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DATE: 11/19/90
PROJECT NUMBER: 69013-4
SUBJECT: REPORT

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ENVIRONMENTAL SUBSURFACE INVESTIGATION at ARCO Station 2152 22141 Center Street Castro Valley, California

11/90

AGS 69013-4

Report prepared for

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TABLE OF CONTENTS

TABLES

TABLE OF CONTENTS
(continued)

PLATES

APPENDICES

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• FREMONT • IRVINE • HOUSTON • BOSTON • SACRAMENTO • CULVER CITY • SAN JOSE

REPORT
ENVIRONMENTAL SUBSURFACE INVESTIGATION
at
ARCO Station 2152
22141 Center Street
Castro Valley, California

For ARCO Products Company

INTRODUCTION

At the request of ARCO Products Company (ARCO), Applied GeoSystems (AGS) conducted an environmental subsurface investigation to evaluate the extent of gasoline hydrocarbons in the soil and ground water near the former underground gasoline-storage tanks and product dispenser lines onsite at ARCO Station 2152. The work was performed to further assess soil and ground-water quality after elevated concentrations of gasoline hydrocarbons were discovered in the soil beneath the former gasoline-storage tanks and product-dispenser lines at the site in August and September 1989 (AGS, January 1990). The present investigation included drilling six soil borings, constructing four 4-inch diameter ground-water monitoring wells and two 2-inch diameter vadose zone monitoring wells in the borings, performing laboratory analyses on selected soil and water samples from the borings/wells, measuring ground-water elevations in the wells, evaluating the ground-water gradient, and performing a 1/2-mile radius well research around the site. This report summarizes previous work performed by AGS at the site and the results of this investigation, and presents our conclusions. This work was performed as outlined in our Work Plan (AGS, April 1990), and Addendum to Work Plan (AGS, May 1990), which were approved by Alameda County Health Agency as stated in their letter dated May 31, 1990. Work to

be completed as outlined in the Work Plan also includes drilling two borings in the tank pit area (B-8 and B-9) and two shallow borings (B-12 and B-13) near the dispenser islands in areas of previously reported elevated levels of gasoline hydrocarbons. This work will be performed as part of the next phase of investigation at the site.

SITE DESCRIPTION AND BACKGROUND

General

ARCO Station 2152 is an operating service station located southwest of the intersection of Center Street and Grove Way in Castro Valley, California. The location of the site is shown on the Site Vicinity Map, Plate 1. The site is a relatively flat, asphalt- and concrete-covered lot at an elevation of approximately 245 feet above mean sea level. Local topography near the vicinity at the site slopes gently to the southwest. Residential areas are southeast and west-southwest of the site, and commercial developments are northwest across Grove Way and northeast across Center Street.

We understand from ARCO that one 12,000-gallon gasoline-storage tank (designated T1) and four underground 6,000-gallon gasoline-storage tanks (T2 through T5) previously existed at the site. We also understand from ARCO that former tank T1 was installed in 1983 and stored unleaded supreme gasoline, tanks T2 through T4 were installed in 1976 and stored unleaded regular gasoline, and tank T5 was installed in 1976 and stored leaded regular gasoline. These tanks were removed, and three underground fiberglass 12,000-gallon gasoline-storage tanks were installed in the former tank pit at the site, in August 1989. The product dispenser lines and product line sump associated with the former tanks were

replaced in October 1989. The approximate locations of the former tanks, existing tanks, and other pertinent site facilities are shown on the Generalized Site Plan, Plate 2.

Geology and Hydrogeology

Regionally, the site is in the Castro Valley Basin with the Diablo Range to the east and the Hayward Fault to the west. The site lies within an area of unconsolidated Pleistocene alluvium consisting of a heterogenous mixture of poorly consolidated clay, silt, sand, and gravel derived from the Diablo Range (Helley, et. al., 1979). Earth materials encountered during previous excavation of the tank pit at the site consisted of silty to sandy clay. Ground water was not encountered in the tank pit to a depth of approximately 22 feet (AGS, January 1990). The inferred direction of ground-water flow is toward the southwest based on regional and local topography and surface drainage patterns.

Well Research

Information regarding water wells in the vicinity of the site has been researched, and was provided to AGS, by the Alameda County Public Works Department (ACPWD). The research was performed for an area within a 1/2-mile radius around the site in order to evaluate ground-water usage in the vicinity of the site. Records exist with ACPWD for 11 wells within 1/2-mile of the site. Four of these wells are used for irrigation; four wells for ground-water monitoring; and one well for domestic purposes. The uses of the other two wells are unknown. The irrigation wells are between 24 and 260 feet deep; have reported water levels of 5 to 35 feet below the ground surface; and are constructed of 4- to 8-inch diameter casing. The exact locations of two of these irrigation wells are unknown. The monitoring wells are located north of the site at a Texaco retail station and are listed as 30

to 45 feet deep; have reported water levels of 20 to 28 feet below the ground surface; and were constructed of 2- or 4-inch diameter casing in December 1987. The domestic well is 365 feet deep; has a reported water level of 208 feet below the ground surface; and was constructed of 10-inch diameter casing in July 1976. The location of this domestic well is unknown, but it is listed as being situated in a section approximately 1/4-mile southwest of the site. No location for one of the wells of unknown use was available. Known well locations are shown on the Well Location Map, Plate 3.

PREVIOUS WORK

May 1989

AGS performed a limited site assessment (AGS, May 26, 1989) to evaluate the presence of gasoline hydrocarbons in soil near the underground gasoline-storage tanks prior to ARCO's planned tank replacement at the site. The work involved drilling three soil borings (B-1 through B-3) close to the fill ends of the tanks. The locations of these borings are shown on Plate 2. Results of laboratory analysis of soil samples from the borings indicated nondetectable concentrations (<5.0 ppm) of gasoline hydrocarbons, with the exception of two samples collected from depths of 30 and 35 feet in boring B-1 (5.1 ppm TPHg) and two samples collected from depths of 5 and 10 feet in boring B-3 (460 and 5.6 ppm TPHg, respectively). Ground water was not encountered in the borings to a depth of 45 feet. Results of laboratory analyses of soil samples collected during the drilling are summarized in Table 1, Cumulative Results of Laboratory Analysis of Soil Samples.

August through October 1989

The former underground gasoline-storage tanks and product-dispenser lines were removed from the site by Paradiso Construction Company on August 17, 1989 and from September 9 through October 4, 1989, respectively (AGS, January 1990). No holes were noted in the tanks during removal. AGS was present to collect soil samples from the former tank pit from depths of 14 to 22 feet. The locations of these samples are shown on Plate A1, Tank Pit Soil Sampling Locations, Appendix A. The results of the laboratory analyses of soil samples from the gasoline-tank pit indicated elevated concentrations (up to 37,000 ppm) of TPHg in soil at depths of 14 and 22 feet beneath the former product line sump. AGS also collected soil samples from beneath the former product-dispenser lines. The locations of these samples are shown on Plate A2, Product-Line Soil Sampling Locations, Appendix A. TPHg concentrations ranging from <2.0 ppm to 73 ppm were reported in 11 soil samples collected from beneath the lines at a depth of approximately three feet, and TPHg concentrations of 100 to 190 ppm were reported in soil samples from the southwestern ends of the dispenser islands near Grove Way and Center Street. Results of laboratory analyses of the samples collected from the former tank pit and beneath the former product lines are presented on Tables A1 and A2, respectively, in Appendix A.

Approximately 1,850 cubic yards of soil excavated from the gasoline-tank pit and the product-dispenser line trenches was aerated onsite between August 21 and October 10, 1989. AGS collected composite soil samples from the aerated soil to verify TPHg concentrations of 100 ppm or lower. Paradiso arranged for the soil to be transported to Redwood Landfill in Novato, California by Conrad Trucking of Escalon, California. We understand that three new 12,000-gallon fiberglass tanks were installed at the site along with new product delivery lines in September 1989. Four 12-inch diameter polyvinyl chloride (PVC) conductor casings

were positioned between the tanks to provide access for future exploratory drilling and/or well installation.

We concluded that the vertical extent of gasoline hydrocarbons in soil beneath the former tanks had not been delineated. We also concluded that the lateral extent of gasoline hydrocarbons in the area of the former tanks above depths of approximately 14 feet appeared to be limited to the tank-pit area, with the possible exception of the northwestern side of the tank pit, and that the extent of gasoline hydrocarbons was not delineated near the southwestern ends of the dispenser islands.

FIELD WORK

Drilling

A well construction permit was acquired from the Alameda County Flood Control and Water Conservation District (ACFCWD - Zone 7) prior to drilling. A copy of the permit is included in Appendix B. Six soil borings (B-4 through B-7, B-10, and B-11) were drilled on June 12 through 15 and 18, 1990. A summary of the field procedures employed by AGS is included in Appendix C. The work for this investigation was performed in accordance with the Site Safety Plan (AGS, May 8, 1990).

Borings B-4 through B-7, B-10, and B-11 were drilled to evaluate the extent of gasoline hydrocarbons in soil. Additionally, boring B-4 (well MW-1) was drilled near and in the inferred downgradient direction of the former product line sump (concentrations of 37,000 ppm TPHg were previously detected in the soil in this area) to evaluate the vertical and lateral extent of gasoline hydrocarbons in the soil and the presence of hydrocarbons in the

ground water. Boring B-5 (well MW-2) was drilled near the northern corner of the tank pit near former tank T1 (concentrations of 430 to 1,400 ppm TPHg were previously detected in the soil in this area) to evaluate the lateral and vertical extent of gasoline hydrocarbons in the soil and the presence of hydrocarbons in the ground water. Borings B-6 and B-7 (wells MW-3 and MW-4) were drilled south and southwest of the gasoline storage-tank area and product dispenser islands to evaluate the extent of gasoline hydrocarbons in ground water in the inferred downgradient direction of ground-water flow from these areas. Because elevated concentrations of gasoline hydrocarbons were detected in the subsurface soil beneath the former tank pit, borings B-10 and B-11 (VW-1 and VW-2) were drilled near the tank pit to evaluate the lateral and vertical extent of gasoline hydrocarbons in soil and to provide for future vapor extraction.

Soil Sampling and Description

Soil samples were collected and described as indicated on the Logs of Borings, Plates 4 through 19, and were classified in accordance with the Unified Soil Classification System, Plate 20. These soil samples were collected at 5-foot intervals and at the bottoms of the borings.

The earth materials encountered during this investigation consisted primarily of silty to sandy clay and clayey sand to sandy gravel (see Logs of Borings and Geologic Cross Sections A-A' through D-D,' Plates 21 through 24). In general, silty to sandy clay was encountered beneath the surface asphalt between depths of approximately 1/2-foot to 42 feet, except for damp clayey sand to clayey gravel encountered in borings B-4 and B-6 between depths of approximately 18 to 35 feet. Clayey sand to sandy gravel was encountered between the depths of approximately 42 to 60 feet. Ground water was encountered within the clayey

sand to sandy gravel at depths of approximately 52 to 56 feet. Hard, dry claystone was encountered at depths of approximately 58 to 60 feet to the bottom of the borings.

One composite soil sample was collected from the stockpiled drill cuttings on June 19, 1990. The method used to obtain this sample is described in Appendix C.

Construction of Monitoring Wells

Four ground-water monitoring wells (MW-1 through MW-4) were constructed in soil borings B-4 through B-7 to evaluate ground-water samples for the presence of gasoline hydrocarbons in the ground water. The wells were completed with 4-inch-inside-diameter, Schedule 40 PVC casing. Wells casings were set in the wells to a depth of approximately 60 feet. The screened casings for the monitoring wells consist of 4-inch-diameter machine-slotted PVC with 0.020-inch-wide slots set from the total depth of the well to approximately 45 feet below the ground surface. Solid PVC casing was set from the top of the screened casing to a few inches below the ground surface. Construction of the wells was completed, and the wells were developed, according to the protocol included in Appendix C.

Two vadose-zone wells (VW-1 and VW-2) were constructed in soil borings B-10 and B-11 for purposes of monitoring hydrocarbon vapors, radius-of-influence tests, and possible future vapor extraction. The wells were completed with 2-inch-diameter PVC casing. Well casings were set in the wells to a depth of approximately 40 feet. The screened casings for the monitoring wells consist of 2-inch-diameter machine-slotted PVC with 0.020-inch-wide slots set from the total depth of the well to approximately 25 feet below the ground surface. Solid PVC casing was set from the top of the screened casing to a few inches below the ground surface.

Ground-Water Sampling and Ground-Water Level Measurement

Ground-water level measurements were taken and water samples were collected from ground-water monitoring wells MW-1 through MW-4 for subjective analysis on June 25, 1990, after waiting a period of at least 72 hours subsequent to development of the wells. A second round of ground-water level measurements were taken and water samples were collected from ground-water monitoring wells MW-1 through MW-4 for subjective analysis on September 26, 1990. Water samples collected from the wells in June and September 1990 showed no evidence of floating product or hydrocarbon odor. Ground-water monitoring wells MW-1 through MW-4 were then purged and sampled for laboratory analysis on June 25 and 26, 1990 and on September 26, 1990. Appendix C contains ground-water level measurement, subjective analysis, and ground-water sampling procedures. Physical parameters pH, temperature, and electric conductivity were measured during purging as shown on the well purge data sheets, Appendix D.

LABORATORY ANALYSIS

Thirty-four soil samples collected from borings B-4 through B-7, B-10, and B-11 were selected for laboratory analysis based on their location above first ground water, organic vapor meter (OVM) measurements obtained in the field during sampling, and location below first ground water. The soil samples were analyzed for TPHg and the purgeable gasoline constituents benzene, toluene, ethylbenzene, and total xylenes (BTEX) by Environmental Protection Agency (EPA) Methods 5030/8015 and 5030/8020. Water samples collected from wells MW-1 through MW-4 in June 1990 were analyzed for TPHg and BTEX by EPA Methods 5030/8015 and 5030/602. The results of soil and ground-water

laboratory analyses are presented in Tables 1 and 2 and in the Laboratory Data Sheets, Appendix E.

One composite soil sample collected form the stockpiled cuttings at the site was analyzed for TPHg and BTEX by EPA Methods 5030/8015 and 5030/8020. The results of laboratory analyses of this sample indicated nondetectable concentrations of TPHg and BTEX and are presented in the Laboratory Data Sheets, Appendix E.

EVALUATION OF GROUND-WATER GRADIENT

On July 7, 1990 the wellheads for the ground-water monitoring wells were surveyed to a local National Geodetic Vertical Datum benchmark by Ron Archer, Civil Engineer, Inc., of Pleasanton, California. The results of this wellhead survey are included in Appendix F, Wellhead Survey. The ground-water elevations for each well were calculated by subtracting the depth-to-water (DTW) measurements from the surveyed elevation of the wellhead. The DTW measurements, wellhead elevations, and ground-water elevations are presented in Table 3, Ground-Water Elevation Data.

Evaluation of the ground-water gradient from DTW measurements collected on June 25, September 7, and September 26, 1990 indicate gradients of 0.003 (0.3 feet vertical drop in 100 horizontal distance), 0.004 (0.4 feet vertical drop in 100 horizontal distance), and 0.004 (0.4 feet vertical drop in 100 horizontal distance) respectively, to the southwest. Plates 25, 26, and 27 are graphic interpretations of the ground-water elevations based on June 25, September 7, and September 26, 1990 ground-water monitoring data.

CONCLUSIONS

We conclude the following based on the results of this subsurface investigation:

- elevated concentrations of gasoline hydrocarbons previously reported beneath the former gasoline-storage tanks and product line sump appear to be limited laterally to the tank pit area, with the possible exception of the areas northwest of the tank pit near boring B-3, and the northeastern corner of the tank pit;

- the vertical extent of gasoline hydrocarbons in soil beneath the former tank pit, and the lateral and vertical extent of gasoline hydrocarbons by the dispenser islands have not been delineated. This work will be done in the next assessment;

- It cannot be concluded at this time whether or not ground-water beneath the site has been impacted by gasoline hydrocarbons. The June 25 and 26, 1990 ground-water sampling episode indicated the presence of low levels of gasoline hydrocarbons as suggested by concentrations of TPHg (27 to 64 ppb) in wells MW-1 through MW-3, benzene (0.63 and 0.65 ppb) in wells MW-1 and MW-3, and toluene (1.5 ppb) and total xylenes (2.0 ppb) in well MW-3. These levels are below regulatory action levels. The September 26, 1990 sampling episode indicated nondetectable levels of gasoline hydrocarbons in MW-1 through MW-4. The results of further ground-water sampling on a quarterly basis, scheduled at the site, will be evaluated to establish a trend of ground-water quality over time.

LIMITATIONS

This report was prepared in accordance with generally accepted standards of environmental geological practice in California at the time this investigation was performed. This investigation was conducted solely for the purpose of evaluating gasoline hydrocarbon-

impacted soil and ground water at this ARCO site. No soil engineering or geotechnical recommendations are implied or should be inferred. Evaluation of the conditions at the site for the purpose of this investigation is made from a limited number of observation points. Subsurface conditions may vary away from the data points available. Additional work, including further subsurface investigation, can reduce the inherent uncertainties associated with this type of investigation.

