.98 feet below the top of the casing. The groundwater elevations for the wells were as follows; MW-1 was 23.46 feet above mean sea level (msl), MW-2 was 23.82 feet above msl, MW-3 was 23.37 feet above msl, and MW-4 was 23.73 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 11°E) at a gradient of 0.0057 ft/ft. The flow direction and gradient are shown in Figure 3.

LABORATORY DATA

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

Table 2. Groundwater Elevation Results
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	
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 3. Dissolved Oxygen and Redox Results (4th Quarter, 1997)
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
MW-2	11/26/97	3.0	162
MW-3	11/26/97	2	67
MW-4	11/26/97	2.4	114

Could add more O_2

pet conc ↑20 ppm D O_2

Table 4.Results of Additional Bioremediation Parameters (4th Quarter, 1997)
Motor Partners, 1234 40th Ave., Oakland, California

↓ indicates that Fe^{+3} is being reduced under anaerobic cond.
low in essential nutrients for bacteria ↑

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
MW-2	11/26/97	ND	<0.05	1.1	3100	0.08
MW-3	11/26/97	2.8	<0.05	<0.05	4100	0.45
MW-4	11/26/97	ND	<0.05	0.66	4900	0.16

Notes: ND = Not Detected
NA = Not Analyzed

pls also run: [CO_2]
[methane]
[hydrocarbon degraders]

Table 5. Quarterly Groundwater Sampling Results (4th Quarter, 1997) Motor Partners, 1234 40th Ave., Oakland, California

Sample I.D. Number	Date Collected	TPH-D (μg/L)	TPH-G (μg/L)	MTBE (μg/L)	Benzene (μg/L)	Toluene (μg/L)	Ethyl Benzene (μg/L)	Total Xylenes (μg/L)
MW-1	**11/26/97**	**14,000**	**24,000**	**81**	**760**	**75**	**660**	**2,100**
MW-2	**11/26/97**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
MW-3	**11/26/97**	**4,100**	**5,600**	**44**	**140**	**22**	**9.6**	**31**
MW-4	**11/26/97**	**ND**	**240**	**ND**	**6.8**	**ND**	**1.8**	**10**
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 μg/l (ppb)
ND = Not Detected
NA = Not Analyzed

DISCUSSION

Hydrocarbon data has been collected at the Motor Partner site since 1990 when two underground storage tanks were removed. Results of quarterly monitoring at the site (between June 1994 and November 1997) has shown that BTEX concentrations are diminishing with time. Natural attenuation appears to be progressing at the site.

However, the results of this study suggest that bioremediation at the site could be enhanced by increasing the levels of dissolved oxygen in the groundwater, especially in the vicinity of MW-1. Rather than conduct aggressive site remediation, it is suggested that a program of controlled applications of oxygen compounds and monitoring be developed for the site.

Treatment Protocol

There are several methods available for increasing dissolved oxygen levels in the groundwater. For the Motor Partners site, it is suggested that filter socks containing Oxygen Release Compound (ORC®) be placed inside three wells. The treatment locations include; MW-1, MW-3, and one of the extraction casings (see Figure 3). The objective of this application is to meet RBCA clean-up levels.

Post Application--Monitoring

Post-treatment monitoring is necessary to quantify the degradation of dissolved Chemicals of Concern (COCs) and to provide evidence that bioremediation is the primary mode of destruction of the COCs. The following analytical parameters are recommended:

Oxidation/Reduction (RedOx) potential
Dissolved oxygen (DO)
pH, temperature and conductivity
Concentration of alternate terminal electron acceptors (nitrate, iron, sulfate)
Nutrients (ammonia and total phosphorus)
Dissolved concentrations of COC's (i.e., BTEX, MTBE, TPH-G, TPH-D)

The monitoring should be completed in conjunction with scheduled quarterly monitoring events.

SUMMARY AND RECOMMENDATIONS

Summary

The four monitoring wells at the Motor Partners site were sampled for the fourth quarter, 1997. The results of the sampling indicate that hydrocarbon contamination is present in groundwater samples from three of the wells (MW-1, MW-3, and MW-4). Concentrations of hydrocarbons in the same range as the results from the previous monitoring period. TPH-Gasoline and Benzene contamination exists on the property. The highest concentrations reported from the four wells were from the groundwater sample collected at MW-1 (inside the building).

