Kaiser Foundation Health Plan, Inc.
Project Production Department
P.O. Box 12916
Oakland, California 94604-2916
(415) 987-2131

92 APR -6 PM 1:09

KAISER PERMANENTE

April 2, 1992

Ms. Susan Hugo
Alameda County Department of Health Services
80 Swan Way, Ste: 200
Oakland, CA 94621

Subject: **KAISER OAKLAND MEDICAL CENTER**
280 West MacArthur Blvd.
Ground Water Monitoring Report

Dear Ms. Hugo:

Enclosed please find one copy of the groundwater monitoring program for the Kaiser Oakland Medical Center. Please contact us of you have any questions regarding this report.

Very Truly Yours,

John F. Adams

John F. Adams
Project Manager
Facilities Design and Construction

Enclosure

JFA/rlmc
corresp.002

100 Pine Street, 10th Floor
San Francisco, CA 94111
(415) 434-9400 • FAX (415) 434-1365

GEOMATRIX

30 March 1992
Project 1459.05

Mr. John Adams, Project Manager
Kaiser Foundation Health Plan
1950 Franklin Street, 11th Floor
Oakland, California 94612-2998

Subject: Groundwater Monitoring Report: October 1991 - December 1991
Kaiser Permanente Medical Center
280 West MacArthur Boulevard
Oakland, California

Dear Mr. Adams:

Enclosed is the subject report for groundwater monitoring at the Kaiser Permanente Medical Center. One copy of this report should be sent to Ms. Susan Hugo at the Alameda County Department of Health Services, and one to Mr. Rich Hyatt at the California Regional Water Quality Control Board, San Francisco Bay Region.

We appreciate the opportunity to provide our consulting engineering services to Kaiser. Please contact either of the undersigned if you have any questions or require further information.

Sincerely yours,

GEOMATRIX CONSULTANTS, INC.

Cheri D. Young
Project Manager

Tom Graf, P.E.
Principal Engineer

CDY/TG/bap
CONTR/1459-GWR.LTR

Enclosure

cc: Mr. Ken Ayers - Kaiser Permanente Medical Center
Ms. Fonda Karelitz - Kaiser Foundation Health Plan
Mr. Tom Wilkes - Kaiser Permanente Medical Center
Mr. Mark Zemelman - Kaiser Foundation Health Plan

GEOMATRIX

GROUNDWATER MONITORING REPORT
OCTOBER 1991 - DECEMBER 1991

Kaiser Permanente Medical Center
280 West MacArthur Boulevard
Oakland, California

Prepared for

Kaiser Foundation Health Plan
1950 Franklin Street, 11th Floor
Oakland, California 94612

30 March 1992
Project No. 1459.05

Geomatrix Consultants

GEOMATRIX

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GEOMATRIX

GROUNDWATER MONITORING REPORT
OCTOBER 1991 - DECEMBER 1991

Kaiser Permanente Medical Center
280 West MacArthur Boulevard
Oakland, California

1.0 INTRODUCTION

At the request of Kaiser Foundation Health Plan (Kaiser), Geomatrix Consultants, Inc. (Geomatrix), conducted groundwater monitoring activities between 1 October 1991 and 31 December 1991 at the Kaiser Permanente Medical Center (Kaiser Hospital) at 280 W. MacArthur Boulevard in Oakland, California (Figure 1). These activities constitute the fourth quarter of the four quarters of groundwater sampling requested by Kaiser. Previous site characterization efforts, including results of the first quarter's groundwater monitoring, are reported in "Site Characterization and Remediation: Mineral Spirits in Soil," dated 5 April 1991 (Geomatrix, 1991a). The second and third quarter results are reported in "Groundwater Monitoring Report, April - September 1991," dated 31 October 1991 (Geomatrix, 1991). Additional previous soil investigations for mineral spirits were reported in "Site Characterization Report: Mineral Spirits in Soil," dated May 1990 (Geomatrix, 1990).

During the three-month period from October through December 1991, groundwater from the monitoring wells was collected and analyzed in December, and water levels were measured monthly. This report describes these activities and the results, and contains all the historical chemical and water-level information for the monitoring wells.

2.0 GROUNDWATER ELEVATIONS

The locations of the six project monitoring wells are shown on Figure 2. Depths to groundwater were measured in the six wells on 9 October, 14 November, and 17 December 1991; these water levels were recorded to the nearest 0.01 foot. Water levels were

measured from the surveyed measuring point with an electric sounder. Groundwater elevation data for this quarter as well as all historical results are summarized in Table 1. Potentiometric surface maps based on these data for the current quarter are presented as Figures 3 through 5. In October and December 1991, four of the wells were dry due to the current drought conditions. Therefore, contours of the potentiometric surface elevation were not presented on the figures for these months.

As described in our report titled "Site Characterization and Remediation: Mineral Spirits in Soil" (Geomatrix, 1991a), the screen interval of well MW-5 intersects the uppermost water-bearing zone approximately seven feet deeper than the uppermost water-bearing zone intersected by well MW-6. Historically, the water levels in well MW-5 have been consistently lower than those in well MW-6. Stratigraphic data suggests that well MW-6 is correlative to the zones intersected by the other monitoring wells. Therefore, the potentiometric surface contours are based on the water level data from MW-6, rather than from MW-5.

3.0 GROUNDWATER SAMPLING

Groundwater sampling for this quarter was performed on 17 December 1991. The sampling methodology and results are described below.

3.1 METHODOLOGY

Before sampling the groundwater, the wells were purged using a stainless steel bailer. All equipment entering monitoring wells was washed with Alconox and rinsed with distilled water before each use. To obtain groundwater representative of site conditions, the wells were purged until the temperature, pH, and specific conductance of the purged groundwater had stabilized and at least four casing volumes had been removed. Groundwater purged from the monitoring wells was placed in a labeled 55-gallon drum on site for temporary storage.

After the monitoring wells were purged, groundwater samples were collected using a clean Teflon bailer. The samples were placed in an ice-cooled chest for delivery to the analytical laboratory under Geomatrix chain-of-custody procedures.

Samples were analyzed by Anametrix, Inc., of San Jose. Mineral spirits were analyzed using modified EPA Method 8015, benzene, toluene, ethylbenzene and xylenes (BTEX) were analyzed using modified EPA method 8020, and volatile organic compounds (VOCs) were analyzed using EPA Method 8240. Analytical results are summarized in Table 2. Copies of the laboratory analytical reports and chain-of-custody records for the current quarter are included in Appendix A.

3.2 RESULTS

During the December monitoring event, groundwater samples were collected from MW-3 and MW-5 for analysis of mineral spirits and BTEX, and from MW-5 for analysis of VOCs. There was insufficient water in wells MW-1, MW-2, MW-4 and MW-6 to collect any samples during this monitoring event.

Table 2 summarizes the analyses performed and the results for the current quarters as well as all monitoring events to date. No mineral spirits or the related compounds of benzene, toluene, xylene, and ethylbenzene were detected in any on-site wells in December 1991.

