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

REPORT OF QUARTERLY GROUNDWATER SAMPLING

(sampled March 14, 1995)

PACIFIC CRYOGENIC COMPANY
2311 Magnolia Street
Oakland, CA

April 6, 1995

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,

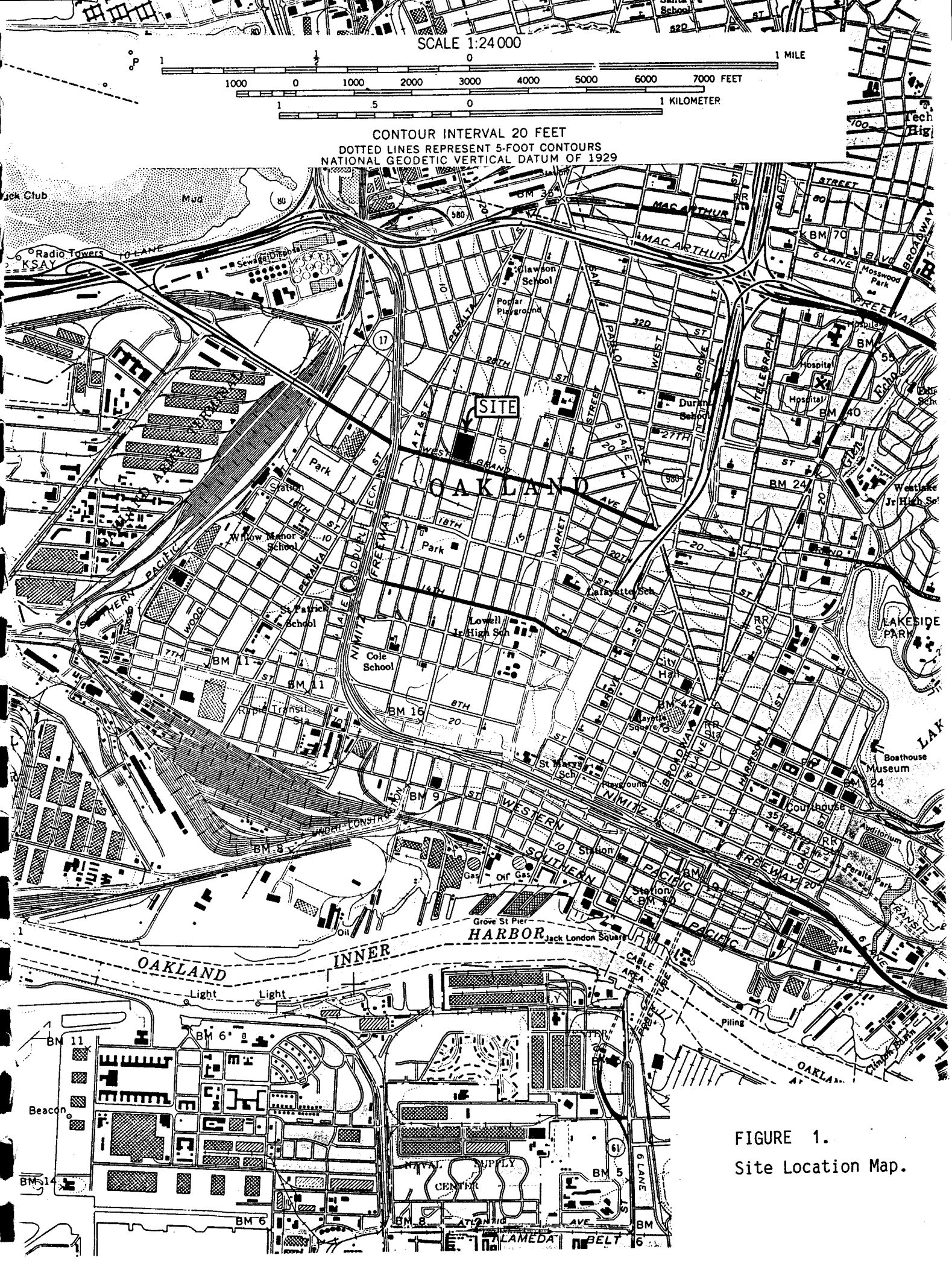


FIGURE 1.
Site Location Map.

