



grettler — ryan inc.

90 OCT 12 AM 10:49

October 11, 1990

County of Alameda
Department of Environmental Health
Hazardous Materials Division
80 Swan Way, Room 200
Oakland, California 94621

Reference: ARCO Service Station #4931
731 W. MacArthur Boulevard
Oakland, California

Gentlemen:

As requested by ARCO Products Company, we are forwarding a copy of the Site Update report dated October 4, 1990 documenting the groundwater sampling and site activities conducted during the third quarter 1990.

Please do not hesitate to call should you have any questions or comments.

Sincerely,

John P. Werfal
Project Manager

enclosure

cc: Mr. Kyle Christie, ARCO Products Company
Mr. Tom Callaghan, Regional Water Quality Control Board



GeoStrategies Inc.

SITE UPDATE

ARCO Service Station No. 4931
731 West MacArthur Boulevard
Oakland, California

Report No. 7909-7

October 4, 1990



GeoStrategies Inc.

2140 WEST WINTON AVENUE
HAYWARD, CALIFORNIA 94545

(415) 352-4800

October 4, 1990

Gettler-Ryan Inc.
2150 West Winton Avenue
Hayward, California 94545

Attn: Mr. John Werfal

Re: SITE UPDATE
ARCO Service Station No. 4931
731 West MacArthur Boulevard
Oakland, California

Gentlemen:

This Site Update has been prepared by GeoStrategies Inc. (GSI) and presents the results of the July 30, 1990 ground-water sampling, performed by Gettler-Ryan Inc. (G-R), for the above referenced location (Plate 1). There are currently eleven ground-water monitoring wells (A-2 through A-12) at the site (Plate 2). Potentiometric data were collected, wells were inspected for floating product, and ground-water samples were collected and analyzed according to current State of California Water Resources Control Board guidelines.

Depth to groundwater in the upper-most water bearing zone ranged from 9.80 to 11.71 feet below ground surface. A potentiometric map was prepared from these data (Plate 3). These data indicate that the shallow groundwater beneath the site flows to the west/southwest with an approximate hydraulic gradient of 0.02.

Floating product was observed in monitoring wells A-4 and A-8 with a measured thickness that ranged from 0.01 to 1.75 feet. Well A-8 was not used in contouring due to the presence of 1.75 feet of floating product.

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Chemical analyses identified Total Petroleum Hydrocarbons calculated as Gasoline (TPH-Gasoline) at concentrations ranging from none detected (ND) to 16,000 parts per billion (ppb). Benzene concentrations were reported ranging from ND to 1,400 ppb. Wells A-2, A-3, A-6, and A-9 contain benzene concentrations exceeding the current Regional Water Quality Control Board Maximum Contaminant Level. Wells A-5, A-7, A-10, and A-12 were reported as ND for all constituents analyzed. The chemical analytical data are summarized in Table 1. TPH-Gasoline and benzene chemical analytical data have been used to prepare isoconcentration maps (Plates 4 and 5) for this quarter. The historical chemical analytical data have been tabulated and are presented in Table 2. The G-R Groundwater Sampling Procedure is presented in Appendix A.

The analyses of the ground-water samples were performed by International Technology (IT) Analytical Services, a State-certified analytical laboratory located in San Jose, California. The IT Analytical Services certified analytical report is included in the attached G-R Groundwater Sampling Report presented in Appendix B.

GeoStrategies Inc.

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If you have any questions, please call.

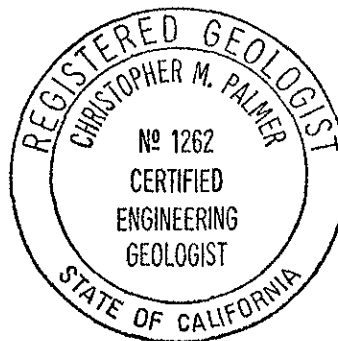
GeoStrategies Inc. by,

Robert A. Lauritzen

Robert A. Lauritzen
Project Geologist

Christopher M. Palmer

Christopher M. Palmer
Senior Geologist
C.E.G. 1262, R.E.A. 285



RAL/CMP/kjj

- Plate 1. Vicinity Map
- Plate 2. Site Plan
- Plate 3. Potentiometric Map
- Plate 4. TPH-Gasoline Isoconcentration Map
- Plate 5. Benzene Isoconcentration Map

- Appendix A: Gettler-Ryan Inc. Sampling Procedures
- Appendix B: Gettler-Ryan Inc. Groundwater Sampling Report
(July 30, 1990)

TABLE 1

GROUND-WATER ANALYSES DATA

WELL NO	SAMPLE DATE	ANALYZED DATE	TPH (PPB)	BENZENE (PPB)	TOLUENE (PPB)	ETHYLBENZENE (PPB)	XYLENES (PPB)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
A-2	30-Jul-90	01-Aug-90	16000.	1400.	340.	290.	3600.	55.38	45.37	----	10.01
A-3	30-Jul-90	03-Aug-90	120.	8.3	2.9	2.3	12.	54.48	43.22	----	11.26
A-4	30-Jul-90	----	----	----	----	----	----	54.62	42.91	0.01	11.71
A-5	30-Jul-90	03-Aug-90	<50.	<0.5	<0.5	<0.5	<0.5	54.15	42.67	----	11.48
A-6	30-Jul-90	02-Aug-90	<50.	2.6	<0.5	<0.5	1.2	55.13	45.20	----	9.93
A-7	30-Jul-90	02-Aug-90	<50.	<0.5	<0.5	<0.5	<0.5	54.67	44.87	----	9.80
A-8	30-Jul-90	----	----	----	----	----	----	53.61	44.53	1.75	10.48
A-9	30-Jul-90	02-Aug-90	180.	77.	1.6	2.1	4.2	52.96	42.80	----	10.16
A-10	30-Jul-90	02-Aug-90	<50.	<0.5	<0.5	<0.5	<0.5	54.16	42.49	----	11.67

CURRENT REGIONAL WATER QUALITY CONTROL BOARD MAXIMUM CONTAMINANT LEVELS

Benzene 1.0 ppb Xylenes 1,750 ppb Ethylbenzene 680 ppb

CURRENT DHS ACTION LEVELS

Toluene 100 ppb

TPH = Total Petroleum Hydrocarbons as Gasoline

PPB = Parts Per Billion TB = Trip Blank

Note: 1. All data shown as <x are reported as ND (none detected)

2. Static Water elevations referenced to mean sea level (MSL). Elevations are corrected for free product using a correction factor of 0.8.

3. DHS Action Levels and MCLs are subject to change pending State review

TABLE 1

GROUND-WATER ANALYSES DATA

WELL NO	SAMPLE DATE	ANALYZED DATE	TPH (PPB)	BENZENE (PPB)	TOLUENE (PPB)	ETHYLBENZENE (PPB)	XYLENES (PPB)	WELL ELEV (FT)	STATIC WATER ELEV (FT)	PRODUCT THICKNESS (FT)	DEPTH TO WATER (FT)
A-11	30-Jul-90	02-Aug-90	<50.	<0.5	0.6	<0.5	0.5	53.75	42.46	----	11.29
A-12	30-Jul-90	02-Aug-90	<50.	<0.5	<0.5	<0.5	<0.5	52.05	41.39	----	10.66
TB	30-Jul-90	06-Aug-90	<50.	<0.5	<0.5	<0.5	<0.5	----	----	----	----

TABLE 2

ANALYTICAL LOG

SAMPLE DATE	SAMPLE POINT	TPH (PPB)	BENZENE (PPB)	TOLUENE (PPB)	E.B. (PPB)	XYLENES* (PPB)
21-Mar-86	A-2	31000.	----	----	----	----
07-Jan-88	A-2	12000.	920.	1500.	----	4000.
20-Mar-89	A-2	22000.	1200.	1800.	1200.	7700.
24-May-89	A-2	9000.	460.	260.	250.	2400.
18-Aug-89	A-2	14000.	900.	200.	<200.	1300.
27-Oct-89	A-2	16000.	1200.	340.	90.	3100.
15-Jan-90	A-2	9900.	1100.	460.	150.	2900.
04-Apr-90	A-2	16000.	1100.	400.	380.	3900.
30-Jul-90	A-2	16000.	1400.	340.	290.	3600.
21-Mar-86	A-3	1000.	----	----	----	----
07-Jan-88	A-3	250.	2.3	8.	----	21.
20-Mar-89	A-3	230.	1.6	<1.	3.	3.
24-May-89	A-3	170.	0.9	2.	1.	<3.
18-Aug-89	A-3	180.	0.7	1.	<1.	<3.
27-Oct-89	A-3	120.	<0.5	<0.5	<0.5	<1.
15-Jan-90	A-3	<50.	<0.5	<0.5	<0.5	<1.
04-Apr-90	A-3	88.	1.2	2.0	0.8	4.
30-Jul-90	A-3	120.	8.3	2.9	2.3	12.
20-Mar-89	A-4	360000.	1500.	3700.	6500.	35000.
24-May-89	A-4	1500000.	1000.	2000.	6000.	23000.
04-Apr-90	A-4	40000.	680.	320.	1400.	4900.
21-Mar-86	A-5	88.	----	----	----	----
07-Jan-88	A-5	<50.	0.5	1.	----	4.
20-Mar-89	A-5	60.	0.5	1.	2.	10.
24-May-89	A-5	<50.	0.5	<1.	<1.	<3.
18-Aug-89	A-5	<50.	<0.5	<1.	<1.	<3.
27-Oct-89	A-5	<50.	<0.5	<0.5	<0.5	<1.
15-Jan-90	A-5	<50.	<0.5	<0.5	<0.5	<1.
04-Apr-90	A-5	<50.	<0.5	<0.5	<0.5	<1.
30-Jul-90	A-5	<50.	<0.5	<0.5	<0.5	<0.5
21-Mar-86	A-6	<10.	----	----	----	----
21-Mar-86	A-6	<10.	----	----	----	----
07-Jan-88	A-6	390.	54.	89.	----	110.
20-Mar-89	A-6	220.	33.	21.	9.	39.
24-May-89	A-6	110.	13.	6.	3.	13.
18-Aug-89	A-6	<50.	2.1	1.	<1.	<3.
27-Oct-89	A-6	55.	3.8	1.6	1.7	6.
15-Jan-90	A-6	100.	12.	2.5	5.5	18.
04-Apr-90	A-6	100.	17.	7.1	5.5	18.
30-Jul-90	A-6	<50.	2.6	<0.5	<0.5	1.2