In addition to the petroleum hydrocarbon parameters discussed above, samples were collected from each of the wells for analysis of dissolved oxygen, redox, nitrate, sulfate, iron, total phosphorus, and ammonia. Evaluation of these results suggests that levels of hydrocarbon contamination may be reduced by increasing dissolved oxygen levels in the groundwater, thus enhancing natural bioremediation processes.

Recommendations

It is recommended that filter socks containing an oxygen compound be placed inside two monitoring wells and one extraction well. The objective of this application is to meet RBCA clean-up levels.

Post-treatment monitoring is necessary to quantify the treatment process. It is recommended that the following parameters be analyzed in conjunction with scheduled quarterly monitoring events:

Oxidation/Reduction (RedOx) potential
Dissolved oxygen (DO)
pH, temperature and conductivity
Concentration of alternate terminal electron acceptors (nitrate, iron, sulfate)
Nutrients (ammonia and total phosphorus)
Dissolved concentrations of COC's (i.e., BTEX, MTBE, TPH-G, TPH-D)

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.

Gary Rogers

Gary L. Rogers Ph.D.

APPENDIX A

Analytical Results

SUBN #: 971140/ REF: PM
CLIENT: NOACCOUNT
DUE: 12/05/97
REF #: 36044

CHROMALAB, INC.

Environmental Services (SDB) (DOHS 1094)

Chain of Custody

DATE 11-26-97 PAGE 1 OF 1

PROJ MGR Gary Rogers
COMPANY Aquatic + Environmental Apps.
ADDRESS 38053 Davy Ct.
Fremont CA 94536

SAMPLERS (SIGNATURE)
Gary Rogers

(PHONE NO.) 510-791-7157
(FAX NO.) 510-791-7157

SAMPLE ID.	DATE	TIME	MATRIX	PRESERV.	TPH - Gasoline (EPA 5030, 8015)	TPH - Gasoline (5030, 8015) w/BTEX (EPA 602, 8020)	TPH - Diesel, TEPH (EPA 3510/3550, 8015)	PURGEABLE AROMATICS BTEX (EPA 602, 8020)	PURGEABLE HALOCARBONS (EPA 601, 8010)	VOLATILE ORGANICS (EPA 624, 8240, 524.2)	BASE/NEUTRALS, ACIDS (EPA 625/627, 8270, 525)	TOTAL OIL & GREASE (EPA 5520, B+F, E+F)	PCB (EPA 608, 8080)	PESTICIDES (EPA 608, 8080)	TOTAL RECOVERABLE HYDROCARBONS (EPA 418.1)	Nitrate, Sulfate	LUFT METALS: Cd, Cr, Pb, Zn, Ni	CAM METALS (17)	PRIORITY POLLUTANT METALS (13)	TOTAL LEAD	EXTRACTION (TCLP, STLC)	Total Phosphate	Ammonia	Ferrous Iron	NUMBER OF CONTAINERS
MW-2	11-26	12:35	W													X						X	X	X	
MW-3	11-26	12:55	W													X						X	X	X	
MW-1	11-26	1:10	W													X						X	X	X	
MW-4	11-26	1:35	W													X						X	X	X	

PROJECT INFORMATION

PROJECT NAME: Motor Partners
PROJECT NUMBER: 1004.95
P.O. #:

TAT: STANDARD 5-DAY | 24 | 48 | 72 | OTHER

SAMPLE RECEIPT

TOTAL NO OF CONTAINERS	
HEAD SPACE	
REC'D GOOD CONDITION/COLD	
CONFORMS TO RECORD	

SPECIAL INSTRUCTIONS/COMMENTS

RELINQUISHED BY 1	RELINQUISHED BY 2	RELINQUISHED BY 3
(SIGNATURE) Gary Rogers 4:39 (TIME)	(SIGNATURE) (TIME)	(SIGNATURE) (TIME)
(PRINTED NAME) Gary Rogers 11-26-97 (DATE)	(PRINTED NAME) (DATE)	(PRINTED NAME) (DATE)
(COMPANY) Aquatic + Env. Apps	(COMPANY)	(COMPANY)

