TRANSMITTAL

TO: Ms. Juliet Shin
Alameda County Health Care Serv. Agency
Hazardous Materials Division
80 Swan Way, Room 200
Oakland, California 94621

DATE: September 9, 1994
PROJECT #: 4945.703
SUBJECT: Additional Onsite Subsurface Investigation and Second Quarter 1994 Quarterly Monitoring Report for ARCO Station 6002

FROM:
Barbara Sieminski
Project Geologist
GeoStrategies, Inc.
6747 Sierra Court, Suite G
Dublin, California 94568

WE ARE SENDING YOU:

COPIES	DATED	DESCRIPTION
1	08/29/94	Additional Onsite Subsurface Investigation and Second Quarter 1994 Quarterly Monitoring Report for ARCO Station 6002, 6235 Seminary Avenue, Oakland, California.

THESE ARE TRANSMITTED as checked below:

[ ] For review and comment
[ ] Approved as submitted
[ ] Resubmit __ copies for approval
[X] As requested
[ ] Approved as noted
[ ] Submit __ copies for distribution
[ ] For approval
[ ] Return for corrections
[ ] Return ___ corrected prints
[ ] For your files

cc: **Mr. Michael Whelan**, ARCO Products Company
Mr. Chris Winsor, ARCO Products Company
Mr. Richard Hiett, Regional Water Quality Control Board (Certified mail)
Mr. Joel Coffman, GSI

GeoStrategies Inc.

ADDITIONAL ONSITE SUBSURFACE INVESTIGATION AND SECOND QUARTER 1994 QUARTERLY MONITORING REPORT

for

ARCO Station 6002
6235 Seminary Avenue
Oakland, California

4945703-2

Report prepared for

ARCO Products Company
P.O. Box 5811
San Mateo, California 94402

by

GeoStrategies Inc.

Barbara Sieminski
Project Geologist

Joel Coffman
Project Manager

Stephen Carter
Senior Project Geologist
R.G. 5577

REGISTERED GEOLOGIST
STEPHEN J. CARTER
No. 5577
STATE OF CALIFORNIA

August 29, 1994

CONTENTS

Tables

Figures

Appendices

GeoStrategies Inc.

ADDITIONAL ONSITE SUBSURFACE INVESTIGATION REPORT AND SECOND QUARTER 1994 QUARTERLY MONITORING REPORT

for ARCO Station 6002,
6235 Seminary Avenue, Oakland, California

1.0 INTRODUCTION

As requested by ARCO Products Company (ARCO), GeoStrategies Inc. (GSI) performed an additional onsite subsurface investigation at ARCO Station 6002 located at 6235 Seminary Avenue, Oakland, California, as specified in the GSI *Work Plan* dated May 18, 1994. This investigation was requested by Ms. Juliet Shin of the Alameda County Health Care Services Agency (ACHCSA) in a letter dated April 14, 1994. The purpose of this investigation was to provide quarterly groundwater monitoring data for the second quarter 1994, to further evaluate the extent of petroleum hydrocarbons in soil and groundwater beneath the subject site, and to evaluate the gradient and flow direction of the shallow groundwater beneath the site. This report includes field methods, results, and conclusions of the investigation.

The work performed for this phase of the investigation included: drilling four soil borings (B-5 through B-8), collecting soil samples from the borings for description and possible laboratory analyses, and installing

6747 Sierra Court, Suite. G • Dublin, CA 94568 • (510) 551-8777 • Fax (510) 551-7888
3035 Prospect Park Drive, Suite 80 • Rancho Cordova, CA 95670 • (916) 631-1314 • Fax (916) 631-1317

groundwater monitoring wells MW-2 through MW-5 in the borings; submitting selected soil samples for laboratory analyses; developing groundwater monitoring wells MW-2 through MW-5; surveying newly installed wells MW-2 through MW-5, pre-existing wells MW-1, VW-1 and VW-2, and other pertinent site features; monitoring, purging and sampling wells MW-1 through MW-5, and submitting groundwater samples for laboratory analyses; and preparing a report which presents field procedures, results, and conclusions of the investigation. Field work was performed to comply with current State of California Water Resources Control Board (SWRCB) and local agency guidelines. GSI Field Methods and Procedures are presented in Appendix A of this report.

2.0 SITE DESCRIPTION AND BACKGROUND

2.1 General

The site is located in a residential area, immediately east of Highway 580, on a gently sloping, asphalt and concrete covered lot at an elevation of approximately 250 feet above mean sea level (msl). Two 6,000 gallon gasoline underground storage tanks (USTs) and two 4,000 gallon gasoline USTs are located in the eastern portion of the site. Two service islands are located in the northern portion of the site. The approximate locations of the USTs and other pertinent site features are shown on the Site Plan, Figure 2.

2.2 Geology and Hydrogeology

The site is located along the eastern margin of San Francisco Bay on the East Bay Plane, approximately ½ mile west of the Hayward Fault Zone. The subsurface soil in the vicinity of the site have been mapped as late Pleistocene alluvium composed of weakly consolidated, slightly weathered, poorly sorted, irregularly interbedded clay, silt, sand, and

gravel deposited mainly in stream channels and on alluvial fans (Helley et.al., 1979).

Groundwater at the subject site was first-encountered at a depth of approximately 10 feet below ground surface. Based on topography, groundwater in the site area was inferred to flow to the west, toward San Francisco Bay (U.S. Geological Survey, 1980).

2.3 Previous Environmental Work

2.3.1 Initial Onsite Environmental Investigation

In January 1994, four exploratory soil borings (B-1 through B-4) were drilled at the site in the vicinity of the USTs, and groundwater monitoring well MW-1 was installed in boring B-2 and vapor extraction wells VW-1 and VW-2 were installed in borings B-3 and B-4, respectively, by RESNA. The soil boring and well locations are shown on Figure 2. The results of this investigation were described in the RESNA Initial Onsite Subsurface Investigation Report, dated March 31, 1994.

The soil encountered at the site consisted primarily of silty clay and sandy silt to silty sand and sandy gravel. Groundwater was encountered in borings B-1 through B-4 at depths between 9½ and 11 feet and stabilized at depths of 7 to 9 feet below ground surface.

Laboratory data for soil samples collected from borings B-1 through B-4 indicated that the greatest concentrations of gasoline hydrocarbons (420 parts per million [ppm] of total petroleum hydrocarbons as gasoline [TPH-G]) were in boring B-2 located in the inferred downgradient direction of the USTs at a depth of approximately 10½ feet. The vertical extent of gasoline hydrocarbons in soil has been delineated to less than 1.0 ppm of TPH-G at depths of 13½ feet in B-2 and 15½ feet in B-4, in the downgradient direction of the USTs. Soil in the upgradient direction of

the USTs (B-3) do not appear to have been impacted by gasoline hydrocarbons. The results of laboratory analyses of soil samples are included in Table 1.

Laboratory analyses results for groundwater samples collected from groundwater monitoring well MW-1 and vapor extraction wells VW-1 and VW-2 (grab samples) indicated TPH-G ranging from 11,000 parts per billion [ppb] to 19,000 ppb and benzene concentrations ranging from 620 ppb to 1,300 ppb. The results of laboratory analyses of groundwater samples are included in Table 2.

3.0 WELL INSTALLATION ACTIVITIES

3.1 Drilling

A well construction permit was acquired from the Alameda County Flood Control and Water Conservation District, Zone 7 (ACFCWCD), prior to drilling at the site. A copy of the permit is included in Appendix B.

Four onsite exploratory soil borings (B-5 through B-8) were drilled at the subject site on June 29, 1994. These borings were drilled to further evaluate the extent of petroleum hydrocarbons in soil beneath the subject site. Borings B-5 through B-8 were drilled using a CME 75 drilling rig and 10-inch outside diameter hollow-stem augers. A GSI geologist observed the drilling, described the soil samples collected from the borings using the Unified Soil Classification System (ASTM D 2488-84) and Munsell Color Chart, and prepared a lithologic log for each boring.

Boring B-5 was drilled to the total depth of 21.5 feet, boring B-7 was drilled to the total depth of 24.5 feet, and borings B-6 and B-8 were drilled to the total depth of 25 feet. Groundwater monitoring wells MW-2 through MW-5 were installed in borings B-5 through B-8, respectively, to delineate the extent of hydrocarbon impacted groundwater beneath the

subject site and to evaluate the gradient and flow direction of the shallow groundwater beneath the site. Boring logs and graphic well construction details are presented in Appendix C.

Drill cuttings generated during drilling were stored onsite, placed on and covered with visqueen.

3.2 Soil Sampling

Soil samples were collected continuously in boring B-7 beginning at 5 feet below ground surface, and at intervals of five-feet or less in borings B-5, B-6 and B-8. The soil samples were collected using a modified California split-spoon sampler fitted with stainless steel sample tube liners. Soil samples retained for chemical analyses were sealed on both ends with aluminum foil and plastic end caps. Samples were labeled, entered onto a Chain-of-Custody form, and transported in a cooler with ice to the laboratory. Upon completion of drilling, four soil samples were collected from the soil stockpile for compositing and analyses for disposal purposes.

An Organic Vapor Monitor (OVM) photoionization detector (PID) was used to perform head-space analyses on soil for each sample interval. These tests were performed as a reconnaissance-level field test to evaluate the presence of hydrocarbons in the soil.

3.3 Well Construction

Groundwater monitoring wells MW-2 through MW-5 were constructed using 4-inch diameter Schedule 40 PVC blank well casing and 0.020-inch wide machine-slotted PVC screen. Screened portions of wells MW-2, MW-3 and MW-5 extend from 5 feet below ground surface to the bottom of each well (18, 25 and 25 feet, respectively), and the screened portion of well MW-4 extends from 4.5 feet below ground surface to the bottom of the well (24.5 feet). The annular space of each well was backfilled

with #2/12 sand to approximately 1 foot above the top of the well screen. A 1-foot bentonite seal was placed above the sandpack. A neat cement seal was placed in each well from the top of the bentonite to approximately 1 foot below ground surface. An underground well box, set in concrete, was installed over the top of each well. Waterproof locking well caps and locks were placed on the well casings. Well completion details are presented with the exploratory boring log in Appendix C.

3.4 Well Development

Groundwater monitoring wells MW-2 through MW-5 were developed by bailing and pumping to remove fine-grained sediments and allow better communication between the water-bearing zone and the wells. Well development was performed by Gettler-Ryan Inc. (G-R) on July 5, 1994. The Well Development Forms are included in Appendix D.

3.5 Site Survey

Newly installed wells MW-2 through MW-5 and pre-existing well MW-1 were surveyed for wellhead elevation and location, and other pertinent site features were surveyed for location on July 12, 1994. The survey was performed by John Koch, a California licensed land surveyor. The survey report is included in Appendix E.

3.6 Well Monitoring and Sampling

On July 8, 1994, newly installed groundwater monitoring wells MW-2 through MW-5 and pre-existing groundwater monitoring well MW-1 were monitored and sampled by G-R. Depth-to-water (DTW) was measured in the wells, groundwater samples were collected and visually inspected for floating product, the wells were purged and groundwater samples were collected for laboratory analyses. The results of groundwater monitoring

and sampling are presented in Tables 2 and 3. The G-R report and field data sheets are included in Appendix F.

4.0 RESULTS OF SUBSURFACE INVESTIGATION

4.1 Subsurface Condition

The soil materials encountered during drilling consisted of sandy silt to silty clay interbedded with clayey sand to sandy gravel to the total depth explored of 25 feet below ground surface. Groundwater was encountered and stabilized at depths of approximately 7.5 to 13 feet. Graphic interpretations of soil stratigraphy beneath the site are shown on geologic Cross Sections A-A'and B-B' (Figures 3 and 4). Locations of the borings and cross-sections are shown on Figure 2.

4.2 Organic Vapor Analyses

OVM measurements performed on soil samples collected from borings B-5 through B-8 indicated nondetectable or near nondetectable (no more than 6 ppm) concentrations of hydrocarbons except for the sample collected from boring B-8 at a depth of approximately 10.5 feet (capillary fringe zone), which indicated 230 ppm. OVM (PID) readings for soil samples collected from borings B-5 through B-10 are presented on the boring logs in Appendix C.

4.3 Laboratory Analyses of Soil Samples

Soil samples collected during this investigation were preserved as required by the applicable analytical method and delivered with Chain-of-Custody Records to Sequoia Analytical (Sequoia), a State-certified environmental laboratory (Hazardous Waste Testing Laboratory #1210) located in Redwood City, California. Thirteen soil samples collected from borings

B-5 through B-8 were analyzed for TPH-G and BTEX using EPA Methods 5030/8015 Mod./8020.

The stockpile sample (SP-0629 Comp.A-D) was composited in the laboratory and analyzed for TPH-G and BTEX using EPA Methods 5030/8015 Mod./8020; soluble threshold limit concentration (STLC) lead; and corrosivity, ignitability and reactivity (RCI) using applicable methods. Upon receipt of chemical analyses the soil stockpile was removed from the site and transported to BFI Landfill in Livermore by ARCO's contractor, Dillard Trucking Inc. of Byron, California, on July 14, 1994.

Laboratory analyses results of soil samples collected from borings B-5 through B-7 indicated nondetectable concentrations of TPH-G (less than 1 ppm). Laboratory analyses results of soil samples collected from boring B-8, located in the southwestern corner of the site, indicated nondetectable concentrations of TPH-G for samples collected at 5.5 feet and 24.5 feet below ground surface, and 1,500 ppm TPH-G in the sample collected at the depth of 10.5 feet below ground surface (capillary fringe zone). Soil chemical analytical data for the present and previous investigation are summarized in Table 1. Graphic interpretation of TPH-G in soil beneath the subject site at depths of 7 to 10.5 feet is shown on Figure 5. Soil chemical analytical reports and Chain-of-Custody Forms are presented in Appendix G.

The majority of hydrocarbon impacted soil at the subject site appears to be in the immediate downgradient vicinity of the UST pit (B-2) and in the southwestern corner of the site (B-8), at depths between 7 and 10.5 feet below ground surface (capillary fringe zone). The lateral extent of hydrocarbon impacted soil at the subject site has been delineated to nondetectable TPH-G in all directions except southwest. The vertical extent of hydrocarbon impacted soil at the subject site has been delineated to nondetectable concentrations of TPH-G at depths of 13.5 feet (B-2) to 24.5 feet (B-7).

4.4 Groundwater Gradient Evaluation

DTW data collected from wells MW-1 through MW-5 on July 8, 1994, were used to construct a potentiometric map shown on Figure 6. The shallow groundwater flow is interpreted to be to the west with a gradient of approximately 0.08.

4.5 Laboratory Analyses of Groundwater Samples

Groundwater samples collected from wells MW-1 through MW-5 on July 8, 1994, were submitted to Sequoia. Samples were analyzed for TPH-G and BTEX using EPA Methods 5030/8015 Mod./8020.

The laboratory analyses results indicated nondetectable concentrations of TPH-G (less than 50 parts per billion [ppb]) and benzene (less than 0.50 ppb) in groundwater monitoring wells MW-2 through MW-4; 21,000 ppb TPH-G and 5,200 ppb benzene in well MW-1, located in the immediate downgradient vicinity of the UST pit; and 41,000 ppb TPH-G and 3,300 ppb benzene in well MW-5, located in the southwestern corner of the site. The G-R groundwater sampling report is presented in Appendix F. Chemical analytical data for groundwater samples are presented in Table 3. Concentrations of TPH-G and benzene detected in wells MW-1 through MW-5 are shown on Figure 7.

The extent of hydrocarbons in shallow groundwater beneath the site appears to be delineated to nondetectable concentrations of TPH-G and benzene in the northeastern, northwestern and southeastern portions of the site.