TABLE 2

ANALYTICAL LOG

SAMPLE DATE	SAMPLE POINT	TPH (PPB)	BENZENE (PPB)	TOLUENE (PPB)	E.B. (PPB)	XYLENES* (PPB)
07-Jan-88	A-7	<50.	<0.5	1.	----	4.
20-Mar-89	A-7	<50.	0.9	<1.	<1.	<3.
24-May-89	A-7	<50.	<0.5	<1.	<1.	<3.
18-Aug-89	A-7	<50.	<0.5	<1.	<1.	<3.
27-Oct-89	A-7	<50.	<0.5	<0.5	<0.5	<1.
15-Jan-90	A-7	<50.	<0.5	<0.5	<0.5	<1.
04-Apr-90	A-7	<50.	<0.5	<0.5	<0.5	<1.
30-Jul-90	A-7	<50.	<0.5	<0.5	<0.5	<0.5
07-Jan-88	A-9	300.	45.	14.	----	43.
21-Mar-89	A-9	50.	2.8	-1.	1.	3.
24-May-89	A-9	120.	26.	12.	4.	79.
18-Aug-89	A-9	14000.	400.	800.	400.	2000.
27-Oct-89	A-9	1700.	150.	36.	30.	110.
15-Jan-90	A-9	860.	140.	58.	38.	140.
04-Apr-90	A-9	620.	36.	13.	9.4	32.
30-Jul-90	A-9	180.	77.	1.6	2.1	4.2
07-Jan-88	A-10	<50.	0.6	11.	----	4.
20-Mar-89	A-10	<50.	<0.5	<1.	<1.	<3.
24-May-89	A-10	<50.	<0.5	<1.	<1.	<3.
18-Aug-89	A-10	<50.	<0.5	<1.	<1.	<3.
27-Oct-89	A-10	<50.	<0.5	<0.5	<0.5	<1.
15-Jan-90	A-10	<50.	<0.5	<0.5	<0.5	<1.
30-Jul-90	A-10	<50.	<0.5	<0.5	<0.5	<0.5
07-Jan-88	A-11	<50.	1.1	2.	----	5.
20-Mar-89	A-11	<50.	<0.5	<1.	<1.	<3.
24-May-89	A-11	<50.	<0.5	<1.	<1.	<3.
18-Aug-89	A-11	<50.	<0.5	<1.	<1.	<3.
27-Oct-89	A-11	<50.	<0.5	<0.5	<0.5	<1.
15-Jan-90	A-11	<50.	<0.5	<0.5	<0.5	<1.
04-Apr-90	A-11	<50.	<0.5	<0.5	<0.5	<1.
30-Jul-90	A-11	<50.	<0.5	0.6	<0.5	0.5
07-Jan-88	A-12	<50.	<0.5	2.	----	<4.
20-Mar-89	A-12	<50.	<0.5	<1.	<1.	<3.
24-May-89	A-12	<50.	<0.5	<1.	<1.	<3.
18-Aug-89	A-12	<50.	<0.5	<1.	<1.	<3.
27-Oct-89	A-12	<50.	<0.5	<0.5	<0.5	<1.
15-Jan-90	A-12	<50.	<0.5	<0.5	<0.5	<1.
04-Apr-90	A-12	<50.	<0.5	<0.5	<0.5	<1.
30-Jul-90	A-12	<50.	<0.5	<0.5	<0.5	<0.5

Ethylbenzene & Xylenes combined in 1986 and 1988
 All data shown as <X are reported as ND (none detected)

TABLE 2

=====

ANALYTICAL LOG

=====

SAMPLE DATE	SAMPLE POINT	TPH (PPB)	BENZENE (PPB)	TOLUENE (PPB)	E.B. (PPB)	XYLENES* (PPB)
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*ETHYLBENZENE & XYLENES COMBINED IN 1986 AND 1988

ALL DATA SHOWN AS <X ARE REPORTED AS ND (NONE DETECTED)

GeoStrategies Inc.

ILLUSTRATIONS



SITE LOCATION



Base Map: USGS Topographic Map

Approximate Scale : 1" = 2000'



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Vicinity Map
 ARCO Service Station #4931
 731 W. MacArthur Boulevard
 Oakland, California

PLATE

1

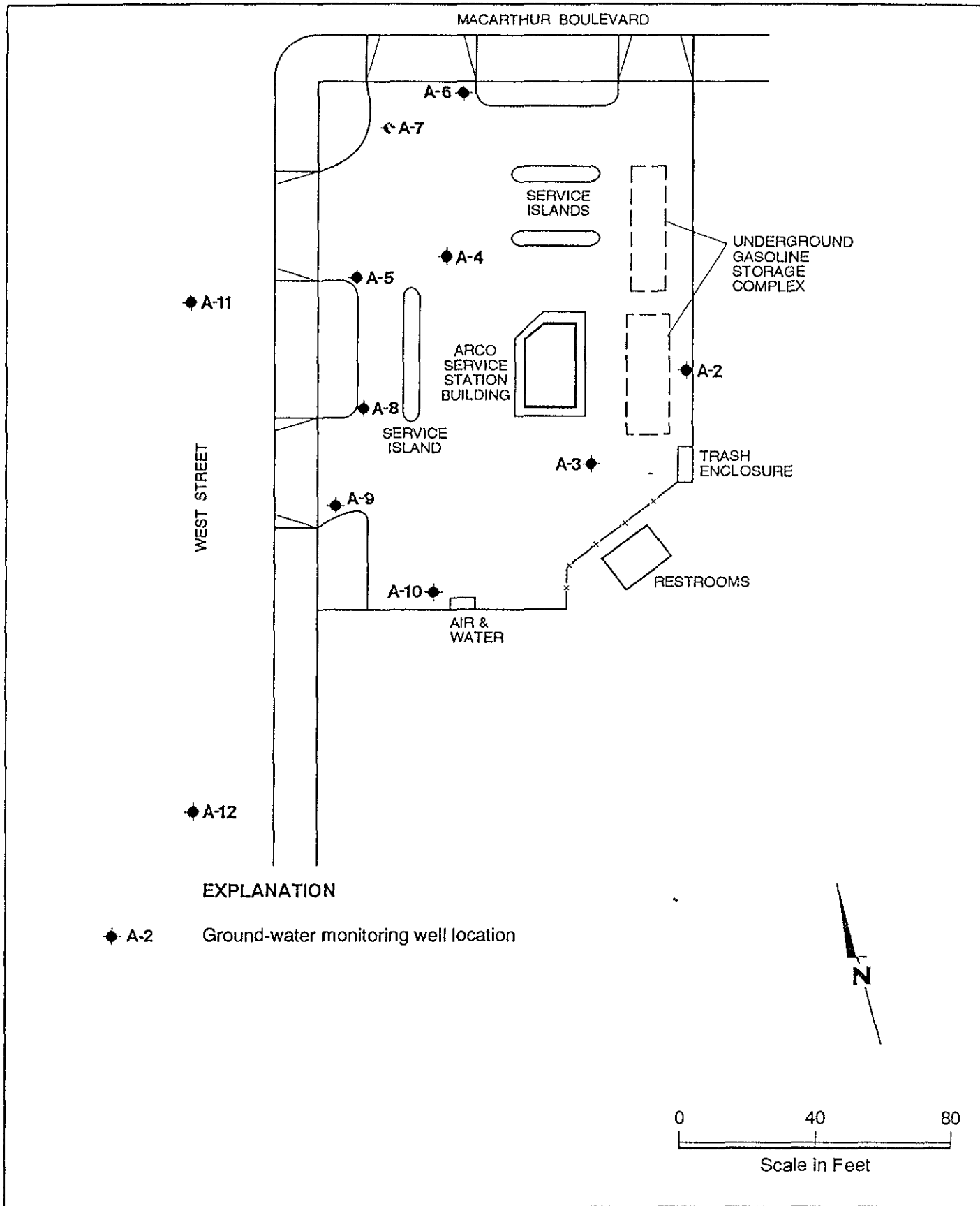
JOB NUMBER
 7909

REVIEWED BY RG/CEG

DATE
 1/90

REVISED DATE

REVISED DATE



EXPLANATION

◆ A-2 Ground-water monitoring well location



GeoStrategies Inc.

