Gary Rogers, Ph.D.

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June 26, 1996

REF: 1004-PT.RPT

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

SUBJECT: AQUIFER PUMP TEST REPORT
MOTOR PARTNERS SITE, 1234 40TH AVE., OAKLAND, CA

Dear Barney:

I have enclosed a copy of the Aquifer Pump Test Report for the Motor Partners site, 1234 40th Avenue, Oakland, California.

The results of this test suggest that Groundwater Extraction is of limited value at the site. The results of the aquifer pump test exhibited relatively low yield values. This is mainly because clayey soil at the site limits hydraulic conductivity.

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

Sincerely,

Gary Rogers

Gary Rogers, Ph.D.
Environmental Consultant

cc: Bill Owens

AQUIFER PUMP TEST REPORT

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
510-567-6765

PREPARED BY:

Gary Rogers, Ph.D.
2657 Bailey Ct.
Fremont, CA 94536
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PROJECT NO. 1004

June 26, 1996

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1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

This report presents the results of an aquifer pump test conducted at the Motor Partners site in Oakland. The pump test was conducted to evaluate hydrogeological conditions at the site.

1.2 PROJECT SITE

The project site is known as Motor Partners, located at 1234 40th Avenue, Oakland, California (Figure 1). It is a commercial/light industrial area, with residential properties close to the site. The elevation of the site is approximately 25 feet above mean sea level.

Motor Partners is located near Nimitz Highway (880) in the Fruitvale District of Oakland, California (Figure 1). The BART rail tracks are about 500 ft. 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.

1.3 BACKGROUND

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.