5.0 SUMMARY OF FINDINGS

The summary of findings is presented below:

- The lithology of borings B-5 through B-8 consisted of sandy silt to silty clay interbedded with clayey sand to sandy gravel to the total depth explored of 25 feet below ground surface. Groundwater was encountered and stabilized at depths of approximately 7.5 to 13 feet below ground surface.

- The majority of hydrocarbon impacted soil at the subject site appears to be in the immediate downgradient vicinity of the UST pit (B-2) and in the southwestern corner of the site (B-8), at depths between 7 and 10.5 feet below ground surface (capillary fringe zone). The lateral extent of hydrocarbon impacted soil at the subject site has been delineated to nondetectable TPH-G in all directions except southwest. The vertical extent of hydrocarbon impacted soil at the subject site has been delineated to nondetectable TPH-G at depths of 13.5 feet (B-2) to 24.5 feet (B-7).

- The shallow groundwater beneath the site is interpreted to flow to the west at a gradient of approximately 0.08.

- The extent of hydrocarbons in shallow groundwater beneath the site appears to be delineated to nondetectable TPH-G and benzene in the northeastern, northwestern and southeastern portions of the site.

6.0 LIMITATIONS

This report was prepared in accordance with generally accepted standards of environmental geological and engineering practice in California at the

time this investigation was performed. This assessment was conducted solely for the purpose of evaluating environmental conditions of the soil and groundwater with respect to gasoline hydrocarbons at the site and for installation of vapor extraction and air sparging wells to be used in an interim remediation system. No soil engineering or geotechnical references are implied or should be inferred.

7.0 REFERENCES

Helley et.al., 1979, Flatland Deposits - Their Geology and Engineering Properties and Their Importance to Comprehensive Planning, Selected Examples from the San Francisco Bay Region, California: U.S. Geological Survey Professional Paper 943, 88p.

RESNA Industries Inc., March 31, 1994. Initial Onsite Subsurface Investigation Report. Report # 130063.01

U.S. Geological Survey 1980. 7.5-Minute Quadrangle, Oakland East, California.

Worst soil contam. at 10.5' bgs in B2 & B8

TABLE 1

CUMULATIVE LABORATORY ANALYSES RESULTS FOR SOIL SAMPLES
ARCO Station 6002
Oakland, California

BORING NO	SAMPLE ID	SAMPLE DEPTH (FEET)	TPH-G (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)
January 1994							
B-1	S-5-B1	5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-1	S-8.5-B1	8.5	**3.8***	<0.0050	<0.0050	<0.0050	<0.0050
B-2	S-5.5-B2	5.5	**3.8**	**0.031**	**0.022**	**0.013**	<0.060
B-2	S-7.5-B2	7.5	**7.2**	**0.030**	**0.042**	**0.027**	**0.16**
B-2	S-10.5-B2	10.5	**420****	<0.0050	<0.0050	**5.5**	**14**
B-2	S-13.5-B2	13.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-2	S-18-B2	18	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-2	S-20.5-B2	20.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-2	S-23.5-B2	23.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-2	S-27-B2	27	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-2	S-32.5-B2	32.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-2	S-36-B2	36	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-3	S-5-B3	5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-3	S-10-B3	10	<1.0	**0.014**	**0.013**	**0.0060**	**0.026**
B-3	S-14.5-B3	14.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-4	S-5-B4	5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-4	S-10-B4	10	**3.9**	**0.014**	<0.0050	<0.0050	**0.041**
B-4	S-15.5-B4	15.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
Soil Stockpile	01140SP-(A-D)	---	**3.1**	<0.0050	<0.0050	<0.0005	<0.0050
June 1994							
B-5	B-5-5.5	5.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-5	B-5-7.5	7.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-5	B-5-21	21	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-6	B-5-5.5	5.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-6	B-5-7	7	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-6	B-5-24.5	24.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050

TABLE 1

CUMULATIVE LABORATORY ANALYSES RESULTS FOR SOIL SAMPLES
ARCO Station 6002
Oakland, California

BORING NO	SAMPLE ID	SAMPLE DEPTH (FEET)	TPH-G (PPM)	BENZENE (PPM)	TOLUENE (PPM)	ETHYLBENZENE (PPM)	XYLENES (PPM)
B-7	B-7-5.5	5.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-7	B-7-8.5	8.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-7	B-7-10	10	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-7	B-7-24	24	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-8	B-8-5.5	5.5	<1.0	<0.0050	<0.0050	<0.0050	<0.0050
B-8	B-8-10.5	10.5	1,500**	<0.50	2.4	17	43
B-8	B-8-24.5	24.5	<1.0	<0.0050	<0.0050	0.0070	0.013
Soil Stockpile	SP-0629(Comp.A-D)	---	110**	<0.01	0.13	1.0	2.3

TPH-G = Total Petroleum Hydrocarbons calculated as Gasoline.
PPM = Parts Per Million.
< = less than detection limit.
* = Laboratory reported the chromatogram pattern to indicate a "non-gas mix >C8."
** = Laboratory reported the chromatogram pattern to indicate "weathered gas."

TABLE 2

GROUNDWATER QUALITY DATABASE
ARCO Station 6002
Oakland, California

SAMPLE DATE	SAMPLE POINT	TPH-G (PPB)	BENZENE (PPB)	TOLUENE (PPB)	ETHYLBENZENE (PPB)	XYLENES (PPB)
21-Jan-94	VW-1*	19,000	1,100	180	720	2,800
21-Jan-94	VW-2*	11,000	620	1,500	330	1,400
21-Jan-94	MW-1	18,000	1,300	1,600	250	1,900
08-Jul-94	MW-1	21,000	5,200	<50	1,000	1,500
08-Jul-94	MW-2	<50	<0.5	<0.5	<0.5	<0.5
08-Jul-94	MW-3	<50	<0.5	<0.5	<0.5	<0.5
08-Jul-94	MW-4	<50	<0.5	<0.5	<0.5	<0.5
08-Jul-94	MW-5	41,000	3,300	<50	2,200	2,900

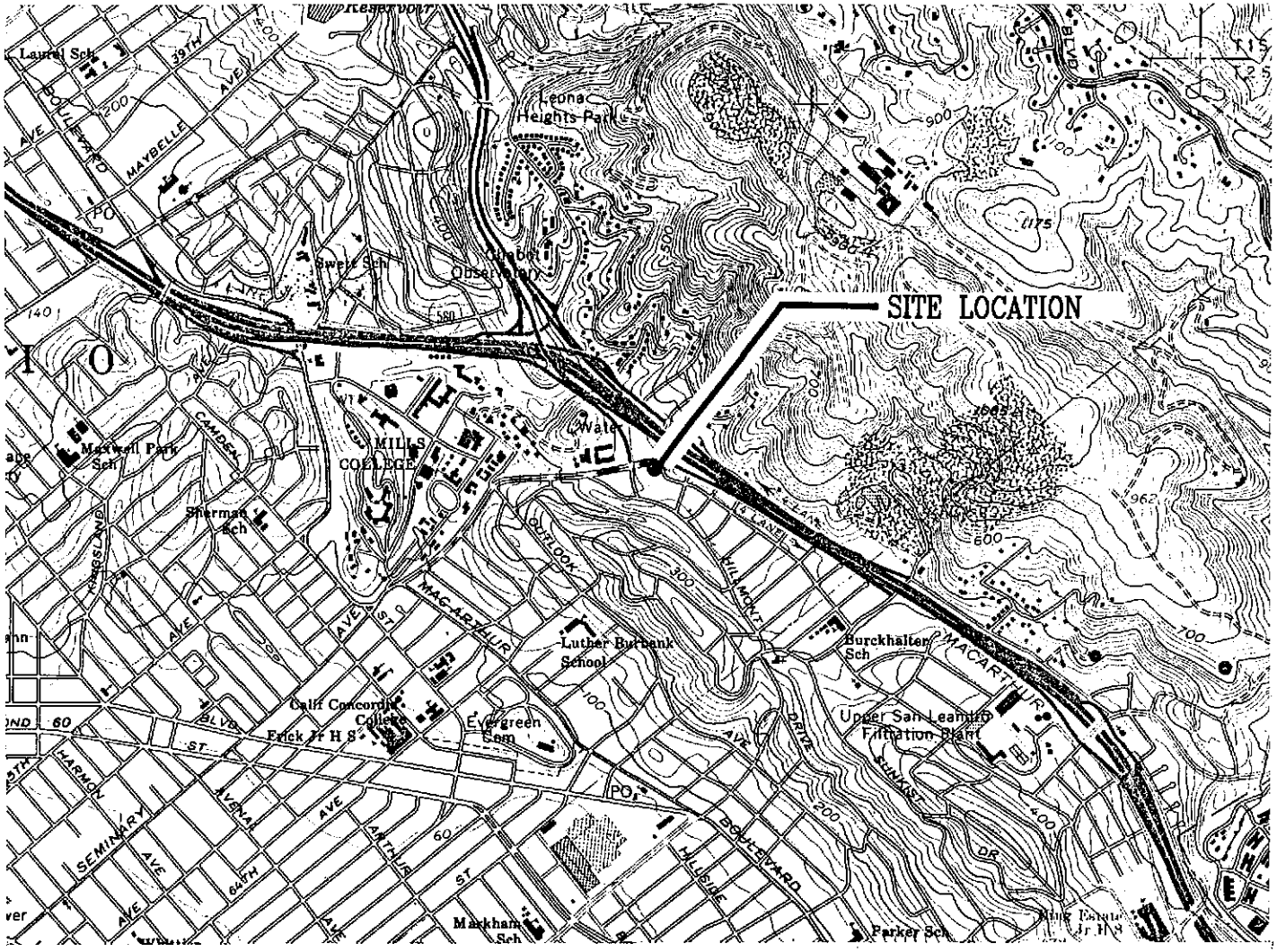
TPH-G = Total Petroleum Hydrocarbons calculated as Gasoline.
PPB = Parts Per Billion.
* = Grab samples collected from vapor wells VW-1 and VW-2 as a one-time sampling event only.

TABLE 3

WATER-LEVEL DATA
ARCO Station 6002
Oakkland, California

MONITORING DATE	WELL NUMBER	DEPTH TO WATER (FT)	WELL ELEVATION (FT)	STATIC WATER ELEVATION (FT)	FLOATING PRODUCT THICKNESS (FT)
21-Jan-94	MW-1	7.82	247.06	239.24	0.00
08-Jul-94	MW-1	8.32	247.06	238.74	0.00
08-Jul-94	MW-2	9.51	249.30	239.79	0.00
08-Jul-94	MW-3	7.75	248.35	240.60	0.00
08-Jul-94	MW-4	10.97	242.91	231.94	0.00
08-Jul-94	MW-5	12.94	244.82	231.88	0.00

Notes:
1. Static water elevations are referenced to Mean Sea Level (MSL).
2. Well elevations and depth to water measurements are referenced to the top of the well casing in feet.



N

0 2000

Scale in Feet

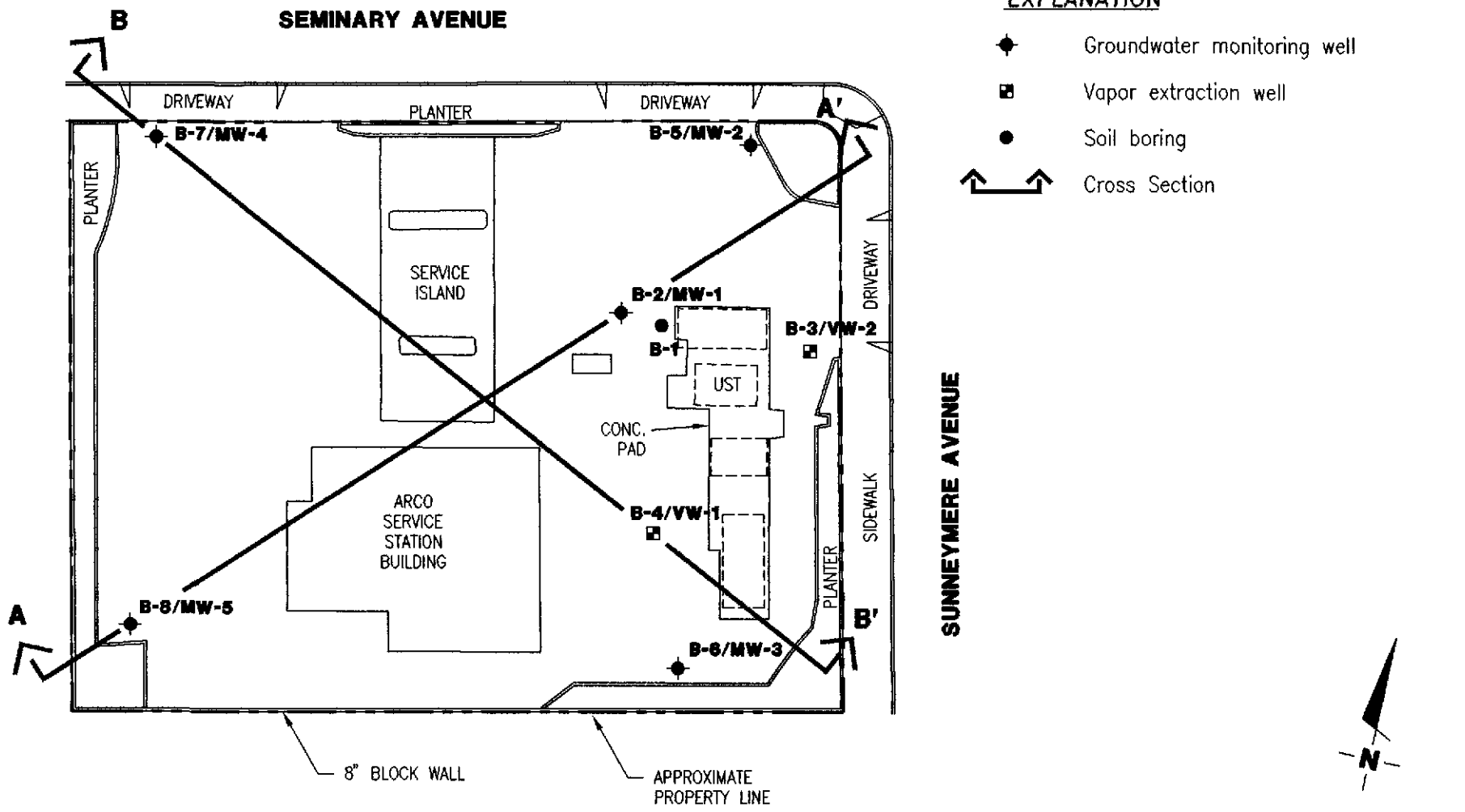
Base Map: USGS Topographic Map

GeoStrategies Inc.

