HAGEMAN-AGUIAR, INC.
Underground Contamination Investigations, Groundwater Consultants, Environmental Engineering

REPORT OF
QUARTERLY GROUNDWATER SAMPLING

(sampled April 23, 1993)

1211

PACIFIC CRYOGENIC COMPANY
2311 Magnolia Street
Oakland, CA

May 24, 1993

3732 Mt. Diablo Blvd. Suite 372 Lafayette, California 94549 (510) 284-1661 FAX (510) 284-1664

TABLE OF CONTENTS

I. INTRODUCTION

The subject site is the historical location of Pacific Cryogenic Company at 2311 Magnolia Street, Oakland, California. The location of the site is shown on Figure 1 (site location map).

On June 30 and July 12, 1989, Geo-Environmental Technology removed three underground storage tanks from the subject site: one 8,000-gallon underground Diesel tank, one 1,000-gallon underground Gasoline tank, and one 550-gallon underground Waste Oil tank.

Due to the detection of subsurface contamination in the vicinity of the Gasoline and Waste Oil tanks, shallow groundwater monitoring well MW-1 was installed by Geo-Environmental Technology at the previous tank locations (see Figure 2). The results of shallow groundwater sampling on October 26, 1990, indicated the presence of Diesel at a concentration of 5,400 µg/L, and Benzene, Toluene, Ethylbenzene, and Total Xylenes at concentrations of 1,200 µg/L, 18 µg/L, 7.1 µg/L, and 37 µg/L, respectively. Subsequent to the installation and sampling of monitoring well MW-1, two additional shallow groundwater monitoring wells were installed on the subject site (wells MW-2 and MW-3). No data regarding these well installations appear to be available at the present time.

On November 12, 1992, the underground piping running between the previous Gasoline and Waste Oil underground tanks and the previous dispenser pedestal were removed by Hageman-Aguiar, Inc. (see Figure 2). During the removal process, several