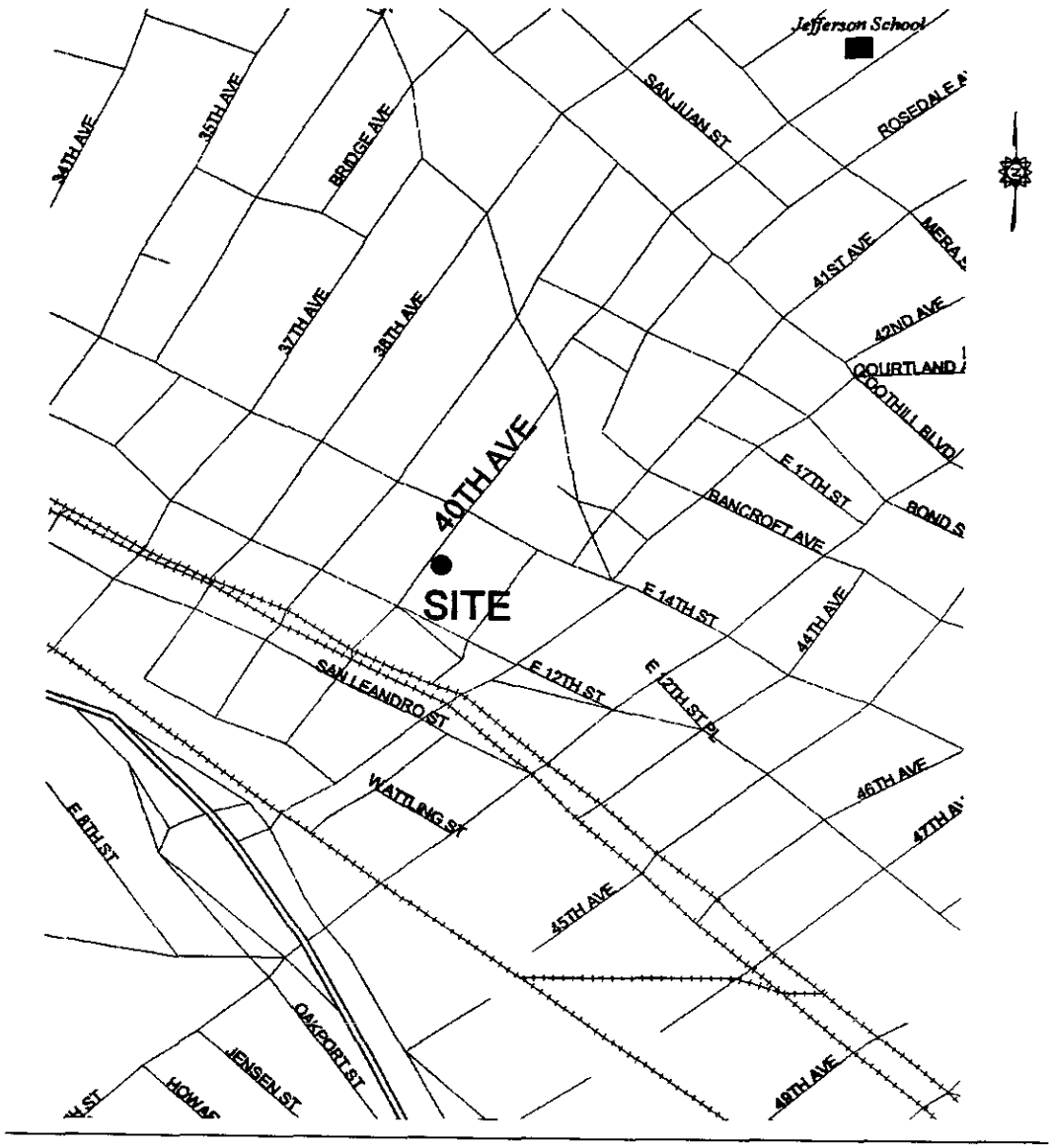
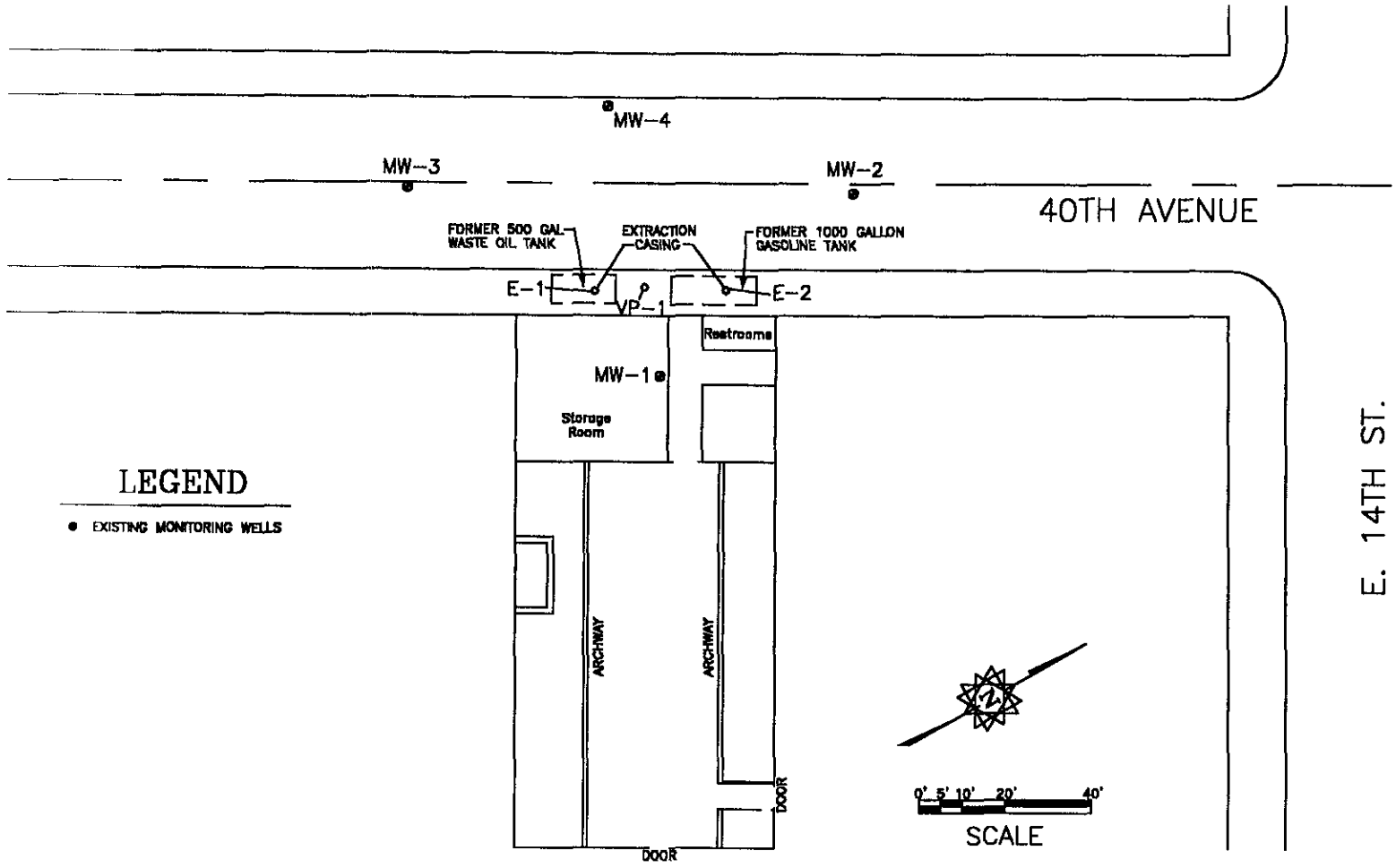