VICINITY MAP
ARCO Service Station #6002
6235 Seminary Avenue
Oakland, California

FIGURE
1

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
4945		5/94	



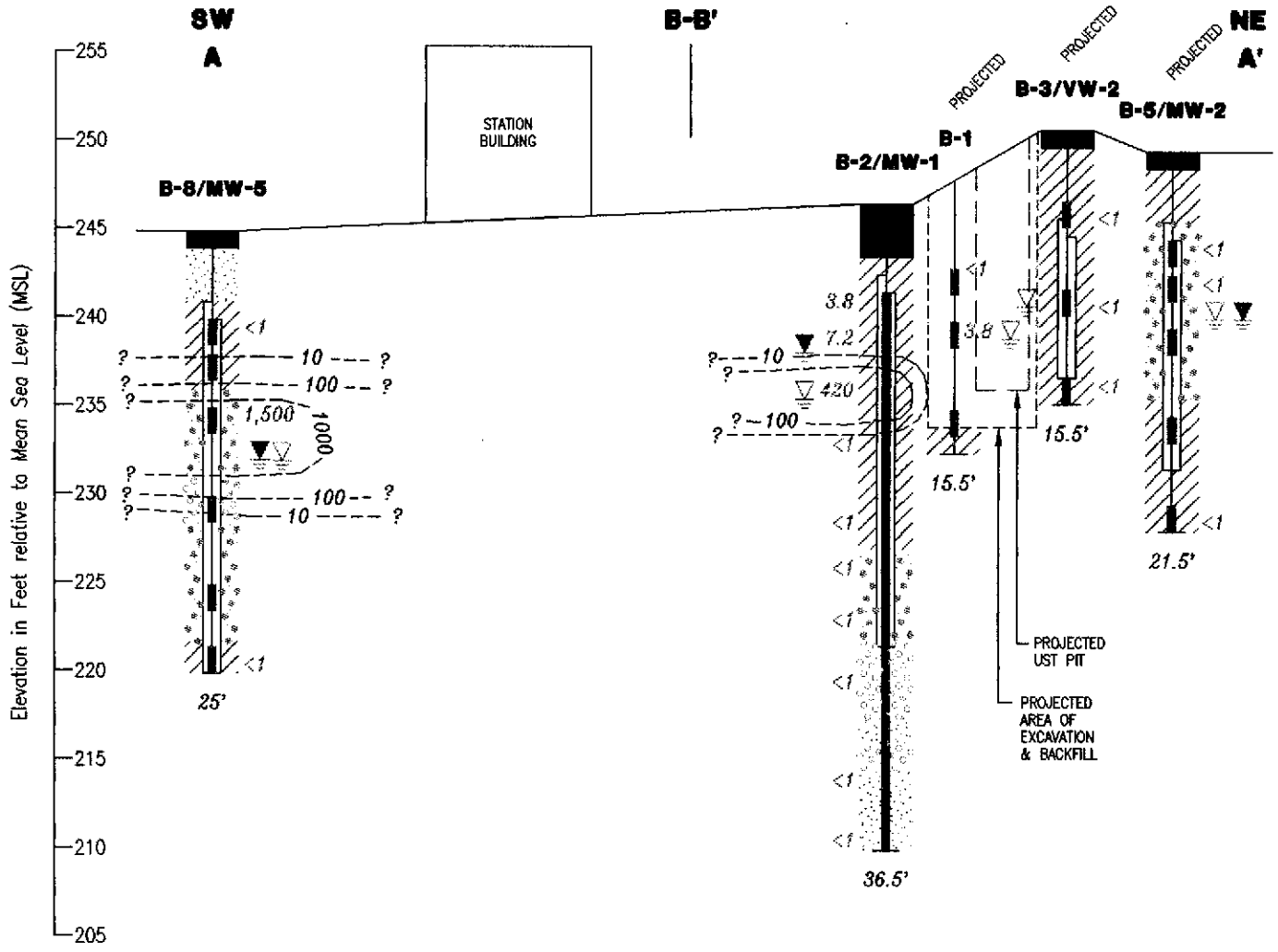
Base Map: Alhambra Land Surveyors
Job No. A94053
Dated July, 1994

GeoStrategies Inc.

SITE PLAN
ARCO Service Station #6002
6235 Seminary Avenue
Oakland, California

FIGURE
2

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
4945703-2	BS	8/94	



SCALE
HORZ. 1"=30'
VERT. 1"=10'

EXPLANATION

- Pavement section
- TPH—Gasoline concentrations in ppm (A)
- Soil sample interval
- First encountered water
- Isoconcentration contour
- Water level measured *July 8, 1994*
- Sandpack interval
- Well screen interval
- 29' Total Depth of boring

LEGEND

- Gravels (GW and GP)
- Gravels (GM and GC)
- Sands (SW to SP)
- Sands (SM to SC)
- Silts and Clays (ML to CL)
- Silts and Clays (MH to CH)
- Silts and Clays (OH and OL)

NOTES

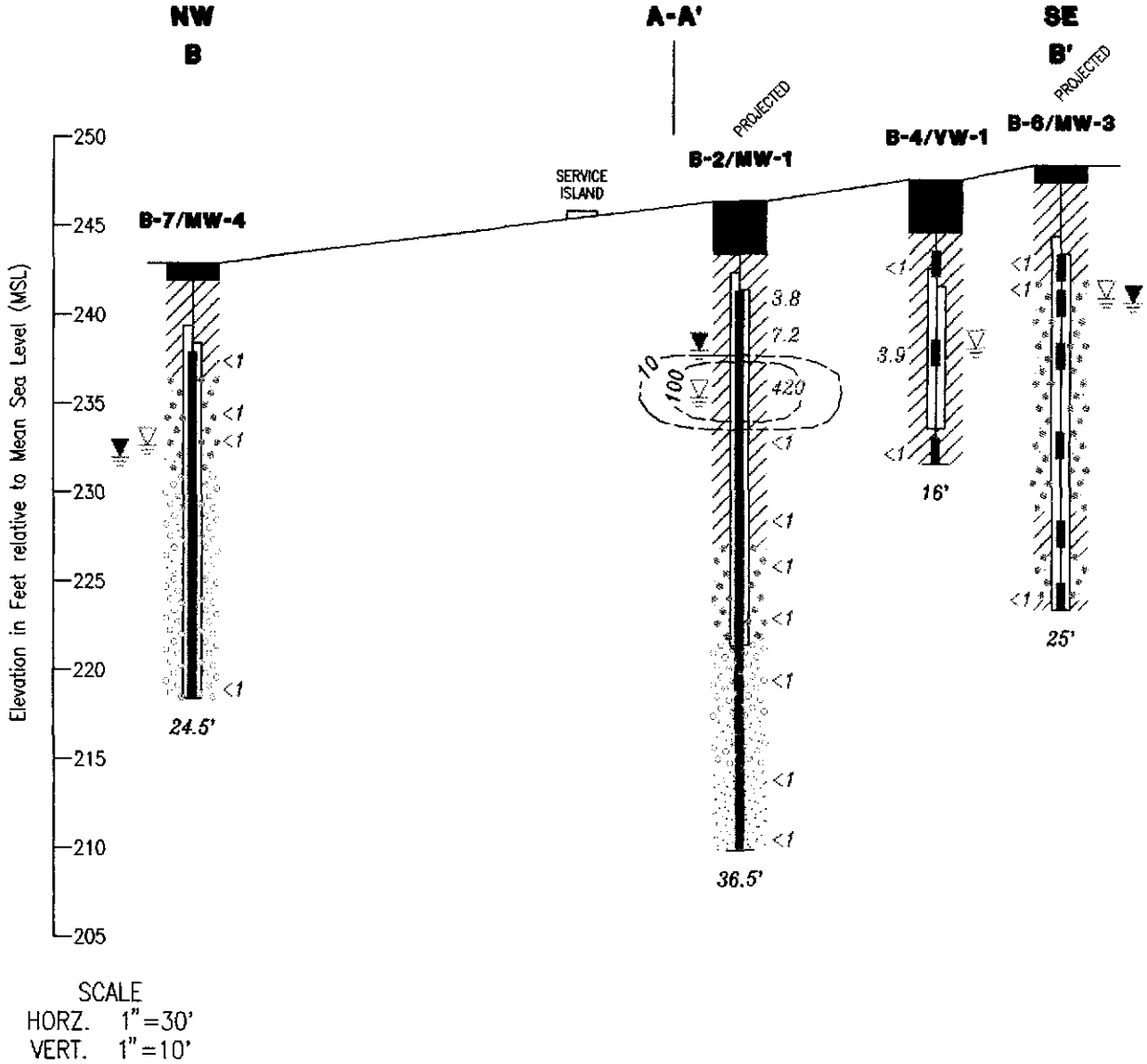
1. General stratigraphic relationships are displayed. Additional horizontal and vertical variations may exist.

GeoStrategies Inc.

CROSS SECTION A—A'
ARCO Service Station #6002
6235 Seminary Avenue
Oakland, California

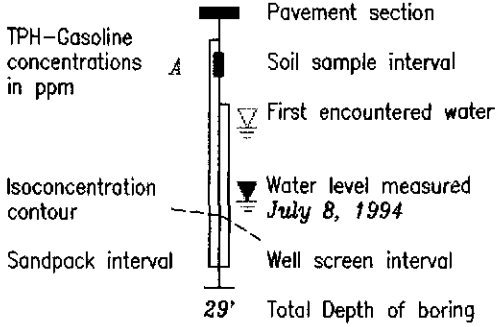
FIGURE **3**

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
4945703-2	BS	8/94	



SCALE
HORZ. 1"=30'
VERT. 1"=10'

EXPLANATION



LEGEND

- Gravels (GW and GP)
- Gravels (GM and GC)
- Sands (SW to SP)
- Sands (SM to SC)
- Silts and Clays (ML to CL)
- Silts and Clays (MH to CH)
- Silts and Clays (OH and OL)

NOTES

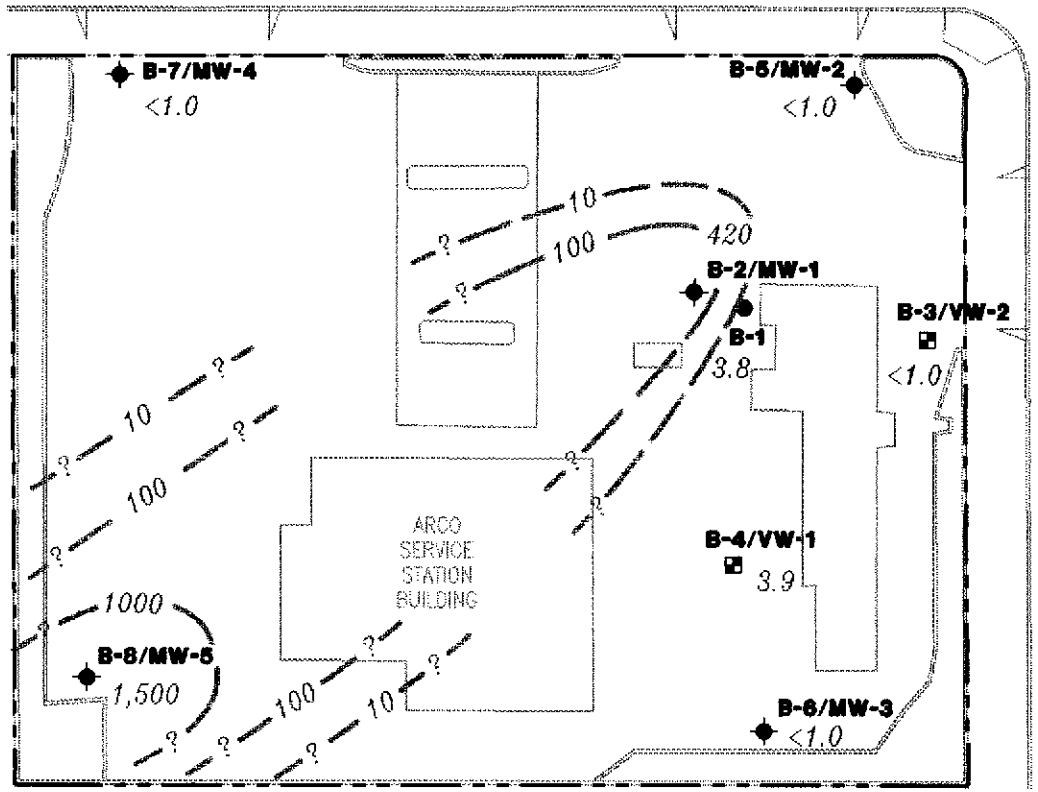
1. General stratigraphic relationships are displayed. Additional horizontal and vertical variations may exist.

GeoStrategies Inc.

CROSS SECTION B-B'
ARCO Service Station #6002
6235 Seminary Avenue
Oakland, California

FIGURE
4

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
4945703-2		8/94	



EXPLANATION

- Groundwater monitoring well
- Vapor extraction well
- Soil boring
- 500 — TPH-G (Total Petroleum Hydrocarbons calculated as Gasoline) concentration in soil in ppb
- 500 — TPH-G isoconcentration contour
- <1.0 — See laboratory reports for detection limits

N

0 30

Scale in Feet

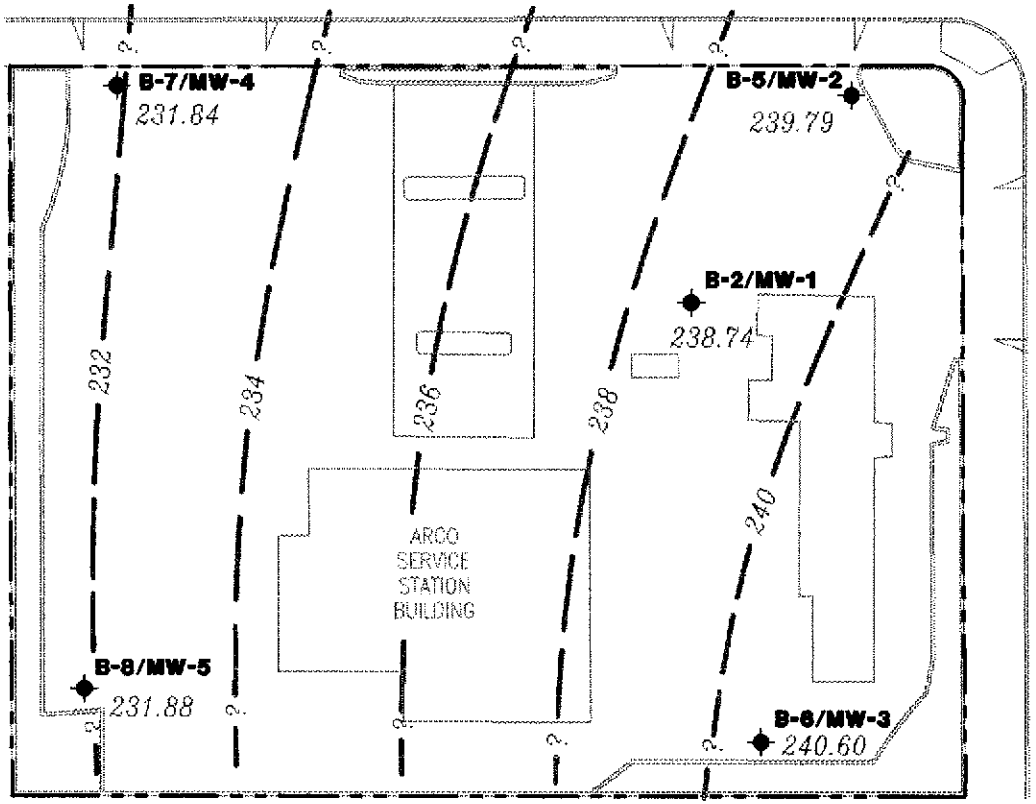
Base Map: Alhambra Land Surveyors
Job No. A94053
Dated July, 1994

GeoStrategies Inc.