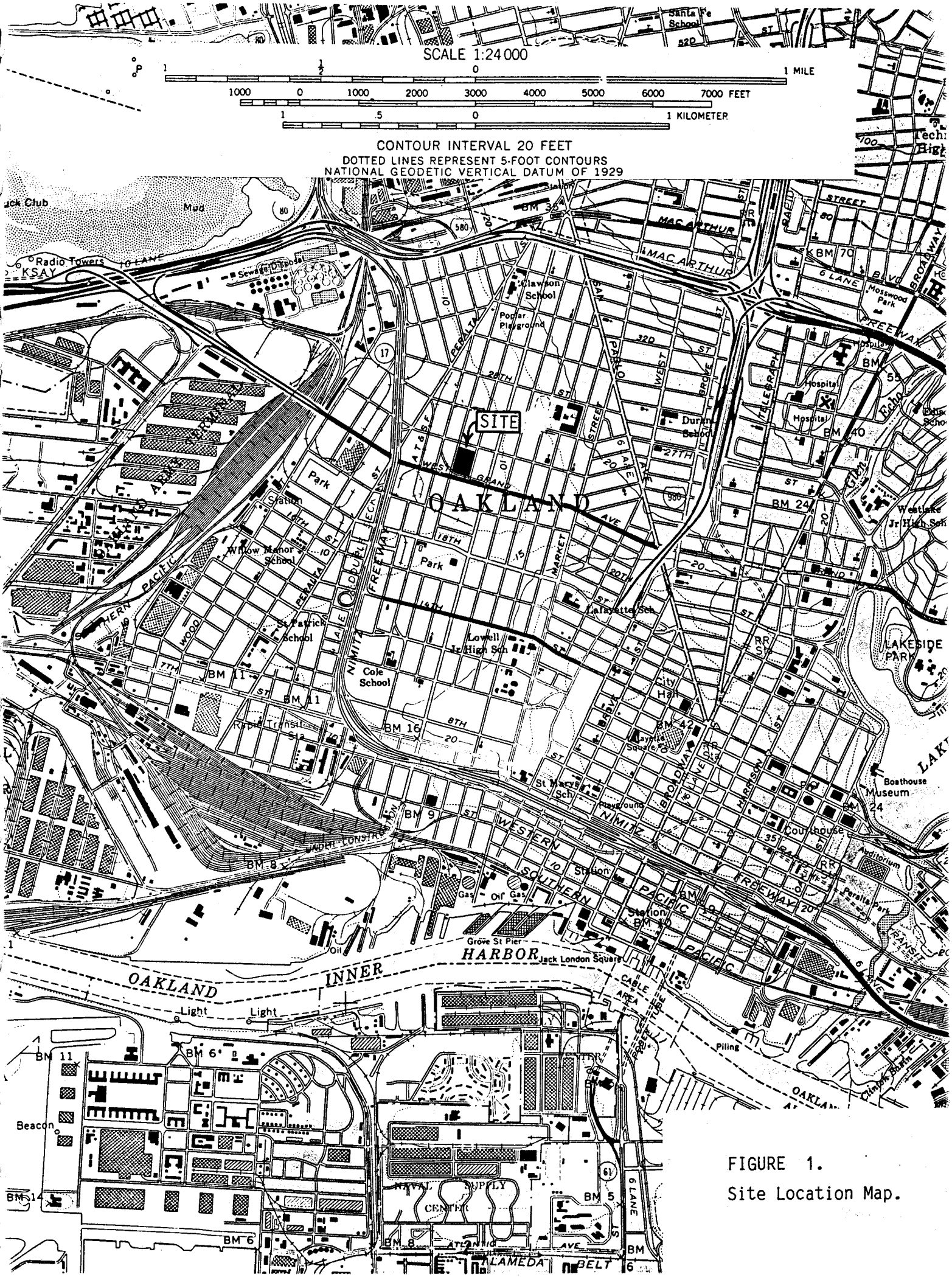

FIGURE 1.
Site Location Map.