Figure 1. Site Location



GARY ROGERS, PH.D. ENVIRONMENTAL CONSULTANT 2657 BAILEY CT. FREMONT, CA 94536 (510) 791-7157	DRAWN BY: GLR	PROJECT NUMBER: 1004	DESCRIPTION: Site Layout	FIGURE: 2
	DRAWING DATE: 6/28/96	FILE NAME: 1004-PT.DWG		
	REVISION BY	PROJECT MANAGER: GLR	PROJECT/LOCATION: Motor Partners 1234 40th Avenue, 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.

Three monitoring wells were installed at the site in June, 1994. 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. Additional quarterly monitoring sampling events have been completed since November, 1995. The groundwater gradient has been shown 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 2). A two-inch groundwater monitoring well (MW-4) was installed in the boring.

1.4 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 property is bounded on the northeast by 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. The groundwater gradient is in a southwesterly direction.

2.0 AQUIFER PUMP TEST

2.1 INTRODUCTION

The purpose of the aquifer pump test was to evaluate site-specific groundwater production and flow characteristics and to assist in evaluating the potential effectiveness of groundwater remediation alternatives.

2.2 DESCRIPTION OF AQUIFER PUMP TEST

On March 27, 1996, pump test equipment was installed to conduct a "constant rate" pumping test on MW-1. Equipment used included:

A submersible pump and associated piping; and
An automated datalogger and pressure sensor equipment to monitor water levels in the monitoring well and nearby observation wells.

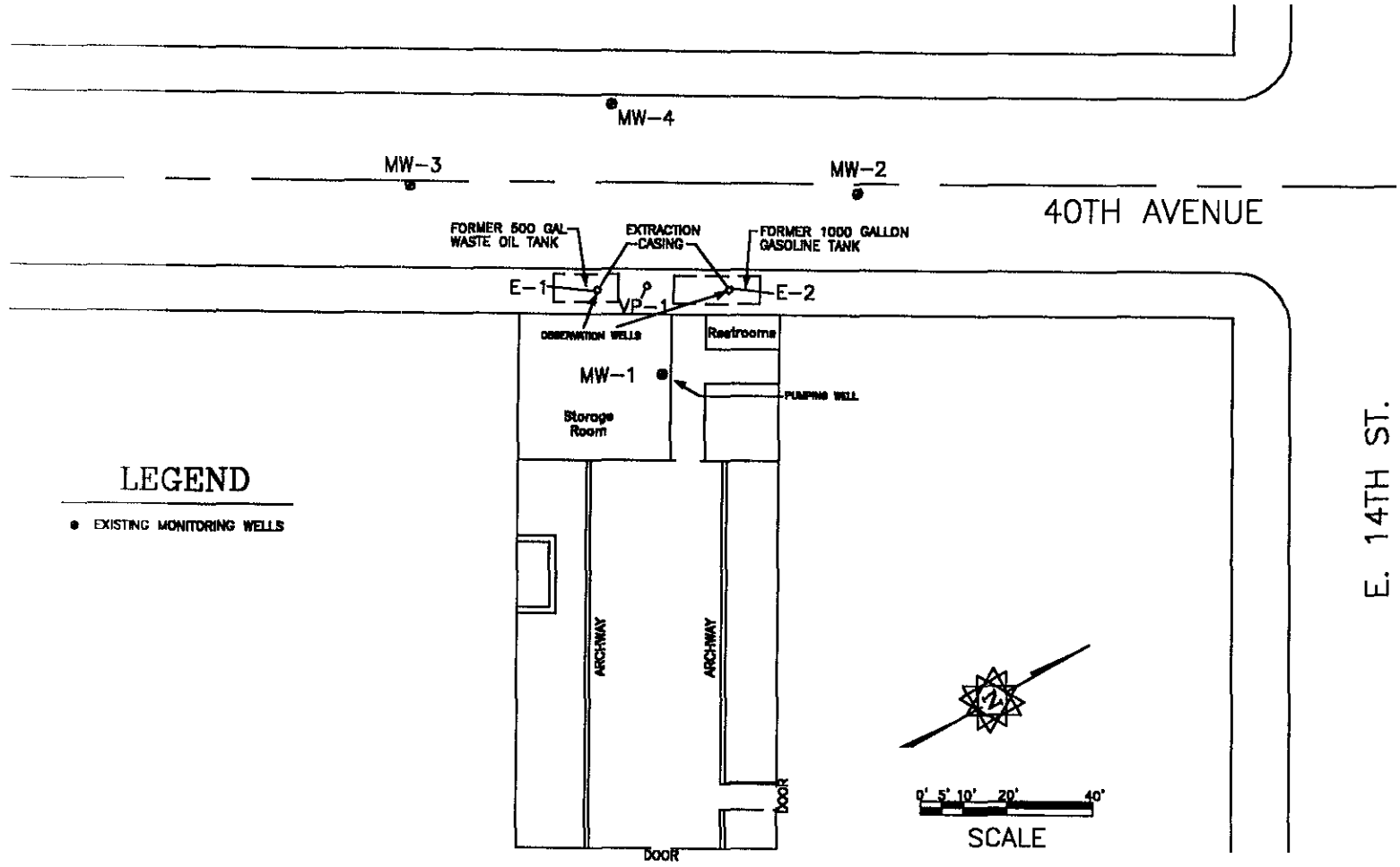
Pump test water was stored in drums at the site for later disposal. The constant rate test comprised a 300 minute pumping duration. The average pumping rate for the test was 0.77 gpm.