TPH-G ISOCONCENTRATION MAP (IN SOIL 7 TO 10.5 FEET)
ARCO Service Station #6002
6235 Seminary Avenue
Oakland, California

FIGURE 5

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
4945703-2	DS	8/94	



EXPLANATION

- Groundwater monitoring well
- 99.99 — Groundwater elevation in feet referenced to Mean Sea Level (MSL) measured on July 8, 1994 1994
- 99.99 — Groundwater elevation contour. Approximate Gradient = 0.08

N

0 30

Scale in Feet

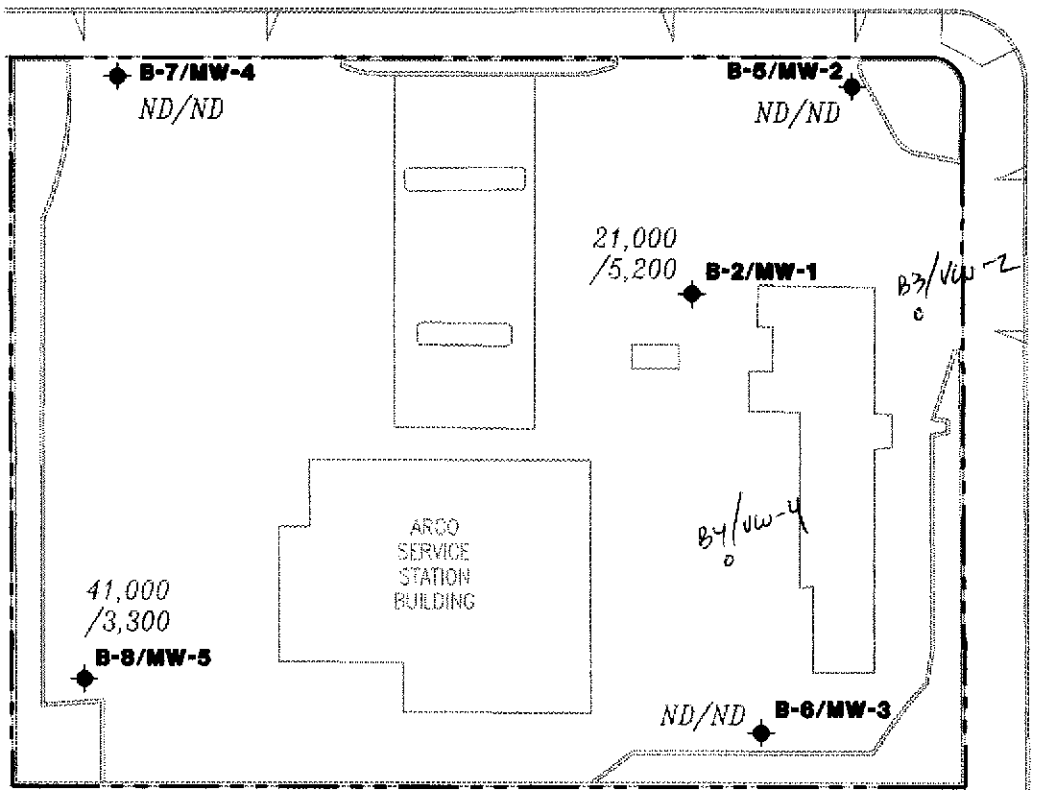
Base Map: Alhambra Land Surveyors
Job No. A94053
Dated July, 1994

GeoStrategies Inc.

POTENTIOMETRIC MAP
ARCO Service Station #6002
6235 Seminary Avenue
Oakland, California

FIGURE 6

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
4945703-2		8/94	



EXPLANATION

- ✦ Groundwater monitoring well
- *99/9.9* TPH–G (Total Petroleum Hydrocarbons calculated as Gasoline)/Benzene concentrations in ppb sampled on July 8, 1994
- *ND* Not Detected (See laboratory reports for detection limits)

N

0 30

Scale in Feet

Base Map: Alhambra Land Surveyors
Job No. A94053
Dated July, 1994

GeoStrategies Inc.

TPH–G/BENZENE CONCENTRATION MAP (IN GROUNDWATER)
ARCO Service Station #6002
6235 Seminary Avenue
Oakland, California

FIGURE 7

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
4945703–2		8/94	

GEOSTRATEGIES INC.
FIELD METHODS AND PROCEDURES

Site Safety Plan

Field work performed by GeoStrategies Inc. (GSI) is conducted in accordance with GSI's Health and Safety Plan and the Site Safety Plan. GSI personnel and subcontractors who perform work at the site are briefed on the of these plans contents prior to initiating site work. The GSI geologist or engineer at the site when the work is performed acts as the Site Safety Officer. GSI utilizes a photoionization detector (PID) to monitor ambient conditions as part of the Health and Safety Plan.

Collection of Soil Samples

Exploratory soil borings are drilled by a California-licensed well driller. A GSI geologist is present to observe the drilling, collect soil samples for description, physical testing, and chemical analysis, and prepare a log of the exploratory soil boring. Soil samples are collected from the exploratory soil boring with a split-barrel sampling device fitted with 2-inch-diameter, clean brass tube or stainless steel liners. The sampling device is driven approximately 18 inches with a 140-pound hammer falling 30 inches. The number of blows required to advance the sampler each successive 6 inches is recorded on the boring log. The encountered soils are described using the Unified Soil Classification System (ASTM 2488-84) and the Munsell Soil Color Chart.

After removal from the sampling device, soil samples for chemical analysis are covered on both ends with teflon sheeting or aluminum foil, capped, labeled, and place in a cooler with blue ice for preservation. A chain-of-custody form is initiated in the field and accompanies the selected soil samples to the analytical laboratory. Samples are selected for chemical analysis based on:

a. depth relative to underground storage tanks and existing ground surface
b. depth relative to known or suspected groundwater
c. presence or absence of contaminant migration pathways
d. presence or absence of discoloration or staining
e. presence or absence of obvious gasoline hydrocarbon odors
f. presence or absence of organic vapors detected by headspace analysis

Field Screening of Soil Samples

A PID is used to perform head-space analysis in the field for the presence of organic vapors from the soil sample. This test procedure involves removing soil from the tip of the sampling device or sample liner into a clean glass jar, and immediately covering the jar with aluminum foil secured under a ring-type threaded lid. After approximately twenty minutes, the foil is pierced and the atmosphere within the jar tested using a PID. Head-space screening results are recorded on the boring log. Head-space screening procedures are performed and results recorded as reconnaissance data. GSI does not consider field screening techniques to be verification of the presence or absence of hydrocarbons.

Construction of Monitoring Wells

Monitoring wells are constructed in the exploratory soil borings with Schedule 40 polyvinyl chloride (PVC) casing. All joints are thread-joined; no glues, cements, or solvents are used in well construction. The screened interval is constructed of machine-slotted PVC well screen which extends from the total well depth to a point above the groundwater. An appropriately-sized sorted sand is placed in the annular adjacent to the entire screened interval. A bentonite seal is placed in the annular space above the sand, and the remaining annular space is sealed with neat cement or cement grout.

Wellheads are protected with water-resistant traffic-rated vault boxes placed flush with the ground surface. The top of the well casing is sealed with a locking waterproof cap. A lock is placed on the well cap to prevent vandalism and unintentional introduction of materials into the well.

Storing and Sampling of Drill Cuttings

Drill cuttings are stockpiled on plastic sheeting. Stockpile samples are collected on the basis of one composite sample per 50 cubic yards of soil. Each composite stockpile sample is composed of 4 discrete sample tubes, composited in the laboratory prior to analysis. Locations of each discrete stockpile sample are chosen arbitrarily.

Each discrete stockpile sample is collected by removing the upper 3 to 6 inches of soil, and them driving the stainless steel or brass sample tube into the stockpiled material with a hand, mallet, or drive sampler. The sample tubes are then covered on both ends with teflon sheeting or aluminum foil, capped, labeled,

and placed in a cooler with blue ice for preservation. A chain-of-custody form is initiated in the field and accompanies the selected soil samples to the analytical laboratory. Stockpiled soils are covered with plastic sheeting after completion of sampling.

Wellhead Survey

The top of the newly-installed well casing is surveyed by a California-licensed Land Surveyor to mean sea level (MSL). Depth-to-groundwater in the well is measured from the top of the well casing with an electronic water-level indicator. Depth-to-groundwater is measured to the nearest 0.01-foot, and referenced to MSL.

Well Development and Sampling

The newly installed wells are properly developed after completion. No well is developed until the well seal has set a minimum of 12 hours. Development procedures include one or more of the methods described below.

Bailing

Bailing is used to remove suspended sediments and drilling fluids from the well, where applicable. The bailer is raised and lowered through the column of water in the well so as to create a gentle surging action in the screened interval. This technique may be used in conjunction with other techniques, such as pumping, and may be used alone if the well is of low yield.

Pumping

Pumping is used in conjunction with bailing or surging. The pump will be operated in such a manner as to gently surge the entire screened interval of the well. This may involve operating the pump with a packer type mechanism attached and slowly raising and lowering the pump, or by cycling the pump off and on to allow water to move in and out of the screened interval. Care is used not to overpump a well.

Surging

Surging is performed on wells that are screened in known or suspected high yield formations and/or on larger diameter (recovery) wells. A surge block will be raised and lowered through the entire screen interval, forcing water in and out of the well screen and sand pack. Pumping or air lifting is used in conjunction with this method of development to remove any sediments brought into the well during surging.

Air Lifting

Air lifting is used to remove sediments from the wells as an alternative to pumping under certain conditions. When appropriate, a surge block designed for use with air lifting is used to agitate the entire screened interval and water is lifted out of the well using forced air. When air lifting is performed, the air source is either nitrogen or filtered air and the procedure is performed gently to prevent any damage to the well screen or casing and to insure that discharged water is contained.

All well development equipment is thoroughly decontaminated prior to development using a steam cleaner and/or Alconox detergent wash and clean water rinse. During development procedures, field parameters (temperature, specific conductance and PH) is monitored and recorded on well development forms. Equilibration requirements consist of a minimum of three readings with the following accuracy standards:

pH	± 0.1 pH units
Specific Conductance	± 10% of full scale reading
Temperature	± 0.5 degrees Celsius

The wells are developed until water is visibly clear and free of sediment, and well purging parameters stabilized. A minimum of 8 to 10 volumes will be purged from each well, if feasible.

Groundwater Monitoring and Sampling

Decontamination Procedures

All physical parameter measuring and sampling equipment are decontaminated prior to sample collection using Alconox or equivalent detergent followed by steam cleaning with deionized water. During field sampling, equipment placed in a well are decontaminated before purging or sampling the next well by cleaning with Alconox or equivalent detergent followed by steam cleaning with deionized water.

Sample bottles, bottle caps, and septa used for sampling are thoroughly cleaned and prepared in the laboratory. Sample bottles, bottle caps, and septa are protected from all potential chemical contact before actual usage at a sample location.

Water-Level Measurements

Prior to purging and sampling a well, the static water level is measured in all wells at a project site using an electric sounder and/or calibrated portable oil-water interface probe. Both static water-level and separate-phase product thickness are measured to the nearest ±0.01 foot. The presence of separate-phase product is confirmed using a clean, acrylic or polyvinylchloride (PVC) bailer, measured to the nearest ±0.01 foot with a decimal scale tape. The monofilament line used to lower the bailer is replaced between wells with new line to preclude the possibility of cross-contamination. Field observations (e.g. well integrity, product color, turbidity, water color, odors, etc.) are noted. Water-levels are measured in wells with known or suspected lowest dissolved chemical concentrations to the highest dissolved concentrations.

Well Purging

Before sampling occurs, well casing storage water and interstitial water in the artificial sand pack is purged using: 1) a positive displacement bladder pump constructed of inert, non-wetting, teflon and stainless steel; 2) a pneumatic-airlift pumping system; 3) a centrifugal pumping system; or 4) a teflon or stainless steel bailer. Methods of purging are assessed based on well size, location, accessibility, and known chemical concentrations. The well is purged until withdrawal of sufficient volume to result in stabilized pH, temperature and conductance of the water, as measured using portable meters calibrated to

standard water solutions. If a purged well becomes dewatered, the water level is allowed to recovered to at least 80% of the initial water level prior to sampling.

Sample Collection and Labeling

Samples of groundwater are collected from the surface of the water in each of the wells using the teflon bailer. The water samples are then gently poured into laboratory-cleaned containers and sealed with teflon-lined caps, and inspected for air bubbles to check for headspace, which would allow volatilization to occur. The samples are then labeled by an adhesive label, noted in permanent ink, and promptly placed in an ice storage. Label information include: sample point designation (i.e. well number or code), sampler's identification, project number, date and time of collection and type of preservation used. A Chain-of-Custody Record is initiated and updated throughout handling of the samples, and accompanies the samples to the laboratory certified by the State of California for analyses requested. The Chain-of-Custody Record contains the following information: sample identification, signatures of collector, sampler or recorder, date and time of collection, place of collection, sample type, signatures of persons involved in chain possession, and inclusive dates of possession. A field log of well sampling procedures and parameter monitoring is prepared. Water generated by purging of wells is stored in 17EDOT 55-gallon drums onsite until disposal by State-certified waste hauler.

ZONE 7 WATER AGENCY

5997 PARKSIDE DRIVE PLEASANTON, CALIFORNIA 94588 VOICE (510) 484-2600
FAX (510) 462-3914

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT 6235 Seminary Ave, Oakland, CA
Arco Station 6002

CLIENT
Name ARCO Products Company
Address P.O. Box 5811 Voice (415) 571-2434
City San Mateo Zip 94402

APPLICANT
Name GeoStrategies Inc
(Barbara Sieminski) Fax (510) 551-7888
Address 6747 Sierra Ct, Suite B Voice (510) 551-7444 ext 288
City Dublin, CA 94568 Zip 94568

TYPE OF PROJECT

Well Construction		Geotechnical Investigation	
Cathodic Protection	___	General	___
Water Supply	___	Contamination	___
Monitoring	✓	Well Destruction	___

PROPOSED WATER SUPPLY WELL USE
Domestic ___ Industrial ___ Other ___
Municipal ___ Irrigation ___

DRILLING METHOD:
Mud Rotary ___ Air Rotary ___ Auger Hollow Stem
Cable ___ Other ___

DRILLER'S LICENSE NO. C-57 # 484288

WELL PROJECTS
Drill Hole Diameter 10 in. Maximum
Casing Diameter 4 in. Depth 25 ft.
Surface Seal Depth 5 ft. Number 4

GEOTECHNICAL PROJECTS
Number of Borings ___ Maximum
Hole Diameter ___ in. Depth ___ ft.

ESTIMATED STARTING DATE 6/28/94
ESTIMATED COMPLETION DATE 6/29/94

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE [signature] Date 6/30/94

FOR OFFICE USE

PERMIT NUMBER 94376
LOCATION NUMBER ___

PERMIT CONDITIONS

Circled Permit Requirements Apply

(A.) GENERAL
1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well Projects, or drilling logs and location sketch for geotechnical projects.
3. Permit is void if project not begun within 90 days of approval date.

(B.) WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

D. CATHODIC. Fill hole above anode zone with concrete placed by tremie.

E. WELL DESTRUCTION. See attached.

Approved Wyman Hong Date 29 Jun 94
Wyman Hong

MAJOR DIVISIONS					TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW		WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
			GP		POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
		GRAVELS WITH OVER 15% FINES	GM		SILTY GRAVELS, SILTY GRAVELS WITH SAND
			GC		CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW		WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			SP		POORLY GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
		SANDS WITH OVER 15% FINES	SM		SILTY SANDS WITH OR WITHOUT GRAVEL
			SC		CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SANDS AND GRAVELS
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY CLAYS WITH SANDS AND GRAVELS, LEAN CLAYS
			OL		ORGANIC SILTS OR CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH		INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS, FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH		ORGANIC SILTS OR CLAYS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			PT		PEAT AND OTHER HIGHLY ORGANIC SOILS

LL - Liquid Limit (%)
PI - Plastic Index (%)
PID - Volatile Vapors in ppm
MA - Particle Size Analysis
2.5 YR 6/2 - Soil Color according to Munsell Soil Color Charts (1975 Edition)
5 GY 5/2 - GSA Rock Color Chart

 - No Soil Sample Recovered
 - "Undisturbed" Sample
 - Bulk or Classification Sample
 - First Encountered Ground Water Level
 - Piezometric Ground Water Level

Penetration - Sample drive hammer weight - 140 pounds falling 30 inches. Blows required to drive sampler 1 foot are indicated on the logs

GeoStrategies Inc.

