

December 5, 1994

Mr. David Johnson
Mills College
5000 MacArthur Boulevard
Oakland, CA 94613

Re: Ground Water Sampling Report
Mills College Corporation Yard, Oakland, California
Project No.: K275-H

Dear Mr. Johnson:

Harza is please to submit this report for the above referenced project. We are submitting copies to Juliet Shin of Alameda County Health Care Services and to the Regional Water Quality Control Board on your behalf.

Should you have any questions or require additional information, please do not hesitate to contact me.

Sincerely,

Harza Consulting Engineers and Scientists



Dennis Laduzinsky, C.E.G.
Head, Geology and Hydrogeology

DL\lk:aa\encl.

Copies: Addressee (2)

Ms. Juliet Shin (ACHCSA - 1)

Alameda County LUFT Case Officer (RWQCB - 1)

K275-H reports\28054
12-05-94

Ground Water Sampling Report
Mills College Corporation Yard
Oakland, California

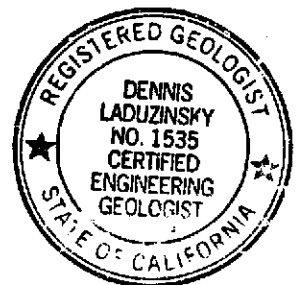
December 5, 1994

Prepared For:

Mills College
5000 MacArthur Boulevard
Oakland, CA 94613

Prepared By:

Harza Consulting Engineers and Scientists
425 Roland Way
Oakland, CA 94621



Derek D. Armentrout
Project Chemist

Dennis Laduzinsky, C.E.G.
Head, Geology and Hydrogeology

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	BACKGROUND	1
3.0	SCOPE OF SERVICES	2
4.0	FIELD INVESTIGATION	2
4.1	<u>Well Sampling</u>	2
4.2	<u>Ground Water Gradient</u>	3
5.0	ANALYTICAL RESULTS	3
5.1	<u>Laboratory Procedures</u>	3
5.2	<u>Analytical Results</u>	3
6.0	MW-4 INVESTIGATION	4
7.0	CONCLUSIONS	5
8.0	LIMITATIONS	5

TABLES

1	Ground Water Elevation Data
2	Summary of Ground Water Sample Analyses
3	Ground Water General Minerals Analyses

FIGURES

1	Site Vicinity Map
2	Site Plan
3	Cross Section Along A-A'
4	Piper Diagram
5	Stiff Diagram

APPENDIXES

A	Boring Logs and Well Sampling Logs
B	Laboratory Analytical Reports and Chain-of-Custody Records

Ground Water Sampling Report
Mills College Corporation Yard
Oakland, California

1.0 INTRODUCTION

This report presents the results of ground water sampling performed at the Mills College Corporation Yard in Oakland, California. The project location is shown on the Site Vicinity Map (Figure 1).

The purpose of the investigation has been to evaluate the extent of petroleum hydrocarbons in ground water related to a previously removed gasoline underground storage tank (UST) at the site. This investigation was performed to comply with the continuing monitoring program under the jurisdiction of Alameda County Health Care Services Agency (ACHCSA).

2.0 BACKGROUND

In October 1988, a 1,000-gallon gasoline UST was removed from the Corporation Yard facility. A report prepared by Blaine Tech Services, Inc. of San Jose, California, indicated that soil samples collected from a depth of 21 feet below ground surface (bgs) following tank removal contained moderately high levels of total petroleum hydrocarbons as gasoline (TPHg). It is understood that 100 cubic yards of contaminated soils were excavated from the tank pit area at the time of tank removal and aerated on-site. The ACHCSA subsequently issued a letter, dated February 15, 1989, requesting investigation of the vertical and lateral extent of petroleum hydrocarbons in soil and ground water related to the former tank.

Beginning in June 1989, Harza (formerly Kaldveer Associates) performed soil and ground water quality investigations at the site, consisting of the installation and sampling of three ground water monitoring wells and two additional shallow soil borings.

The results of these investigations, presented in a report titled "Soil and Ground Water Testing Report For Mills College Corporation Yard", dated May 7, 1991, indicated that the majority of gasoline contamination in the unsaturated zone in the vicinity of the tanks appeared to have been removed during the soil excavation program conducted when the tanks were removed. Analysis of ground water samples collected from the monitoring wells since June 1989 have indicated the presence of TPHg at concentrations up to 11 parts per million (ppm).

The measured ground water flow direction at the site has usually been toward the south, beneath the existing Corporation Yard buildings, but has occasionally been directed southwesterly.

In May 1994, well MW-4 was installed downgradient of the Corporation Yard along Seminary Avenue. The well was installed to respond to the ACHCSA letter of April 23, 1993 requesting an additional downgradient monitoring point. In their September 7, 1994 letter, the ACHCSA expressed concern that well MW-4 was not screened in the same aquifer as wells MW-1 through MW-3, and requested an investigation to determine if well MW-4 is hydraulically connected to the other wells.

3.0 SCOPE OF SERVICES

The investigation consisted of the following tasks:

- Measuring ground water levels in all wells for use in developing a ground water elevation contour map.
- Collecting ground water samples from the four wells at the site.
- Analyzing ground water samples for TPHg using EPA Method 5030/GCFID, and for purgeable aromatic compounds (benzene, toluene, ethylbenzene, and xylenes or BTEX) using EPA Method 8020.
- Analyzing ground water samples from wells MW-3 and MW-4 for general minerals and preparing geologic cross sections to determine if the wells are screened in the same aquifer.
- Preparing this report.

4.0 FIELD INVESTIGATION

4.1 Well Sampling

The four monitoring wells were sampled on October 26, 1994. Following an initial ground water level measurement, a minimum of three well-casing volumes of water were purged from each well using a Teflon bailer. Purging consisted of the gradual removal of water from the well until physical parameters such as pH, temperature, and electrical conductivity stabilized.

Following purging, samples were decanted from the bailer into appropriate sample containers, labeled, and placed in refrigerated storage for transport to the laboratory under chain-of-custody control. The bailer was washed with trisodium phosphate (TSP) and rinsed with deionized water between wells to reduce the potential for cross contamination. Purge water was contained on-site in 55-gallon drums. Monitoring well sampling logs are attached to this report as Appendix A.

4.2 Ground Water Gradient

Well-top elevations have been surveyed to a common datum and water levels were measured in each well. Well-top elevations, depth to water, and calculated water-surface elevations are presented in Table 1. These data are used to generate the ground water elevation contours presented on Figure 2. Ground water elevation data collected during this investigation indicate ground water has a gradient of 0.0024 foot per foot to the southwest. This flow direction is slightly westward of the direction that has historically been observed at the site.