2.3 PUMP TEST WELL AND OBSERVATION WELLS

One monitoring well, MW-1, and two extraction wells, E-1 and E-2, were used in this test. Monitoring well MW-1 was used as the pumping well and extraction wells, E-1 and E-2, were used as the observation wells. The well and probe locations are shown in Figure 3. Well construction details for the wells are summarized in Table 1.

Table 1. Summary of Well Construction Data for Aquifer Pump Test

Well ID	Test Status	Well Dia. (in.)	Screen Int. (ft.)	Total Depth	S.W.L. (ft)
E-1	Observation Well	4	0.5 - 13	13.7	5.31
E-2	Observation Well	4	0.5 - 13	13.5	5.36
MW-1	Extraction Well	2	7 - 17	17.0	5.93



GARY ROGERS, PH.D. ENVIRONMENTAL CONSULTANT 2657 BAILEY CT. FREMONT, CA 94536 (510) 791-7157	DRAWN BY: GLR	PROJECT NUMBER: 1004	DESCRIPTION: Well Locations	FIGURE: 3
	DRAWING DATE: 6/26/96	FILE NAME: 1004-PT.DWG		
	REVISION BY	PROJECT MANAGER: GLR	PROJECT/LOCATION: Motor Partners 1234 40th Avenue, Oakland	
	REVISION BY	CHECKED BY		

In the case of observation well, E-1,

$Q = 0.77$ gpm
$\Delta S = 0.08$ feet
$t_o = 110$ minutes, and
$r = 24.9$ feet

Using these values from the pump test information and the fitted straight line, the aquifer parameters were:

$$T = \frac{264\ (0.77\ \text{gpm})}{0.08\ \text{ft}} = 2{,}541\ \text{gpd/ft}$$

and

$$S = \frac{(2{,}541\ \text{gpd/ft})\ (110\ \text{min})}{4{,}790\ (24.9\ \text{ft})^2} = 0.094$$

(clays ~ 10%)

These calculations were repeated for each observation well. Table 1 presents the transmissivity and storativity values obtained from the Jacob method drawdown data analyses.

Table 2. Pump Test Analysis Results

Monitoring Well	Jacob Method	
	Transmissivity (T) gpd/ft	Storativity (S)
E-1	2,541	0.094
E-2	1,694	0.057
Average	2,118	0.076

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

This report presents the results of an Aquifer Pump test completed for the Motor Partners site, 1234 40th Ave., Oakland, California. The purpose was to evaluate groundwater production and flow characteristics to assist in evaluating the potential effectiveness of groundwater remediation alternatives.

The results of the aquifer pump test yielded an average Transmissivity value of 2,118 gpd/ft and Storativity of 0.076. These are relatively low yield values. The clayey soil at the site limits hydraulic conductivity.

4.2 RECOMMENDATIONS

Because of low transmissivity values for the site, groundwater pumping and treatment does not appear to be a feasible treatment alternative unless an infiltration trench is designed. It is recommended that other methods of remediation be considered for the site.

3.0 RESULTS AND DATA ANALYSIS

3.1 PUMP TEST RESULTS

Results of the pump test performed on monitoring well, MW-1, are summarized in the following discussion.