Unified Soil Classification - ASTM D 2488-85 and Key to Test Data

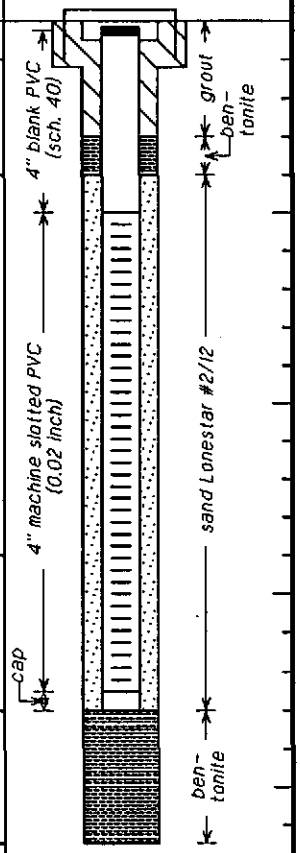
GeoStrategies, Inc.

Log of Boring B-5/MW-2

PROJECT: *ARCO PRODUCTS COMPANY*	LOCATION: *6235 Seminary Avenue, Oakland, CA*
GSI PROJECT NO.: *4945.703*	SURFACE ELEVATION:
DATE STARTED: *6/29/94*	WL (ft. bgs): *9.50* DATE: *6/29/94* TIME: *14:30*
DATE FINISHED: *6/29/94*	WL (ft. bgs): *9.50* DATE: *6/29/94* TIME: *16:00*
DRILLING METHOD: *10 in. Hollow Stem Auger*	TOTAL DEPTH: *21.5 Feet*
DRILLING COMPANY: *West Hazmat Drilling Corp.*	GEOLOGIST: *BS*

DEPTH feet	PID (ppm)	BLOWS/FT. *	SAMPLE NUMBER	SOIL CLASS	GEOLOGIC DESCRIPTION
					PAVEMENT
				ML	SANDY SILT WITH GRAVEL (ML) – dark reddish brown (5YR 3/2), damp, very stiff, low plasticity; 60% fines, 30% sand, 10% gravel.
5	0	22	B-5-5.5	GC	CLAYEY GRAVEL (GC) – dark yellowish brown (10YR 4/4), moist, medium dense, 50% gravel, 30% fines, 20% sand.
	0	20	B-5-7.5		
10		50	B-5-10.5		saturated at 9.5 feet. increasing clay at 10 feet.
15	0	38	B-5-15.5	CL	SANDY CLAY WITH GRAVEL (CL) – dark yellowish brown (10YR 4/6), mottled dark gray (N5), moist, low plasticity; hard, 50% fines, 30% sand, 20% gravel.
				CL	
20	0	46	B-5-21.0		SILTY CLAY WITH SAND (CL) – strong brown (7.5YR 3/4), damp, hard, medium plasticity; 70% fines, 30% sand.
					Bottom of boring at 21.5 feet, 6/29/94
25					(* = converted to equivalent standard penetration blows/ft.)
30					
35					

WELL DIAGRAM



JOB NUMBER: *4945.703*

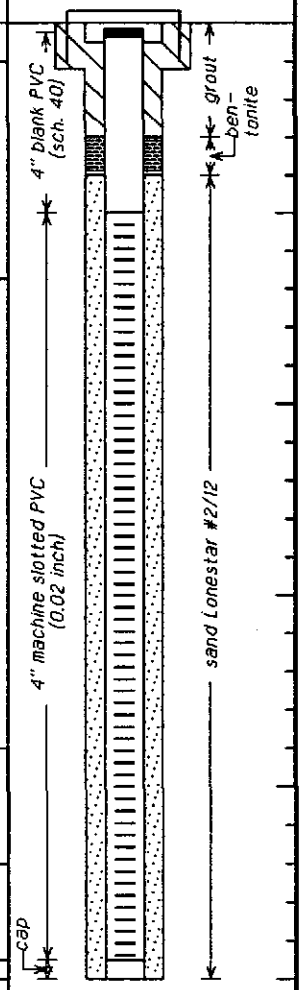
GeoStrategies, Inc.

Log of Boring B-6/MW-3

PROJECT: *ARCO PRODUCTS COMPANY*	LOCATION: *6235 Seminary Avenue, Oakland, CA*
GSI PROJECT NO.: *4945.703*	SURFACE ELEVATION:
DATE STARTED: *6/29/94*	WL (ft. bgs): *7.50* DATE: *6/29/94* TIME: *10:00*
DATE FINISHED: *6/29/94*	WL (ft. bgs): *7.50* DATE: *6/29/94* TIME: *16:30*
DRILLING METHOD: *10 in. Hollow Stem Auger*	TOTAL DEPTH: *25.0 Feet*
DRILLING COMPANY: *West Hazmat Drilling Corp.*	GEOLOGIST: *BS*

DEPTH feet	PID (ppm)	BLOWS/FT. *	SAMPLE NUMBER	SOIL CLASS	GEOLOGIC DESCRIPTION
					PAVEMENT
				ML	SANDY SILT WITH GRAVEL (ML) – dark reddish brown (5YR 3/2), damp, very stiff, low plasticity; 60% fines, 25% sand, 15% gravel.
5	0	28	B-6-5.5		color change to yellowish brown (10YR 5/4), increasing sand at 5.5 feet.
	0	36	B-6-7.0	GC	CLAYEY GRAVEL WITH SAND (GC) – dark yellowish brown (10YR 4/4), saturated, dense; 50% gravel, 30% sand, 20% fines.
10	0	29	B-6-10.0		increasing clay, medium dense.
15	0	18	B-6-15.0		
				CL	
20	0	27	B-6-20.5		SANDY CLAY (CL) – dark yellowish brown (10YR 4/4), mottled grayish green (5G 5/2), moist, very stiff, low plasticity; 60% fines, 40% fine- to medium-grained sand.
				GC	CLAYEY GRAVEL WITH SAND (GC) – dark yellowish brown (10YR 4/4), saturated, dense; 50% gravel, 30% sand, 20% fines.
25	0	47	B-6-24.5	CL	SANDY CLAY WITH GRAVEL (CL) – strong brown (7.5YR 4/6), damp to moist, hard, low plasticity; 60% fines, 40% fine- to medium-grained sand.
					Bottom of boring at 25.0 feet, 6/29/94
30					(* = converted to equivalent standard penetration blows/ft.)
35					

WELL DIAGRAM



JOB NUMBER: *4945.703*

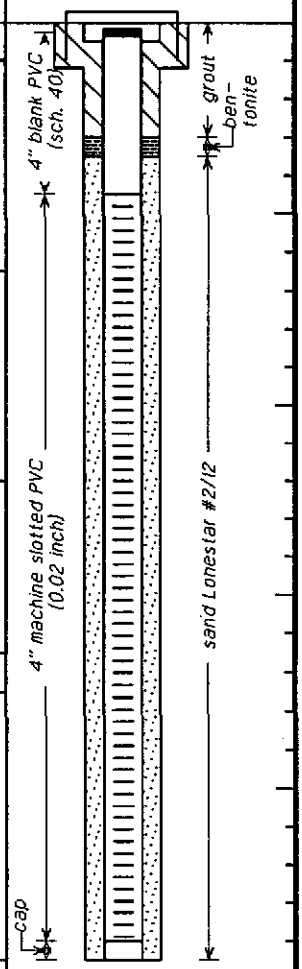
GeoStrategies, Inc.

Log of Boring B-7/MW-4

PROJECT: *ARCO PRODUCTS COMPANY*	LOCATION: *6235 Seminary Avenue, Oakland, CA*
GSI PROJECT NO. : *4945.703*	SURFACE ELEVATION:
DATE STARTED: *6/29/94*	WL (ft. bgs): *10.30* DATE: *6/29/94* TIME: *12:00*
DATE FINISHED: *6/29/94*	WL (ft. bgs): *10.70* DATE: *6/29/94* TIME: *19:00*
DRILLING METHOD: *10 in. Hollow Stem Auger*	TOTAL DEPTH: *24.5 Feet*
DRILLING COMPANY: *West Hazmat Drilling Corp.*	GEOLOGIST: *BS*

DEPTH feet	PID (ppm)	BLOWS/FT. *	SAMPLE NUMBER	SOIL CLASS	GEOLOGIC DESCRIPTION
					PAVEMENT
				ML	SANDY SILT WITH GRAVEL (ML) – very dark grayish brown (2.5YR 3/2), damp, very stiff, low plasticity; 60% fines, 25% sand, 15% gravel.
5	0	18	B-7-5.5		
					becoming moist at 6 feet.
	3	18	B-7-7.0	GC	CLAYEY GRAVEL (GC) – dark yellowish brown (10YR 4/4), damp to moist, medium dense; 50% gravel, 20% sand, 30% fines.
	6	18	B-7-8.5		
10	6	21	B-7-10.0		color change to grayish green (5G 4/2), increasing sand, saturated at 10.3 feet.
	2	29	B-7-12.0		
				GP	SANDY GRAVEL (GP) – strong brown (7.5YR 4/6), saturated, medium dense; 50% gravel, 30% sand, 20% fines.
	0	20	B-7-14.0		
15	0	24	B-7-16.0		
				SP	CLAYEY SAND WITH GRAVEL (SP) – yellowish red (5YR 3/4), saturated, medium dense; 60% sand, 25% fines, 15% gravel.
	0	40		GP	
	0	56			SANDY GRAVEL (GP) – strong brown (7.5YR 4/6), saturated, dense; 50% gravel, 35% sand, 15% fines.
20	0	48	B-7-21.0		becoming very dense at 19 feet.
	0	52			increasing clay, becoming moist at 21 feet.
	0		B-7-24.0		decreasing gravel, becoming damp to moist at 23 feet.
25					Bottom of boring at 24.5 feet, 6/29/94
					(* = converted to equivalent standard penetration blows/ft.)
30					
35					

WELL DIAGRAM



JOB NUMBER: *4945.703*

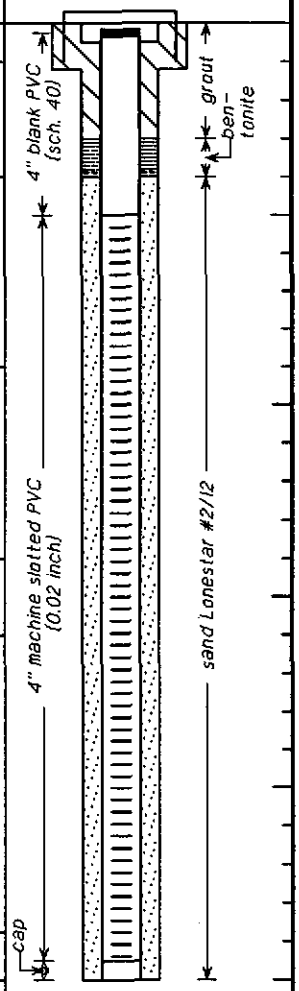
GeoStrategies, Inc.

Log of Boring B-8/MW-5

PROJECT: *ARCO PRODUCTS COMPANY*	LOCATION: *6235 Seminary Avenue, Oakland, CA*
GSI PROJECT NO.: *4945.703*	SURFACE ELEVATION:
DATE STARTED: *6/29/94*	WL (ft. bgs): *13.00* DATE: *6/29/94* TIME: *16:30*
DATE FINISHED: *6/29/94*	WL (ft. bgs): *13.00* DATE: *6/29/94* TIME: *18:00*
DRILLING METHOD: *10 in. Hollow Stem Auger*	TOTAL DEPTH: *25.0 Feet*
DRILLING COMPANY: *West Hazmat Drilling Corp.*	GEOLOGIST: *BS*

DEPTH feet	PID (ppm)	BLOWS/FT. *	SAMPLE NUMBER	SAMPLE INT.	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
							PAVEMENT
						SC	CLAYEY SAND (SC) – light olive brown (2.5Y 5/6), damp, dense; 70% sand, 30% fines.
5	0	38	U-8-5.5			ML	SANDY SILT WITH GRAVEL (ML) – very dark brown (10YR 2/1), damp, hard, low plasticity; 60% fines, 30% sand, 10% fine gravel.
	0	31	B-8-7.5				color change to dark grayish brown (10YR 4/2) at 7 feet.
10	230	48	B-8-10.5			GC	CLAYEY GRAVEL (GC) – dark yellowish brown (10YR 4/4), damp, dense; 50% gravel, 30% fines, 20% sand, obvious product odor; becoming moist at 11 feet.
15	4	<50	B-8-15.5			GP	SANDY GRAVEL WITH CLAY (GP) – strong brown (7.5YR 4/6), mottled grayish green (5G 5/2), saturated, very dense, 50% gravel, 30% sand, 20% fines.
						GC	CLAYEY GRAVEL WITH SAND (GC) – strong brown (7.5YR 4/6), wet around gravel, very dense; 40% gravel, 30% fines, 30% sand.
20	5	48	B-8-20.5				increasing clay at 20 feet.
25	3	52	B-8-24.5			ML	SANDY SILT WITH FINE GRAVEL (ML) – yellowish brown (10YR 5/6), moist, hard, low plasticity, 50% silt, 40% fine-grained sand, 10% fine gravel.
30							Bottom of boring at 25.0 feet, 6/29/94
35							(* = converted to equivalent standard penetration blows/ft.)
							<50 = less than 1 foot was penetrated

WELL DIAGRAM



JOB NUMBER: *4945.703*

WELL DEVELOPMENT FORM

Page_____ of_____

(to be filled out in office)

Client ARCO SS# 6002 Job# 7945.03

Name ARCO Station Location 6235 Seminary Avenue, Oakland

Well# MW-5 Screened Interval 5'-25' Depth 25'

Aquifer Material clayey gravel with sand Installation Date 6/29/94

Drilling Method Hollow-Stem Auger Borehole Diameter 10"

Comments regarding well installation: well diameter - 4"

(to be filled out in the field) Name P. Clint

Date 7-5 thr 7-7 Development Method Surge & purge

Total Depth 26 - Depth to liquid 12.93 = WaterColumn 12.07

Product thickness_____

12.07 x 0.66 = 7.9 x ~~0.0408~~ = _____ gals

Water Column | Diameter (in.) | #Vol (1 casing)

Purge Start 9:26 Stop_____ Rate_____ gpm

Gallons	Time	Clarity	Temp.	pH	Conductivity	
0	9:29	Muddy	65.6	6.97	642	Pump
10	9:32	Very Muddy	66.5	6.95	823	
15	9:35	Muddy	66.2	7.00	738	Develop
20	9:45	Cloudy/Muddy	66.3	7.00	637	
>40 gals	11:30	Muddy	68.4	6.52	644	Surge
99 gals	14:16	Cloudy	70.1	6.74	651	Develop
546 gals	14:26	Cloudy	69.1	7.01	653	Pump
63 gals	15:30	Cloudy	69.1	6.88	588	
70 gals	15:38	Cloudy	69.3	6.90	608	Develop

Total gallons removed 70 Development stop time_____

Depth to liquid 23.8 at 15:40 (time)

Odor of water Strong Gas Water discharged to Drum

Comments Initial Depth 23.5' Final total Depth 25'

WELL DEVELOPMENT FORM

Page_____ of_____

(to be filled out in office)

Client ARCO SS# 6002 Job# 7945.03

Name ARCO Station Location 6235 Seminary Ave, Oakland

Well# MW-2 Screened Interval 5'-18' Depth 18'

Aquifer Material clayey gravel with sand Installation Date 6/29/94

Drilling Method Hollow Stem Auger Borehole Diameter 10"

Comments regarding well installation: well diameter 4"

(to be filled out in the field) Name F. Cline

Date 7-5 Development Method Surge & Purge

Total Depth 18' - Depth to liquid ~~17.3~~ 9.0 = WaterColumn 8.5

Product thickness_____

8.5 x 0.16 = 5.01 gal/case x 0.0408 = _____gals

Water Column Diameter (in.) #Vol/case

Purge Start 10:18 Stop_____ Rate_____ gpm

Gallons	Time	Clarity	Temp.	pH	Conductivity	
0	10:19	Muddy	66.2	7.01	485	Pump
5	10:23	Muddy	68.3	7.04	471	
	10:27	Muddy/Cloud	68.3	7.03	350	Drummed
5	10:37	Muddy/Cloudy	68.0	7.09	316	
5 gals	11:01	Muddy cloudy	69.2	6.94	289	Surged Dewa
5 gals	10:02	Cloudy	70.0	6.57	293	
5 gals	15:12	Cloudy/clearing	70.0	6.58	290	Dewater
gals	16:03	clearing	69.9	6.55	~~300~~ 284	
5 gals 70	16:13	clearing	69.7	6.56	290	Dewat.