Site Plan
 ARCO Service Station #4931
 731 W. MacArthur Boulevard
 Oakland, California

PLATE

2

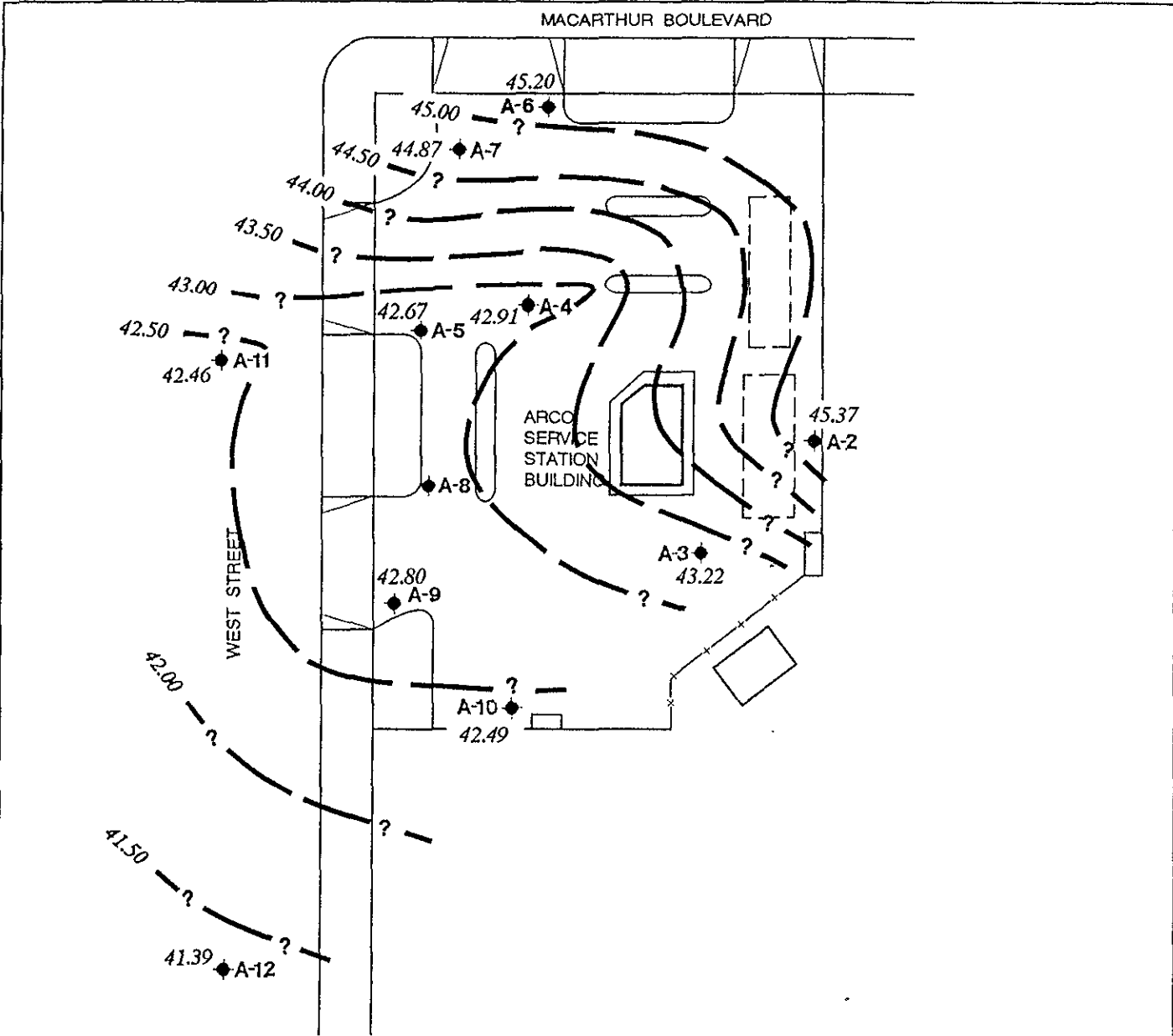
JOB NUMBER
7909

REVIEWED BY RG/CEG
CMP-061262

DATE
8/90

REVISED DATE

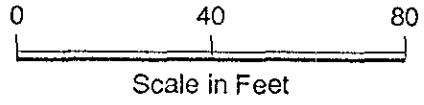
REVISED DATE



EXPLANATION

- ◆ A-2 Ground-water monitoring well location
- 45.00 — Ground-water elevation contour
Approximate Gradient = 0.02
- 41.39 Ground-water elevation in feet referenced to Mean Sea Level (MSL) measured on July 30, 1990

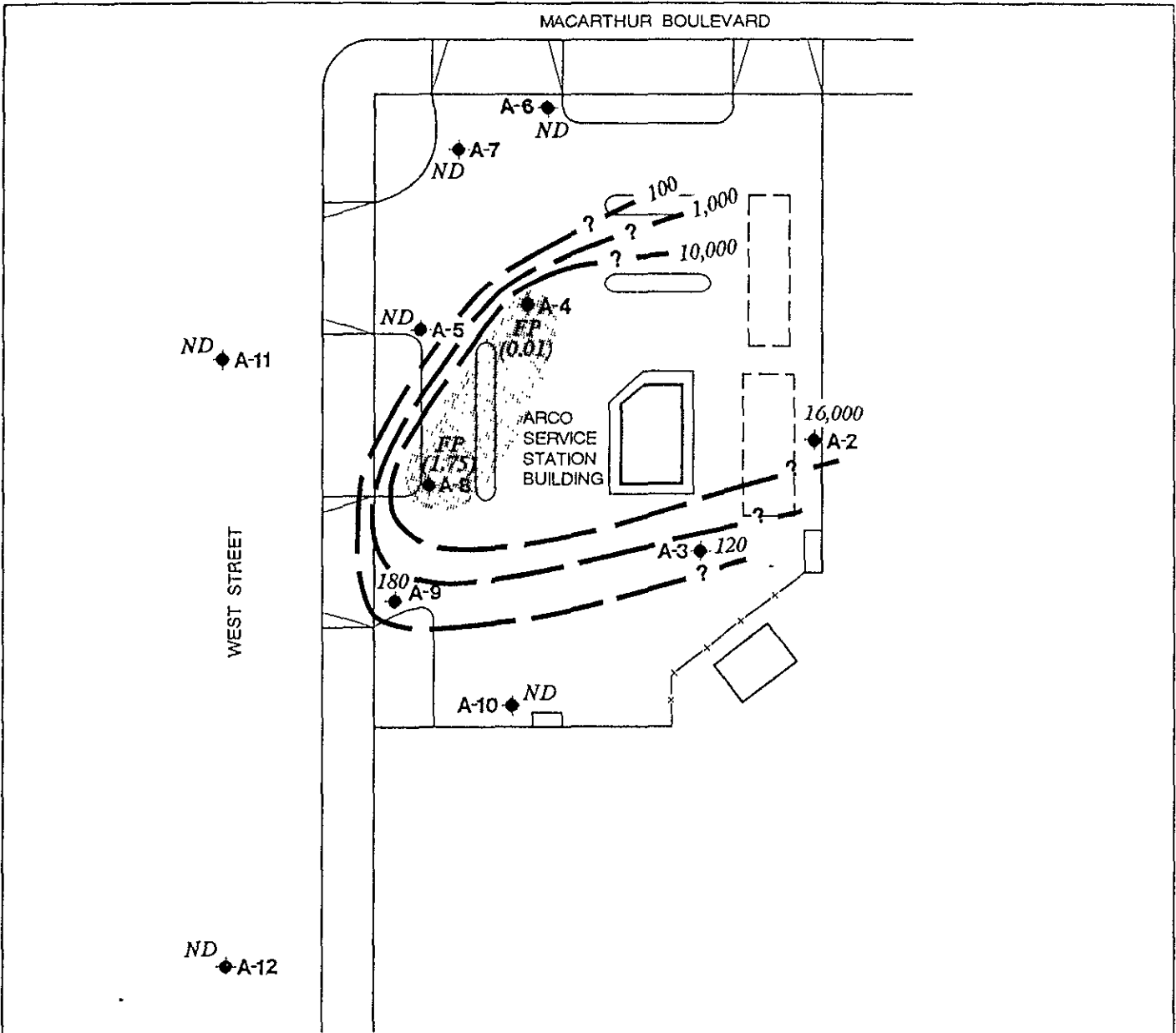
Notes: Well A-8 was not used in contouring
Contours may be influenced by irrigation practices and/or site construction activities



GeoStrategies Inc.