A 5-hour pump test was conducted at a constant pumping rate (Q) of 0.77 gallons per minute (gpm), starting on March 27, 1996. There was no pumping for several days prior to the test to allow aquifer recharge. Drawdown in three wells (MW-1, E-1, and E-2) was monitored during the test with an Campbell Scientific PST Programmable Data Logger (See photos, Appendix C). The unit uses a Campbell CR10 control module and connects directly to pressure transducers. Drawdown measurements were recorded with pressure transducers.

The maximum drawdown recorded at the end of the pump test was 4.7 feet. The specific capacity (Q/drawdown) after 5 hours of pumping was 0.16 gallons per minute per foot (gpm/ft), a low yield value.

Drawdown data were analyzed using the Jacob method to determine aquifer parameters of transmissivity (T) and storativity (S). It was assumed that the data analyzed for this test fit the conditions required and should be a good approximation of aquifer parameters.

Jacob Method of Analysis

Jacob developed a graphic method to determine transmissivity and storativity values for an aquifer (Heath, 1983). The drawdown is plotted versus time on semi-log paper. Then, a line is fitted to the portion of the data that approximates a straight line. From the fitted line, the aquifer parameters are calculated as follows:

not provided

$$T = \frac{264\ Q}{\Delta S}$$

$$S = \frac{T\ t_o}{4{,}790\ r^2}$$

where

T = Transmissivity (gpd/ft)
S = Storativity = specific yield
Q = Pumping rate (gpm)
ΔS = Drawdown over one log cycle (feet)
t_o = Time intercept of straight-line (minutes) where drawdown = 0
r = Distance to recovery well (feet)

5.O REFERENCES

1. Marshack, J.B., 1991. A Compilation of Water Quality Goals, Staff Report of the California Regional Water Quality Control Board, Central Valley Region, 15 pages.

2. Heath, R.C., 1983. Basic Groundwater Hydrology, US Geological Survey Paper 2220, 84 pages.

6.0 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, conclusion or recommendations presented herein is at the sole risk of the said user.

Gary Rogers

Gary L. Rogers, Ph.D.

7.0 APPENDICES

APPENDIX A

Drawdown Data

Drawdown Results for Aquifer Pump Test
Motor Partners Site, 1234 40th Ave., Oakland, California

	Drawdown (ft)		
Time From Start	E-1	E-2	MW-1
0	0.003	-0.001	0
0.01	0	-0.001	0.002
0.019	0	0	0
0.027	-0.003	0	0
0.035	0	0	0
0.044	0.003	0	0
0.052	-0.003	-0.001	0
0.06	0.003	-0.001	0
0.069	0	-0.001	0.002
0.077	0.003	0.001	0
0.085	0	0.001	0
0.094	0.003	-0.001	0
0.102	-0.003	0	0
0.11	-0.001	0.001	0
0.119	-0.005	0.001	0.002
0.127	0	0.001	0.002
0.135	0	0.001	0
0.144	-0.003	0.001	0
0.152	0	0.001	0
0.16	0.003	0.001	0
0.169	0	0.001	0
0.177	0	0.001	0
0.185	0	0	0
0.194	0.002	0.001	0
0.202	0	0	0
0.21	-0.003	-0.001	0
0.219	0	0.001	0
0.227	0	0	0
0.235	0.003	0.001	0
0.244	0.003	0.001	0
0.252	0	0	0.002
0.26	0.003	0	0
0.269	0.003	0	0
0.277	0.003	0	0
0.285	0	0	0
0.294	0	0	0

	Drawdown (ft)		
Time From Start	E-1	E-2	MW-1
0.302	0	0	0
0.31	0	0	0.002
0.319	-0.003	0	0
0.327	0	-0.001	0
0.335	0	-0.001	0
0.344	0	0	0
0.352	0	-0.001	0
0.36	0.003	0.001	0.009
0.369	0.003	0	0
0.377	0.003	0.001	0
0.385	0.003	-0.001	0
0.394	0	0.001	0
0.402	0	0	0
0.41	0.003	0.001	0
0.419	-0.001	0	0.039
0.427	-0.003	0	0.075
0.435	-0.013	0	0.152
0.444	-0.003	0.001	0.235
0.452	-0.002	0	0.332
0.46	0	0	0.417
0.469	-0.003	0	0.458
0.477	-0.003	0.001	0.547
0.485	0.003	0	0.598
0.494	0.003	-0.001	0.652
0.502	-0.003	0	0.703
0.51	-0.008	0.001	0.757
0.519	-0.005	0.001	0.806
0.527	0.003	-0.001	0.851
0.535	0.003	-0.001	0.89
0.544	0.003	0	0.924
0.552	-0.009	0.001	0.965
0.56	-0.005	0.001	0.994
0.569	0.003	0.001	1.044
0.577	0.003	-0.001	1.08
0.585	0.003	-0.001	1.116
0.594	-0.003	0.001	1.153
0.602	-0.003	0.001	1.183
0.61	0.003	0.001	1.215
0.619	0.003	0	1.245
0.627	0.002	-0.001	1.279