Total gallons removed 70 gals Development stop time_____

Depth to liquid 17.5' at 16:13 (time)

Color of water None Water discharged to Drum

Comments Initial Depth 18' Final Depth 18'

WELL DEVELOPMENT FORM

Page_____ of_____

(to be filled out in office)

Client ARCO SS# 6002 Job# 7145.03

Name ARCO Station Location 6235 Seminary Avenue, Oakland

Well# MW-3 Screened Interval 5' - 25' Depth 25'

Aquifer Material clayey gravel with sand Installation Date 06/29/94

Drilling Method Hollow Stem Auger Borehole Diameter 10"

Comments regarding well installation: well diameter - 4"

(to be filled out in the field) Name F. Chinn

Date 7-5-94 Development Method Surge & Purge

Total Depth 23.5 - Depth to liquid 7.73 = WaterColumn 15.77

Product thickness_____

15.77 x 0.66 ~~x~~ 10.4 x 0.0408 = _____ gals
Water Column Diameter (in.) #Vol (1 casing)

Purge Start 10:50 Stop_____ Rate_____ gpm

Gallons	Time	Clarity	Temp.	pH	Conductivity	
0	10:50	Muddy	64.9	7.02	651	Pump
10 15	10:54	Muddy	66.7	6.94	331	
20 30	10:58	Muddy	68.2	6.44	384	
28 40	11:04	Muddy	65.3	6.38	532	Dewater
32 50	11:14	Cloudy/Muddy	67.9	6.77	391	Dewater
36 56	11:24	Cloudy/Muddy	66.1	6.78	574	
78gal	12:26	Muddy/Cloud	67.5	6.65	349	Surged
90gals	15:15	Cloudy	67.8	6.62	330	Dewater
110gals	16:22	Cloudy	67.8	6.63	395	
120gals	16:26	clearing	67.9	6.60	326	
130gals	16:30	clearing	67.8	6.61	325	Dewatered

Total gallons removed 130gals Development stop time_____

Depth to liquid 24.0 at 16:30 (time)

Odor of water Mild Water discharged to Drums

Comments Initial total Depth 23.5' Final total Depth 24.5

WELL DEVELOPMENT FORM

Page_____ of_____

(To be filled out in office)

Client ARCO SS# 6002 Job# 7945.03

Name ARCO Station Location 6235 Seminary Avenue, Oakland

Well# MW-4 Screened Interval 5'-25' Depth 25'

Aquifer Material Clayey gravel with sand Installation Date _____

Drilling Method Hollow-Stem Auger Borehole Diameter 10"

Comments regarding well installation: well diameter - 4"

(To be filled out in the field) Name F. Cline

Date 7-5 thru 7-7 Development Method Surge & Purge

Total Depth 25 - Depth to liquid 10.96 = WaterColumn 14.04

Product thickness _____

14.04 x 0.66 x 9.2 x ~~0.0408~~ = 9.2 gals

Water Column | Diameter (in.) | #Vol 1 casing

Purge Start _____ Stop _____ Rate _____ gpm

Gallons	Time	Clarity	Temp.	pH	Conductivity	
0	9:50	Muddy	7.08	6.66	652	Dum
10 18	9:54	Muddy	~~7~~ 68.1	6.91	594	↓
gals	10:01	Cloudy	67.2	6.63	389	Dewat
gals	10:11	Cloudy	68.3	6.79	338	Dewat
gals	11:56	Muddy	68.3	6.76	353	Surge Dev
0 gals	14:48	Cloudy	69.8	~~7.33~~ 6.60	304	
gals	14:55	cloudy	69.7	6.64	307	Dewater.
0 gals	15:42	cloudy	69.7	6.60	314	
gals	15:52	cloudy	69.8	6.62	310	Dewater

Total gallons removed 90 Development stop time _____

Depth to liquid 28.8' at 15:54 (time)

Color of water Man Water discharged to Drums

Comments Initial total Depth 23.5' Final total Depth 25'

ALHAMBRA LAND SURVEYORS
649 Main Street
Martinez, CA 94553

JOHN E.KOCH, L.S.
(510)655-9956
FAX (510)655-9745

GeoStrategies Inc.
6747 Sierra Court, Suite J
Dublin, CA 94568
(510)551-7555
FAX(510)551-5888

Tabulation of Elevations as of
02:00 p.m. 07/12/94

JOB NUMBER A94053
GSI JOB NUMBER 945.703
Project Manager:Barbara Sieminski
Site: ARCO Service Station #6002
6235 Seminary Avenue
@ Sunnymere Avenue
Oakland, CA 94605

BENCHMARK: City of Oakland pin monument at the intersection of Seminary Avenue with Overdale Avenue (El. = 235.126').

MONITOR WELL DATA TABLE

Well Designation	Elevation	Description
MW-1	247.06	Top of PVC Casing
	247.66	Top of Box
MW-2	249.30	Too of PVC Casing
	250.00	Top of Box
MW-3	248.35	Top of PVC Casing
	248.53	Top of Box
MW-4	242.91	Top of PVC Casing
	243.38	Top of Box
MW-5	244.82	Top of PVC Casing
	245.11	Top of Box
VW-1	247.45	Top of PVC Casing
	247.97	Top of Box
VW-2	250.51	Top of PVC Casing
	250.83	Top of Box

ALHAMBRA LAND SURVEYORS JOHN E. KOCH, L.S. JOB NO. A94053

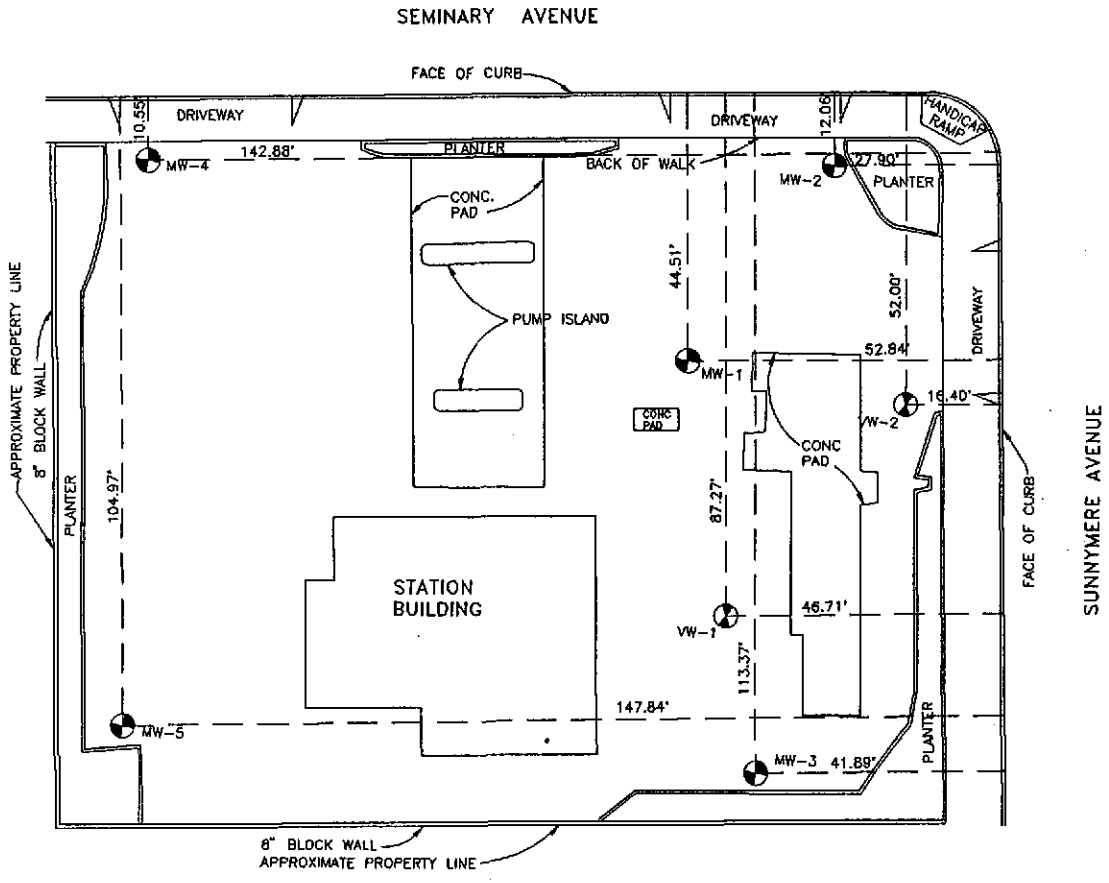
GSI JOB #945.703
ARCO 6002

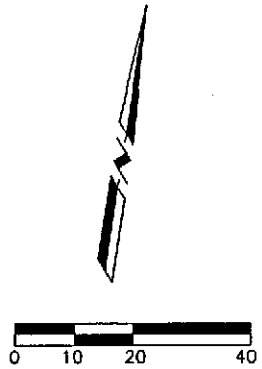
NOTES:

1. Datum is City of Oakland = (USGS) + 3.00'

2. Top of PVC Casing Elevation located at a notch set on the top of PVC for all wells.

3. Top of Box elevation located at the rim of "Christie" box.





ALHAMBRA LAND SURVEYORS
JOHN E. KOCH, L.S.
CA. STATE LIC. NO. LS4811
649 MAIN STREET
MARTINEZ, CALIFORINA 94553
(510) 655-9956
(510) 655-9745 FAX

GSI / GETTLER-RYAN INC.
6747 SIERRA COURT, SUITE J
DUBLIN, CALIFORNIA 94568
(510) 551-7555
(510) 551-7888 FAX

SITE: ARCO 6002
6235 SEMINARY AVENUE
@ SUNNYMERE AVENUE
OAKLAND, CALIFORNIA 94605

MLWH DRAWN BY:	JULY, 1994 DATE:
JEK CHECKED BY:	1 DRAWING NO.
A94053 JOB NO.	1 OF 1 SHEET

GEOSTRATEGIES INC.
Environmental Consultants

MONITORING WELL
OBSERVATION SUMMARY SHEET

COMPANY: Arco # 6002 — JOB NO.: 9945.03
LOCATION: 6235 Seminary Ave — DATE: 2-8-94
CITY: Oakland CA — TIME: 0500

WELL ID	TOTAL WELL DEPTH	DEPTH TO LIQUID	HYDROCARBON THICKNESS	MEASUREMENT POINT TOB or TOC	COMMENTS
MW-1	24.2	8.32	0	TOC	Well okay plug.
MW-2	18'	9.51	0	TOC	well okay plug
MW-3	25'	7.75	0	TOC	"
MW-4	25'	10.97	0	TOC	"
MW-5	25'	12.94	0	TOC	"

Comments: New 2208 lock on MW-2 thru MW-5

Sampler: E. Cline — Assistant:

GETTLER–RYAN INC.

General and Environmental Contractors

WELL SAMPLING FIELD DATA SHEET

COMPANY Arco # 6002 JOB # 9945

LOCATION 6235 Seminary Ave DATE 7-8-94

CITY Oakland CA TIME

Well ID. MW-1 Well Condition okay

Well Diameter 4" in. Hydrocarbon Thickness — ft.

Total Depth 24.2 ft.

Depth to Liquid- 8.32 ft.

Volume Factor (VF)			
	2" = 0.17	6" = 1.50	12" = 5.80
	3" = 0.38	8" = 2.60	
	4" = 0.66	10" = 4.10	

(# of casing volumes) 3 x 15.88 x(VF) 0.66 = (Estimated Purge Volume) 10.5 31.4 gal.

Purging Equipment Suction

Sampling Equipment Bailer

Starting Time 6:30 Purging Flow Rate gpm.

(Estimated Purge Volume) gal. / (Purging Flow Rate) gpm. = (Anticipated Purging Time) min.

Time	pH	Conductivity	Temperature	Volume
6:34	5.97	693	68.2	10.5
6:38	6.01	662	68.8	21.0
6:42	6.06	692	68.9	31.5
6:46	6.05	691	68.8	32.5

Did well dewater? No If yes, time Volume

Sampling Time 6:46 Weather Conditions

Analysis Gas BTEX Bottles Used

Chain of Custody Number

COMMENTS

FOREMAN Mark ASSISTANT

GETTLER–RYAN INC.

General and Environmental Contractors

WELL SAMPLING FIELD DATA SHEET

COMPANY Arco # 6002 JOB # 9945

LOCATION 6235 Seminary Ave DATE 7-8-99

CITY Oakland CA TIME

Well ID. MW-2" Well Condition okay

Well Diameter 4" in. Hydrocarbon Thickness — ft.

Total Depth 18' ft.

Depth to Liquid- 9.51 ft.

Volume Factor (VF)			
	2" = 0.17	6" = 1.50	12" = 5.80
	3" = 0.38	8" = 2.60	
	4" = 0.66	10" = 4.10	

(# of casing volumes) 3 x .8149 x(VF) 0.66 = (Estimated Purge Volume) 36 1618 gal.

Purging Equipment Suction

Sampling Equipment Bailer

Starting Time 5:51 Purging Flow Rate gpm.

(Estimated Purge Volume) gal. / (Purging Flow Rate) gpm. = (Anticipated Purging Time) min.

Time	pH	Conductivity	Temperature	Volume
5:54	6.40	296	69.9	6
5:57	6.14	284	69.9	12
6:00	6.15	279	69.7	18
6:04	6.15	280	69.9	19

Did well dewater? No If yes, time Volume

Sampling Time 6:04 Weather Conditions

Analysis Gas BTXE Bottles Used

Chain of Custody Number

COMMENTS

FOREMAN ASSISTANT

GETTLER–RYAN INC.

General and Environmental Contractors

WELL SAMPLING FIELD DATA SHEET

COMPANY Arco # 6002 JOB # 9945

LOCATION 6235 Seminary/Hwy DATE 7-8-94

CITY Oakland CA TIME

Well ID. MW-3 Well Condition okay

Well Diameter 4" in. Hydrocarbon Thickness ft.

Total Depth 25' ft.

Depth to Liquid- 7.75 ft.

Volume Factor (VF)			
	2" = 0.17	6" = 1.50	12" = 5.80
	3" = 0.38	8" = 2.60	
	4" = 0.66	10" = 4.10	

(# of casing volumes) 3 x 17.25 x(VF) 0.66 = (Estimated Purge Volume) 114.34 gal.

Purging Equipment Suction

Sampling Equipment Bailer

Starting Time 6:08 Purging Flow Rate gpm.

(Estimated Purge Volume) gal. / (Purging Flow Rate) gpm. = (Anticipated Purging Time) min.