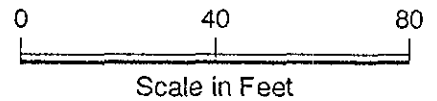
Potentiometric Map
ARCO Service Station #4931
731 W. MacArthur Boulevard
Oakland, California

PLATE
3



EXPLANATION

- ◆ A-2 Ground-water monitoring well location
- 180 TPH-G (Total Petroleum Hydrocarbons calculated as Gasoline) concentration in ppb sampled on July 30, 1990
- 100 ——— TPH-G isoconcentration contour
- ND Not Detected
(see laboratory reports for detection limits)
- FP(0.01) Approx. area of Floating Product (thickness in feet)

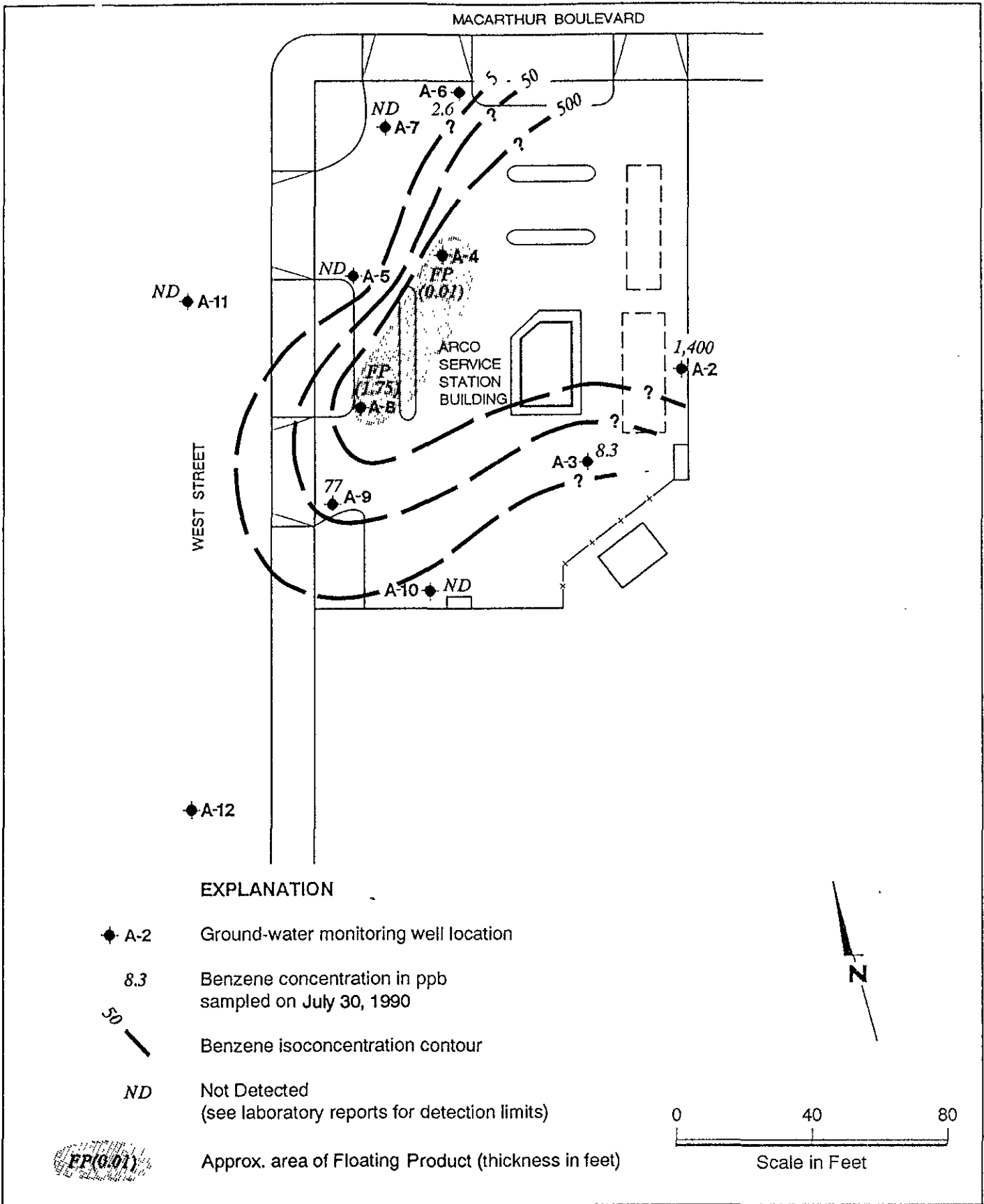


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TPH-G Isoconcentration Map
ARCO Service Station #4931
731 W. MacArthur Boulevard
Oakland, California

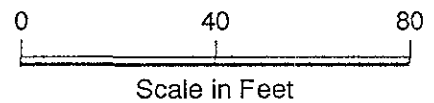
PLATE

4



EXPLANATION

- ◆ A-2 Ground-water monitoring well location
- 8.3 Benzene concentration in ppb sampled on July 30, 1990
- 50 Benzene isoconcentration contour
- ND Not Detected (see laboratory reports for detection limits)
- FP(0.01) Approx. area of Floating Product (thickness in feet)



GeoStrategies Inc.

**APPENDIX A
G-R GROUND-WATER SAMPLING PROCEDURES**

GROUND-WATER SAMPLING AND ANALYSIS

Quality Assurance/Quality Control Objectives

The sampling and analysis procedures employed by Gettler-Ryan Inc. (G-R) for ground-water sampling and monitoring follow specific Quality Assurance/Quality Control (QA/QC) guidelines. Quality Assurance objectives have been established by G-R to develop and implement procedures for obtaining and evaluating water quality and field data in an accurate, precise, and complete manner so that sampling procedures and field measurements provide information that is comparable and representative of actual field conditions. Quality Control (QC) is maintained by G-R by using specific field protocols and requiring the analytical laboratory to perform internal and external QC checks. It is the goal of G-R to provide data that are accurate, precise, complete, comparable, and representative. The definitions for accuracy, precision, completeness, comparability, and representativeness are as follows:

- Accuracy - the degree of agreement of a measurement with an accepted referenced or true value.
- Precision - a measure of agreement among individual measurements under similar conditions. Usually expressed in terms of the standard deviation.
- Completeness - the amount of valid data obtained from a measurement system compared to the amount that was expected to meet the project data goals.
- Comparability - expresses the confidence with which one data set can be compared to another.
- Representativeness - a sample or group of samples that reflects the characteristics of the media at the sampling point. It also includes how well the sampling point represents the actual parameter variations which are under study.

As part of the G-R QA/QC program, applicable federal, state, and local reference guidance documents are followed. The procedures outlined in these regulations, manuals, handbooks, guidance documents, and journals are incorporated into the G-R sampling procedures to assure that; (1) ground-water samples are properly collected, (2) ground-water samples are identified, preserved, and transported in a manner such that they are representative of field conditions, and (3) chemical analysis of samples are accurate and reproducible.

Guidance and Reference Documents Used to Collect Groundwater Samples

These documents are used to verify G-R sampling procedures and are consistent with current regulatory guidance. If site specific work and sampling plans are required, those plans will be developed from these documents, and newly received applicable documents.

U.S.E.P.A. - 330/9-51-002	NEIC Manual for Groundwater/Subsurface Investigation at Hazardous Waste Sites
U.S.E.P.A. - 530/SW611	Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities (August, 1977)
U.S.E.P.A. - 600/4-79-020	Methods for Chemical Analysis of Water and Wastes (1983)
U.S.E.P.A. - 600/4-82-029	Handbook for Sampling and Sample Preservation of Water and Wastewater (1982)
U.S.E.P.A. - 600/4-82-057	Test Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater (July, 1982)
U.S.E.P.A. - SW-846#, 3rd Edition	Test Methods for Evaluating Solid Waste - Physical/Chemical Methods (November, 1986)
40 CFR 136.3e, Table II (Code of Federal Regulations)	Required Containers, Preservation Techniques, and Holding Times
Resources Conservation and Recover Act (OSWER 9950.1)	Groundwater Monitoring Technical Enforcement Guidance Document (September, 1986)
California Regional Water Quality Control Board (Central Valley Region)	A Compilation of Water Quality Goals (September, 1988); Updates (October, 1988)
California Regional Water Quality Control Board (North Coast, San Francisco Bay, and Central Valley)	Regional Board Staff Recommendations for Initial Evaluations and Investigation of Underground Tanks: Tri-Regional Recommendations (June, 1988)

Guidance and Reference Documents Used to Collect Groundwater Samples (cont.)