5.0 ANALYTICAL RESULTS

5.1 Laboratory Procedures

Ground water samples were analyzed by American Environmental Network (AEN) of Pleasant Hill, California. AEN is certified by the California Environmental Protection Agency for the analyses performed. Samples from each well were analyzed for TPHg using EPA Method 5030/GCFID, and for BTEX using EPA Method 8020.

5.2 Analytical Results

The results of the chemical analyses are presented in Table 2 and laboratory analytical results are attached to this report as Appendix B. A historical summary of ground water sample analytical results is also included in Table 2.

TPHg was detected in the sample from well MW-1 at a concentration of 8.7 ppm. BTEX compounds were detected in the sample from MW-1 at concentrations of 1.0, 0.29, 0.14 and 0.36 ppm, respectively. A petroleum odor and a slight hydrocarbon sheen on the water surface were recognized during the purging of the well.

TPHg was detected in the sample from well MW-2 at 0.2 ppm. Benzene was also detected in the sample at 0.13 ppm. Benzene (0.004 ppm) was the only compound detected in the sample from well MW-3. No TPHg or BTEX compounds were detected in the sample from well MW-4.

6.0 MW-4 INVESTIGATION

A geologic cross-section was prepared for the site to evaluate if well MW-4 is hydraulically connected to wells MW-1 through MW-3 (Figure 3). Boring logs from wells drilled at the site indicate the surficial soils at the site consist of sandy clay and clayey sand, underlain by deeply weathered (decomposed) granitic bedrock of the Leona Rhyolite to depths of approximately 20 feet. Weathering of the Leona Rhyolite is characterized by the presence of highly decomposed rock fragments loosely embedded in a clay matrix that may locally persist to a depth of 30 feet. Fresh bedrock is extremely hard, sheared, friable, and closely fractured. The fractures are generally open and interconnected except where filled with clay.

The upper 20 feet of bedrock shows intense decomposition of rock minerals to clay. This zone acts as a quasi-impermeable bed that confines the ground water level at or near the approximate depth where the degree of decomposition changes from intense to slight or moderate. The change in degree of mineral decomposition allows the water to flow more freely within the open and interconnected fractures.

As shown on Figure 3, stabilized water level measurements for all four wells show a distinct planar surface parallel to ground surface and the lower boundary of intense mineral decomposition. However, it should be noted that ground water in MW-4 was initially encountered at a depth of 45 feet at the time of drilling, and subsequently rose to a depth of 14 feet within about three hours. → probably due to pressure head

From a geologic standpoint, the characteristics of the Leona Rhyolite and the occurrence of the stabilized ground water levels observed at the site would suggest that all four wells are hydraulically connected by open and interconnected fractures in the deeper, less weathered bedrock. However, the strong confined ground water conditions observed in MW-4 may indicate that whereas ground water between MW-4 and MW-1, 2, and 3 is hydraulically connected at depth, specific weathering differences in the shallow bedrock zones may preclude direct connection of the upper surface of the saturated zone.

A chemical investigation was also performed for well MW-4. Ground water samples from wells MW-3 and MW-4 were analyzed for general minerals and water quality parameters to evaluate if the samples represent water from the same aquifer. Analytical results are shown on Table 3. The results were plotted on Piper and Stiff diagrams (Figures 4 and 5). These diagrams are useful for plotting mineral concentrations and visually comparing the concentrations for different wells. In general, the mineral concentrations and general water quality parameters for wells MW-3 and MW-4 are similar. The alkalinities of the two samples show the most significant difference. Alkalinity will increase as water flows through carbonaceous rock such as that found at the site. The increase in total dissolved solids (TDS) between wells MW-3 and MW-4 may also be due to dissolution of minerals as water moves through the aquifer. In summary, the chemistry of the ground water samples does not conclusively indicate that the samples represent different aquifers.

7.0 CONCLUSIONS

The sampling performed between June 1989 and October 1994 have shown a fluctuation in reported TPHg and BTEX concentrations, although no trends are apparent. Ground water elevations measured during this, and the previous investigation, indicate an apparent shift in flow direction toward the southwest, from the general southerly flow direction historically measured at the site. The gradient remains relatively flat. It is unclear at this time if the ground water elevations represent a permanent or temporary change in flow direction.

The geologic and chemical investigation of well MW-4 indicates that the well may be hydraulically connected to wells MW-1 through MW-3, but a conclusive determination could not be made. We therefore recommend that monitoring be continued at the four existing wells at the site on a quarterly schedule. The next monitoring event at the Corporation Yard will occur in January 1995.

*You, but
at some
point, the
will need
verify that
please is
limited*

8.0 LIMITATIONS

The purpose of a geologic/hydrogeologic study is to reasonably characterize existing site conditions based on the geology/hydrogeology of the area. In performing such a study, a balance must be struck between a reasonable investigation into the site conditions and an exhaustive analysis of each conceivable condition. The following paragraphs discuss the assumptions and parameters under which such a study is conducted.

No investigation is thorough enough to detect every geologic/hydrogeologic condition of interest at a given site. If conditions have not been identified during the study, such a finding should not therefore be construed as a guarantee of the absence of such conditions at the site, but rather as the result of the services performed within the scope, limitations, and cost of the work performed.

We are unable to report on or accurately predict events that may change the site conditions after the described services are performed, whether occurring naturally or caused by external forces. We cannot assume responsibility for conditions we were not authorized to evaluate, or conditions not generally recognized as predictable when services were performed.

Geologic/hydrogeologic conditions may exist at the site that cannot be identified solely by visual observation. Where subsurface exploratory work was performed, our professional opinions are based in part on interpretation of data from discrete sampling locations that may not represent actual conditions at unsampled locations.

TABLES

Table 1
GROUND WATER ELEVATION DATA
 Ground Water Sampling Report
 Mills College Corporation Yard, Oakland, California
 (Reported in feet)

Monitoring Well	Relative Well-Top Elevation (1)	Depth to Water	Ground Water Elevation
<u>June 1989:</u>			
MW-1	100.00	19.44	80.56
MW-2	99.98	19.36	80.62
MW-3	100.01	19.40	80.61
<u>December 1990:</u>			
MW-1	100.00	22.05	77.95
MW-2	99.98	21.96	78.02
MW-3	100.01	22.00	78.01
<u>June 1991:</u>			
MW-1	100.00	20.85	79.15
MW-2	99.98	20.76	79.22
MW-3	100.01	20.81	79.20
<u>March 1992:</u>			
MW-1	100.00	19.87	80.13
MW-2	99.98	19.92	80.06
MW-3	100.01	19.82	80.19
<u>October 1992:</u>			
MW-1	100.00	21.69	78.31
MW-2	99.98	21.60	78.38
MW-3	100.01	21.65	78.36
<u>May 1994:</u>			
MW-1	100.00	19.66	80.34
MW-2	99.97	19.62	80.35
MW-3	100.01	19.60	80.41
MW-4	88.88	13.60	75.28
<u>June 1994:</u>			
MW-1	100.00	19.72	80.28
MW-2	99.97	19.65	80.32
MW-3	100.01	19.65	80.36
MW-4	88.88	14.01	74.87

Table 1
GROUND WATER ELEVATION DATA
 Ground Water Sampling Report
 Mills College Corporation Yard, Oakland, California
 (Reported in feet)

Monitoring Well	Relative Well-Top Elevation (1)	Depth to Water	Ground Water Elevation
<u>October 1994:</u>			
MW-1	100.00	20.17	79.83
MW-2	99.97	20.10	79.87
MW-3	100.01	20.08	79.93
MW-4	88.88	17.95	70.93

NOTES

(1): Well-top elevations are based on an arbitrary datum of 100.00 feet at MW-1.