Time	pH	Conductivity	Temperature	Volume
6:12	6.04	302	67.9	12
6:16	6.09	320	66.9	24
6:20	6.08	315	66.8	36
6:24	6.08	315	66.9	37

Did well dewater? No If yes, time Volume

Sampling Time 6:24 Weather Conditions

Analysis Gas BTEX Bottles Used

Chain of Custody Number

COMMENTS

FOREMAN [signature] ASSISTANT

GETTLER–RYAN INC.

General and Environmental Contractors

WELL SAMPLING FIELD DATA SHEET

COMPANY Arco # 6002 JOB # 9945

LOCATION 6235 Seminary ~~Hwy~~ Ave DATE 7-8-94

CITY Oakland CA TIME

Well ID. MW-4 Well Condition okay

Well Diameter 4" ~~2~~ 4 in. Hydrocarbon Thickness ft.

Total Depth 25' ft.

Depth to Liquid- 10.97 ft.

Volume Factor (VF)			
	2" = 0.17	6" = 1.50	12" = 5.80
	3" = 0.38	8" = 2.60	
	4" = 0.66	10" = 4.10	

(# of casing volumes) 3 x 14.03 x(VF) 0.66 = (Estimated Purge Volume) 9.3 27 gal.

Purging Equipment Suction

Sampling Equipment Bailer

Starting Time 5:25 Purging Flow Rate gpm.

(Estimated Purge Volume) gal. / (Purging Flow Rate) gpm. = (Anticipated Purging Time) min.

Time	pH	Conductivity	Temperature	Volume
5:29	~~6.24~~ 6.24	~~296~~ 314	69.9	10
5:33	6.14	324	69.8	20
5:37	6.19	314	69.8	30
5:41	6.18	316	69.7	31

Did well dewater? No / Drew to within 2' of Bottom If yes, time Volume

Sampling Time 5:41 Weather Conditions

Analysis Gas BTXE Bottles Used

Chain of Custody Number

COMMENTS

FOREMAN [signature] ASSISTANT

GETTLER-RYAN INC.

General and Environmental Contractors

WELL SAMPLING
FIELD DATA SHEET

COMPANY Arco # 6002 JOB # 9945

LOCATION 6235 Seminary Ave DATE 7-8-94

CITY Oakland CA TIME

Well ID. MW-5 Well Condition Okay

Well Diameter 4" in. Hydrocarbon Thickness ft.

Total Depth 25' ft.

Depth to Liquid- 12.94 ft.

Volume Factor (VF)			
	2" = 0.17	6" = 1.50	12" = 5.80
	3" = 0.38	8" = 2.60	
	4" = 0.66	10" = 4.10	

(# of casing volumes) 3 x 12.06 x(VF) 0.66 = (Estimated Purge Volume) 7.9 24 gal.

Purging Equipment Suction

Sampling Equipment Bailer

Starting Time 6:52 Purging Flow Rate gpm.

(Estimated Purge Volume) gal. / (Purging Flow Rate) gpm. = (Anticipated Purging Time) min.

Time	pH	Conductivity	Temperature	Volume
6:55	6.27	588	67.1	8
6:58	6.25	605	66.8	16
7:01	6.30	608	66.7	24
7:05	6.28	606	66.8	25

Did well dewater? No If yes, time Volume

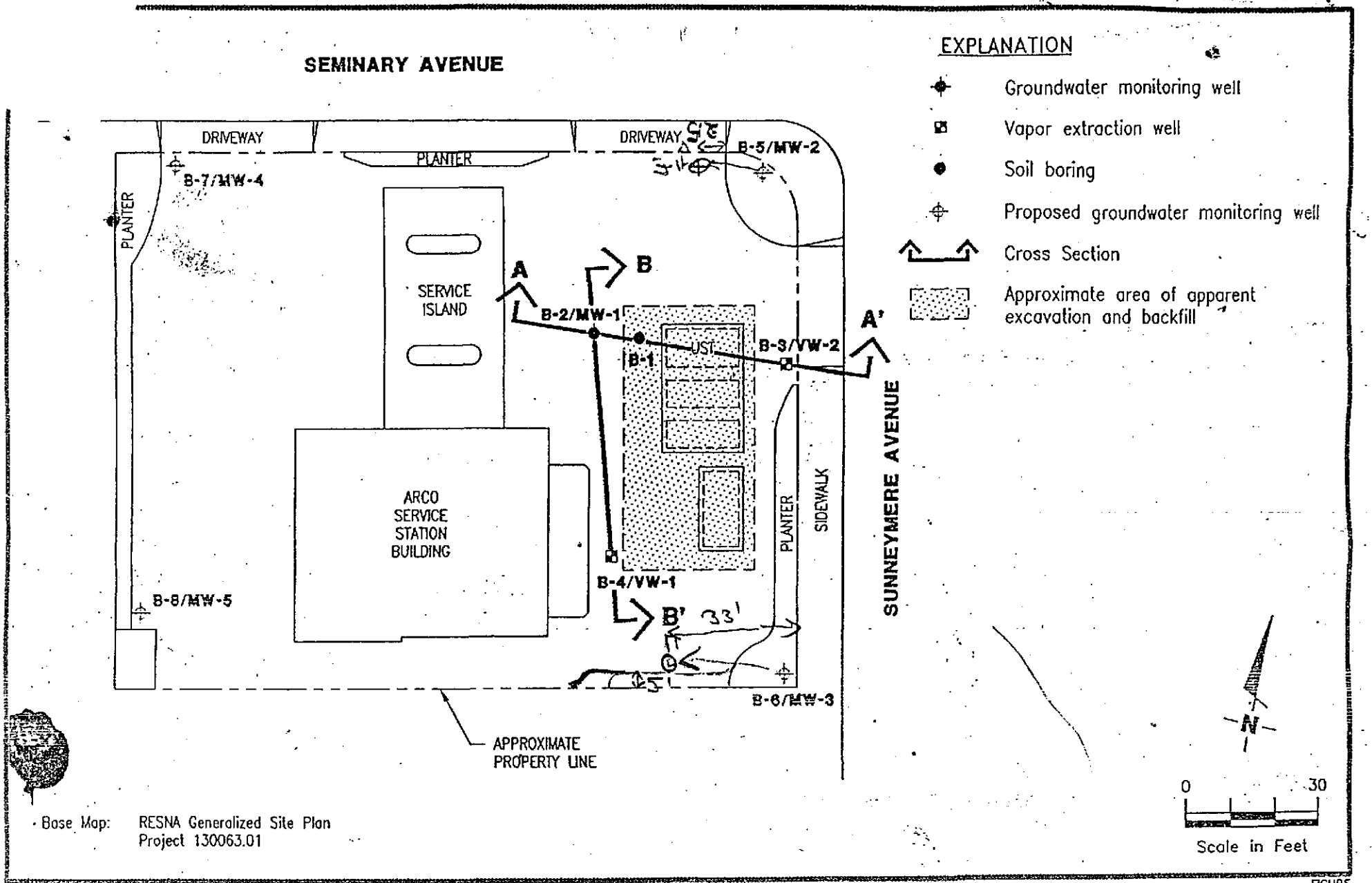
Sampling Time 7:05 Weather Conditions

Analysis Cevs BTXE Bottles Used

Chain of Custody Number

COMMENTS

FOREMAN [signature] ASSISTANT



Base Map: RESNA Generalized Site Plan
Project 130063.01

GeoStrategies Inc.

SITE PLAN
ARCO Service Station #6002
6235 Seminary Avenue
Oakland, California

FIGURE 2

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
7945		5/94	

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies
6747 Sierra Court, Ste J
Dublin, CA 94568
Attention: Joel Coffman

Project: Arco 6002-94-5

Enclosed are the results from 5 water samples received at Sequoia Analytical on July 8,1994. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
4G41101	Water, MW-1	7/8/94	EPA 5030/8015 Mod./8020
4G41102	Water, MW-2	7/8/94	EPA 5030/8015 Mod./8020
4G41103	Water, MW-3	7/8/94	EPA 5030/8015 Mod./8020
4G41104	Water, MW-4	7/8/94	EPA 5030/8015 Mod./8020
4G41105	Water, MW-5	7/8/94	EPA 5030/8015 Mod./8020

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies	Client Project ID:	Arco 6002-94-5	Sampled:	Jul 8, 1994
6747 Sierra Court, Ste J	Sample Matrix:	Water	Received:	Jul 8, 1994
Dublin, CA 94568	Analysis Method:	EPA 5030/8015 Mod./8020	Reported:	Jul 18, 1994
Attention: Joel Coffman	First Sample #:	4G41101		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 4G41101 MW-1	Sample I.D. 4G41102 MW-2	Sample I.D. 4G41103 MW-3	Sample I.D. 4G41104 MW-4	Sample I.D. 4G41105 MW-5	Sample I.D.
Purgeable Hydrocarbons	50	21,000	N.D.	N.D.	N.D.	41,000	
Benzene	0.50	5,200	N.D.	N.D.	N.D.	3,300	
Toluene	0.50	N.D.	N.D.	N.D.	N.D.	N.D.	
Ethyl Benzene	0.50	1,000	N.D.	N.D.	N.D.	2,200	
Total Xylenes	0.50	1,500	N.D.	N.D.	N.D.	2,900	
Chromatogram Pattern:		Gas	--	--	--	Gas	

Quality Control Data

Report Limit Multiplication Factor:	100	1.0	1.0	1.0	100
Date Analyzed:	7/12/94	7/12/94	7/12/94	7/12/94	7/12/94
Instrument Identification:	GCHP-3	GCHP-3	GCHP-2	GCHP-2	GCHP-3
Surrogate Recovery, %: (QC Limits = 70-130%)	107	106	92	101	93

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies
6747 Sierra Court, Ste J
Dublin, CA 94568
Attention: Joel Coffman

Client Project ID: Arco 6002-94-5
Matrix: Liquid
QC Sample Group: 4G41101, 02, 05
Reported: Jul 18, 1994

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	J. Minkel	J. Minkel	J. Minkel	J. Minkel
MS/MSD Batch#:	4G43001	4G43001	4G43001	4G43001
Date Prepared:	N.A.	N.A.	N.A.	N.A.
Date Analyzed:	7/12/94	7/12/94	7/12/94	7/12/94
Instrument I.D.#:	GCHP-3	GCHP-3	GCHP-3	GCHP-3
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L
Matrix Spike % Recovery:	98	100	96	100
Matrix Spike Duplicate % Recovery:	100	100	100	100
Relative % Difference:	2.0	0.0	4.1	0.0
LCS Batch#:				
Date Prepared:				
Date Analyzed:				
Instrument I.D.#:				
LCS % Recovery:				
% Recovery Control Limits:	71-133	72-128	72-130	71-120

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

4G41101.GET <2>

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies
6747 Sierra Court, Ste J
Dublin, CA 94568
Attention: Joel Coffman

Client Project ID: Arco 6002-94-5
Matrix: Liquid
QC Sample Group: 4G41103, 04
Reported: Jul 18, 1994

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	J. Minkel	J. Minkel	J. Minkel	J. Minkel
MS/MSD Batch#:	4G43003	4G43003	4G43003	4G43003
Date Prepared:	N.A.	N.A.	N.A.	N.A.
Date Analyzed:	7/12/94	7/12/94	7/12/94	7/12/94
Instrument I.D.#:	GCHP-2	GCHP-2	GCHP-2	GCHP-2
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L
Matrix Spike % Recovery:	110	110	110	107
Matrix Spike Duplicate % Recovery:	110	110	110	107
Relative % Difference:	0.0	0.0	0.0	0.0
LCS Batch#:				
Date Prepared:				
Date Analyzed:				
Instrument I.D.#:				
LCS % Recovery:				
% Recovery Control Limits:	71-133	72-128	72-130	71-120

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 6002-94-5

Chain of Custody

ARCO Facility no. 6002	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name Sequoia
ARCO engineer Mike Whelan	Telephone no. (ARCO)	Telephone no. (Consultant) 510-551-7555	Fax no. (Consultant) 551-7885
Consultant name GSI	Address (Consultant) 6747 Sierra Ct Suite G Dublin CA		Contract number

Method of shipment: GSI/Hand

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	
MW-1		2		↓		↓	↓	7-8-94	6:46		↓										-01
MW-2		2							6:01		↓										-02
MW-3		2							6:21		↓										-03
MW-4		2							5:41		↓										-04
MW-5		2		↓		↓	↓	↓	7:05		↓										-05

Special detection Limit/reporting: Standard

Special QA/QC: Standard

Remarks: 9945.03

Lab number: 9407411

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒

Condition of sample: Good		Temperature received: 6001	
Relinquished by sampler	Date 7-8-94 Time 18:40	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory	Date 7.8.94 Time 1840

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

APPC-3292 (2-91)

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies
6747 Sierra Court, Ste J
Dublin, CA 94568
Attention: Joel Coffman

Project: Arco, 6002-94-2A

Enclosed are the results from 13 soil samples received at Sequoia Analytical on July 1,1994. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
4G07001	Soil, B-5-5.5	6/29/94	EPA 5030/8015 Mod./8020
4G07002	Soil, B-5-7.5	6/29/94	EPA 5030/8015 Mod./8020
4G07003	Soil, B-5-21	6/29/94	EPA 5030/8015 Mod./8020
4G07004	Soil, B-6-5.5	6/29/94	EPA 5030/8015 Mod./8020
4G07005	Soil, B-6-7	6/29/94	EPA 5030/8015 Mod./8020
4G07006	Soil, B-6-24.5	6/29/94	EPA 5030/8015 Mod./8020
4G07007	Soil, B-7-5.5	6/29/94	EPA 5030/8015 Mod./8020
4G07008	Soil, B-7-8.5	6/29/94	EPA 5030/8015 Mod./8020
4G07009	Soil, B-7-24	6/29/94	EPA 5030/8015 Mod./8020
4G07010	Soil, B-8-5.5	6/29/94	EPA 5030/8015 Mod./8020
4G07011	Soil, B-8-10.5	6/29/94	EPA 5030/8015 Mod./8020
4G07012	Soil, B-8-24.5	6/29/94	EPA 5030/8015 Mod./8020
4G07013	Soil, B-7-10	6/29/94	EPA 5030/8015 Mod./8020

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies
6747 Sierra Court, Suite J
Dublin, CA 94568
Attention: Joel Coffman

Client Project ID: Arco 6136-94-5
Matrix: Liquid
QC Sample Group: 4G02804 - 07

Reported: Jul 12, 1994

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	J. Minkel	J. Minkel	J. Minkel	J. Minkel
MS/MSD Batch#:	4GH3901	4GH3901	4GH3901	4GH3901
Date Prepared:	N.A.	N.A.	N.A.	N.A.
Date Analyzed:	7/5/94	7/7/94	7/7/94	7/7/94
Instrument I.D.#:	GCHP-17	GCHP-17	GCHP-17	GCHP-17
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L
Matrix Spike % Recovery:	110	100	110	103
Matrix Spike Duplicate % Recovery:	110	110	110	103
Relative % Difference:	0.0	9.5	0.0	0.0

LCS Batch#:

Date Prepared:
Date Analyzed:
Instrument I.D.#:

LCS % Recovery:

% Recovery Control Limits:	71-133	72-128	72-130	71-120

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies	Client Project ID:	Arco, 6002-94-2A	Sampled: Jun 29, 1994
6747 Sierra Court, Ste J	Sample Matrix:	Soil	Received: Jul 1, 1994
Dublin, CA 94568	Analysis Method:	EPA 5030/8015 Mod./8020	Reported: Jul 12, 1994
Attention: Joel Coffman	First Sample #:	4G07001	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 4G07001 B-5-5.5	Sample I.D. 4G07002 B-5-7.5	Sample I.D. 4G07003 B-5-21	Sample I.D. 4G07004 B-6-5.5	Sample I.D. 4G07005 B-6-7	Sample I.D. 4G07006 B-6-24.5
Purgeable Hydrocarbons	1.0	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Benzene	0.0050	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Toluene	0.0050	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Ethyl Benzene	0.0050	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Total Xylenes	0.0050	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Chromatogram Pattern:		--	--	--	--	--	--