Regional Water Quality Control Board (Central Valley Region)	Memorandum: Disposal, Treatment, and Refuse of Soils Contaminated with Petroleum Fractions (August, 1986)
State of California Department of Health Services	Hazardous Waste Testing Laboratory Certification List (March, 1987)
State of California Water Resources Control Board	Leaking Underground Fuel Tank (LUFT) Field Manual (May, 1988), and LUFT Field Manual Revision (April, 1989)
State of California Water Resources Control Board	Title 23, (Register #85.#33-8-17-85), Subchapter 16: Underground Tank Regulations; Article 3, Sections 2632 and 2634; Article 4, Sections 2645, 2646, 2647, and 2648; Article 7, Sections 2670, 2671, and 2672 (October, 1986: including 1988 Amendments)
Alameda County Water District	Groundwater Protection Program: Guidelines for Groundwater and Soil Investigations at Leaking Underground Fuel Tank Sites (November, 1988)
American Public Health Association	Standard Methods for the Examination of Water and Wastewaters, 16th Edition
Analytical Chemistry (journal)	Principles of Environmental Analysis, Volume 55, Pages 2212-2218 (December, 1983)
Napa County	Napa County Underground Storage Tank Program: Guidelines for Site Investigations; February 1989.
Santa Clara Valley Water District	Guidelines for Preparing or Reviewing Sampling Plans for Soil and Groundwater Investigation of Fuel Contamination Sites (January, 1989)

Guidance and Reference Documents Used to Collect Groundwater Samples (cont.)

Santa Clara Valley Water District	Investigation and Remediation at Fuel Leak sites: Guidelines for Investigation and Technical Report Preparation (March 1989)
Santa Clara Valley Water District	Revised Well Standards for Santa Clara County (July 18, 1989)
American Petroleum Institute	Groundwater Monitoring & Sample Bias; API Publication 4367, Environmental Affairs Department, June 1983
American Petroleum Institute	A Guide to the Assessment and Remediation of Underground Petroleum Releases; API Publication 1628, February 1989
American Petroleum Institute	Literature Summary: Hydrocarbon Solubilities and Attenuations Mechanisms, API Publication 4414, August 1985
Site Specific (as needed)	General and specific regulatory documents as required.

Because ground-water samples collected by G-R are analyzed to the parts per billion (ppb) range for many compounds, extreme care is exercised to prevent contamination of samples. When volatile or semi-volatile organic compounds are included for analysis, G-R sampling crew members will adhere to the following precautions in the field:

1. A clean pair of new, disposable gloves are worn for each well being sampled.
2. When possible, samples are collected from known or suspected wells that are least contaminated (i.e. background) followed by wells in increasing order of contamination.
3. Ambient conditions are continually monitored to maintain sample integrity.

When known or potential organic compounds are being sampled for, the following additional precautions are taken:

1. All sample bottles and equipment are kept away from fuels and solvents. When possible, gasoline (used in generators) is stored away from bailers, sample bottles, purging pumps, etc.
2. Bailers are made of Teflon or Stainless Steel. Other materials such as plastic may contaminate samples with phthalate esters which interfere with many Gas Chromatography (GC) analyses.
3. Volatile organic ground-water samples are collected so that air passage through the sample does not occur or is minimal (to prevent volatiles from being stripped from the samples): sample bottles are filled by slowly running the sample down the side of the bottle until there is a positive convex meniscus over the neck of the bottle; the Teflon side of the septum (in cap) is positioned against the meniscus, and the cap screwed on tightly; the sample is inverted and the bottle lightly tapped. The absence of an air bubble indicates a successful seal; if a bubble is evident, the cap is removed, more sample is added, and the bottle is resealed.
4. Extra Teflon seals are brought into the field in case seals are difficult to handle and/or are dropped. Dropped seals are considered contaminated and are not used. When replacing seals or if seals become flipped, care is taken to assure that the Teflon seal faces down.

Sample analysis methods, containers, preservatives and holding times are shown on Table 1.

April 20, 1990

Laboratory and field handling procedures of samples are monitored by including QC samples for analysis with every submitted sample lot from a project site. QC samples may include any combination of the following:

- A. Trip Blank: Used for purgeable organic compounds only; QC samples are collected in 40 milliliter (ml) sample vials filled in the analytical laboratory with organic-free water. Trip blanks are sent to the project site, and travel with project site samples. Trip blanks are not opened, and are returned from a project site with the project site samples for analysis.
- B. Field Blank: Prepared in the field using organic-free water. These QC samples accompany project site samples to the laboratory and are analyzed for specific chemical parameters unique to the project site where they were prepared.
- C. Duplicates: Duplicated samples are collected "second samples" from a selected well and project site. They are collected as either split samples or second-run samples collected from the same well.
- D. Equipment Blank: Periodic QC sample collected from field equipment rinsate to verify decontamination procedures.

The number and types of QC samples are determined as follows:

- A. Up to 2 wells - Trip Blank Only
- B. 2 to 5 Wells - 1 Field Blank and 1 Trip Blank
- C. 5 to 10 Wells - 1 Field blank, 1 Trip Blank, and 1 Duplicate
- D. More than 10 Wells - 1 Field Blank, 1 Trip Blank, and 1 Duplicate per each 12 wells
- E. If sampling extends beyond one day, quality control samples will be collected for each day.

Additional QC is performed through ongoing and random reviews of duplicate samples to evaluate the precision of the field sampling procedures and analytical laboratory. Precision of QC data is accomplished by calculating the Relative Percent Difference (RPD). The RPD is evaluated to assess whether values are within an acceptable range (typically $\pm 20\%$ of duplicate sample).

SAMPLE COLLECTION

This section describes the routine procedures followed by G-R while collecting ground-water samples for chemical analysis. These procedures include decontamination, water-level measurements, well purging, physical parameter measurements, sample collection, sample preservation, sample handling, and sample documentation. Critical sampling objectives for G-R are to:

1. Collect ground-water samples that are representative of the sampled matrix and,
2. Maintain sample integrity from the time of sample collection to receipt by the analytical laboratory.

Sample analyses methods, containers, preservation, and holding times are presented in Table 1.

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. Any sampling equipment surfaces or parts that might absorb specific contaminants, such as plastic pump valves, impellers, etc., are cleaned in the same manner.

Sample bottles, bottle caps, and septa used for sampling volatile organics 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.

During field sampling, equipment placed in a well are decontaminated before purging or sampling the next well. The equipment are decontaminated by cleaning with Alconox or equivalent detergent followed by steam cleaning with deionized water.

Water-Level Measurements

Prior to purging and sampling a well, the static-water levels are measured in all wells at a project site using an electric sounder and/or calibrated portable oil-water interface probe (Figure 4). 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.

Water-Level Measurements (continued)

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 on the G-R Well Sampling Field Data Sheet shown in Figure 4. Before and after each use, the electric sounder, interface probe and bailer are decontaminated by washing with Alconox or equivalent detergent followed by rinsing with deionized water to prevent cross-contamination.

As mentioned previously, 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 will be 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 (Figure 5). Methods of purging will be assessed based on well size, location, accessibility, and known chemical conditions. Individual well purge volumes are calculated from borehole volumes which take into account the sand packed interval in the well annular space. As a general rule, a minimum of 3 and a maximum of 10 borehole volumes will be purged. Wells which dewater or demonstrate slow recharge periods (i.e. low-yield wells) during purging activities may be sampled after fewer purging cycles. If a low-yield (low recovery) well is to be sampled, sampling will not take place until at least 80 percent of the previously measured water column has been replaced by recharge, or as per local requirements. Physical parameter measurements (temperature, pH, and specific conductance) are closely monitored throughout the well purging process and are used by the G-R sampling crew as indicators for assessing sufficient purging. Purging is continued until all three physical parameters have stabilized. Specific conductance (conductivity) meters are read to the nearest ± 10 umhos/cm, and are calibrated daily. pH meters are read to the nearest ± 0.1 pH units and are calibrated daily. Temperature is read to the nearest 0.1 degree F. Calibration of physical parameter meters will follow manufacturers specifications. Monitoring wells will be purged according to the protocol presented in Figure 5. Collected field data during purging activities will be entered on the G-R Well Sampling Field Data Sheet shown in Figure 4. Copies of the G-R Field Data Sheets will be reviewed by the G-R Sampling Manager for accuracy and completeness.

DOCUMENTATION

Sample Container Labels

Each sample container will be labeled by an adhesive label, noted in permanent ink immediately after the sample is collected. Label information will include:

Sample point designation (i.e. well number or code)

Sampler's identification

Project number

Date and time of collection

Type of preservation used

Well Sampling Data Forms

In the field, the G-R sampling crew will record the following information on the Well Sampling Data Sheet for each sample collected:

Project number

Client

Location

Source (i.e. well number)

Time and date

Well accessibility and integrity

Pertinent well data (e.g. depth, product thickness, static water-level, pH, specific conductance, temperature)

Calculated and actual purge volumes

Chain-of-Custody

A Chain-of-Custody record (Figure 6) shall be completed and accompany every sample and every shipment of samples to the analytical laboratory in order to establish the documentation necessary to trace sample possession from time of collections. The record will contain the following information:

- Sample or station number or sample identification (ID)
- Signature of collector, sampler, or recorder
- Date and time of collection
- Place of collection
- Sample type
- Signatures of persons involved in chain of possession
- Inclusive dates of possession

Samples shall always be accompanied by a Chain-of-Custody record. When transferring the samples, the individual relinquishing and receiving the samples will sign, date, and note the time on the Chain-of-Custody record. G-R will be responsible for notifying the laboratory coordinator when and how many samples will be sent to the laboratory for analysis, and what types of analyses shall be performed.