Table 2
SUMMARY OF GROUND WATER SAMPLE ANALYSES
 Ground Water Sampling Report
 Mills College Corporation Yard, Oakland, California
 (Reported in parts per million, or milligrams per liter)

Sample Date	TPH Gasoline	Benzene	Toluene	Ethylbenzene	Xylenes
MW-1:					
June 1989	11	2.1	1.9	0.031	1.4
December 1990	2.5	0.4	0.21	0.056	0.31
June 1991	16	2	1.1	0.41	2.8
March 1992	1.6	0.26	0.1	0.47	0.12
October 1992	2.8	0.33	0.13	0.06	0.2
October 1992(D)	4.2	0.54	0.23	0.08	0.36
May 1994	3.4	0.6	0.11	0.11	0.15
October 1994	8.7	1.0	0.29	0.14	0.36
MW-2:					
June 1989	ND	ND	ND	ND	ND
December 1990	ND	ND	ND	ND	ND
June 1991	ND	0.005	ND	ND	ND
March 1992	0.09	0.047	0.0005	ND	ND
October 1992	ND	0.003	ND	ND	ND
May 1994	0.2	0.084	0.0006	ND	ND
October 1994	0.2	0.13	ND	ND	ND
MW-3:					
June 1989	ND	ND	ND	ND	ND
December 1990	0.05	0.011	ND	ND	ND
June 1991	0.1	0.007	ND	ND	ND
March 1992	0.09	0.27	0.0009	ND	ND
October 1992	ND	0.005	ND	ND	ND
May 1994	ND	0.005	ND	ND	ND
October 1994	ND	0.004	ND	ND	ND
MW-4:					
May 1994	ND	ND	ND	ND	ND
October 1994	ND	ND	ND	ND	ND

NOTES

- TPH: Total petroleum hydrocarbons
- ND: Not detected at or above the laboratory method reporting limits
- (D): Duplicate sample analytical results

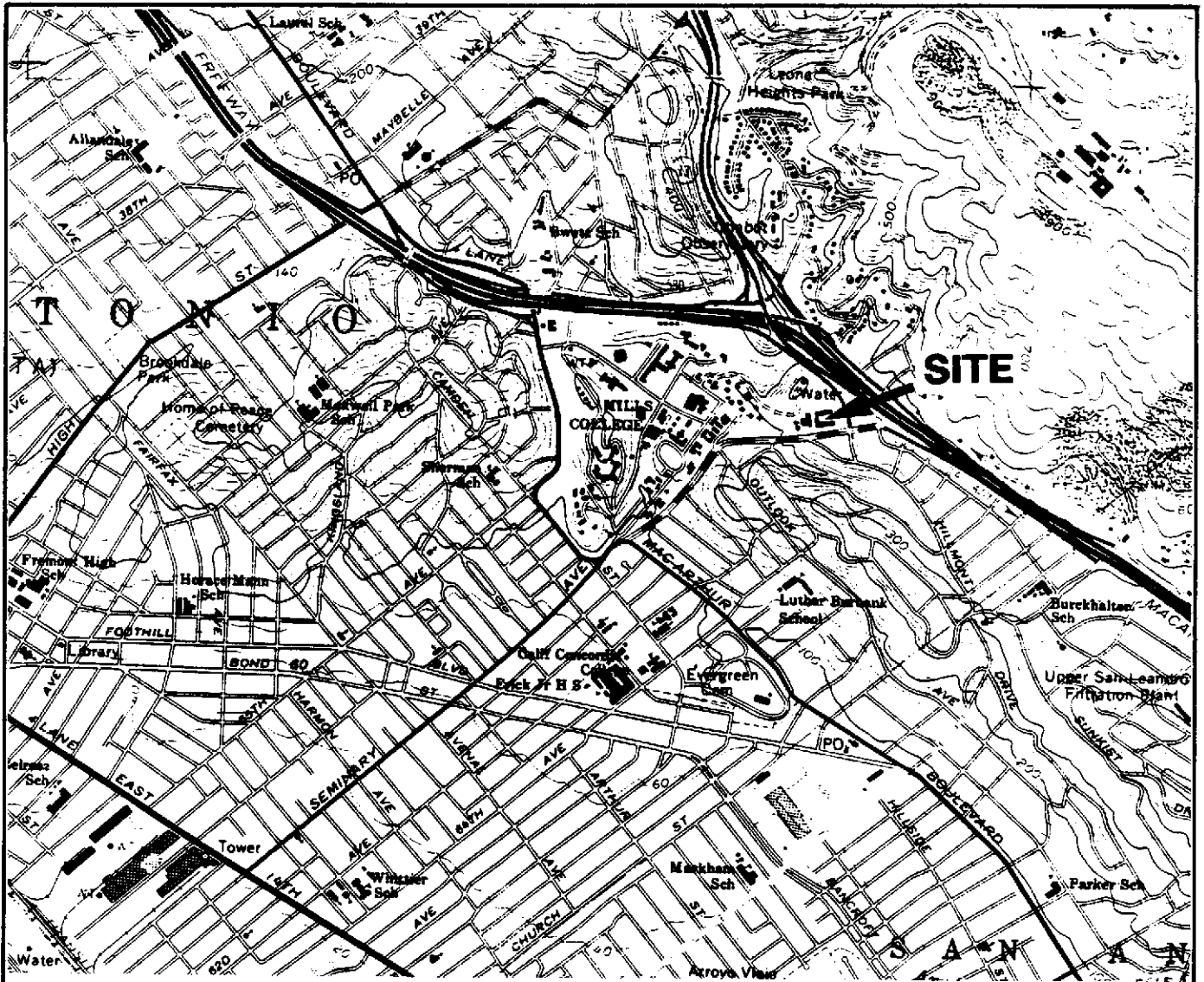
Table 3
GROUND WATER GENERAL MINERALS ANALYSES
 Ground Water Sampling Report
 Mills College Corporation Yard, Oakland, California
 (Reported in parts per million, or milligrams per liter)