RECEIVED BY 1	RECEIVED BY 2	RECEIVED BY (LABORATORY)
(SIGNATURE) (TIME)	(SIGNATURE) (TIME)	(SIGNATURE) 11/26 (TIME)
(PRINTED NAME) (DATE)	(PRINTED NAME) (DATE)	(PRINTED NAME) 11/26/97 (DATE)
(COMPANY)	(COMPANY)	(LAB) Chromalab

San Francisco Regional Office

1252 Quarry Lane
P.O. Box 9019
Pleasanton, CA 94566
(510) 426-2600
Fax (510) 426-0106

Clayton
ENVIRONMENTAL
CONSULTANTS

December 8, 1997

Ms. Criselda Laluces
CHROMALAB, INC.
1220 Quarry Lane
Pleasanton, CA 94566

Client Ref.: 9711407
Clayton Project No.: 97120.05

Dear Ms. Laluces:

Attached is our analytical laboratory report for the samples received on December 1, 1997. Also enclosed is a copy of the Chain-of-Custody record acknowledging receipt of these samples.

Please note that any unused portion of the samples will be discarded after January 7, 1998, unless you have requested otherwise.

We appreciate the opportunity to assist you. If you have any questions concerning this report, please contact Client Services at (510) 426-2657.

Sincerely,

Andrew Bradeen

Andrew C. Bradeen
Director, Laboratory Services
San Francisco Regional Office

ACB/caa

Attachments

Clayton
ENVIRONMENTAL
CONSULTANTS

Analytical Results
for
CHROMALAB, INC.
Client Reference: 9711407
Clayton Project No. 97120.05

Sample Identification: MW-2
Lab Number: 9712005-01
Sample Matrix/Media: WATER

Date Sampled: 11/26/97
Date Received: 12/01/97

Analyte	Concentration	Method Detection Limit	Units	Date Prepared	Date Analyzed	Prep Method	Method Reference
Ammonia-N	<0.05	0.05	mg/L	--	12/04/97	--	EPA 350.3
Nitrate-N	1.1	0.05	mg/L	--	12/04/97	--	EPA 353.2
Sulfate	3100	2	mg/L	--	12/05/97	--	EPA 300.0
Total Phosphorus	0.08	0.02	mg/L	--	12/08/97	--	EPA 365.3

ND: Not detected at or above limit of detection
--: Information not available or not applicable

Analytical Results
for
CHROMALAB, INC.
Client Reference: 9711407
Clayton Project No. 97120.05

Sample Identification: MW-3
Lab Number: 9712005-02
Sample Matrix/Media: WATER

Date Sampled: 11/26/97
Date Received: 12/01/97

Analyte	Concentration	Method Detection Limit	Units	Date Prepared	Date Analyzed	Prep Method	Method Reference
Ammonia-N	<0.05	0.05	mg/L	--	12/04/97	--	EPA 350.3
Nitrate-N	<0.05	0.05	mg/L	--	12/04/97	--	EPA 353.2
Sulfate	4100	2	mg/L	--	12/05/97	--	EPA 300.0
Total Phosphorus	0.45	0.02	mg/L	--	12/08/97	--	EPA 365.3

ND: Not detected at or above limit of detection
--: Information not available or not applicable

Analytical Results
for
CHROMALAB, INC.
Client Reference: 9711407
Clayton Project No. 97120.05

Sample Identification: MW-1
Lab Number: 9712005-03
Sample Matrix/Media: WATER

Date Sampled: 11/26/97
Date Received: 12/01/97

Analyte	Concentration	Method Detection Limit	Units	Date Prepared	Date Analyzed	Prep Method	Method Reference
Ammonia-N	<0.05	0.05	mg/L	--	12/04/97	--	EPA 350.3
Nitrate-N	<0.05	0.05	mg/L	--	12/04/97	--	EPA 353.2
Sulfate	4200	2	mg/L	--	12/05/97	--	EPA 300.0
Total Phosphorus	0.06	0.02	mg/L	--	12/08/97	--	EPA 365.3

ND: Not detected at or above limit of detection
--: Information not available or not applicable

Analytical Results
for
CHROMALAB, INC.
Client Reference: 9711407
Clayton Project No. 97120.05