TABLE 1

SAMPLE ANALYSIS METHODS, CONTAINERS, PRESERVATIONS, AND HOLDING TIMES

Parameter	Analytical Method	Reporting Units	Container	Preservation	Maximum Holding Time
Total Petroleum Hydrocarbons (Gasoline)	EPA 8015 (modified)	mg/l ug/l	40 ml. vial glass, Teflon	cool, 4 C HCl to pH<2	14 days (maximum)
Benzene	EPA 8020	mg/l	50 ml. vial glass, Teflon	cool, 4 C HCl to pH<2	7 days (w/o preservative)
Toluene		ug/l	lined septum		14 days (w preservative)
Ethylbenzene					
Xylenes (BTEX)					
Oil & Grease	SM 503E	mg/l ug/l	1 l glass, Teflon lined septum	H2SO4 or HCl to pH<2	28 days (maximum)
Total Petroleum Hydrocarbons (Diesel)	EPA 8015 (modified)	mg/l ug/l	40 ml. vial glass, Teflon lined septum	cool, 4 C	14 days (maximum)
Halogenated Volatile Organics (chlorinated solvents)	8010	mg/l ug/l	40 ml. vial glass, Teflon lined septum	cool, 4 C	14 days (maximum)
Non chlorinated solvents	8020	mg/l ug/l	40 ml. vial glass, Teflon lined septum	cool, 4 C HCl to pH<2	14 days (maximum)
Volatile Organics	8240	mg/l ug/l	40 ml. vial glass, Teflon lined septum	cool, 4 C HCl to pH<2	14 days (maximum)
Semi-Volatile Organics	8270	mg/l ug/l	1 l amber glass, Teflon lined septum	cool, 4 C	7 days extract 40 days (maximum to analyze)
Specific Conductance (Field test)		umhos/cm			
pH (Field test)		pH units			
Temperature (Field test)		Deg F			

GETTLER-RYAN INC.

General and Environmental Contractors

WELL SAMPLING FIELD DATA SHEET

FIGURE 4

COMPANY _____ JOB # _____
LOCATION _____ DATE _____
CITY _____ TIME _____

Well ID. _____ Well Condition _____

Well Diameter _____ in. Hydrocarbon Thickness _____ ft.

Total Depth _____ ft.

Depth to Liquid- _____ ft.

(# of casing volumes) _____ x _____ x(VF) _____ = (Estimated Purge Volume) _____ gal.

Purging Equipment _____

Sampling Equipment _____

Starting Time _____ Purging Flow Rate _____ gpm.

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

Time	pH	Conductivity	Temperature	Volume
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Did well dewater? _____ If yes, time _____ Volume _____

Sampling Time _____ Weather Conditions _____

Analysis _____ Bottles Used _____

Chain of Custody Number _____

COMMENTS _____

FOREMAN _____ ASSISTANT _____

Monitoring Well Sampling Protocol Schematic

Sampling Crew Reviews Project
Sampling Requirements/Schedule

Field Decontamination and
Instrumentation Calibration

Check Integrity of Well
(Inspect for Well Damage)

Measure and Record Depth to Water
and Total Well Depth
(Electric Well Sounder)

Check for Floating Product
(Oil/Water Interface Probe)

Floating Product Present

Confirm Product Thickness
(Acrylic or PVC Bailer)

Collect Free-Product Sample

Dissolved Product Sample Not
Required

Record Data on Field Data Form

Floating Product Not Present

Purge Volume Calculation

$$V = \pi (r/12)^2 h (\% \text{ vol}) (7.48) = _ _ / \text{gallons}$$

V = Purge volume (gallons)

$\pi = 3.14159$

h = Height of Water Column (feet)

r = Borehole radius (inches)

Evacuate water from well equal to the calculated purge volume while monitoring groundwater stabilization indicator parameters (pH, conductivity, temperature) at intervals of one casing volume.

Well Dewater after One Purge Volume
(Low yield well)

Well Recharges to 80% of Initial
Measured Water Column Height in
Feet within 24 hrs. of Evacuation.

Measure Groundwater Stability Indicator
Parameters (pH, Temperature, Conductivity)

Collect Sample and Complete
Chain-of-Custody

Preserve Sample According to Required
Chemical Analysis

Transport to Analytical Laboratory

Well Readily Recovers

Record Groundwater Stability Indicator
Parameters from each Additional Purge Volume
Stability indicated when the following Criteria are met:

pH : ± 0.1 pH units

Conductivity: $\pm 10\%$

Temperature: 1.0 degrees F

Groundwater Stability Achieved

Collect Sample and Complete
Chain-of-Custody

Preserve Sample According
to Required Chemical Analysis

Transport to Analytical Laboratory

Groundwater Stability Not Achieved

Continue Purging Until Stability
is Achieved

Collect Sample and complete
Chain-of-Custody

Preserve Sample According to Required
Chemical Analysis

Transport to Analytical Laboratory

GeoStrategies Inc.

**APPENDIX B
GETTLER-RYAN INC.
GROUNDWATER SAMPLING REPORT**



August 17, 1990

GROUNDWATER SAMPLING REPORT

ARCO Products Company
Post Office Box 5811
San Mateo, California 94402

Referenced Site: ARCO Service Station #4931
731 W MacArthur Blvd./West St.
Oakland, California

Sampling Date: July 30, 1990

This report presents the results of the quarterly groundwater sampling and analytical program conducted by Gettler-Ryan Inc. on July 30, 1990 at the referenced location. The site is occupied by an operating service station located on the southeast corner of West MacArthur Boulevard and West Street. The service station has underground storage tanks containing regular leaded, unleaded and super unleaded gasoline products.

There are currently nine groundwater monitoring wells on site and two off site at the locations shown on the attached site map. Prior to sampling, the wells were inspected for total well depth, water levels, and presence of separate phase product using an electronic interface probe. A clean acrylic bailer was used to visually confirm the presence and thickness of separate phase product. Groundwater depths ranged from 9.80 to 11.71 feet below grade. A product sheen was observed in well A-4. Separate phase product was observed in Wells A-4 and A-8.

Wells that did not contain separate phase product were purged and sampled. The purge water was contained in drums for proper disposal. Standard sampling procedure calls for a minimum of four case volumes to be purged from each well. Each well was purged while pH, temperature, and conductivity measurements were monitored for stability. Details of the final well purging results are presented on the attached Table of Monitoring Data. In cases where a well dewatered or less than four case volumes were purged, groundwater samples were obtained after the physical parameters had stabilized. Under such circumstances the sample may not represent actual formation water, due to the low flow conditions.

Samples were collected, using Teflon bailers, in properly cleaned and laboratory prepared containers. All sampling equipment was thoroughly cleaned after each well was sampled and steam cleaned upon completion of work at the site. The samples were labeled, stored on blue ice, and transported to the laboratory for analysis. A trip blank, supplied by the laboratory, was included and analyzed to assess quality control. Analytical results for the trip blank are included in the Certified Analytical Report (CAR's). Chain of custody records were established noting sample identification numbers, time, date, and custody signatures.

The samples were analyzed at International Technology Corporation - Santa Clara Valley Laboratory located at 2055 Junction Avenue, San Jose, California. The laboratory is assigned a California DHS-HMTL Certification number of 137. The results are presented as a Certified Analytical Report, a copy of which is attached to this report.