Parameter	Monitoring Well	
	MW-3	MW-4
Nitrate-Nitrogen	0.3	<0.1
Phosphate-Phosphorus	<0.5	<0.5
Chloride	42	48
Sulfate	61	51
Bicarbonate Alkalinity	90	510
Carbonate Alkalinity	<2	<2
Hydroxide Alkalinity	<2	<2
Calcium	64	140
Copper	0.48	0.19
Iron	140	140
Magnesium	68	92
Manganese	1.3	1.3
Sodium	18	41
Zinc	0.11	0.16
Hardness	440	730
Total Dissolved Solids	280	670
Electrical Conductivity (micromhos per centimeter)	480	1200
pH (units)	6.6	7.2

NOTE

Samples were collected on 10/26/94

FIGURES



BASE: U.S.G.S. Oakland East 7.5 Minute Quadrangle (topographic)

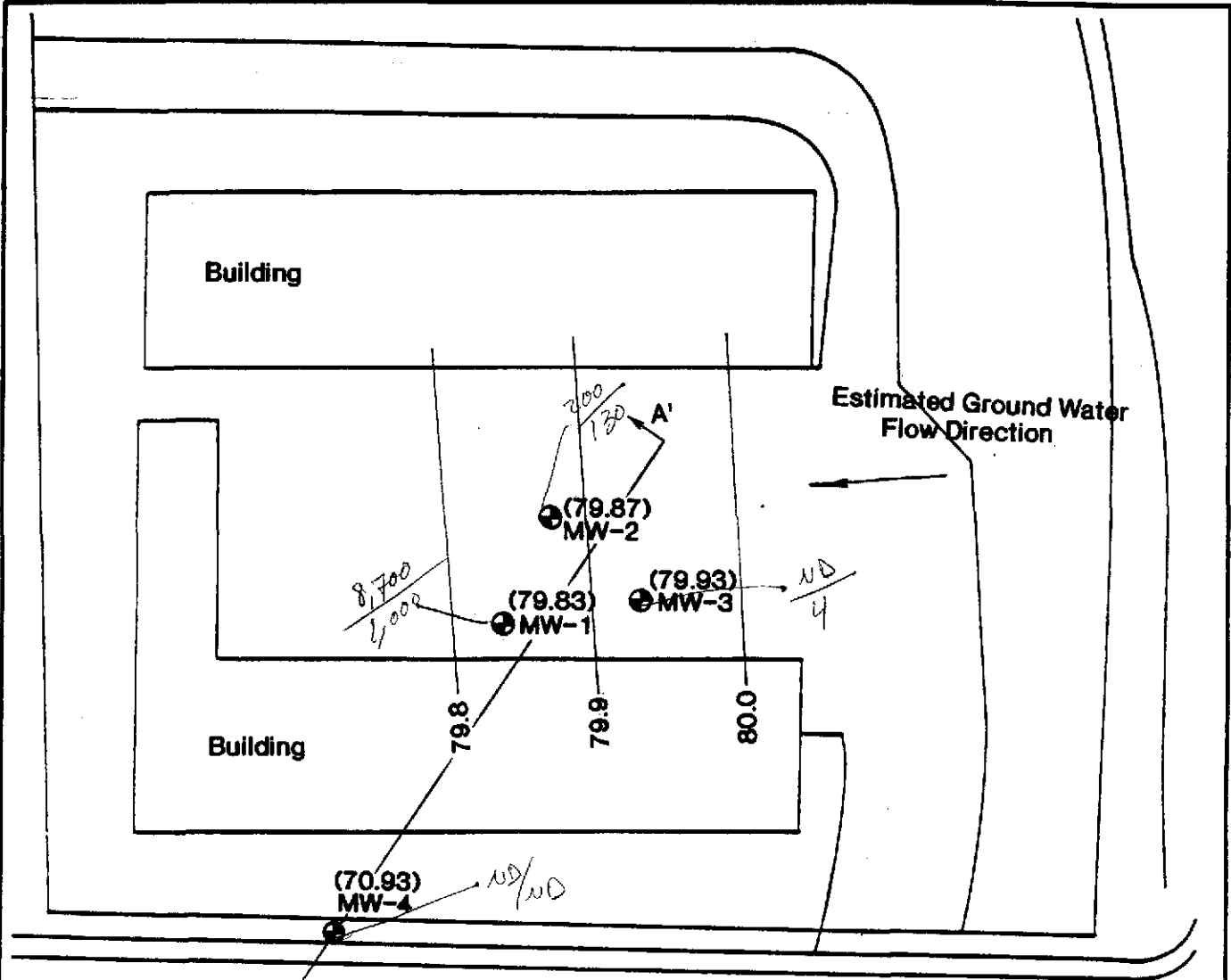
HARZA

Consulting Engineers and Scientists

SITE VICINITY MAP

**MILLS COLLEGE
CORPORATION YARD FACILITY
Oakland, California**

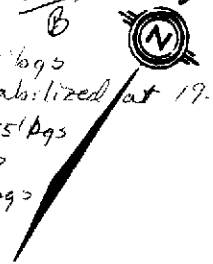
PROJECT NO.	DATE	Figure 1
K275-H	December 1994	