Sample Identification: MW-4
Lab Number: 9712005-04
Sample Matrix/Media: WATER

Date Sampled: 11/26/97
Date Received: 12/01/97

Analyte	Concentration	Method Detection Limit	Units	Date Prepared	Date Analyzed	Prep Method	Method Reference
Ammonia-N	<0.05	0.05	mg/L	--	12/04/97	--	EPA 350.3
Nitrate-N	0.66	0.05	mg/L	--	12/04/97	--	EPA 353.2
Sulfate	4900	2	mg/L	--	12/05/97	--	EPA 300.0
Total Phosphorus	0.16	0.02	mg/L	--	12/08/97	--	EPA 365.3

ND: Not detected at or above limit of detection
--: Information not available or not applicable

Analytical Results
for
CHROMALAB, INC.
Client Reference: 9711407
Clayton Project No. 97120.05

Sample Identification: METHOD BLANK
Lab Number: 9712005-05
Sample Matrix/Media: WATER

Date Sampled: --
Date Received: --

Analyte	Concentration	Method Detection Limit	Units	Date Prepared	Date Analyzed	Prep Method	Method Reference
Ammonia-N	<0.05	0.05	mg/L	--	12/04/97	--	EPA 350.3
Nitrate-N	<0.05	0.05	mg/L	--	12/04/97	--	EPA 353.2
Sulfate	<2	2	mg/L	--	12/05/97	--	EPA 300.0
Total Phosphorus	<0.02	0.02	mg/L	--	12/08/97	--	EPA 365.3

ND: Not detected at or above limit of detection
--: Information not available or not applicable

CHROMALAB, INC.

Environmental Services (SDB)

December 5, 1997 *Submission #:* 9711407

ROGERS ENVIRONMENTAL SERVICES

Atten: Gary Rogers

Project: MOTOR PARTNERS *Project#:* 1004.95
Received: November 26, 1997

re: One sample for Soluble Miscellaneous Metals analysis.
Method: *EPA 3005A/6010A Nov 1990*

Client Sample ID: **MW-1**
Spl#: 159982 *Matrix:* WATER
Sampled: November 26, 1997 *Run#:* 9957 *Analyzed:* December 3, 1997

ANALYTE	RESULT (mg/L)	REPORTING LIMIT (mg/L)	BLANK RESULT (mg/L)	BLANK SPIKE (%)	DILUTION FACTOR
IRON	1.2	0.10	N.D.	101	1

Christopher Arndt
Chemist

John S. Labash
Inorganics Supervisor

510-791-7157 PM 005

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Federal ID #68-0140157

CHROMALAB, INC.

Environmental Services (SDB)

December 5, 1997 *Submission #:* 9711407

ROGERS ENVIRONMENTAL SERVICES

Atten: Gary Rogers

Project: MOTOR PARTNERS *Project#:* 1004.95
Received: November 26, 1997

re: One sample for Soluble Miscellaneous Metals analysis.
Method: *EPA 3005A/6010A Nov 1990*

Client Sample ID: **MW-2**
Spl#: 159980 *Matrix:* WATER
Sampled: November 26, 1997 *Run#:* 9957 *Analyzed:* December 3, 1997

ANALYTE	RESULT (mg/L)	REPORTING LIMIT (mg/L)	BLANK RESULT (mg/L)	BLANK SPIKE (%)	DILUTION FACTOR
IRON	N.D.	0.10	N.D.	101	1

Christopher Arndt
Chemist

John S. Labash
Inorganics Supervisor

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CHROMALAB, INC.

Environmental Services (SDB)

December 5, 1997 *Submission #:* 9711407

ROGERS ENVIRONMENTAL SERVICES

Atten: Gary Rogers

Project: MOTOR PARTNERS *Project#:* 1004.95
Received: November 26, 1997

re: One sample for Soluble Miscellaneous Metals analysis.
Method: *EPA 3005A/6010A Nov 1990*

Client Sample ID: **MW-3**
Spl#: 159981 *Matrix:* WATER
Sampled: November 26, 1997 *Run#:* 9957 *Analyzed:* December 3, 1997

ANALYTE	RESULT (mg/L)	REPORTING LIMIT (mg/L)	BLANK RESULT (mg/L)	BLANK SPIKE (%)	DILUTION FACTOR
IRON	2.8	0.10	N.D.	101	1

Christopher Arndt
Chemist

John S. Labash
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CHROMALAB, INC.