Tom Paulson
Sampling Manager

attachments

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

<u>WELL I.D.</u>	A-2	A-3	A-4	A-5	A-6	A-7
Casing Diameter (inches)	4	4	4	3	3	3
Total Well Depth (feet)	18.5	19.3	----	23.8	25.0	22.7
Depth to Water (feet)	10.01	11.26	11.71 **	11.48	9.93	9.80
Free Product (feet)	none	none	0.01	none	none	none
Reason Not Sampled	----	----	free product	----	----	----
Calculated 4 Case Vol.(gal.)	22.4	21.2	----	18.7	22.9	19.6
Did Well Dewater?	yes	yes	----	yes	no	no
Volume Evacuated (gal.)	8.5	8.0	----	13.0	31.0	30.0
Purging Device Sampling Device	Suction Bailer	Suction Bailer	----	Diaphragm Bailer	Diaphragm Bailer	Diaphragm Bailer
Time	10:20	10:54	----	11:27	11:17	11:07
Temperature (F)*	67.8	69.0	----	68.9	67.9	68.6
pH*	6.47	6.44	----	6.65	6.61	6.63
Conductivity (umhos/cm)*	776	1515	----	769	599	619

* Indicates Stabilized Value

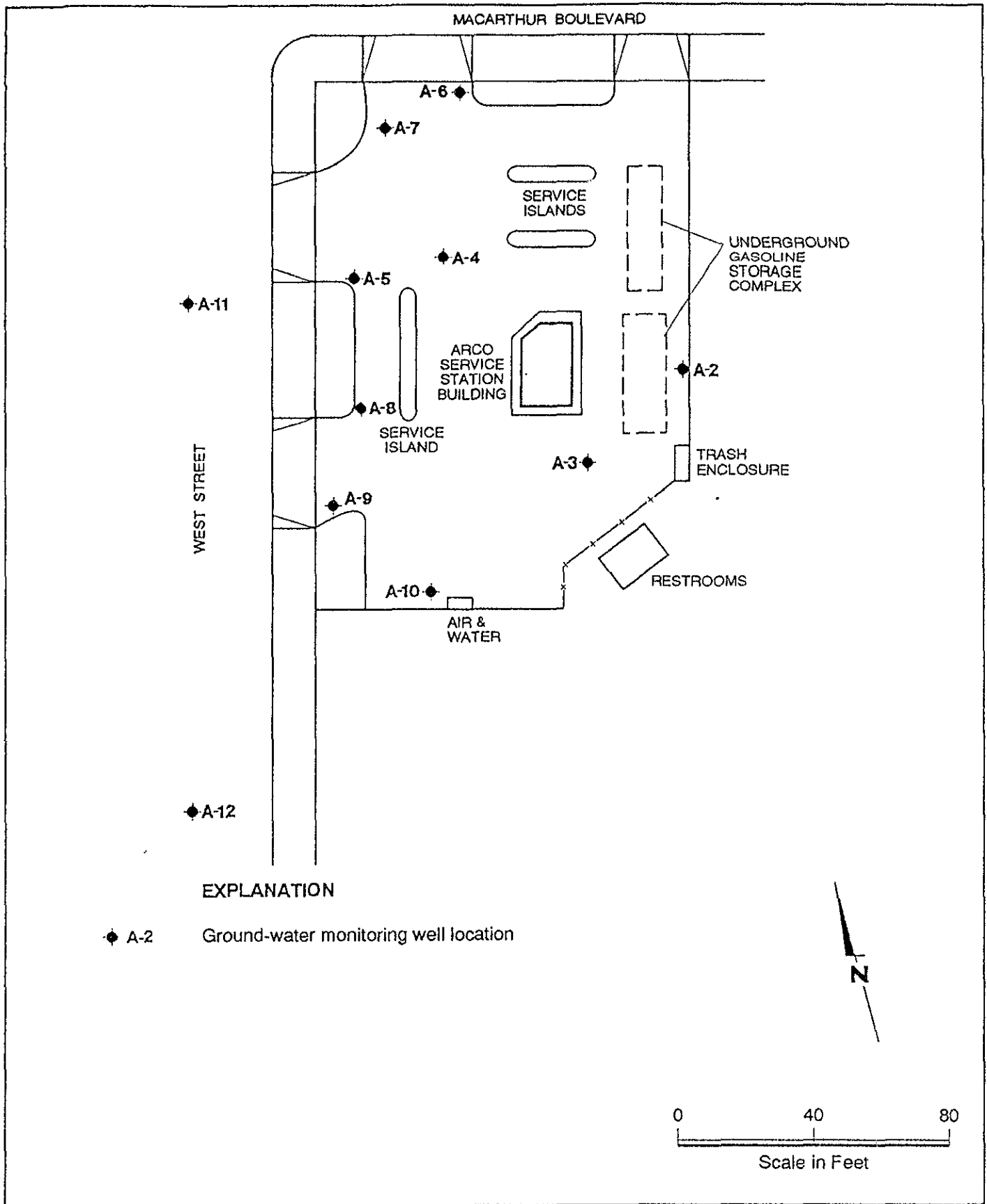
** Not corrected for presence of free product

TABLE OF MONITORING DATA
GROUNDWATER WELL SAMPLING REPORT

<u>WELL I.D.</u>	A-8	A-9	A-10	A-11	A-12
Casing Diameter (inches)	3	6	3	3	3
Total Well Depth (feet)	----	38.8	28.1	27.3	29.0
Depth to Water (feet)	10.48 **	10.16	11.67	11.29	10.66
Free Product (feet)	1.75	none	none	none	none
Reason Not Sampled	free product	----		----	----
Calculated 4 Case Vol.(gal.)	----	171.8	24.8	24.3	27.8
Did Well Dewater?	----	no	no	no	no
Volume Evacuated (gal.)	----	215.0	31.0	34.0	36.0
Purging Device	----	Diaphragm	Suction	Diaphragm	Suction
Sampling Device	----	Bailer	Bailer	Bailer	Bailer
Time	----	11:36	11:26	09:00	09:12
Temperature (F)*	----	68.0	65.2	66.9	66.7
pH*	----	6.52	6.53	6.69	6.69
Conductivity (umhos/cm)*	----	652	658	664	658

* Indicates Stabilized Value

** Not corrected for presence of free product



EXPLANATION

◆ A-2 Ground-water monitoring well location



Site Plan
 ARCO Service Station #4931
 731 W. MacArthur Boulevard
 Oakland, California

PLATE



INTERNATIONAL
TECHNOLOGY
CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

Date: 08/14/90

Gettler-Ryan
2150 West Winton
Hayward, CA 94545
Tom Paulson

Work Order: T0-07-292

P.O. Number: 3909

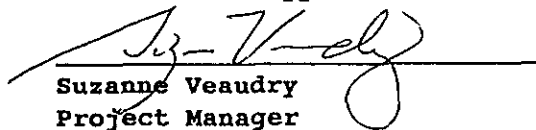
This is the Certificate of Analysis for the following samples:

Client Work ID: GR3909, Arco #4931
Date Received: 07/30/90
Number of Samples: 10
Sample Type: water

TABLE OF CONTENTS FOR ANALYTICAL RESULTS

<u>PAGES</u>	<u>LABORATORY #</u>	<u>SAMPLE IDENTIFICATION</u>
2	T0-07-292-01	A-2
3	T0-07-292-02	A-3
4	T0-07-292-03	A-5
5	T0-07-292-04	A-6
6	T0-07-292-05	A-7
7	T0-07-292-06	A-9
8	T0-07-292-07	A-10
9	T0-07-292-08	A-11
10	T0-07-292-09	A-12
11	T0-07-292-10	Trip Blank

Reviewed and Approved:


Suzanne Veaudry
Project Manager

American Council of Independent Laboratories
International Association of Environmental Testing Laboratories
American Association for Laboratory Accreditation

Company: Gettler-Ryan

Date: 08/24/90

Client Work ID: GR3909, Arco #4931

Work Order: T0-07-292

TEST NAME: Petroleum Hydrocarbons

SAMPLE ID: A-2

SAMPLE DATE: 07/30/90

LAB SAMPLE ID: T007292-01

SAMPLE MATRIX: aqueous

RECEIPT CONDITION: cool pH < 2

RESULTS in Micrograms per Liter:

	METHOD	EXTRACTION DATE	ANALYSIS DATE
BTEX	8020		08/01/90
Low Boiling Hydrocarbons	Mod.8015		08/01/90

PARAMETER	DETECTION LIMIT	DETECTED
Low Boiling Hydrocarbons calculated as Gasoline	2,500.	16,000.
BTEX		
Benzene	25.	1,400.
Toluene	25.	340.
Ethylbenzene	25.	290.
Xylenes (total)	25.	3,600.

Company: Gettler-Ryan

Date: 08/14/90

Client Work ID: GR3909, Arco #4931

Work Order: T0-07-292

TEST NAME: Petroleum Hydrocarbons

SAMPLE ID: A-3

SAMPLE DATE: 07/30/90

LAB SAMPLE ID: T007292-02

SAMPLE MATRIX: aqueous

RECEIPT CONDITION: cool pH < 2

RESULTS in Micrograms per Liter:

	METHOD	EXTRACTION DATE	ANALYSIS DATE
BTEX	8020		08/03/90
Low Boiling Hydrocarbons	Mod.8015		08/03/90

PARAMETER	DETECTION LIMIT	DETECTED
Low Boiling Hydrocarbons calculated as Gasoline	50.	120.
BTEX		
Benzene	0.5	8.3
Toluene	0.5	2.9
Ethylbenzene	0.5	2.3
Xylenes (total)	0.5	12.