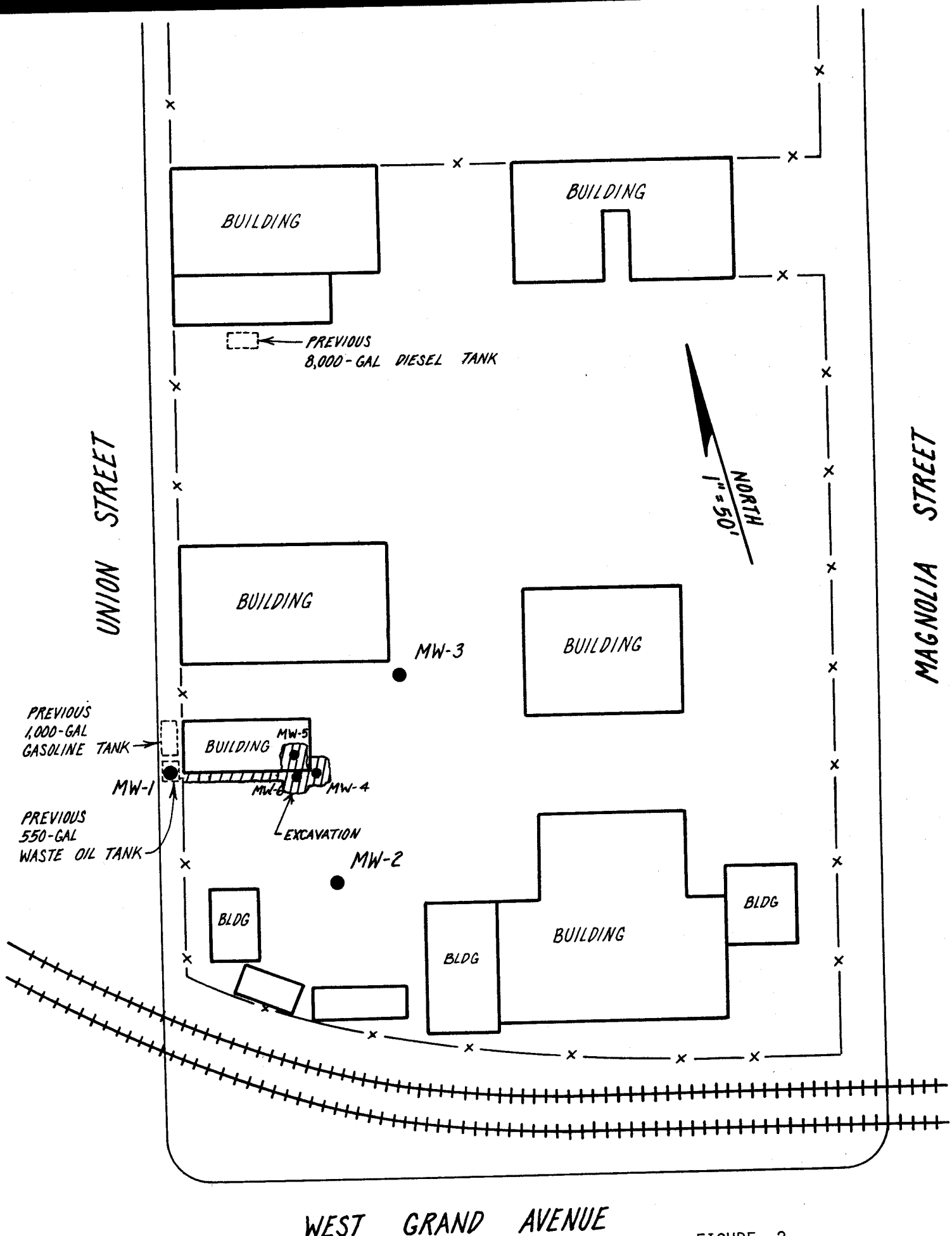


FIGURE 2.
Site Map.

Inc. (see Figure 2). During the removal process, several 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 March 14, 1995, 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 March 14, 1995, 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 bailing approximately 5 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.

III. RESULTS OF WATER LEVEL MEASUREMENTS

Shallow Groundwater Flow Direction

Shallow water table elevations were measured on March 14, 1995. 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 easterly 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 = 1.0'/73' = 0.0137.