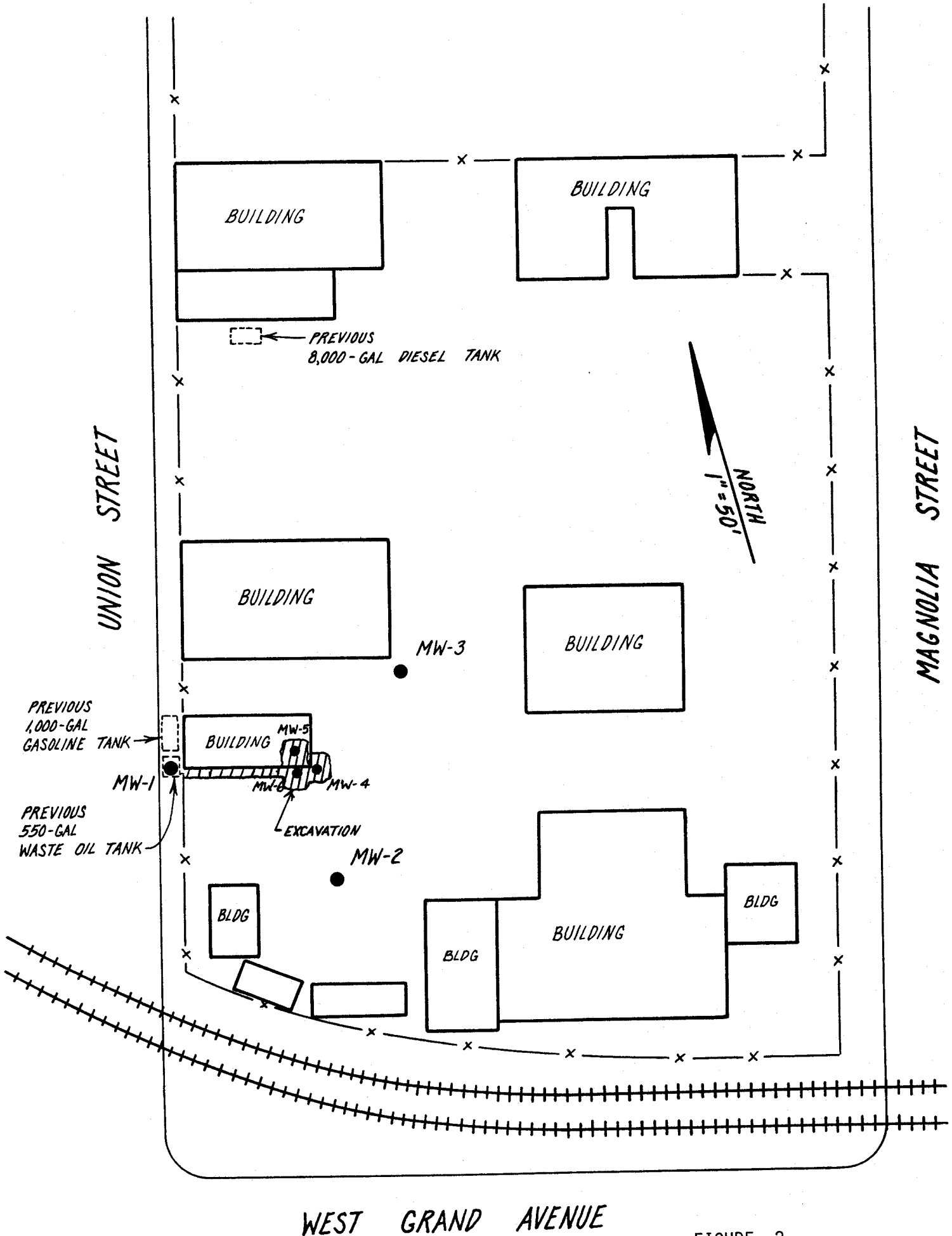

FIGURE 2.
Site Map.

holes were noted in both the waste oil and the gasoline underground pipelines. At one location, significant gasoline contamination was apparent in the soil (based upon odor and color).

Subsequent to the piping removal, additional excavation was conducted on November 18, 1992. The excavation extended to a depth of approximately 15 feet below ground surface and was conducted in order to mitigate the apparent subsurface gasoline contamination. Upon completion of the soil excavation on November 18, 1992, three excavation backfill wells were installed. The locations of these monitoring wells MW-4, MW-5 and MW-6 are shown in Figure 2.

On April 23, 1993, all on-site monitoring wells MW-1, MW-2 MW-3 and MW-4 were sampled for the laboratory analysis for dissolved petroleum constituents.

II. FIELD WORK

Monitoring Well Sampling

On April 23, 1993, groundwater samples were collected from monitoring wells MW-1, MW-2, MW-3, and MW-4. Prior to groundwater sampling, each well was purged by removing approximately 3 to 10 casing volumes of water. Field conductivity, temperature, and pH meters were present on-site during the monitoring well sampling. As the purging process proceeded, the three parameters were monitored. Purging continued until readings appeared to have reasonably stabilized. After the water level in the well had attained 80% or more of the original static water level, a groundwater sample was collected using a clean teflon bailer. The water sample was placed inside appropriate 40 mL VOA vials and 1 liter amber bottles free of any headspace. The samples were immediately placed on crushed ice, then transported under chain-of-custody to the laboratory at the end of the work day.

At the time each monitoring well was sampled, the following information was recorded in the field: 1) depth-to-water prior to purging, using an electrical well sounding tape, 2) identification of any floating product, sheen, or odor prior to purging, using a clear teflon bailer, 3) sample pH, 4) sample temperature, and 5) specific conductance of the sample.

Copies of the well sampling logs are included as Attachment A.

Wastewater Generation

All water removed from the wells during purging and sampling was drummed and stored on-site until the results of laboratory analyses were obtained. Based upon these results, the water should be transported as a hazardous liquid waste under proper manifest to an appropriate TSD facility for treatment and disposal. The disposal of wastewater is the responsibility of the property owner (waste generator), and is beyond the scope of work as described in this report.

follow up!

III. RESULTS OF WATER LEVEL MEASUREMENTS

Shallow Groundwater Flow Direction.

Shallow water table elevations were measured on April 23, 1993. These measurements are shown in Table 1. Figure 3 presents a contour map for the shallow groundwater table beneath the site. As shown in this figure, the data from the three monitoring wells indicate that the shallow groundwater flow was in the southeasterly direction during this round of groundwater sampling.

Shallow Water Table Hydraulic Gradient

Figure 3 presents the contour map for the shallow groundwater table beneath the site. As shown in this figure, the shallow groundwater table beneath the site appears to have a calculated hydraulic gradient of dH/dL = 0.6'/15' = 0.040.

Historical Water Level Measurements

Table 2 presents the results of all water level measurements collected between April 3, 1992, and the present time.