4.0 CONCLUSIONS

The six monitoring wells on-site provide an adequate groundwater sample distribution with which to characterize the shallow groundwater quality at the site. The wells have been installed in the uppermost groundwater-bearing zone below the site which is seasonally dry in all but the lowest elevations of the zone. Groundwater elevation data collected monthly from November 1990 through December 1991 indicates a consistent pattern of shallow groundwater flow toward monitoring wells MW-4 and MW-2, and from MW-4 toward MW-2 during both wet and dry seasons. These two wells are located downgradient of both

soil areas containing mineral spirits, which are on the hillside by the emergency water tank and below the mechanical building. These areas and the well locations are shown on Figure 2. Wells MW-5 and MW-6 are located downgradient of the February 1990 excavation near the mechanical building (Figure 2), where mineral spirits were detected in vadose zone soil.

Mineral spirits have not been detected in groundwater samples from four quarters of monitoring, and the related compounds of benzene, toluene, xylenes, and ethylbenzene have also not been detected with the exception of trace concentrations of toluene and xylenes in well MW-3 in November 1990. These compounds were not detected in four sampling periods from well MW-3 in 1991. It is apparent, based on these results, that shallow groundwater is not affected by the release of mineral spirits to the soil.

The potential for future migration of mineral spirits to the groundwater is very low. Near both the hillside and the mechanical building, most of the soil that contained mineral spirits has been removed (Geomatrix, 1990). Mineral spirits are long-chain hydrocarbons that have a relatively low solubility in water and therefore are trapped easily in pore spaces of the soil matrix and are not easily transported downward by percolating groundwater. The maximum concentration of mineral spirits on the hillside occurs within the upper two feet, and it is likely the mineral spirits have already migrated to their maximum depth.

5.0 RECOMMENDATIONS

To achieve inactive status for this site by documenting that shallow groundwater has not been affected by the release of mineral spirits to the soil, we recommend that groundwater samples from the six monitoring wells be collected annually in March when groundwater elevations are expected to be at their highest for the year. Four years of annual sampling, which would complete a total of five years of groundwater sampling at the site, is considered adequate to indicate the remaining soil containing mineral spirits will not be a future threat to groundwater.

Groundwater samples would be analyzed for total petroleum hydrocarbons as mineral spirits by modified EPA Method 5030/8015, and for benzene, toluene, xylene, and ethylbenzene by EPA Method 8020. Samples from wells MW-1, MW-2, MW-4, and MW-5 would also be analyzed for volatile organics by EPA Method 8010. Water-levels of all wells would be measured quarterly in December, March, June, and September. The water level data would be used to assess the seasonal variability of the groundwater gradient.

An annual report summarizing and analyzing the previous year of data would be prepared. The report would cover a sampling year from April through March and would be completed on 15 May of each year. The first annual report would be prepared in May 1992. The groundwater sampling program would be reevaluated at the end of five years of sampling (May 1995).

6.0 REFERENCES

Geomatrix Consultants, Inc., 1990, Site Characterization Report: Mineral Spirits in Soil, Kaiser Permanente Medical Center, 280 W. MacArthur Boulevard, Oakland, California, 8 May 1990.

Geomatrix Consultants, Inc., 1991a, Site Characterization and Remediation: Mineral Spirits in Soil; Kaiser Permanente Medical Center, 280 W. MacArthur Boulevard, Oakland, California, 5 April 1991.

Geomatrix Consultants, Inc., 1991b, Groundwater Monitoring Report, April-September 1991, Kaiser Permanente Medical Center, 280 W. MacArthur Boulevard, Oakland, California, 31 October 1991.

GEOMATRIX

TABLE 1

WATER-LEVEL MEASUREMENTS

November 1990 through September 1991
Kaiser Permanente Medical Center
Oakland, California

Date	Well I.D.	Measuring Point Elevation (ft.)	Depth to Water (ft.)	Groundwater Elevation (ft.)
11/19/90	MW-1	71.78	5.19	66.59
	MW-2	82.10	20.70	61.40
	MW-3	102.04	40.52	61.52
	MW-4	82.57	dry	--
11/20/90	MW-1	71.78	5.20	66.58
	MW-2	82.10	20.42	61.68
	MW-3	102.04	41.08	60.96
	MW-4	82.57	dry	--
11/26/90	MW-1	71.78	4.73	67.05
	MW-2	82.10	20.34	61.76
	MW-3	102.04	40.25	61.79
	MW-4	82.57	dry	--
1/2/91	MW-1	71.78	5.13	66.65
	MW-2	82.10	20.15	61.95
	MW-3	102.04	40.11	61.93
	MW-4	82.57	dry	--
2/7/91	MW-1	71.78	5.67	66.11
	MW-2	82.10	19.96	62.14
	MW-3	102.04	40.07	61.97
	MW-4	82.57	dry	--
	MW-5	71.81	10.62	61.19
	MW-6	71.82	6.29	65.53
3/7/91	MW-1	71.78	5.40	66.38
	MW-2	82.10	19.70	62.40
	MW-3	102.04	39.55	62.49
	MW-4	82.57[1]	18.39	64.18
	MW-5	71.81	9.76	62.05
	MW-6	71.82	5.77	66.05

GEOMATRIX

TABLE 1

WATER-LEVEL MEASUREMENTS

Date	Well I.D.	Measuring Point Elevation (ft.)	Depth to Water (ft.)	Groundwater Elevation (ft.)
4/11/91	MW-1	71.78	5.14	66.64
	MW-2	82.10	17.97	64.13
	MW-3	102.04	38.05	63.99
	MW-4	82.58[2]	16.85	65.73
	MW-5	71.81	8.43	63.38
	MW-6	71.82	5.57	66.25
5/6/91	MW-1	71.78	6.14	65.64
	MW-2	82.10	18.85	63.25
	MW-3	102.04	38.62	63.42
	MW-4	82.58	18.49	64.09
	MW-5	71.81	9.19	62.62
	MW-6	71.82	6.74	65.08
6/11/91	MW-1	71.78	dry	--
	MW-2	82.10	19.56	62.54
	MW-3	102.04	39.25	62.79
	MW-4	82.58	19.35	63.23
	MW-5	71.81	7.57	62.04
	MW-6	71.82	9.77	64.25
7/24/91	MW-1	71.78	5.75	66.03
	MW-2	82.10	20.17	61.93
	MW-3	102.04	39.62	62.42
	MW-4	82.58	19.85	62.73
	MW-5	71.81	9.88	61.93
	MW-6	71.82	7.68	64.14
8/14/91	MW-1	71.78	5.32	66.46
	MW-2	82.10	20.17	61.93
	MW-3	102.04	39.81	62.23
	MW-4	82.58	19.71	62.87
	MW-5	71.81	10.30	61.51
	MW-6	71.82	8.79	63.03

GEOMATRIX

TABLE 1

WATER-LEVEL MEASUREMENTS

Date	Well I.D.	Measuring Point Elevation (ft.)	Depth to Water (ft.)	Groundwater Elevation (ft.)
9/11/91	MW-1	71.78	5.80	65.98
	MW-2	82.10	20.53	61.57
	MW-3	102.04	40.22	61.91
	MW-4	82.58[1]	dry	--
	MW-5	71.81	10.67	61.14
	MW-6	71.82	8.95	62.87
10/9/91	MW-1	71.78	dry	--
	MW-2	82.10	dry	--
	MW-3	102.04	40.45	61.59
	MW-4	82.58[1]	dry	--
	MW-5	71.81	10.95	60.86
	MW-6	71.82	dry	--
11/14/91	MW-1	71.78	dry	--
	MW-2	82.10	20.68	61.42
	MW-3	102.04	40.25	61.79
	MW-4	82.58[1]	dry	--
	MW-5	71.81	10.70	61.11
	MW-6	71.82	8.59	63.23
12/17/91	MW-1	71.78	dry	--
	MW-2	82.10	dry	--
	MW-3	102.04	40.37	61.67
	MW-4	82.58[1]	dry	--
	MW-5	71.81	10.87	60.94
	MW-6	71.82	dry	--

[1] Top of casing cracked.
[2] Measuring point resurveyed on 11 April 1991 by Bates and Bailey Land Surveyors of Berkeley, California.