Historical Water Level Measurements

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

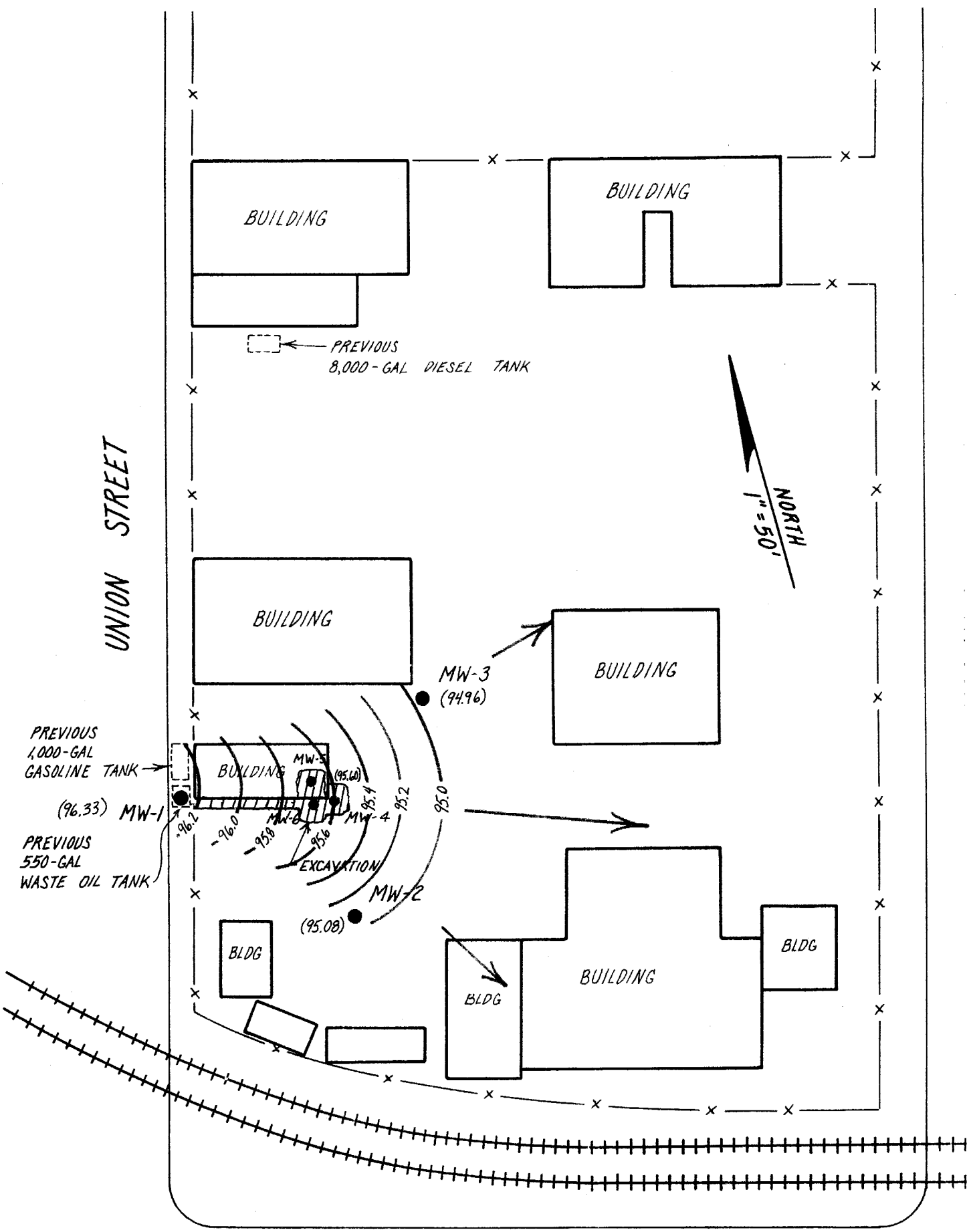


FIGURE 3. Shallow Groundwate Table Contour Map, measured March 14, 1995.

TABLE 2.

Historical Water Table Elevations
(feet)

Well	Date of Measurement								
	4-3-92	6-16-92	10-8-92	1-7-93	4-23-93	7-16-93	11-8-93	2-2-94	5-2-94
MW-1	95.58	92.01	91.11	97.17	95.17	92.07	91.78	94.42	93.55
MW-2	93.25	91.60	90.83	94.24	92.69	91.46	91.04	92.55	92.19
MW-3	92.52	91.87	90.65	94.43	92.64	91.21	91.14	92.21	91.94
MW-4	---	---	---	---	---	91.48	91.16	92.67	92.37
Flow Direction	SE	SE	E	SE	SE	E	SE	E	E

Well	Date of Measurement								
	8-3-94	8-3-94	11-4-94	3-14-95					
MW-1	---	90.96	90.96	96.33					
MW-2	91.25	90.77	90.77	95.08					
MW-3	91.00	90.57	90.57	94.96					
MW-4	91.26	90.74	90.74	95.60					
Flow Direction	E	E	E	E					

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, Kerosene, Mineral Spirits and Motor Oil (EPA method 8015).