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TABLE 1
CUMULATIVE RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
ARCO Station 2152
Castro Valley, California
Page 1 of 3

Date	Sample ID	TPHg	B	T	E	X
4/13/89	S-10-B1	<2.0	<0.050	<0.050	<0.050	<0.050
4/13/89	S-20-B1	<2.0	0.11	0.15	<0.050	0.19
4/13/89	S-25-B1	<2.0	0.22	0.34	0.088	0.38
4/13/89	S-30-B1	5.1	0.42	0.89	0.11	0.56
4/13/89	S-35-B1	5.1	0.40	0.72	0.094	0.42
4/13/89	S-40-B1	<2.0	0.10	<0.050	<0.050	<0.050
4/13/89	S-45-B1	<2.0	<0.050	<0.050	<0.050	<0.050
4/13/89	S-10-B2	<2.0	<0.050	<0.050	<0.050	<0.050
4/13/89	S-20-B2	<2.0	<0.050	<0.050	<0.050	<0.050
4/13/89	S-25-B2	<2.0	<0.050	<0.050	<0.050	<0.050
4/13/89	S-30-B2	<2.0	<0.050	<0.050	<0.050	<0.050
4/13/89	S-5-B3	460	5.1	34	9.6	51
4/13/89	S-10-B3	5.6	<0.050	0.11	<0.050	1.0
4/13/89	S-20-B3	<2.0	<0.050	<0.050	0.055	0.068
4/13/89	S-25-B3	<2.0	<0.050	<0.050	0.17	0.16
4/13/89	S-30-B3	<2.0	<0.050	<0.050	<0.050	<0.050

See notes on page 3 of 3.

TABLE 1
CUMULATIVE RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
ARCO Station 2152
Castro Valley, California
Page 2 of 3

Date	Sample ID	TPHg	B	T	E	X
6/15/90	S-20-B4	<2.0	<0.050	<0.050	<0.050	<0.050
6/15/90	S-29.5-B4	<2.0	<0.050	<0.050	<0.050	<0.050
6/15/90	S-40-B4	<2.0	<0.050	<0.050	<0.050	<0.050
6/15/90	S-44.5-B4	<2.0	<0.050	<0.050	<0.050	<0.050
6/15/90	S-49.5-B4	<2.0	<0.050	<0.050	<0.050	<0.050
6/15/90	S-59-B4	<2.0	<0.050	<0.050	<0.050	<0.050
6/14/90	S-20-B5	<2.0	<0.050	<0.050	<0.050	0.077
6/14/90	S-30-B5	<2.0	0.17	<0.050	<0.050	0.16
6/14/90	S-40-B5	88	2.1	7.2	1.8	13
6/14/90	S-45-B5	<2.0	<0.050	<0.050	<0.050	<0.050
6/14/90	S-49.5-B5	7.9	<0.050	<0.050	<0.050	0.096
6/14/90	S-59-B5	<2.0	<0.050	<0.050	<0.050	<0.050
6/12/90	S-5-B6	<2.0	<0.050	<0.050	<0.050	<0.050
6/12/90	S-15-B6	<2.0	<0.050	<0.050	<0.050	<0.050
6/12/90	S-29.5-B6	<2.0	<0.050	<0.050	<0.050	<0.050
6/12/90	S-44.5-B6	<2.0	<0.050	<0.050	<0.050	<0.050
6/12/90	S-49.5-B6	<2.0	<0.050	<0.050	<0.050	<0.050
6/12/90	S-62-B6	<2.0	<0.050	<0.050	<0.050	<0.050
6/13/90	S-5-B7	<2.0	<0.050	<0.050	<0.050	<0.050
6/13/90	S-15-B7	<2.0	<0.050	<0.050	<0.050	<0.050
6/13/90	S-30-B7	<2.0	<0.050	<0.050	<0.050	<0.050
6/13/90	S-44.5-B7	<2.0	<0.050	0.10	<0.050	0.093
6/13/90	S-49-B7	<2.0	<0.050	<0.050	<0.050	<0.050
6/13/90	S-61-B7	<2.0	<0.050	<0.050	<0.050	<0.050

See notes on page 3 of 3.

TABLE 1
CUMULATIVE RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
ARCO Station 2152
Castro Valley, California
Page 3 of 3

Date	Sample ID	TPHg	B	T	E	X
6/18/90	S-10-B10	<2.0	<0.05	<0.05	<0.05	<0.05
6/18/90	S-20-B10	<2.0	<0.05	<0.05	<0.05	<0.05
6/18/90	S-30-B10	<2.0	<0.05	<0.05	<0.05	<0.05
6/18/90	S-35-B10	<2.0	<0.05	<0.05	<0.05	<0.05
6/18/90	S-40-B10	<2.0	<0.05	<0.05	<0.05	<0.05
6/18/90	S-5-B11	<2.0	<0.05	<0.05	<0.05	<0.05
6/18/90	S-15-B11	<2.0	<0.05	<0.05	<0.05	<0.05
6/18/90	S-25-B11	<2.0	<0.05	<0.05	<0.05	<0.05
6/18/90	S-35-B11	<2.0	<0.05	<0.05	<0.05	<0.05
6/18/90	S-40-B11	<2.0	<0.05	<0.05	<0.05	<0.05

Results in parts per million (ppm).
TPHg: Total petroleum hydrocarbons as gasoline
B:benzene T:toluene E:ethylbenzene X:total xylene isomers

Sample ID: S-40-B11

- S: Soil Sample
- 40: Approximate sample depth in feet
- B11: Boring number

TABLE 2
RESULTS OF LABORATORY ANALYSIS OF GROUND-WATER SAMPLES
ARCO Station 2152
Castro Valley, California

Date Well Measured	Depth of Well	Sample TPHg	B	T	E	X
MW-1						
6/26/90	50	64	0.63	<0.50	<0.50	<0.50
9/26/90	51	<50	<0.50	<0.50	<0.50	<0.50
MW-2						
6/26/90	49	27	<0.50	<0.50	<0.50	<0.50
9/26/90	50	<50	<0.50	<0.50	<0.50	<0.50
MW-3						
6/25/90	50	52	0.65	1.5	<0.50	2.0
9/26/90	51	<50	<0.50	<0.50	<0.50	<0.50
MW-4						
6/25/90	48	<20	<0.50	<0.50	<0.50	<0.50
9/26/90	49	<50	<0.50	<0.50	<0.50	<0.50

Results in parts per billion (ppb).
TPHg: Total petroleum hydrocarbons as gasoline
B:benzene T:toluene E:ethylbenzene X:total xylene isomers

Sample identification:

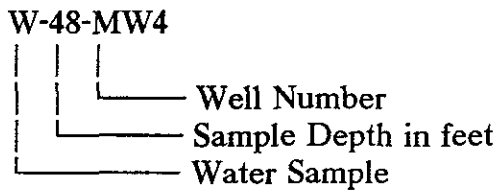
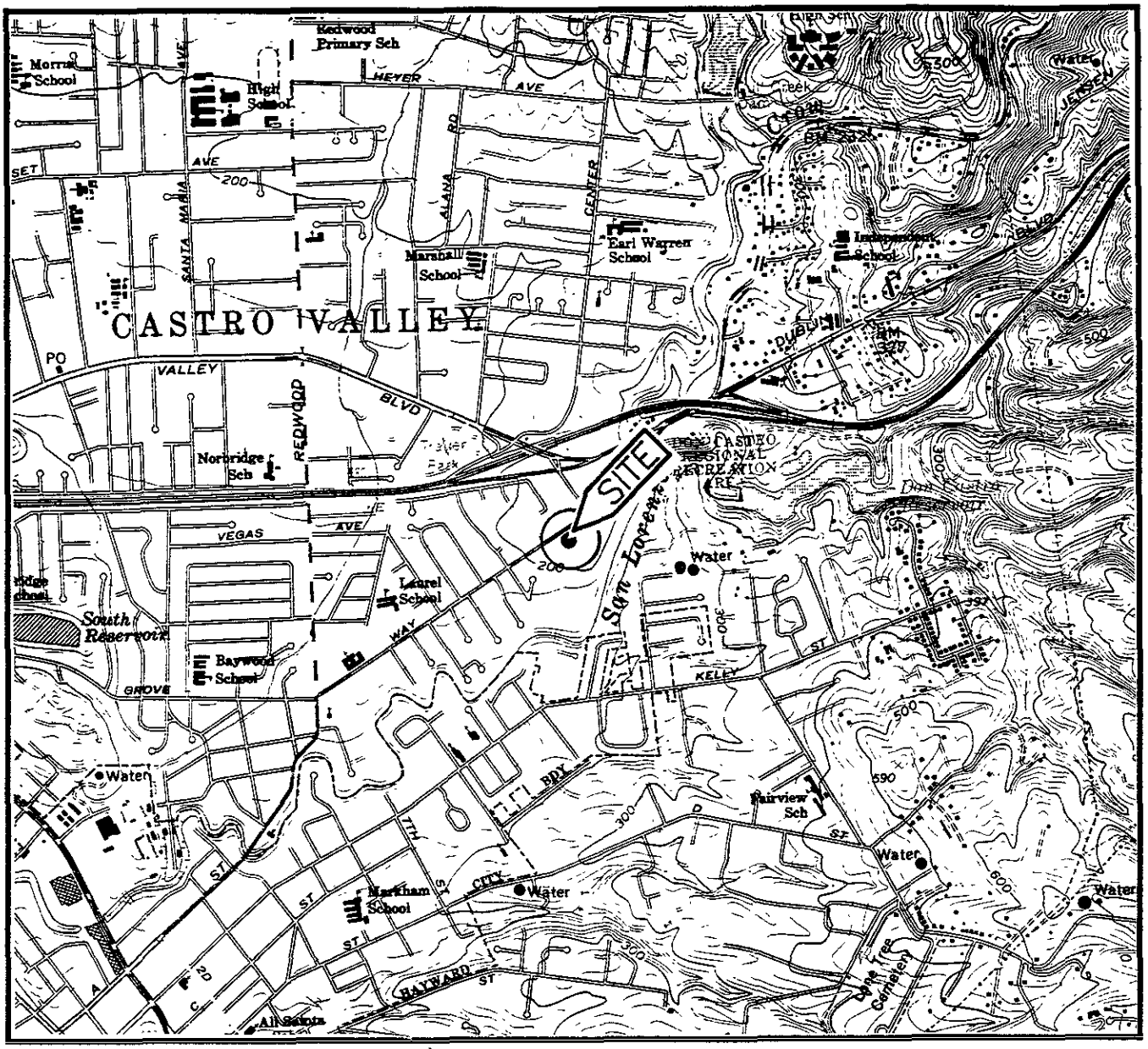


TABLE 3
GROUND-WATER ELEVATION DATA
ARCO Station 2152
Castro Valley, California

Well Date Measured	Depth of Well	Well Elevation	Static Water Depth	Water Elevation
MW-1				
06/25/90	58.10	217.16	49.80	167.36
09/07/90	58.10	217.16	50.00	167.16
09/26/90	58.10	217.16	50.09	167.07
MW-2				
06/25/90	59.20	216.50	49.04	167.46
09/07/90	59.20	216.50	49.22	167.28
09/26/90	59.20	216.50	49.32	167.18
MW-3				
06/25/90	59.70	217.57	50.55	167.02
09/07/90	59.71	217.57	50.73	166.84
09/26/90	59.68	217.57	50.81	166.76
MW-4				
06/25/90	60.30	215.18	48.06	167.12
09/07/90	60.30	215.18	48.25	166.93
09/26/90	60.29	215.18	48.35	166.83

Measurements in feet. Datum is mean sea level.
Static water level measured in feet below top of casing.



Source: U.S. Geological Survey
7.5–Minute Quadrangle
Hayward, California
Photorevised 1980

N

Approximate Scale

2000 1000 0 2000 4000

feet

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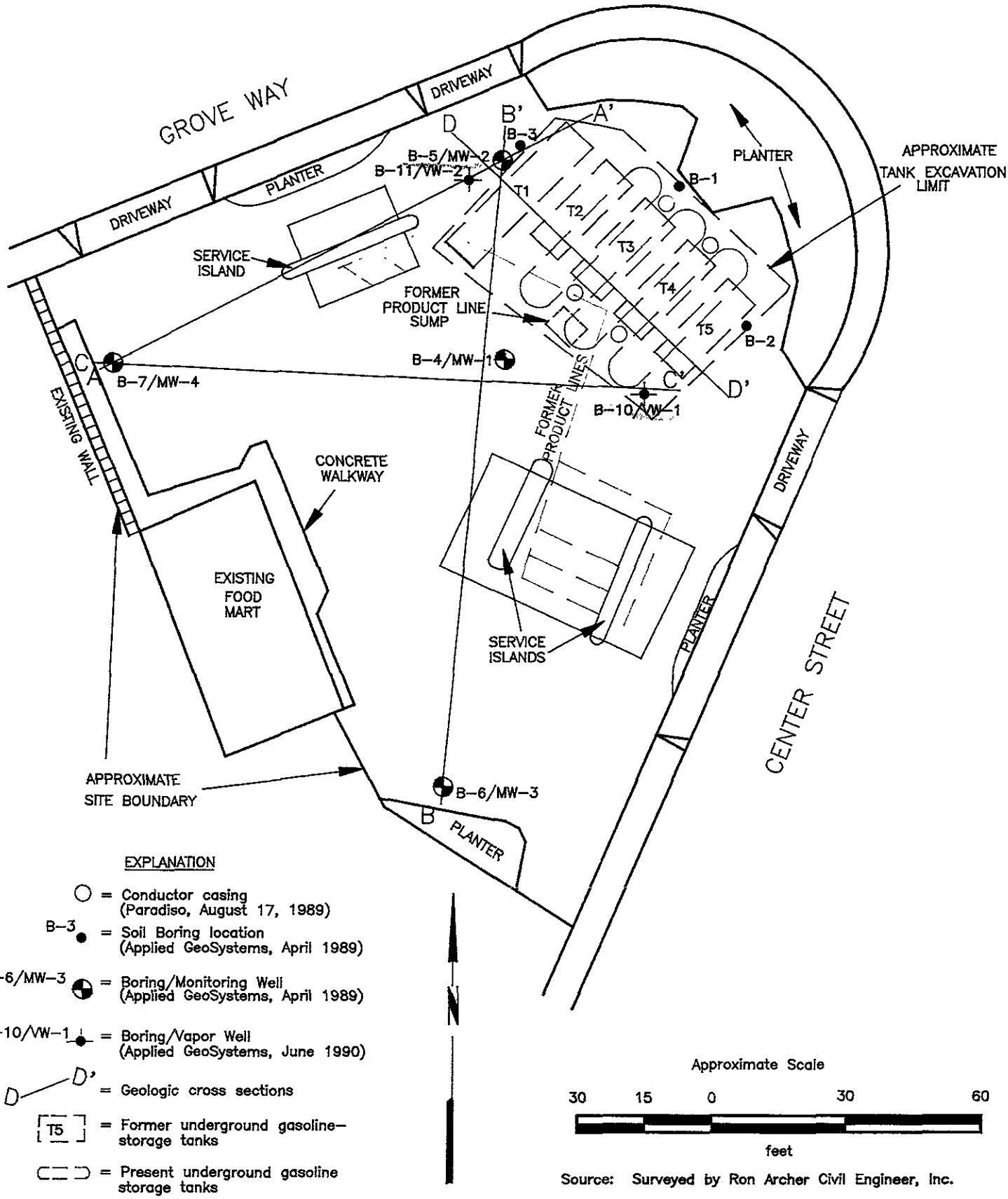
SITE VICINITY MAP
ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE

1



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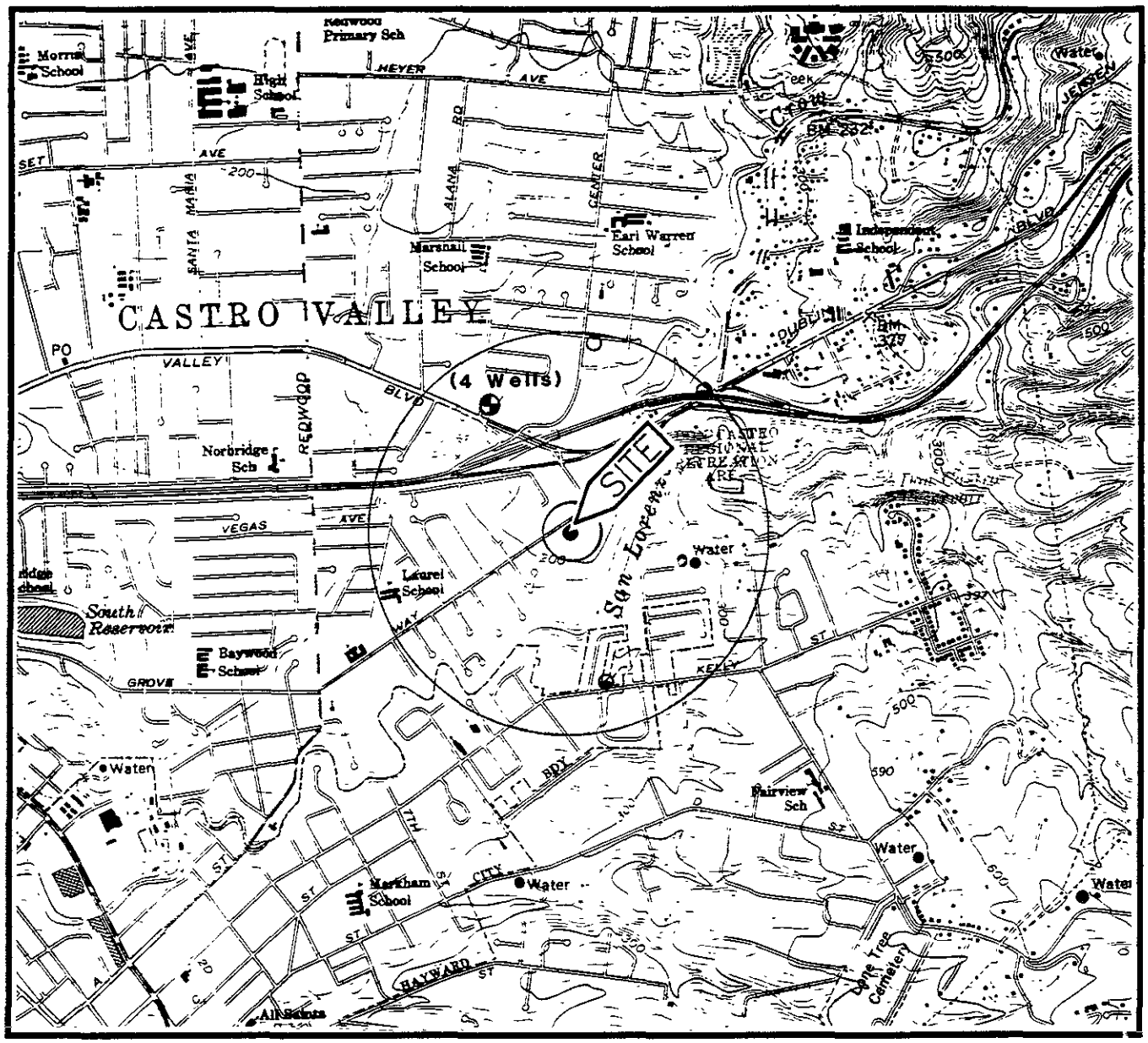
PROJECT 69013-4

GENERALIZED SITE PLAN
ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 2



Source: U.S. Geological Survey
7.5–Minute Quadrangle
Hayward, California
Photorevised 1980

○ = Unknown Well (1)

◒ = Irrigation Wells (2)

◔ = Monitoring Wells (4)

NOTE: Locations of Domestic Well, two Irrigation Wells, and one Unknown Well are not listed.