TABLE 1.

Shallow Water Table Elevations
April 23, 1993

Well	Top of Casing Elevation (feet)	Depth to Water (feet)	Water Table Elevation (feet)
MW-1	99.27	4.10	95.17
MW-2	100.00	7.31	92.69
MW-3	100.02	7.38	92.64
MW-4	99.95	6.66	93.29

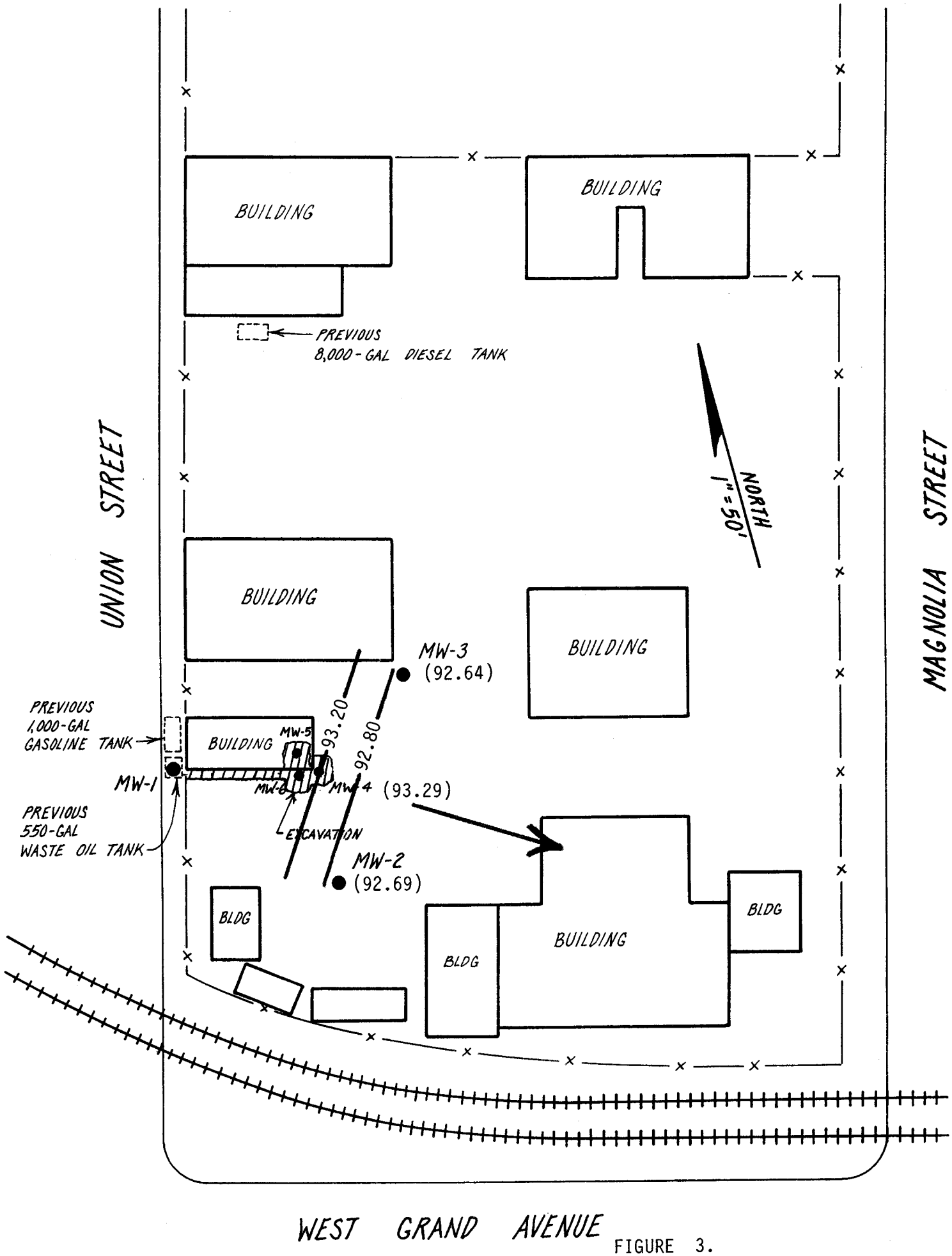

FIGURE 3.
Shallow Groundwater Table Contour Map (measured April 23, 1993).