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0	1.0	1.0	1.0
Date Analyzed:	7/5/94	7/5/94	7/5/94	7/5/94	7/5/94	7/6/94
Instrument Identification:	GCHP-18	GCHP-18	GCHP-18	GCHP-18	GCHP-18	GCHP-18
Surrogate Recovery, %: (QC Limits = 70-130%)	92	92	97	96	98	99

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies	Client Project ID:	Arco, 6002-94-2A	Sampled: Jun 29, 1994
6747 Sierra Court, Ste J	Sample Matrix:	Soil	Received: Jul 1, 1994
Dublin, CA 94568	Analysis Method:	EPA 5030/8015 Mod./8020	Reported: Jul 12, 1994
Attention: Joel Coffman	First Sample #:	4G07007	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 4G07007 B-7-5.5	Sample I.D. 4G07008 B-7-8.5	Sample I.D. 4G07009 B-7-24	Sample I.D. 4G07010 B-8-5.5	Sample I.D. 4G07011 B-8-10.5	Sample I.D. 4G07012 B-8-24.5
Purgeable Hydrocarbons	1.0	N.D.	N.D.	N.D.	N.D.	1,500	N.D.
Benzene	0.0050	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Toluene	0.0050	N.D.	N.D.	N.D.	N.D.	2.4	N.D.
Ethyl Benzene	0.0050	N.D.	N.D.	N.D.	N.D.	17	0.0070
Total Xylenes	0.0050	N.D.	N.D.	N.D.	N.D.	43	0.013
Chromatogram Pattern:		--	--	--	--	Weathered Gas	Wathered Gas

Quality Control Data

Report Limit Multiplication Factor:	1.0	1.0	1.0	1.0	100	1.0
Date Analyzed:	7/6/94	7/6/94	7/6/94	7/6/94	7/6/94	7/6/94
Instrument Identification:	GCHP-18	GCHP-18	GCHP-18	GCHP-1	GCHP-1	GCHP-1
Surrogate Recovery, %: (QC Limits = 70-130%)	99	102	82	88	121	91

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies	Client Project ID:	Arco, 6002-94-2A	Sampled:	Jun 29, 1994
6747 Sierra Court, Ste J	Sample Matrix:	Soil	Received:	Jul 1, 1994
Dublin, CA 94568	Analysis Method:	EPA 5030/8015 Mod./8020	Reported:	Jul 12, 1994
Attention: Joel Coffman	First Sample #:	4G07013		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 4G07013 B-7-10	Sample I.D.	Sample I.D.	Sample I.D.	Sample I.D.	Sample I.D.
Purgeable Hydrocarbons	1.0	N.D.					
Benzene	0.0050	N.D.					
Toluene	0.0050	N.D.					
Ethyl Benzene	0.0050	N.D.					
Total Xylenes	0.0050	N.D.					
Chromatogram Pattern:		--					

Quality Control Data

Report Limit Multiplication Factor:	1.0
Date Analyzed:	7/6/94
Instrument Identification:	GCHP-18
Surrogate Recovery, %: (QC Limits = 70-130%)	90

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies
6747 Sierra Court, Ste J
Dublin, CA 94568
Attention: Joel Coffman

Client Project ID: Arco, 6002-94-2A
Matrix: Solid
QC Sample Group: 4G07001 -13

Reported: Jul 12, 1994

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	R. Geckler	R. Geckler	R. Geckler	R. Geckler
MS/MSD Batch#:	4GH1501	4GH1501	4GH1501	4GH1501
Date Prepared:	7/5/94	7/5/94	7/5/94	7/5/94
Date Analyzed:	7/5/94	7/5/94	7/5/94	7/5/94
Instrument I.D.#:	GCHP-18	GCHP-18	GCHP-18	GCHP-18
Conc. Spiked:	0.20 mg/kg	0.20 mg/kg	0.20 mg/kg	0.60 mg/kg
Matrix Spike % Recovery:	100	105	105	103
Matrix Spike Duplicate % Recovery:	100	105	105	102
Relative % Difference:	0.0	0.0	0.0	0.98

LCS Batch#:				
Date Prepared:				
Date Analyzed:				
Instrument I.D.#:				
LCS % Recovery:				
% Recovery Control Limits:	55-145	47-149	47-155	56-140

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 6002-94-2A

Chain of Custody

ARCO Facility no. 6002	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name Sequoia
ARCO engineer Michael Whelan	Telephone no. (ARCO) (415) 571-2434	Telephone no. (Consultant) (510) 551-8777	Fax no. (Consultant) (510) 551-7888
Consultant name GeoStrategies	Address (Consultant) 6747 Sierra Ct., Suite G, Dublin, CA 94568		Contract number 9401

Method of shipment: Sequoia Courier

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015 GAS	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Semi Metals ☐ VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
B-5-5.5		1	✓			✓		06/29/94			X											-01
B-5-7.5		1	✓			✓		06/29/94			X											-02
B-5-21		1	✓			✓		06/29/94			X											-03
B-6-5.5		1	✓			✓		06/29/94			X											-04
B-6-7		1	✓			✓		06/29/94			X											-05
B-6-24.5		1	✓			✓		06/29/94			X											-06
B-7-5.5		1	✓			✓		06/29/94			X											-07
B-7-8.5		1	✓			✓		06/29/94			X											-08
B-7-24		1	✓			✓		06/29/94			X											-09
B-8-5.5		1	✓			✓		06/29/94			X											-10
B-8-10.5		1	✓			✓		06/29/94			X											-11
B-8-24.5		1	✓			✓		06/29/94			X											-12
B-7-10		1	✓			✓		06/29/94			X											-13

Special detection Limit/reporting: MAY 12

Special QA/QC

Remarks

Lab number: 9407070

Turnaround time
- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☑

Condition of sample:		Temperature received:	
Relinquished by sampler: Barbara Sieminski	Date: 07/01/94	Time: 1055 AM	Received by: S Wright
Relinquished by: S Wright	Date: 7/1/94	Time: 1837	Received by:
Relinquished by:	Date:	Time:	Received by laboratory:	Date: 7/2/94	Time: 1231

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Gettler Ryan/Geostrategies
6747 Sierra Court, Ste J
Dublin, CA 94568
Attention: Joel Coffman

Project: Arco 6002-94-2A

Enclosed are the results from 1 soil sample received at Sequoia Analytical on July 1,1994. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
4G04501	Soil, SP-0629 (Comp. A-D)	6/29/94	Corrosivity, Ignitability, Reactivity STLC Lead EPA 5030/8015 Mod./8020

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Gettler Ryan/Geostrategies	Client Project ID:	Arco 6002-94-2A	Sampled:	Jun 29, 1994
6747 Sierra Court, Ste J	Sample Descript:	Soil, SP-0629 (Comp. A-D)	Received:	Jul 1, 1994
Dublin, CA 94568				
Attention: Joel Coffman	Lab Number:	4G04501	Reported:	Jul 8, 1994

CORROSIVITY, IGNITABILITY, AND REACTIVITY

Analyte	Detection Limit	Sample Results
Corrosivity:		
pH	N.A.	7.3
Ignitability:		
Flashpoint (Pensky-Martens), °C	N.A.	> 100 °C
Reactivity:		
Sulfide, mg/kg	13	N.D.
Cyanide, mg/kg	0.50	N.D.
Reaction with water	N.A.	Negative

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Gettler Ryan/Geostrategies	Client Project ID:	Arco 6002-94-2A	Sampled:	Jun 29, 1994
6747 Sierra Court, Ste J	Sample Descript:	Soil, SP-0629 (Comp. A-D)	Received:	Jul 1, 1994
Dublin, CA 94568				
Attention: Joel Coffman	Lab Number:	4G04501	Reported:	Jul 8, 1994

INORGANIC PERSISTENT AND BIOACCUMULATIVE TOXIC SUBSTANCES

	Soluble Threshold Limit Concentration (Waste Extraction Test)			Total Threshold Limit Concentration		
Analyte	STLC Max. Limit (mg/L)	Detection Limit (mg/L)	Analysis Result (mg/L)	TTLC Max. Limit (mg/kg)	Detection Limit (mg/kg)	Analysis Result (mg/kg)
Antimony	15	0.10	-	500	0.10	-
Arsenic	5	0.10	-	500	0.10	-
Barium	100	0.10	-	10,000	0.10	-
Beryllium	0.75	0.010	-	75	0.010	-
Cadmium	1	0.010	-	100	0.010	-
Chromium (VI)	5	0.0050	-	500	0.0050	-
Chromium	560	0.010	-	2,500	0.010	-
Cobalt	80	0.050	-	8,000	0.050	-
Copper	25	0.010	-	2,500	0.010	-
Lead	5	0.10	0.11	1,000	0.10	-
Mercury	0.2	0.00020	-	20	0.00020	-
Molybdenum	350	0.050	-	3,500	0.050	-
Nickel	20	0.050	-	2,000	0.050	-
Selenium	1	0.10	-	100	0.10	-
Silver	5	0.010	-	500	0.010	-
Thallium	7	0.10	-	700	0.10	-
Vanadium	24	0.050	-	2,400	0.050	-
Zinc	250	0.010	-	5,000	0.010	-
Asbestos	-	10	-	10,000	10	-
Fluoride	180	0.10	-	18,000	0.10	-

Asbestos results are reported as fibers/g.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies	Client Project ID:	Arco 6002-94-2A	Sampled:	Jun 29, 1994
6747 Sierra Court, Ste J	Sample Matrix:	Soil	Received:	Jul 1, 1994
Dublin, CA 94568	Analysis Method:	EPA 5030/8015 Mod./8020	Reported:	Jul 8, 1994
Attention: Joel Coffman	First Sample #:	4G04501		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit mg/kg	Sample I.D. 4G04501 SP-0629 (Comp. A-D)	Sample I.D.	Sample I.D.	Sample I.D.	Sample I.D.	Sample I.D.
Purgeable Hydrocarbons	1.0	110					
Benzene	0.0050	N.D.					
Toluene	0.0050	0.13					
Ethyl Benzene	0.0050	1.0					
Total Xylenes	0.0050	2.3					
Chromatogram Pattern:		Weathered Gas					

Quality Control Data

Report Limit Multiplication Factor:	20
Date Analyzed:	7/5/94
Instrument Identification:	GCHP-18
Surrogate Recovery, %: (QC Limits = 70-130%)	98

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Gettler Ryan/Geostrategies	Client Project ID:	Arco 6002-94-2A
6747 Sierra Court, Ste J	Matrix:	Soil
Dublin, CA 94568		
Attention: Joel Coffman	QC Sample Group: 4G04501	Reported: Jul 8, 1994

QUALITY CONTROL DATA REPORT

ANALYTE	Reactive Sulfide	Cyanide	Flashpoint	pH
Method:	SW 846	SW 846	Karl Fischer	EPA 9045
Analyst:	K.Newberry	J. Heider	K. Newberry	Y.Arteaga
Date Analyzed:	6/30/94	6/30/94	7/5/94	7/6/94
Sample #:	4EI0401	4EI0401	4F01801	4F04501
Sample Concentration:	N.D.	N.D.	70	7.3
Sample Duplicate Concentration:	N.D.	N.D.	71	7.2
% RPD:	0.0	0.0	1.4	1.4
Control Limits:	± 20	± 20	± 5.0	0-30

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Gettler Ryan/Geostrategies	Client Project ID:	Arco 6002-94-2A
6747 Sierra Court, Ste J	Matrix:	Solid
Dublin, CA 94568		
Attention: Joel Coffman	QC Sample Group: 4G04501	Reported: Jul 8, 1994

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	R. Geckler	R. Geckler	R. Geckler	R. Geckler
MS/MSD Batch#:	4FH1501	4FH1501	4FH1501	4FH1501
Date Prepared:	7/5/94	7/5/94	7/5/94	7/5/94
Date Analyzed:	7/5/94	7/5/94	7/5/94	7/5/94
Instrument I.D.#:	GCHP-18	GCHP-18	GCHP-18	GCHP-18
Conc. Spiked:	0.20 mg/kg	0.20 mg/kg	0.20 mg/kg	0.60 mg/kg
Matrix Spike % Recovery:	100	105	105	103
Matrix Spike Duplicate % Recovery:	100	105	105	102
Relative % Difference:	0.0	0.0	0.0	0.98
LCS Batch#:				
Date Prepared:				
Date Analyzed:				
Instrument I.D.#:				
LCS % Recovery:				
% Recovery Control Limits:	55-145	47-149	47-155	56-140

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

Gettler Ryan/Geostrategies
6747 Sierra Court, Ste J
Dublin, CA 94568
Attention: Joel Coffman

Client Project ID: Arco 6002-94-2A
Matrix: Liquid
QC Sample Group: 4G04501

Reported: Jul 8, 1994

QUALITY CONTROL DATA REPORT

ANALYTE	Beryllium	Cadmium	Chromium	Nickel
Method:	EPA 200.7	EPA 200.7	EPA 200.7	EPA 200.7
Analyst:	C.Medefesser	C.Medefesser	C.Medefesser	C.Medefesser
MS/MSD Batch#:	4G09902	4G09902	4G09902	4G09902
Date Prepared:	7/7/94	7/7/94	7/7/94	7/7/94
Date Analyzed:	7/8/94	7/8/94	7/8/94	7/8/94
Instrument I.D.#:	MTJA-2	MTJA-2	MTJA-2	MTJA-2
Conc. Spiked:	1.0 mg/L	1.0 mg/L	1.0 mg/L	1.0 mg/L
Matrix Spike % Recovery:	98	105	104	99
Matrix Spike Duplicate % Recovery:	99	106	97	96
Relative % Difference:	1.0	0.95	7.0	3.1
LCS Batch#:	BLK070794	BLK070794	BLK070794	BLK070794
Date Prepared:	7/7/94	7/7/94	7/7/94	7/7/94
Date Analyzed:	7/8/94	7/8/94	7/8/94	7/8/94
Instrument I.D.#:	MTJA-1	MTJA-1	MTJA-1	MTJA-1
LCS % Recovery:	110	111	105	105
% Recovery Control Limits:	75-125	75-125	75-125	75-125

SEQUOIA ANALYTICAL

Todd Olive
Project Manager

Please Note:
The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 6002-94-2A

Chain of Custody

ARCO Facility no. 6002	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name Sequoia
ARCO engineer Michael Whelan	Telephone no. (ARCO) (415) 571-2434	Telephone no. (Consultant) (510) 551-8777	Fax no. (Consultant) (510) 551-7888
Consultant name	Address (Consultant)		Contract number

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015 925	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	STLC Lead	RCI
SP-0629-A		1	V			V		06/29/94			X										X	X
SP-0629-B		1	V			V		06/29/94			X										X	X
SP-0629-C		1	V			V		06/29/94			X										X	X
SP-0629-D		1	V			V		06/29/94			X										X	X

Sequoia Courier

Special detection Limit/reporting

MAY 31 12

Special QA/QC

Remarks: Composite Sample

5 Business Day

Lab number 9407045

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☑
- Standard 10 Business Days ☐

Condition of sample:		Temperature received:	
Relinquished by sampler: Barbara Sieminski	Date 7/1/94 Time 1055	Received by: S Wright	
Relinquished by: S Wright	Date 7/1/94 Time 1231	Received by:	
Relinquished by:	Date Time	Received by laboratory: Kris A	Date 07094 Time 1231

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

APPC-3292 (2-91)