GEOMATRIX

TABLE 2

SUMMARY OF ANALYTICAL RESULTS FOR GROUNDWATER[1]

November 1990 through December 1991
Kaiser Permanente Medical Center
Oakland, California

Concentrations in micrograms per liter (μg/l) or parts per billion (ppb)

Well No.	Date Sampled	Mineral Spirits	Benzene	Toluene	Ethyl-benzene	Xylenes	EPA Method 8240 Compounds Detected[2]	EPA Method 8270 Compounds Detected
MW-1	11/20/90	<1000[3]	<0.5	<0.5	<0.5	<0.5	--[4]	--
	1/2/91	--	--	--	--	--	--	None
	1/4/91	--	--	--	--	--	6.0 Chloroform	--
	2/7/91	<50	<0.5	<0.5	<0.5	<0.5	8.0 1,1,-DCA	--
	3/7/91	<50	--	--	--	--	--	--
	9/11/91	<50	<0.5	<0.5	<0.5	<0.5	None	--
MW-2	11/29/90	<50	<0.5	<0.5	<0.5	<0.5	--	--
	1/3/91	--	--	--	--	--	7.0 PCE 7.0 Freon 11	--
	1/4/91	--	--	--	--	--	--	None[5]
	2/7/91	<50	<0.5	<0.5	<0.5	<0.5	None	--
	3/7/91	<50	--	--	--	--	--	None
	6/12/91	<50	<0.5	<0.5	<0.5	<0.5	9.0 Freon 11	None
	9/11/91	<50	<0.5	<0.5	<0.5	<0.5	8.0 Freon 11 3.0 Chloroform 11 PCE	--
MW-3	11/27/90	<50	<0.5	0.6	<0.5	2.3	--	--
	1/3/91	--	--	--	--	--	None	None
	2/7/91	<50	<0.5	<0.5	<0.5	<0.5	--	--
	6/12/91	<50	<0.5	<0.5	<0.5	<0.5	--	--
	9/11/91	<50	<0.5	<0.5	<0.5	<0.5	--	--
	12/17/91	<50	<0.5	<0.5	<0.5	<0.5	--	--
MW-4	3/11/91	<50	<0.5	<0.5	<0.5	<0.5	9.0 PCE	--[7]
MW-5	2/1/91	<50	--[6]	--[6]	--[6]	--[6]	25 Freon 11	None
	2/25/91	--	<0.5	<0.5	<0.5	<0.5	--	--
	3/7/91	<50	<0.5	<0.5	<0.5	<0.5	24 Freon 11	--
	6/12/91	<50	<0.5	<0.5	<0.5	<0.5	26 Freon 11	--
	9/11/91	<50	<0.5	<0.5	<0.5	<0.5	16 Freon 11 3.0 PCE	--
	12/17/91	<50	<0.5	<0.5	<0.5	<0.5	11 Freon 11 3.0 Freon 113 2.0 PCE	--

GEOMATRIX

TABLE 2

SUMMARY OF ANALYTICAL RESULTS FOR GROUNDWATER[1]

November 1990 through December 1991
Kaiser Permanente Medical Center
Oakland, California

Concentrations in micrograms per liter (μg/l) or parts per billion (ppb)

Well No.	Date Sampled	Mineral Spirits	Benzene	Toluene	Ethyl-benzene	Xylenes	EPA Method 8240 Compounds Detected[2]	EPA Method 8270 Compounds Detected
MW-6	2/1/91	<50	--[6]	--[6]	--[6]	--[6]	--	--[7]
	3/7/91	<50	<0.5	<0.5	<0.5	<0.5	None	--[7]
	6/12/91	<50	<0.5	<0.5	<0.5	<0.5	--	--[7]

Notes:

[1] Total petroleum hydrocarbons as mineral spirits were analyzed by EPA Methods 5030/8015; benzene, toluene, ethylbenzene, and xylenes (BTEX) were analyzed by modified EPA Method 8020. All samples were analyzed by Anametrix, Inc., except the MW-1 sample on 11/20/90, which was analyzed by BC Analytical. Laboratory reports, including detection limits are included in Appendix A.

[2] 1,1-DCA = 1,1-dichloroethane; PCE = tetrachloroethene; Freon 11 = trichlorofluoromethane; Freon 113 = trichlorotrifluoroethane.

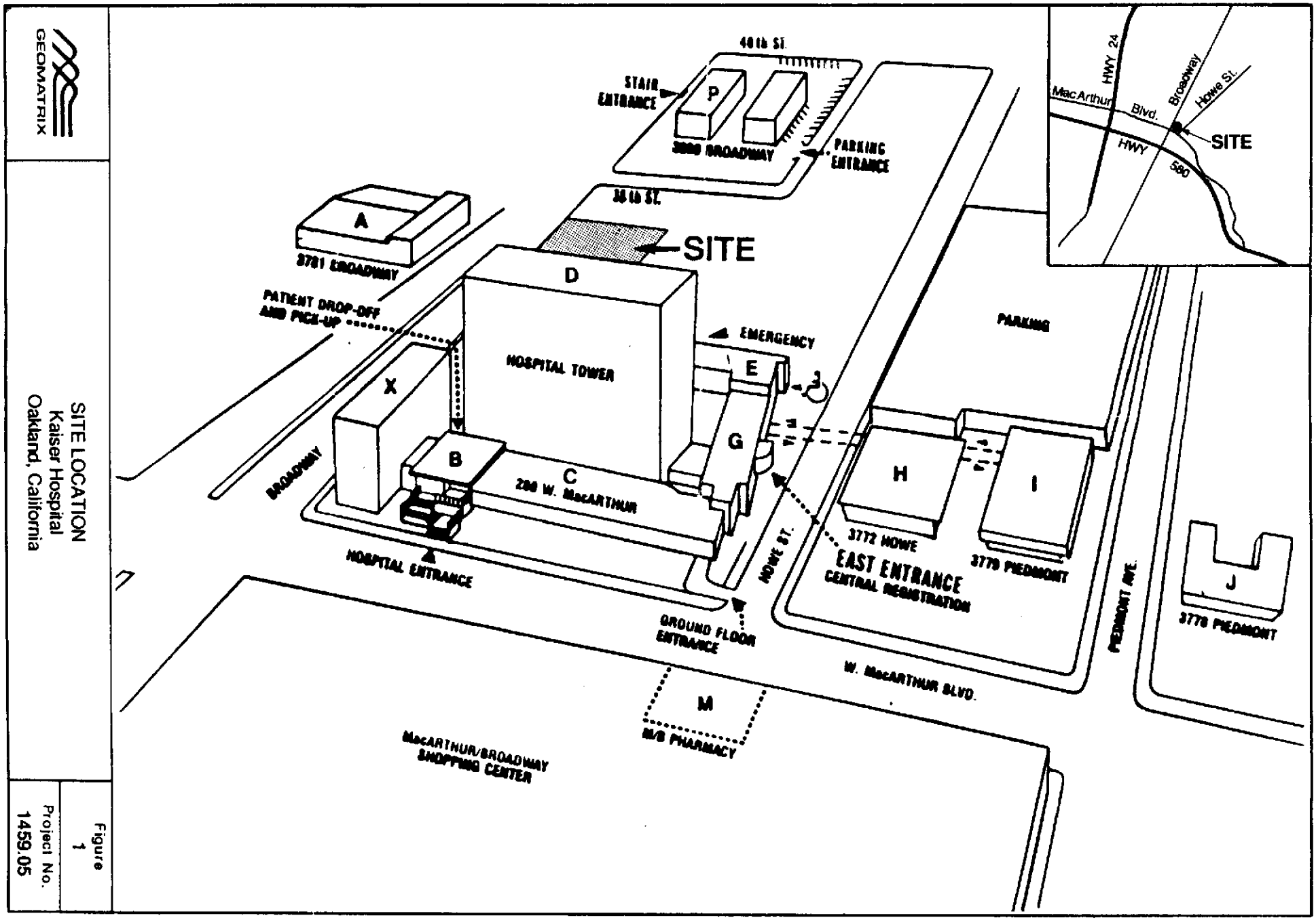
[3] A hydrocarbon was detected in the sample at a concentration of 150 mg/l or ppm by BC Analytical. Based on a fingerprint characterization using gas chromatography, Friedman and Bruya, Inc., characterized the compound as a naturally occurring biogenic hydrocarbon and did not identify any mineral spirits in the sample.