N

Approximate Scale

2000 1000 0 2000 4000

feet

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PROJECT 69013-4

WELL LOCATION MAP
ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 3

Depth of boring: 60 feet **Diameter of boring:** 10 inches **Date drilled:** 6-14-90

Well depth: 58 feet **Material type:** Sch 40 PVC **Casing diameter:** 4 inches

Screen interval: 45 to 58 feet **Slot size:** 0.020-inch

Drilling Company: Gregg Drilling **Driller:** Steve and Mike

Method Used: Hollow-Stem Auger **Field Geologist:** Steve Bittman

Signature of Registered Professional: Duane Barclay PGA

Registration No.: CEG 1366 **State:** CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt (4 inches) over baserock (2 inches).	
2				CH	Silty clay, dark gray to black, damp, high plasticity, very stiff. Brown.	
4	S-5	10, 14, 25	0	CL	Silty clay, brown mottled with black, damp, low plasticity, hard.	
6						
8						
10	S-10	10, 10, 10	0	CL	Sandy clay, brown, damp, low plasticity, very stiff.	
12						
14	S-15	8, 10, 20	0	CH	Silty clay, brown, damp, high plasticity, very stiff.	
16						
18				SP	Gravelly sand, brown, damp, very dense; medium-grained.	
20	S-20	15, 20, 32	0		(Section continues downward)	

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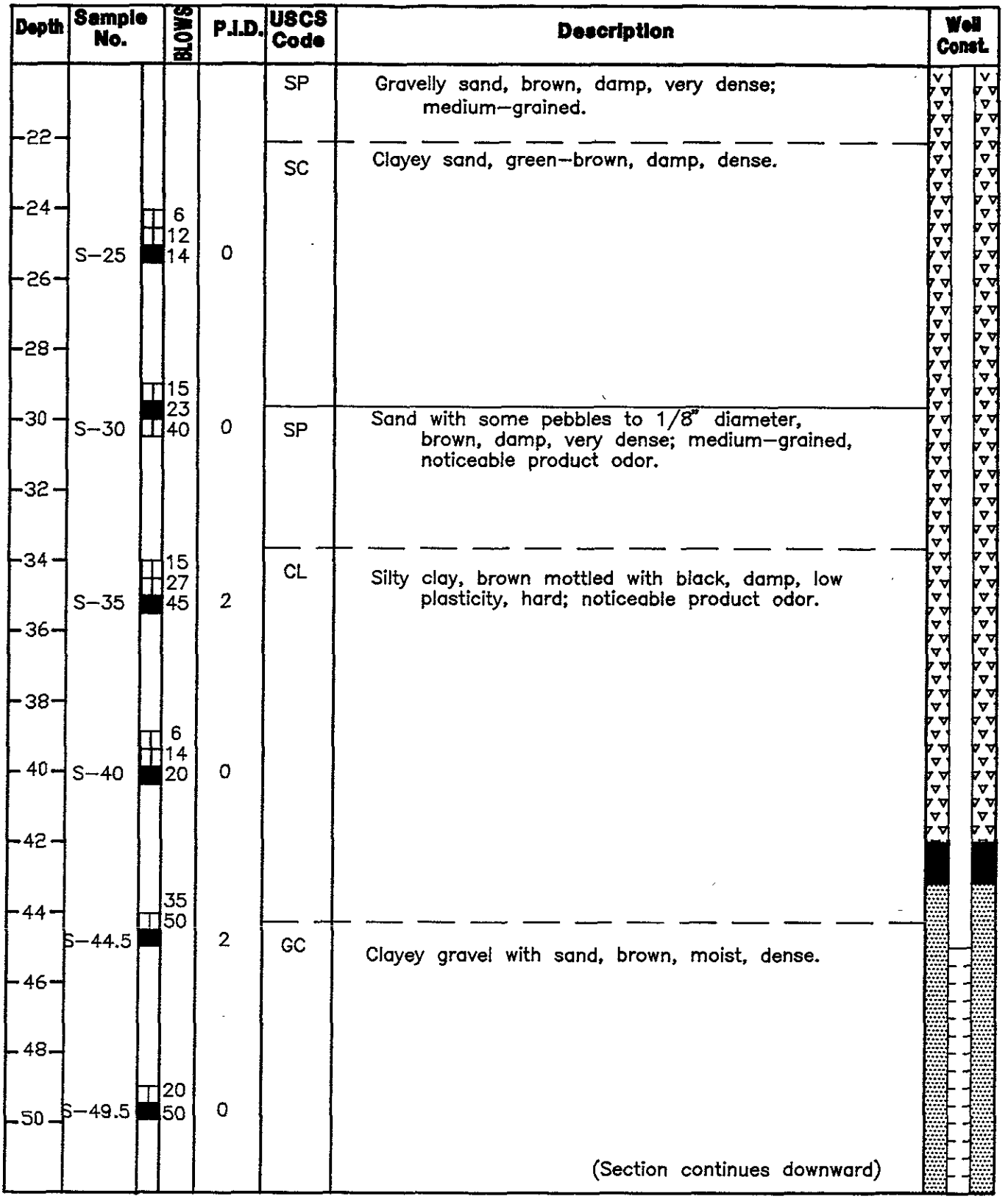
PROJECT: 69013-4

LOG OF BORING B-4/MW-1

ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 4



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PROJECT 69013-4

LOG OF BORING B-4/MW-1

ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 5

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
52				GC	Clayey gravel with sand, brown, moist, dense.	
54	S-54.5	20 50	0	GW	Sandy gravel with clay, brown, moist, very dense. Wet.	
56						
58	S-59	100	0		Claystone, brown, dry. Drilling hard at 58 feet.	
60					Total Depth = 60 feet.	
62						
64						
66						
68						
70						
72						
74						
76						
78						
80						

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PROJECT 69013-4

LOG OF BORING B-4/MW-1

ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 6

Depth of boring: 60 feet **Diameter of boring:** 10 inches **Date drilled:** 6–14–90

Well depth: 59 feet **Material type:** Sch 40 PVC **Casing diameter:** 4 inches

Screen interval: 47 to 59 feet **Slot size:** 0.020–inch

Drilling Company: Gregg Drilling **Driller:** Steve and Mike

Method Used: Hollow–Stem Auger **Field Geologist:** Steve Bittman

Signature of Registered Professional: Duane Barclay/BSA

Registration No.: CEG 1366 **State:** CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0						
					Asphalt (4 inches) over baserock (2 inches).	
2				CH	Silty clay, blue–green, damp, high plasticity, very stiff; noticeable product odor.	
4	S–5	10 15 20	0	CL	Silty clay, brown, damp, medium plasticity, hard.	
6						
8						
10	S–10	15 25 32	0			
12						
14	S–15	15 31 39	0.5			
16						
18						
20	S–20	17 22 37	20		With fine sand, green–brown, low plasticity; noticeable product odor.	
					(Section continues downward)	

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PROJECT: 69013-4

LOG OF BORING B-5/MW-2

ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 7

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
22				CL	Silty clay with fine sand, green–brown, damp, low plasticity, hard; noticeable product odor.	
24		15				
	S–25	25 35	55		Brown, stringers of caliche throughout; noticeable product odor.	
26						
28						
		6				
30	S–30	12 15	200			
32						
34		5				
		15				
	S–35	37	600			
36						
38					Obvious product odor.	
		6				
		17				
40	S–40	29	525			
42						
				SC	Clayey sand, green–brown, damp, very dense; fine–grained, noticeable product odor.	
44		10				
		23				
	S–45	40	90			
46						
48						
		17		GC	Clayey gravel, reddish–brown, moist, very dense.	
50	S–49.5	50	60			
					(Section continues downward)	

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PROJECT 69013-4

LOG OF BORING B-5/MW-2

ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 8

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
52				GC	Clayey gravel, reddish–brown, moist, very dense.	
54	S–54.5	27 50	0.5			
56				▽	Wet.	
58						
60	S–59	75	0		Claystone, yellow–brown, dry, moderately cemented, hard.	
					Total Depth = 60 feet.	
62						
64						
66						
68						
70						
72						
74						
76						
78						
80						

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PROJECT 69013-4

LOG OF BORING B-5/MW-2

ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 9

Depth of boring: 63 feet **Diameter of boring:** 10 inches **Date drilled:** 6-12-90

Well depth: 60 feet **Material type:** Sch 40 PVC **Casing diameter:** 4 inches

Screen interval: 45 to 60 feet **Slot size:** 0.020-inch

Drilling Company: Gregg Drilling **Driller:** Steve and Mike

Method Used: Hollow-Stem Auger **Field Geologist:** Steve Bittman

Signature of Registered Professional: Duane Barclay BGA

Registration No.: CEG 1366 **State:** CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt (4 inches) over baserock (2 inches).	
2				CL	Silty clay, dark brown, damp, low plasticity, stiff.	
					Light brown, medium plasticity.	
4		5		CH	Silty clay, gray-brown, damp, high plasticity, very stiff.	
		12				
	S-5	20	0			
6						
8						
		14		CL	Sandy clay, light brown, damp, low plasticity, hard.	
		20				
10	S-10	32	0			
12					Interbedded clayey sand.	
14		10			With medium-grained sand.	
		19				
	S-15	24	0			
16						
18				GC	Clayey gravel with sand, subrounded cobbles to 3", brown, damp, dense.	
		20				
		17				
20	S-20	12	0			
					(Section continues downward)	

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PROJECT: 69013-4

LOG OF BORING B-6/MW-3

ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE
10

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
22				GC	Clayey gravel with sand, subrounded cobbles to 3", brown, damp, medium dense.	
24	S-25	10 18 26	0	SM	Silty fine sand, light brown, damp, dense.	
26				SP	Gravelly sand, medium-grained with subangular pebbles to 1/2", brown, damp, very dense.	
28						
30	S-29.5	27 32	0			
32				GC	Clayey gravel with medium-grained sand, brown, damp, very dense.	
34	S-35	20 25 35	2			
36						
38				ML	Clayey silt, light brown, damp, low plasticity, hard.	
40	S-40	15 22 27	0			
42				CL	Silty clay, reddish-brown, moist, medium plasticity, very stiff.	
44	S-44.5	27 50	2	GC	Clayey gravel, reddish-brown, moist, very dense.	
46						
48						
50	S-49.5	32 70	0		With stringers of black fine-grained sand.	
					(Section continues downward)	

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PROJECT 69013-4

LOG OF BORING B-6/MW-3

ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 11

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
52				GC	Clayey gravel, reddish–brown, moist, very dense; with stringers of black fine–grained sand.	
54	S–54.5	35 90	0			
56				SC	Clayey sand with gravel, medium–grained, gray–brown, wet, very dense.	
58						
60	S–59	80			Claystone, gray, dry. Very hard drilling at 60 feet.	
62	S–62	75	0			
64					Total Depth = 63 feet.	
66						
68						
70						
72						
74						
76						
78						
80						

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PROJECT 69013-4

LOG OF BORING B-6/MW-3

ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 12

Depth of boring: 61-1/2 feet **Diameter of boring:** 10 inches **Date drilled:** 6-13-90

Well depth: 60 feet **Material type:** Sch 40 PVC **Casing diameter:** 4 inches

Screen interval: 45 to 60 feet **Slot size:** 0.020-inch

Drilling Company: Gregg Drilling **Driller:** Steve and Mike

Method Used: Hollow-Stem Auger **Field Geologist:** Steve Bittman

Signature of Registered Professional: Duane Barclay BSA

Registration No.: CEG 1366 **State:** CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt (4 inches) over baserock (2 inches).	
2				CH	Silty clay, gray mottled with brown, damp, high plasticity, very stiff.	
4	S-5	22 34 52	0	CL	Silty clay, light brown, mottled with black, damp, low plasticity, hard.	
6						
8						
10	S-10	15 25 35	0			
12						
14	S-15	14 25 34	0		Dark brown, medium plasticity.	
16						
18						
20	S-20	18 25 39	0		Brown.	

(Section continues downward)

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PROJECT: 69013-4

LOG OF BORING B-7/MW-4

ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE
13

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
22				CL	Silty clay, brown, damp, medium plasticity, hard.	
24		17				
		35				
	S-25	51	0			
26						
28						
		15				
		32				
30	S-30	59	0		Some fine sand, light brown, low plasticity.	
32						
34		15				
		20				
	S-35	27	0			
36						
38						
		18				
		25				
40	S-40	39	0			
42						
				GW	Sandy gravel with minor clay, brown, damp, very dense.	
44		25				
		50				
	S-44.5		0			
46						
					Heavy cobbles to 4" diameter.	
48						
	S-49	50	0			
50						
					(Section continues downward)	

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PROJECT 69013-4

LOG OF BORING B-7/MW-4

ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 14

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
				GW ▽	Sandy gravel with minor clay, brown, moist, very dense. Wet.	
52				SC	Clayey sand with gravel to 2" diameter, brown, wet, very dense; medium-grained.	
54		50				
	S-54.5	50	0			
56						
58		45				
	S-58	63	0			
		20				
60	S-59.5	50	0		Drilling hard at 60 feet.	
	S-61	100	0	GW	Claystone, brown, dry, very hard.	
62					Total Depth = 61-1/2 feet.	
64						
66						
68						
70						
72						
74						
76						
78						
80						

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PROJECT 69013-4

LOG OF BORING B-7/MW-4

ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 15

Depth of boring: 40–1/2 feet **Diameter of boring:** 6 inches **Date drilled:** 6–18–90

Well depth: 40–1/2 feet **Material type:** Sch 40 PVC **Casing diameter:** 2 inches

Screen interval: 25 to 40 feet **Slot size:** 0.020–inch

Drilling Company: Gregg Drilling **Driller:** Steve and Mike

Method Used: Hollow–Stem Auger **Field Geologist:** Steve Bittman

Signature of Registered Professional: Diane Barclay, PGA

Registration No.: CEG 1366 **State:** CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt (4 inches) over baserock (2 inches).	
2				CH	Silty clay, brown, damp, high plasticity, very stiff.	
4		15		CL	Silty clay, brown mottled with black, damp, low plasticity, hard.	
	S–5	22 39	0			
6						
8						
10	S–10	13 9 31	0		Brown.	
12						
14		6		CH	Silty clay, brown, damp, high plasticity, hard.	
	S–15	15 25	0			
16						
18				CL	Silty clay with some fine–grained sand, brown, damp, medium plasticity, hard.	
		10				
20	S–20	19 22	0			

(Section continues downward)

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LOG OF BORING B-10/VW-1

ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 16

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
22				CL	Silty clay with fine–grained sand, brown, damp, medium plasticity, hard.	
24		10				
		19			Interbedded with fine–grained sand, low plasticity.	
	S–25	22	0			
26						
28				GW	Gravelly sand with minor clay, brown, damp, very dense.	
		8				
		15				
30	S–30	25	0			
32						
34		9		GC	Clayey gravel, brown, damp, dense.	
		15				
	S–35	35	0			
36						
38						
		18				
		39				
40	S–40	50	0			
					Total Depth = 40–1/2 feet.	
42						
44						
46						
48						
50						