Results of Groundwater Sampling

Tables 3 and 4 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-3 and MW-4 at concentrations of 2,500 µg/L (ppb) and 120 µg/L (ppb), respectively. In addition, Benzene was detected in the groundwater samples collected from wells MW-3 and MW-4 at concentrations of 9.5 µg/L (ppb) and 3.6 µg/L (ppb), respectively.

As shown in Table 4, for this round of sampling, Total Petroleum Hydrocarbons as Diesel, Kerosene, Mineral Spirits or Motor Oil **were not detected** in the groundwater samples collected from wells MW-1, MW-2, MW-3 and MW-4.

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	---	1200	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
	07-16-93	110	ND	ND	0.5	1.1
	11-08-93	ND	ND	ND	ND	ND
	01-28-94	190	5.7	4.9	6.7	21
	05-02-94	ND	ND	ND	ND	ND
	08-03-94	ND	ND	ND	ND	ND
	11-04-94	ND	ND	ND	ND	ND
	03-14-95	ND	ND	ND	ND	ND
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
	07-16-93	ND	ND	ND	ND	ND
	11-08-93	ND	ND	ND	ND	ND
	01-28-94	ND	ND	ND	ND	ND
	05-02-94	ND	ND	ND	ND	ND
	08-03-94	ND	ND	ND	ND	ND
	11-04-94	ND	ND	ND	ND	ND
	03-14-95	ND	ND	ND	ND	ND
Detection Limit		50	0.5	0.5	0.5	0.5

ND = Not Detected

TABLE 3. (continued)
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-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
	07-16-93	16,000	19	21	25	78
	11-08-93	10,000	4.3	5.7	7.9	35
	01-28-94	7,500	8.5	10	50	95
	05-02-94	22,000	69	39	60	110
	08-03-94	2,500	35	12	27	25
	11-04-94	2,900	4.0	8.1	18	27
	03-14-95	2,500	9.5	3.0	4.6	8.3
MW-4	01-07-93	4,800	6.4	25	60	110
	04-23-93	2,700	8.3	11	31	59
	07-16-93	3,000	3.7	4.2	4.9	15
	11-08-93	1,400	0.6	0.8	1.1	4.8
	01-28-94	830	8.5	10	12	27
	05-02-94	900	7.3	3.2	0.5	14
	08-03-94	1,000	22	0.7	8.0	7.4
	11-04-94	160	0.6	ND	1.9	2.9
	03-14-95	120	3.6	ND	ND	3.7
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 Mineral Spirits (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	---	---
	07-16-93	---	**59**	---	---
	11-08-93	---	ND	---	---
	01-28-94	ND	ND	ND	ND
	05-02-94	ND	ND	ND	ND
	08-03-94	ND	ND	ND	ND
	11-04-94	ND	ND	ND	ND
	03-14-95	ND	ND	ND	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	---	---
	07-16-93	---	ND	---	---
	11-08-93	---	ND	---	---
	01-28-94	ND	ND	ND	ND
	05-02-94	ND	ND	ND	ND
	08-03-94	ND	ND	ND	ND
	11-04-94	ND	ND	ND	ND
	03-14-95	ND	ND	ND	ND
Detection Limit		50	50	50	50

ND = Not Detected

TABLE 4. (continued)
Shallow Groundwater Sampling Results

Well	Date	TPH as Kerosene (ug/L)	TPH as Diesel (ug/L)	TPH as Mineral Spirits (ug/L)	TPH as Motor Oil (ug/L)
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	---	---
	07-16-93	---	ND	---	---
	11-08-93	---	ND	---	---
	01-28-94	ND	**310**	**370**	ND
	05-02-94	ND	ND	ND	ND
	08-03-94	ND	ND	ND	ND
	11-04-94	ND	ND	ND	ND
	03-14-95	ND	ND	ND	ND
MW-4	01-07-93	ND	ND	---	ND
	04-23-93	---	ND	---	---
	07-16-93	---	ND	---	---
	11-08-93	---	ND	---	---
	01-28-94	ND	**160**	**180**	ND
	05-02-94	ND	ND	ND	ND
	11-04-94	ND	ND	ND	ND
	03-14-95	ND	ND	ND	ND
Detection Limit		50	50	50	50

ND = Not Detected

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

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.