SEMINARY AVENUE

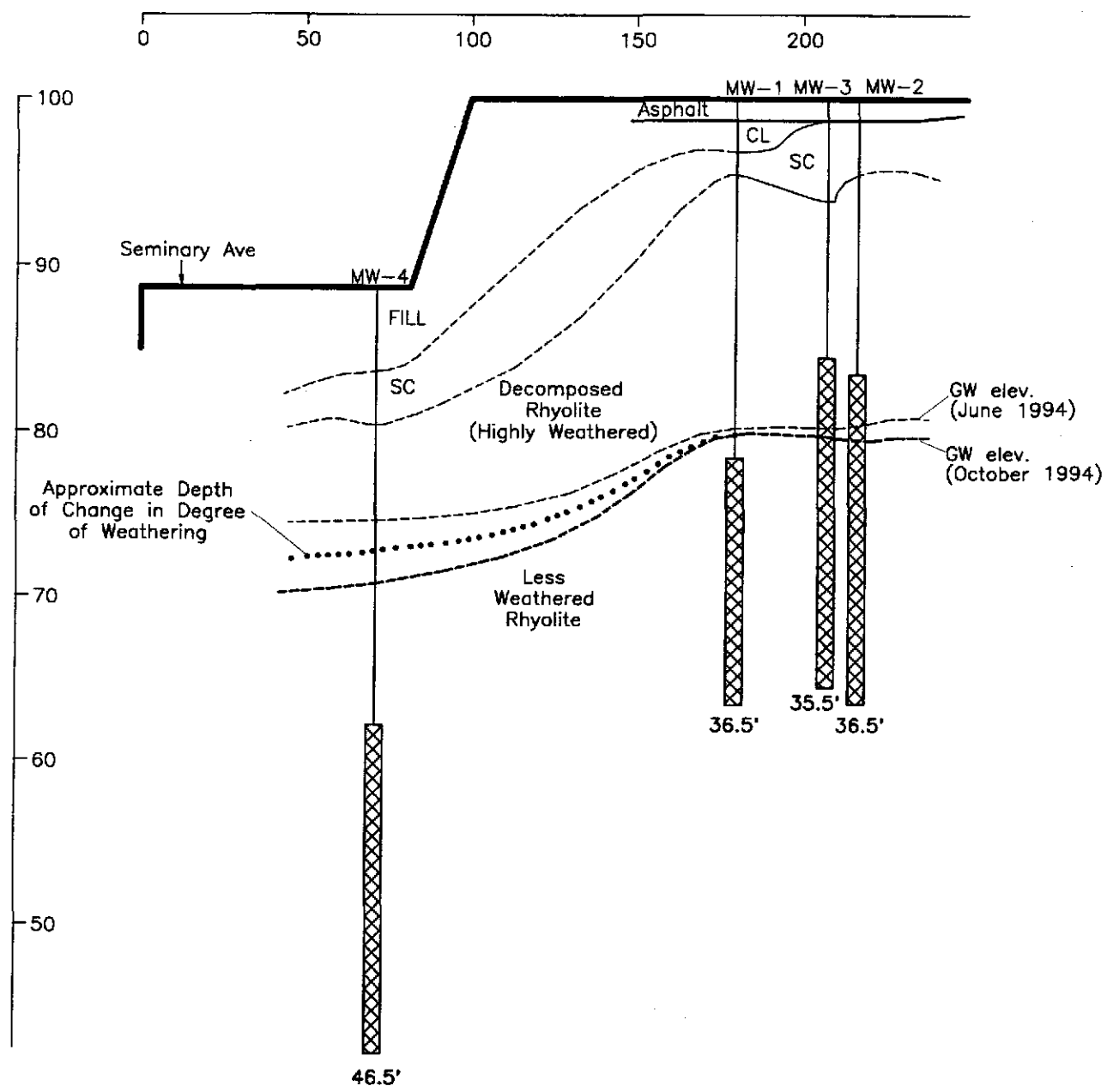
MW-1 → Screened from 19' → 34' bgs
 Initial water level at 24.1' bgs + stabilized to 19.44' bgs
 MW-2 → Screened 15' - 35' bgs
 Initial BW at installation → 25' bgs
 Stabilized - 19.36' bgs
 TPA (CPD)
 B

- Existing Monitoring Well Location
- 80.0 — Ground Water Contour 10/26/94
- MW-3 - Screened 14' - 34' bgs
Initial BW 25' bgs + stabilized at 19.4' bgs
- MW-4 - Screened 27' - 45' bgs
Initial BW → 45' bgs
Stabilized → 13' bgs



HARZA
 Consulting Engineers and Scientists

SITE PLAN		
MILLS CORPORATION YARD Oakland, California		
PROJECT NO.	DATE	Figure 2
K275-H	December 1994	



ek275h3

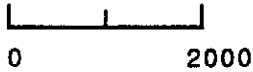
HARZA
Consulting Engineers and Scientists

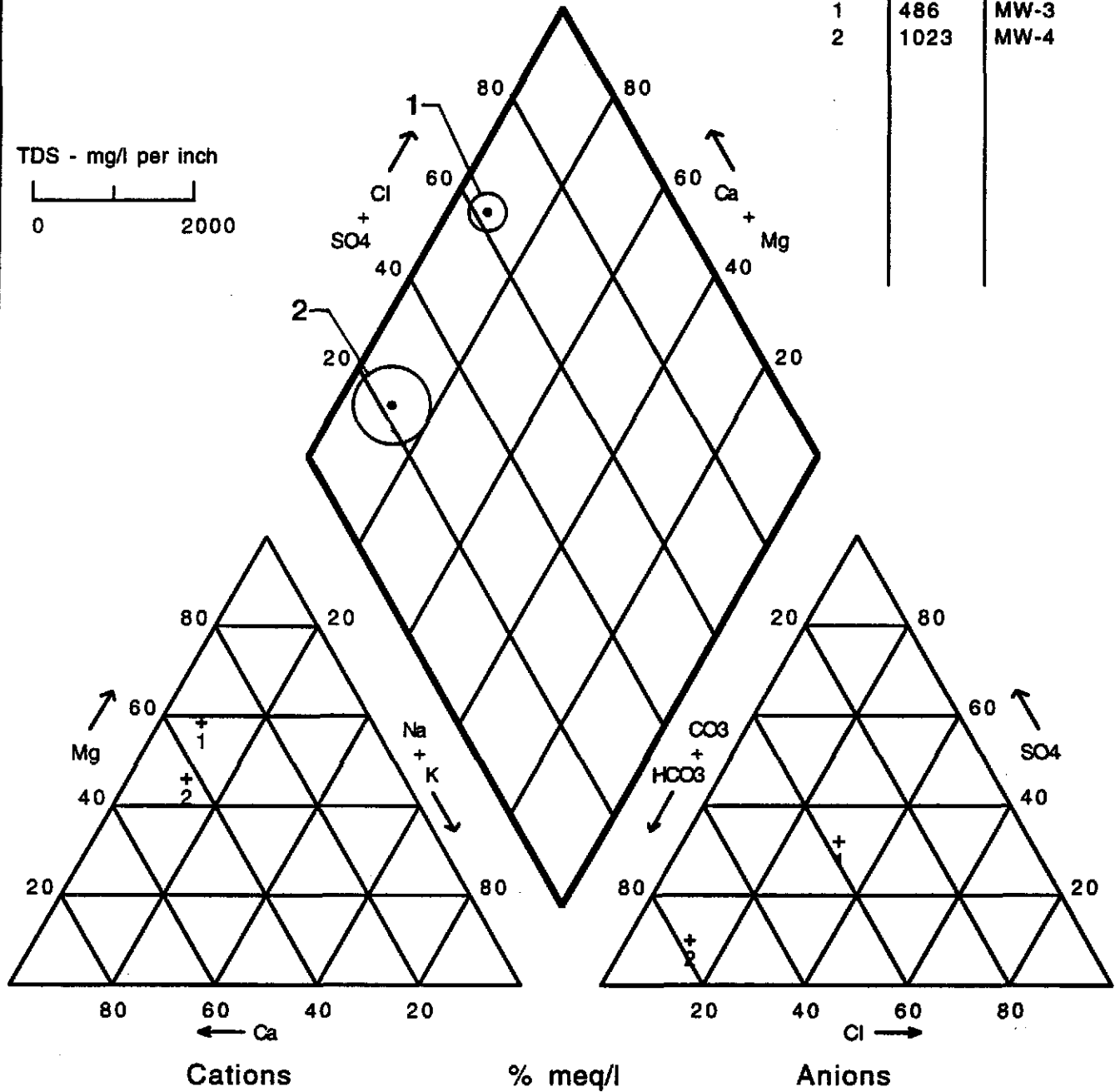
CROSS SECTION ALONG A-A'