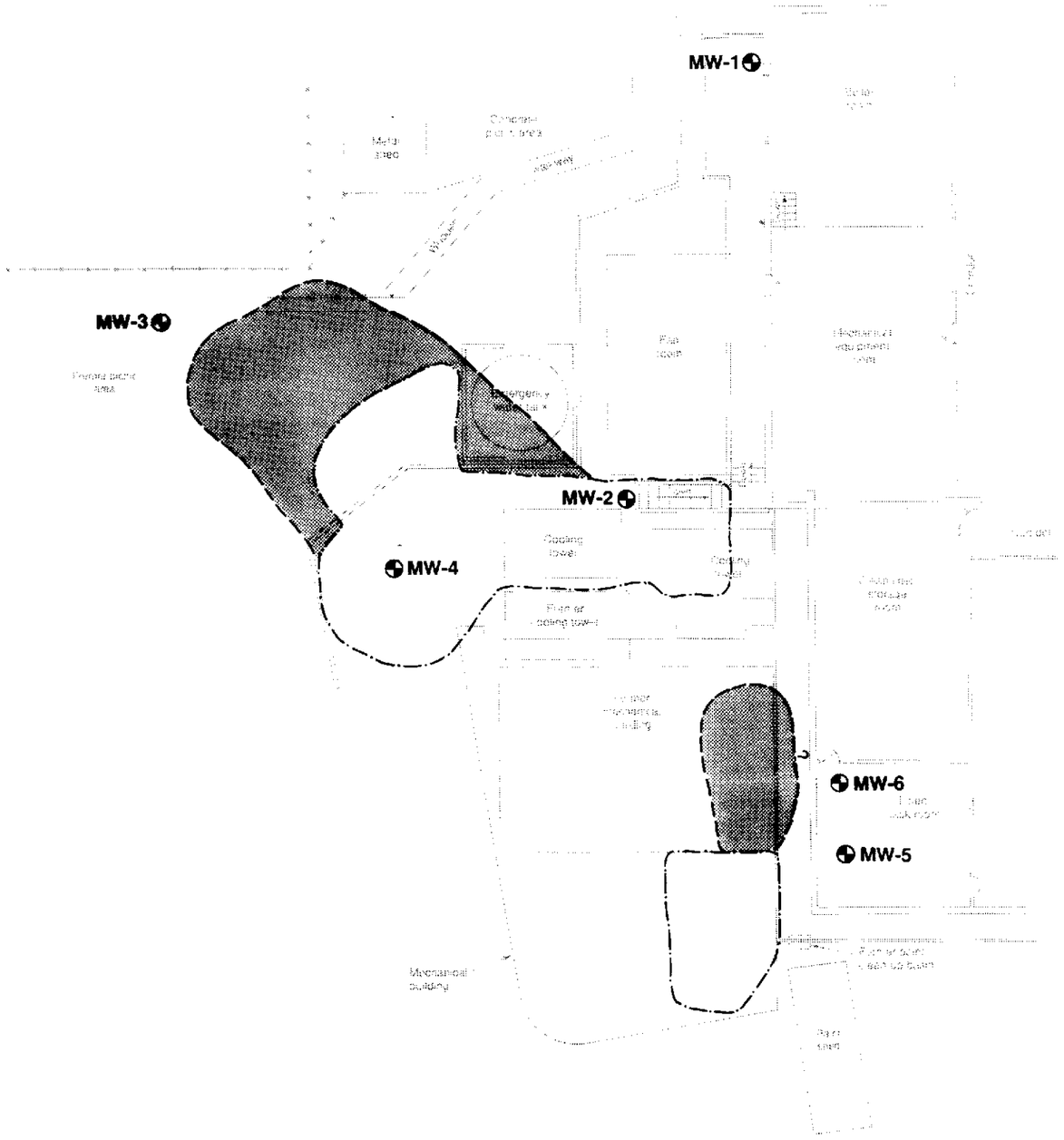
[4] -- not analyzed.

[5] Sample volume was 400 ml instead of 1000 ml because of limited well recharge. Detection limits therefore ranged from 25 to 120 ppb instead of 10 to 50 ppb as is typical with EPA Method 8270 analyses.

[6] Analyzed four days after the 14-day holding time, with no BTEX detected.

[7] Insufficient water available for this analysis.