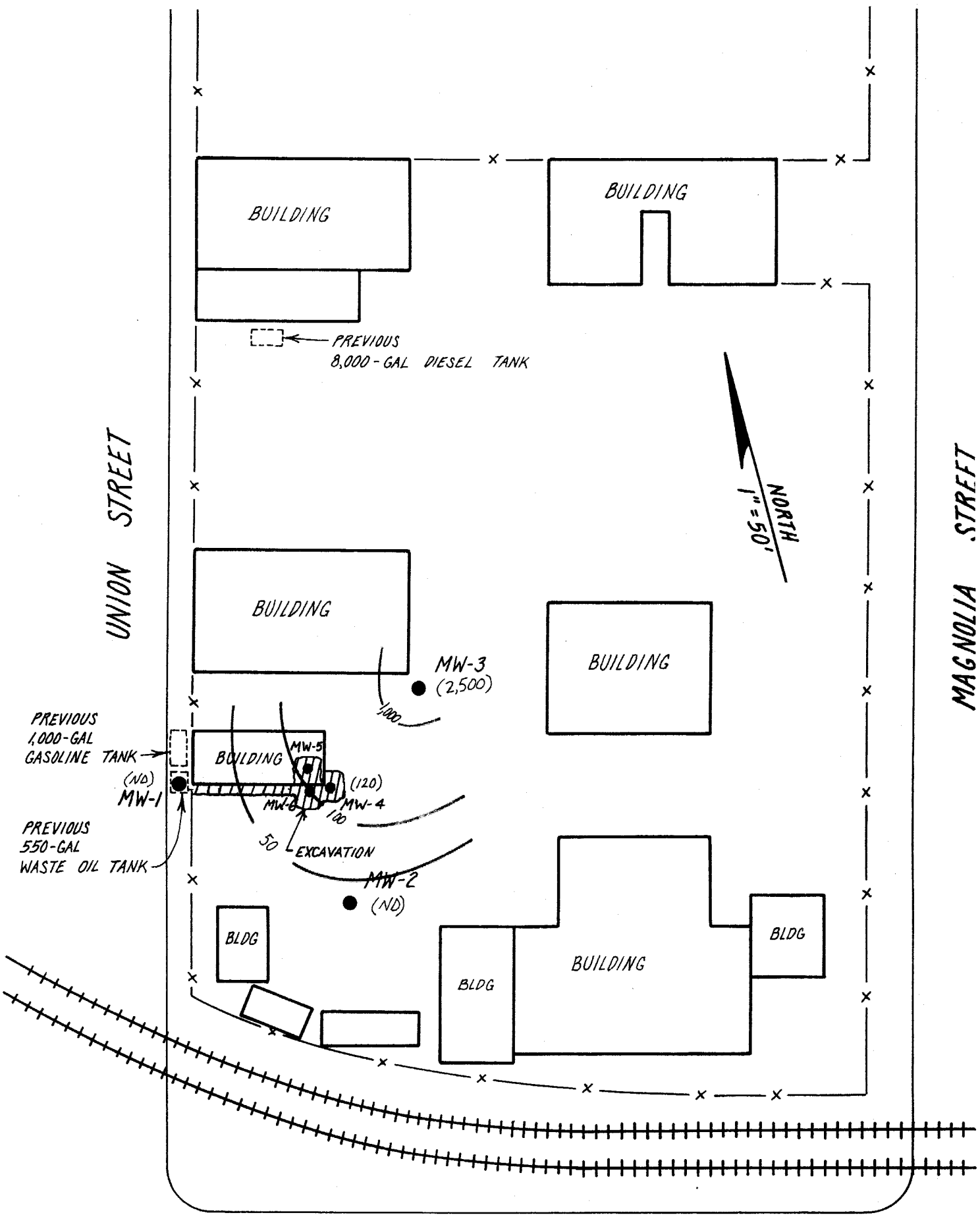


FIGURE 4. Lines of Equal Concentration of Gasoline in ug/L (ppb) in the Shallow Groundwater. (March 14, 1995)