Company: Gettler-Ryan

Date: 08/14/90

Client Work ID: GR3909, Arco #4931

Work Order: T0-07-292

TEST NAME: Petroleum Hydrocarbons

SAMPLE ID: A-5

SAMPLE DATE: 07/30/90

LAB SAMPLE ID: T007292-03

SAMPLE MATRIX: aqueous

RECEIPT CONDITION: cool pH < 2

RESULTS in Micrograms per Liter:

	METHOD	EXTRACTION DATE	ANALYSIS DATE
BTEX	8020		08/03/90
Low Boiling Hydrocarbons	Mod.8015		08/03/90

PARAMETER	DETECTION LIMIT	DETECTED
Low Boiling Hydrocarbons calculated as Gasoline	50.	None
BTEX		
Benzene	0.5	None
Toluene	0.5	None
Ethylbenzene	0.5	None
Xylenes (total)	0.5	None

Company: Gettler-Ryan

Date: 08/14/90

Client Work ID: GR3909, Arco #4931

Work Order: TO-07-292

TEST NAME: Petroleum Hydrocarbons

SAMPLE ID: A-6

SAMPLE DATE: 07/30/90

LAB SAMPLE ID: T007292-04

SAMPLE MATRIX: aqueous

RECEIPT CONDITION: cool pH < 2

RESULTS in Micrograms per Liter:

	<u>METHOD</u>	<u>EXTRACTION DATE</u>	<u>ANALYSIS DATE</u>
BTEX	8020		08/02/90
Low Boiling Hydrocarbons	Mod.8015		08/02/90

<u>PARAMETER</u>	<u>DETECTION LIMIT</u>	<u>DETECTED</u>
Low Boiling Hydrocarbons calculated as Gasoline	50.	None
BTEX		
Benzene	0.5	2.6
Toluene	0.5	None
Ethylbenzene	0.5	None
Xylenes (total)	0.5	1.2

Company: Gettler-Ryan
 Date: 08/14/90
 Client Work ID: GR3909, Arco #4931

Work Order: T0-07-292

TEST NAME: Petroleum Hydrocarbons

SAMPLE ID: A-7
 SAMPLE DATE: 07/30/90
 LAB SAMPLE ID: T007292-05
 SAMPLE MATRIX: aqueous
 RECEIPT CONDITION: cool pH < 2

RESULTS in Micrograms per Liter:

	<u>METHOD</u>	<u>EXTRACTION DATE</u>	<u>ANALYSIS DATE</u>
BTEX	8020		08/02/90
Low Boiling Hydrocarbons	Mod.8015		08/02/90

<u>PARAMETER</u>	<u>DETECTION LIMIT</u>	<u>DETECTED</u>
Low Boiling Hydrocarbons calculated as Gasoline	50.	None
BTEX		
Benzene	0.5	None
Toluene	0.5	None
Ethylbenzene	0.5	None
Xylenes (total)	0.5	None

Company: Gettler-Ryan

Date: 08/14/90

Client Work ID: GR3909, Arco #4931

Work Order: T0-07-292

TEST NAME: Petroleum Hydrocarbons

SAMPLE ID: A-9

SAMPLE DATE: 07/30/90

LAB SAMPLE ID: T007292-06

SAMPLE MATRIX: aqueous

RECEIPT CONDITION: cool pH < 2

RESULTS in Micrograms per Liter:

	METHOD	EXTRACTION DATE	ANALYSIS DATE
BTEX	8020		08/02/90
Low Boiling Hydrocarbons	Mod.8015		08/02/90

PARAMETER	DETECTION LIMIT	DETECTED
Low Boiling Hydrocarbons calculated as Gasoline	50.	180.
BTEX		
Benzene	0.5	77.
Toluene	0.5	1.6
Ethylbenzene	0.5	2.1
Xylenes (total)	0.5	4.2

Company: Gettler-Ryan

Date: 08/14/90

Client Work ID: GR3909, Arco #4931

Work Order: T0-07-292

TEST NAME: Petroleum Hydrocarbons

SAMPLE ID: A-10

SAMPLE DATE: 07/30/90

LAB SAMPLE ID: T007292-07

SAMPLE MATRIX: aqueous

RECEIPT CONDITION: cool pH < 2

RESULTS in Micrograms per Liter:

	<u>METHOD</u>	<u>EXTRACTION DATE</u>	<u>ANALYSIS DATE</u>
BTEX	8020		08/02/90
Low Boiling Hydrocarbons	Mod.8015		08/02/90

<u>PARAMETER</u>	<u>DETECTION LIMIT</u>	<u>DETECTED</u>
Low Boiling Hydrocarbons calculated as Gasoline	50.	None
BTEX		
Benzene	0.5	None
Toluene	0.5	None
Ethylbenzene	0.5	None
Xylenes (total)	0.5	None

Company: Gettler-Ryan
Date: 08/14/90
Client Work ID: GR3909, Arco #4931

Work Order: T0-07-292

TEST NAME: Petroleum Hydrocarbons

SAMPLE ID: A-11
SAMPLE DATE: 07/30/90
LAB SAMPLE ID: T007292-08
SAMPLE MATRIX: aqueous
RECEIPT CONDITION: cool pH < 2

RESULTS in Micrograms per Liter:

	METHOD	EXTRACTION DATE	ANALYSIS DATE
BTEX	8020		08/02/90
Low Boiling Hydrocarbons	Mod.8015		08/02/90

PARAMETER	DETECTION LIMIT	DETECTED
Low Boiling Hydrocarbons calculated as Gasoline	50.	None
BTEX		
Benzene	0.5	None
Toluene	0.5	0.6
Ethylbenzene	0.5	None
Xylenes (total)	0.5	0.5

Company: Gettler-Ryan
 Date: 08/14/90
 Client Work ID: GR3909, Arco #4931

Work Order: T0-07-292

TEST NAME: Petroleum Hydrocarbons

SAMPLE ID: A-12
 SAMPLE DATE: 07/30/90
 LAB SAMPLE ID: T007292-09
 SAMPLE MATRIX: aqueous
 RECEIPT CONDITION: cool pH < 2

RESULTS in Micrograms per Liter:

	<u>METHOD</u>	<u>EXTRACTION DATE</u>	<u>ANALYSIS DATE</u>
BTEX	8020		08/02/90
Low Boiling Hydrocarbons	Mod.8015		08/02/90

<u>PARAMETER</u>	<u>DETECTION LIMIT</u>	<u>DETECTED</u>
Low Boiling Hydrocarbons calculated as Gasoline	50.	None
BTEX		
Benzene	0.5	None
Toluene	0.5	None
Ethylbenzene	0.5	None
Xylenes (total)	0.5	None

Company: Gettler-Ryan
Date: 08/14/90
Client Work ID: GR3909, Arco #4931

Work Order: T0-07-292

TEST NAME: Petroleum Hydrocarbons

SAMPLE ID: Trip Blank
SAMPLE DATE: not spec
LAB SAMPLE ID: T007292-10
SAMPLE MATRIX: aqueous
RECEIPT CONDITION: cool pH < 2

RESULTS in Micrograms per Liter:

	<u>METHOD</u>	<u>EXTRACTION DATE</u>	<u>ANALYSIS DATE</u>
BTEX	8020		08/06/90
Low Boiling Hydrocarbons	Mod.8015		08/06/90

<u>PARAMETER</u>	<u>DETECTION LIMIT</u>	<u>DETECTED</u>
Low Boiling Hydrocarbons calculated as Gasoline	50.	None
BTEX		
Benzene	0.5	None
Toluene	0.5	None
Ethylbenzene	0.5	None
Xylenes (total)	0.5	None

Company: Gettler-Ryan

Date: 08/14/90

Client Work ID: GR3909, Arco #4931

Work Order: T0-07-292

TEST CODE TPHVB TEST NAME TPH Gas,BTEX by 8015/8020

The method of analysis for low boiling hydrocarbons is taken from E.P.A. Methods 8015, 8020 and 5030. The sample is examined using the purge and trap technique. Final detection is by gas chromatography using a flame ionization detector as well as a photoionization detector. The result for total low boiling hydrocarbons is calculated as gasoline and includes benzene, toluene, ethylbenzene and xylenes.

ENVIRONMENTAL DIVISION
 COMPANY ARCO Products Company S.S. #4931 JOB NO. _____
 JOB LOCATION 731 W. MacArthur Blvd / West St.
 CITY Oakland, CA PHONE NO. 783-7500
 AUTHORIZED Tom Paulson DATE 7/30/90 P.O. NO. 3909

SAMPLE ID	NO. OF CONTAINERS	SAMPLE MATRIX	DATE/TIME SAMPLED	ANALYSIS REQUIRED	SAMPLE CONDITION LAB ID				
A-2	3	Liquid	7-30/1020	THC(SOS) BPTOE	Cal 6				
A-3	↓	↓	11054	↓	↓				
A-45			11127						
A-56			11117						
A-67			11107						
A-79			11136						
A-810			11126						
A-911			10900						
A-12			10912						
Trap blank			1			↓	1-	↓	↓

RELINQUISHED BY: Philip J. Ryan 7/30/90 RECEIVED BY: [Signature] 7/30/90

RELINQUISHED BY: [Signature] 18:36 7/30/90 RECEIVED BY: _____

RELINQUISHED BY: _____ RECEIVED BY LAB: [Signature] 7/30/90 1836
 DESIGNATED LABORATORY: ET SCW DHS #: 137

REMARKS: Normal TAT

DATE COMPLETED: July 30, 1990 FOREMAN: Philip J. Ryan

ORIGINAL