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PROJECT 69013-4

LOG OF BORING B-10/VW-1

ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 17

Depth of boring: 40-1/2 feet **Diameter of boring:** 6 inches **Date drilled:** 6-18-90

Well depth: 39 feet **Material type:** Sch 40 PVC **Casing diameter:** 2 inches

Screen interval: 24 to 39 feet **Slot size:** 0.020-inch

Drilling Company: Gregg Drilling **Driller:** Steve and Mike

Method Used: Hollow-Stem Auger **Field Geologist:** Steve Bittman

Signature of Registered Professional: Diane Barclay CEG

Registration No.: CEG 1366 **State:** CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt (4 inches) over baserock (2 inches).	
2				CH	Silty clay, brown, damp, high plasticity, very stiff.	
4		10		CL	Silty clay, brown mottled with black, damp, low plasticity, very stiff.	
6	S-5	19 40	0			
8						
10	S-10	8 19 20	0			
12						
14		8				
16	S-15	19 22	0			
18						
20	S-20	10 29 31	0		Noticeable product odor.	
					(Section continues downward)	

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PROJECT: 69013-4

LOG OF BORING B-11/VW-2

ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 18

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
22				CL	Silty clay, brown, damp, low plasticity, hard; noticeable product odor.	
24		6 19				
	S–25	27	12		Gray–brown.	
26						
28		12 17				
30	S–30	29	7			
32						
34		21 15				
	S–35	40	12			
36						
38		8 9				
40	S–40	9	10			
					Total Depth = 40–1/2 feet.	
42						
44						
46						
48						
50						

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PROJECT 69013-4

LOG OF BORING B-11/VW-2

ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 19

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISION		LTR	DESCRIPTION	MAJOR DIVISION		LTR	DESCRIPTION
COARSE-GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	Well-graded Gravels or Gravel-Sand mixtures, little or no fines.	FINE-GRAINED SOILS	SILTS AND CLAYS LL<50	ML	Inorganic Silts and very fine sands, rock flour, Silty or Clayey fine Sands, or Clayey Silts with slight plasticity.
		GP	Poorly-graded Gravels or Gravel-Sand mixtures, little or no fines.			CL	Inorganic Clays of low to medium plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays.
		GM	Silty Gravels, Gravel-Sand-Silt mixtures.			OL	Organic Silts and Organic Silt-Clays of low plasticity.
		GC	Clayey Gravel, Gravel-Sand-Clay mixtures.		SILTS AND CLAYS LL>50	MH	Inorganic Silts, micaceous or diatomaceous fine Sandy or Silty Soils, Elastic Silts.
	SAND AND SANDY SOILS	SW	Well-graded Sand or Gravelly Sands, little or no fines.			CH	Inorganic Clays of high plasticity, fat Clays.
		SP	Poorly-graded Sands or Gravelly Sands, little or no fines.			OH	Organic Clays of medium to high plasticity, organic Silts.
		SM	Silty Sands, Sand-Silt mixtures.				
		SC	Clayey Sands, Sand-Clay mixtures.	HIGHLY ORGANIC SOILS		PT	Peat and other highly Organic Soils.


Depth through which sampler is driven


Relatively undisturbed sample


No sample recovered


Static water level observed in well/boring


Initial water level observed in boring

S-10 Sample number


Sand pack


Bentonite


Neat cement


Caved native soil


Blank PVC


Machine-slotted PVC

P.I.D. Photoionization detector

BLOWS REPRESENT THE NUMBER OF BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES TO DRIVE THE SAMPLER THROUGH EACH 6 INCHES OF AN 18-INCH PENETRATION.

DASHED LINES SEPARATING UNITS ON THE LOG REPRESENT APPROXIMATE BOUNDARIES ONLY. ACTUAL BOUNDARIES MAY BE GRADUAL LOGS REPRESENT SUBSURFACE CONDITIONS AT THE BORING LOCATION AT THE TIME OF DRILLING ONLY.

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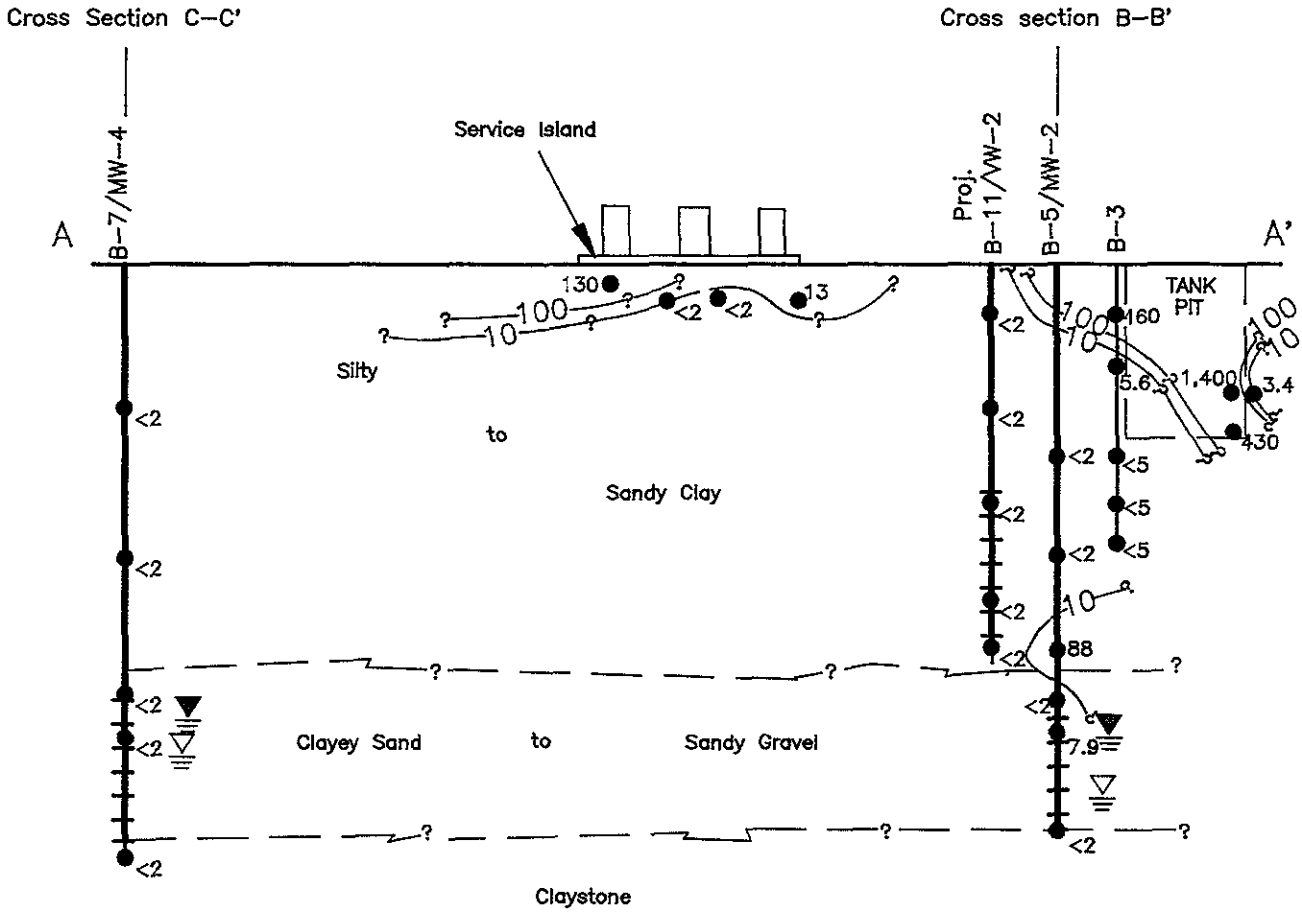
UNIFIED SOIL CLASSIFICATION SYSTEM AND SYMBOL KEY
ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 20



EXPLANATION

? —100— = Line of equal concentration of TTPHg

1,400 ● = Laboratory analyzed soil sample around product lines and beneath the tank showing concentration of TPHg in parts per million

88 = Laboratory analyzed soil sample showing concentration of TPHg in parts per million

= Well casing

= Well screen

= Boring

= Initial water level in boring

= Static water level in well (6/25/90)

Approximate Horizontal and Vertical Scale

20 10 0 20 40

feet

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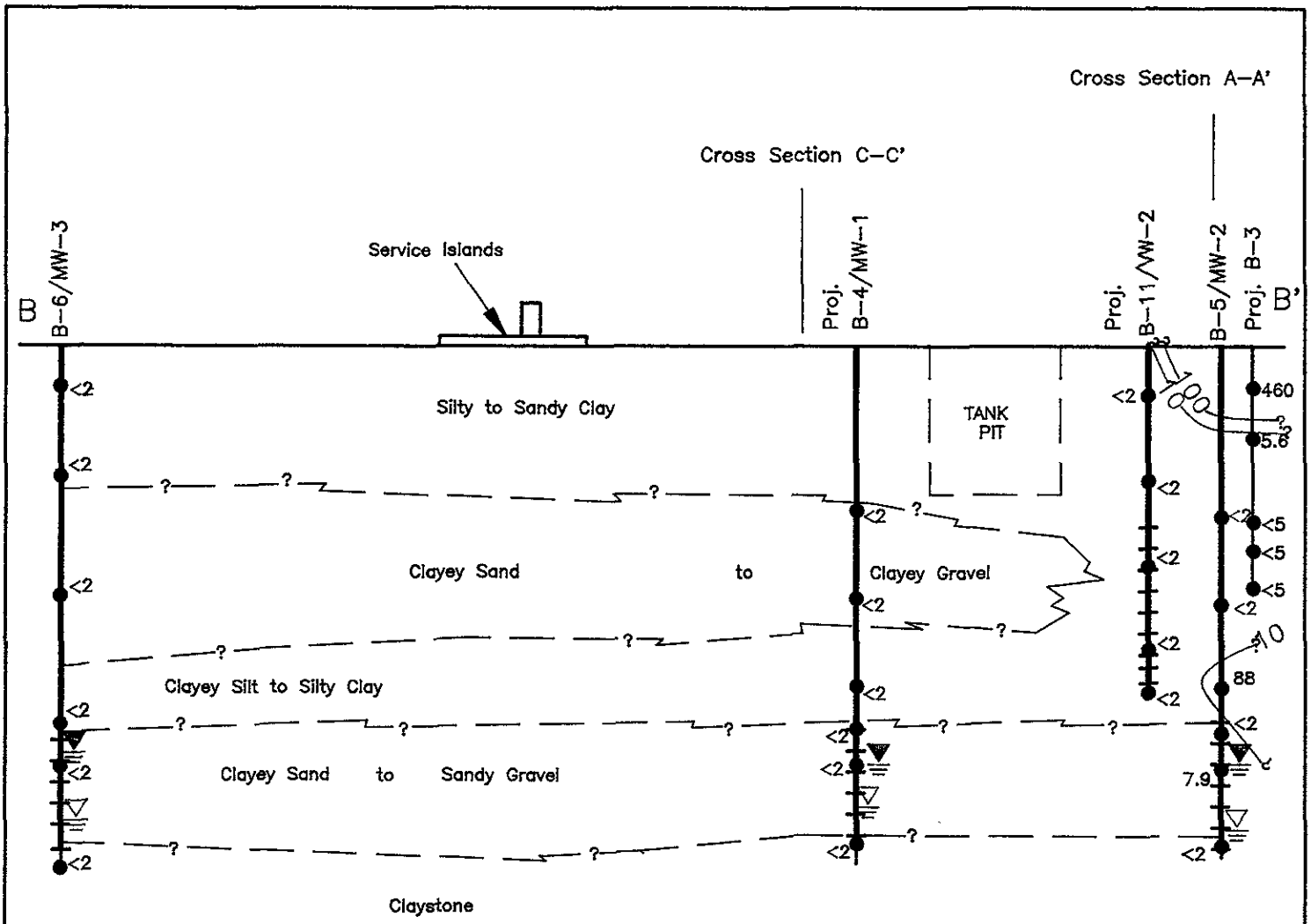
PROJECT 69013-4

GEOLOGIC CROSS SECTION A-A'
ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 21



EXPLANATION

100 = Line of equal concentration of TPHg

88 = Laboratory analyzed soil sample showing concentration of TPHg in parts per million

= Well casing

= Well screen

= Boring

= Initial water level in boring

= Static water level in well (6/25/90)

Approximate Horizontal and Vertical Scale

20 10 0 20 40

feet

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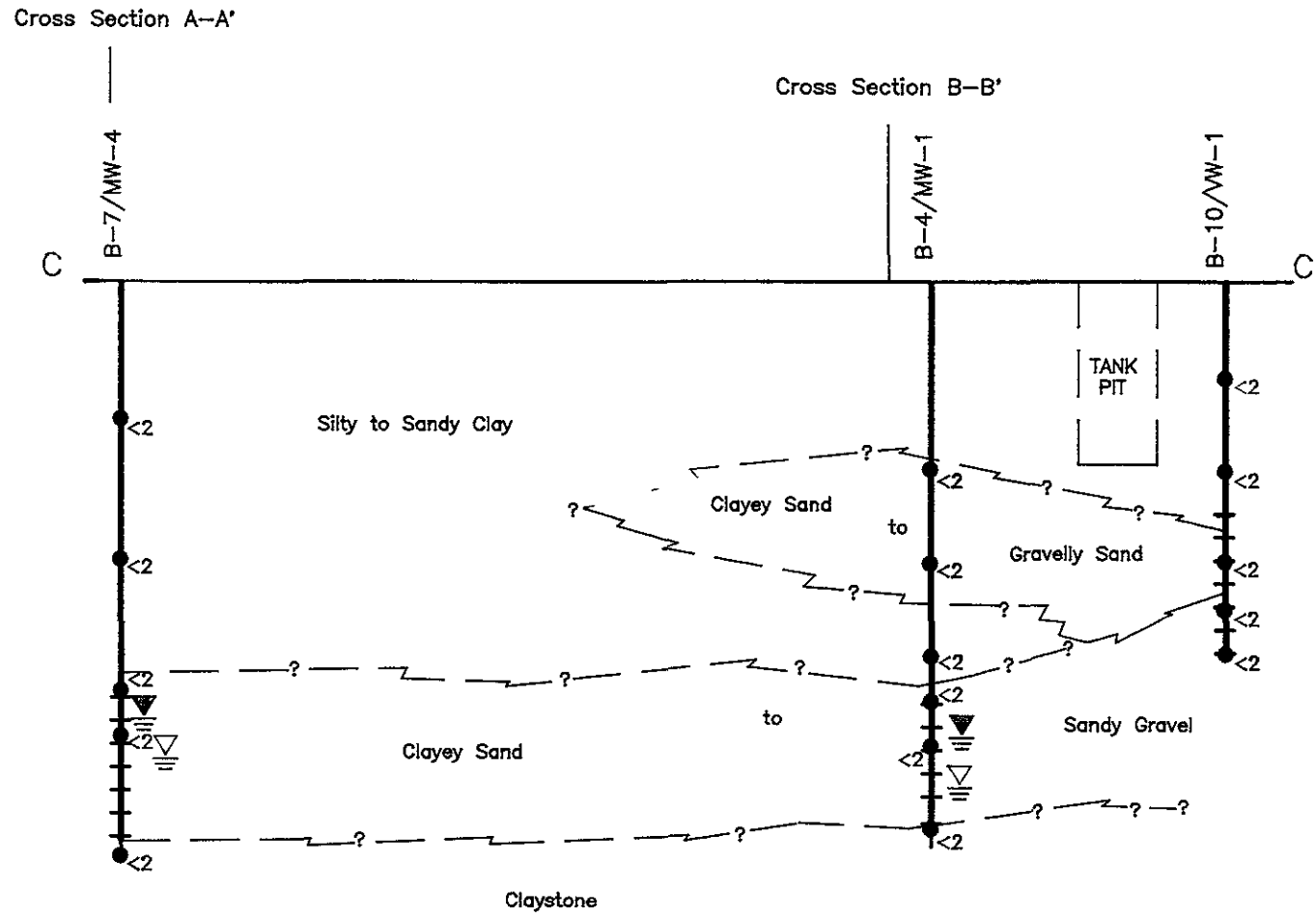
PROJECT 69013-4

GEOLOGIC CROSS SECTION B-B'
ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 22



EXPLANATION

<2 = Laboratory analyzed soil sample showing concentration of TPHg in parts per million

= Well casing

= Well screen

= Boring

= Initial water level in boring

= Static water level in well (6/25/90)