Environmental Services (SDB)

December 5, 1997 *Submission #:* 9711407

ROGERS ENVIRONMENTAL SERVICES

Atten: Gary Rogers

Project: MOTOR PARTNERS *Project#:* 1004.95
Received: November 26, 1997

re: One sample for Soluble Miscellaneous Metals analysis.
Method: *EPA 3005A/6010A Nov 1990*

Client Sample ID: **MW-4**
Spl#: 159983 *Matrix:* WATER
Sampled: November 26, 1997 *Run#:* 9957 *Analyzed:* December 3, 1997

ANALYTE	RESULT (mg/L)	REPORTING LIMIT (mg/L)	BLANK RESULT (mg/L)	BLANK SPIKE (%)	DILUTION FACTOR
IRON	N.D.	0.10	N.D.	101	1

Christopher Arndt
Chemist

John S. Labash
Inorganics Supervisor

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Federal ID #68-0140157

36945

CHROMALAB, INC.

Environmental Services (SDB) (DOHS 1094)

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Chain of Custody

DATE 11-26-97 PAGE 1 OF 1

PROJ MGR Gary Rogers
COMPANY Aquatic + Environmental Apps.
ADDRESS 38053 Davy Ct
Fremont, CA 94536
SAMPLERS (SIGNATURE) Gary Rogers
(PHONE NO.) 510-791-7157
(FAX NO.) 510-791-7157

SAMPLE ID.	DATE	TIME	MATRIX	PRESERV.	TPH - Gasoline (EPA 5030, 8015)	TPH - Gasoline (5030, 8015) w/BTEX (EPA 602, 8020)	TPH - Diesel, TEPH (EPA 3510/3550, 8015)	PURGEABLE AROMATICS BTEX (EPA 602, 8020)	PURGEABLE HALOCARBONS (EPA 601, 8010)	VOLATILE ORGANICS (EPA 624, 8240, 524.2)	BASE/NEUTRALS, ACIDS (EPA 625/627, 8270, 525)	TOTAL OIL & GREASE (EPA 5520, B+F, E+F)	PCB (EPA 608, 8080)	PESTICIDES (EPA 608, 8080)	TOTAL RECOVERABLE HYDROCARBONS (EPA 418.1)	MTBE	LUFT METALS: Cd, Cr, Pb, Zn, Ni	CAM METALS (17)	PRIORITY POLLUTANT METALS (13)	TOTAL LEAD	EXTRACTION (TCLP, STLC)				NUMBER OF CONTAINERS
MW-2	11-26	12:35	W			X	X									X									
MW-3	11-26	12:55	W			X	X									X									
MW-1	11-26	1:10	W			X	X									X									
MW-4	11-26	1:35	W			X	X									X									

PROJECT INFORMATION

PROJECT NAME: Motor Partners
PROJECT NUMBER: 1004.95
P O #:

SAMPLE RECEIPT

TOTAL NO OF CONTAINERS	
HEAD SPACE	
REC'D GOOD CONDITION/COLD	
CONFORMS TO RECORD	

TAT: (STANDARD 5-DAY) | 24 | 48 | 72 | OTHER

SPECIAL INSTRUCTIONS/COMMENTS

RELINQUISHED BY 1.
Gary Rogers 4:39 (SIGNATURE) (TIME)
Gary Rogers 11-26-97 (PRINTED NAME) (DATE)
Aquatic + Env. Apps (COMPANY)

RECEIVED BY 1
(SIGNATURE) (TIME)
(PRINTED NAME) (DATE)
(COMPANY)

RELINQUISHED BY 2.
(SIGNATURE) (TIME)
(PRINTED NAME) (DATE)
(COMPANY)

RECEIVED BY 2.
(SIGNATURE) (TIME)
(PRINTED NAME) (DATE)
(COMPANY)

RELINQUISHED BY 3
(SIGNATURE) (TIME)
(PRINTED NAME) (DATE)
(COMPANY)

RECEIVED BY (LABORATORY) 3
Chris Rowley 11:39 (SIGNATURE) (TIME)
Chris Rowley 11/26/97 (PRINTED NAME) (DATE)
Chromalab (LAB)

CHROMALAB, INC.