GEOMATRIX
SITE LOCATION
Kaiser Hospital
Oakland, California
Figure
1
Project No.
1459.05
40th St.
STAIR ENTRANCE
P
3880 BROADWAY
PARKING ENTRANCE
36th ST.
SITE
A
3781 BROADWAY
PATIENT DROP-OFF AND PICK-UP
D
HOSPITAL TOWER
EMERGENCY
E
X
B
C
280 W. MacARTHUR
G
BROADWAY
HOSPITAL ENTRANCE
GROUND FLOOR ENTRANCE
HOWE ST.
PARKING
H
I
3772 HOWE
3770 PIEDMONT
EAST ENTRANCE
CENTRAL REGISTRATION
PIEDMONT AVE.
J
3770 PIEDMONT
W. MacARTHUR BLVD.
M
M/B PHARMACY
MacARTHUR/BROADWAY SHOPPING CENTER
HWY 24
MacArthur
Blvd.
Broadway
Howe St.
SITE
HWY
580



EXPLANATION

MW-1 Groundwater monitoring well

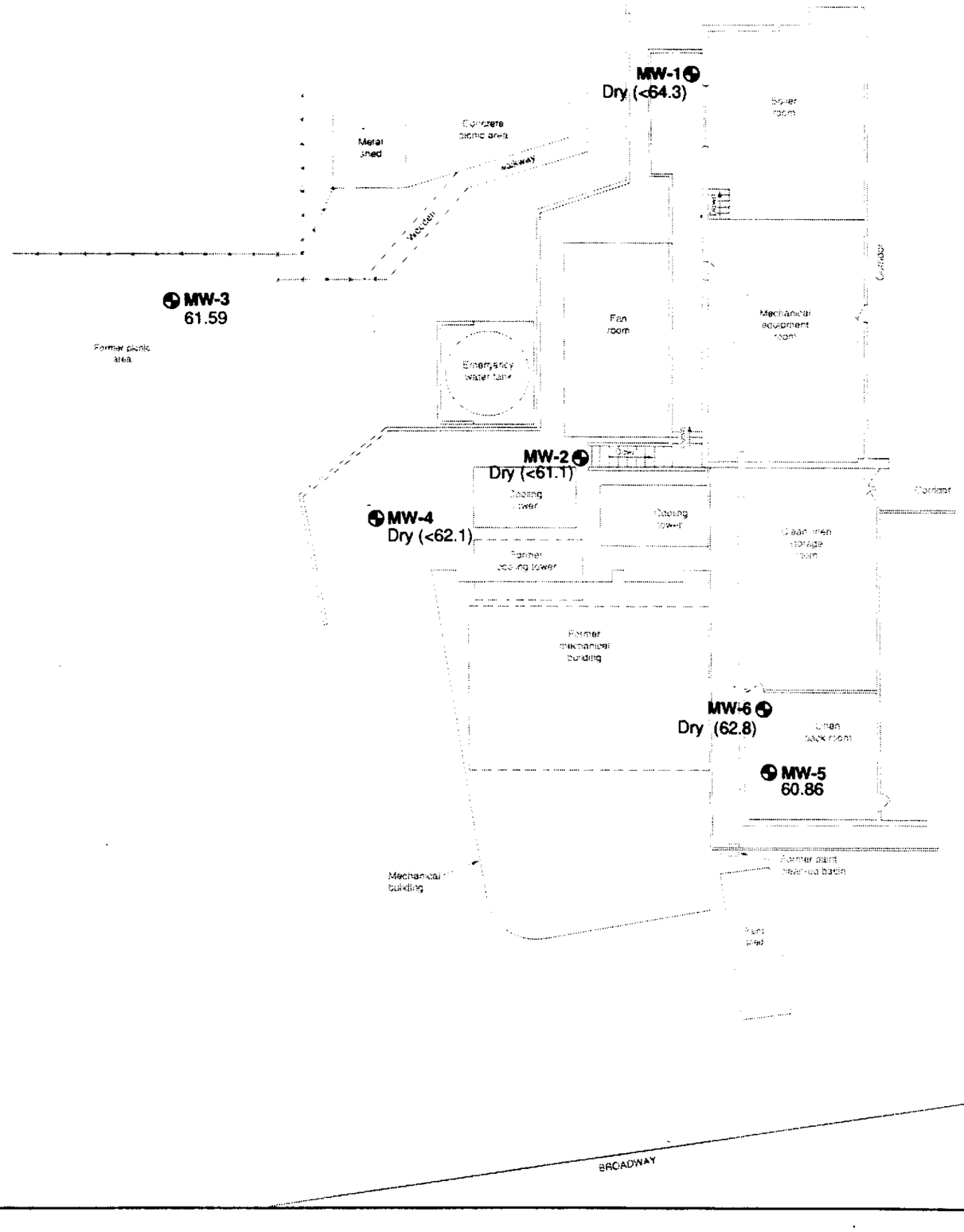
Approximate lateral extent of area with detectable mineral spirits in soil

Approximate lateral extent of excavation of soil containing mineral spirits

0 20 Feet

SITE PLAN
MONITORING WELL LOCATIONS
Kaiser Permanente Medical Center
280 West MacArthur Boulevard
Oakland, California

GEOMATRIX	Project No. 1459.05	Figure 2



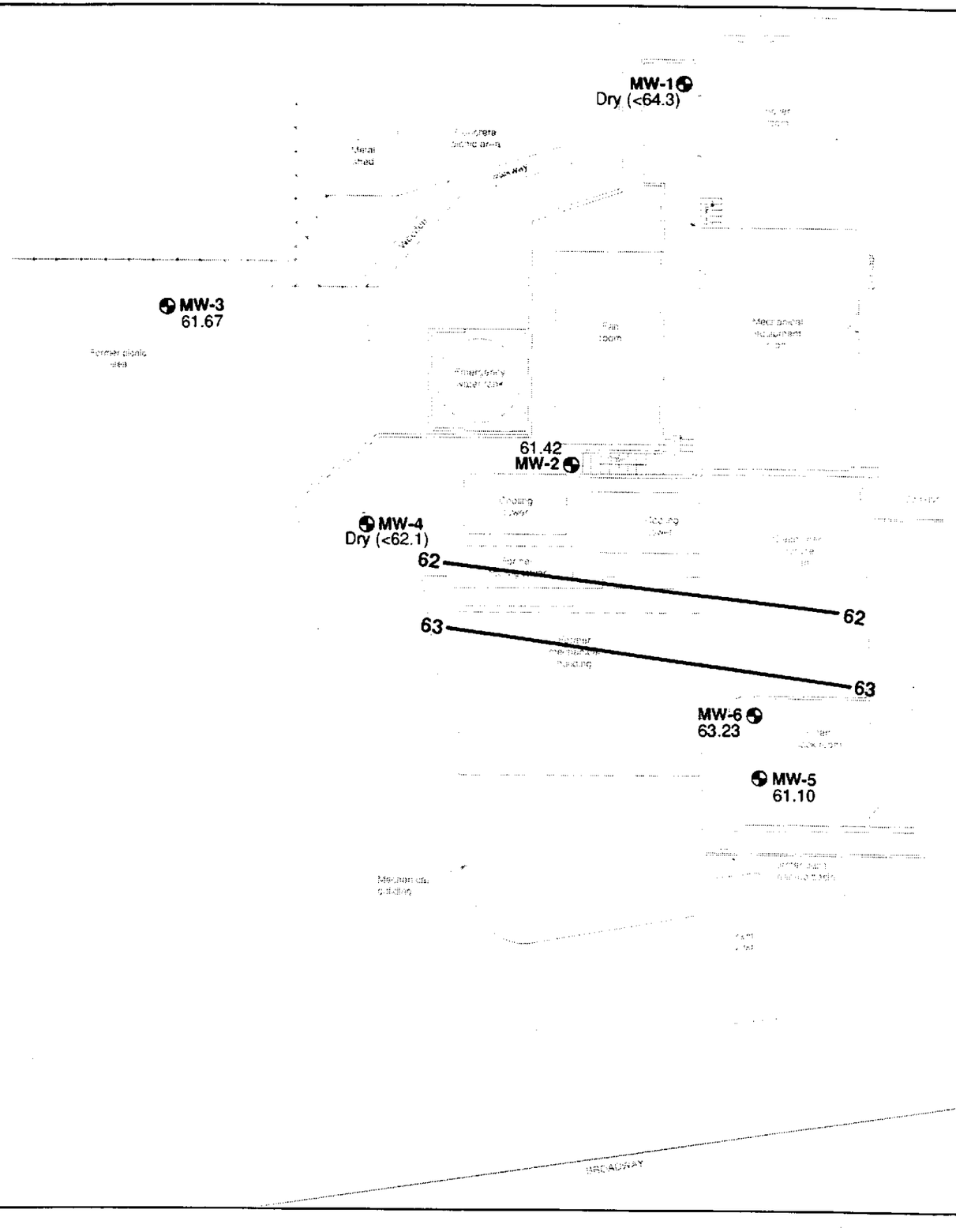
KEY

MW-3 ◔ 61.59 — Groundwater monitoring well with groundwater elevation on 9 October 1991