IV. SHALLOW GROUNDWATER SAMPLING RESULTS

Laboratory Analysis

All analyses were conducted by a California State DOHS certified laboratory in accordance with EPA recommended procedures (Priority Environmental Labs, Milpitas, CA). All Groundwater samples were analyzed for Total Petroleum Hydrocarbons as Gasoline (EPA method 8015), Benzene, Toluene, Ethylbenzene, and Total Xylenes (EPA method 602) and Total Petroleum Hydrocarbons as Diesel (EPA method 8015).

Results of Groundwater Sampling

Table 3 presents the results of the laboratory analysis of the groundwater samples collected from monitoring wells MW-1, MW-2, MW-3 and MW-4.

As shown in Table 3, for this round of sampling, Total Petroleum Hydrocarbons as Gasoline were detected in the groundwater samples collected from wells MW-1, MW-3 and MW-4 at concentrations of 280 µg/L (ppb), 21,000 µg/L (ppb) and 2,700 µg/L (ppb), respectively. In addition, Benzene was detected in the groundwater samples collected from wells MW-1, MW-3 and MW-4 at concentrations of 0.9 µg/L (ppb), 23 µg/L (ppb) and 8.3 µg/L (ppb), respectively.

A copy of the laboratory certificate for the water sample analysis is included in Attachment B.

TABLE 3.
Shallow Groundwater Sampling Results

Well	Date	TPH as Gasoline (ug/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl-benzene (ug/L)	Total Xylenes (ug/L)
MW-1	10-26-90	---	1,200	18	7.1	37
	03-04-92	460	120	9.0	16	44
	04-03-92	300	21	6.0	15	36
	06-16-92	220	54	17	29	73
	10-09-92	ND	ND	ND	ND	ND
	01-07-93	210	0.7	3.7	4.4	9.6
	04-23-93	280	0.9	1.3	2.9	6.2
MW-2	03-04-92	ND	ND	ND	ND	ND
	04-03-92	ND	ND	ND	ND	ND
	06-16-92	ND	ND	ND	ND	ND
	10-09-92	ND	ND	ND	ND	ND
	01-07-93	ND	ND	ND	ND	ND
	04-23-93	ND	ND	ND	ND	ND
MW-3	03-04-92	14,000	6,200	60	110	740
	04-03-92	5,200	120	32	57	180
	06-16-92	6,000	180	45	82	190
	10-09-92	11,000	87	49	94	200
	01-07-93	4,200	3.3	13	44	92
	04-23-93	21,000	23	43	49	130
MW-4	01-07-93	4,800	6.4	25	60	110
	04-23-93	2,700	8.3	11	31	59
Detection Limit		50	0.5	0.5	0.5	0.5

ND = Not Detected

TABLE 4.
Shallow Groundwater Sampling Results

Well	Date	TPH as Kerosene (ug/L)	TPH as Diesel (ug/L)	TPH as Motor Oil (ug/L)
MW-1	10-26-90	---	**5,400**	---
	03-04-92	---	**590**	---
	04-03-92	ND	ND	ND
	06-16-92	---	**730**	---
	10-09-92	ND	ND	ND
	01-07-93	ND	ND	ND
	04-23-93	---	ND	---
MW-2	03-04-92	---	ND	---
	04-03-92	ND	ND	ND
	06-16-92	---	ND	---
	10-09-92	ND	ND	ND
	01-07-93	ND	ND	ND
	04-23-93	---	ND	---
MW-3	03-04-92	---	**360**	---
	04-03-92	ND	ND	ND
	06-16-92	---	ND	---
	10-09-92	ND	ND	ND
	01-07-93	ND	ND	ND
	04-23-93	---	ND	---
MW-4	01-07-93	ND	ND	ND
	04-23-93	---	ND	---
Detection Limit		50	50	50

ND = Not Detected

Chemical Concentration Contours.

Figures 4 and 5 show lines of equal concentration for Gasoline and Benzene in the shallow groundwater. Since these lines have been drawn based upon relatively limited data (four data points), the plot represents only a small portion of the respective concentration plume. The plot does suggest, however, that the dissolved concentrations are now centered somewhere around the area of monitoring well MW-3.