MILLS CORPORATION YARD
 Oakland, California

PROJECT NUMBER	DATE	Figure 3
K275-H	December 1994	

No.	TDS	Well Name
1	486	MW-3
2	1023	MW-4

TDS - mg/l per inch





 HARZA <i>Consulting Engineers and Scientists</i>	PIPER DIAGRAM	
	MILLS COLLEGE CORPORATION YARD FACILITY Oakland, California	
	PROJECT NO.	DATE
	K275-H	December 1994

Figure 4

Cations meq/l Anions

25 20 15 10 5 0 5 10 15 20 25

Na + K
Ca
Mg
Fe

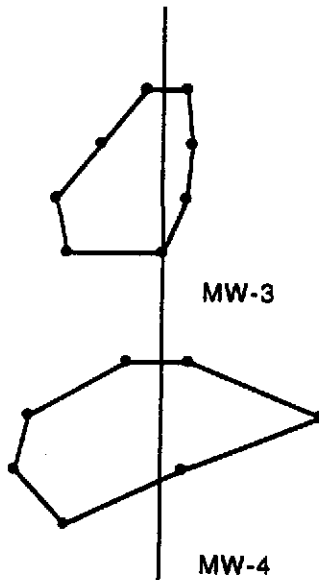
Cl
HCO₃ + CO₃
SO₄
NO₃

MW-3

Na + K
Ca
Mg
Fe

Cl
HCO₃ + CO₃
SO₄

MW-4



HARZA
Consulting Engineers and Scientists

STIFF DIAGRAM

MILLS COLLEGE
CORPORATION YARD FACILITY
Oakland, California

PROJECT NO.

DATE

Figure 5

K275-H

December 1994

APPENDIX A
Well Sampling Logs

WATER SAMPLE LOG

Project Name: Mills College - GAR YARD
 Project Number: K275-H
 Well Number: MW-1
 Well Location: _____

Date: 10/26/94
 Sampler: Derek Armentrout
 Weather: _____

Well Construction

Date Completed: _____
 Total Depth of Well: 32.5
 Diameter: 2 inches
 Well Elevation and Reference: _____

Sampling Equipment & Cleaning

Sampler Type: Teflon bailer
 Method of Cleaning: TSP wash/DI rinse
 Pump/Bailer Type: Teflon bailer
 Method of Cleaning: TSP wash/DI rinse
 pH Meter: Hydac
 Conductivity Meter: Hydac
 Comments: _____

Ground Water Levels:

Initial: 20.17
 Final: 20.76
 Reference Point: top of casing
 Well Volume of Water: 2.0 gal

SAMPLING MEASUREMENTS

Time	Discharge (gal.)		pH	Temp (°F)	Spec. Conductance (µmhos/cm)		Color/Turbidity	Odor
	Per Time Period	Cumulative			Field	@ 25°C		
1439	start	0						
1447		2.5	6.86	67.7	1280		BLACK / HIGH	STR. PETR.
1454		5	6.80	67.0	1300		"	"
1459		7	6.91	66.9	1270		"	"
		SAMPLED						

Total Discharge: 7 gal Comments: SHEEN ON WATER
 Casing Volumes Removed: 3.5
 Method of Disposal: 55-drum at Corporation Yard

HARZA <i>Consulting Engineers and Scientists</i>	WATER SAMPLE LOG		
	Project No.	Date	Figure

WATER SAMPLE LOG

Project Name: Mills College - CORE YARD
 Project Number: K275 -H
 Well Number: MW-2
 Well Location: _____

Date: 10/26/94
 Sampler: Derek Armentrout
 Weather: _____

Well Construction

Date Completed: _____
 Total Depth of Well: 34.5
 Diameter: 2 inches
 Well Elevation and Reference: _____

Sampling Equipment & Cleaning

Sampler Type: Teflon bailer
 Method of Cleaning: TSP wash/DI rinse
 Pump/Bailer Type: Teflon bailer
 Method of Cleaning: TSP wash/DI rinse
 pH Meter: Hydac
 Conductivity Meter: Hydac
 Comments: _____

Ground Water Levels:

Initial: 20.10
 Final: 23.88
 Reference Point: top of casing
 Well Volume of Water: 2.4 gal

SAMPLING MEASUREMENTS

Time	Discharge (gal.)		pH	Temp (°F)	Spec. Conductance (µmhos/cm)		Color/ Turbidity	Odor
	Per Time Period	Cumulative			Field	@ 25°C		
	start	0					0	
1413		2.5	7.45	70.6	650		ORANGE/HIGH	NONE
1420		5	7.37	69.5	630		"	"
1426		7.5	7.34	69.5	610		"	"
		SAMPLED						

Total Discharge: 7.5 gal
 Casing Volumes Removed: 3
 Method of Disposal: 55-drum at Corporation Yard

Comments: _____

HARZA <i>Consulting Engineers and Scientists</i>	WATER SAMPLE LOG		
	Project No.	Date	Figure

WATER SAMPLE LOG

Project Name: Mills College - Corp YARD
 Project Number: K275 - 4
 Well Number: MW-3
 Well Location: _____

Date: 10/26/94
 Sampler: Derek Armentrout
 Weather: _____

Well Construction

Sampling Equipment & Cleaning

Date Completed: _____
 Total Depth of Well: 32.5
 Diameter: 2 inches
 Well Elevation and Reference: _____

Sampler Type: Teflon bailer
 Method of Cleaning: TSP wash/DI rinse
 Pump/Bailer Type: Teflon bailer
 Method of Cleaning: TSP wash/DI rinse
 pH Meter: Hydac
 Conductivity Meter: Hydac
 Comments: _____

Ground Water Levels:

Initial: 20.08
 Final: 22.02
 Reference Point: top of casing
 Well Volume of Water: 2 gal

SAMPLING MEASUREMENTS

Time	Discharge (gal.)		pH	Temp (°F)	Spec. Conductance (µmhos/cm)		Color/Turbidity	Odor
	Per Time Period	Cumulative			Field	@ 25°C		
	start	0						
1324		2	7.50	68.7	4200		GRAY/MODERATE	NONE
		4	6.87	67.6	6700 530			
1345		6.5	6.81	68.0	550			
	SAMPLED							