0 20 Feet

POTENTIOMETRIC SURFACE MAP
9 OCTOBER 1991
Kaiser Permanente Medical Center
Oakland, California

GEOMATRIX	Project No. 1459.05	Figure 3



EXPLANATION

63 —— Line of equal elevation of groundwater on 14 November 1991 in first encountered groundwater zone

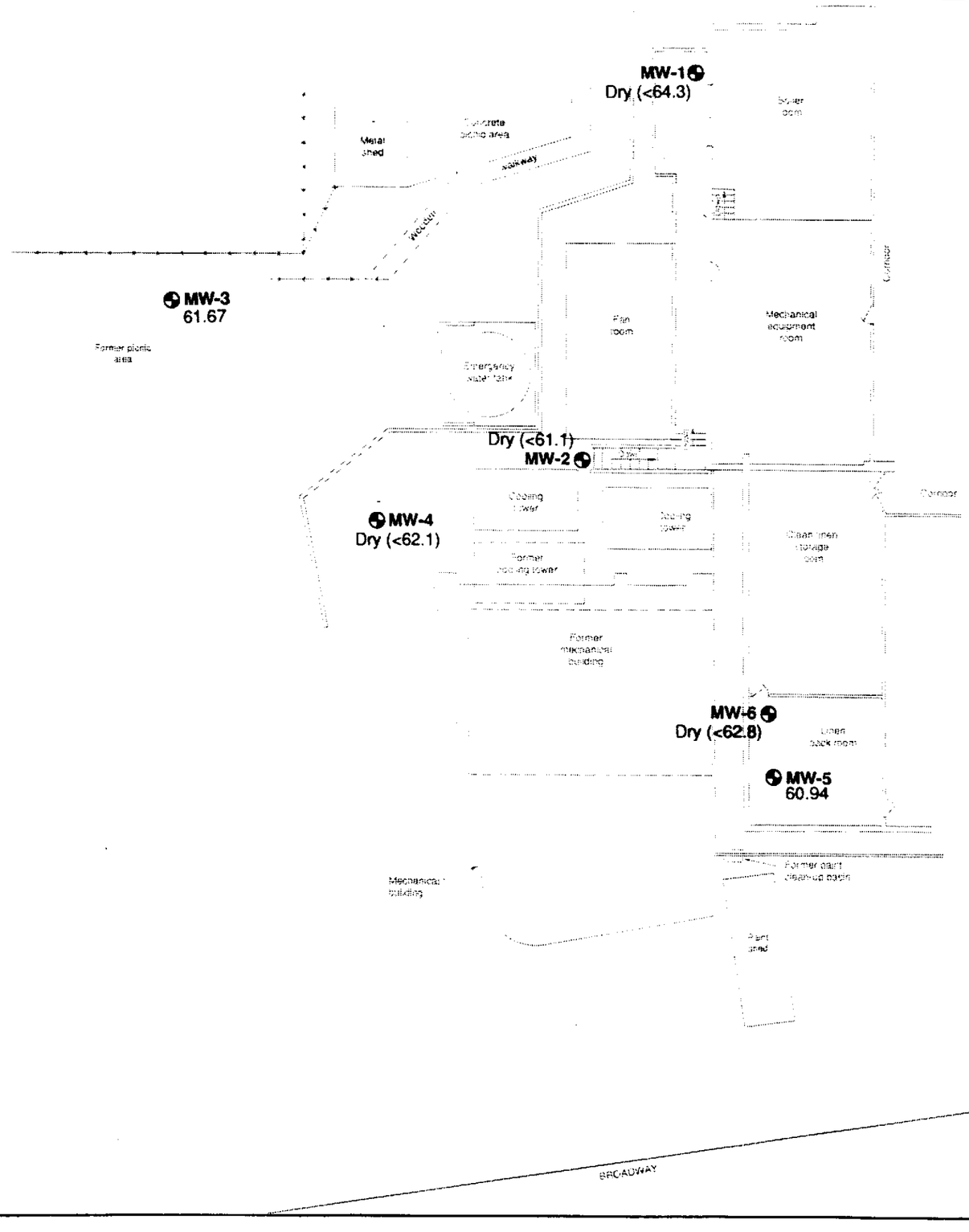
MW-3 61.67 Groundwater monitoring well with groundwater elevation on 14 November 1991

0 20 Feet

POTENTIOMETRIC SURFACE MAP
14 NOVEMBER 1991
Kaiser Permanente Medical Center
Oakland, California

GEOMATRIX

Project No.	Figure
1459.05	4



KEY

MW-3 61.67 — Groundwater monitoring well with groundwater elevation on 17 December 1991

0 — 20 Feet

POTENTIOMETRIC SURFACE MAP
17 DECEMBER1991
Kaiser Permanente Medical Center
Oakland, California

GEOMATRIX	Project No.	Figure
	1459.05	5

GEOMATRIX

APPENDIX A

Analytical Laboratory Reports and
Chain-of-Custody Records for Groundwater Samples

ANAMETRIX INC

Environmental Analytical Chemistry
1961 Concourse Drive, San Jose, California 95131
(408) 432-8192 FAX (408) 432-8198

REPORT

MS. CHERI YOUNG
GEOMATRIX CONSULTANTS INC.
100 PINE STREET, SUITE 1000
SAN FRANCISCO, CA 94111

Workorder # : 9112163
Date Received : 12/17/91
Project ID : 1459.05
Purchase Order: N/A

The following samples were received at Anametrix, Inc. for analysis :

ANAMETRIX ID	CLIENT SAMPLE ID
9112163- 1	MW-3
9112163- 2	MW-5

This report consists of 10 pages not including the cover letter, and is organized in sections according to the specific Anametrix laboratory group or section which performed the analysis(es) and generated the data. The Report Summary that precedes each section will help you determine which Anametrix group is responsible for those test results, and will bear the signatures of the department supervisor and the chemist who have reviewed the analytical data. Please refer all questions to the department supervisor who signed the form.

Anametrix is certified by the California Department of Health Services (DHS) to perform environmental testing under Certificate Number 1234. A detailed list of the approved fields of testing can be obtained by calling our office, or the DHS Environmental Laboratory Accreditation Program at (415)540-2800.

If you have any further questions or comments on this report, please give us a call as soon as possible. Thank you for using Anametrix.