Approximate Horizontal and Vertical Scale

20 10 0 20 40

feet

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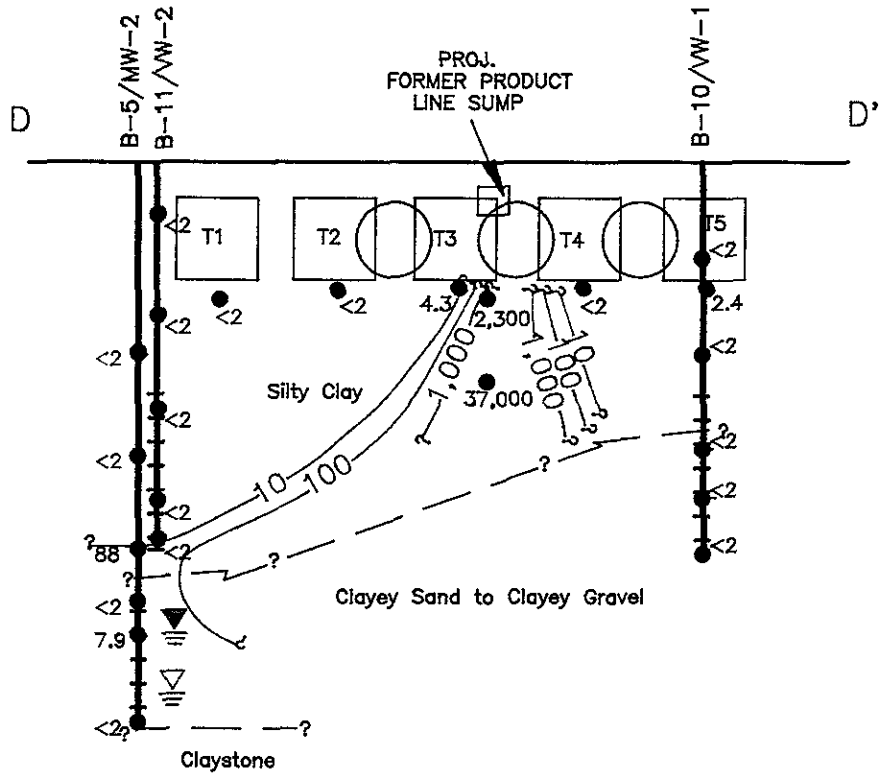
PROJECT 69013-4

GEOLOGIC CROSS SECTION C-C'
ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE 23



EXPLANATION

= Existing underground gasoline storage tanks

T5 = Former underground gasoline storage tanks

1,000 = Line of equal concentration of TPHg

37,000 = Concentration of TPHg in ppm for soil sample collected 8/89

88 = Laboratory analyzed soil sample showing concentration of TPHg in parts per million

= Well casing

= Well screen

= Boring

= Initial water level in boring

= Static water level in well (6/25/90)

Approximate Horizontal and Vertical Scale

20 10 0 20 40

feet

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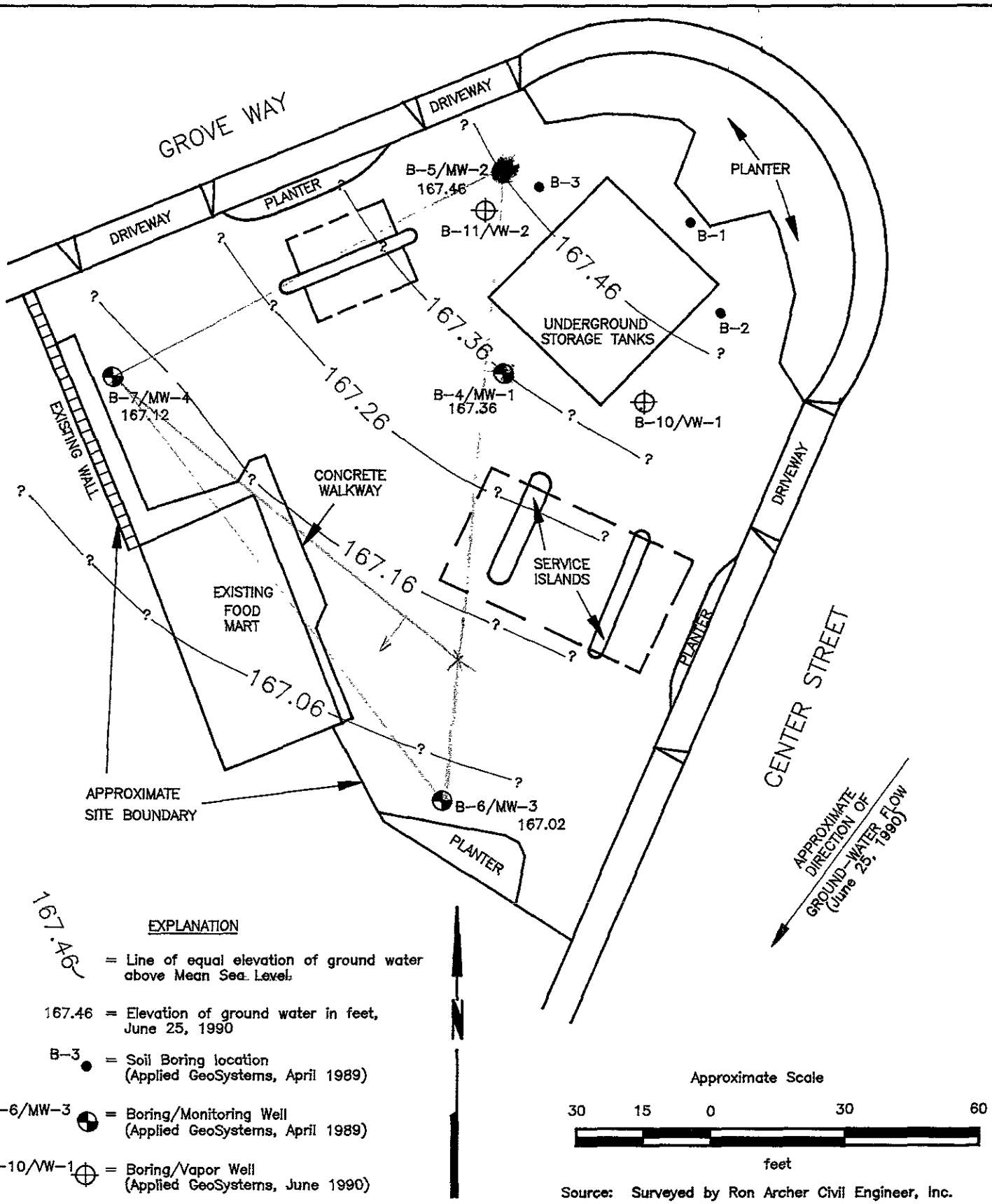
PROJECT 69013-4

GEOLOGIC CROSS SECTION D-D'
ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE
24



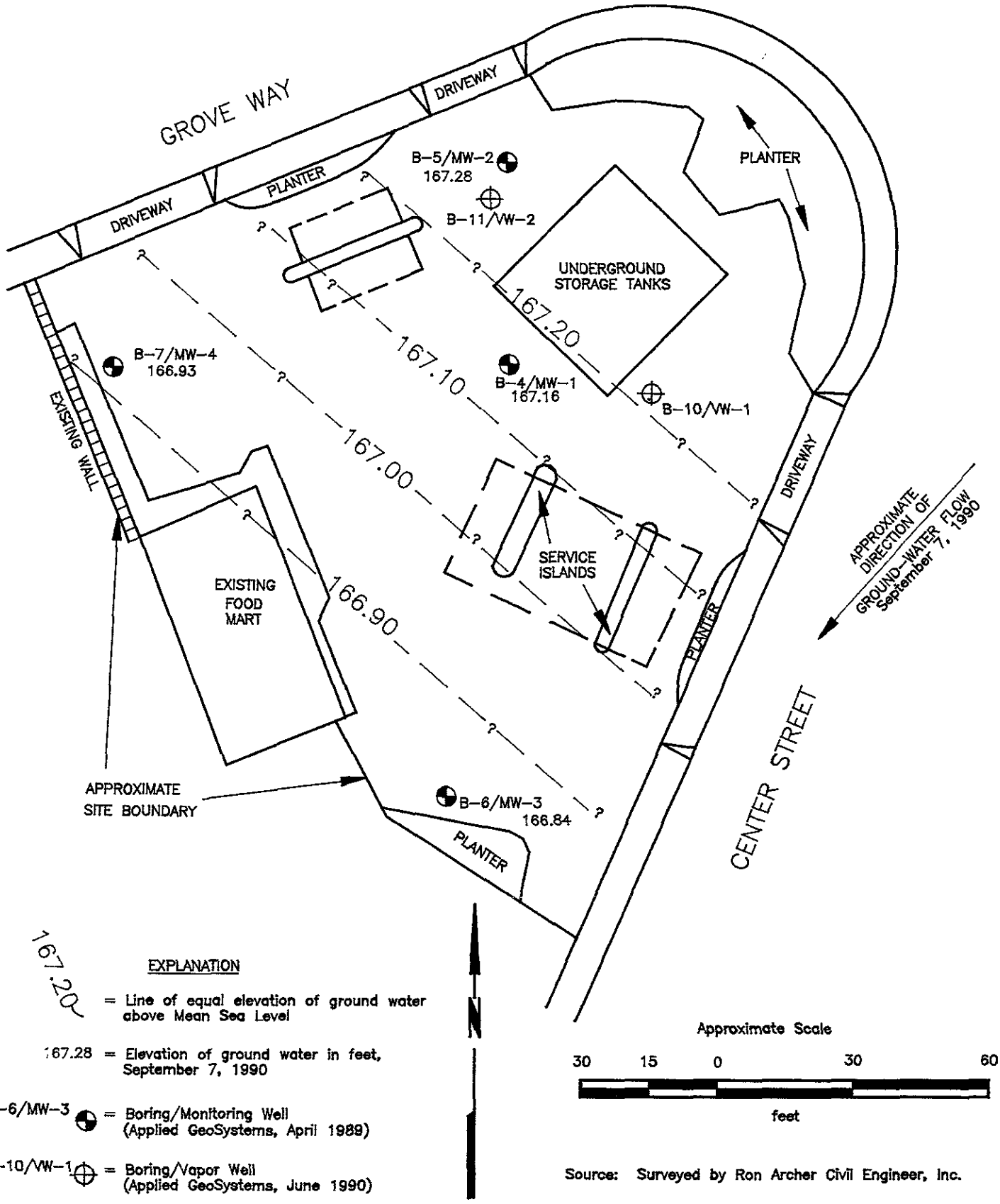
Applied GeoSystems

PROJECT **69013-4**

GROUND WATER GRADIENT MAP
ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE

25



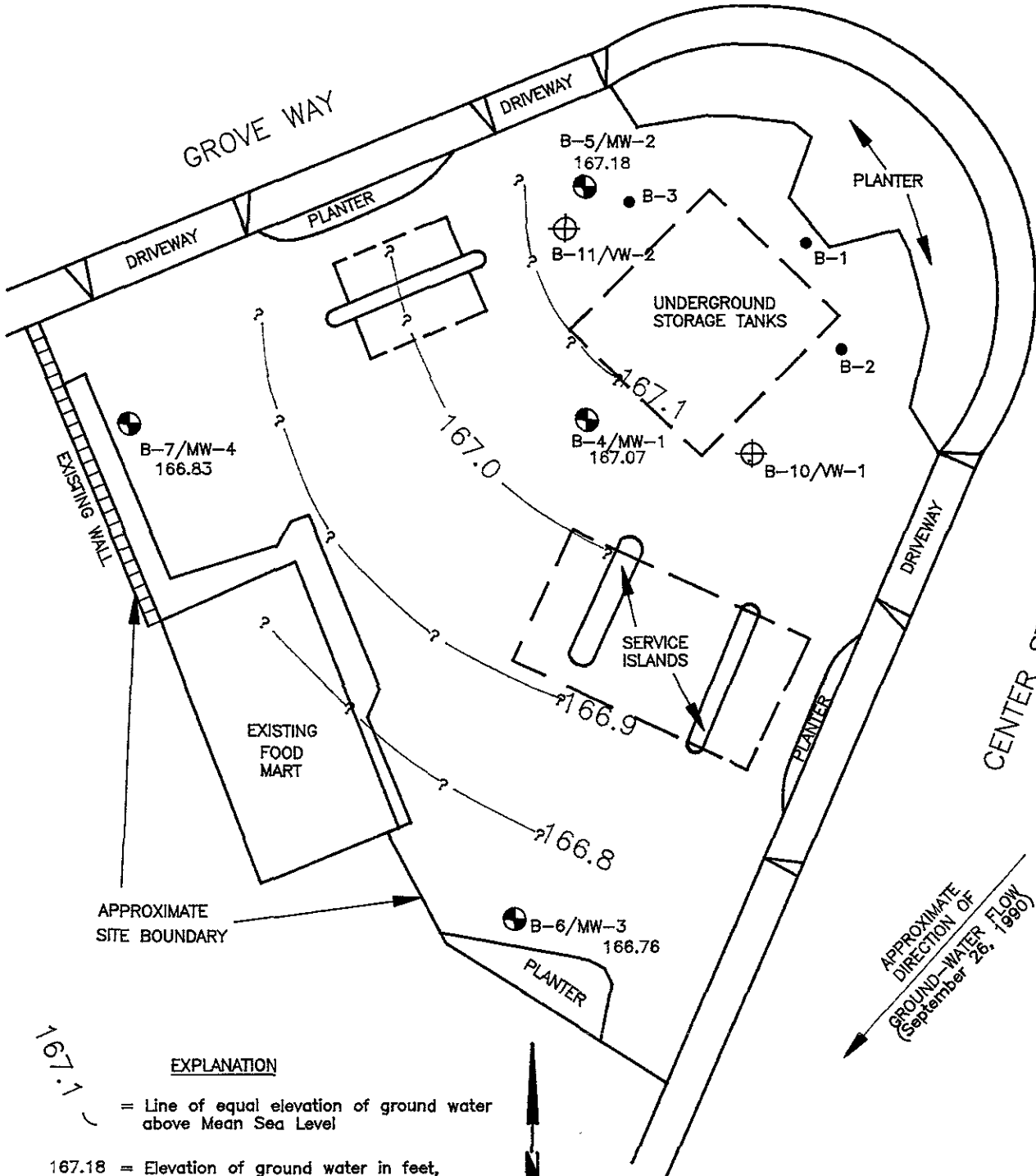
Applied GeoSystems

PROJECT 69013-4

GROUND WATER GRADIENT MAP
ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE

26



167.1

EXPLANATION

= Line of equal elevation of ground water above Mean Sea Level

167.18 = Elevation of ground water in feet, September 26, 1990

B-3 = Soil Boring location (Applied GeoSystems, April 1989)

B-6/MW-3 = Boring/Monitoring Well (Applied GeoSystems, April 1989)

B-10/VW-1 = Boring/Vapor Well (Applied GeoSystems, June 1990)

N

Approximate Scale

30 15 0 30 60

feet

Source: Surveyed by Ron Archer Civil Engineer, Inc.