Environmental Services (SDB)

December 8, 1997 *Submission #:* 9711408

ROGERS ENVIRONMENTAL SERVICES

Atten: Gary Rogers

Project: MOTOR PARTNERS *Project#:* 1004.95
Received: November 26, 1997

re: One sample for Gasoline BTEX MTBE analysis.
Method: SW846 8020A Nov 1990 / 8015Mod

Client Sample ID: **MW-1**
Spl#: 159986 *Matrix:* WATER
Sampled: November 26, 1997 *Run#:*10062 *Analyzed:* December 5, 1997

ANALYTE	RESULT (ug/L)	REPORTING LIMIT (ug/L)	BLANK RESULT (ug/L)	BLANK SPIKE (%)	DILUTION FACTOR
GASOLINE	24000	500	N.D.	90	10
MTBE	81	50	N.D.	101	10
BENZENE	760	5.0	N.D.	107	10
TOLUENE	75	5.0	N.D.	104	10
ETHYL BENZENE	660	5.0	N.D.	101	10
XYLENES	2100	5.0	N.D.	98	10

Marianne Alexander
Gas/BTEX Supervisor

Michael R. Verona
Michael Verona
Operations Manager

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Federal ID #68-0140157

CHROMALAB, INC.

Environmental Services (SDB)

December 8, 1997 *Submission #:* 9711408

ROGERS ENVIRONMENTAL SERVICES

Atten: Gary Rogers

Project: MOTOR PARTNERS *Project#:* 1004.95
Received: November 26, 1997

re: One sample for Gasoline BTEX MTBE analysis.
Method: SW846 8020A Nov 1990 / 8015Mod

Client Sample ID: **MW-2**
Spl#: 159984 *Matrix:* WATER
Sampled: November 26, 1997 *Run#:*10052 *Analyzed:* December 5, 1997

ANALYTE	RESULT (ug/L)	REPORTING LIMIT (ug/L)	BLANK RESULT (ug/L)	BLANK SPIKE (%)	DILUTION FACTOR
GASOLINE	N.D.	50	N.D.	111	1
MTBE	N.D.	5.0	N.D.	102	1
BENZENE	N.D.	0.50	N.D.	96	1
TOLUENE	N.D.	0.50	N.D.	91	1
ETHYL BENZENE	N.D.	0.50	N.D.	92	1
XYLENES	N.D.	0.50	N.D.	89	1

Marianne Alexander
Gas/BTEX Supervisor

Michael Verona
Operations Manager

CHROMALAB, INC.

Environmental Services (SDB)

December 8, 1997 *Submission #:* 9711408

ROGERS ENVIRONMENTAL SERVICES

Attn: Gary Rogers

Project: MOTOR PARTNERS *Project#:* 1004.95
Received: November 26, 1997

re: One sample for Gasoline BTEX MTBE analysis.
Method: SW846 8020A Nov 1990 / 8015Mod

Client Sample ID: **MW-3**
Spl#: 159985 *Matrix:* WATER
Sampled: November 26, 1997 *Run#:*10062 *Analyzed:* December 5, 1997

ANALYTE	RESULT (ug/L)	REPORTING LIMIT (ug/L)	BLANK RESULT (ug/L)	BLANK SPIKE (%)	DILUTION FACTOR
GASOLINE	5600	250	N.D.	90	5
MTBE	44	25	N.D.	101	5
BENZENE	140	2.5	N.D.	107	5
TOLUENE	22	2.5	N.D.	104	5
ETHYL BENZENE	9.6	2.5	N.D.	101	5
XYLENES	31	2.5	N.D.	98	5

Marianne Alexander
Gas/BTEX Supervisor

Michael Verona
Operations Manager

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CHROMALAB, INC.