Sarah Schoen, Ph.D.
Laboratory Manager

12-27-91
Date

ANAMETRIX REPORT DESCRIPTION
GCMS

Organic Analysis Data Sheets (OADS)

OADS forms contain tabulated results for target compounds. The OADS are grouped by method and, within each method, organized sequentially in order of increasing Anametrix ID number.

Tentatively Identified Compounds (TICs)

TIC forms contain tabulated results for non-target compounds detected in GC/MS analyses. TICs must be requested at the time samples are submitted at Anametrix. TIC forms immediately follow the OADS form for each sample. If TICs are requested but not found, then TIC forms will not be included with the report.

Surrogate Recovery Summary (SRS)

SRS forms contain quality assurance data. An SRS form will be printed for each method, if the method requires surrogate compounds. They will list surrogate percent recoveries for all samples and any method blanks. Any surrogate recovery outside the established limits will be flagged with an "*", and the total number of surrogates outside the limits will be listed in the column labelled "Total Out".

Matrix Spike Recovery Form (MSR)

MSR forms contain quality assurance data. They summarize percent recovery and relative percent difference information for matrix spikes and matrix spike duplicates. This information is a statement of both accuracy and precision. Any percent recovery or relative percent difference outside established limits will be flagged with an "*", and the total number outside the limits will be listed at the bottom of the page. Not all reports will contain an MSR form.

Qualifiers

Anametrix uses several data qualifiers (Q) in it's report forms. These qualifiers give additional information on the compounds reported. They should help a data reviewer to verify the integrity of the analytical results. The following is a list of qualifiers and their meanings:

- U - Indicates that the compound was analyzed for, but was not detected at or above the specified reporting limit.
- B - Indicates that the compound was detected in the associated method blank.
- J - Indicates that the compound was detected at an amount below the specified reporting limit. Consequently, the amount should be considered an approximate value. Tentatively identified compounds will always have a "J" qualifier because they are not included in the instrument calibration.
- E - Indicates that the amount reported exceeded the linear range of the instrument calibration.
- D - Indicates that the compound was detected in an analysis performed at a secondary dilution.
- A - Indicates that the tentatively identified compound is a suspected aldol condensation product. This is common in EPA Method 8270 soil analyses.

Absence of a qualifier indicates that the compound was detected at a concentration at or above the specified reporting limit.

REPORTING CONVENTIONS

- Due to a size limitation in our data processing step, only the first eight (8) characters of your project ID and sample ID will be printed on the report forms. However, the report cover letter and report summary pages display up to twenty (20) characters of your project and sample IDs.
- Amounts reported are gross values, i.e., not corrected for method blank contamination.

REPORT SUMMARY
ANAMETRIX, INC. (408)432-8192

MS. CHERI YOUNG
GEOMATRIX CONSULTANTS INC.
100 PINE STREET, SUITE 1000
SAN FRANCISCO, CA 94111

Workorder # : 9112163
Date Received : 12/17/91
Project ID : 1459.05
Purchase Order: N/A
Department : GCMS
Sub-Department: GCMS

SAMPLE INFORMATION:

ANAMETRIX SAMPLE ID	CLIENT SAMPLE ID	MATRIX	DATE SAMPLED	METHOD
9112163- 2	MW-5	WATER	12/17/91	8240

REPORT SUMMARY
ANAMETRIX, INC. (408)432-8192

MS. CHERI YOUNG
GEOMATRIX CONSULTANTS INC.
100 PINE STREET, SUITE 1000
SAN FRANCISCO, CA 94111

Workorder # : 9112163
Date Received : 12/17/91
Project ID : 1459.05
Purchase Order: N/A
Department : GCMS
Sub-Department: GCMS

QA/QC SUMMARY :

- No QA/QC problems.

Department Supervisor — Date: 12-27-91

Chemist — Date: 12.27.91

ORGANIC ANALYSIS DATA SHEET -- EPA METHOD 624/8240
ANAMETRIX, INC. (408)432-8192

Project ID	: 1459.05	Anametrix ID	: 9112163-02
Sample ID	: MW-5	Analyst	: DP
Matrix	: WATER	Supervisor	: WM
Date Sampled	:12/17/91		
Date Analyzed	:12/23/91	Dilution Factor	: 1.00
Instrument ID	: MSD1	Conc. Units	: ug/L

CAS No.	COMPOUND NAME	REPORTING LIMIT	AMOUNT DETECTED	Q
74-87-3	Chloromethane	2.	ND	U
75-01-4	Vinyl chloride	2.	ND	U
74-83-9	Bromomethane	2.	ND	U
75-00-3	Chloroethane	2.	ND	U
75-69-4	Trichlorofluoromethane	1.	11.	
75-35-4	1,1-Dichloroethene	1.	ND	U
76-13-1	Trichlorotrifluoroethane	1.	3.	
67-64-1	Acetone	2.	ND	U
75-15-0	Carbon disulfide	1.	ND	U
75-09-2	Methylene chloride	1.	ND	U
156-60-5	Trans-1,2-dichloroethene	1.	ND	U
75-34-3	1,1-Dichloroethane	1.	ND	U
156-59-2	Cis-1,2-dichloroethene	1.	ND	U
78-93-3	2-Butanone	2.	ND	U
67-66-3	Chloroform	1.	ND	U
71-55-6	1,1,1-Trichloroethane	1.	ND	U
56-23-5	Carbon tetrachloride	1.	ND	U
108-05-4	Vinyl acetate	2.	ND	U
71-43-2	Benzene	1.	ND	U
107-06-2	1,2-Dichloroethane	1.	ND	U
79-01-6	Trichloroethene	1.	ND	U
78-87-5	1,2-Dichloropropane	1.	ND	U
75-27-4	Bromodichloromethane	1.	ND	U
110-75-8	2-Chloroethylvinyl ether	1.	ND	U
10061-01-5	Cis-1,3-dichloropropene	1.	ND	U
108-10-1	4-Methyl-2-pentanone	2.	ND	U
108-88-3	Toluene	1.	ND	U
10061-02-6	Trans-1,3-dichloropropene	1.	ND	U
79-00-5	1,1,2-Trichloroethane	1.	ND	U
127-18-4	Tetrachloroethene	1.	2.	
591-78-6	2-Hexanone	2.	ND	U
124-48-1	Dibromochloromethane	1.	ND	U
108-90-7	Chlorobenzene	1.	ND	U
100-41-4	Ethylbenzene	1.	ND	U
1330-20-7	Xylene (Total)	1.	ND	U
100-42-5	Styrene	1.	ND	U
75-25-2	Bromoform	1.	ND	U
79-34-5	1,1,2,2-Tetrachloroethane	1.	ND	U
541-73-1	1,3-Dichlorobenzene	1.	ND	U
106-46-7	1,4-Dichlorobenzene	1.	ND	U
95-50-1	1,2-Dichlorobenzene	1.	ND	U

ORGANIC ANALYSIS DATA SHEET -- EPA METHOD 624/8240
ANAMETRIX, INC. (408)432-8192

Project ID :
Sample ID : BLANK
Matrix : WATER
Date Sampled : 0/ 0/ 0
Date Analyzed :12/23/91
Instrument ID : MSD1

Anametrix ID : 1223B001
Analyst :
Supervisor :