	Drawdown (ft)		
Time From Start	E-1	E-2	MW-1
0.635	-0.001	0	1.301
0.644	-0.008	0.001	1.322
0.652	-0.005	0.001	1.348
0.66	0.003	0	1.363
0.752	-0.003	0.001	1.609
0.84	0.005	0.001	1.793
0.927	-0.005	0.001	1.973
1.015	-0.005	0	1.966
1.102	-0.003	0.001	1.952
1.19	-0.007	0	1.945
1.277	-0.005	0	1.95
1.365	-0.005	0.001	1.965
1.452	0	0.001	1.976
1.54	-0.003	0.001	1.913
1.627	-0.009	0.001	1.781
1.715	-0.003	0.001	1.674
1.802	-0.005	0.001	1.595
1.89	-0.003	0.001	1.533
1.977	-0.008	0.001	1.486
2.065	-0.005	0.001	1.453
2.152	-0.009	0.001	1.529
2.24	-0.011	0.001	1.575
2.327	-0.005	0.001	1.623
2.415	-0.005	0.001	1.655
2.919	-0.003	0	1.757
3.423	0.003	0.001	1.819
3.927	0.005	0.001	1.862
4.431	-0.01	0.001	2.018
4.935	0.029	0.001	2.729
5.44	0.019	-0.001	3.193
5.944	-0.013	0.001	3.411
6.448	0.022	0.001	3.497
6.952	0.011	0.001	3.55
7.46	-0.001	-0.002	3.578
7.96	0	-0.004	3.608
8.46	-0.011	0.001	3.636
8.97	-0.011	0.001	3.653
9.47	-0.011	0.001	3.653
9.98	0	0.001	3.689
10.48	-0.003	0.001	3.685

	Drawdown (ft)		
Time From Start	E-1	E-2	MW-1
12.49	-0.009	0.001	3.723
14.49	-0.009	-0.002	3.773
16.49	-0.008	0.001	3.809
18.5	-0.008	0.001	3.841
20.5	-0.009	0.003	3.858
22.51	-0.008	0.001	3.901
24.51	-0.014	0.001	3.948
26.51	-0.011	0	3.974
28.52	-0.008	-0.002	3.989
30.52	-0.005	-0.002	4.012
32.53	0.003	0.001	4.032
34.53	0.002	-0.004	4.085
36.54	-0.008	0	4.079
38.54	0.005	-0.004	4.072
40.54	-0.011	-0.004	4.079
42.55	-0.003	0.001	4.077
44.55	-0.005	-0.001	4.096
46.56	0.003	-0.002	4.143
48.56	-0.011	-0.006	4.173
50.56	0.003	-0.004	4.134
52.57	0.003	-0.004	4.128
54.57	0	-0.004	4.081
56.58	-0.005	-0.002	4.042
58.58	0	-0.004	3.978
60.59	0.003	-0.004	3.942
62.59	-0.006	-0.002	3.905
64.59	0.005	-0.004	3.942
66.6	-0.005	-0.005	4.012
68.6	-0.005	-0.007	4.019
70.6	-0.003	-0.005	4.015
72.6	-0.008	-0.005	4.015
74.6	0.007	-0.004	4.034
76.6	-0.003	-0.004	4.032
78.6	0.01	-0.004	4.034
80.6	0.009	-0.005	4.03
82.6	0.009	-0.004	4.045
84.6	0.005	0	4.042
86.6	0.013	0.001	4.045
88.6	0.003	-0.005	4.055
90.6	0.003	-0.002	4.04