Total Discharge: 6.5 gal
 Casing Volumes Removed: 3
 Method of Disposal: 55-drum at Corporation Yard

Comments: _____

HARZA <i>Consulting Engineers and Scientists</i>	WATER SAMPLE LOG		
	Project No.	Date	Figure

APPENDIX B
Laboratory Analytical Reports and Chain-of-Custody Records

American Environmental Network

Certificate of Analysis

DOHS Certification: 1172

AIHA Accreditation: 11134

PAGE 1

HARZA
425 ROLAND WAY
OAKLAND, CA 94621

ATTN: DEREK ARMENTROUT
CLIENT PROJ. ID: K275-H

REPORT DATE: 11/08/94

DATE(S) SAMPLED: 10/26/94

DATE RECEIVED: 10/26/94

AEN WORK ORDER: 9410322

PROJECT SUMMARY:

On October 26, 1994, this laboratory received 4 water sample(s).

Client requested sample(s) be analyzed for inorganic and organic parameters. Results of analysis are summarized on the following page(s).

Please see quality control report for a summary of QC data pertaining to this project.

If you have any questions, please contact Client Services at (510) 930-9090.


Lancy Klein
Laboratory Director

HARZA

SAMPLE ID: MW-1
AEN LAB NO: 9410322-01
AEN WORK ORDER: 9410322
CLIENT PROJ. ID: K275-H

DATE SAMPLED: 10/26/94
DATE RECEIVED: 10/26/94
REPORT DATE: 11/08/94

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
BTEX & Gasoline HCs	EPA 8020				
Benzene	71-43-2	1,000 *	1	ug/L	11/02/94
Toluene	108-88-3	290 *	1	ug/L	11/02/94
Ethylbenzene	100-41-4	140 *	1	ug/L	11/02/94
Xylenes, Total	1330-20-7	360 *	4	ug/L	11/02/94
Purgeable HCs as Gasoline	5030/GCFID	8.7 *	0.1	mg/L	11/02/94

Reporting limits elevated for gasoline/BTEX due to high levels of target compounds; sample run at dilution.

ND = Not detected at or above the reporting limit
* = Value above reporting limit

HARZA

SAMPLE ID: MW-2
AEN LAB NO: 9410322-02
AEN WORK ORDER: 9410322
CLIENT PROJ. ID: K275-H

DATE SAMPLED: 10/26/94
DATE RECEIVED: 10/26/94
REPORT DATE: 11/08/94

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
BTEX & Gasoline HCs	EPA 8020				
Benzene	71-43-2	130 *	0.5	ug/L	11/02/94
Toluene	108-88-3	ND	0.5	ug/L	11/02/94
Ethylbenzene	100-41-4	ND	0.5	ug/L	11/02/94
Xylenes, Total	1330-20-7	ND	2	ug/L	11/02/94
Purgeable HCs as Gasoline	5030/GCFID	0.2 *	0.05	mg/L	11/02/94

ND = Not detected at or above the reporting limit
* = Value above reporting limit

HARZA

SAMPLE ID: MW-3
 AEN LAB NO: 9410322-03
 AEN WORK ORDER: 9410322
 CLIENT PROJ. ID: K275-H

DATE SAMPLED: 10/26/94
 DATE RECEIVED: 10/26/94
 REPORT DATE: 11/08/94

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
BTEX & Gasoline HCs	EPA 8020				
Benzene	71-43-2	4 *	0.5	ug/L	11/02/94
Toluene	108-88-3	ND	0.5	ug/L	11/02/94
Ethylbenzene	100-41-4	ND	0.5	ug/L	11/02/94
Xylenes, Total	1330-20-7	ND	2	ug/L	11/02/94
Purgeable HCs as Gasoline	5030/GCFID	ND	0.05	mg/L	11/02/94
Nitrate-Nitrogen	EPA 300	0.3 *	0.1	mg/L	10/28/94
Phosphate-P in water	EPA 300	ND	0.5	mg/L	10/28/94
General Minerals					
Bicarbonate Alkalinity	EPA 310.1	90 *	2	mg CaCO3/L	11/01/94
Carbonate Alkalinity	EPA 310.1	ND	2	mg CaCO3/L	11/01/94
Hydroxide Alkalinity	EPA 310.1	ND	2	mg CaCO3/L	11/01/94
Calcium	EPA 6010	64 *	0.05	mg/L	11/02/94
Chloride	EPA 300	42 *	0.5	mg/L	11/01/94
Copper	EPA 6010	0.48 *	0.01	mg/L	11/02/94
Iron	EPA 6010	140 *	0.05	mg/L	11/02/94
Magnesium	EPA 6010	68 *	0.04	mg/L	11/02/94
Manganese	EPA 6010	1.3 *	0.005	mg/L	11/02/94
pH	EPA 9040	6.6	NA	std. units	10/26/94
Sodium	EPA 6010	18 *	0.1	mg/L	11/02/94
Sulfate	EPA 300	61 *	0.5	mg/L	10/28/94
Conductivity	EPA 120.1	480 *	20	umhos/cm	10/31/94
Total Dissolved Solids	EPA 160.1	280 *	10	mg/L	11/01/94
Hardness	SM 2340B	440 *	1	mg CaCO3/L	11/02/94
Zinc	EPA 6010	0.11 *	0.01	mg/L	11/02/94