Environmental Services (SDB)

December 8, 1997 *Submission #:* 9711408

ROGERS ENVIRONMENTAL SERVICES

Atten: Gary Rogers

Project: MOTOR PARTNERS *Project#:* 1004.95
Received: November 26, 1997

re: One sample for Gasoline BTEX MTBE analysis.
Method: SW846 8020A Nov 1990 / 8015Mod

Client Sample ID: **MW-4**
Spl#: 159987 *Matrix:* WATER
Sampled: November 26, 1997 *Run#:*10052 *Analyzed:* December 5, 1997

ANALYTE	RESULT (ug/L)	REPORTING LIMIT (ug/L)	BLANK RESULT (ug/L)	BLANK SPIKE (%)	DILUTION FACTOR
GASOLINE	240	50	N.D.	111	1
MTBE	N.D.	5.0	N.D.	102	1
BENZENE	6.8	0.50	N.D.	96	1
TOLUENE	N.D.	0.50	N.D.	91	1
ETHYL BENZENE	1.8	0.50	N.D.	92	1
XYLENES	10	0.50	N.D.	89	1

Marianne Alexander
Gas/BTEX Supervisor

Michael Verona
Operations Manager

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CHROMALAB, INC.

Environmental Services (SDB)

December 5, 1997 Submission #: 9711408

ROGERS ENVIRONMENTAL SERVICES
2657 Bailey Ct.
Fremont, CA 94536

Attn: Gary Rogers

RE: Analysis for project MOTOR PARTNERS, number 1004.95.

REPORTING INFORMATION

Samples were received cold and in good condition on November 26, 1997. They were refrigerated upon receipt and analyzed as described in the attached report. ChromaLab followed EPA or equivalent methods for all testing reported.

No discrepancies were observed or difficulties encountered with the testing.

Motor oil was found in sample MW-1.
Motor oil was found in sample MW-3.

Bruce Havlik
Chemist

Alex Tam
Semivolatiles Supervisor

CHROMALAB, INC.

Environmental Services (SDB)

December 5, 1997

Submission #: 9711408

ROGERS ENVIRONMENTAL SERVICES

Atten: Gary Rogers

Project: MOTOR PARTNERS
Received: November 26, 1997

Project#: 1004.95

re: 4 samples for TPH - Diesel analysis.
Method: *EPA 8015M*

Matrix: WATER
Sampled: November 26, 1997 *Run#:* 9971
Extracted: December 2, 1997
Analyzed: December 3, 1997

Spl#	CLIENT SPL ID	DIESEL (ug/L)	REPORTING LIMIT (ug/L)	BLANK RESULT (ug/L)	BLANK SPIKE (%)	DILUTION FACTOR
159984	MW-2	N.D.	50	N.D.	65.0	1

Matrix: WATER
Sampled: November 26, 1997 *Run#:* 9971
Extracted: December 2, 1997
Analyzed: December 5, 1997

Spl#	CLIENT SPL ID	DIESEL (ug/L)	REPORTING LIMIT (ug/L)	BLANK RESULT (ug/L)	BLANK SPIKE (%)	DILUTION FACTOR
159985	MW-3	4100	50	N.D.	65.0	1
	Note: *Hydrocarbon reported does not match the pattern of our Diesel standard. Estimated concentration due to overlapping fuel patterns.*					
159986	MW-1	14000	250	N.D.	65.0	5
	Note: *Hydrocarbon reported has characteristics of weathered/aged Diesel. Estimated concentration due to overlapping fuel patterns.*					
159987	MW-4	N.D.	50	N.D.	65.0	1

Bruce Havlik
Chemist

Alex Tam
Semivolatiles Supervisor

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Federal ID #68-0140157

APPENDIX B

Quarterly Monitoring Data Sheets

Quarterly Monitoring Data Sheet

Date: 11/26/97	Well Diameter: 2 Inches Well ID: MW-1
Project Location: Motor Partners Site	Well Type: Monitoring Well
1234 40th Ave., Oakland	Total Depth as Built: 19 ft
Sampler: G. Rogers	Screened Interval: 7 ft to 17 ft

Water Level Data	Purge Calculation(Min 3 Casing Volumes)
Time Depth Sounded: 11:10 AM	gal/ft X ft = gal X 3 = gal
Measured Depth to Water: 7.98 ft.	0.163 X 8.8 = 1.4 X 3 = 4.3
Measured Total Depth: 16.8 ft.	