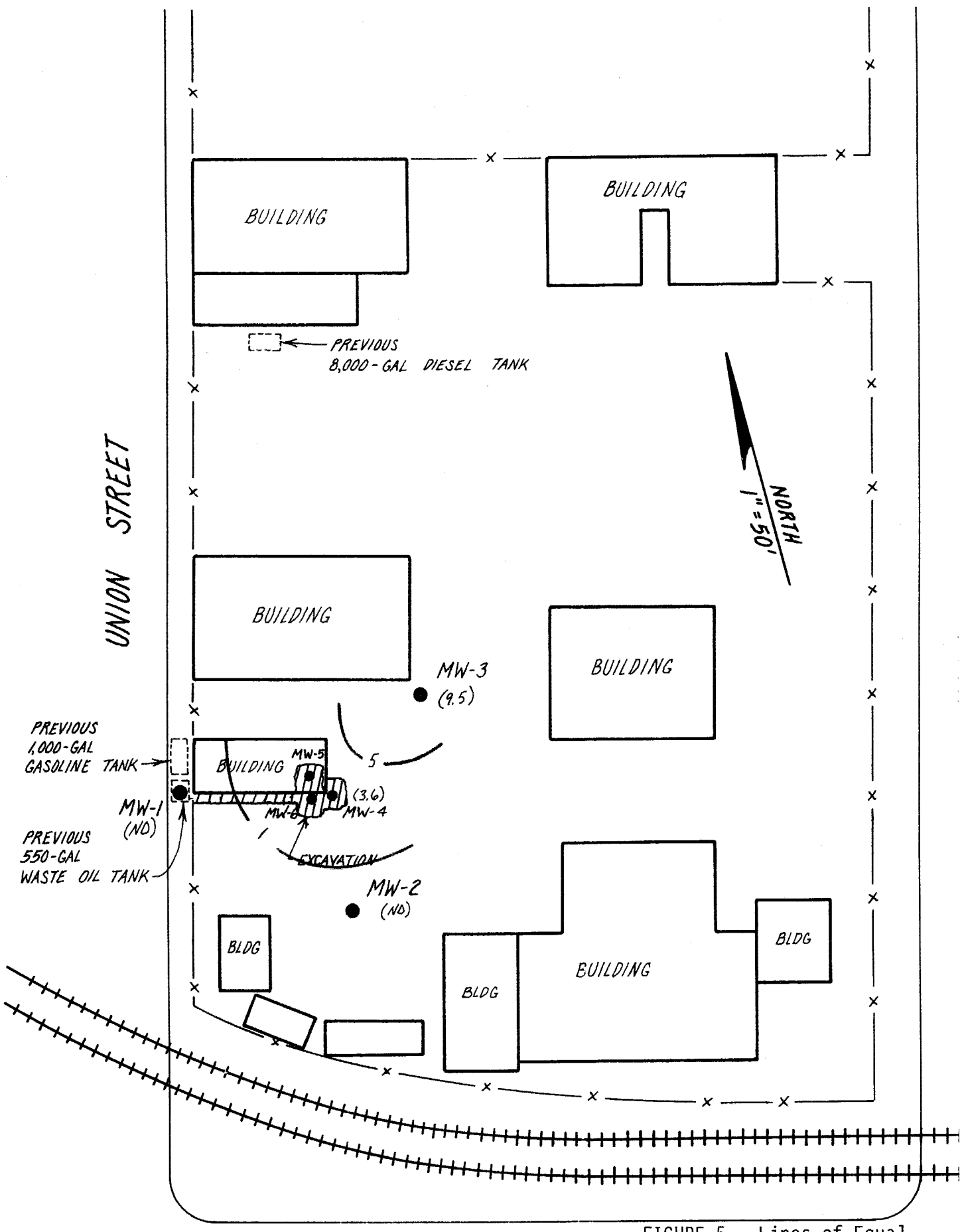
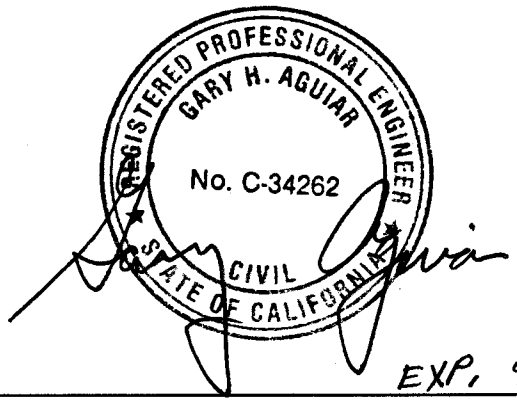