ND = Not detected at or above the reporting limit

* = Value above reporting limit

HARZA

SAMPLE ID: MW-4
 AEN LAB NO: 9410322-04
 AEN WORK ORDER: 9410322
 CLIENT PROJ. ID: K275-H

DATE SAMPLED: 10/26/94
 DATE RECEIVED: 10/26/94
 REPORT DATE: 11/08/94

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
BTEX & Gasoline HCs					
Benzene	EPA 8020 71-43-2	ND	0.5	ug/L	11/02/94
Toluene	108-88-3	ND	0.5	ug/L	11/02/94
Ethylbenzene	100-41-4	ND	0.5	ug/L	11/02/94
Xylenes, Total	1330-20-7	ND	2	ug/L	11/02/94
Purgeable HCs as Gasoline	5030/GCFID	ND	0.05	mg/L	11/02/94
Nitrate-Nitrogen					
Nitrate-Nitrogen	EPA 300	ND	0.1	mg/L	10/28/94
Phosphate-P in water					
Phosphate-P in water	EPA 300	ND	0.5	mg/L	10/28/94
General Minerals					
Bicarbonate Alkalinity	EPA 310.1	510 *	2	mg CaCO3/L	11/01/94
Carbonate Alkalinity	EPA 310.1	ND	2	mg CaCO3/L	11/01/94
Hydroxide Alkalinity	EPA 310.1	ND	2	mg CaCO3/L	11/01/94
Calcium	EPA 6010	140 *	0.05	mg/L	11/02/94
Chloride	EPA 300	48 *	0.5	mg/L	10/28/94
Copper	EPA 6010	0.19 *	0.01	mg/L	11/02/94
Iron	EPA 6010	140 *	0.05	mg/L	11/02/94
Magnesium	EPA 6010	92 *	0.04	mg/L	11/02/94
Manganese	EPA 6010	1.3 *	0.005	mg/L	11/02/94
pH	EPA 9040	7.2	NA	std. units	10/26/94
Sodium	EPA 6010	41 *	0.1	mg/L	11/02/94
Sulfate	EPA 300	51 *	0.5	mg/L	10/28/94
Conductivity	EPA 120.1	1,200 *	20	umhos/cm	10/31/94
Total Dissolved Solids	EPA 160.1	670 *	10	mg/L	11/01/94
Hardness	SM 2340B	730 *	1	mg CaCO3/L	11/02/94
Zinc	EPA 6010	0.16 *	0.01	mg/L	11/02/94

ND = Not detected at or above the reporting limit

* = Value above reporting limit

AEN (CALIFORNIA)
QUALITY CONTROL REPORT

AEN JOB NUMBER: 9410322

CLIENT PROJECT ID: K275-H

Quality Control and Project Summary

All laboratory quality control parameters were found to be within established limits.

Definitions

Laboratory Control Sample (LCS)/Method Spike(s): Control samples of known composition. LCS and Method Spike data are used to validate batch analytical results.

Matrix Spike(s): Aliquot of a sample (aqueous or solid) with added quantities of specific compounds and subjected to the entire analytical procedure. Matrix spike and matrix spike duplicate QC data are advisory.

Method Blank: An analytical control consisting of all reagents, internal standards, and surrogate standards carried through the entire analytical process. Used to monitor laboratory background and reagent contamination.

Not Detected (ND): Not detected at or above the reporting limit.

Relative Percent Difference (RPD): An indication of method precision based on duplicate analysis.

Reporting Limit (RL): The lowest concentration routinely determined during laboratory operations. The RL is generally 1 to 10 times the Method Detection Limit (MDL). Reporting limits are matrix, method, and analyte dependent and take into account any dilutions performed as part of the analysis.

Surrogates: Organic compounds which are similar to analytes of interest in chemical behavior, but are not found in environmental samples. Surrogates are added to all blanks, calibration and check standards, samples, and spiked samples. Surrogate recovery is monitored as an indication of acceptable sample preparation and instrumental performance.

D: Surrogates diluted out.

#: Indicates result outside of established laboratory QC limits.

QUALITY CONTROL DATA

AEN JOB NO: 9410322
 DATE(S) ANALYZED: 10/28-11/02/94
 MATRIX: WATER

Method Spike Recovery Summary

Analyte	Inst./ Method	Spike Added (mg/L)	Average Percent Recovery	RPD	QC Limits	
					Percent Recovery	RPD
Cu, Copper	ICP/6010	0.13	92	2	85-113	6
Ca, Calcium	ICP/6010	10.0	103	2	80-120	15
Fe, Iron	ICP/6010	0.50	102	1	80-120	15
Mg, Magnesium	ICP/6010	10.0	102	2	80-120	15
Mn, Manganese	ICP/6010	0.25	105	1	80-120	15
Na, Sodium	ICP/6010	10.0	101	2	80-120	15
Zn, Zinc	ICP/6010	0.25	104	2	87-117	7
Chloride	DIONEX/300	5.0	108	2	80-120	15
Nitrate-N	DIONEX/300	1.0	89	<1	80-120	15
Phosphate-P	DIONEX/300	10.0	100	1	80-120	15
Sulfate	DIONEX/300	10.0	101	4	80-120	15

Daily method blanks for all associated analytical runs showed no contamination over the reporting limit.

*** END OF REPORT ***

Reporting Information:

R-3, S-3

American Environmental Network

AEN

1. Client: HARZA
 Address: _____
 Contact: DEREK ARMENTROUT
 Alt. Contact: _____

3440 Vincent Road, Pleasant Hill, CA 94523
 Phone (510) 930-9090
 FAX (510) 930-0256

REQUEST FOR ANALYSIS / CHAIN OF CUSTODY

Lab Job Number: 9410322
 Lab Destination: _____
 Date Samples Shipped: _____
 Lab Contact: _____
 Date Results Required: _____
 Date Report Required: _____
 Client Phone No.: _____
 Client FAX No.: _____

2. Address Report To: _____

3. Send Invoice To: DAVE JOHNSON
MILLS COLLEGE
5000 MACARTHUR BLVD.
OAKLAND CA 94613

Send Report To: 1 or 2 (Circle one)

Client P.O. No.: _____ Client Project I.D. No.: K275-H

Sample Team Member (s) DEREK ARMENTROUT

Lab Number	Client Sample Identification	Air Volume	Date/Time Collected	Sample Type*	Pres.	No. of Cont.	Type of Cont.	ANALYSIS					Comments / Hazards							
								TPH-Gas/BTEX	ANION SCANS*	GENERAL MINERALS										
01A-C	MW-1		10/26/94	H ₂ O		3	VOA	X												*10/27 - per client, General Mineral
02A-C	MW-2		↓	↓		↓		X												Scans, plus NO3-N
03A-E	MW-3		↓	↓		3	VOA,	X	X	X										and PO4-P. - Dist
04A-E	MW-4		↓	↓		500ml, 1000ml		X	X	X										

Relinquished by: (Signature) <u>[Signature]</u>	DATE <u>10/26/94</u>	TIME <u>16:30</u>	Received by: (Signature) <u>[Signature]</u>	DATE <u>10/26/94</u>	TIME <u>16:30</u>
Relinquished by: (Signature) <u>[Signature]</u>	DATE <u>10/26/94</u>	TIME <u>12:20</u>	Received by: (Signature) <u>[Signature]</u>	DATE <u>10/26/94</u>	TIME <u>16:30</u>
Relinquished by: (Signature) _____	DATE _____	TIME _____	Received by: (Signature) _____	DATE _____	TIME _____
Method of Shipment _____			Lab Comments _____		

*Sample type (Specify): 1) 37mm 0.8 µm MCEF 2) 25mm 0.8 µm MCEF 3) 25mm 0.4 µm polycarb. filter
 4) PVC filter, diam. _____ pore size _____ 5) Charcoal tube 6) Silica gel tube 7) Water 8) Soil 9) Bulk Sample
 10) Other _____ 11) Other _____