	Drawdown (ft)		
Time From Start	E-1	E-2	MW-1
92.7	0.006	-0.004	4.055
94.7	0.013	0.001	4.062
96.7	0.019	-0.001	3.959
98.7	0.008	0.001	3.86
100.7	0.013	-0.004	3.863
110.7	0.013	-0.002	3.858
120.7	0.008	-0.002	4.025
130.7	0.024	0.001	4.717
140.7	0.024	0.003	4.717
150.7	0.024	0	4.71
160.7	0.029	0.001	4.715
170.7	0.032	0.003	4.503
180.7	0.032	0.006	4.267
190.7	0.038	0.002	4.704
200.7	0.038	0.01	4.71
210.7	0.042	0.01	4.708
220.7	0.042	0.012	4.71
230.7	0.048	0.015	4.488
240.7	0.051	0.015	4.246
250.7	0.048	0.015	4.702
260.7	0.051	0.014	4.691
270.7	0.052	0.013	4.704
280.7	0.063	0.017	4.697
290.7	0.064	0.022	4.479
300.8	0.066	0.022	4.25

APPENDIX B

Boring Log

CERTIFIED ENVIRONMENTAL CONSULTING
536 STONE ROAD SUITE J BENICIA CA, 94510
(707) 745-0171 / (800) 228-0171 / (707) 745-0163 FAX

BORING NUMBER **MW-1** SHEET 1 OF 1

PROJECT **Motor Partners**

LOCATION **1234 40th Ave., Oakland, CA**

CONTRACT NUMBER **477-1532**

COORDINATES

SURFACE ELEVATION DATUM

LOGGED BY **R. Gallardo**

DEPTH FEET	LAB SAMPLE	SAMPLE TYPE	BLOW COUNTS	Recovery %	HNu (ppm)	STRATA	DESCRIPTION	WELL CONSTRUCTION DETAIL	ELEVATION FEET
							Concrete from surface to 4" bgs		
							SANDY SILTY CLAY (CL) Dark brown, stiff, moist		
							SANDY CLAY (CL) Brown, stiff, moist		
5							GRAVELLY CLAY (CL) Grey-brown, stiff, moist		
			30 21 22 25				CLAYEY GRAVEL (GC) Brown Grey, dense, moist Gasoline Odor		
							CLAYEY SANDY GRAVEL (GC) Grey, dense, moist to wet		
10							Drilling like gravel		
15			6 11 10				CLAYEY GRAVELY SAND (SC) Brown, dense, saturated		
							SANDY SILTY CLAY (SC) Brown, stiff, moist leopard texture w/ black carbon nodules		
20			10 12 16						
							TOTAL DEPTH OF BORING 22.5'		

DRILLING CONTRACTOR Clear Heart

DRILLING METHOD Solid Flight Auger

DRILLING EQUIPMENT Giddings Probe

DRILLING STARTED 6/15/94 ENDED 6/15/94

REMARKS Monitoring Well #1

APPENDIX C

Photographs

LIST OF PHOTOGRAPHS

Aquifer Pump Test
Motor Partners Site, 1234 40th Avenue, Oakland, California

Photo No.	Description
1	Submersible Pump and Controller at Pumping Well, MW-1
2	Connection to Observation Well E-1
3	Computer and Data Logger Used in Aquifer Pump Test