FIGURE 5. Lines of Equal Concentration of Benzene in ug/L (ppb) in the Shallow Groundwater. (March 14, 1995)

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

April 6, 1995



EXP, 9-30-95

Gary Aguiar **RCE 34262**

Gerard F. Aarons 4-6-95

Gerard F. Aarons **Geologist**

ATTACHMENT A

Well Sampling Logs

WELL SAMPLING LOG

Project/No. Pacific Oxygen

Page 1 of 4

Site Location Oakland CA

Date 3/14/95

Well No. MW-1

Time Began 9:40
Completed 13:00

Weather Cloudy Mid 60°

EVACUATION DATA

Description of Measuring Point (MP) Well Box at Grade

Total Sounded Depth of Well Below MP 19.19'

- Depth to Water Below MP 2.94'

Diameter of Casing 2"

= Water Column in Well 16.25'

Gallons in Casing 2.65 + Annular Space (30% porosity) x10 = Total Gallons 26.5

Gallons Pumped Prior to Sampling 25

Evacuation Method PVC Bailer

SAMPLING DATA / FIELD PARAMETERS

Inspection for Free Product: None, Light Fuel Smell, Low Turb.
(thickness to 0.1 inch, if any)

Time	11:18	11:29	11:35	11:42
Gals Removed	5	15	20	25
Temperature	65.5	67.1	66.0	66.5
Conductivity	840	830	810	810
pH	6.76	6.66	6.71	6.70
Color / Odor	Grey Tint, Fuel Smell, Sheen Observed	Grey Tint Fuel Smell Sheen Observed	Grey Tint Fuel Smell Sheen Observed	Grey Tint Fuel Smell Sheen Observed
Turbidity	mod	mod	mod	Mod

Comments: Strong Fuel Smell In All The Buckets, A Greasy Sheen was also present.
A Sheen on water in the gutter next to the well was observed.

WELL SAMPLING LOG

Project/No. Pacific Oxygen

Page 2 of 4

Site Location Oakland CA

Date 3/14/95

Well No. MW-2

Time Began 9:40

Weather Cloudy Mid 60°F

Completed

EVACUATION DATA

Description of Measuring Point (MP) Well Box @ Grade

Total Sounded Depth of Well Below MP 23.06

- Depth to Water Below MP 4.92

Diameter of Casing 2"

= Water Column in Well 18.14

Gallons in Casing 2.99 + Annular Space (30% porosity) (x10) = Total Gallons 29.90

Gallons Pumped Prior to Sampling 25

Evacuation Method PVC Bailer

SAMPLING DATA / FIELD PARAMETERS

Inspection for Free Product: None Clear
(thickness to 0.1 inch, if any)

Time	12:00	12:06	12:14	12:20
Gals Removed	10	15	20	25
Temperature	64.9	64.2	63.8	63.8
Conductivity	1520	1580	1530	1530
pH	6.92	6.93	6.98	6.98
Color / Odor	Grey Small Sheen	Grey Small Sheen	Grey Small Sheen	Grey Small Sheen
Turbidity	mod	mod	mod/High	mod/High

Comments: It began to rain during well bailing

WELL SAMPLING LOG

Project/No. Pacific Oxygen

Page 3 of 4

Site Location Oakland CA

Date 3/14/95

Well No. MW-3

Time Began 9:40
Completed 15:00

Weather Cloudy 60°F

EVACUATION DATA

Description of Measuring Point (MP) Well Box @ Grade

Total Sounded Depth of Well Below MP 22.64

- Depth to Water Below MP 5.06

Diameter of Casing 2"

= Water Column in Well 17.58

Gallons in Casing 2.85 + Annular Space (30% porosity) (x10) = Total Gallons 28.50

Gallons Pumped Prior to Sampling _____

Evacuation Method PVC Bailer

SAMPLING DATA / FIELD PARAMETERS

Inspection for Free Product: None, Light Fuel Smell, Clear
(thickness to 0.1 inch, if any)

Time	12:32	13:03	13:22	13:40
Gals Removed	5	7	8	9
Temperature	64.2	63.6	63.8	63.6
Conductivity	1160	1140	1150	1140
pH	6.68	6.81	6.75	6.69
Color / Odor	muddy Gray Fuel Smell	muddy Gray Fuel Smell	muddy Gray Fuel Smell	muddy Gray Fuel Smell
Turbidity	High	High	High	High

Comments: Well dewatered after 7 galbns - extremely slow recharge.