The shift in the location of the center of the concentration plume appears to coincide with the removal of the subsurface contamination source (contaminated soil beneath piping leak). The elevated petroleum hydrocarbons concentrations detected in well MW-3 are representative of residual concentrations that have migrated down-gradient of this location. With continued shallow groundwater movement beneath the site, future shallow groundwater sampling results are likely to reflect continued attenuation of concentrations due to hydrodynamic dispersion.

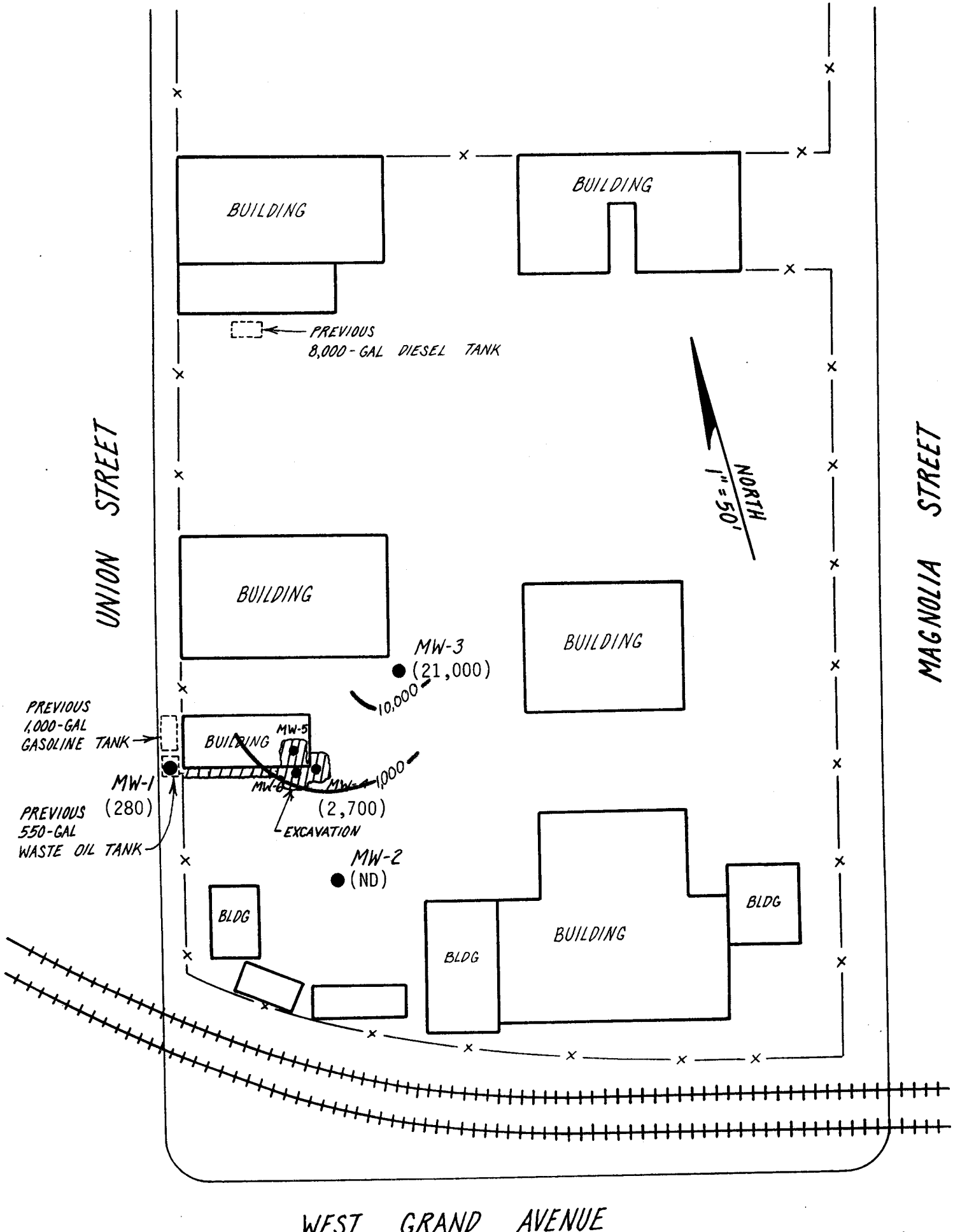

FIGURE 4. Lines of Equal Concentration of Gasoline in ug/L (ppb) in the Shallow Groundwater.