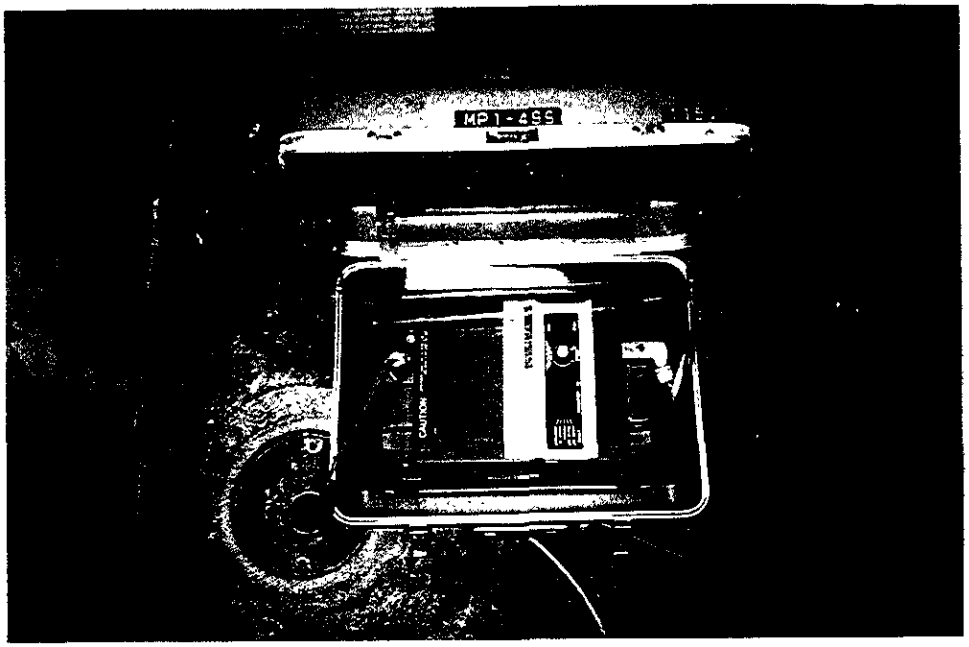


Photo 1
Submersible Pump &
Controller Pumping
Well, MW-1

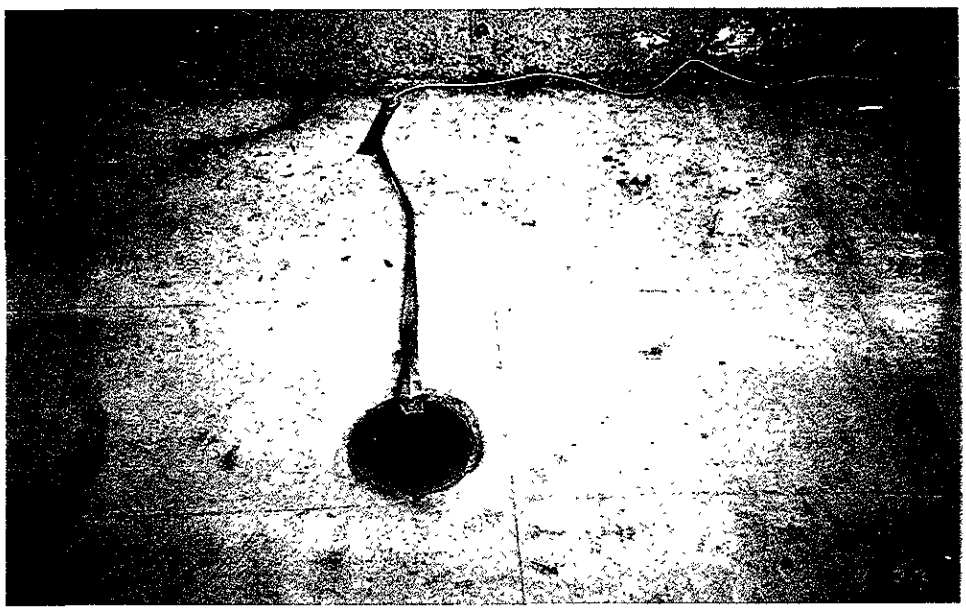


Photo 2
Connection to
Observation Well E-1

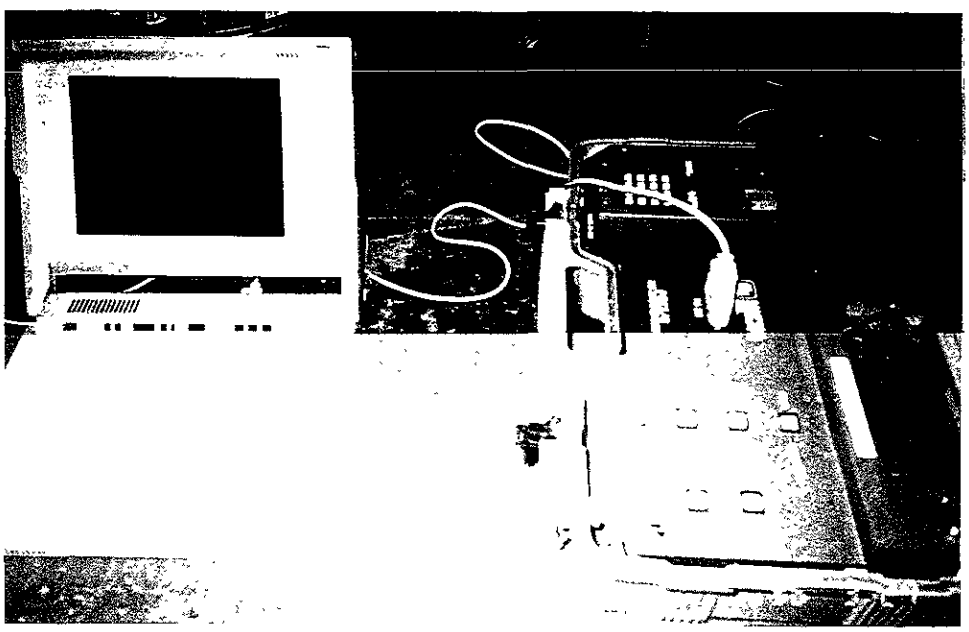


Photo 3
Computer and Data
Logger Used in
Aquifer Pump Test