Applied GeoSystems

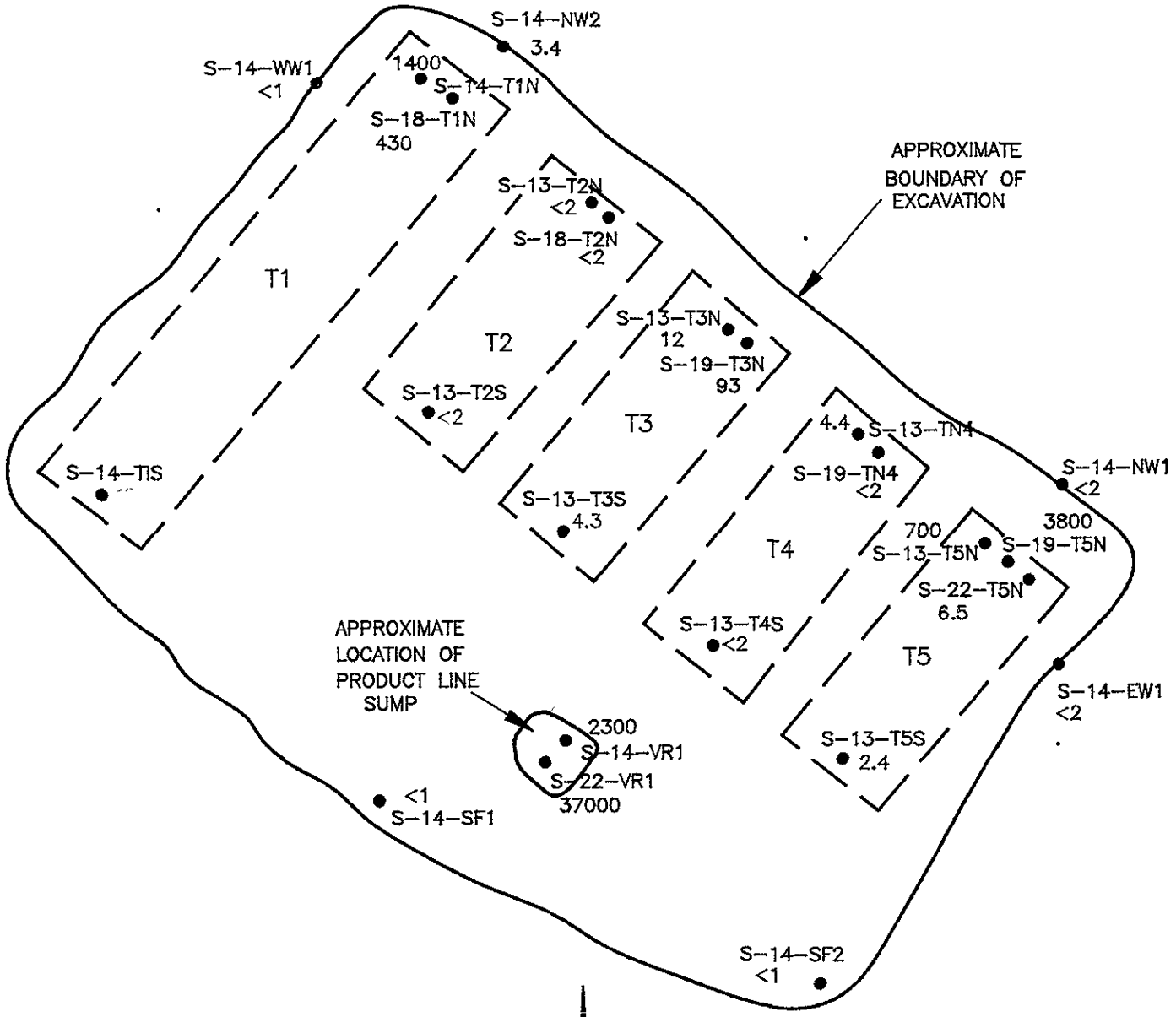
PROJECT 69013-4

GROUND WATER GRADIENT MAP
ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE

27

APPENDIX A
Previous Results from
Underground Tank Removal Investigation



EXPLANATION

T5 = Designated tank number

S-14-SF1 ● = Soil sample

37,000 = Concentration of TPHg in ppm

N

Approximate Scale

10 5 0 10 20

feet

Source: Modified from plan prepared by ARCO

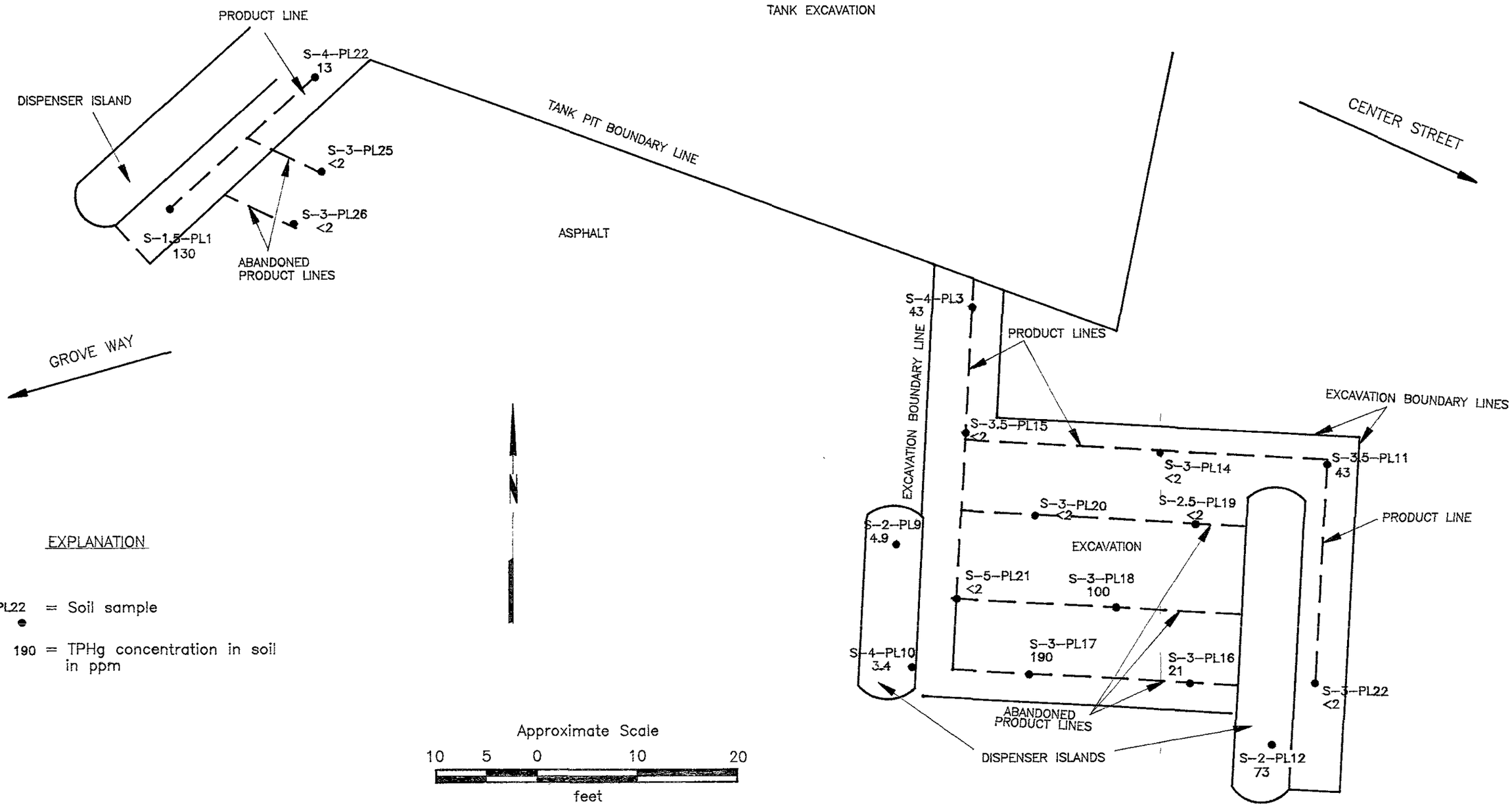
Applied GeoSystems

PROJECT 69013-4

TANK PIT SOIL SAMPLING LOCATIONS
ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE

A1



Applied GeoSystems

PROJECT 69013-4

PRODUCT-LINE SOIL SAMPLE LOCATIONS
ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE
A2

TABLE A1
RESULTS OF LABORATORY ANALYSES OF TANK-PIT SOIL SAMPLES
ARCO Station 2152
Castro Valley, California

Date	Sample #	TPHg	B	T	E	X
Tank-Pit Excavation						
08/18/89	S-14-T1S	<2	0.24	<0.05	<0.05	<0.05
08/18/89	S-13-T2S	<2	<0.05	<0.05	<0.05	<0.05
08/18/89	S-13-T3S	4.3	0.09	<0.05	<0.05	<0.05
08/18/89	S-13-T4S	<2	<0.05	<0.05	<0.05	<0.05
08/18/89	S-13-T5S	2.4	<0.05	<0.05	<0.05	<0.05
08/18/89	S-14-T1N	1,400	0.72	6.1	11	130
08/18/89	S-13-T2N	<2	0.076	<0.05	1.1	8.5
08/18/89	S-13-T3N	12	0.29	0.29	0.22	1.3
08/18/89	S-13-T4N	4.4	<0.05	<0.05	<0.05	0.23
08/18/89	S-13-T5N	700	4.6	2.0	4.6	83
08/18/89	S-18-T1N	430	<0.05	<0.05	1.1	8.5
08/18/89	S-18-T2N	<2	0.076	<0.05	<0.05	0.092
08/18/89	S-19-T3N	93	0.11	0.11	0.74	3.5
08/18/89	S-19-T4N	<2	<0.05	<0.05	<0.05	<0.05
08/18/89	S-19-T5N	3,800	<0.05	15	18	150
08/24/89	S-22-T5N	6.5	<0.05	0.36	0.093	0.82
08/22/89	S-14-NW1	<2	<0.05	<0.05	<0.05	<0.05
08/22/89	S-14-EW1	<2	<0.05	<0.05	<0.05	<0.05
08/30/89	S-14-NW2	3.4	<0.005	<0.005	<0.005	.030
08/30/89	S-14-WW1	<1	<0.005	<0.005	<0.005	<0.005
08/30/89	S-14-SF1	<1	<0.005	<0.005	<0.005	<0.005
08/30/89	S-14-SF2	<1	<0.005	<0.005	<0.005	<0.005
08/30/89	S-14-VR1	2,300	<2	<2	19	146
08/30/89	S-22-VR1	37,000	<40	510	38	2,600

Results in milligrams per kilogram (mg/kg) or parts per million (ppm).
TPHg: Total petroleum hydrocarbons as gasoline
B: Benzene T: Toluene E: Ethylbenzene X: Total xylenes
<: Less than the detection limit for the analysis method.

Sample Identification: S-14-T1S
- S: Soil sample
- 14: Approximate sample depth in feet below grade
- T1S: Area of sample (See Plate A1)

TABLE A2
RESULTS OF LABORATORY ANALYSES OF PRODUCT-LINE SOIL SAMPLES
ARCO Station 2152
Castro Valley, California

Date	Sample #	TPHg	B	T	E	X
Center Street Dispensers						
09/06/89	S-4-PL3	43	1.0	3.2	0.74	4.0
09/06/89	S-2-PL9	4.9	0.24	0.18	0.16	0.64
09/06/89	S-4-PL10	3.4	0.21	0.18	0.11	0.25
09/06/89	S-3.5-PL11	43	1.0	3.2	0.74	4.0
09/06/89	S-2-PL12	73	0.13	<0.050	0.60	3.6
09/11/89	S-3-PL14	<2	<0.050	<0.050	<0.050	<0.050
09/11/89	S-3.5-PL15	<2	<0.050	<0.050	<0.050	0.087
09/15/89	S-3-PL16	21	0.14	0.84	0.42	2.5
09/15/89	S-3-PL17	190	0.85	7.4	2.3	14
09/15/89	S-3-PL18	100	0.72	3.3	1.2	7.2
09/15/89	S-2.5-PL19	<2	<0.050	<0.050	<0.050	<0.050
09/15/89	S-3-PL20	<2	<0.050	<0.050	<0.050	<0.050
09/15/89	S-5-PL21	<2	<0.050	<0.050	<0.050	<0.050
09/15/89	S-3-PL22	<2	<0.050	<0.050	<0.050	<0.050
Grove Street Dispensers						
09/06/89	S-1.5-PL1	130	1.6	3.8	2.4	13
09/19/89	S-4-PL22	13	0.20	0.97	0.16	1.2
10/04/89	S-3-PL25	<2	<0.050	<0.05	<0.050	<0.050
10/04/89	S-3-PL26	<2	<0.050	<0.050	<0.050	<0.050

Results in milligrams per kilogram (mg/kg) or parts per million (ppm).
TPHg: Total petroleum hydrocarbons as gasoline
B: Benzene T: Toluene E: Ethylbenzene X: Total xylenes
<: Less than the detection limit for the analysis method.
Sample identification:

S-4-PL3
- S: Soil sample
- 4: Approximate sample depth in feet below grade
- PL3: Area of sample (See Plate A2)

APPENDIX B
Permit

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94566 • (415) 484-2600

30 May 1990

Applied GeoSystems
3315 Almaden Expressway, Ste. 34
San Jose, CA 95118

Gentlemen:

Enclosed is Groundwater Protection Ordinance permit 90331 for a monitoring well construction project at 22141 Center Street in Castro Valley for Arco Products.

Please note that permit condition A-2 requires that a well construction report be submitted after completion of the work. The report should include drilling and completion logs, location sketch, and permit number.

If you have any questions, please contact Todd Wendler or Craig Mayfield at 484-2600.

Very truly yours,

Mun J. Mar
General Manager

By J. Killingstad
J. Killingstad, Chief
Water Resources Engineering

TW:mm
Enc.

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE ♦ PLEASANTON, CALIFORNIA 94566 ♦ (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT ARCO Service Station
22141 Center Street
Castro Valley, CA

CLIENT
Name ARCO Products Co.
Address P.O. Box 5811 Phone (415) 571-2434
City San Mateo CA Zip 94403

APPLICANT
Name Applied GeoSystems
Address 3315 Almaden Exp. #34 Phone (408) 264-7723
City San Jose, CA Zip 95118

TYPE OF PROJECT

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

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

DRILLING METHOD:
Mud Rotary ___ Air Rotary ___ Auger X
Cable ___ Other ___

DRILLER'S LICENSE NO. (C-57) 485165

WELL PROJECTS
Drill Hole Diameter 10 in. Maximum
Casing Diameter 4 in. Depth 70 ft.
Surface Seal Depth 50 ft. Number 6
2 Vadose wells
4 G-W wells

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

ESTIMATED STARTING DATE June 12 1990
ESTIMATED COMPLETION DATE June 20 1990

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

APPLICANT'S SIGNATURE Steve Bittman Date 5-22-90

FOR OFFICE USE

PERMIT NUMBER 90331
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 Todd N. Wendler Date 25 May 90
Todd N. Wendler

121989

APPENDIX C
Field Protocol

APPENDIX C

Site Safety Plan

Field work performed by Applied GeoSystems at the site on behalf of ARCO Products Company (ARCO) was conducted in accordance with Applied GeoSystems Site Safety Plan 69013-3S, dated May 8, 1990. This plan describes safety requirements for the evaluation of gasoline hydrocarbons in soil and ground-water, including drilling of soil borings and installing of monitoring wells at the site. The Site Safety Plan is applicable to personnel of Applied GeoSystems and its subcontractors. Applied GeoSystems personnel (and subcontractors of Applied GeoSystems) scheduled to perform the work at the site were briefed on the contents of the Site Safety Plan before the work began. A copy of the Site Safety Plan was available at the site for reference by appropriate parties during the work. The Staff Geologist of Applied GeoSystems was the Site Safety Officer.

Drilling of Borings for Soil Sample Collection

The borings were drilled with a truck-mounted drill rig using six to 10-inch-diameter, hollow stem augers to depths of approximately 40 to 60 feet below ground surface. Drilling equipment was steam-cleaned prior to use and between borings at the site. The drilling was performed under the direction of an Applied GeoSystems field geologist who maintained a continuous log of the materials encountered and classified them by the Unified Soil Classification System, Plate 20.

Soil samples were collected by advancing the boring to a point immediately above the sampling depth and driving a California-modified split-spoon sampler (2-1/2-inch inside-diameter) through the hollow center of the auger into the soil with a standard 140-pound hammer repeatedly dropped 30 inches. The sampler was driven 18 inches, and the number of blows to drive the sampler each 6-inch increment was counted and recorded as an indication of the relative consistency of the soil.

The samples were removed from the sampler and one of the brass sleeves was promptly sealed with aluminum foil and plastic caps, and wrapped with aluminized tape. This soil sample was then labeled and placed in iced storage for laboratory analysis. A second brass-sleeved soil sample was sealed and stored separately to be available for sieve analysis.

The sampler was cleaned prior to use at the site and between sampling intervals using Alconox, and rinsed with deionized water. Brass sleeves were steam-cleaned prior to being used for soil sampling.

Field Analysis

Soil samples from each sampling interval were evaluated for concentrations of organic vapor in the field using a Thermo Environmental Instruments Inc. Model 580A Portable Organic Vapor Meter (OVM). The OVM was field calibrated to isobutylene before being used on soil samples. A portion of soil from each sample interval was placed and sealed in a resealable, zipper-type plastic bag to allow volatilization of hydrocarbons. Vapor readings were collected by placing the OVM intake port in the headspace inside the plastic bag. Field instruments such as the OVM are capable of measuring relative concentrations of vapor content, but cannot be used to measure concentrations of hydrocarbons in soil with the accuracy of laboratory analysis. The OVM readings are presented on the Logs of Borings.

Drill Cuttings

Drill cuttings generated from the borings were stockpiled on and covered by plastic sheets. Based on the results of laboratory testing of a composite sample from the stockpile, on July 23, 1990, American Engineering Construction of French Camp, California was present at the site to remove approximately five cubic yards of soil generated from the soil borings to a Class III landfill.

Monitoring Well Construction and Development

Casing joints were flush-threaded; and no glues, chemical cements, or solvents were used in well construction. The top of each casing was covered with a locking cap and the bottom sealed with a threaded end plug.

Each boring was backfilled with bentonite pellets from the bottom of the boring to the total depth of the well. The annular space of each well was backfilled with No. 3 Monterey Sand from the total depth of the well to approximately one to two feet above the top of the screened casing. A bentonite plug approximately one to two feet thick was placed above the sand as a seal against cement entering the sand pack; the remaining annulus was backfilled with an 11-sack sand cement slurry to within a few inches below the ground surface. A graphic representation of the well construction is shown in the right column of each boring log.

An aluminum, traffic rated, street box with a PVC apron was placed over the well head to a height just above the ground surface and set with concrete. The street box has a seal to protect the ground-water well against surface-water infiltration, and requires a specially designed wrench to open. The wellhead was sealed with a watertight locking cap and secured with a lock.

The wells were developed by surging and bailing using a Smeal 5T development rig equipped with a 3-1/2-inch-diameter by 10-foot-long PVC bailer. The bailer and associated equipment was steam-cleaned prior to the development of each well. Approximately 50 to 100 gallons of water were removed from each well during well development until the water appeared clear.

Ground-Water Sampling

Before purging and sampling the wells, the static water level in each well was measured with a Solinst water-level indicator; this instrument is accurate to the nearest 0.01 foot. The depth to water measurements were subtracted from the wellhead elevations measured on July 7, 1990, by Ron Archer, Civil Engineer, Inc. of Pleasanton, California, to calculate ground-water elevations.

Water samples were collected for subjective analysis from each of the wells that contained water and checked for odor and floating hydrocarbon product. The samples were collected by gently lowering approximately half the length of a clean Teflon bailer past the air-water interface and collecting a sample from near the surface of the water in the well.

Prior to water sample collection from the ground-water monitoring wells, the ground-water monitoring wells were purged until the measurable physical parameters of temperature, pH, and electrical conductivity stabilized. Well purge data sheets for wells MW-1 through MW-4 are attached in Appendix D.