QUARTERLY GROUNDWATER SAMPLING REPORT
PACIFIC CRYOGENIC COMPANY
2311 Magnolia Street, Oakland, CA

May 24, 1993

EXP. 9-30-95

Gary Aguiar **RCE 34262**

Rick Milelli **Env. Engineer**

ATTACHMENT A

WELL SAMPLING LOGS

WELL SAMPLING LOG

Project/No. PACIFIC OXYGEN

Page 1 of 4

Site Location OAKLAND, CA

Date 4/23/93

Well No. MW 1

Time Began 1309

Weather CLOUDY / 65°F

Completed 1335

EVACUATION DATA

Description of Measuring Point (MP) WELL BOX AT GRADE

Total Sounded Depth of Well Below MP 19.50

Diameter of Casing 2"

- Depth to Water Below MP 4.10

= Water Column in Well 15.40

Gallons in Casing 2.5 + Annular Space (30% porosity) (x10) = Total Gallons 25

Gallons Pumped Prior to Sampling 25

Evacuation Method TEFLON BAILER

SAMPLING DATA / FIELD PARAMETERS

Inspection for Free Product: NONE DETECTED
(thickness to 0.1 inch, if any)

Time	1309	1315	1323	1330
Gals Removed	0	8	16	25
Temperature	17.6	17.6	17.3	17.8
Conductivity	500	600	550	550
pH	7.4	7.3	7.4	7.2
Color / Odor	CLR/NO	CLR/NO	CLR/ORG	GRY/ORG
Turbidity	LOW	LOW	LOW	MED

Comments: NONE

WELL SAMPLING LOG

Project/No. PACIFIC OXYGEN

Page 2 of 4

Site Location OAKLAND, CA

Date 4/23/93

Well No. MW 2

Time Began 1454
Completed 1545

Weather CLOUDY / 65°F

EVACUATION DATA

Description of Measuring Point (MP) WELL BOX AT GRADE

Total Sounded Depth of Well Below MP 23.14

Diameter of Casing 2"

- Depth to Water Below MP 7.31

= Water Column in Well 15.83

Gallons in Casing 2.5 + Annular Space (30% porosity) (X 10) = Total Gallons 25

Gallons Pumped Prior to Sampling 25

Evacuation Method TEFLON BAILER

SAMPLING DATA / FIELD PARAMETERS

Inspection for Free Product: NONE DETECTED
(thickness to 0.1 inch, if any)

Time	1454	1504	1515	1525
Gals Removed	0	8	16	25
Temperature	16.5	17.3	16.6	17.1
Conductivity	1600	1000	1100	1050
pH	7.1	7.3	7.3	7.3
Color / Odor	CLR/NO	BRN/NO	BRN/NO	BRN/NO
Turbidity	LOW	HIGH	MED	HIGH

Comments: NONE

WELL SAMPLING LOG

Project/No. PACIFIC OXYGEN

Page 3 of 34

Site Location OAKLAND, CA

Date 4/23/93

Well No. MW 3

Time Began 1435
Completed 1610

Weather CLOUDY / 65°F

EVACUATION DATA

Description of Measuring Point (MP) WELL BOX AT GRADE

Total Sounded Depth of Well Below MP 22.98

Diameter of Casing 2"

- Depth to Water Below MP 7.38

= Water Column in Well 15.60

Gallons in Casing 2.5 + Annular Space (30% porosity) (X10) = Total Gallons 25

Gallons Pumped Prior to Sampling 7

Evacuation Method TEFLON BAILER

SAMPLING DATA / FIELD PARAMETERS

Inspection for Free Product: NONE DETECTED
(thickness to 0.1 inch, if any)

		*	*	
Time	1435	1443	1535	
Gals Removed	0	5	7	
Temperature	17.2	17.5	17.9	
Conductivity	750	700	700	
pH	6.9	7.0	7.2	
Color / Odor	CLR/HC	GRY/HC	GRY/HC	
Turbidity	LOW	HIGH	HIGH	

Comments: * DEWATERED (EXTREMELY LOW RECHARGE)
NOTE: ONE CASING VOLUME ALLOWED TO RECHARGE BEFORE SAMPLING.