Purge Data

Time	Flowrate (gpm)	Volume (gal)	Temp (°F)	EC (μs/cm)	pH	Turbidity (NTU)	
11:15		0	62.9	643	7.46	175	
11:18		2	65.1	698	6.99	152	
11:22		4	65.2	726	7.02	27	
11:25		6	65.0	750	6.75	29	

Observations/Comments:

Inside Building

Laboratory Analysis:

Sample at 1:10 PM
Water depth - 7.92 ft.
Analyze for TPH-D, TPH-G, BTEX, and MTBE

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: 11/26/97	Well Diameter: 2 Inches Well ID: MW-2
Project Location: Motor Partners Site	Well Type: Monitoring Well
1234 40th Ave., Oakland	Total Depth as Built: 22 ft
Sampler: G. Rogers	Screened Interval: 10 ft to 20 ft

Water Level Data	**Purge Calculation(Min 3 Casing Volumes)**
Time Depth Sounded: 10:00 AM	gal/ft X ft = gal X 3 = gal
Measured Depth to Water: 7.24 ft.	
Measured Total Depth: 19.6 ft.	0.163 X 12.4 = 2.0 X 3 = 6.0

Purge Data

Time	Flowrate (gpm)	Volume (gal)	Temp (°F)	EC (μs/cm)	pH	Turbidity (NTU)
10:03		0	60.6	382	7.60	48
10:10		2	62.1	513	7.47	55
10:20		4	64.2	578	7.68	89
10:33		6	64.0	580	7.49	70

Observations/Comments:

Overcast, raining

Laboratory Analysis:

Sample at 12:35 PM
Water depth - 7.18 ft.
Analyze for TPH-D, TPH-G, BTEX and MTBE

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: 11/26/97	Well Diameter: 2 Inches Well ID: MW-3
Project Location: Motor Partners Site	Well Type: Monitoring Well
1234 40th Ave., Oakland	Total Depth as Built: 23 ft
Sampler: G. Rogers	Screened Interval: 7 ft to 20 ft

Water Level Data	**Purge Calculation(Min 3 Casing Volumes)**
Time Depth Sounded: 10:45 AM	gal/ft X ft = gal X 3 = gal
Measured Depth to Water: 7.06 ft.	
Measured Total Depth: 19.4 ft.	0.163 X 12.3 = 2.0 X 3 = 6.0

Purge Data

Time	Flowrate (gpm)	Volume (gal)	Temp (°F)	EC (μs/cm)	pH	Turbidity (NTU)	
10:47		0	63.5	657	7.35	88	
10:52		2	64.8	738	7.04	152	
10:57		4	63.8	750	7.22	139	
11:03		6	63.9	761	7.25	180	

Observations/Comments:

Overcast, raining

Laboratory Analysis:

Sample at 12:55 PM
Water depth - 6.94 ft.
Analyze for TPH-D, TPH-G, BTEX and MTBE

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: 11/26/97
Project Location: Motor Partners Site
1234 40th Ave., Oakland
Sampler: G. Rogers

Well Diameter: 2 Inches Well ID: MW-4
Well Type: Monitoring Well
Total Depth as Built: 25 ft
Screened Interval: 5 ft to 25 ft

Water Level Data

Time Depth Sounded: 11:30 AM
Measured Depth to Water: 6.64 ft.
Measured Total Depth: 24.2 ft.

Purge Calculation(Min 3 Casing Volumes)

gal/ft X ft = gal X 3 = gal

0.163 X 17.6 = 2.9 X 3 = 8.6

Purge Data

Time	Flowrate (gpm)	Volume (gal)	Temp (°F)	EC (μs/cm)	pH	Turbidity (NTU)	
11:35		0	63.0	657	7.64	110	
11:40		2	65.9	631	7.35	23	
11:43		4	66.0	639	7.33	21	
11:46		6	66.3	676	7.25	6	
11:50		8	66.1	670	6.95	7.8	
11:54		10	66.4	659	7.07	1.3	

Observations/Comments:

Partly Cloudy

Laboratory Analysis:

Sample at 1:35 PM
Water depth - 6.69 ft.
Analyze for TPH-D, TPH-G, BTEX and MTBE

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.