WELL SAMPLING LOG

Project/No. Pacific Oxygen

Page 4 of 4

Site Location Oakland CA

Date 3/14/95

Well No. MW-4

Time Began 9:40

Weather Overcast 60°F

Completed

EVACUATION DATA

Description of Measuring Point (MP) Well Box @ Grade

Total Sounded Depth of Well Below MP 13.97

- Depth to Water Below MP 4.35

Diameter of Casing 4"

= Water Column in Well 9.62

Gallons in Casing 6.2 + Annular Space (30% porosity) (None / Tank p.t) = Total Gallons 6.2

Gallons Pumped Prior to Sampling 15

Evacuation Method PVC Bailer

SAMPLING DATA / FIELD PARAMETERS

Inspection for Free Product: None, Low Turb
(thickness to 0.1 inch, if any)

Time	10:53	11:00	11:03	11:07
Gals Removed	0	5	10	15
Temperature	70.9	68.0	65.4	65.3
Conductivity	780	790	790	800
pH	6.63	6.68	6.70	6.72
Color / Odor	Clear, No Odor	Clear, No Odor	Clear, No Odor	Clear, No Odor
Turbidity	Low	Low	Low	Low

Comments:

ATTACHMENT B

ANALYTICAL RESULTS: GROUNDWATER

PRIORITY ENVIRONMENTAL LABS

Precision Environmental Analytical Laboratory

March 17, 1995 PEL # 9503038

HAGEMAN - AGUIAR, INC.

Attn: Mark Hainsworth
Re: Four water samples for Gasoline/BTEX and TEPH analyses.

Project name: Pacific Oxygen
Project location: Magnolia, Oakland, CA.

Date sampled: Mar 14, 1995 Date submitted: Mar 15, 1995
Date extracted: Mar 15-17, 1995 Date analyzed: Mar 15-17, 1995

RESULTS:

SAMPLE I.D.	Kerosene (ug/L)	Gasoline (ug/L)	Diesel (ug/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl Benzene (ug/L)	Total Xylenes (ug/L)	Motor Oil (mg/L)	Stoddard Solvent (ug/L)
MW-1	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
MW-2	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
MW-3	N.D.	2500	N.D.	9.5	3.0	4.6	8.3	N.D.	N.D.
MW-4	N.D.	120	N.D.	3.6	N.D.	N.D.	3.7	N.D.	N.D.
Blank	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Spiked Recovery	---	86.7%	91.7%	88.0%	102.4%	88.9%	87.1%	---	---
Detection limit	50	50	50	0.5	0.5	0.5	0.5	0.5	50
Method of Analysis	3510/ 8015	5030 / 8015	3510 / 8015	602	602	602	602	3510 / 8015	3510/ 8015

David Duong
Laboratory Director

1764 Houret Court Milpitas, CA. 95035 Tel: 408-946-9636 Fax: 408-946-9663

PEL # 9503038

CHAIN OF CUSTODY RECORD

INV # 25762

PROJECT NAME AND ADDRESS:
Pacific Oxygen
Magnolia
Oakland CA

SAMPLER: (Signature) Mark Hammond

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

CROSS REFERENCE NUMBER	DATE	TIME	SOIL	WATER	STATION LOCATION	ANALYSIS REQUESTED: TPH Gas / BTXE	TEPH						REMARKS
MW-1	3/14/95			X	Monitor Well #1		X	X					
MW-2	3/14/95			X	#2		X	X					
MW-3	3/14/95			X	#3		X	X					
MW-4	3/14/95			X	#4		X	X					

RELINQUISHED BY: (Signature) Mark Hammond	DATE 3/14/95 TIME 4:54	RECEIVED BY: (Signature)	DATE 3/14/95 TIME 4:55 PM
RELINQUISHED BY: (Signature)	DATE TIME	RECEIVED BY: (Signature)	DATE TIME
RELINQUISHED BY: (Signature)	DATE TIME	RECEIVED BY: (Signature)	DATE TIME
RELINQUISHED BY: (Signature)	DATE TIME	RECEIVED FOR LABORATORY BY: (Signature) PEL	DATE TIME