Water samples were collected with a Teflon bailer after the bailer was cleaned with Alconox and deionized water. The water samples were poured into 40-milliliter (ml) glass vials and 1-liter bottles and preserved with hydrochloric acid. The vials were filled so as to produce a positive meniscus and sealed with a cap containing a Teflon septum to minimize the possibility of airspace remaining for volatilization of hydrocarbons to occur. The samples were transported in iced storage in a thermally insulated ice chest, accompanied with a Chain of Custody Record, to a California state-certified laboratory.

Development and purge water was stored onsite in a Department of Transportation (DOT) 17E 55-gallon drums. As requested by ARCO, Armor Petroleum of Fairfield, California, a licensed hazardous materials transporter, was onsite to remove and dispose of the water on June 21, 1990.

Sampling of Stockpiled Soil

Composite soil samples were obtained by first evaluating relatively high, average, and low areas of hydrocarbon concentration by digging approximately one foot into the stockpile and placing the intake probe of the OVM against the surface of the soil; and then collecting one sample from the "high" reading area, and three from the "average" areas. Samples were collected by removing the top one to two feet of soil, then driving steam-cleaned brass sleeves into the soil. The samples were handled and transported to the laboratory as described above. Compositing was performed at the laboratory.

APPENDIX D
Well Purge Data Sheets

WELL PURGE DATA SHEET

Project Name: Arco 2151 Job No. 69013-4

Date: June 26, 1990 Page 1 of 1

Well No. MW-1 Time Started 8:50

Time (hr)	Gallons (cum.)	Temp. (°F)	pH	Conduct. (micromoh)	
8:50	Begin purging MW-1				
8:59	5	71.7	6.17	2.05	
9:07	10	69.7	6.21	1.91	
9:16	15	69.7	6.23	1.93	
9:25	20	70.1	6.72	1.96	
9:38	25	71.2	6.72	2.00	
9:46	30	69.9	6.57	1.96	
9:54	35	70.2	6.60	1.99	
10:06	40	71.2	6.61	1.98	
10:15	45	72.6	6.59	2.00	
10:23	50	70.8	6.59	1.99	
10:45	55	71.0	6.58	2.00	
10:46	Stop purging MW-1				

Notes:

Depth to Bottom (feet)	:	58.1
Depth to Water - initial (feet)	:	49.80
Depth to Water - final (feet)	:	50.01
% Recovery	:	100%
Time Sampled	:	12:00
Dissolved Oxygen - initial (ppm)	:	N/A
Dissolved Oxygen - final (ppm)	:	N/A
Gallons per Well Casing Volume	:	5.4
Gallons Purged	:	55.0
Well Casing Volumes Purged	:	10.0
Approximate Pumping Rate (gpm)	:	0.48

WELL PURGE DATA SHEET

Project Name: Arco 2151 Job No. 69013-4

Date: June 26, 1990 Page 1 of 1

Well No. MW-2 Time Started 11:00

Time (hr)	Gallons (cum.)	Temp. (°F)	pH	Conduct. (micromoh)	
11:00	Begin purging MW-2				
11:05	5	74.7	6.21	2.45	
11:14	10	71.2	6.45	2.30	
11:24	15	71.3	6.47	2.31	
11:34	20	70.8	6.48	2.33	
11:44	25	70.8	6.59	2.35	
11:54	30	71.4	6.59	2.37	
12:04	35	70.9	6.57	2.36	
12:14	40	70.9	6.57	2.36	
12:24	45	73.2	6.55	2.38	
12:34	50	72.9	6.58	2.40	
12:44	55	73.3	6.56	2.40	
12:45	Stop purging MW-2				

Notes:

Depth to Bottom (feet) :	59.2
Depth to Water - initial (feet) :	49.04
Depth to Water - final (feet) :	49.44
% Recovery :	99%
Time Sampled :	13:45
Dissolved Oxygen - initial (ppm) :	N/A
Dissolved Oxygen - final (ppm) :	N/A
Gallons per Well Casing Volume :	6.6
Gallons Purged :	55.0
Well Casing Volumes Purged :	8.33
Approximate Pumping Rate (gpm) :	0.53

WELL PURGE DATA SHEET

Project Name: Arco 2151 Job No. 69013-4

Date: June 25, 1990 Page 1 of 1

Well No. MW-3 Time Started 12:05

Time (hr)	Gallons (cum.)	Temp. (°F)	pH	Conduct. (micromoh)	
12:05	Start purging MW-3				
12:11	5	72.6	7.29	3.24	
12:18	10	70.2	7.15	2.88	
12:26	15	69.7	7.11	2.78	
12:36	20	75.2	7.48	2.84	
12:43	25	71.2	7.73	2.75	
12:50	30	71.0	7.52	2.72	
13:05	35	70.2	7.61	2.67	
13:12	40	71.5	7.71	2.72	
13:22	45	71.7	7.71	2.70	
13:38	50	72.1	7.76	2.71	
13:47	55	73.6	7.74	2.72	
13:55	60	71.7	7.71	2.70	
14:04	65	71.7	7.70	2.72	

Notes:

Depth to Bottom (feet) :	59.7
Depth to Water - initial (feet) :	50.55
Depth to Water - final (feet) :	50.71
% Recovery :	100%
Time Sampled :	15:30
Dissolved Oxygen - initial (ppm) :	N/A
Dissolved Oxygen - final (ppm) :	N/A
Gallons per Well Casing Volume :	5.95
Gallons Purged :	65.0
Well Casing Volumes Purged :	10.9
Approximate Pumping Rate (gpm) :	0.54

WELL PURGE DATA SHEET

Project Name: Arco 2151 Job No. 69013-4

Date: June 25, 1990 Page 1 of 1

Well No. MW-4 Time Started 10:00

Time (hr)	Gallons (cum.)	Temp. (°F)	pH	Conduct. (micromoh)	
10:00	Begin purging MW-4				
10:08	5	71.6	6.09	1.87	
10:15	10	70.6	6.22	1.86	
10:22	15	70.6	6.34	1.87	
10:32	20	70.2	6.25	1.86	
10:39	25	71.0	6.19	1.88	
10:46	30	70.4	6.26	1.87	
10:55	35	71.5	6.17	1.87	
11:01	40	70.9	6.19	1.85	
11:09	45	71.6	6.18	1.88	
11:16	50	71.5	6.18	1.87	
11:24	55	71.0	6.17	1.88	
11:31	60	72.7	6.19	1.89	
11:39	65	72.1	6.18	1.88	

Notes:

Depth to Bottom (feet)	:	60.3
Depth to Water - initial (feet)	:	48.06
Depth to Water - final (feet)	:	48.08
% Recovery	:	100%
Time Sampled	:	13:30
Dissolved Oxygen - initial (ppm)	:	N/A
Dissolved Oxygen - final (ppm)	:	N/A
Gallons per Well Casing Volume	:	7.96
Gallons Purged	:	65.0
Well Casing Volumes Purged	:	8.16
Approximate Pumping Rate (gpm)	:	0.66

WELL PURGE DATA SHEET

Project Name: ARCO 2152 Job No. 69013-5

Date: 09/26/90 Page 1 of 1

Well No. MW-1 Time Started 1:40

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)	
1:40	Begin pumping well MW-1				
1:44	4	74.8	7.42	2.09	
2:06	10	76.0	7.71	2.13	
2:34	15	76.8	7.58	2.15	
2:49	20	72.4	7.47	2.05	
3:18	25	74.5	7.76	2.12	
3:26	30	74.3	7.58	2.04	
3:44	35	74.4	7.42	2.05	
3:57	40	73.2	7.38	2.03	
3:58	Stop purging MW-1				

Notes:

Depth to Bottom (feet)	: 58.10
Depth to Water - initial (feet)	: 50.09
Depth to Water - final (feet)	: 50.10
% recovery	: 100.125
Time Sampled	: 8:45
Gallons per Well Casing Volume	: 12.25
Gallons Purged	: 40
Well Casing Volumes Purged	: 3.26
Approximate Pumping Rate (gpm)	: 0.3

WELL PURGE DATA SHEET

Project Name: ARCO 2152 Job No. 69013-5

Date: 09/26/90 Page 1 of 2

Well No. MW-2 Time Started 11:15

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)	
11:15	Begin pumping well MW-2				
11:33	1	72.5	8.40	2.64	
2:07	5	74.3	7.26	2.38	
2:27	7.5	73.1	7.34	2.59	
3:11	10	76.5	7.40	2.44	
3:19	15	74.8	7.30	2.42	
3:23	20	73.7	7.22	2.40	
3:28	25	75.3	7.26	2.41	
3:43	30	75.8	7.30	2.44	
Continued on page 2					

WELL PURGE DATA SHEET

Project Name: ARCO 2152 Job No. 69013-5

Date: 09/26/90 Page 2 of 2

Well No. MW-2 Time Started 11:15

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)	
3:43	Continued from page 1				
3:52	35	72.8	7.38	2.40	
4:08	40	75.1	7.29	2.40	
4:19	45	74.7	7.52	2.42	
4:35	50	74.6	7.12	2.40	
4:44	55	73.6	7.31	2.38	
4:45	Stop purging MW-2				

Notes:

Depth to Bottom (feet)	: 59.68
Depth to Water - initial (feet)	: 49.32
Depth to Water - final (feet)	: 49.35
% recovery	: 99.7
Time Sampled	: 8:00
Gallons per Well Casing Volume	: 15.11
Gallons Purged	: 55
Well Casing Volumes Purged	: 3.64
Approximate Pumping Rate (gpm)	: 0.17

WELL PURGE DATA SHEET

Project Name: ARCO 2152 **Job No.** 69013-5

Date: 09/26/90 **Page** 1 **of** 1

Well No. MW-3 **Time Started** 10:20

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)	
10:20	Begin pumping well MW-1				
10:23	2	71.5	7.63	2.84	
10:55	5	70.6	7.58	2.96	
11:28	10	70.2	7.62	2.79	
11:46	15	69.8	8.13	2.88	
11:53	20	68.3	7.64	2.77	
12:07	25	69.4	7.63	2.72	
12:24	30	69.1	7.74	2.66	
12:39	35	70.0	7.63	2.63	
1:15	40	75.5	7.62	2.74	
1:16	Stop purging MW-3				

Notes:

Depth to Bottom (feet)	: 59.68
Depth to Water - initial (feet)	: 50.81
Depth to Water - final (feet)	: 50.98
% recovery	: 98.1
Time Sampled	: 7:45
Gallons per Well Casing Volume	: 13.57
Gallons Purged	: 40
Well Casing Volumes Purged	: 2.95
Approximate Pumping Rate (gpm)	: 0.23

WELL PURGE DATA SHEET

Project Name: ARCO 2152 Job No. 69013-5

Date: 09/26/90 Page 1 of 1

Well No. MW-4 Time Started 5:00

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)	
5:00	Begin pumping well MW-4				
5:04	2	69.4	7.15	1.97	
5:15	5	67.4	7.14	1.86	
5:33	10	67.2	7.08	1.93	
5:54	16	66.0	7.47	1.89	
6:13	20	63.8	6.90	2.21	
6:33	27	56.7	5.98	2.32	
6:53	32	55.0	6.06	2.03	
7:13	37	54.8	5.83	2.02	
7:14	Stop purging MW-4				

Notes:

Depth to Bottom (feet)	: 60.29
Depth to Water - initial (feet)	: 48.35
Depth to Water - final (feet)	: 48.38
% recovery	: 99.7
Time Sampled	: 8:30
Gallons per Well Casing Volume	: 18.26
Gallons Purged	: 37
Well Casing Volumes Purged	: 2.03
Approximate Pumping Rate (gpm)	: 0.28

APPENDIX E
Laboratory Data Sheets
and
Chain of Custody Records

Applied GeoSystems

CHAIN-OF-CUSTODY RECORD

PROJ. NO.	PROJECT NAME
69013-4	Arco 2152 Castro Valley
P.O. NO.	SAMPLERS (Signature)
	Steve Bittman

DATE MM/DD/YY	TIME	SAMPLE I.D.		No. of Containers	ANALYSIS: TPHg	BTEX	TPHd	Preserved?	LABORATORY I.D. NUMBER
6-15-90		S-20-B4		1	X	X		ice	
		S-29.5-B4	already in lab	1	X	X			
		S-40-B4	"	1	X	X			
		S-44.5-B4		1	X	X			
		S-49.5-B4	"	1	X	X			
		S-59-B4	"	1	X	X			
6-14-90		S-20-B5	already in lab	1	X	X			
		S-30-B5	"	1	X	X			
		S-40-B5	"	1	X	X			
		S-45-B5	"	1	X	X			
		S-49.5 B5		1	X	X			
		S-59-B5		1	X	X			

RELINQUISHED BY (Signature)	DATE / TIME	RECEIVED BY (Signature)
Steve Bittman	6-20-90 11/13	B. Gardner X 282
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature):

REMARKS:
2 weeks Turnaround
Note Sample dates!

SEND RESULTS TO:
Applied GeoSystems
3315 Almaden Expressway
Suite 34
San Jose, California 95118
(408) 264-7723

Proj. Mgr.: Steve Bittman

Applied GeoSystems

CHAIN-OF-CUSTODY RECORD

PROJ. NO.	PROJECT NAME
69013-4	ARCO 2152 Castro Valley
P.O. NO.	SAMPLERS (Signature)
	Steve Bittman

DATE MM/DD/YY	TIME	SAMPLE I.D.	No. of Containers	TPHg	BTEX	TPHd	Preserved?	LABORATORY I.D. NUMBER
6-12-90		S-15-B6 already in lab	1	X	X		ice	
		S-29.5 B6	1	X	X			
		S-44.5-B6	1	X	X			
		S-49.5-B6 "	1	X	X			
↓		S-62-B6 "	1	X	X			
6-13-90		S-15-B7	1	X	X			
		S-30-B7 already in lab	1	X	X			
		S-44.5-B7 "	1	X	X			
		S-49-B7	1	X	X			
↓		S-61-B7 "	1	X	X		↓	

ANALYSIS

RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
Steve Bittman	6-20-90 1113	B. Gardner x282
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature):

REMARKS:
2 week Turnaround
note Sample dates!

SEND RESULTS TO:
Applied GeoSystems
3315 Almaden Expressway
Suite 34
San Jose, California 95118
(408) 264-7723

Proj. Mgr.: Steve Bittman

Applied GeoSystems

CHAIN-OF-CUSTODY RECORD

PROJ. NO.	PROJECT NAME
69013-4	ARCO 2152 Castro Valley
P.O. NO.	SAMPLERS (Signature)
	Steve Bittman

DATE MM/DD/YY	TIME	SAMPLE I.D.	No. of Containers	TPHg	BTEX	TPHd						Preserved?	LABORATORY I.D. NUMBER
6-18-90		S-10-B10 already in lab	1	X	X							ice	
		S-20-B10	1	X	X								
		S-30-B10	1	X	X								
		S-35-B10	1	X	X								
		S-40-B10	1	X	X								
		S-5-B11	1	X	X								
		S-15-B11	1	X	X								
		S-25-B11	1	X	X								
		S-35-B11 already in lab	1	X	X								
		S-40-B11 "	1	X	X								
6-12-90		S-5-B6	1	X	X							ice	
6-13-90		S-5-B7	1	X	X								

RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
Steve Bittman	6-22-90	A Brotkes 1618 F2200086
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature):

REMARKS:
2 week Turnaround
- note Sample dates!