WELL SAMPLING LOG

Project/No. PACIFIC OXYGEN

Page 4 of 4

Site Location OAKLAND, CA

Date 4/23/93

Well No. MW 4

Time Began 1408

Weather CLOUDY / 65°F

Completed 1430

EVACUATION DATA

Description of Measuring Point (MP) WELL BOX AT GRADE

Total Sounded Depth of Well Below MP 14.20

- Depth to Water Below MP 6.66

Diameter of Casing 4"

= Water Column in Well 7.54

Gallons in Casing 4.8 + Annular Space (30% porosity) (NONE) = Total Gallons 4.8 (x4 = 19.3)

Gallons Pumped Prior to Sampling 20

Evacuation Method PVC BAILER

SAMPLING DATA / FIELD PARAMETERS

Inspection for Free Product: NONE DETECTED
(thickness to 0.1 inch, if any)

Time	1408	1413	1417	1425
Gals Removed	0	7	14	20
Temperature	17.2	17.1	16.9	17.1
Conductivity	750	750	700	700
pH	7.2	7.1	7.2	7.2
Color / Odor	LT. GRY / ORG	LT. GRY / ORG	LT. GRY / LT. HC	LT. GRY / LT. HC
Turbidity	MED	MED	MED	MED

Comments: NONE

ATTACHMENT B

ANALYTICAL RESULTS: GROUNDWATER

PRIORITY ENVIRONMENTAL LABS

Precision Environmental Analytical Laboratory

April 27, 1993 PEL # 9304062

HAGEMAN - AGUIAR, INC.

Attn: Jeffrey Roth
Re: Four water samples for Gasoline/BTEX and Diesel analyses.

Project name: Pacific Oxygen
Project location: Grand Ave., - Oakland, CA.

Date sampled: Apr 23, 1993 ✓ Date submitted: Apr 26, 1993
Date extracted: Apr 26-27, 1993 Date analyzed: Apr 26-27, 1993

RESULTS:

SAMPLE I.D.	Gasoline (ug/L)	Diesel (ug/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl Benzene (ug/L)	Total Xylenes (ug/L)
MW 1	280 ✓	N.D ✓	0.9 ✓	1.3	2.9	6.2
MW 2	N.D. ✓	N.D. ✓	N.D. ✓	N.D.	N.D.	N.D.
MW 3	21000 ✓	N.D. ✓	23 ✓	43	49	130
MW 4	2700 ✓	N.D. ✓	8.3 ✓	11	31	59
Blank	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Spiked Recovery	80.4%	91.0%	90.2%	94.3%	91.6%	104.2%
Duplicate Spiked Recovery	92.5%	90.7%	93.0%	86.8%	85.1%	95.2%
Detection limit	50	50	0.5	0.5	0.5	0.5
Method of Analysis	5030 / 8015	3510 / 8015	602	602	602	602

Sign?

PEL # 9304062

INV # 23555

CHAIN OF CUSTODY RECORD

NAME AND ADDRESS:
UNICAL OXYGEN
[illegible] AND Ave.
[illegible]KLAND, CA

SAMPLER: (Signature)

HAGEMAN - AGUIAR, INC.
3732 Mt. Diablo Blvd., Suite 372
Lafayette, CA 94549
(415)284-1661 (415)284-1664 (FAX)

SS NCE ER	DATE	TIME	SOIL	WATER	STATION LOCATION	TPH GAS/BTXE	TPH DIESEL	REMARKS
1	4-23-93	1335		X	MONITORING WELL #1	X	X	NORM TAT
2	4-23-93	1545		X	" " #2	X	X	↓
3	4-23-93	1610		X	" " #3	X	X	
4	4-23-93	1430		X	" " #4	X	X	

ANALYSIS REQUESTED

SHED BY: (Signature)	DATE 4-26-93 TIME 0945	RECEIVED BY: (Signature)	DATE TIME
SHED BY: (Signature)	DATE TIME	RECEIVED BY: (Signature)	DATE TIME
SHED BY: (Signature)	DATE TIME	RECEIVED BY: (Signature)	DATE TIME
SHED BY: (Signature)	DATE TIME	RECEIVED FOR LABORATORY BY: (Signature)	DATE 4-26-93 TIME 945