Dilution Factor : 1.00
Conc. Units : ug/L

CAS No.	COMPOUND NAME	REPORTING LIMIT	AMOUNT DETECTED	Q
74-87-3	Chloromethane	2.	ND	U
75-01-4	Vinyl chloride	2.	ND	U
74-83-9	Bromomethane	2.	ND	U
75-00-3	Chloroethane	2.	ND	U
75-69-4	Trichlorofluoromethane	1.	ND	U
75-35-4	1,1-Dichloroethene	1.	ND	U
76-13-1	Trichlorotrifluoroethane	1.	ND	U
67-64-1	Acetone	2.	ND	U
75-15-0	Carbon disulfide	1.	ND	U
75-09-2	Methylene chloride	1.	ND	U
156-60-5	Trans-1,2-dichloroethene	1.	ND	U
75-34-3	1,1-Dichloroethane	1.	ND	U
156-59-2	Cis-1,2-dichloroethene	1.	ND	U
78-93-3	2-Butanone	2.	ND	U
67-66-3	Chloroform	1.	ND	U
71-55-6	1,1,1-Trichloroethane	1.	ND	U
56-23-5	Carbon tetrachloride	1.	ND	U
108-05-4	Vinyl acetate	2.	ND	U
71-43-2	Benzene	1.	ND	U
107-06-2	1,2-Dichloroethane	1.	ND	U
79-01-6	Trichloroethene	1.	ND	U
78-87-5	1,2-Dichloropropane	1.	ND	U
75-27-4	Bromodichloromethane	1.	ND	U
110-75-8	2-Chloroethylvinyl ether	1.	ND	U
10061-01-5	Cis-1,3-dichloropropene	1.	ND	U
108-10-1	4-Methyl-2-pentanone	2.	ND	U
108-88-3	Toluene	1.	ND	U
10061-02-6	Trans-1,3-dichloropropene	1.	ND	U
79-00-5	1,1,2-Trichloroethane	1.	ND	U
127-18-4	Tetrachloroethene	1.	ND	U
591-78-6	2-Hexanone	2.	ND	U
124-48-1	Dibromochloromethane	1.	ND	U
108-90-7	Chlorobenzene	1.	ND	U
100-41-4	Ethylbenzene	1.	ND	U
1330-20-7	Xylene (Total)	1.	ND	U
100-42-5	Styrene	1.	ND	U
75-25-2	Bromoform	1.	ND	U
79-34-5	1,1,2,2-Tetrachloroethane	1.	ND	U
541-73-1	1,3-Dichlorobenzene	1.	ND	U
106-46-7	1,4-Dichlorobenzene	1.	ND	U
95-50-1	1,2-Dichlorobenzene	1.	ND	U

SURROGATE RECOVERY SUMMARY -- EPA METHOD 624/8240
ANAMETRIX, INC. (408)432-8192

Project ID : 1459.05
Matrix : LIQUID

Anametrix ID : 9112163
Analyst : [illegible]
Supervisor : [illegible]

	SAMPLE ID	SU1	SU2	SU3	TOTAL OUT
1	BLANK	99	98	103	0
2	MW-5	104	99	103	0
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

	QC LIMITS
SU1 = 1,2-Dichloroethane-d4	(70-130)
SU2 = Toluene-d8	(70-130)
SU3 = 1,4-Bromofluorobenzene	(70-130)

* Values outside of Anametrix QC limits

REPORT SUMMARY
ANAMETRIX, INC. (408)432-8192

MS. CHERI YOUNG
GEOMATRIX CONSULTANTS INC.
100 PINE STREET, SUITE 1000
SAN FRANCISCO, CA 94111

Workorder # : 9112163
Date Received : 12/17/91
Project ID : 1459.05
Purchase Order: N/A
Department : GC
Sub-Department: TPH

SAMPLE INFORMATION:

ANAMETRIX SAMPLE ID	CLIENT SAMPLE ID	MATRIX	DATE SAMPLED	METHOD
9112163- 1	MW-3	WATER	12/17/91	TPHg/BTEX
9112163- 2	MW-5	WATER	12/17/91	TPHg/BTEX

REPORT SUMMARY
ANAMETRIX, INC. (408)432-8192

MS. CHERI YOUNG
GEOMATRIX CONSULTANTS INC.
100 PINE STREET, SUITE 1000
SAN FRANCISCO, CA 94111

Workorder # : 9112163
Date Received : 12/17/91
Project ID : 1459.05
Purchase Order: N/A
Department : GC
Sub-Department: TPH

QA/QC SUMMARY :

- The surrogate recoveries for the matrix spike and matrix spike duplicate were outside Anametrix control limits due to the presence of interfering peaks.

Department Supervisor 12.23.91 Date

Chemist 12/23/91 Date

ANALYSIS DATA SHEET - TOTAL PETROLEUM HYDROCARBONS
(GASOLINE WITH BTEX)
ANAMETRIX, INC. - (408) 432-8192

Anametrix W.O.: 9112163
Matrix : WATER
Date Sampled : 12/17/91

Project Number : 1459.05
Date Released : 12/20/91

COMPOUNDS	Reporting Limit (ug/L)	Sample I.D.# MW-3 -01	Sample I.D.# MW-5 -02	Sample I.D.# 04B1219B BLANK
Benzene	0.5	ND	ND	ND
Toluene	0.5	ND	ND	ND
Ethylbenzene	0.5	ND	ND	ND
Total Xylenes	0.5	ND	ND	ND
Mineral Spirits	50	ND	ND	ND
% Surrogate Recovery		99%	97%	99%
Instrument I.D.		HP4	HP4	HP4
Date Analyzed		12/19/91	12/19/91	12/19/91
RLMF		1	1	1

ND - Not detected at or above the practical quantitation limit for the method.
TPHg - Total Petroleum Hydrocarbons as mineral spirits is determined by GCFID using modified EPA Method 8015 following sample purge and trap by EPA Method 5030.
BTEX - Benzene, Toluene, Ethylbenzene, and Total Xylenes are determined by modified EPA Method 8020 following sample purge and trap by EPA Method 5030.
RLMF - Reporting Limit Multiplication Factor.

Anametrix control limits for surrogate p-Bromofluorobenzene recovery are 53-147%.

All testing procedures follow California Department of Health Services (Cal-DHS) approved methods.

Jane Jurenka 12-20 91
Analyst Date

Supervisor 12-26-91
Supervisor Date

TOTAL VOLATILE HYDROCARBON METHOD SPIKE REPORT
EPA METHOD 5030 WITH GC/FID
ANAMETRIX, INC. (408) 432-8192

Sample I.D.	: 1459.05 MW-5	Anametrix I.D.	: 9112163-02
Matrix	: WATER	Analyst	: IS
Date Sampled	: 12/17/91	Supervisor	: CF
Date Analyzed	: 12/19/91	Date Released	: 12/20/91
		Instument ID	: HP4

COMPOUND	SPIKE AMT. (ug/L)	MS (ug/L)	%REC MS	MSD (ug/L)	%REC MSD	RPD	%REC LIMITS
MINERAL SPIRITS	1000	930	93%	940	94%	1%	48-145
P-BFB			229%		243%		53-147

* Limits established by Anametrix, Inc.