SEND RESULTS TO:

Applied GeoSystems
3315 Almaden Expressway
Suite 34
San Jose, California 95118
(408) 264-7723

Proj. Mgr.: Steve Bittman

Applied GeoSystems

CHAIN-OF-CUSTODY RECORD

PROJ. NO.	PROJECT NAME
69013-4	ARCO 2152 - CASTRO VALLEY
P.O. NO.	SAMPLERS (Signature)
	Marc A Briggs

DATE MM/DD/YY	TIME		No. of Cont-ainers	TPHgasoline (8015)	BTEX (602/8020)	TPHdiesel (8015)						Frozen Preserved?	REMARKS	LABORATORY I.D. NUMBER
6/19/90	11:30	S-0619-SP1A,B,C,D	4	X	X							X	COMPOSITE	

RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
Marc A Briggs	6/20/90 1113	B. Gardner X282
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature):

Laboratory:
Applied Analytical
3459 Edison Wy
Fremont CA 94538

Turn Around: 1 week

SEND RESULTS TO:
Applied GeoSystems
3315 Almaden Expressway
Suite 34
San Jose, California 95118
(408) 264-7723

Proj. Mgr.: Steve Bitman

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Steve Bittman	Date Sampled:	06-15-90
	Applied GeoSystems	Date Received:	06-20-90
	3315 Almaden Expressway	BTEX Analyzed:	06-26-90
	San Jose, CA 95113	TPHg Analyzed:	06-26-90
Project:	AGS 69013-4	TPHd Analyzed:	NR
		Matrix:	Soil

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit:	0.050	0.050	0.050	0.050	2.0	10
SAMPLE Laboratory Identification						
S-20-B4 S1006736	ND	ND	ND	ND	ND	NR
S-29.5-B4 S1006737	ND	ND	ND	ND	ND	NR
S-40-B4 S1006738	ND	ND	ND	ND	ND	NR
S-44.5-B4 S1006739	ND	ND	ND	ND	ND	NR
S-49.5-B4 S1006740	ND	ND	ND	ND	ND	NR

ppm = parts per million = mg/kg = milligrams per kilogram.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX– Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg–Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd–Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

07-02-90
Date Reported

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Steve Bittman	Date Sampled:	06-15-90
	Applied GeoSystems	Date Received:	06-20-90
	3315 Almaden Expressway	BTEX Analyzed:	06-26-90
	San Jose, CA 95113	TPHg Analyzed:	06-26-90
Project:	AGS 69013-4	TPHd Analyzed:	NR
		Matrix:	Soil

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit:	0.050	0.050	0.050	0.050	2.0	10
SAMPLE Laboratory Identification						
S-59-B4 S1006741	ND	ND	ND	ND	ND	NR

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Laboratory Representative

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ANALYSIS REPORT

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Attention:	Mr. Steve Bittman	Date Sampled:	06-14-90
	Applied GeoSystems	Date Received:	06-20-90
	3315 Almaden Expressway	BTEX Analyzed:	06-26-90
	San Jose, CA 95113	TPHg Analyzed:	06-26-90
Project:	AGS 69013-4	TPHd Analyzed:	NR
		Matrix:	Soil

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit:	0.050	0.050	0.050	0.050	2.0	10
SAMPLE Laboratory Identification						
S-20-B5 S1006742	ND	ND	ND	0.077	ND	NR
S-30-B5 S1006743	0.17	ND	ND	0.16	ND	NR

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Laboratory Representative

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ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Steve Bittman	Date Sampled:	06-14-90
	Applied GeoSystems	Date Received:	06-20-90
	3315 Almaden Expressway	BTEX Analyzed:	06-26-90
	San Jose, CA 95113	TPHg Analyzed:	06-26-90
Project:	AGS 69013-4	TPHd Analyzed:	NR
		Matrix:	Soil

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit:	0.25	0.25	0.25	0.25	10	10
SAMPLE Laboratory Identification						
S-40-B5 S1006744	2.1	7.2	1.8	13	88	NR

ppm = parts per million = mg/kg = milligrams per kilogram.
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TPHd--Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

07-02-90
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ANALYSIS REPORT

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Attention:	Mr. Steve Bittman	Date Sampled:	06-14-90
	Applied GeoSystems	Date Received:	06-20-90
	3315 Almaden Expressway	BTEX Analyzed:	06-26-90
	San Jose, CA 95113	TPHg Analyzed:	06-26-90
Project:	AGS 69013-4	TPHd Analyzed:	NR
		Matrix:	Soil

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit:	0.050	0.050	0.050	0.050	2.0	10
SAMPLE Laboratory Identification						
S-45-B5 S1006745	ND	ND	ND	ND	ND	NR
S-49.5-B5 S1006746	ND	ND	ND	0.096	7.9	NR
S-59-B5 S1006747	ND	ND	ND	ND	ND	NR

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Laboratory Representative

07-02-90
Date Reported

APPLIED ANALYTICAL

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ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Steve Bittman	Date Sampled:	06-12-90
	Applied GeoSystems	Date Received:	06-22-90
	3315 Almaden Expressway	BTEX Analyzed:	06-23-90
	San Jose, CA 95118	TPHg Analyzed:	06-23-90
Project:	AGS 69013-4	TPHd Analyzed:	NR
		Matrix:	Soil

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit:	0.050	0.050	0.050	0.050	2.0	10
SAMPLE Laboratory Identification						
S-5-B6 S1006804	ND	ND	ND	ND	ND	NR

ppm = parts per million = mg/kg = milligrams per kilogram.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

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Laboratory Representative

06-27-90
Date Reported

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ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Steve Bittman	Date Sampled:	06-12-90
	Applied GeoSystems	Date Received:	06-20-90
	3315 Almaden Expressway	BTEX Analyzed:	06-23-90
	San Jose, CA 95118	TPHg Analyzed:	06-23-90
Project:	AGS 69013-4	TPHd Analyzed:	NR
		Matrix:	Soil

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit:	0.050	0.050	0.050	0.050	2.0	10
SAMPLE Laboratory Identification						
S-15-B16 S1006748	ND	ND	ND	ND	ND	NR
S-29.5-B6 S1006749	ND	ND	ND	ND	ND	NR
S-44.5-B6 S1006750	ND	ND	ND	ND	ND	NR
S-49.5-B6 S1006751	ND	ND	ND	ND	ND	NR
S-62-B6 S1006752	ND	ND	ND	ND	ND	NR

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TPHd--Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

06-27-90
Date Reported

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Steve Bittman	Date Sampled:	06-13-90
	Applied GeoSystems	Date Received:	06-22-90
	3315 Almaden Expressway	BTEX Analyzed:	06-23-90
	San Jose, CA 95118	TPHg Analyzed:	06-23-90
Project:	AGS 69013-4	TPHd Analyzed:	NR
		Matrix:	Soil

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit:	0.050	0.050	0.050	0.050	2.0	10
SAMPLE Laboratory Identification						
S-5-B7 S1006805	ND	ND	ND	ND	ND	NR

ppm = parts per million = mg/kg = milligrams per kilogram.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg--Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd--Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

06-27-90
Date Reported

APPLIED ANALYTICAL LABORATORY IS CERTIFIED BY THE STATE OF CALIFORNIA DEPARTMENT OF HEALTH SERVICES AS A HAZARDOUS WASTE TESTING LABORATORY (Certification No. 153)

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Steve Bittman
Applied GeoSystems
3315 Almaden Expressway
San Jose, CA 95118
Project: AGS 69013-4

Date Sampled: 06-13-90
Date Received: 06-20-90
BTEX Analyzed: 06-23-90
TPHg Analyzed: 06-23-90
TPHd Analyzed: NR
Matrix: Soil

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit:	0.050	0.050	0.050	0.050	2.0	10
SAMPLE Laboratory Identification						
S-15-B7 S1006753	ND	ND	ND	ND	ND	NR
S-30-B7 S1006754	ND	ND	ND	ND	ND	NR
S-44.5-B7 S1006755	ND	0.10	ND	0.093	ND	NR
S-49-B7 S1006756	ND	ND	ND	ND	ND	NR
S-61-B7 S1006757	ND	ND	ND	ND	ND	NR

ppm = parts per million = mg/kg = milligrams per kilogram.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg--Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd--Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

06-27-90
Date Reported

APPLIED ANALYTICAL

Environmental Laboratories

13844 Alton Pkwy.-Suite 140
Irvine, CA 92718
(714) 472-1020

Submitted by:
Applied GeoSystems
3315 Almaden Expressway, Suite 34
San Jose, California 95118

Date Sampled: 06/18/90
Date Received: 06/22/90
Date Analyzed: 06/29/90
Date Reported: 07/03/90

Attention: Steve Biltman
Project Number: 69013-4
Analysis: TPH as gasoline with BTXE distinction
Matrix: Soil

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH
Detection limit (mg/kg)	0.05	0.05	0.05	0.05	2.0
Sample Number					
S-10-B10 2006076*	<0.05	<0.05	<0.05	<0.05	<2.0
S-20-B10 2006077*	<0.05	<0.05	<0.05	<0.05	<2.0
S-30-B10 2006078*	<0.05	<0.05	<0.05	<0.05	<2.0
S-35-B10 2006079*	<0.05	<0.05	<0.05	<0.05	<2.0
S-40-B10 2006080*	<0.05	<0.05	<0.05	<0.05	<2.0
S-5-B11 2006081*	<0.05	<0.05	<0.05	<0.05	<2.0

TPH = total petroleum hydrocarbons
mg/kg = milligrams per kiligram = parts per million (ppm)
* = laboratory identification number
< = Compound(s) may be present below the detection limit

PROCEDURES

Benzene, toluene, ethylbenzene, and xylene isomers are analyzed in accordance with EPA methods 5030 and 8020.
TPH as gasoline is analyzed in accordance with EPA methods 5030 and 8015 modified for petroleum hydrocarbon detection.

F. A. Jaime
Laboratory Supervisor

APPLIED ANALYTICAL

Environmental Laboratories
13844 Alton Pkwy.-Suite 140
Irvine, CA 92718
(714) 472-1020

Submitted by:
Applied GeoSystems
3315 Almaden Expressway, Suite 34
San Jose, California 95118

Date Sampled: 06/18/90
Date Received: 06/22/90
Date Analyzed: 06/29/90
Date Reported: 07/03/90

Attention: Steve Biltman
Project Number: 69013-4
Analysis: TPH as gasoline with BTXE distinction
Matrix: Soil

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH
Detection limit (mg/kg)	0.05	0.05	0.05	0.05	2.0
Sample Number					
S-15-B11 2006082*	<0.05	<0.05	<0.05	<0.05	<2.0
S-25-B11 2006083*	<0.05	<0.05	<0.05	<0.05	<2.0
S-35-B11 2006084*	<0.05	<0.05	<0.05	<0.05	<2.0
S-40-B11 2006085*	<0.05	<0.05	<0.05	<0.05	<2.0

TPH = total petroleum hydrocarbons
mg/kg = milligrams per kiligram = parts per million (ppm)
* = laboratory identification number
< = Compound(s) may be present below the detection limit

PROCEDURES

Benzene, toluene, ethylbenzene, and xylene isomers are analyzed in accordance with EPA methods 5030 and 8020.
TPH as gasoline is analyzed in accordance with EPA methods 5030 and 8015 modified for petroleum hydrocarbon detection.

F. A. Jaime
Laboratory Supervisor

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Steve Bittman	Date Sampled:	06-19-90
	Applied GeoSystems	Date Received:	06-20-90
	3315 Almaden Expressway	BTEX Analyzed:	06-26-90
	San Jose, CA 95113	TPHg Analyzed:	06-26-90
Project:	AGS 69013-4	TPHd Analyzed:	NR
		Matrix:	Soil

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit:	0.050	0.050	0.050	0.050	2.0	10
SAMPLE Laboratory Identification						
S-0619-SP1(ABCD) S1006758	ND	ND	ND	ND	ND	NR

ppm = parts per million = mg/kg = milligrams per kilogram.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX– Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg–Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd–Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

07-02-90
Date Reported

Applied GeoSystems

CHAIN-OF-CUSTODY RECORD

PROJ. NO.	PROJECT NAME
69013-4	Arco 2151 - Castro Valley
P.O. NO.	SAMPLERS (Signature)
	Marc A Briggs

DATE MM/DD/YY	TIME		No. of Containers	TPHgasoline (8015)	BTEX (602/8020)	TPHdiesel (8015)						HCl-iced? Preserved?	REMARKS	LABORATORY I.D. NUMBER
6/25/90	13:30	W-Rinsate-MW4 (Holo)	1									X		
6/25/90	13:30	W-48-MW4	3	X	X							X		
6/25/90		W-Rinsate-MW3 (Holo)	1									X		
6/25/90	15:30	W-50-MW3	3	X	X							X		
6/26/90	12:00	W-Rinsate-MW1 (Holo)	1									X		
6/26/90	12:00	W-50-MW1	3	X	X							X		
6/26/90	14:45	W-Rinsate-MW2 (Holo)	1									X		
6/26/90	14:45	W-49-MW2	3	X	X							X		

RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
Mike Bannister	6/27/90 9:50	B. Gardner X282
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature):

Laboratory:
Applied Analytical
3459 Edison Wy
Fremont CA 941538
4086230775

Turn Around: 2 Week

SEND RESULTS TO:
Applied GeoSystems
3315 Almaden Expressway
Suite 34
San Jose, California 95118
(408) 264-7723

Proj. Mgr.: Steve Bittman

Applied GeoSystems

CHAIN-OF-CUSTODY RECORD

PROJ. NO.	PROJECT NAME
69013-5	ARCO 2152
P.O. NO.	SAMPLERS (Signature)
	Mike Baminski.

DATE MM/DD/YY	TIME	SAMPLE I.D.	No. of Containers	TPHg	BTEX	TPHd						Preserved?	LABORATORY I.D. NUMBER
				ANALYSIS									
9-26-90	7:45	W - 51 - MW3	4	X	X							X	
9-26-90	7:45	W - RINSATE - MW3	1	X	X								HOLD
9-26-90	8:00	W - 50 - MW2	4	X	X							X	
9-26-90	8:00	W - RINSATE - MW2	1	X	X								HOLD
9-26-90	8:30	W - 49 - MW4	4	X	X							X	
9-26-90	8:30	W - RINSATE - MW4	1	X	X								HOLD
9-26-90	8:45	W - 51 - MW1	4	X	X								
9-26-90	8:45	W - RINSATE - MW1	1	X	X							X	HOLD

RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
Mike Baminski.	9/27/90 9:15	Steve Britman 9-27-90
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature):
	9-27 2:00	

REMARKS:

2 week Turnaround

SEND RESULTS TO:

Applied GeoSystems
3315 Almaden Expressway
Suite 34
San Jose, California 95118
(408) 264-7723

Proj. Mgr.: Steve Britman

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Steve Bittman
Applied GeoSystems
3315 Almaden Expressway
San Jose, CA 95118
Project: AGS 69013-4

Date Sampled: 06-26-90
Date Received: 06-27-90
BTEX Analyzed: 07-07-90
TPHg Analyzed: 07-07-90
TPHd Analyzed: NR
Matrix: Water

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.50	0.50	0.50	0.50	20	100
SAMPLE Laboratory Identification						
W-50-MW1 W1006845	0.63	ND	ND	ND	64	NR
W-49-MW2 W1006846	ND	ND	ND	ND	27	NR

ppb = parts per billion = µg/L = micrograms per liter.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg--Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd--Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

07-11-90
Date Reported

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Steve Bittman	Date Sampled:	06-25-90
	Applied GeoSystems	Date Received:	06-27-90
	3315 Almaden Expressway	BTEX Analyzed:	07-07-90
	San Jose, CA 95118	TPHg Analyzed:	07-07-90
Project:	AGS 69013-4	TPHd Analyzed:	NR
		Matrix:	Water

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.50	0.50	0.50	0.50	20	100
SAMPLE Laboratory Identification						
W-50-MW3 W1006847	0.65	1.5	ND	2.0	52	NR
W-48-MW4 W1006848	ND	ND	ND	ND	ND	NR

ppb = parts per billion = $\mu g/L$ = micrograms per liter.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX– Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg–Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd–Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

07-11-90
Date Reported

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Steve Bittman	Date Sampled:	09-26-90
	Applied GeoSystems	Date Received:	09-27-90
	3315 Almaden Expressway	BTEX Analyzed:	10-02-90
	San Jose, CA 95118	TPHg Analyzed:	10-02-90
Project:	AGS 69013-5	TPHd Analyzed:	NR
		Matrix:	Water

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.5	0.5	0.5	0.5	50	100
SAMPLE Laboratory Identification						
W-51-MW1 W1009368	ND	ND	ND	ND	ND	NR
W-50-MW2 W1009369	ND	ND	ND	ND	ND	NR
W-51-MW3 W1009370	ND	ND	ND	ND	ND	NR
W-49-MW4 W1009371	ND	ND	ND	ND	ND	NR

ppb = parts per billion = µg/L = micrograms per liter.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX– Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg–Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd–Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

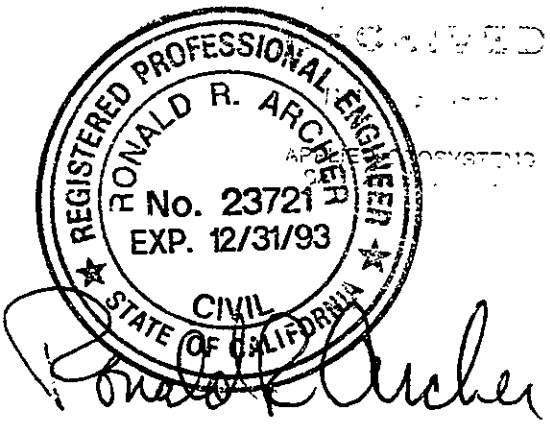
October 8, 1990
Date Reported

APPENDIX F
Wellhead Survey

RON ARCHER
CIVIL ENGINEER, INC.

CONSULTING • PLANNING • DESIGN • SURVEYING

4133 Mohr Ave., Suite E • Pleasanton, CA 94566
(415) 462-9372



JULY 7, 1990 JOB NO. 1695

ELEVATIONS OF EXISTING MONITOR WELLS AT AN ARCO STATION LOCATED AT 22141 CENTER STREET , CASTRO VALLEY, CALIFORNIA.

FOR: APPLIED GEOSYSTEMS,
PROJECT NO. 60013-4

BENCHMARK:
A STANDARD BRASS DISC MONUMENT LOCATED 6 FEET NORTHWEST OF THE CENTERLINE OF GROVE WAY AND 6 FEET SOUTHEAST OF THE CENTERLINE OF BETLEN WAY, THE ELEVATION BEING TAKEN AS 190.99 COUNTY OF ALAMEDA DATUM.

MONITOR WELL DATA TABLE

WELL DESIGNATION	ELEV	DESCRIPTION
MW1	217.16	TOP OF PVC CASING
	217.72	TOP OF BOX
MW2	216.50	TOP OF PVC CASING
	217.11	TOP OF BOX
MW3	217.57	TOP OF PVC CASING
	218.21	TOP OF BOX
MW4	215.18	TOP OF PVC CASING
	215.72	TOP OF BOX
VW1	218.37	TOP OF PVC CASING
	218.71	TOP OF BOX
VW2	216.38	TOP OF PVC CASING
	216.77	TOP OF BOX